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**IS THERE
"NO
ALTERNATIVE"?**

"The strike was complete and the company had no alternative." This was the explanation of the speedy and unconditional surrender of the Delaware & Hudson Railroad last week when its engineers, firemen and trainmen quit work in a body because the company refused to reinstate two discharged employees. The explanation was given by the member of the federal Board of Mediation and Conciliation who had brought about a settlement by the simple expedient of inducing the railroad, which was not turning a wheel, to accede to the demand of the various organizations which had completely tied up the road. Something might be said about the ineffectiveness of the federal law in this case and about the conditions which induce a railroad to re-employ an engineer and a conductor believed to be incompetent and careless and who had been several times disciplined before they were discharged for hauling a derailed car 3 $\frac{1}{2}$ miles. But these reflections are too familiar to call for reiteration. It is advisable, however, to consider whether there is no alternative to surrender to any demand that may be made by organized labor. Otherwise the legal title to the property owned by the stockholders will prove to be about all that they can claim to possess in it. If this condition is to be avoided, it is safe to say that the time to look for relief is before, not after, a road has been put out of business.

**VICE-PRESIDENT
FOR
LABOR**

The only hope is that of preparation for, and provision against, such a complete tie-up as that considered above. Strike history shows that a railroad, whether steam or electric, seldom knows beforehand of, and is always surprised by, a complete strike on its lines. The reason for this surprise is a combination of unbelief in organized labor's power and lack of information as to what is going on among the men, and is due to absence of close touch with them. We have officials in charge of finance, engineering, operation and traffic, but there is rarely found an official especially charged with responsibility for labor matters. Yet nothing is more vital than the maintenance of good relations with labor, when possible, or preparedness for trouble if it must come. Almost always the official who handles labor relations does so as an incident to other duties that take all of his time and thought. It is not difficult to imagine what would happen to a road that gave no regular attention to operation until movement stopped, or to traffic until business disappeared, or to financing until there was default upon its paper. But in respect to labor matters this

policy, which seems preposterous when applied to other departments, is the one commonly found in force. Under such conditions there is no alternative but to surrender when trouble comes, but the condition can be changed by as close attention to labor relations as is given to other, though no more important, factors in successful railroad management.

**RAILWAY AND
LIGHTING
CONDITIONS**

In the model presidential address made by William H. Winslow, of Superior, Wis., at the recent Milwaukee convention of the Wisconsin Electrical Association the speaker gave some significant figures showing the relative advancement of a few of the electric lighting and power and the electric railway utilities of the State. The statistics available were scanty, but Mr. Winslow concluded that the operations of the former for the last fiscal year showed a considerable improvement over the year ended June 30, 1912, gross income having increased more than \$400,000 in 1913 as compared with an increase of \$50,000 in 1912. But in the electric railway field in Wisconsin Mr. Winslow found it difficult to draw any cheerful or reassuring conclusions. The figures available show that gross income for 1913 actually decreased over \$250,000 compared with 1912. Increased depreciation appropriations may account in part for this discouraging showing, but it is probable that the constantly increasing cost of supplies, wages and taxes is mainly responsible, the rate of fare being largely limited to the 5-cent piece. Mr. Winslow points out that the exchange value of the nickel in terms of wages and material has been shrinking year by year, and he makes the interesting comment that "with none of the manifold ways of increasing business open to the light and power companies it would seem that the street railway companies have a very difficult problem on their hands." His conclusions, which apply to other states quite as well as to Wisconsin, are that some method of charging by which compensation will be based on length of passenger haul seems inevitable if the companies are to continue to serve the people properly. The danger of injustice due to the rigidity of the 5-cent fare has been long recognized, but the fact, as mentioned, that the electric railway companies have none of the manifold ways of increasing business open to the electric lighting and power companies has not been so often pointed out. By an interesting coincidence we are able to report this week, also from Wisconsin, the establishment of a system of zone fares in the suburban territory tributary to the city of Milwaukee, a plan which may offer suggestions for other properties.

PUBLIC RELATIONS: HOW TO BETTER THEM

There is no doubt that public relations constitute the paramount problem in the electric railway industry. This thought was suggested by President Black of the association in an article in our issue of Jan. 3, and the same sentiment was expressed by practically all of the other contributors to that issue among the bankers and active railway managers. As each is a leader in the industry, their combined testimony is deserving of the greatest weight. It is easy to understand the importance of the subject in the minds of those who are giving serious thought to the problems of electric railway properties because it threatens the integrity of railway capital values and the stability of the return thereon. Its solution is the most important work before the association, and if that body and the member companies and all the forces of the industry working together cannot change these conditions, nothing can.

The primary responsibility for this work necessarily falls upon the committee on public relations of the association, but all electric railway companies, whether they are members of the association or not, and all who are interested in the industry must share this responsibility if effective work is to be accomplished. To help in attracting interest and support to the work of this year's committee some of the topics which could be taken up to advantage by it during the coming year will be mentioned.

We believe that the association, through its public policy committee, ought to express its disapproval of limited franchises. These franchises are iniquitous in several ways. When a limited franchise expires it is a signal and invitation to confiscation. Long before the end of the franchise period is in sight the company is harassed by the fear that it may not get a renewal on terms that will protect it. Its security holders are alarmed, its credit is weakened. It is the target for every kind of political attack. The only kind of a limited franchise which a company ought to accept is one that provides a long enough time and a high enough fare to retire the capital investment at the end of the period and to permit a reasonable rate of return during the franchise, or else there should be some definite provision by which the immovable property of the company will be taken over by the city at a fair valuation. Otherwise a situation will be developed which experience has made familiar to all of us—a company with its investments sunk and a hostile city declaring that the property of a company which has no franchise is worth only scrap value. The association, through its committee on public relations, ought to contend for forms of franchise that are perpetual or indeterminate and leave no room for confiscation of property. It ought to make a report pointing out the fair advantages to the public as well as to the company of franchises that recognize the property as a going one, built to serve the public permanently. It ought to do all that it can to take the franchise out of politics. The elimination of the short-term limited

franchise will be a long step toward securing that desirable end.

Another important step is definitely and clearly to define what is meant by capital value and to show that it consists of the fair cost of bringing the property to its present state, including the fair costs of development sunk in the project. Many companies are seriously concerned about the protection of their capital value. They not only wish to protect the holders of their present stock and bonds, but they owe it to the holders of securities to be issued in the future to see that the full value received is put into the property in legitimate investment which can be accounted for at any time. The committee should recommend a method for determining capital value that will afford the fairest means of protection to securities and also one that will not fail to take into account the fair point of view of the public.

The committee should also take up the question of a reasonable rate of return. In doing so it ought to direct attention to the different elements of security and hazards involved in the railway business. One of the arguments of the opponents of the railways is that the railways are greatly helped by public franchises; in other words, that they get the right to do business from the public and that the public then has to do business with them. The point should be made that this does not impair in any way the right of the company to earn a reasonable return upon its investment, that a street railway which did not use the streets is inconceivable, that such a service is necessary to the prosperity of every community, and that the owners of the railway property are just as much entitled to a fair return on their investment as if they had engaged in any other commercial enterprise. Moreover, the rate of return in the electric railway must not only care for present investment but must be large enough to invite continually the investment of fresh capital in order that the service may be properly enlarged.

The committee should also declare definitely in favor of good regulation and should help to secure it. We believe that, rightly directed, regulation will protect the companies as well as the public. The sooner this fact is realized the better it will be for everybody concerned.

Finally, another and perhaps the most important work of the committee is that of promoting real publicity. This is a matter upon which practically all railway managers agree in theory, but upon which nearly all of them disagree in practice. Few companies give real publicity to their affairs. The number that do so is increasing, but the committee ought to outline a policy in this respect that will commend itself so strongly to member companies that many will do what few do now. To agree on the wisdom of publicity is not enough. To admit that the policies of the past have been wrong is a step in the right direction. To establish a publicity department and to run it on strong independent lines under the charge of a man in sympathy with the best of the acceptable policies of the

times will do much for every company. This policy of publicity should not be confined purely to the service of the companies. It should include a policy of adequate publication in regard to accounts. Too many financial statements of electric railway companies now are absolutely unfathomable, even to the expert accountant, to say nothing of the ordinary layman. It would seem as if the complicated relationship of holding companies found one of its chief purposes in the obscuring of the actual financial conditions of the controlled and controlling corporations. The published reports should include not only clear statements of the assets and liabilities of each company, the interrelationships of the companies and an adequate account of the receipts and expenditures for the period under consideration, but in its published return the company should make a careful separation of its disbursements for current expenses and those for permanent improvements.

The possibilities for useful work along these and parallel lines are so great as almost to be without limit. We have not mentioned the subject of municipal ownership, service rendered, relations with employees or the best methods of educating the public by a broad system of publicity, the latter to be taken up by the association itself in a comprehensive and effective way, but these should also form a necessary part of the program and should be vigorously followed.

THE BOSTON ARBITRATION AWARD

Elsewhere in this issue are printed the essential features of the award of the arbitration board in the Boston Elevated labor controversy. The finding is one of the most elaborate that have ever been made public, and it is of interest not only on account of the fact that nearly three-score of occupations are involved in its jurisdiction but because of the thorough discussion of principles with which the report is replete. The final decision which the board reached, to the effect that the men have made out a case as to their right to increased pay, will impose a heavy burden upon the company's finances. But it has been accepted in good faith by the management, and there is not the slightest doubt that every possible effort will be made so to conduct the affairs of the road that the present return to the stockholders may be preserved, the compensation of the employees cheerfully rendered, and the existing high quality of service sustained.

It has been estimated in financial circles that the increases granted will cost the company at least \$500,000 a year when they become fully operative, but fortunately the board has spread this burden over about sixteen months, so that the company is not at once obliged to meet the extreme peak of wages award. No doubt the natural increase in traffic from year to year will help somewhat in meeting the new requirements, and the agreement of Dec. 20, 1913, with the employees' organization regarding the liberal interpretation of the "nine-hours-in-eleven" law will at least preserve the company from insupportable costs in that branch of its service.

The employees can do a great deal, if they will, to safeguard the future of the concern from which they derive their living by striving to give the best possible service in a spirit of co-operation, by doing their utmost to avoid accidents and by refraining from unreasonable demands upon the management. Public sentiment supported them in their efforts to form their local organization, and it is clearly "up to" the members of the union to demonstrate that the award of increased pay and easier working conditions generally only stimulates each individual to do his best and to give his employer full measure, pressed down and running over, in return for the good things which he has obtained.

The conclusions of the board are obviously open to critical study, and there is room for a good deal of argument upon these. The most striking pronouncement is that the law of supply and demand has only an indirect influence on the wages which the company should pay for labor and that the financial condition of the company has none at all. The rate should be determined by a comparison with those paid elsewhere for the same service, plus such allowances as arbitrators think are warranted by local conditions. This is a large question, one likely to be heard of again in this country before the limits of moral and business responsibility of employers are settled once and for all, if, indeed, this can ever be accomplished. But, taking the board's opinions as set down in this particular case, it is cause for gratification that the company's status has so clearly been set forth and that the extreme peril of further present demands upon it in the way of subways built only at enormous cost has been sounded to the public.

There is no mincing matters in the statement of the board that a continuance of the policy of overloading the company with the fixed charges of additional rapid transit lines will send it to the poorhouse; that the company needs a recuperative period or some relief in the way of lightened burdens before it is asked to become responsible for another subway or elevated extension, and that if the community wishes to have million after million of dollars spent almost continuously in order to bring about rapid transit between the heart of the city and its suburbs and also wishes to restrict the fare to 5 cents, it must co-operate by lightening the rentals for the subways, especially during the earlier years of their use, and perhaps at the same time demanding less tribute in the form of direct taxes than an amount equal to the return to the stockholders who are invited to play an essential part in supplying the money, and practically the whole part so far as the risk of the enterprise is concerned. Clearly the community has duties to perform as well as the company and its men, and upon the public relations of the road within the next few years, its ability to maintain the highest standards of operating economy consistent with good service and the willingness of its employees to put their shoulders to the wheel depends in no small measure the success of the Boston transportation system, which is unique in its scope, historic in its adaptability to new conditions and eminent among the public utilities of America.

The Pittsburgh & Butler Street Railway

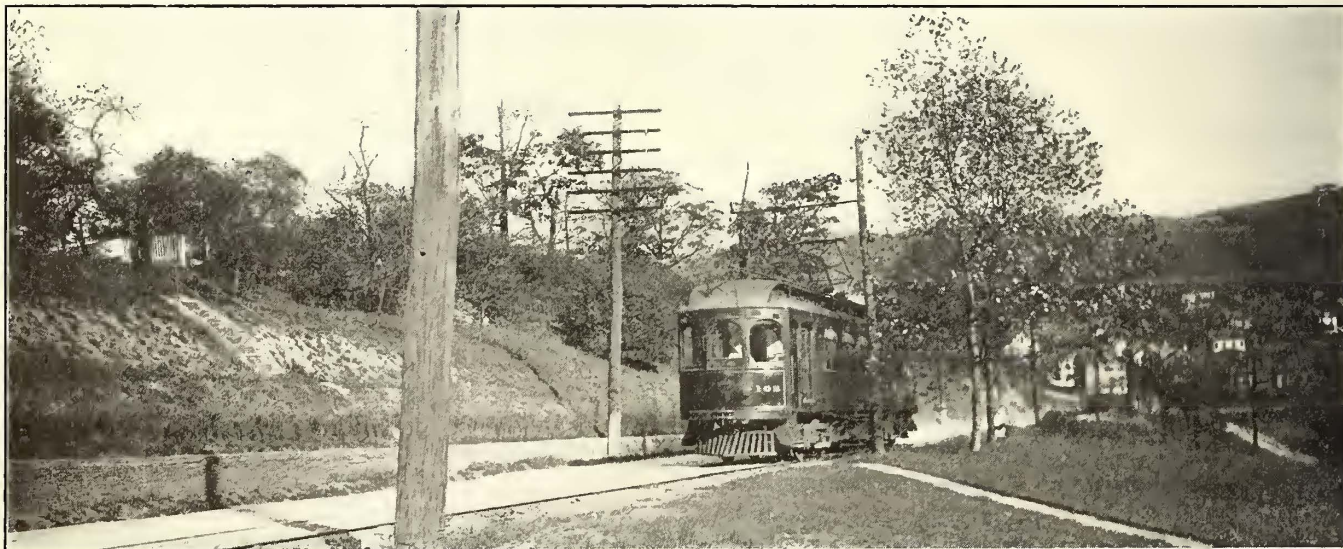
This High-Speed Interurban Line Has Recently Been Changed Over from Single-Phase to 1200-Volt Direct Current—A Description of the New Equipment Is Given Together with Some General Results of the Change

The Pittsburgh & Butler Street Railway has now been operating for several months as a high-voltage, direct-current road, and the accompanying description of the new equipment should be of interest as this is the fifth single-phase interurban road in the United States to substitute 1200 volts d.c. for the single-phase system. The road affords an unusually good opportunity for a comparison of the relative merits of the two methods of propulsion as it has had five and one-half years of single-phase operation.* With the new 1200-volt direct-current apparatus the same car bodies are used, and the new motors are of the same nominal rating as the former ones. Power is supplied from the same power plant, and for the first four months of operation the same schedule was run.

Under these conditions, according to Charles C. Tennis, vice-president Pittsburgh & Butler Street Railway, a reduction in power consumption per car mile of not

The track gage is 5 ft. 2½ in., conforming to that of the Pittsburgh Railways. The road for a greater part of the way passes through a hilly country, making operation especially severe on account of the extra power requirements and the unusually heavy duty on the equipment. There are three grades averaging from 7 per cent to 9 per cent, while frequent lesser grades range from 3 per cent to 5½ per cent. A grade of 9 per cent is encountered near Etna, and at a point about 5 miles north of the Gibson substation near Bryant the south-bound cars ascend a 6 per cent grade with an 8-deg. curve. The road from Etna to Butler is single track throughout, and, with the exception of short stretches through the larger towns, is over a private right-of-way.

The old timetable, which was in operation up to Dec. 1, 1913, calls for three classes of service, namely, first, dispatch, making about five interurban stops; second,



Pittsburgh & Butler Street Railway—1200-Volt Car Ascending 9 Per Cent Grade Near Etna

less than 15 per cent has been shown by a comparison of power-house records for the months of August, 1913, and August, 1912. In addition, the mechanical and electrical force at the carhouse has been reduced 54 per cent compared with that employed a year ago, this figure being, of course, exclusive of car washers, etc.

The total length of road now operating on 1200 volts is about 28 miles. For a distance of 6 miles, from Etna to the Pittsburgh terminal, the cars operate on the 600-volt trolley over the tracks of the Pittsburgh Railways. At the Butler end of the line the substation of the Butler Passenger Railway, an affiliated company, is utilized to supply current to 4¾ miles of track. There were two reasons for equipping this part of the line for 600 volts instead of 1200 volts. In the first place, the Butler substation has more than double the capacity necessary for the local system, and the additional load materially improves the load factor. Furthermore, it is proposed to extend the local service soon to the suburban district just outside of the city.

limited, averaging twenty-five interurban stops, the cars of these two classes running from Butler to the Pittsburgh terminal; third, local service, running between Butler and Etna and averaging about thirty-five stops. On the new schedule the running time of the "dispatch" service, which has been re-named "the flyer," was cut ten minutes compared with the old schedule; that is, from one hour and forty minutes to one hour and thirty minutes between Pittsburgh and Butler. The schedule of the "local," making all stops, was reduced five minutes. There are now but two classes of service, the "flyer," making three interurban stops, and the "local," making all stops, averaging about thirty, and all cars run from Butler to the Pittsburgh terminal. In the limited service a high-speed schedule is maintained, the 33 miles from Etna to Butler being made in fifty-five minutes including stops. Speeds as high as 48 m.p.h. are common, with a maximum of 60 m.p.h. on favorable grades.

Besides the regular passenger traffic, a large express and freight business has been developed and is handled by a regular express car and in express compartments

*ELECTRIC RAILWAY JOURNAL, Aug. 10 and Aug. 17, 1907.

on the passenger cars. An additional express car and three gondola cars will shortly be placed in operation to take care of the rapidly increasing business.

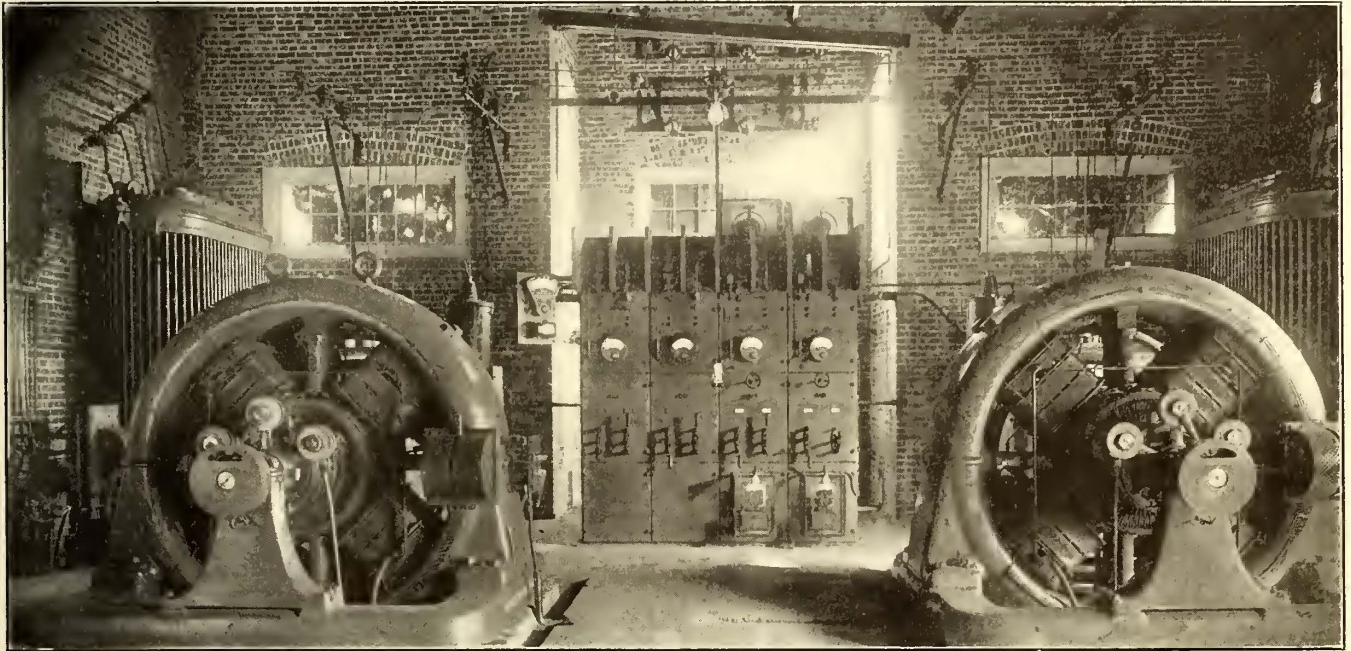
GENERAL SCHEME OF ELECTRIFICATION

Electric power is generated at the power house at Renfrew, 5¼ miles from the Butler terminal, is transmitted to two rotary converter substations at 22,000 volts and there is transformed to direct current at 1200 volts.

The power house at Renfrew, which was originally

having been utilized by the addition of a third wire. The 1200-volt circuit also has been reinforced by additional feeders, as shown, and the rail bonding was, of course, renewed throughout.

The substation and carhouse at Mars are approximately 17 miles from Etna and 16 miles from Butler. The distance to the Renfrew power house is about 10 miles. The two equipments in each substation are in exact duplicate, each consisting of a 300-kva, twenty-five-cycle, 1200-volt synchronous converter, a 300-kva,

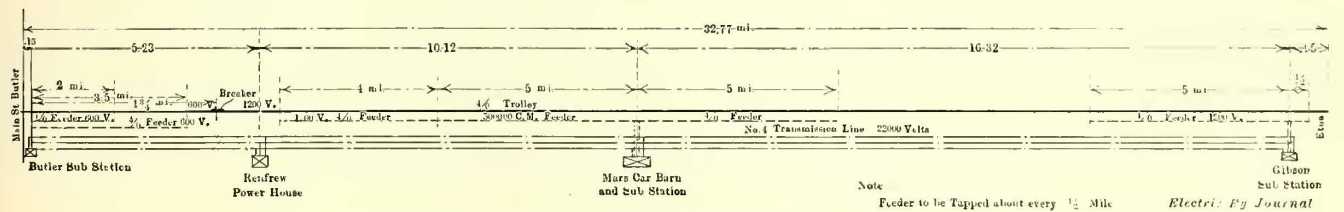


Pittsburgh & Butler Street Railway—Interior of Substation at Mars

used to supply single-phase current to the trolley through transformer substations, has been easily adapted to supply three-phase current to the rotary substations. This power station contains one 1500-kva and two 750-kva horizontal steam-turbine units connected to deliver three-phase, twenty-five-cycle, 6600-volt current. By a rearrangement of the single-phase transformers this current is now stepped up to 22,000 volts, three-phase, for transmission. Besides supplying the 1200-volt substations at Mars and Gibson, alternating current is also transmitted to the 600-volt substation of the Butler Passenger Railway at Butler. The same three-phase lines provide power for the lighting circuits in that city and for towns along the line.

three-phase, oil-cooled transformer and the necessary switchboard with feeder and starting panels. The incoming 22,000-volt circuits are protected by a four-tank aluminum lightning arrester. These lines are also provided with choke coils and disconnecting switches. On the high-voltage side of each transformer are three single-pole, 22,000-volt, 300-amp automatic oil switches, installed in brick cells and hand-operated by means of switch levers mounted on a slate panel.

The transformers are Y-connected, with 740-volt secondaries. Four 2½ per cent taps are provided in the primary side, thus allowing adjustment between 19,800 volts and 22,000 volts. A one-half-voltage tap is provided on the secondary side for starting purposes.



Pittsburgh & Butler Street Railway—Feeder Layout

These circuits consume an average of approximately 20,000 kw-hr. per month.

SUBSTATIONS

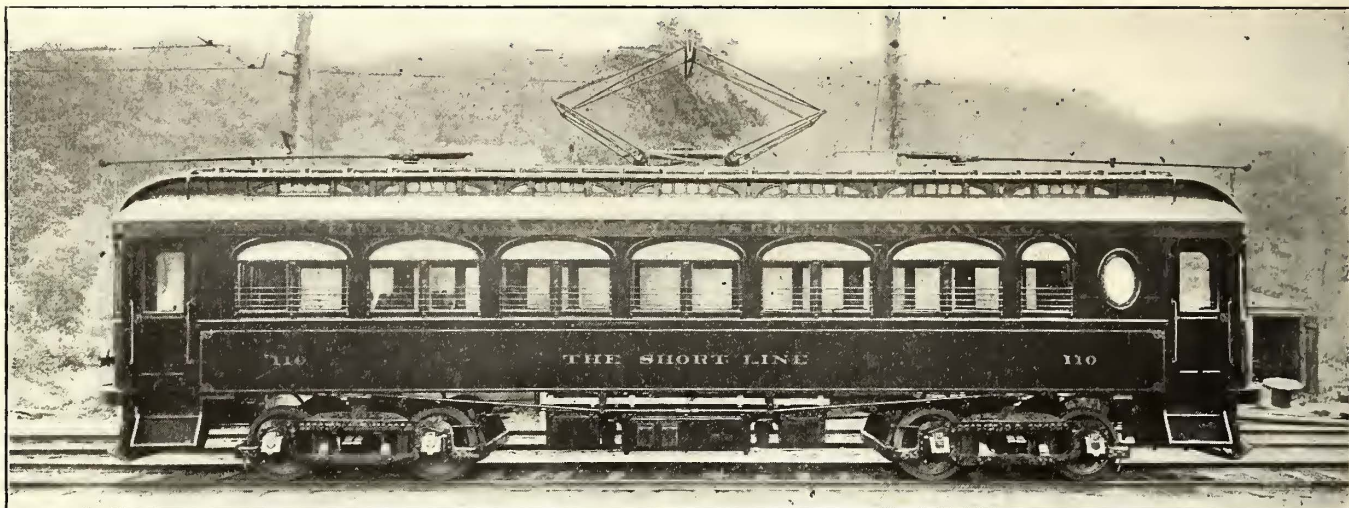
There are two substations containing identical equipment, one at Mars, adjoining the carhouse, and one at Gibson, near the city of Etna. The accompanying diagram shows the location of these substations together with feeder and transmission lines. A transmission line made up of three No. 4 copper wires extends the entire length of the system, the original single-phase line

These transformers are of the standard railway type with high inherent reactance.

The synchronous converters are rated at 300 kw, 750 r.p.m., 1200 volts, and are provided with the usual end-play, speed-limit and brush-raising devices. These machines are capable of handling 50 per cent overload for two hours and three times normal load momentarily. A separate switch panel is used for starting from the alternating-current side. The d.c. switchboard consists of four standard 1200-volt panels, including a

synchronous converter panel for each machine and two feeder panels. A standard 1200-volt d.c. aluminum lightning arrester is provided for each of the outgoing feeders. One machine is sufficient to handle the entire load except for a few hours in the morning when the

capacity is fifty-two passengers, and the estimated weight of the car with average seated load is 37 tons. This is a reduction of 6 tons from the weight of the same car equipped for single-phase operation. This reduction was made possible by the elimination of the



Pittsburgh & Butler Street Railway—View of Standard Motor Car Showing Pantograph and Trolley Poles

first cars are leaving the carhouse. The proper taps are used on the primary side of the transformer to give 1300 volts on the d.c. side of the rotary converter.

The Gibson substation is 1 mile from the end of the line at Etna and contains exactly the same equipment as the Mars substation.

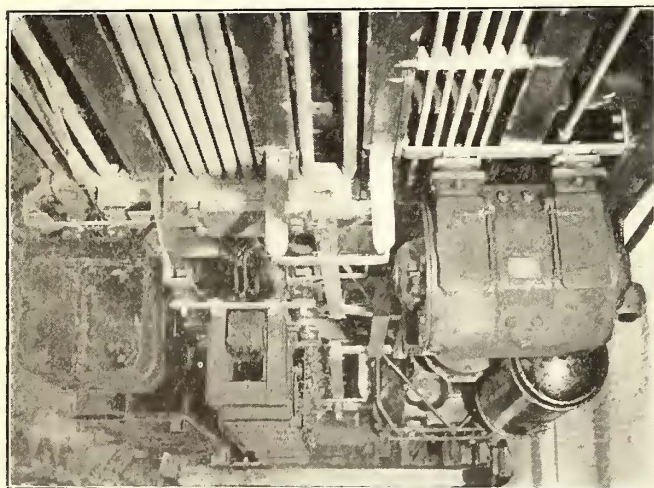
As mentioned before, at the Butler end of the road for a distance of 4¾ miles the trolley is fed from the 600-volt substation of the Butler Passenger Railway Company. The present equipment of the substation includes two 500-kw synchronous converters, which is ample provision for the maximum load requirements of both systems.

transformer and duplicate a.c.-d.c. control, and a reduction of 1500 lb. in the weight of each motor.

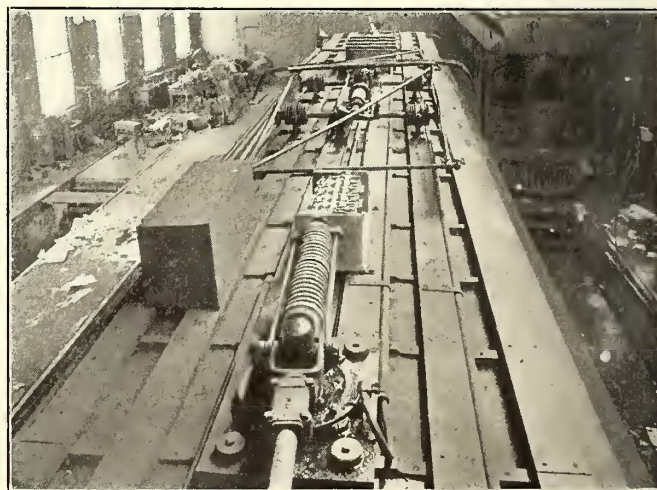
The principal dimensions and weights of these cars are shown in the following table:

Length over all	51 ft. 3 in.
Width over all	8 ft. 1½ in.
Height from track to roof	13 ft. 6 in.
Distance between truck centers	27 ft. 6 in.
Wheelbase of truck	6 ft. 8 in.
Weight of car body	30,000 lb.
Weight of trucks	17,000 lb.
Weight of electrical equipment	22,000 lb.
Brakes and compressors	1,800 lb.
Average passenger load	4,000 lb.
Total weight	74,800 lb.

The electrical equipments of these cars are identical with the exception of the gear reduction on the express-



Pittsburgh & Butler Street Railway—View from Pit Showing Arrangement of 1200-Volt Equipment Under the Car



Pittsburgh & Butler Street Railway—Car Roof, Showing Trolleys, Pantograph and 1200-Volt Aluminum Cell Arrester with Cover Removed

ROLLING STOCK

Eleven of the thirteen original single-phase car equipments have been replaced by 1200-volt d.c. apparatus. These cars include ten combination passenger and baggage cars and one express car. The passenger cars have passenger and smoking compartments and all but two are provided with a baggage compartment for light freight and package express. The total seating

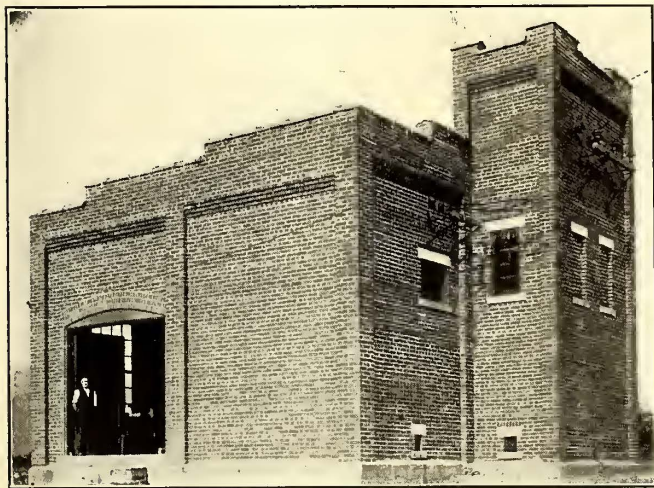
car motors. The four GE-225 motors used on each car are of the internally ventilated, commutating-pole type, rated at 100 hp on 600 volts. The gear reduction on the passenger cars is 59:19 and on the express car 61:17. The control equipment is of the Sprague-General Electric type M, non-automatic, and is arranged to give full speed on both 600-volt and 1200-volt trolleys. The master controllers are of the C-74 type

fitted with a dead-man's handle and pilot and emergency valves for emergency braking. These controllers also provide means for increasing the free running speed of the motors by shunting the field. A normal running speed of from 46 to 48 m.p.h. on level track can thus be obtained.

The control circuits, lights and air compressors are operated from a dynamotor when running on the 1200-volt trolley. In re-equipping the cars, General Electric straight air brakes were installed with air compressors having a displacement of 25 cu. ft. of free air per minute. An aluminum-cell lightning arrester with electrolyte for summer and winter service is installed in a suitable box on the roof of each car.

There are nine lighting circuits, each wired for five lamps in series. These lamps and the arc headlight are all controlled by a three-point switch in the motorman's cab. In place of a headlight resistance the incandescent circuits are thrown in series with the arc lamp. Each car carries a standard No. 8 U. S. wheel trolley at each end and also a sliding pantograph for collection of current from the catenary construction used on the private right-of-way.

The installation of the apparatus on the cars is an unusually good example of car equipment, and several



Pittsburgh & Butler Street Railway—Gibson Substation

features deserve special mention. All wiring is in conduit, and every conduit is a straight pipe, which simplifies the pulling in of wires and cables. Special cast-iron outlet boxes are suspended directly over the resistance grids, and the grids themselves are carefully insulated to prevent damage from snow. The motor leads are also well protected from injury by use of cast-iron terminal boxes on the car and special wooden terminal blocks on the motor case. Each lead is covered with rubber hose armored with brass wire, and the outlet box is placed near the center of the bolster to obtain maximum flexibility. Hangers and boxes, and in fact all accessories, are interchangeable on all cars.

Among the changes made in the cars to adapt them to direct-current operation the roof covering was changed. With the single-phase equipment a grounded copper sheathing was used on the car roof to ground a broken trolley wire. For direct-current operation the cars are covered with canvas, and the trolley deck running the entire length of the car is insulated for 1200 volts.

OPERATION

The alterations and the work of re-equipping the cars was done in the carhouse at Mars under the supervision of John Christensen, master mechanic, who also designed many of the devices used on these cars. Sufficient

trackage is available for housing all of the equipment. The cars in the carhouse are operated from a 1200-volt trolley, which formerly carried 6600 volts a.c.

The change from 6600 volts single-phase to 1200 volts d.c. was accomplished without interruption to traffic. After the first two cars had been equipped for 1200 volts, the system was changed over from Mars to Butler, passengers being transferred to the single-phase cars at Mars. On Aug. 1, 1913, direct current was thrown on the entire system, and four additional cars were put in service on the regular schedule. Since the inauguration of the 1200-volt service no trouble of any kind has developed in the operation of the electrical equipment.

The reconstruction of this road has been supervised by James Bryan, consulting engineer, Pittsburgh, who is known locally as the father of the 1200-volt system. Three other roads have been equipped with 1200 volts under his direction, namely, the Pittsburgh, Harmony, Butler & Newcastle; the Indianapolis & Louisville, and the Southern Cambria Railway.

ANNUAL MEETING OF WESTERN RED CEDAR ASSOCIATION

The regular annual meeting of the Western Red Cedar Association was held in Spokane on Monday, Jan. 12, 1914. President H. C. Culver opened the meeting with his annual address, which was in part as follows:

"During the first half of the year poles, posts and piling moved freely at fair prices. A general recession of trade during the latter half of the year has taken place, and to-day the industry is in a very unsatisfactory state. Your president believes, however, that soon a more healthy condition of affairs will prevail.

"Stocks are not too large and are fairly well assorted. It is expected that the output during the present winter will be greatly restricted. Owing to lack of snow thus far practically no stock has been hauled out. In addition, owing to the poor market in the latter part of the year, the usual preparations for cedar production were not undertaken. Another factor tending toward curtailment is the lack of activity by the sawmill companies, which annually produce considerable cedar they find mixed in with their saw timber.

"It is understood that cedar dealers in Michigan, Wisconsin and Minnesota are suffering from somewhat similar climatic conditions; therefore the general outlook at this time would indicate a smaller output than for several preceding years.

"That we may bear in mind the extensive use of poles for conveying electricity, let me remind you that in the United States there are more than 800,000 miles of pole lines, there being in service to-day over 32,000,000 poles. The annual renewal requirements are more than 4,000,000, and of these large totals it is claimed that more than 65 per cent are cedar."

After a short discussion, the committee on the Forest Products Exposition was instructed to take up with the National Electric Light Association the matter of having specifications for Western red cedar poles adopted by that association. At the present time the National Electric Light Association has specifications covering yellow-pine poles, Eastern white-cedar and chestnut poles, but has none covering the Western red cedar. It is the belief of the association that the Western red cedar poles are far superior to any of the other three now covered by the specifications of the National Electric Light Association, and it is therefore hoped that during the year 1914 specifications will be adopted by the National Electric Light Association for the Western poles.

Report of Arbitration Board on Boston Elevated Railway

An Abstract of the Findings in the Controversy Regarding Wages, Hours of Work and Conditions of Labor in Which the Considerations Affecting the Decisions of the Board Are Set Forth in Detail

An exhaustive report was handed down on Jan. 15 by the arbitration board sitting in the Boston Elevated wage and hours of labor investigation, which has been in progress during the past six months. The finding of the board, which is effective until May 1, 1916, increases the wages of blue-uniformed men, shop employees and others by from 5 per cent to 6 per cent, distributed over a three-year period, and in the proceedings now closed there have been presented to the board a larger number of questions for decision than were ever brought up in any street railway arbitration in this country or perhaps in any other industry. Hearings were held on fifty-six days, and the record before the board comprised 5238 pages of evidence and argument, besides 202 exhibits. In the proceedings the bulk of the evidence introduced related directly to car service labor conditions, although attention was given to the conditions of employment prevailing in power houses, substations, shops, carhouses and other branches of the company's activity. The arbitration board consisted of James J. Storrow, chairman; James L. Richards, representing the company, and James H. Vahey, representing Division 589 of the Amalgamated Association. A résumé of the report is given below.

On Dec. 20, 1913, an agreement was signed by the company and the union upon hours of labor for blue-uniformed men. Part of it was printed in the *ELECTRIC RAILWAY JOURNAL* of Dec. 13, 1913, page 1254, and in effect it gives the company a reasonable latitude in the making up of its schedules without suffering the extreme burdens of the "nine-hours-in-eleven" law which was passed by the Massachusetts Legislature in 1913.

GENERAL QUESTION OF WAGES

The finding of the board affects nearly all of the company's 9474 employees, over 7000 of whom are members of the union. The board places the burden of proof upon the men that increased wages are necessary. Upon the evidence submitted, the board cannot find that, upon the whole, the work of blue-uniformed men is to-day more arduous than it was in 1897. It feels that vestibuled platforms, seats for motormen, the collection of fares at subway stations and use of more efficient equipment, including prepayment cars, very nearly offset the factors pointed out by the men as tending to increase the difficulties of their work, such as the introduction of larger cars, operation of faster schedules, increased traffic on cars and highways, shorter layovers and more rules and general orders. The shortening of hours and the reduction in their outside limit throw the balance on the side of the company.

The board is of the opinion that wages in other occupations are not very helpful in determining what the wages of blue-uniformed men should be, but that outside wages have more bearing in the case of shop men. Many of the mechanics and other employees of the company, however, are not obliged to have the same all-around knowledge of their trade that is required of journeymen in the building trades. The company's work is largely repetitive. It appears that an inexperienced man in the company's shops can pick up the knowledge needed in a much shorter time than in the one to three years' apprenticeship required in outside

trades. Again, most of the company's employees are given continuous work throughout the entire year. The board does not think that the wages paid city employees constitutes a determining factor in the inquiry.

However, the wage rates of the other Massachusetts street railways have a direct and vital bearing upon the question of wages in Boston. In numerous and important respects the wages paid blue-uniformed men by the Bay State Street Railway, Worcester Consolidated Street Railway and Springfield Street Railway are higher than in Boston. The Boston surface motorman or conductor has to work fifteen years before reaching the maximum wage—a much longer period than upon any other street railway of the State, although the first-year rate is higher in Boston than on any other road in the State except that at Springfield. The board is of the opinion that the wages of blue-uniformed men in Boston ought to be higher than in the smaller Massachusetts cities. There are some routes in Boston where the traffic conditions are no more difficult than on the main street of Springfield or Worcester, but on the average a higher degree of skill and judgment is required in Boston, the cost of living also being somewhat higher.

COST OF LIVING

The board finds that the cost of living has increased about 24 per cent since 1897. Between 1903 and 1913 the cost of living increased 14 per cent, about 8 per cent being between 1908 and 1913. Advances in wages since 1897 offset, so far as they go, the increase in the cost of living and have been taken into consideration by the board, although there is no evidence regarding the adequacy of the wages paid in 1897. Another consideration the board has had in mind is that the cost of living probably does determine in large degree the wages of the man receiving the smallest pay, but that as one rises in the scale of wages one obviously departs from the mere cost of living, and, instead of paying a man a wage determined by the necessary cost of living, one begins to take into account skill, ability, judgment, knowledge and other factors. If a company needs in its employ a man having these qualities, it must pay for them. These qualities have a value, and the man is paid accordingly. Then the employee so paid for these qualities proceeds, as is the custom with all sensible men, to live upon a scale which is in accord with his income; but the scale of living is not the cost of living, and it is confusing to treat these two things as being the same. This consideration has inclined the board in dealing with the wage question to place greater emphasis upon the increase in the cost of living when considering wages at or near the minimum.

Evidence seems to show that the company can secure plenty of men at the present wage scale under ordinary conditions, but that it cannot hold them in its employ. There were 5034 blue-uniformed men in the service Aug. 1, 1913. Under normal conditions the company is losing every year about 40 per cent of these, renewing its entire car-operating force on the average once in two and one-half years. The board maintains that it is the duty of the company to operate its cars with experienced men and points out that, even if the company can succeed in maintaining at its full quota such

a rapidly shifting organization, it does not furnish the public with the protection to which it is entitled. This is shown to be no formal consideration by the accident record of the past five years as filed with the Public Service Commission, there having been 3149 accidents in 1909 as compared with 4847 in 1913, the total fatalities being thirty-seven and fifty-seven respectively and the grand total for the five-year period being 207 fatalities and 17,580 accidents resulting only in injury.

FINANCIAL CONDITION OF THE COMPANY

The company urged with great earnestness that it has not the available income out of which to pay an increase or certainly any substantial increase in wages. For the fiscal year ended June 30, 1913, the company's gross income was \$16,968,328 and its operating expenses were \$11,135,581, its net earnings being \$5,832,747. Fixed charges totaled \$5,132,124, leaving a net divisible income of \$700,622. Dividends of 6 per cent on the capital stock totaled \$1,197,000, leaving a deficit of \$496,377. The fiscal year 1912 showed a deficit of \$491,632 after the payment of a 6 per cent dividend. Neither of these years would have shown a deficit after the payment of dividends except for the expenses incident to the strike of 1912. The board is convinced that the company has not artificially kept down its surplus during its existence by any undue or excessive charges against income to meet depreciation of the property of the West End or Elevated companies. The total surpluses of the years 1898 to 1911, inclusive, are \$1,214,903, the total deficits of the last two years being \$988,009.

The company stated in the hearings that its interest charges during the present year would be increased by \$80,000 and its dividends by \$235,764, and that in the near future the burdens imposed by the construction of the Dorchester subway, Boylston Street subway and East Boston tunnel extension will require added rentals amounting to \$675,000 per year upon an increased investment of \$15,000,000. New capital to the amount of \$6,300,000 will be needed by the company to complete the elevated extension from Sullivan Square to Everett and to purchase additional equipment and supplies, and also \$900,000 of new capital per annum is required for necessary additions to the property of the West End Street Railway. It was also stated that the cash and available resources of the company on Sept. 1, 1913, totaled \$5,936,800, and, as the stock is selling below par, the company is at or near the end of the new capital it can raise except so far as new expenditures can be incurred for the West End company.

The union contended that the company has not been managed with due regard to efficiency and economy, that the increase in fixed charges will be spread over several years and must be cared for by increasing traffic; that legal expenses and salaries were excessive, and that the building of the Cambridge subway was carried on under a wasteful and extravagant contract. The union also claimed that the recent strike cost the company \$2,000,000 and that it was an unnecessary waste of its resources, being forced upon the men, according to the union officials, by the policy of the company in undertaking to prevent the men from organizing their union. The board concedes the right of the men to engage in collective bargaining by organization and by recourse to the strike method if conditions are not reasonably satisfactory and no redress can be obtained. But it points out that a strike is much to be regretted is not lightly to be undertaken and is to be unquestionably condemned if unnecessarily ordered. No benefit can be seen, however, in reopening the question whether the strike of 1912 could have been avoided, but the board states that it has no doubt that its cost was at least \$1,500,000 and perhaps

more—a loss which the company could ill afford to stand.

SALARIES AND LEGAL EXPENSES

In the case of the company's officers and legal advisers there is no testimony to explain their daily duties, and still less any testimony to show with what ability their duties are performed. The arbitration agreement does not ask the board to determine the compensation of the company's officers, and the absence of adequate evidence makes it impossible for the board to pass justly or accurately upon the salary schedule. Managing expenses have increased 54 per cent since 1899 and passenger revenue 72 per cent, or from \$182,441 to \$280,265 in the former case and from \$9,449,928 to \$16,289,919 in the latter. In other words, managing expense has grown less rapidly than receipts.

CAMBRIDGE SUBWAY CONTRACT

The board reaches the conclusion, with Mr. Richards dissenting, that the contract for the construction of the Cambridge subway was unwarranted. The work was not divided into sections, as in the Boston subway construction, nor was the construction advertised for bids, the entire job being turned over to a single contracting company, to be built upon a basis of cost plus a 10 per cent bonus.

CONCLUSION OF BOARD ON FINANCIAL CONDITION OF COMPANY

The board states that burdens have been thrown upon the company faster than the increase in traffic justifies. In addition to the rapidly growing item for rentals of subways now built and building, the public exacts as a charge upon its earnings, ahead of dividends, interest, wages and everything else, an annual sum in taxes which in 1913 amounted to \$1,128,021. This is substantially equal to the amount paid in dividends. A glance at the rapidly increasing capitalization of the company, which has gone on at a rate out of all proportion to the increase in gross earnings, indicates plainly enough that the company is being rapidly overloaded by excessive capital expenses and rentals for capital expenses incurred by the city in the construction of tunnels and subways. In 1897 the company was obliged to earn a return upon an investment of \$25,291,913, compared with an investment of \$105,684,146 in 1913. During this period the gross earnings increased 94.6 per cent and the capital investment 317.86 per cent. The board states that this policy, if continued, is going to send the company to the poorhouse, and it is also going to render it incapable of obtaining each year the additional capital which it must have in order to supply the transportation service needed by the community. To-day the stock is selling below par, and under the provisions of the Massachusetts law that capital stock must always equal the amount of bonded indebtedness the company has the right to sell only \$4,236,800 more bonds. Then, unless the stock rises again to par or above, it will begin to lack funds. It will not tend to better traffic conditions but will lead to almost irretrievable injury if this process of overloading the company is not stopped, so as to give the gross earnings a chance to catch up with capitalization.

POSITION OF STOCKHOLDERS

The board states that if it is true that the metropolitan community of Greater Boston is loading upon the company burdens which it cannot bear the community is not only unwise in its own interest but is committing an act of rank injustice toward the company's shareholders, many of whom are dependent women and children.

It is a great and general public advantage for any community to have a system of rapid transit which will enable its workers to escape from the crowded and con-

gested districts at the close of the day and in a few minutes reach a home in the suburbs. If the community wishes to have millions of dollars spent to bring this about and also wishes, as is probably wise, to restrict the fare to 5 cents, it must co-operate with the company undertaking the task by lightening the rentals for the subways, especially during the early years of their use. Perhaps at the same time the community should demand from the company less tribute in the form of direct taxes than an amount equal to the return to the stockholders, as the latter are invited to play an essential part in supplying the money and to play practically the whole part, so far as the risk of the enterprise is concerned.

FINANCIAL CONDITION OF COMPANY IMMATERIAL

The union contended that all evidence of the financial condition of the company is immaterial, as it claimed that the obligation of the company to pay adequate wages does not depend upon its financial condition, but that, on the contrary, even if the company is unable to pay its rentals and the interest on its outstanding bonds, the receiver would still be obliged to pay the men adequate wages. The board says: "We attach great weight to this argument, made on behalf of the men, that if the Elevated company is to furnish all the improvements demanded by the community they ought not to come out of the pockets of the men, that the men are entitled to fair and adequate wages so long as they are employed, and that it is for others to decide whether the company is to be gradually bankrupted, whether the passengers are to pay more, or whether the community as a whole is to come to the rescue of the situation. We think the argument of the men on this point should prevail. We have not thought it right, therefore, to permit the plight, or alleged plight, of the company to affect our findings materially, except that every sensible man knows that in the modern complex and interrelated life, if you insist upon the exact 100 per cent of justice to one man your supply of justice may run short, and that the next man—or in this case it may be widow—will receive no justice at all, but, instead, a notice in the morning mail saying that her income has been stopped. We go so far in assenting to the men's argument on this point that we would agree that if the company was to be operated by a receiver the receiver ought to pay the wages to which the men are entitled."

HOURS OF CAR SERVICE MEN

The board has considered that the company has shortened the working hours of many employees since 1897, doubtless in accordance with the wishes of its men. But even after from eight years to twelve years' service an ideal run, as regarded by most of the men, begins at 5 a. m. and ends at 5 p. m., or else begins at noon and ends at midnight. Under the agreement of Dec. 20 these most desirable runs would be shortened an hour as to their outside limit. Such hours are by no means average hours, and under the new agreement relating to the nine-hours-in-eleven law only 40 per cent of the regular schedule runs will enable the men to finish a day's work of nine hours within eleven outside hours. Twenty per cent of the regular schedule runs can be finished inside of eleven and one-half hours. Then a very large body of the men, amounting to 40 per cent of the whole, may receive runs as provided in the agreement, which make their outside time from twelve hours to sixteen hours. In the opinion of the board, a spread of sixteen hours constitutes an almost intolerable hardship, and any excess over twelve hours is considered a severe hardship.

CONCLUSION OF BOARD REGARDING WAGES

Speaking broadly, the majority of the board's opinion is that the men have made out a case establishing

their right to an increase in pay. It feels that the wages of blue-uniformed men have been relatively lower than the wages in other departments, and that they have not in the past been proportionally increased. It rules that the new wage scales for all employees other than blue-uniformed men shall take effect in their entirety as of May 1, 1913; that the wage scales for blue-uniformed men shall become effective in part from the above date, in part from May 1, 1914, and the balance on May 1, 1915. Members of the union are to be paid accumulated back wages by March 1, 1914. The so-called "gold award" of the company and "stripe money" are abolished. Details of the award for blue-uniformed men are printed on the opposite page.

Under the operation of the graduated wage scale placed in service in 1903, blue-uniformed men receive six different rates of wages, the purpose being to encourage men to remain in the service. About 17 per cent of the men receive the maximum pay, which is accorded after sixteen years' work. In the opinion of the board the graduated scale has failed as a device to retain experienced men, the failure being not one of principle but of application. Five years is sufficient time, in the board's opinion, for a man to attain the point of maximum efficiency, and it has fixed its award on this basis.

MISCELLANEOUS WAGE MATTERS

The union demanded a seven-hour guaranteed minimum workday for extra men. The board awards that to all extra blue-uniformed men, who report for work under call but are not assigned work to the extent of six and three-tenths hours, there shall be paid not less than six and three-tenths hours' pay, provided they remain on duty so long as required, but not to exceed fourteen hours. The same minimum wage guaranty is awarded to collectors and porters. The union asked that no more trips be required as a day's work on Sundays and holidays than on week days, but the board rules that since the traffic conditions permit higher speed on such days with safety, the public interest warrants faster transit and that the diminished responsibilities to car service employees resulting from the decrease in ordinary street traffic offsets the added number of trips. No interference with Sunday and holiday schedules is therefore made by the board.

Another request of the union was that a minimum of \$3 should be paid for six hours' work or less on night cars, all excess to be at the regular rates. The present rates for day and night work are the same. The board considers that night work falls with substantial evenness on all blue-uniformed men in a term of about five years and that it is proper that most of it should come to the newer men on account of greater safety of night operation through less congested streets, and also because the older men are entitled to the most desirable work. The board awards the regular rates for regular night work. An increase of 25 per cent is awarded above the regular rate for special cars run between midnight and 5 a. m. Motormen called for snow duty are to be paid the regular rates while waiting for cars and 45 cents per hour when working. The present rate is 40 cents. The board rules that instructors shall be paid 2.5 cents per hour above their regular rate while instructing, the present rate being 1.2 cents per hour in addition to regular pay, whether instructing or not. The board awards that all employees shall be paid special compensation for time required by the company in making out accident reports, not to exceed 10 cents per report.

The new schedule of platform wages is shown in Table I. The years indicated commence on May 1 in each case. Layoffs not exceeding thirty minutes are to be paid for at regular rates.

TABLE I—SCHEDULE OF RATES IN CENTS PER HOUR AWARDED BY THE BOSTON ELEVATED RAILWAY ARBITRATION BOARD

Surface Lines—Motormen and Conductors				
Year of Service	Present	Award		
		1913-4	1914-5	1915-6
First	25.6	{ 26.25	{ 26.5	{ 26.75
Second	26.2	{ 27.25	{ 27.75	{ 28.25
Third	26.8	28	28.75	29
Fourth	26.8	28.5	29.25	29.5
Fifth	26.8	29	29.75	30.5
Sixth-tenth	27.5	30.5	31.25	32
Eleventh-fifteenth	28.2	.....	.....	.....
Sixteenth and thereafter	28.9	.....	.....	.....

Rapid Transit Lines—Motormen				
Year of Service	Present	Award		
		1913-4	1914-5	1915-6
First	26.2	28.25	29.25	30.25
Second	27.8	29	30	31
Third	29.6	30.25	30.75	31.75
Fourth	29.6	30.5	31.5	32.5
Fifth	29.6	31.25	32.25	33.25
Sixth-tenth	30.3	32	33	34
Eleventh-fifteenth	30.9	.....	.....	.....
Sixteenth and thereafter	31.7	.....	.....	.....

Rapid Transit Lines—Guards				
Year of Service	Present	Award		
		1913-4	1914-5	1915-6
First	23.9	24.75	25	25.5
Second	24.5	25.25	26	26.5
Third	25.2	25.75	26.5	27
Fourth	25.2	26.25	27	27.5
Fifth	25.2	26.5	27.5	28
Sixth-tenth	25.8	27	28	28.5
Eleventh-fifteenth	26.5	.....	.....	.....
Sixteenth and thereafter	27.3	.....	.....	.....

Rapid Transit Lines—Brakemen				
Year of Service	Present	Award		
		1913-4	1914-5	1915-6
First	21.2	21.5	21.75	22
Second	21.7	22.25	22.25	22.5
Third	22.4	23	23	23.25
Fourth	22.4	23.25	23.5	23.75
Fifth	22.4	23.75	24	24.25
Sixth-tenth	23	24.25	24.5	24.75
Eleventh-fifteenth	23.7	.....	.....	.....
Sixteenth and thereafter	24.5	.....	.....	.....

Rapid Transit Lines—Gatemen				
Year of Service	Present	Award		
		1913-4	1914-5	1915-6
First	16.7	17.5	18	18.50
Second	17.3	18.50	19	19.50
Third	17.9	19	19.50	20
Fourth	17.9	19.25	19.75	20.25
Fifth	17.9	19.50	20	20.50
Sixth-tenth	18.6	20	20.50	21
Eleventh-fifteenth	19.3	.....	.....	.....
Sixteenth and thereafter	20	.....	.....	.....

EMPLOYEES OTHER THAN BLUE-UNIFORM

For every conductor and motorman on a car there are two other men in the company's employ, the total number of occupations investigated being fifty-nine. The board has endeavored to avoid discrimination between different crafts, feeling that the relative wages of carpenters, blacksmiths and painters have become adjusted with relation to one another by time, and that to disregard such differentials might work injustice. The award reduces the blacksmith classifications to six and includes many other reductions of this character in other crafts.

The board considers that it has no authority over the hours of employees engaged in power maintenance, the wire and conduit department, structural iron workers and painters, or the Albany Street yard crew, but rules that fifty-one hours shall constitute a week's work in the rapid transit and surface car shops at Sullivan Square, Guild Street, Eliot Square, Albany and Bartlett Streets; but this ruling does not apply to carhouse work. The union asked for forty-eight hours.

The abolition of piece work was an issue. The total amount carried on is very limited, and it has been discontinued in the brass foundry and in car wiring. In view of the evidence which seems to indicate that the employees on piece work are getting more than 50 per cent addition to their wages when working by the piece compared with what they can earn when working by the day, the board does not think it wise to abolish the limited amount of this class of work being carried on in the company's shops.

The board rules that overtime shall be compensated at 150 per cent of the regular rate except in the case of blue-uniformed employees. The hours of labor in the

road and track department are reduced to fifty-six per week, the former figure being fifty-nine and the union's request fifty-three. A few exceptions are cared for by increased compensation in the detailed awards of wages. In the case of night special or irregular work 75 per cent of the number of hours constituting a day's work are to be the maximum required, and these are to be paid for on the full day's basis.

FREE TRANSPORTATION TO EMPLOYEES

The union asked for free transportation to all its members in the active service of the company on the ground that this practice prevails elsewhere. In the opinion of the board, employees when engaged in company business should be carried free or have their fares refunded, but the board says: "Free transportation really constitutes additional wage, and the wage, if given in this form, is unequally distributed among the employees, for it is worth little to an employee who is so situated that he walks between his home and his work and is worth considerable to an employee who lives so far away from his work that he must ride. . . . The board is not disposed to take away, and does not take away, such free transportation as the road has already accorded its employees, but feels that it cannot grant the additional transportation asked for by the union."

ADDITIONAL COMPENSATION OF BLUE-UNIFORMED MEN

In the agreement of Dec. 20, 1913, the principle was recognized that men having runs with an outside limit exceeding twelve hours are entitled to additional compensation, as fixed by the board. The award of 25 per cent of the employees' regular hourly rate for the first excess hour or fraction thereof and 50 per cent for the second excess hour or fraction, the latter rate being maintained for any further excess. Thus an employee having a run of nine hours with thirteen hours' outside limit and a rate of 27 cents would be paid \$2.16 for eight hours' work and 33.75 cents for the ninth hour, totaling \$2.49.

In the computation of fractional hours the board rules that in general the company shall give the blue-uniformed man the benefit of the quarter-hour into which his work extends, regardless of whether the full fifteen minutes is worked or not. In the case of runs of eight hours or more platform time but less than eight and one-half hours and of runs not exceeding twelve hours outside time, with platform time between nine and one-half and ten hours, the full half-hour is to be figured. The board further awards as to time for making up work and for work at the end of the day that conductors and motormen on surface lines be allowed the actual time they are required to report before the scheduled leaving time of their cars, either for the first run of the day or after reliefs in excess of one, and shall be allowed ten minutes in the case of conductors and five minutes in the case of motormen on surface lines for work at the end of the day, and such allowed time is to be computed at regular rates. The same rate is to be paid for work after reliefs in excess of one.

In case of extra runs having more than fourteen hours' outside time, additional compensation is to be paid at the rate of 25 per cent of the regular rate for the first hour or fraction and 50 per cent for the second hour or fraction. Thus, an employee having a run of nine hours, with an outside limit of fifteen and one-half hours and a rate of 27 cents per hour, will be paid \$2.025 for seven and one-half hours at 27 cents, 33.75 cents for one hour at 33.75 cents, and 20.25 cents for one-half hour at 40.5 cents, a total of \$2.565.

DISSENTING VIEWS OF ARBITRATOR RICHARDS

Arbitrator James L. Richards, for the company, records his dissent from that portion of the report providing for an unconditional advance in wages. He

states: "I believe that the public and the stockholders should have equal consideration with the employees, and that any such substantial increase of wages as is provided for by the award should, under the conditions which exist, be made conditional upon the adoption of some plan of co-operation which would give the employees an interest in the future prosperity of the business similar to that of partners. I likewise do not agree with that portion of the award which questions the wisdom of the manner in which the Cambridge subway was built or its ownership by the company."

AGREEMENT OF BOSTON ELEVATED WITH AMALGAMATED ASSOCIATION

The agreement of Dec. 20, referred to by the arbitration board, a contract between the Boston Elevated Railway Company and the Amalgamated Association, is given in condensed form below. This is supplementary to the agreement covering the matter of hours of labor printed in the *ELECTRIC RAILWAY JOURNAL* of Dec. 13, 1913, page 1254.

This agreement is, of course, not a part of the report of the board of arbitration, but was, instead, entered into by the railway company and the employees directly without reference to the issues pending before that board.

The agreement provides full procedure for employees in taking up grievances which have not been adjusted with their superior officers, secures the men freedom from discrimination on account of their membership in the union, sets forth the general relations between the company and the officers of the employees' organization, and provides for many matters of detail bearing upon working conditions in the car service.

The company agrees to suspend or discharge employees refusing to pay dues to the union without written notice of the desire to terminate membership and to reinstate employees found not guilty of sufficient cause to warrant suspension or discharge. Provision is made for leave of absence on the business of the association, with return to full rating. Any member of the association taking other employment during leave of absence is to be considered as having terminated his service with the company. Employees may be removed from their present places only for unsatisfactory service or lack of work. Uniforms may be purchased in the open market when meeting the company's specifications and inspection. Seniority is to prevail so far as practicable in all departments and shops, men laid off receiving opportunities to return prior to hiring outsiders, one week's notice being allowed. Except temporarily, no man is to be hired at a higher rate of pay than men already working in any department, unless it can be shown that no one in the department can do the work required. Seniority in promotions is to be practised whenever the oldest man can qualify.

Any employee assigned to a position where the work required differs as to quality and kind from his previous occupation is required to serve a probationary period of thirty days, returning to his previous grade of pay if he fails to qualify. Official positions are not included in these regulations. Each time an employee is hired or leaves the service the company agrees to post a seniority list. Except in emergency work lasting not over a week, employees called upon to perform duties of higher grades are to receive the pay of such grades while working in them. Where an employee may be called upon temporarily to perform work in a lower paid class, no change in his rate of pay is to be made, unless the work is intermittent, involving

laying off, when the employee is to receive the pay for the class of work performed.

Seats are to be provided for motormen on all cars where possible. In the selection of runs seniority is to prevail. The association is to have the right to take up the rating of men on the rapid transit lines, but the rest are to be rated as at the time of the signing of the agreement. A general selection of runs is to occur at each rating station whenever the company deems necessary, but at least three times a year, if requested by the association, on or within fifteen days of Jan. 1, May 1 and Sept. 1 respectively. All tables are to be posted two days before the picking time and at least four days allowed in which to pick runs. The time for picking runs is to close twenty-four hours before the timetable goes into effect. Emergency runs may be assigned for a period of seven days. When men are promoted to official positions, in no case are their runs to be held open longer than thirty days. This applies to men off duty for any cause except illness. In case of illness, if there be no immediate prospect of a man's return at the end of thirty days, his run is to be advertised to be bid for by men below on the seniority list operating on the same line. Men returning after illness are to be restored to their old runs.

The present system of division and rating station seniority is to continue, existing ratings being retained in transfers. Loaning of men from one division to another in emergencies is not considered a transfer. The assignments of extra men are to be shown on the bulletin board before 5 p. m., and extra men not listed for work are not to be required to report except in emergencies. Applications for snow work are to be made before Oct. 15, yearly, seniority being practised so far as possible in the awards. All surface car motormen and conductors are liable to perform snow or emergency work. In no case is a man to be required to do more than six consecutive hours of snow work without a meal. Guards while breaking in as motormen on the rapid transit lines are to be paid at the regular guards' rates. All surface car motormen and conductors who have already broken in on equipment now operated by the company are to be paid regular rates while learning to operate different equipment, if they have been in the service six months or more. The present practice of reversing the extra list on Sunday is to be discontinued. Men having six-day runs and no Sunday run, if ordered to report, are to take their position on Sundays at the foot of the extra list. Any blue-uniformed man is to be given, if he so desires, at least one day off in fifteen. So far as practicable, employees doing court work are to receive full compensation.

The transmission line from the new Stevens Creek hydroelectric plant to Augusta, Ga., is approximately 7 miles long, with galvanized steel towers, designed for two circuits, with three wires on each side, the height to the lowest cross-arm being 50 ft. The tower spacing is approximately ten per mile. At one crossing over a lake special towers are provided, 80 ft. high for the span of 860 ft. In the city of Augusta, along the canal, latticed steel poles, spaced 200 ft. apart, are used. The wire for the power circuits is No. 0 seventeen-strand, medium hard-drawn copper, and the ground wire is 5/16-in. seven-strand, copper-clad cable, having 30 per cent conductivity. A telephone circuit is run on the towers, 10 ft. below the lowest power wires, and is transposed at every tower, all instruments being protected by transformers. The power circuits have one complete transportation between the power house and the substation, hung on suspension-type insulators.

Convention of Wisconsin Electrical Association

A Report of the Proceedings at the Concluding Sessions of This Association, an Account of the First Day's Proceedings Having Been Published in Last Week's Issue—The Papers of Special Interest to Electric Railways Which Were Presented Before the Convention Are Published in Abstract

The annual convention of the Wisconsin Electrical Association, which was held in Milwaukee, Jan. 15 and 16, was reported in part in the *ELECTRIC RAILWAY JOURNAL* of last week, and an account of the proceedings at the concluding sessions, together with abstracts of the papers of special interest to electric railways, is presented in the following paragraphs, including the address of C. M. Larson. The discussion on this was published in last week's issue, page 137.

The Friday morning session of the association opened with a report of the committee on overhead inspection, of which F. C. Way, vice-president Milwaukee Electric Railway, was chairman. This committee's report urged the necessity of employing designs, material and workmanship of first quality in overhead construction. It also recommended that all employees should report defects, and that overhead lines should be inspected at regular intervals. While the length and character of the overhead lines would govern the inspection intervals, the committee recommended the following general practice: Overhead lines carrying 7500 volts or over should be inspected every three months, lines carrying 1000 volts to 7500 volts should be inspected every six months, and lines carrying less than 1000 volts should be inspected once a year. Blanks should be provided for the use of inspectors so that their reports can be made a part of the company's permanent records.

In the discussion of this subject, W. E. Haseltine, Ripon; F. A. Vaughn, Milwaukee; P. H. Korst, Janesville; President Winslow and others took part. It was the consensus of opinion that each company not only should inspect its lines at regular intervals but should keep permanent records of such inspections so that they would be available to prove in a court of law the condition of the line at any time. It was stated that at the present time the Industrial Commission of Wisconsin was at work on standard electrical work, but it did not contemplate line inspection. It was therefore recommended that the association develop its own rules for overhead inspections and submit them to the commission for adoption. The report of this committee was received as representing progress, and its membership was continued.

A paper entitled "Voltage Regulation, Its Necessity and How Accomplished," by G. G. Post, electrical engineer The Milwaukee Electric Railway & Light Company, was presented following the discussion of the foregoing committee's report. This paper contained descriptions of the latest types of voltage regulation apparatus, and accounts of their operation and application to the small central stations. Following a brief discussion of this paper on voltage regulation, Prof. S. E. Doane, chief engineer National Electric Lamp Association, read a paper entitled "High-Efficiency Incandescent Lamps and Their Central Station Application." In a few preliminary remarks Professor Doane gave some valuable information on European methods of furnishing current to small consumers at a low cost. He also exhibited one of the new $\frac{1}{2}$ -watt Mazda lamps. A description of the lamp was given in the paper, which also contained a prediction of the ultimate effect of the lamp on the central stations.

The Friday afternoon session of the association was devoted to subjects largely of interest to street rail-

way operators. Owing to the illness of Halford Erickson, member of the Wisconsin Railroad Commission, Madison, his paper, entitled "Some Problems of Public Utility Accounting and Rate Making," was read by F. W. Doolittle, special investigator for the commission. Following the presentation of this paper, President Winslow brought out the fact that but very few companies carried a depreciation fund. Some had reserve funds used for this purpose, but the usual shortage in net required that the managers use all the extra funds they could obtain to keep up the property. President Winslow predicted that ultimately the utilities would be called upon to produce some evidence of a depreciation fund, which, according to Mr. Erickson's recommendation, should contain one item made up of depreciation and maintenance expenditures.

Continuing the discussion, M. C. Ewing, general manager Wausau Street Railway, emphasized Mr. Erickson's theory of making rates as well as its relation to public opinion. He suggested that reprints of the paper be made and distributed to all the public utilities in the State, they in turn to give as much publicity to its contents as possible. Upon motion, the executive committee was instructed to have this and such other papers as it considered of sufficient importance printed and distributed to the member companies.

Following the report of the membership committee by Chairman M. A. Gurney, A. A. Gray, *Electrical Review* Publishing Company, Chicago, in the unavoidable absence of J. M. Wakeman, manager of the Society for Electrical Development, addressed the association urging its members to become members of the Society for Electrical Development.

The report of the nominating committee put in nomination P. H. Korst, general manager Janesville Electric Company, for president of the association; M. C. Ewing, general manager Wausau Street Railroad, Wausau, for vice-president; W. L. Hazeltine, Ripon, for second vice-president, and B. F. Lyons, Beloit, for third vice-president. George Allison, comptroller Clement C. Smith properties, was re-elected secretary and treasurer. The report of the nominating committee was adopted, and the secretary was instructed to cast a unanimous vote for the new officers.

George B. Wheeler, general manager Chippewa Valley Railway, Light & Power Company, Eau Claire, chairman of the committee on the president's address, recommended for the association's thoughtful consideration the appointment of a committee on associations to confer with the Wisconsin Gas Association in the matter of co-operation on legislative and other matters of common interest. This committee should be instructed also to consider whether or not a consolidation of the Gas Association and the Electrical Association into a general utility association would not be practicable and desirable. Chairman Wheeler's committee also recommended that a committee be appointed to investigate what had been done by utility companies in the way of rural extensions. The report of the committee on the president's address was adopted, and the president of the association was instructed to appoint the two committees as recommended.

MAINTENANCE COST OF OLD AND NEW MOTORS

Edward Taylor, General Electric Company, then followed with a paper on "Comparative Cost of Maintenance

nance of Electrical Railway Car Equipment." Mr. Taylor pointed out that it would be fitting at this time to include an accurate, detailed statement showing the comparative cost of modern equipment against some of the older types, say on twenty to thirty roads, but this result was practically unattainable because most roads did not segregate the costs of individual types of motors. However, the few figures already accumulated proved that the higher maintenance cost of the older motors warranted their replacement by modern designs on an investment basis. Mr. Taylor then submitted the table on motor maintenance costs printed below.

This table showed that the saving of the GE-80 over the GE-1000 motor is 0.07163 cent per motor mile, assuming 40,000 motor miles per year, thus giving a saving of \$28.65 per motor. Carrying the comparison still farther, the GE-216 motor saved in cost of maintenance over the GE-1000 \$51.75 per year per motor. Now the GE-216 is not, strictly speaking, a modern motor. He estimated that a modern motor would have a maintenance cost of 0.006 cent per motor mile, or \$2.40 per year per motor. The GE-1000 motor showed a cost of 0.15847 cent per motor mile, or \$63.38 per motor per year. If \$2.40, or the cost of yearly maintenance of a modern motor, was taken from the latter figure the annual saving would be \$60.98.

After urging that operators of old motors should keep records which would permit them to determine what savings new equipment could bring, Mr. Taylor discussed recent improvements in motor design, particularly those made in ventilation, commutation and field control. He also mentioned the use of wooden covers and individual blow-out coils in the new controllers.

MAINTENANCE OF ELECTRICAL EQUIPMENT

The next speaker was Clarence Renshaw, railway engineering department Westinghouse Electric & Manufacturing Company, who read a paper entitled "Modern Versus Old-Type Maintenance of Car Electrical Equipments." Mr. Renshaw compared repair and maintenance practice as the difference between winding up an eight-day clock every ninth day and every seventh day. Ten years ago it was the usual custom on electric railways to make hurried repairs on cars after they had broken down. Experience had shown, however, that it was much easier to replace a loose band before it comes off than to put in a new set of coils afterward. In one case where all but two cars on a system had been grounded because of slush and water it was found that the unimpaired motors had had a coat of insulating paint when lately in the shop for worn armature bearings. This experience showed that it paid to bake

COMPARATIVE COST OF MOTOR MAINTENANCE, AVERAGE OF FOUR OPERATING COMPANIES

	GE-1000	GE-52	GE-67	GE-80	GE-216
Types of motors operated.....					
Number of motors of each type.....	686	148	1390	720	1028
Number of armature defects, per year.....	1733	172	2967	1045	227
Number of armature defects per motor, per year.....	2.52	1.16	2.13	1.45	0.22
Average number of miles made per motor, per year.....	29,444	36,941	31,454	41,350	36,339
Average motor miles made per armature defect.....	11,656	31,730	1,473	28,490	164,569
Cost of repairs to electrical equipment, per motor mile.....	0.23169	0.21774	0.16372	0.12699	0.04252
Cost of repairs to motors only, per motor mile.....	0.14179	0.13326	0.10019	0.07772	0.02602
Cost of inspection to electrical equipment, per motor mile.....	0.04170	0.03919	0.02947	0.02281	0.00766
Cost of inspection to motors only, per motor mile.....	0.01668	0.01567	0.01179	0.00912	0.00306
Total cost of repairs and inspection to electrical equipment, per motor mile.....	0.27339	0.25693	0.19319	0.14980	0.05018
Total cost of repairs and inspection to motors only, per year per motor.....	\$46.65	\$55.01	\$35.22	\$35.91	\$10.56
Total cost of repairs and inspection to motors only, per motor mile..	0.15847	0.14893	0.11198	0.08684	0.02908

Note: The foregoing figures are in cents and fractions, except annual cost, as noted.

The modern equipment was lower in weight per rated horse-power than motors of the older types. Thus a GE-80 four-motor equipment of 160 rated horse-power per car had a total weight of 11,200 lb., whereas the later GE-200 four-motor equipment of the same rating would weigh 8800 lb.

It would, therefore be ultra-conservative to take 4 per cent as the reduction in weight by using the new equipments.

Assuming 0.14 kw-hr. per ton mile for the energy input, a 30-ton car would take 4.2 kw-hr. per car mile. With energy at 1.5 cents per kw-hr. at the car, the cost was 6.3 cents per car mile. The yearly cost at 100 miles per day for 360 days would be \$2,268. On the basis of 4 per cent weight reduction, modern equipment would save \$90.72 per equipment, or \$22.68 per motor per year. The total amount saved by the adoption of the modern motor would be the sum of \$60.98, due to lower maintenance, plus \$22.68 on account of less energy input, or \$83.66.

The cost of the new motor at \$400 less the scrap value of the old motor at \$40 left the new investment at \$360 per motor. The interest and depreciation taken at 6 and 8 per cent respectively made a total fixed charge of 14 per cent, or \$50.40 per year. If, from the total amount saved by lower maintenance and less energy of the modern equipment, the fixed charges were deducted, the final saving over all expenses would be \$33.26 per motor per year, or on a four-motor equipment \$133.64. Furthermore, up-to-date equipment would mean an incomparably better and more reliable service.

and dip armature and field coils at every overhauling.

Reliable operation meant the maximum earning power of a car. If such a car costs \$6,000, interest, taxes and depreciation on it would usually amount to at least \$600 per annum. Hence thirty days spent in the shop would cost \$50 for these items alone. The loss of revenue would be much greater, however, as it would usually approximate \$15 to \$20 a day. It should not cost more than \$200 a year to maintain the electrical equipment of a car, and even if this figure was increased 10 per cent to 20 per cent the total charge would be small in comparison with the interest charges and loss of revenue due to poor maintenance. When an old armature is damaged it might seem cheaper to repair it with only one or two new coils instead of completely rewinding it at, say, a cost of \$20; but in a month or two the partly repaired armature was likely to get into trouble again, whereas the completely repaired armature would serve for years.

Another trouble of old-time maintenance was to examine and repair only the parts reported defective, but since a large part of the expense was merely for bringing the car into the shop it was wiser to put all of the equipment in first-class shape before sending it out again. Insufficient testing facilities were also a drawback which could be readily avoided because a.c. lighting was now available almost everywhere for short-circuit tests.

Shop conditions as to labor also had an important bearing. Good work must not be expected in a dirty and cold building without ample facilities. Reliable operation and economical maintenance, furthermore,

could be secured only with intelligent men. By providing reasonable physical accommodations the railway could enlist a spirit of loyalty and enthusiasm. Economy in the use of materials would be fostered by posting the prices of the material used, and care in inspection could be often secured by showing the percentage of inspection failures. Railway shop records had proved of the greatest value in promoting the improvement of equipment by the manufacturer.

Mr. Renshaw did not believe that home manufacture of coils and other parts was good economy. In one case a large company had discontinued such manufacture because it found that careful attention to store-room conditions readily compensated for the convenience and quick production of home manufacture. Again, the makers of railway equipment were now offering better service than ever before in supplying, in addition to complete spare parts, the same tapes, cloths, bearing metal, solders, paints, varnishes and other items which had been used in the original construction. New materials were also being brought out. One of the latest was arc cement by means of which arc barriers in controllers and switch groups may be repaired when burned through instead of being scrapped.

EXHIBIT AND BANQUET

In order that the members of the association might be advised of the work being done by the Standards Laboratory of the University of Wisconsin, working in conjunction with the electrical engineering division of the Railroad Commission of Wisconsin, exhibits of the various types of testing equipment and account forms were displayed. These exhibits gave evidence of the remarkable progress that had been made during the past year in the construction and operation of testing equipment. In connection with the exhibits the latest improved methods of testing meters, etc., were explained by representatives of the university and the Railroad Commission.

On the evening of Thursday, Jan. 15, the members of the association gave a theater party and informal banquet. At the latter function Ernest Gonzenbach, formerly president Sheboygan Railway & Electric Company, acted as toastmaster, and C. E. Searles, of the Allis-Chalmers Company; S. A. Hobson, of the McGraw Publishing Company; C. F. Axford, Green Bay; P. T. Bowler; George Allison, secretary and treasurer of the association; L. E. Gould, business manager ELECTRIC RAILWAY JOURNAL, and George E. Wheeler, general manager Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis., made brief addresses.

STREET RAILWAY TRAFFIC SURVEYS IN RELATION TO RAILWAY OPERATION, MANAGEMENT AND REGULATION

BY C. M. LARSON, CHIEF ENGINEER WISCONSIN RAILROAD COMMISSION

In general the type of traffic data required by the manager to assist him in the management of his properties is identical with the data required by the operating department and by the regulating body, whether commission or city council. The manager desires to obtain at all times as large a net income as possible from the system. This, of course, involves the highest possible gross earnings coupled with the lowest possible operating expenses. The responsibility of managing the property to conform to the public needs and requirements is always present, and the manager must meet all complaints relating to service and rates.

The commodity for sale by a street railway company is transportation. If the manager is to be sure that a maximum amount of this commodity is being disposed

of, he must know how much business may be expected of each community and satisfy himself that the service supplied at all points within the zone of operation is such as to meet the demand for transportation in a reasonable and satisfactory manner. This involves a knowledge of the type of residents in each community, of their places of employment and of their riding habits in general. He must know that each community is receiving a fair treatment as compared with all other communities. If his operating ratio is high or low, he must know the reason for this condition. His financial statements will show what the condition is, but they leave the manager quite helpless as to what department is causing the condition or where the trouble lies and how it may be remedied.

DUTIES OF RAILWAY OPERATING DEPARTMENT

Upon the operating department falls the duty of preparing schedules to meet the demands of traffic with all its seasonal, daily and hourly variations. It is also the duty of this department to deliver the passengers to their destinations at the smallest expense consistent with reasonable service requirements. To this end it is necessary to know just how many cars should be operated to meet these requirements and just how to place them most advantageously. Furthermore, the zone of operation of each car must be so determined that there is a minimum of dead car mileage, especially at the ends of the lines. The people are served better and at lower cost if the equipment is operated only where and when needed, and unless the operating department is familiar with every detail relating to traffic conditions on each part of each line, it certainly cannot operate the cars at a high percentage of efficiency. Casual observations by employees are useful but hardly sufficient for the purpose.

DUTIES OF PUBLIC REGULATING BODIES

Upon the regulating body of to-day falls the duty of requiring that the service shall at all times be reasonably adequate and satisfactory for the community's requirements. This sentence alone conveys to such regulating body powers that are extremely broad and far-reaching. It means that schedules shall be made and operated in such a manner that each individual and each community shall receive just and fair treatment in the matter of service. It means that there shall be no discrimination between individuals or communities, but that the needs of each shall be considered from a perfectly unbiased point of view. It also places upon the regulating body the task of protecting the company's interests as well as those of the community, for in no other way can the service be kept adequate at all times.

There are fundamental defects in the principle of regulation of street railway service by a municipal council. Each member of the council is personally interested in obtaining certain results. No matter how honestly he may try to eliminate all such interests from consideration in his actions on service matters, he is but human, and furthermore he is the representative of a certain community whose special interests he is expected to enhance. He cannot ignore these interests. Again, he is not an expert in street railway operation or management. No matter how much he may desire to be consistent in his actions, the fact remains that he is necessarily ignorant of many of the principles involved. Even if experts be employed to advise the council, there still remains the condition recognized as fundamentally unjust the world over, namely, a judiciary body whose members are necessarily interested in the results of the decision.

Regulation also involves the reasonableness of speed of cars and of giving consideration to users of the public streets as well as patrons of the street railway. Reasonable facilities must be maintained for boarding,

transferring, etc., and proper provision made for the comfort and safety of the passengers.

CHANGES IN OPERATING CONDITIONS AND PUBLIC ATTITUDE

It will be urged that everybody knows the duties of the manager and of the operating department, and that nothing unusual has been presented. This is true. It is not the purpose of this paper to point out to street railway men what their duties are, but let us see if it may not be possible to obtain results in management and operation which will justify the application of principles or processes not heretofore considered.

Let us trace the history of the operation of an imaginary street railway system in one of the larger cities of this country. Years ago a simple street car schedule was sufficient to meet the not too exacting needs of public travel. A schedule providing a certain time interval between cars for the day with a few additional cars for the rush-hour service was considered sufficient for all purposes. The demands of business were not then so exacting. People had more leisure. Street cars operated by power were such an improvement over previous modes of travel that the service supplied by the management was accepted and patronized without question. As time passed and it was found that the business was remunerative the man with political or personal influence soon made his appearance and through persuasion or similar means sought to obtain favor in service or rates to certain communities or localities in which he had interests. At first investigation of the company's condition convinced the management that these favors could be granted without serious financial results, but during the next few years these cases multiplied until the schedules and rates on certain lines were more the result of outside influence than of common sense and bore no semblance of consistency when compared with other lines. Furthermore, as certain lines were favored, others had to suffer to a corresponding extent in order that the ledger might show a balance on the right side, for such methods of operation very soon swept away all reserve. Naturally complaints soon began coming in of the crowded condition of the cars on some lines during certain periods of the day. To increase the service still more would further deplete the financial reserve, and besides inspection of operating statistics showed that already more cars were being operated by the company than appeared to be warranted by the operating income. Why should people be complaining about the service when so many cars were being operated in comparison with the number of persons desiring to ride on them?

Sometimes the manager even pointed out to those making complaints that his cars were operating at a loss during a large part of the time. He had no control over the actions of his patrons, and if they chose to ride all at one time and not make use of the service as he supplied it, how was he to be blamed for the inconvenience they might suffer?

Something had to be done, however, and often additional service would be supplied though the result was financial loss. Already agitation for some kind of regulation that would compel the company to render better service was beginning to be felt. This agitation became more and more pronounced as years went by.

The American public began to awaken to a need for saving time. "Time is money" became the slogan, and of course the street railway company was immediately called upon to assist in conserving the public bank account by reducing the waste in time. Demands for better service became more and more insistent and were soon coupled with demands for lower rates. Step by step the public came to accept the theory that public utilities, including street railways, are to be considered

as servants of the public, and as such should be required to give reasonable and adequate service at the lowest rates consistent with such service. The various stages of development which have resulted in this general attitude need not be discussed here. It is a well-known condition, widespread at the present time. It is sanctioned by legislatures and courts and must be recognized in any study of the subject of service. Attempts to evade this issue are likely to result simply in more and more drastic legislation until regulation satisfactory to the public is obtained or until the utilities become public property.

Now to revert to the example of a street railway above mentioned. The manager at present finds himself surrounded by conditions as above described. He is confronted with the public demands on one side and a growing deficiency in his finances on the other side, a condition that is certain to result disastrously unless some relief is obtained. The old-time methods of old-fashioned physicians are not adapted to modern treatment of diseases, especially of modern diseases. The trouble with the street railway is that it is still suffering from an old complaint which old methods could not entirely cure, and to complicate the case an entirely new disease has now attacked it and new methods of diagnosis and treatment must be employed.

SCIENTIFIC METHODS

Fortunately parallel with the development of exacting demands relating to service and rates has been the development of scientific methods of management in many lines of endeavor. Public utilities have been well to the front in this development along with other industries now recognized as private, as distinguished from the quasi-public industries of which the street railway is a member. The latter, however, has hardly kept pace with other utilities in the development of scientific methods. The man who stated that the railroads of the United States were wasting a million dollars a day may or may not have stated a fact, but he echoed a sentiment broadcast throughout the country for conservation of energy and elimination of wasteful methods. No longer may the losses incident to the too generous treatment of one locality be shifted upon another community not so able to protect itself. No longer may the public be burdened with losses resulting from the ignorance of managers or operators, or from the application of old-time methods that have no place in modern industry.

The modern manager has at his disposal the means of obtaining exact data relating to traffic conditions and service requirements for every part of each line under his control. If he so desires, these may be plotted into charts that will show at a glance to any intelligent person just how one particular community fares compared with any other. These charts show him just where the operating department is wasting the company's money and why certain lines are operated at a loss when people are constantly demanding better service. By reference to them he discovers that his patrons are not so unreasonable as he had supposed. True, he finds from his operating report that he has operated 2000 car miles a day over this line, that considering the revenue and expense of operation there is no profit in operating this line, but upon a closer inspection of the chart he finds that a very large percentage of the cars have been running at a time of the day when nobody needs them or cares particularly whether they are operating or not. Simultaneously he discovers that during a correspondingly long period of the day a great many more persons were desiring to ride than he has been providing for. He observes that a uniform schedule has been operated all day with additional cars during

the rush periods, while as a matter of fact more than twice as many people ride in the afternoon as in the forenoon. He also discovers that a very small proportion of his patrons live within a mile or two of the end of the line while his cars have all invariably gone entirely to the end to make the turn, with a consequent large number of car miles operated to little useful purpose. His charts also show him that often there are relatively long periods when no service whatever is supplied, when interruptions have occurred. He may have been informed of this by the operating department, but its real significance is only shown when plotted in this form.

MAKING THE DIAGNOSIS

When a person is seriously ill the physician often discovers the causes to be relatively trivial matters which the uninitiated would not in any way associate with the disease.

It is the opinion of the writer that many of the real causes for complaint of street car service are the lack of attention on the part of the officers or employees of the operating companies to seemingly unimportant details which would represent little or no cost to the company or effort on the part of the employees, but which are doubly trying on the public. Most of the patrons are business men and recognize the practical limitations to perfect service, but, being business men and good business men, they also recognize the lack of business judgment displayed in not trying to please the public when it costs little or nothing to do so. They know that it costs money to run additional cars and they know that it costs money to keep track and equipment always in good condition; but they are equally certain that it does not cost the company anything to extend certain courtesies which they have a right to expect and which are invariably extended to the patrons of their own business who can transfer their patronage if they so desire. A person does not resent riding in a well-filled car so much if he feels that the company is honestly striving to make him as comfortable as possible and is always willing to listen to reasonable suggestions.

Rule No. 55 of the American Electric Railway Association reads as follows:

"Information to proper persons only: Motorman or conductor must not under any circumstances give any information whatever concerning any accident, delay, blockade or mishap to any person except to a properly authorized representative of the company."

The committee of this association which is revising the old rules recommended that the following sentence be added:

"Conductor may when necessary advise passengers as to general cause and probable duration of a blockade."

This additional sentence was voted down by the convention at Atlantic City in October, 1913. If there is any reason for such action other than careless disregard of public interests and convenience or a premeditated desire to annoy patrons who have no choice but to take what they get, I have yet to hear it. On many occasions when the employees know that a blockade will last for a considerable time, if they would tell the patrons the facts it would save a great deal of annoyance and loss of time. This is simply a sample of rules and practices which operating companies direct or permit their employees to follow which have no other result than to convince the public that their interests receive small consideration at the hands of the street car company.

Most of these minor items are of such a nature that it is quite impossible to bring them to the attention of the proper regulating authorities, and their accumulation finally engenders in the mind of the public a feeling that the street railway company has something coming

to it. A blow is therefore struck at the only vulnerable spots, namely, service or rates or both.

But to return to the subject in hand. Enough has been said to convey an idea of what is necessary in the way of an investigation to determine what is wrong in the case in question. If the system is of considerable size, a traffic study department should be established under the direction either of the manager or the operating officer. If the system is small, this officer may himself have direct charge of the details of the work provided he is thoroughly familiar with the nature and scope of the investigation to be made. This department should not be a spasmodic affair, dependent for its existence upon a shortage of work in some other department. It should be permanent and should be prepared to supply to the manager or operating department reliable information of traffic conditions for any season, day or hour and upon any point of every line.

There are, of course, more ways than one in which data of this kind may be collected, and the method best adapted will readily suggest itself to each company, but in whatever way this is done its collection should be under the direction of the head of the traffic study department in order that results may be consistent and trustworthy. Checks of accuracy should often be made and the men who take the data should receive thorough instructions in the methods which are best calculated to insure accurate results. It is usually desirable to record all data in bound pocket field books, though printed cards may be substituted if desired.

CHARACTERISTICS OF EACH LINE

It is common knowledge that ordinarily there is a certain point on each line near the beginning of the discharged area where the number of passengers on the cars is usually a maximum. This point is approximately the same for travel in both directions and should be determined quite accurately as this is the point at which future observations will be made which will determine the number of cars necessary for operation of the line during both the rush and the non-rush periods.

Other critical and important points along the line are those where the number of passengers is so small as to justify the termination of part of the service at these points. In collecting these data a count of all passengers on all or a large proportion of the cars on the line should be made at predetermined points at intervals of a few blocks. A count at every block would be preferable in some respects, but this would require the presence of a man in addition to the conductor, while if the count is made only at intervals of several blocks, the conductor can usually do this in addition to his other duties, except perhaps on heavy lines or during the busiest periods of the day. The count should cover a long enough period to obtain normal results with twenty-four hours as the minimum.

The figures thus obtained can be tabulated or plotted as shown on the accompanying Fig. 1. This plate shows the typical curve for the heaviest period in the morning and the same for the evening. On this plate is drawn a horizontal line showing the average seating capacity of the cars, and it will be noted that with a complete set of such charts it is a simple matter to determine the point of maximum load and the points at which part of the service might be terminated. This latter determination cannot, of course, be made upon a study of the chart alone. A general knowledge of the riding habits of the residents in the neighborhood together with a careful study of transfers and transfer points must be coupled with the predetermined standards of service before such a point is finally established.

By use of the data thus collected it is also possible to obtain a fairly accurate estimate of the average distance passengers are hauled for a single fare.

MAXIMUM TRAFFIC RECORDS

Having determined the point on the line where traffic is heaviest, accurate counts should be made covering a period of several days to insure normal results. For this purpose it is desirable to station trained checkers at the point in question with instructions to collect the

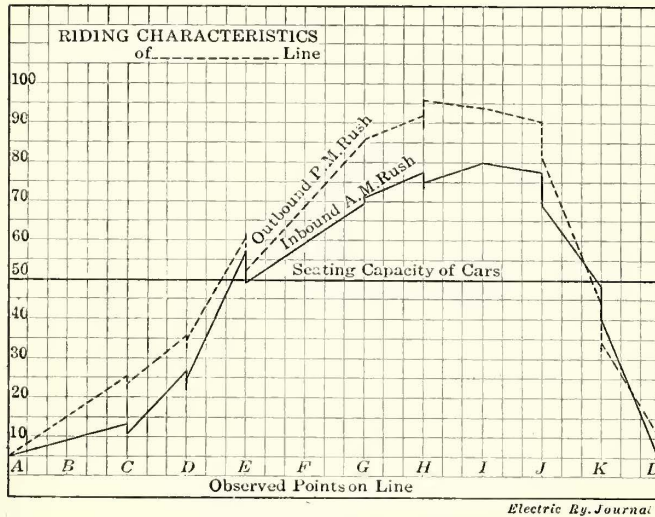


Fig. 1—Variations in Traffic Density at Several Points on a Line

following information for each car in both directions, the data for each direction being kept separately, preferably on opposite pages of a notebook: (a) route on which the car is operating, (b) destination, (c) origin when possible, (d) run number when possible, (e) car number, (f) arriving or leaving time, (g) total number of passengers, (h) such other information as is desirable.

The field book should be ruled in columns with proper headings, and in case the cars come too often to permit of collecting all the data only such as is positively necessary should be required; but in no case should a car be permitted to pass without a note to that effect even though no data are taken.

It has been found that if the checker is familiar with the seating capacity of all types of cars he readily becomes efficient in estimating the total number of passengers, basing his estimate on the relation between the vacant seats and those occupied, or upon the total number standing added to the seating capacity, after satisfying himself that all seats are occupied. Usually two checkers can cover one point for the entire day, but in cases of very heavy traffic assistance is needed during the rush periods. The data thus collected should be turned in for tabulating or plotting at the end of each day if possible, and any irregularities in schedule should be followed up and causes noted.

Weather conditions are important and should always be noted for all parts of the day, and note should always

be made of any abnormal occasion such as ball games, park music, etc., which might affect the normal riding characteristics.

Having obtained the data from the checkers, this information may either be tabulated or plotted in the form of a curve or chart with all necessary notation to insure a true record of all pertinent facts. While to the engineer the latter method is usually desirable, others may prefer that the results be put in tabular form. These results may either be plotted by single days or the average of the total number of days observed may be included. In plotting each day's results it is desirable to represent the number of passengers on each car by a vertical line drawn from a base and to space these lines to represent the time interval between cars. Cars bound for different destinations, or originating at different places, may be represented by different types of lines as desired. Such a chart is shown on the accompanying Fig. 2 and represents part of the actual observations for two days on one of the lines in Milwaukee. In plotting the average results obtained over a number of days it is necessary to average the number of passengers by short periods, preferably of fifteen minutes, and to represent the average number of passengers per period by a horizontal line extending across the space allowed for each period. Such a chart is shown on the accompanying Fig. 3, which is the average for several days on the same line as is shown on Fig. 2. Upon this same chart can then be plotted the average number of seats furnished by the operating company during the corresponding period, and, if desired, the number of seats required according to any predetermined standard can also be plotted on this same chart. Here, then, will be a complete record of the traffic, the service rendered, the service required and such

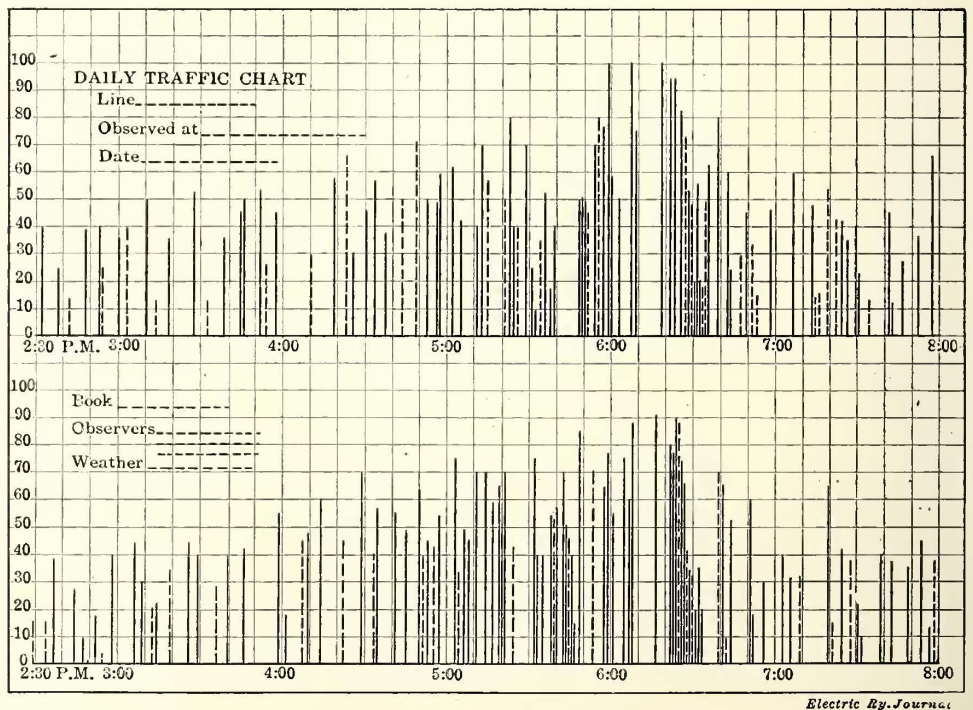


Fig. 2—Intervals Between Cars of Different Routes as Represented by Full and Broken Lines, and Variations in Their Loads

other miscellaneous data as bear on the case. Obviously this record is applicable to conditions for a certain season only. Such a record is necessary for week days, for Saturdays and for Sundays, as well as for other seasons of the year when the traffic is not of the same magnitude. There are, of course, variations in the traffic due to temporary weather conditions. These can usually be

determined by general observations and the necessary steps taken for the required variations in the service.

Similar observations should be made at such points along the line as may be determined by circumstances. The principal purpose of these latter observations would be to furnish a basis for turning of cars which it is not necessary to operate the entire length of the line. The plotting of the data will be made in the same way as described for the point of maximum riding.

STANDING BY PREFERENCE

Standing by preference may refer to two different sets of riders. Certain persons may prefer to stand in a car the seats of which are all taken rather than wait for a possible seat in a car following. There are also certain persons who prefer to stand even though seats are available, provided they are permitted to ride in either the front or the rear vestibule. The proportion of last-described passengers is quite large on certain types of equipment, especially if smoking is permitted in the vestibules and prohibited in the body of the car. As this preference may have a bearing on the amount of equipment necessary for satisfactory service, it is essen-

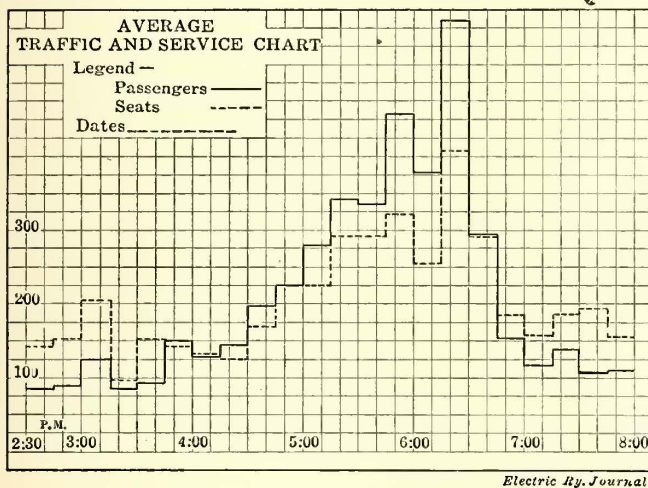


Fig. 3—Relation Between Passenger Travel and Seating Capacity Throughout the Day

tial that checks be made. This can be done by careful count of persons standing when part of the seats are vacant, observing at the same time the total number of passengers riding, for the purpose of obtaining a percentage. The number of seats in the car must also be recorded as the ratio of persons standing is affected to some extent by the number of seats vacant. Recent observations have shown that for cars with cross seats the ratio increases quite suddenly when about 50 per cent of the seats have been taken; that is, when there is an average of one person on a seat which normally is large enough for two. It is highly important that a complete description of equipment, company rules, etc., which in any way affect this habit of standing must accompany any data of this sort, for it is obviously useless, for instance, to expect to find persons standing by preference on a closed car on which smoking is prohibited and where passengers are never permitted on the front platform and only on the rear platform when the body of the car is so full that no more can enter.

USES FOR TRAFFIC DATA

It is not necessary here to go again into detail as to uses to which these data may be put. Too many schedules have been made in the past on anything but scientific bases. As stated above, the results demanded of the present-day manager will no longer permit him to operate his railway by rule of thumb. The public is an interested party on one side and the manager, repre-

senting the interests of his stock and bond owners, is the interested party on the other side. Both must be recognized, and in order that full justice may be done to all, and that modern conceptions of the necessity of using all known means for the avoidance of waste and loss may receive due consideration, modern and scientific methods should be used to determine what is fair as between the parties interested, and what most nearly conforms to modern ideas of true economy. With the data collected and tabulated or plotted in serviceable form the manager or operating officer will at all times know whether or not he is doing justice to the position he holds. He will so regulate the service that there need be no appeal to a regulating body with the consequent long and expensive investigation, and if such appeal should be made he is in excellent position to present the facts and reduce the investigation by a corresponding amount.

As a sample of a schedule made up to give service as required and still avoid dead car mileage the following table shows the variations in headway on the Court Street line in the borough of Brooklyn, New York City, as taken from the testimony of George L. Fowler before the Railroad Commission of Wisconsin, May 6, 1912:

Time	Headway, Minutes
5:00 to 5:36 a.m.	7.2
5:36 to 5:48 a.m.	6.0
5:48 to 6:00 a.m.	4.0
6:00 to 6:18 a.m.	3.0
6:18 to 6:52 a.m.	2.0
6:52 to 9:00 a.m.	1.6
9:00 to 9:12 a.m.	3.0
9:12 a.m. to 3:26 p.m.	4.0
3:26 to 4:00 p.m.	3.0
4:00 to 4:30 p.m.	2.0
4:30 to 6:12 p.m.	1.6
6:12 to 6:26 p.m.	2.0
6:26 to 7:00 p.m.	3.0
7:00 to 8:00 p.m.	3.2
8:00 to 11:00 p.m.	6.0
11:00 p.m. to 12:50 a.m.	15.0
12:50 to 1:08 a.m.	18.0
1:08 to 4:28 a.m.	20.0
4:28 to 5:00 a.m.	16.0

TESTING FOR SEAMS IN A HYDROELECTRIC PLANT FOUNDATION

As a preliminary to foundation work in a new hydroelectric project near Augusta, Ga., test holes were drilled to determine the character of the granite ledge on which the dam was to be built. To determine the extent of seams in the rock dye was forced in under pressure, the color showing wherever there was a flaw in the stone. This method proved very satisfactory in that the character of the ledge was known in advance, and this prevented unnecessary drilling and excavation. The tests disclosed the presence of several dangerous, smooth, horizontal seams, to which it was necessary to excavate the ledge in order to prevent possible uplift and sliding of the dam. These test holes, as well as any other holes where necessary, were grouted under 100-lb. air pressure before construction commenced. In addition, to prevent possible sliding, trenches were cut in the ledge. It is believed that by these methods a very secure foundation was obtained at a minimum cost.

Stockholders of the Bahia Tramway, Light & Power Company, Bahia, Brazil, have received a circular announcing that the municipality has no immediate prospect of raising funds to carry out the terms of the offer made last June for the purchase of the company, which was approved by the holders of the debentures. A provisional contract has been entered into between the directors of the company and the municipality, providing for an issue of external gold bonds, the proceeds to be applied to the payment of the amount due the debenture holders under the previous contract.

Papers Read Before the American Wood Preservers' Association

The Annual Meeting of the American Wood Preservers' Association Was Held in New Orleans Jan. 20, 21 and 22
—Abstracts Are Presented of Papers of Interest to Electric Railways

STUDIES OF EXPERIMENTAL TIES

J. H. Waterman, superintendent of timber preservation Chicago, Burlington & Quincy Railroad, read a paper entitled "Some Facts Which I Have Gathered from Observation and Inspection of Experimental Ties." Four years' observation of 26,000 ties on his system treated with various processes still did not permit him to state which of the methods was best. The treatment must be such that it would keep the tie sound just as long as it was fit mechanically. In 1900 550 red oak ties treated with zinc chloride had been placed on a 12-deg. curve of the Deadwood line near Mystic, S. D., and no tie failures occurred on it until after twelve years' service. Eighteen were taken out during 1912 on account of rot and three were taken out for laboratory tests. He had no doubt that 80 per cent of the ties would give more than fifteen years' service. Equally good results had been obtained with pine ties laid on 14 miles of track between Sydney, Neb., and Petz, Col., in a very dry climate. All ties had been treated at the company's plant with $\frac{1}{2}$ lb. of zinc chloride per cubic foot. Only the ties on curves were protected with tie plates. On 10 miles of track between Concord and Jacksonville, Ill., 35,000 red oak ties treated with zinc chloride had been placed between Nov. 15, 1903, and Feb. 5, 1904. Of these ties 21,000 were still in service, more than 90 per cent giving nine years' life and 60 per cent ten years' life. Many of the ties which had been taken out were not decayed but were simply worn out mechanically because they had not been plated when laid. Mr. Waterman did not assert that the zinc-chloride treatment was the only good one but said that it had proved very satisfactory to his company. He believed that it was a crime to use inferior wood without treatment of some kind.

SPECIFICATIONS FOR WOOD PRESERVATION

E. L. Powell, vice-president American Creosote Works, described "Treatment of Piling and Timber According to Conditions of Use and Exposure." He believed that wood preservation specifications should be drawn up in closer co-operation with the wood-preserving company than was now the case. The wood preserver should control treating methods at least to the extent of seeing that no material was treated under improper specifications and that the conditions under which the material was to be used had due thought. It was dangerous for engineers to follow printed specifications which in most cases had been drawn up for different climatic conditions.

YALE FOREST SCHOOL

Samuel J. Record, assistant professor of forest products Yale University, described the work of its forest school. At this time there were 170 technical men in the United States Forest Service who had received their training at Yale. The school conducts field work not only on its own land in New Haven but in a number of forests owned by others throughout the country. The field work at New Haven is conducted on the lands of the New Haven Water Company, which comprise 9000 acres. Part of this property has been under management by the school since 1900, so that good illustrations of what forestry will accomplish are already available. As indicating the wide variety of conditions under which the students obtain their train-

ing, Professor Record said that the class of 1913 had its final field instruction on the lands of the Southern Lumber Company, Warren, Ark. The work was divided as follows: classroom, 658 hours; laboratory, 354 hours, and field work, 1238 hours. The school did not undertake to train the men specifically for the wood-preserving industry but did give consideration to this subject so that its graduates would have entire sympathy with its objects.

CREOSOTED WOOD-BLOCK PAVEMENTS

R. S. Manley, president Creosoted Wood Block Paving Company, New Orleans, La., discussed "The Construction of Creosoted Wood Block Pavement." The objection to the stickiness of bituminous filler in warm weather was groundless because the proper filler had the consistency of rubber and could be taken and bent in the fingers without soiling them.

THE PROTECTION OF TIES FROM MECHANICAL DESTRUCTION

Howard F. Weiss, director Forest Products Laboratory, presented a paper on "Protection of Ties from Mechanical Destruction." Many varieties of wood and metal plates had been advocated to protect ties. Wooden plates were rather extensively used abroad, but so far American tests had not been satisfactory. Wooden plates offered little or no reinforcement to spikes when these were subjected to a lateral thrust; consequently the spikes were more likely to bend and rail spreading was more likely to occur. In some tests where wooden plates were attached to the ties they actually became embedded in them. If the tie was slotted so that the plate could be inserted with its upper surface level with the top of the tie, many of the objections would be overcome, but this treatment increased the cost of preparing ties for service and also weakened them. Metal plates could be classed as of the pronged or ribbed type and flat. The chief disadvantages of the former was its tendency to gouge into the wood and at times to destroy it completely. Thus, the untreated interior of the tie was exposed to the weather, and decay was readily admitted. Flat plates did not have this objection but were troublesome at times in that they became loose and rattled under the rail. Furthermore, they simply rested upon the tie and offered no reinforcement to the tie against lateral thrusts. One point which had been overlooked was that the size of the plate should be dependent upon the kind of tie with which it is used. The plate should have sufficient surface area so that the crushing action of the rail would be distributed as widely as possible, and it should have sufficient thickness to prevent buckling. That track was best laid which made each tie carry its proportionate share of a passing load.

The Forest Products Laboratory had made more than 2000 tests on about seventy species of timber to determine their resistance to crushing when the force was applied at right angles to the ground. The tests made with green wood showed that variations of 20 per cent in the strength of some species of wood were not uncommon. The tests also showed that except in the cases of ties treated with crude oil the preservative process had little effect on the strength of the timber, assuming, of course, that the ties were not injured by excessive heating or other causes during treating.

While the cut spike was still the most used, the screw

spike was growing in popularity. In many tests made at Purdue University, some of which were conducted by the Forest Service, it was found that screw spikes had from one and seven-tenths to three and four-fifths times the strength of common cut spikes against pull, and from one and one-fifth to two and two-fifths times the lateral resistance of the common spike. In round numbers, one screw spike was about as efficient as two cut spikes in holding the rail to the tie. Screw spikes, of course, did not injure the fibers of the wood the way that cut spikes did. The large number of ties cut from several woods like loblolly pine had encouraged some roads to experiment with dowels made of creosoted red oak and screwed into the tie. The spike was then driven or screwed into this hardwood dowel. This method insured a very firm grasp of the rail to the tie. Should the spike become loose, the worn hardwood dowel could be unscrewed from the tie and a new one inserted. This method was expensive and also tended to weaken the tie if the ballast was not kept in very good condition. However, the practical tests had yielded very satisfactory results.

The adzing and boring of ties were features of comparatively recent origin in this country. As most cross-ties now in use were hewn, the problem of securing a uniform bearing of the rail or tie-plate on the tie was of great importance. Unfortunately common practice consisted in adzing such ties after they had been treated. This removed a preserved layer of wood at the very point where its protection was most needed. For best results it was absolutely essential to have the rail or tie-plate bear uniformly on the tie, and unless the ties were adzed, this result was rarely accomplished. Adzing, therefore, was strongly recommended, particularly on hewn ties. The proper time to adze was before the ties were treated, and not after. Another feature, in too little use at present, was the boring of ties for the installation of spikes. When screw spikes were used it was absolutely essential to bore a hole for their insertion. If this hole was bored after the tie was treated, the unprotected interior was exposed to decay. Boring should preferably be done before the ties were treated. Even with the ordinary cut spike such boring was of direct value. Mr. Weiss submitted a table showing that spikes driven into a hole $\frac{3}{8}$ in. in diameter had a greater holding power than spikes driven into the untreated red oak tie not bored; thus, an ordinary 9/16-in. square spike driven without boring had a resistance to pull of 7613 lb., while a smaller spike pointed on four sides driven in a bored hole $\frac{3}{8}$ in. in diameter had a resistance to pull of 8178 lb. This proved that when a spike was driven into a bored tie the fibers were not crushed as much as when no boring had been made.

FUTURE TIE MATERIAL IN THE UNITED STATES

H. H. Gibson, editor *Hardwood Record*, Chicago, offered a paper entitled "Future Tie Material in the United States." He said that even if the demand for new tracks was ignored the call for ties for repair work would continue and must be met. Seven cross-ties were used for maintenance for every one that went into new lines. Of the 126,155,000 ties bought by steam and electric roads in 1911 only 11,041,324, or 8.2 per cent, went into new construction. In round numbers, 125,000,000 cross-ties were needed yearly. This was equivalent to 4,000,000,000 board feet, and ties cost the railroads approximately \$15 per 1000 ft. B.M. Practically the entire quantity was cut from nine or ten kinds of wood, chiefly oak, pine, Douglas fir, cedar, chestnut, cypress, tamarack, hemlock and redwood. Specifications sent out by the principal railroads listed seventy-eight varieties of wood as acceptable for ties, but many of these were simply subdivisions of the oaks and pines.

The forests of the United States contained more than 500 species of wood, but by far the greater number of them were unfit for tie service. Of the present cutting for ties, one-half was oak and about one-half of the remainder was pine. Both white oak and Southern yellow pine, the chief sources of ties, were being cut faster than they could be renewed. Much Northern white cedar remained, but its growth did not half make good the cut, and any increased demand would quickly bear results in lessened supply. The same fact held for hemlock and tamarack. Chestnut was a substantial tie material, but was now passing through a crisis on account of the blight. Douglas fir, Western yellow pine and redwood were not available for most roads because the wood was needed for other purposes, and the cost of hauling it 2000 to 3000 miles would be prohibitive. Railroads must find ties nearer home if possible. While it would be many a year before railroads would be unable to get some kind of ties if they were willing and able to pay the price, the time was not far off when the manner of providing ties would need radical revision. This revision had already begun. Its basic principle did not consist so much in searching for new woods as in treating with preservatives the old woods to make them last longer. The suggestion to use the semi-tropical hardwoods of southern Texas and Florida had been honestly made but gave no consideration to the fact that ties piled along the Rio Grande or on the southern coast of Florida are a long distance from the places where they are needed. Furthermore, all of the semi-tropical woods from Key Largo, Fla., to Devils River, Tex., would hardly make enough cross-ties to last the railroads of this country one year.

Some of the country's leading railroads had anticipated tie shortage some years ago and had undertaken to plant trees and grow the necessary timber. The move was commendable and deserved better success than attended it. In the first place, not enough planting was done to make a drop in the bucket, even if all the trees had prospered. However, in the East the planted locust was eaten up by beetles, and the chestnut was threatened or attacked by blight. In the South the catalpa was a fizzle, and the eucalyptus plantations on the Pacific slope were still in the experimental state. The reasonable thing to do was to treat all cross-ties with preservatives to make them last longer. By doing this the demand could be cut down nearly one-half. Preservative treatment had been tried and had proved satisfactory. In 1912 the United States had 112 treating plants, of which twenty-two were operated by steam railroads. In 1911 31,141,231 cross-ties were treated in the United States. Of this number 11,606,392 were Southern pine, 9,433,002 oak, 3,628,706 Douglas fir, 1,789,026 Western pine and 1,182,095 gum. A practically worthless tie wood like gum, beech, elm, white pine, sycamore and hickory made good ties after being passed through the preserving tanks. In this direction lay the hope of the situation, because ties could be made of timbers heretofore regarded as scarcely worth cutting. Very soft woods, like buckeye, aspen and white pine could be used for ties if plates were added to prevent rapid wear. Viewed in this light, the situation was not particularly discouraging because a practically clean sweep could be made of all ties in a tract, provided they were of suitable size. Some of the species which held out promise as sources of ties because they grew rapidly, reproduced readily, took preservative treatment easily and had extensive ranges were loblolly pine in the South and white pine in the North, willow oak in the South and red oak in the North and the cottonwood and willow in the South and Middle West. These were not the only woods but they were important. In the far West the tie problem was not serious, but nevertheless

preservative treatment was as essential there as in the East. It might be safely predicted that before many years few untreated ties would be laid anywhere in this country.

METHODS OF KEEPING TIE RECORDS

E. T. Howson, engineering editor *Railway Age Gazette*, presented a paper on the "Methods of Keeping Tie Records." He gave a tabulation of the methods used by twenty-eight steam railroads. Owing to the difficulty of securing accurate records of all ties from the average section foremen, it was becoming generally realized that a more accurate system of collecting data was necessary. The Chicago, Burlington & Quincy Railroad was the first to discontinue keeping a record of all ties and to substitute test sections with ties properly marked and inspected at regular intervals by competent men. On the Santa Fé system the monthly report of all ties renewed on similar test divisions had been made since 1910, and every three months an inspector from the timber-treating department examined all ties removed from such sections, in addition to which he made a close annual inspection of all ties on these divisions. Special care should be taken to secure No. 1 ties for test sections. It was also advantageous, though not essential, to place 100 ties of each kind together so that records would be at once available in terms of percentages and at the same time no one set of ties would be required to carry a portion of the load of other kinds of ties which might fail early.

The most common means of identification was by the use of large-headed dating nails, where the only record kept was that of the date of installation. In some cases the shape of the nail head had a special meaning; thus, on the New York Central & Hudson River Railroad, nails with square heads indicated ties treated in the company's plant while those with circular heads indicated ties treated elsewhere. The nails were also placed in a variety of positions. One of the earliest methods of marking ties, which was returning to favor, was the hammer stamping on the end. From 1885 to 1900 the Santa Fé Railroad used a branding hammer, and within the past two years air hammers had been installed on the adzing machine in the treating plant of the Delaware, Lackawanna & Western and the Philadelphia & Reading Railroads so that the ties were stamped as they were adzed before treatment. Various symbols were used to indicate the weight of rail, kind of wood wanted, etc. While the end stamping was not visible without moving the ballast from the end of the ties, it was superior to the metal dating nail in remaining legible for the full life of the ties provided the latter had not been mauled by tools.

OTHER PAPERS

"A Comparison of Wood Paving in European Countries and the United States" was the title of a paper read by S. R. Church, manager research department Barrett Manufacturing Company. The different conditions made a real comparison impossible, but he emphasized the points that in the United States greater care should be used in preparing the concrete foundation and that deeper blocks were desirable. The sealing of the pavement joints with coal tar pitch to prevent the entrance of moisture had proved so satisfactory in England that it was universally used there. England had both soft-wood and hard-wood paving, but the latter, which was ordinarily laid untreated, was going out of favor rapidly, because it was usually rough and noisy. These hard-wood pavements were the Australian Jarrah and Karri species of the eucalyptus. Their uses had unquestionably proved a failure.

J. B. Card, manager Chicago Creosoting Company, presented a paper on "New Type of Paving Block Plant."

R. H. White, president Southern Wood Preserving Company, Atlanta, Ga., discussed the savings obtained by piling creosoted wood blocks closely in cages.

F. J. Angier, superintendent timber preservation Baltimore & Ohio Railroad, discussed "Air Pumps Versus Hydraulic Pumps for Injecting Preservatives Into Wood."

Clyde H. Teesdale, Forest Products Laboratory, Madison, Wis., presented a paper on "The Effect of Varying the Preliminary Air Pressure in Treating Ties Upon the Absorption and Penetration of Creosote."

Lambert T. Ericson, assistant superintendent Port Reading Creosoting Plant, discussed "Mechanical Handling of Railroad Cross Ties and Timbers at Timber Preservation Plants." Mr. Ericson showed by illustrations and cost figures that flat cars equipped with cranes were very desirable for this work. Each car held an average of 190 standard ties which were loaded in slings of thirty or sixty, according to the height of the piles and the size of the stacking crane. The slings were picked up and landed on the piles. They were then lifted off by hand at a piece-work rate. The cross-ties were placed in rectangular piles 51 ft. long, perpendicular at each end to an average height of 25 ft., and contained usually 1850 ties. The switch timber was either piled with the lengths varied, and all running one way, to an average height of 21 ft., or was lifted on to the ground by the crane, sorted into lengths by hand, made into slings and then picked up by the crane again and put on the piles.

Robert E. Prince, Forest Products Laboratory, Madison, Wis., presented a paper on "Preliminary Work in Fireproofing Wood." Ammonium salts were of great value in fireproofing wood, as it was found impossible to ignite wood treated with them. Borax was of somewhat less value but promised a means of lessening the cost of treating by using it with another salt of greater value. From the good results already obtained it appeared possible to devise a reasonable, inexpensive method of rendering wood fire-retarding. The present report was purely of a preliminary character. Further work was now being conducted by the laboratory to determine the least amount of each fireproofing agent necessary to accomplish the desired results, and it was also investigating new fireproofing compounds.

SHORT SUBWAY FOR CHRISTIANIA

The Holmenkol Railway, Christiania, Norway, which operates a 4-mile, 600-volt d.c. line to a suburb is now constructing a 1¼-mile extension as a subway from 65 ft. to 100 ft. below the street surface. The franchise was granted in January, 1912, for a period of sixty years, and work was begun in May, 1912. Ultimately the tunnel will consist of two single-track sections, each entirely independent. Only one of the tunnels is under construction. About 75 per cent of the work is through stony ground and the rest through clay. The tunnel is being constructed as a reinforced concrete arch. The ties will be of creosoted wood on broken stone, and the rails will weigh 70 lb. per yard. In the tunnel current will be taken from a third-rail but from the trolley elsewhere. The signals and switches will be electro-pneumatically operated. The cars will be 50 ft. 6 in. long and 10 ft. 10 in. wide. Their normal capacity will be eighty and their rush-hour capacity 180 passengers. Each car will weigh about 60,000 lb. and carry four 64-hp motors with multiple-unit control. Electro-magnetic track brakes, as well as hand and air equipment, will be provided because of a 5 per cent grade on one of the outlying sections.

Suburban Fare Zones on Milwaukee System

Suburban Territory in Milwaukee District Is Divided Into Fare Zones by Order of the Railroad Commission of Wisconsin—Rates in Suburban District Will Be 2 Cents a Mile with Minimum Fare of 5 Cents

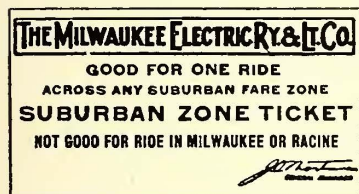
As mentioned in last week's issue, the Railroad Commission of Wisconsin has established for the suburban territory of The Milwaukee Electric Railway & Light Company a zone system of fare charges and collections.

At the same time the commission readjusted the system of fares on the extensive interurban lines of the company, doing away with the old basis and the discriminations and inequalities it contained, and substituting therefor the mile basis of rate-making, with a charge of 2 cents per mile. The new rates became effective on Jan. 18, 1914. The commission left the Milwaukee city fare points and the rate charged therein undisturbed.

Previously there was outside of the single-fare city zone an outer irregular zone in the suburbs, in which a 5-cent fare was charged. There were also commutation tickets, the effect of most of which was to reduce the rate for these two zones from 10 cents to 7½ cents a ride. Outside of the first outlying suburban zone there was also in a few instances another outer zone for which a separate fare of 5 cents was charged.

By the order of the commission all of these outside zones are abolished and, beginning from the city single-fare limits, the suburban territory is divided into zones of approximately 1 mile each and a fare of 2 cents is

charged for the ride into or through any such zone if it is a part of a longer haul, the minimum fare being 5 cents. The effect is to reduce the fare to the popular resort at Whitefish Bay, to the southern end of North Milwaukee,



Suburban Zone Ticket

the center of the city of Wauwatosa and to the center of the city of West Allis. It increases the fare to the northern edge of the village of Whitefish Bay, to Fox Point, to Tippecanoe and to South Milwaukee. The fare to the northern part of North Milwaukee, to the western part of West Allis and to the western part of Wauwatosa is the same. The withdrawal of the commutation tickets sold in blocks at a rate of 7½ cents each makes some of these fares show a slight advance. The reductions are effective on those parts of lines most used by suburban or holiday riders. Limited personal use tickets have been put into temporary use between Milwaukee and the center of South Milwaukee at a rate of 12½ cents in blocks of twenty.

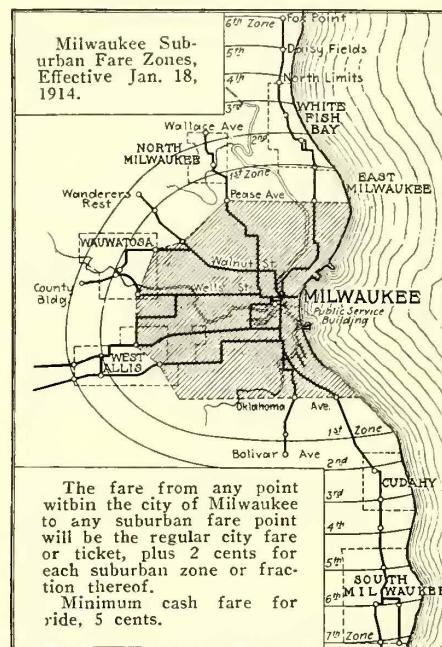
Under the plan of operation suburban passengers outbound from Milwaukee will pay, on entering the car, a city ticket or 5 cents cash. On leaving the car they will deposit in the fare box 2 cents cash or a 2-cent zone ticket for each zone into or through which they travel. The zone limits are at well-established points, making it easy for passengers to distinguish the zones and leave the car at the point nearest their destination. Suburban passengers inbound to the city will pay to destination as they enter, using cash or zone tickets in connection with city tickets if they desire. If a city fare is paid, transfers will be issued to any city line if requested when the fare is paid. Passengers desiring to ride in suburban territory only will pay 2 cents cash or a zone ticket for each zone into or through which they ride, the minimum cash fare being as stated, 5 cents for any suburban ride.

The old stations, stopping points and fare points are

retained but the fares between them are adjusted to the distance traveled, and new stations, stopping points and fare points are created so as to do away with the discriminations and inequalities under the old system. The fare within the various cities, Milwaukee, Racine, Burlington, Waukesha and Watertown, is retained and added to the suburban mileage of passengers traveling in any part of the suburban zones.

All reduced fare round-trip tickets are discontinued and the round-trip rates are made the total of the flat rate each way. This means that while many of the one way rates have been reduced most of the round-trip rates have been increased. As a concession to those who travel much a 300-mile coupon book is sold at \$5.40, with a minimum tear of 5 miles.

The Milwaukee Light, Heat & Traction Company has title to property situated beyond the single-fare limits



Map Showing Fare Zones

of Milwaukee and is the owner of 24 miles of track in the city of Milwaukee for which The Milwaukee Electric Railway & Light Company pays rental. All of the property is operated by The Milwaukee Electric Railway & Light Company. The company operates suburban service to West Allis, Wauwatosa, North Milwaukee, Whitefish Bay, Fox Point, Cudahy, Tippecanoe and Wanderer's Rest, and interurban service to Waukesha, Oconomowoc and Watertown, to Racine and Kenosha, to St. Martins and East Troy and to St. Martins and Burlington and intermediary points. The extent of this service is indicated on the accompanying map.

The service is operated under various franchises and right-of-way agreements. The 5-cent zone of the original system was developed generally with the growth of the lines and not on scientific rate-making principles. Some of the rates were stipulated in franchises and were necessarily effective prior to the time when the Railroad Commission assumed jurisdiction.

Under the 5-cent suburban zone system, now abandoned, the company charged, in one case, 5 cents for

2.04 miles and in another extreme case 5 cents for 7.17 miles. On another interurban line it charged 5 cents for 0.99 mile and the same fare for 3.35 miles. On another line it charged 5 cents for 1.66 miles and the same fare for 3.89 miles. These rates may be contrasted with the haul of 3.36 miles on one line for which the company formerly charged 10 cents.

DECISION OF THE COMMISSION

The decision of the commission says in part:

"Directly due to the inequity of the 5-cent zone system is the practice of granting overlapping zones, special and round-trip rates to favored points. When overlapping zones are interjected into the 5-cent zone system we have a rate scheme which places every locality in competition with its neighbors. For instance, it is usually contended that if a company extends the limits of an interurban zone for a half mile so as to reach a certain locality and thereby grant a lower fare to this locality to all points through the overlap it logically follows that the next locality a quarter or half mile distant should receive a similar concession. The result is that this necessity of granting overlaps causes the rate schedules to become even more discriminatory, and carried to its logical conclusion the entire schedule ultimately must fall to the ground.

"Upon the suburban lines extending from Milwaukee a number of overlapping zones have also been established. The zones were originally of proper distance, but have become extended with the extension of municipal limits, the idea being in most cases to have the unequal zone conform with the political boundary line, and the result has been that zones immediately adjacent to the municipalities have been narrowed and the passengers originating in such zones discriminated against.

"In any equitable system of fares for suburban and interurban service the overlapping zone cannot be justified except under very extreme conditions.

"In establishing a revised system of interurban and suburban fares it is fully realized that the present fares will be considerably disturbed in some sections of the tributary territory, but this is not due to the application of any radical or untried theory of rates. It is due principally to the fact that the existing fares do not rest upon any scientific basis but are based upon unequal zone distances and favored local concessions. The results of such a schedule are obvious. Invariably one or more localities are built up at the expense of others. Patrons favorably situated obtain extremely low fares, part of the cost of which has to be borne by those less favorably situated and paying excessive rates. With these facts in mind, a revision is here undertaken with the sole aim of removing as much of the discrimination as possible and placing a schedule of fares in force, upon a uniform rate per passenger mile, which will equalize opportunity for local growth and expansion, insure equity between persons and reasonably preserve the amount of traffic upon the various lines.

MILEAGE BASIS OF OTHER LINES

"In this State the Sheboygan Electric Railway, running between Sheboygan, Plymouth and Elkhart, changed over to a mileage basis of fare six years ago; the Milwaukee Northern Railway, running between Milwaukee and Sheboygan, adopted the mileage system when it began operation in 1908; the Rockford & Interurban Railway, running between Rockford, Ill., and Janesville, changed over to a distance basis last year, and the three interurban lines operating between Oshkosh, Fond du Lac, Neenah and Omro, in the region of Winnebago Lake, have filed an application with the commission to change their 5-cent zone rates to a mileage basis. The application of the respondents, filed Aug. 15, 1913, with this commission, to abandon the 5-cent zone system and place the rates on a more uniform

basis is in line with this general change. In this State and in the States of Minnesota, Iowa, Illinois, Michigan, Indiana and Ohio returns show that out of eighty-three electric interurban companies more than one-half now operate under some form of mileage rate; and it may be stated that the Pennsylvania and New Jersey state commissions have declared in favor of the mileage basis.

"The rate of return upon the total interurban physical property of The Milwaukee Electric Railway & Light Company amounted to 3.10 per cent in 1908, 3.05 per cent in 1909, 1.84 per cent in 1910, and 2.35 per cent in 1911. Similar computations for 1912 show the per cent return to approximate 1.6 per cent. These facts indicate that when 7.5 per cent is considered a fair return the rates of return as quoted for the past five years have fallen considerably below an adequate return. To bring the revenues to the point where they would yield such a return for 1912, for instance, it would be necessary—assuming no decrease in traffic, which is very unlikely—to establish the basic rate at about 2.75 cents per passenger mile. When the conditions prevailing on the interurban system are considered as indicated by the passenger density per car mile, increasing only from 2.09 in 1908 to 2.13 in 1913, it seems best to place the rate at a lower figure than the cost of service would demand so as to encourage the passenger density with this lower rate to increase sufficiently to bring the revenues to the point where they will bring an adequate return above all expenses. It should also be stated that a rate of 2.75 cents per passenger mile would result in a large number of increases upon the entire system, while a rate of 2 cents, although increasing certain low rates, reduces a considerable number and thus equalizes the conditions on a more satisfactory basis."

An accompanying illustration shows the form of the suburban zone tickets. These tickets have a value of 2 cents each and are sold in strips of five for 10 cents or twenty-five for 50 cents. They will be sold by conductors on the city and suburban cars. They will be good for the payment of suburban fares only and are not good for fares within the single-fare limits of the city of Milwaukee or Racine or fares on the interurban lines between points beyond the terminus of the suburban territory.

The Massachusetts Institute of Technology, Boston, Mass., has issued its bulletin for December, 1913, which contains a general description of the various technical courses of instruction offered. Of particular interest to students who propose to enter the electric railway field are the courses offered in the department of electrical engineering, which include these subjects: alternating currents and a. c. machinery, electric light and transmission of power, central stations, electric railways, dynamo design, storage batteries and their design. In addition to the above regular courses of instruction, occasional lectures are given before the Electrical Engineering Society by prominent engineers not connected with the institute upon subjects with which they are especially familiar. Visits of inspection to the numerous activities of engineering interest about Boston, planned by the Electrical Engineering Society and carried out with the co-operation of the instructing staff, are made by third and fourth year students each year, and occasional tests are made of operating electrical plants in the vicinity.

The library of the Public Service Corporation of New Jersey, Newark, N. J., has issued a 152-page author and title catalog covering its large and complete collection of books and publications relating to electric railways and allied technical subjects.

Program for the Midyear Conference

Committees of the American Electric Railway Association and Allied and Affiliated Associations to Meet in New York Next Week—Plans for the Annual Dinner and the Conference

Additional details in regard to the program for the midyear conference of the American Electric Railway Association to be held next week at the headquarters of the association in New York have been announced.

MEETINGS OF MANY COMMITTEES

One of the principal features of the gathering of representatives of electric railways from all sections of the country will be a large number of meetings of committees of the various associations. The first of the meetings will be that of the classification committee of the Accountants' Association, which will hold sessions daily from Jan. 26 to 29. The work of this committee consists of the consideration, with the representatives of the Interstate Commerce Commission, of the new classification of accounts which has been under discussion for some time. In the last year the committee has held a number of meetings with representatives of the Interstate commission so that the work on the new classification is now well advanced. The committee, however, has some final details to consider in conference with representatives of the commission before the completed classifications can be sent out for the attention of the electric railway companies throughout the country.

Another of the important meetings to be held next week is that of the committee on the joint use of poles of the American Association. It will be recollected that the report of this committee was presented at the convention of the American Association held in Atlantic City in October of last year. Lack of time prevented full consideration and discussion of the report at the convention. After preliminary discussion, therefore, it was suggested that the committee write to member companies asking for comments on the report and that the entire matter be taken up at the midyear conference. In accordance with this suggestion the committee has written to member companies and a large number of replies will be before it for attention.

The extent of the total of committee meetings planned for the week is indicated by the fact that twelve committees of the American Association will meet, one of the Manufacturers' Association, two of the Claims Association, ten of the Engineering Association, seven of the Accountants' Association and seven of the Transportation & Traffic Association. Some of these meetings, however, are meetings of joint committees of two of the associations. The committee meetings are announced as follows:

AMERICAN ASSOCIATION

The committee on joint use of poles will meet on Wednesday, Jan. 28, at 9:30 a. m. The following committees are scheduled to meet at 10 a. m. on Thursday, Jan. 29: Subjects, relations with sectional associations, public relations, insurance, federal relations, education, compensation for carrying United States mail, company sections and individual members, *Aera* advisory. The executive committee is to meet at 2 p. m. on Jan. 29. The committee on company membership is to meet at 4 p. m. on Jan. 29.

MANUFACTURERS' ASSOCIATION

The executive committee will meet at 10:30 a. m. on Thursday, Jan. 29.

CLAIMS ASSOCIATION

The executive committee and the committee on subjects are scheduled to meet at 10 a. m. on Thursday, Jan. 29.

ENGINEERING ASSOCIATION

The committee on electrolysis will meet on Tuesday, Jan. 27, at 10 a. m. The committee on power distribution will meet at 9:30 a. m. on Wednesday, Jan. 28. The committee on way matters will meet at 10 a. m. on Jan. 28. The joint committee with the Accountants' Association on engineering accounting will meet at 2:30 p. m. on Jan. 28. The committee on equipment will meet at 10 a. m. on Thursday, Jan. 29. The joint committee on block signals with the Transportation & Traffic Association will meet at 11 a. m. on Jan. 29. The committee on standards will meet at 9 a. m. on Jan. 30. The committee on power generation will meet at 10 a. m. on Jan. 30. The joint committee on transportation engineering with the Transportation & Traffic Association will meet at 10:30 a. m. on Jan. 30. The committee on heavy electric traction will meet at 3 p. m. on Jan. 30.

ACCOUNTANTS' ASSOCIATION

The committee on a standard classification of accounts will meet at 10 a. m. each day from Jan. 26 to 29, inclusive. The joint committee on engineering accounting with the Engineering Association will meet at 2:30 p. m. on Jan. 28. The committees on education and express and freight accounting and the executive committee will meet at 10 a. m. on Jan. 29. The committees on interline accounting and overhead charges will meet at 2:30 p. m. on Jan. 29.

TRANSPORTATION & TRAFFIC ASSOCIATION

The executive committee and the committees on fares and transfers, schedules and timetables and training of transportation employees will meet at 10 a. m. on Thursday, Jan. 29. The joint committee with the Engineering Association on transportation engineering will meet at 10:30 a. m. on Jan. 29. The joint committee on block signals with the Engineering Association will meet at 11 a. m. on Jan. 29. The committee on express and freight traffic will meet at 2 p. m. on Jan. 29.

ANNUAL DINNER

As announced previously, the annual dinner of the association will be held in the grand ballroom of the Waldorf-Astoria Hotel at 7 o'clock on the evening of Thursday, Jan. 29. It was announced officially at the time this issue went to press that the number of advance registrations exceeded the total received at the corresponding time last year. President Charles N. Black will preside at the dinner. The speakers announced are Guy E. Tripp, chairman of the board of directors of the Westinghouse Electric & Manufacturing Company; Cornell S. Hawley, president of the Manufacturers' Association, and Henry W. Anderson, vice-president Virginia Railway & Power Company.

PROGRAM OF THE CONFERENCE

The regular midyear conference will be called to order at 10:30 a. m. on Friday, Jan. 30. The first order of business will be a brief statement from the American Association committee on company sections and individual membership. This will be presented by Martin Schreiber, engineer maintenance of way Public Service Railway, Newark, N. J.

The report of the committee on the joint use of poles will be presented next.

Halford Erickson, member of the Railroad Commission of Wisconsin, will then read a paper on "The Economic Aspects of Regulation Compared with Profit Sharing with Municipalities." This paper will be discussed by Arthur W. Brady, president Union Traction

Company of Indiana. It will then be open for general discussion.

Lunch will be served in the Engineering Societies Building at 1 p. m.

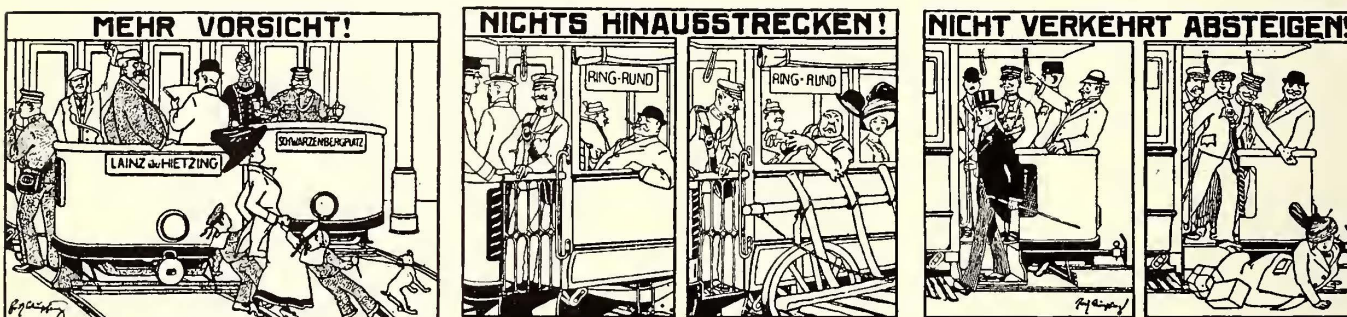
The association will reconvene at 2:30 p. m., and F. W. Hild, general manager Portland Railway, Light & Power Company, will read his paper on "The Effect of the Rate of Fare on the Riding Habit." This paper will be discussed by Luther P. Nash, of Stone & Webster, and will then be open for general discussion.

C. L. S. Tingley, vice-president American Railways Company, will then read a paper on "Present-Day Influence of Labor on Legislation." The paper will be open for discussion.

A paper on "Inherent Hazards of the Electric Railway Industry," which had been expected, will not be presented.

MOVING PICTURES AND POSTERS USED IN VIENNA TO PREVENT ACCIDENTS

An article in the Dec. 14, 1913, issue of *Elektrische Kraftbetriebe und Bahnen* describes the moving pictures and posters prepared by the Vienna Municipal Tramways in connection with accident work. The moving pictures embrace thirteen subjects. Some of these show the results of carelessness of drivers and chauff-



Accident Warning Posters of the Vienna Tramways System. Note that Operation Is Left-Handed

feurs, others those of pedestrians, and still others those of passengers. Furthermore, the pictures are also intended to show that undue haste increases congestion as well as accidents.

In view of the fact that moving pictures cannot be made to reach all the public, especially those who patronize the cheaper theaters, where American Wild West films are favored, a number of posters of unusual design have been prepared for car and station display. One of the three reproduced herewith shows the result of getting off the car backward, another that of leaning out of the windows, and the third that of failing to watch for cars coming in the opposite direction. In looking at the positions in the views it should be borne in mind that Vienna cars are operated left-handed. Fac-similes of these posters made in postage-stamp size are distributed to school children and are placed on all envelopes and wrappers mailed by the railway management.

The Worcester Polytechnic Institute offers through its annual catalog for 1913-14 a large number of courses in electrical engineering. These courses are classified in general under the following subjects: elements of electrical engineering, theory of a.c. circuits, transmission and distribution circuits, electrical engineering design, electric railway engineering, engineering business organization and finance, power plant engineering and transportation engineering. In connection with several of the above subjects laboratory courses are also offered.

ELECTRIFICATION OF STATE RAILWAYS IN SWITZERLAND

It is reported that the Swiss federal government has definitely decided to electrify 1875 miles and to make a beginning where electrification is most urgently needed, namely, on the Gotthard tunnel line, the most important in Switzerland. A preliminary credit of \$7,700,000 has been granted for this first electrification, and the work, which is to be completed in 1918, has already been begun between Erstfeld and Bellinzona, a distance of 67¾ miles. At Amsteg a hydroelectric plant able to supply 32,000 hp is being installed, and at Piotta a similar plant of 39,000 hp. One station alone, however, could take the loads expected in 1918, namely, 12,000 hp normal and 32,000 hp maximum. These stations will also be tied in with others to avoid possible failure of water. The power generated will be conducted at 60,000 volts to from three to six substations, from which the current will be stepped down and delivered to a 15,000-volt or 7500-volt trolley.

In view of the experience of the Lötschberg Railway, it has been definitely decided to use the single-phase system. Even if 7500 volts were reserved eventually for the Gotthard line, 15,000 volts could be adopted for the rest of the federal lines, where tunnels are less frequent. The choice of system is most significant because what-

ever one is chosen on this line it must afterward be extended to all the other lines in the country that are operated by the government.

The steam locomotives on the Gotthard express trains now draw eight four-axle coaches, but the electric engines will be designed to draw ten such coaches. Two kinds of engines are contemplated, one with a speed of about 56 m.p.h. for international express trains but capable of being used for any other trains, and the other a lighter type. The present shops at Bellinzona will have a special department for the repair of electric rolling stock and inspection plants will be located at Biasca, Erstfeld, Airolo and Göschenen.

It has been finally decided that the Federal Railways themselves shall own the power stations and generate their own supply of electricity and that this work shall in no case be intrusted to private firms or be contracted for. The total cost of electrifying the Erstfeld-Bellinzona section of the Gotthard railway is officially estimated at \$7,700,000, but much of the plant will be used not merely on the Erstfeld-Bellinzona line, but throughout the fifth section of the Swiss Federal Railways, of which the Gotthard line is a part.

The principal advantages which the Swiss Federal Railways hope to reap from the electrification are independence of foreign coal supply, suppression of smoke nuisance, increased train speed and capacity and more tourist travel. It is also hoped that ultimately electricity will prove considerably cheaper in actual operating cost.

Business Prospects for 1914

These Letters, with Those Published Last Week, Indicate an Optimistic View of Business Prospects

In the last issue of the ELECTRIC RAILWAY JOURNAL expressions of opinion as to business prospects from a number of manufacturers of electric railway apparatus were published. Additional views are presented this week. Many of the manufacturing companies quoted this week, it will be noticed, supply material for steam railroads as well as for electric railways, and some of them also do a very large business in other lines of industry.

CARNEGIE STEEL COMPANY, PITTSBURGH AND NEW YORK: "We certainly feel optimistic with regard to the business of our company during 1914. The needs of the country in steel lines are continually growing. Stocks to-day are very low, and the fundamental monetary and commercial conditions are sound. We cannot but feel that before the year has progressed very far we shall have a volume of business quite equal to our capacity."

BRIDGEPORT BRASS COMPANY, BRIDGEPORT, CONN.—"We are inclined to be optimistic regarding the outlook for the year 1914. Our plant is running full time and our prospects for increased business are indeed promising, to say the least. 'Phono-Electric' trolley wire made a fine showing in 1913 and, in fact, stood more trial tests successfully than in any previous year. This, of course, led to increased orders and no doubt will influence the output for this year. We are going ahead with very active sales and advertising plans and have made improvements which we believe will be to our customers' benefit. We are keeping up the efficiency of the men and of our machines in our plant, for 'quality and accuracy' is our watchword."

NATIONAL BRAKE COMPANY, INC., BUFFALO, N. Y.: "Our orders for the first month of the new year will hardly exceed those of the first month of 1913. Inquiries, however, are greatly in excess of those received during January of last year, and if this line of inquiries is maintained throughout the year and if the cars for which we have received inquiries for brakes are built, the year 1914 will probably be better than an average car-building year. So far as our own business is concerned, we can hardly expect it to reach the volume it did during 1913 because during that year more than 4000 brakes were sold to one purchaser. The fact that we have recently added the automatic stop to our Peacock brake, reducing the amount of winding necessary to set the brake to a minimum, should secure the specification of the brake on a larger percentage of the number of cars built than ever before."

GALENA-SIGNAL OIL COMPANY, FRANKLIN, PA.: "Our sales during the year 1913 exceeded those for the previous year and we consider that the prospects for the year 1914 are exceptionally bright. We believe that our business is, in a way, a barometer of trade conditions in the United States, as it is confined exclusively to the sale of lubricating and burning oils to steam and electric railways. The railroads of necessity depend upon the transportation of manufactured and raw products to insure constant movement of their equipment, and the facts that our sales to the railways in 1913 were in excess of those for the preceding year and that so far this month we have run in excess of the same period in 1913 are an indication that the railroads are moving freights. Of course, at certain seasons during the past year there has been experienced slackness in certain lines of trade, but we believe a little investigation would have shown that it was due to perfectly natural and

temporary depressions that are experienced every year."

THE PROTECTIVE SIGNAL MANUFACTURING COMPANY, DENVER, COL.: "In our opinion, the business prospects for any of the railway supply companies for the coming year depend very largely upon the attitude of Congress and the decision of the Interstate Commerce Commission in reference to the just and reasonable demands of the railroads. The attitude of the administration at Washington and the future legislation also enter largely into this question. The railroads to-day are the greatest factor for the development and progress of the whole country. They are ably managed, the rights of the public are being carefully considered, and everything is being done for the protection and welfare of the public as well as for the employees. It is absurd and foolish to attack and hamper by antagonistic and radical legislation the foremost industry in the country because of errors of omission or commission ten or fifteen years ago. Should the railroads receive any degree of fair treatment, we look forward to a gradual and steady increase in the prosperity of every manufacturing industry in the country."

CAMBRIA STEEL COMPANY, JOHNSTOWN, PA., through J. L. Replogle, vice-president and general manager of sales, writes: "We believe that the business prospects for this year will depend largely upon the decision of the Interstate Commerce Commission as to the 5 per cent increase in freight rates for which the railroads are asking. If this increase is authorized within the next two months, I personally believe our mills will be running to capacity during the rest of the year, as there is a large tonnage of rails, cars and other railroad supplies ready to be placed as soon as the railroads feel they are justified in buying. Many of them do not feel that present conditions permit of any extensive purchases at this time and are confining their purchases to immediate necessities. Stocks throughout the country are generally low. The writer has recently returned from several extensive trips and does not believe the stocks of the fabricating structural concerns are over 25 per cent of normal. Inventories have been taken, and, while there may be a fairly good buying movement this spring, business in our line cannot be good without a good volume of railroad business, which we cannot expect under present conditions."

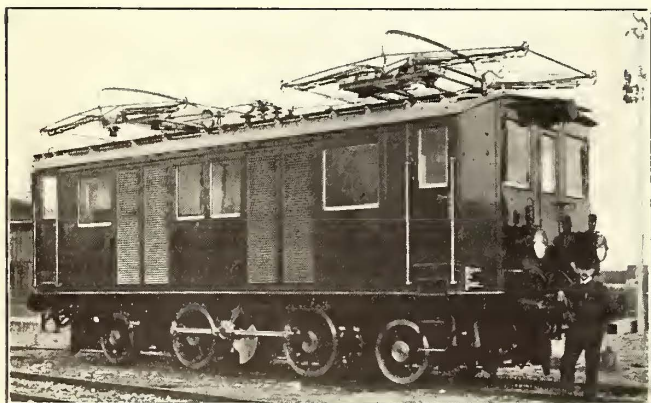
LORD MANUFACTURING COMPANY, BROOKLYN, N. Y.: "Conditions in this country are becoming, we believe, fundamentally more sound than they have ever been. Irrespective of one's politics, it is manifestly clear that the people and business men are daily increasing their confidence in the present administration. In the process of adjustment now going on the railroads have had to bear a large share of the sacrifices, and so accordingly have companies like our own which are engaged in manufacturing protective and economizing devices for the railroads. Nevertheless, 1913 was the best year in the history of our company, as well as in that of our parent organization, the Lord Electric Company, now engaged in the electrical construction work on the new ship-barge canal. Our plans are based on the belief that 1914 will be on the whole much like 1913, except that the better half of the year will be the last six months instead of the first. Our aggregate business will be much larger than last year, however, by reason of the addition to our line of the old and

successfully established Sterling-Meaker products, including gear brakes, trolley bases, wheelguards, fenders, sand boxes and ticket punches. We have recently increased the size of our factory."

THE CLEVELAND FARE BOX COMPANY, CLEVELAND, OHIO: "Our activities during the past year have been primarily centered in Ohio and adjacent states, but we are anticipating the broadening of our sales efforts during 1914 to meet the demands that are being made in other states by conservative, efficient railway men for the safeguarding of the fares collected on their system. We not only believe that conservative national legislation on corporate matters will re-establish the broadest confidence that is possible and bring about the resumption of buying of materials and devices that are needed, but that it will as well impress on the minds of the buyers the necessity of efficiency in buying and will bring prosperity to the manufacturers who have reliable devices to sell. We believe that closer scrutiny of electric railways will result in the general adoption of more efficient methods of fare collections on street cars and the safeguarding of these collections after they have been made. In our judgment, it is as essential to take care of the ticket fares (which are really money) as it is to take care of the cash that is collected as fares. This can be done only by the use of a reliable, non-tamperable fare box that is designed to take care of both tickets and cash. In addition to our single compartment lock-box fare box, which has been made standard by several of the largest street railway systems in this part of the country, we are now building a four-compartment locked box that is attracting much attention among railway men who find it desirable to keep the fares collected on each run separate from other runs. The locked box principle of fare collection eliminates the 'middleman' and insures the safe delivery of every fare collected into the counting room of the company. Fare boxes of this type will assist in bringing increased revenue and the resulting prosperity to the street railways of the country."

A 16,000-VOLT SINGLE-PHASE LINE BETWEEN VIENNA, AUSTRIA, AND PRESSBURG, HUNGARY

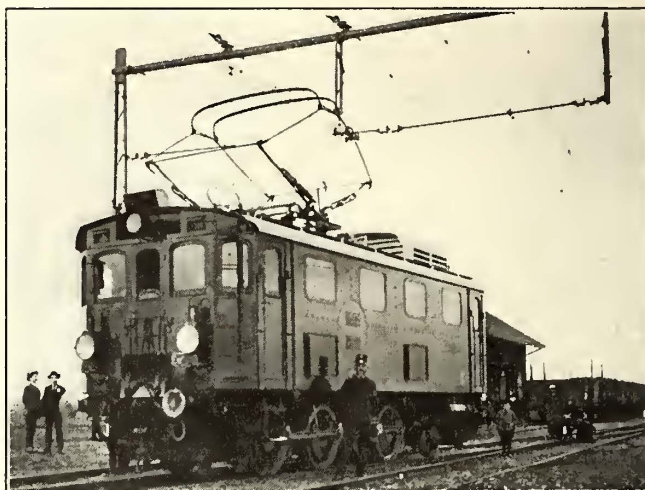
The new single-phase line between Vienna and Pressburg was recently described in a lecture before the Na-



Vienna-Pressburg Single-Phase Line—Passenger Locomotive for Express Train Service

tional Economy Society by Etienne de Fodor, director-general Budapest General Electric Company. This road, which is 43 miles long, receives energy from the municipal central station of Vienna. The steel transmission towers carry one 16,000-volt traction line and two 35,000-volt three-phase lines for lighting the towns

along the route. The trolley potential is 16,000 volts, but on the locomotive this is transformed to 600 volts for use by single-phase commutator motors. Both the passenger and freight locomotives shown in the illustrations are rated at 750 hp each. The passenger trains are hauled at 46.5 m.p.h. and the freight trains at 25 m.p.h. Both locomotives are furnished with pan-



Vienna-Pressburg Single-Phase Line—Freight Locomotive

tograph type collectors. Two views of the locomotive are shown. A third illustration shows the light steel pole and bridge construction employed for the catenary suspension. This view was taken at the boundary of Austria and Hungary. Meters for registering the current that passes over the Hungarian part of the road are installed in the tower house shown at the rear.

On Jan. 1 there were 88,586 shareholders in the Pennsylvania Railroad Company, the largest number in the history of the company and showing an increase of 13,431 for the calendar year 1913. Of this total 42,514



Vienna-Pressburg Single-Phase Line—View of Typical Steel Pole and Bridge Catenary Construction

shareholders were women, there having been an increase during the year of 6266 women stockholders. Women constitute almost 48 per cent of the total number of Pennsylvania Railroad stockholders. Stockholders abroad now number 11,676, a total of 1047 having been added during the past year.

THE RELATION OF THE STREET RAILWAY TO AGRICULTURE

The regular monthly meeting of the Massachusetts Street Railway Association was held at the Engineers' Club, Boston, on Jan. 14, President Crapo being in the chair. The evening was devoted to addresses upon the relation of the street railway to agriculture, the principal speakers being Messrs. R. W. Perkins, president Shore Line Electric Railway, Norwich, Conn.; John R. Graham, president Bangor Railway & Electric Company, Bangor Maine; G. C. White, of the Office of Markets, United States Department of Agriculture, Washington, D. C.; B. E. Kingsley, of the Bay State Street Railway, Boston, Mass., and Harry B. Ivers, general manager Cumberland County Power & Light Company, Portland, Maine.

Mr. Perkins maintained that the transportation companies should take a more prominent part in the repopulation of rural New England and gave numerous statistics of the agricultural development of Connecticut tending to show the possibilities of its soil as compared with other parts of the world. He stated that on the Shore Line system a farm bureau had been established in which were maintained lists of all farms and other real estate on the markets. The employees of the company had in a number of cases joined local granges to come closer to the farmers, and an active co-operative movement was under way along the lines found successful by the government. The company operated about 240 miles of track in Connecticut and Rhode Island and was seeking in every feasible way to develop its territory and encourage first-class farming methods. Instead of establishing and maintaining a model farm of its own, the company favored helping the local farmers to secure the best results on their own properties. Demonstrations were therefore made on the farms themselves, the work being done by the farmers under expert guidance. In this way the temptations to do too much on a grand scale common to corporate farms were avoided.

At Norwich a five-story warehouse about 135 ft. long and 130 ft. wide had been built and a physical connection was in service between the Shore Line and the New York, New Haven & Hartford Railroad. Another warehouse was located at New London, Conn. In the former city the farmers on the company's tributary lines maintained an agent at the terminal who was thoroughly experienced in grading, sorting, crediting, shipping, packing and selling agricultural products, and the results were most beneficial. Time was saved to the farmers by the shipment of their products into these terminals by electric express cars and better prices were secured than where sales were handled by the farmer as an individual. Through this co-operative movement efforts were being made to establish a standard quality of products which would yield profits through their reputation.

Mr. Perkins said that the farmer must be convinced that the railway man was in earnest and that the farmer must be enabled to realize actual money as a result of the co-operation in order to insure success. The feeling that New England farmers could not compete with those in the West in beef raising must be overcome by acquainting the farmer with the changed conditions now prevailing in the West as a result of the occupation of that territory and the passing of the public cattle range. The speaker contended that alfalfa could be raised in Connecticut as well as in the West, and pointed out that its yield of corn per acre about equaled that of Iowa. He outlined the benefits of co-operation in selling products among the citrus growers of California,

the peach growers of Georgia, the apple raisers of Oregon and the early vegetable raisers of Texas, and in closing emphasized the fact that \$6,000,000,000 worth of farm products were annually raised in the United States. These products were sold to the ultimate consumer for \$13,000,000,000, and it was the hope of the electric railway man interested in developing his service to reduce in some way this huge gap between the producer and consumer through economical transportation and closer co-operation with the farmer, cutting the cost to the consumer and helping the farmer to receive more for his products.

Mr. Graham described the development of traffic on the Bangor-Charleston line of the Bangor Railway & Electric Company, a branch of the system 25 miles long which served a rural territory with a population of about 2500. Before the speaker took hold of this line it was highly unprofitable. The gross receipts on the line were about \$32,000 per year, and a radical step toward increasing traffic was taken about six years ago when the electric freight rates on potatoes and cordwood, the chief products of the territory through which the line passes, were cut in half. This reduction was advertised widely and greatly facilitated building up the territory served. The traffic in potatoes increased from eighty-one carloads in 1907 to 438 carloads in 1913, and it was expected that 600 carloads would be hauled this year. The receipts had increased to \$65,000 per year. No reduction was made on supplies shipped to the farms over this line, and the company gained a large amount of business through the transportation of fertilizers, farming implements and other commodities into the territory.

Aside from establishing a model farm 6 miles from Bangor the company had organized an association for selling produce. No house deliveries were made in the handling of the trolley express service, but ample facilities were given to farmers along the line in the collection and distribution of freight from the track. The company's model farm was being conducted with the co-operation of the University of Maine. Closing, Mr. Graham pointed out the possibilities in the way of stock raising provided adequate fencing was installed on the farms.

Mr. Kingsley stated that since 1906 about 400 miles of electric railway lines had been provided with trolley express service in eastern New England. These facilities were now available in 181 municipalities. He described the development of strawberry culture at Dighton, Mass., which had resulted from the increase of electric express facilities. Attempts on the part of the farmers to ship these berries to the Boston market by steam railroad were unsatisfactory. On account of the slow service the quality of the berries was impaired and the farmer realized but 3 cents to 8 cents per quart. Refrigeration cars were tried, but the cost of icing destroyed the extra compensation, and the industry languished until, by the introduction of electric express service with cars having open bulkheads, it was revived again. When the service was extended to Neponset in 1912, 4000 crates of berries were shipped into the Boston market, and last year over 10,000 crates were handled with the through service to the heart of Boston. The Bay State Street Railway express cars enabled fruit picked late in the afternoon to be sold in Boston early the following morning at from 8 cents to 18 cents per quart. Other products of the garden had been developed as a result of this service.

Mr. Ivers included many personal reminiscences of electric railway history in his remarks, and in describing the co-operation maintained in the Lewiston

district of Maine with the farmers he touched upon the value of supplying mailing lists of farmers residing along the company's lines to merchants in the towns. The electric railway could, he said, help the farmer in securing credit at local banks, and conferences with the farmers in small groups were mutually helpful. The evening travel habit had been stimulated on his lines by the use of free theater tickets and in this way the farmer had been brought to realize the possibilities of the electric railway in catering to his natural desire for amusement after the day's work was done.

Mr. White pointed out the unanimity of interest existing between the farmer and the railroads, and said that an imperfect system of distribution, and not over-production, was the fundamental cause of the inadequate return that the producer received. He commended the work done by organizations of farmers in connection with the purchase of supplies, sales and transportation.

Charles C. Peirce, Boston, also spoke, briefly describing his farming experiences.

REPORTS OF NEW YORK PUBLIC SERVICE COMMISSIONS

The seventh annual report of the Public Service Commission, Second District, New York, was submitted to the Legislature on Jan. 19. Several important amendments to the Public Service Commissions law are recommended. Among them the commission urges that it receive authority, such as is now possessed by the Interstate Commerce Commission, to suspend for a period not exceeding four months the taking effect of advanced rates pending investigation as to the reasonableness of the proposed advance. The commission also asks for a modification of the so-called "short and long haul" clause of the law so as to make it similar to that in the interstate commerce law.

During 1913 corporations operating stage route or autobus lines were placed under the jurisdiction of the commission, and it suggests that the statute in regard to these lines be amended so as to require specified reports from them to the commission.

The report calls attention to the increased safety of operation of high-speed interurban electric railroads, and states that during the past year no serious accident on these roads has occurred because of defective track conditions or failures of structures. Careful attention has been given to the operating methods employed on these roads, especially in train dispatching. Improvements have resulted from frequent conferences regarding safety which have been held with operating officials. The equipment of interurban roads has been well maintained and standards have been adopted for proper inspection and maintenance of rolling stock. On nearly all of the single-track roads a satisfactory train-dispatching system has been employed, and several interurban roads have recently been equipped with proper block signal systems.

Extensive investigations of city street railway systems have been made in Rochester, Binghamton, Schenectady and Utica.

During the year 22,232 rate and fare schedules were tendered for filing, 22,123 of which were passed into the files, 109 being rejected for statutory reasons. There were also filed 989 authorities relating to schedule publications, making the total of all tariff filings for the year 23,112 and for all tariff filings since the establishment of the commission 133,785.

The expenses of the commission for all purposes whatsoever for the fiscal year from Oct. 1, 1912, to Sept. 30, 1913, were \$373,068.21. The appropriation of the

Legislature for the fiscal year from Oct. 1, 1913, to Sept. 30, 1914, is \$405,245.90. This does not include any appropriation for the State's portion of the expense of grade crossing eliminations under the provisions of the railroad law. The estimate which has been submitted to the state authorities for the total expenses of the commission for the fiscal year commencing Oct. 1, 1914, is \$434,205.90. The commission has also asked the present Legislature to appropriate for the purpose of defraying the State's share of grade crossing eliminations during that year the sum of \$500,000.

The statistics published with the report include a table showing the comparative cost of fuel for steam power used in generating electricity by different electrical corporations; a condensed income statement for each electric railway company reporting to the commission, covering the year ended June 30, 1913; a statistical summary showing the total for all electric railways for each year since the establishment of the commission, of revenues, expenses, passengers carried, etc.

Reference is made to the difficulties caused by the tendency of many corporations to include in their property accounts items which should be paid for from income as operating expenses, a practice which is forbidden by the commission's standard classification of accounts. This is especially true of expenditures for replacements of their capital investment.

The report also says that the subject of depreciation has received considerable study from the commission in connection with capitalization and rate cases which have been before it for decision. The commission admits that this is a very complex matter, but it is certain that unless the public service corporations are not only permitted but required to charge to their operating expenses a sufficient amount not only to cover current wear and tear but to make it possible for them to retire antiquated and inadequate apparatus, the prosperity of the district which they serve will be seriously hampered.

REPORT OF PUBLIC SERVICE COMMISSION, FIRST DISTRICT, NEW YORK

The annual report of the New York Public Service Commission, First District, for the year 1913 is devoted mainly to rapid transit matters, as they required most of its time.

The total number of passengers carried by all street railroads in the district during the year was 1,769,889,284, an increase of 5.29 per cent over 1912. The total amount of passenger fares was \$87,718,359. This is equivalent to about \$17.50 per capita on a basis of 5,000,000 population. For gas the New York City public paid during the year \$34,319,912. This was equivalent to 81.45 cents per 1000 cu. ft. For electric current it paid \$29,990,908. This makes a total of \$152,029,179, or upward of \$30 per capita, for transportation, gas and electric service.

The following figures show the total number of passengers carried by street railroads in New York City, including surface, subway and elevated lines, for the fiscal year ended June 30 of each year since the organization of the commission:

1908.....	1,358,000,407	1911.....	1,603,901,397
1909.....	1,402,417,642	1912.....	1,680,913,935
1910.....	1,531,262,914	1913.....	1,769,889,284

During the year the commission received 6329 complaints, of which 1768 were against transportation companies. The commission authorized stock and bond issues by various corporations under its jurisdiction to the amount of \$287,342,000. This makes a total of such authorizations from July 1, 1907, to Dec. 31, 1913, of \$517,535,219.

The commission strongly urges upon the Legislature the necessity for appropriations by the State to permit the prosecution of grade crossing elimination in New

York City. It asks for an appropriation for the year of \$1,500,000. The number of accidents on railroads and street railroads was 71,631, an increase of 1087 over 1912. The details are shown in the accompanying table.

DATA ON ACCIDENTS FOR YEAR ENDED DEC. 31, 1913

Car collisions	1,441
Persons and vehicles struck by cars	17,914
Boarding	10,746
Alighting	11,218
Electric shocks	336
Derailments	1,995
Other accidents	27,981
Totals	71,631
Injuries	
Passengers	31,149
Employees	7,568
Others	6,643
Totals	45,360
Serious (Included in Above)	
Killed	319
Fractured skulls	77
Amputated limbs	40
Broken limbs	337
Other serious	1,898
Totals	2,671

COMMUNICATION

SYSTEMS FOR MAIN LINE ELECTRIFICATION

CANADIAN PACIFIC RAILWAY COMPANY

MONTREAL, Jan. 16, 1914.

To the Editors:

Referring to your editorial of Dec. 20 on "Systems for Main-Line Electrification," I do not feel that your suggestion of a committee to report on electrification systems is really practicable. I am afraid that the determination of the system to be adopted will have to be fought out in the old-fashioned way of trying out the various methods and the survival of the fittest.

I cannot agree with the statement in your article as to there not being any great necessity for a standard system even for one road. I would illustrate this by first saying that it might be possible to operate from New York to Buffalo on one system but that the introduction of two systems in that district would necessarily restrict the transfer of locomotives and would be seriously objectionable on that account. Any change of system at Buffalo between the New York Central or Lake Shore lines would, I believe, be objectionable on account of the impossibility of running the same locomotives in either direction.

When electrification is restricted to locomotive service in distinct electric zones, the use of different systems for different districts may not be objectionable. But as soon as electricity becomes a general railway proposition a considerable additional investment will be necessary if each district must be supplied with the maximum amount of power which it requires at any one time.

H. H. VAUGHAN,

Assistant to Vice-President.

The catalog of the college of engineering, Polytechnic Institute of Brooklyn, for 1914-1915 contains among its descriptions of technical courses an outline of the four-year course in electrical engineering. In addition to its regular day courses, the college offers a parallel series of afternoon and evening courses in electrical engineering, especially designed to afford men in actual practice opportunities for professional study. These courses may be taken either independently or in connection with the regular work of the courses leading to the degree of electrical engineer. No formal examinations for entrance are required of those not seeking a degree, although secondary-school preparation is assumed.

ANNUAL MEETING OF AMERICAN SOCIETY OF CIVIL ENGINEERS

The annual meeting of the American Society of Civil Engineers took place in New York Jan. 21 and 22. Progress reports of the committees on valuation, on bituminous materials for road construction, on steel columns and struts and on bearing values of soils were submitted. The committee on engineering education reported that the Carnegie Foundation for the Advancement of Teaching had announced its readiness to conduct, at its own expense, a thorough investigation of the subject, co-operating with all of the national engineering societies.

A joint committee, to act with representatives of the American Railway Engineering Association, to investigate stresses in rails, ties, etc., was appointed as follows: Chairman, A. N. Talbot; A. S. Baldwin, J. B. Berry, G. H. Bremner, John Brunner, W. J. Burton, C. S. Churchill, W. C. Cushing, E. Gerber, R. W. Hunt, G. W. Kittredge, William McNab, G. J. Ray, F. E. Turneure and J. E. Willoughby.

Hunter McDonald was elected president for the ensuing year.

INSPECTION OF THE DUAL SUBWAY SYSTEM

On the afternoon of Jan. 21 more than 300 members inspected part of the dual subway system in course of construction for the city of New York under the control of the Public Service Commission. The work visited comprised three contract sections in various stages of completion, extending from Rector Street on Trinity Place to Prince Street on Broadway, which are part of the system to be operated by the Municipal Railway Corporation under its part of the dual subway contract with the city of New York. Alfred Craven, chief engineer Public Service Commission, had members of his staff escort the visitors in groups of ten to twelve men through the work and explain the various interesting and difficult features. The contractors, F. L. Cranford, the Degnon Company and the Underpinning & Foundation Company, extended all the necessary facilities and provided the lighting to allow a proper inspection of the subway. The work visited was Sections 1, 1A, 2 and 3 of Route 5, the visitors assembling at the shaft located at Prince Street and Broadway. The party walked south to Grand Street, where the two express (center) tracks are depressed for a turnout into Canal Street, the subgrade being 40 ft. below ground water, and where two pumps are required to keep the water level down. Section 2, immediately to the south, was next visited.

The chief point of interest in this section of the work is the two-story station at City Hall, 480 ft. long. This station has the south terminal for local trains on the lower level, the expresses continuing through on the upper level. The station is 85 ft. wide, occupying the full width of the street, and 40 ft. deep, the subgrade being several feet below ground water. The S-shaped curve from Broadway to Church Street, which consists of two single-track tunnels lined with cast iron and which passes under the old Astor House property and St. Paul's Churchyard, was of particular interest, especially the method used for underpinning the five-story brick Vestry Building and the methods of tunneling employed.

The last section visited showed the novel and excellent methods used in excavating in bad soil while maintaining the street and car traffic on the surface and also underpinning the foundations of the elevated railroad columns which are on top of, or immediately adjoining, the subway structures. The part of the subway inspected is 1½ miles long. The trip lasted two hours.

Equipment and Its Maintenance

Short Descriptions of Mechanical and Electrical Practices from Every Department of Electric Railroading

(Contributions from the Men in the Field Are Solicited and Will Be Paid for in Accordance with Our Regular Rates.)

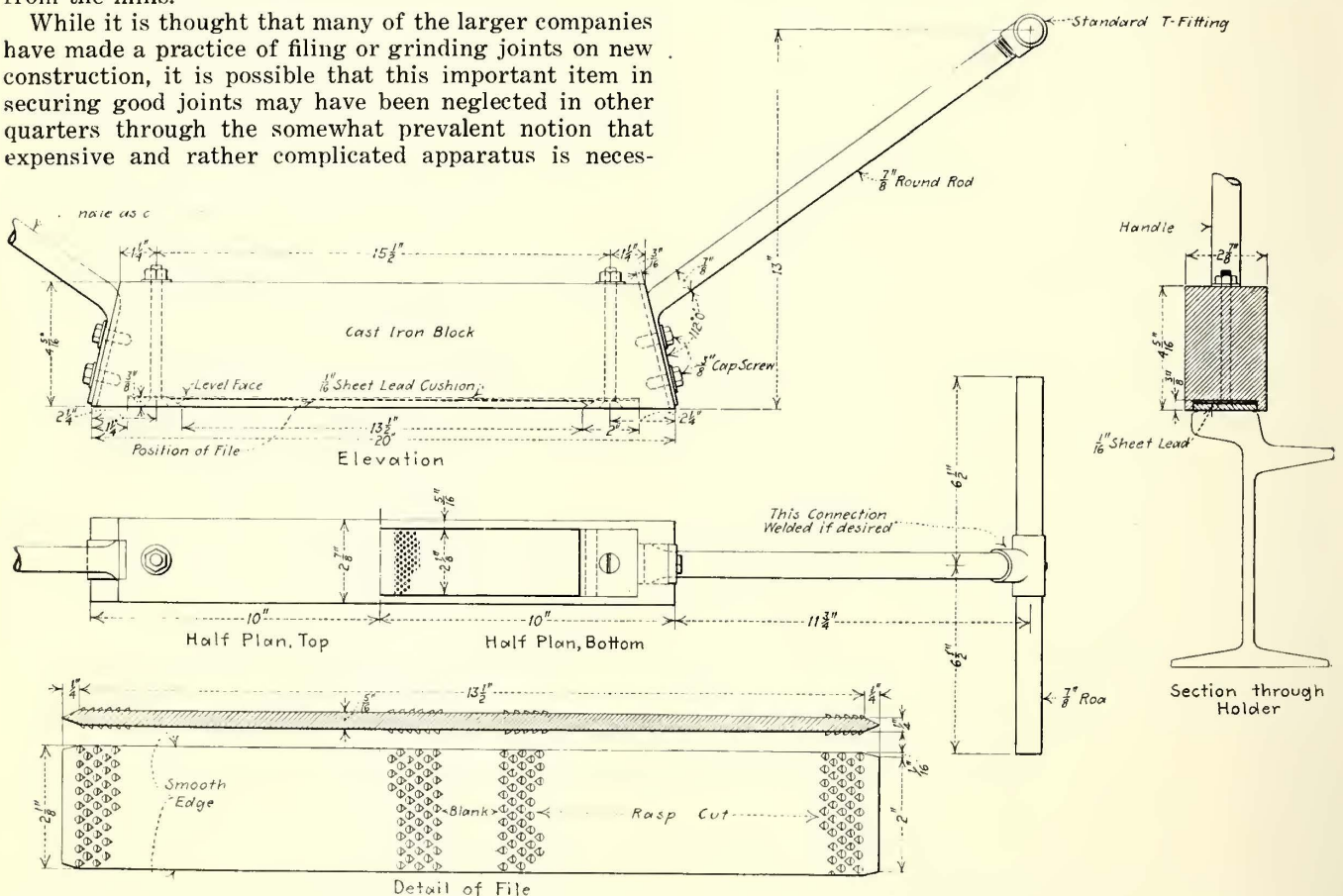
AN INEXPENSIVE RAIL FILE FOR NEW JOINT WORK

BY R. C. CRAM, ASSISTANT ENGINEER WAY AND STRUCTURE DEPARTMENT BROOKLYN RAPID TRANSIT SYSTEM

Track engineers are agreed as to the desirability of filing the tops of the rail heads at joints in new rails to insure an even surface by removing the slight differences in the head sections which are found in rails as received from the mills.

While it is thought that many of the larger companies have made a practice of filing or grinding joints on new construction, it is possible that this important item in securing good joints may have been neglected in other quarters through the somewhat prevalent notion that expensive and rather complicated apparatus is neces-

sary to provide effective cutting with the file blades when the apparatus is operated as intended, namely, by two men who when the track is open are seated directly upon the rails or, when the track is back-paved before filing, upon boxes or paving blocks. These latter provide a seat about 8 in. above the level of the rails. The accompanying drawing gives the principal details of the construction of this device. A halftone view of the men seated upon the rail and operating the



Construction Details of Inexpensive Hand-Operated Rail File Used for the Accurate Finish of New Joints on the Brooklyn Rapid Transit System

sary to secure good results. On the contrary, the work may be done by means of a comparatively simple and inexpensive device, such as the one which is in use by the way and structure department of the Brooklyn Rapid Transit System.

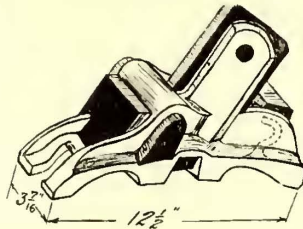
This device consists mainly of a cast-iron "holder" weighing about 70 lb. and so constructed that special file blades, made for filing high-grade steel and having a peculiar form of tooth, may be quickly detached and removed. The blades are made with teeth on both surfaces and are reversed in the holder when one side has become dull; they are discarded only after the second face has been dulled. Handles are attached to the

file was shown on page 922 of the ELECTRIC RAILWAY JOURNAL for Oct. 25, 1913, in an article entitled "Cast-Weld Joints and Steel Ties in Brooklyn."

The holder castings cost about \$5 each completely assembled. The file blades are purchased by the dozen from Henry Disston & Sons, Philadelphia, Pa. It has been observed that on new rail work one double-faced file blade will level down from fifty-six to eighty joints, depending mainly on the depth of cut necessary. As a rule, two men will file twelve to fifteen joints in a ten-hour day. It is customary to have one of these rail files in the tool box of each gang regularly assigned to reconstruction and joint repair work.

PATTERN SKETCHES ON RECORDS

A convenient feature of the pattern records of the mechanical department Brooklyn Rapid Transit System is the incorporation of pattern sketches on the back of the record. An example of this practice as applied to a brake shoe head is offered in the accompanying reproductions of the back and front of the standard 6-in. x 4-in. card kept in the drafting room of the Superintendent of Equipment. In the original sketch the core sections are shown in red, while in the reproduction they appear in heavy black. The use of such sketches saves a great deal of time when hunting for one pattern among thousands because the pattern clerk knows just what the object looks like. These sketches are also of considerable value to the draftsmen in studying the devel-



Sketch on Back of Record

Patt. No. 8240		Description Brake Shoe Head for Brill Elev. Motor Truck (R.H.)									
Plan No. 15473	Ordered	Complt	Cre Bxs	No. Pces	Weight	Cost	Castings				
Wood D Shrnkg	11-6-09	11-17-09	0	1	2 1/2 lbs	1/2	25	of			
Metal ALUMINUM	11-17-09	12-21-09	6	15	17 lbs	3/4	30	Steel			
Kind	Shippg Ord	Rcd at S/R	Rept No.	Foundry	Ret. Notice	Rcd 52d St.					
Wood	11-10-09	11-18-09	714	Magaus		12-1-09					
Metal	11-18-09	12-21-09	738	Johnson	6/18/12	6-25-12					

Brooklyn Pattern Record

opment of previous types when they make up new designs. Several of the foundries with which the Brooklyn Rapid Transit System does business follow the same plan for their own convenience.

MECHANICAL STRAINS IN A. C. CONDUCTORS

In planning the distributing system for the Interborough Rapid Transit Company's new 30,000-kw turbines it was found that the currents under short-circuit conditions and with the proposed arrangement of electrical equipment would momentarily run up to 60,000 amp. Electrically this presented difficulties which were by no means insurmountable, but it was found at the same time that the repulsive action between the conductors of the two phases across which the short-circuit was assumed to exist would be of extraordinary intensity. Approximately speaking, the force amounted to 1 ton per linear foot of cable, thus producing a really astounding disruptive effect. As a matter of fact, it was soon afterward discovered that the helical paper wrapping of the proposed cables possessed an unsuspected strength which was sufficient to withstand the strain and in consequence the difficulty thus eliminated itself. Nevertheless, the incident points clearly to the fact that the repulsive force between parallel a.c. conductors must always receive serious consideration in design.

A somewhat similar case was discovered on the single-phase cars of the New York, Westchester & Boston Railway on which the six transformer taps originally ran unsupported for about 2 ft. to the switch group. With these cables the insulation was continually breaking down and the cables were short-circuited on the car framing above them until they were heavily roped in place, the trouble being due solely to repulsive action which caused one of each pair to fly upward like

a shot from a gun whenever current was turned on.

The phenomenon displayed in both of these cases has been brought to the front more or less within the last two years through its influence in transformer design, yet the incidents naturally involve the question whether it is generally borne in mind in matters relating to low-voltage a.c. circuits, in car equipment or in substations, especially where the conductors are insulated. On high-voltage lines the necessity for wide separation of the different phase wires to prevent arcing obviates serious consideration of the repulsive effect, which acts inversely as the distance between the conductors, but where the cables are set close together, possibly separated only by a small thickness of insulating material, the intermittent mechanical stresses may easily be sufficient to cause rapid deterioration of both insulation and copper even under normal current.

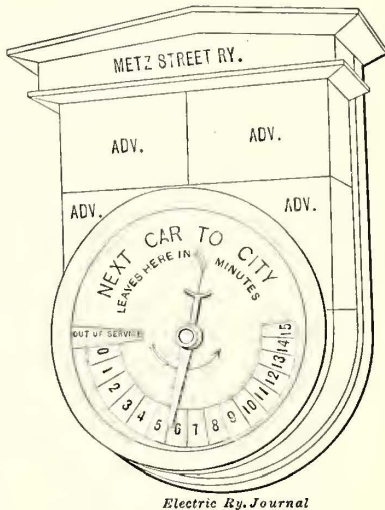
Under short-circuit conditions, of course, the opportunity for destruction becomes enormous, a simple formula, submitted before the A. I. E. E. at its midyear convention in February, 1911, showing that the mean repulsive force in pounds per linear foot of cable was equal to 0.538 time the square of the current in amperes, divided by 1,000,000 times the distance between cables in inches; and, since the force varies as the square of the current, even, the surges which may be normally expected whenever an alternating circuit is made or broken are likely to subject adjoining cables to serious mechanical strains.

On single-phase cars or locomotives the actual motor voltages are low and the currents are proportionately high. In some cases the low-tension cables on such equipment cannot be run in conduit for mechanical reasons, and in others the use of conduit is practically prevented on account of heating. Consequently, the cables must depend upon their own qualities of mechanical strength to avoid damage. If they are stretched tightly, the lack of the equivalent of sag in an overhead wire naturally causes the tensile strain at the ends to be multiplied many times, and if they are hung loosely between supports, the opportunity for mechanical damage to the insulation by vibration and by striking adjacent objects is vastly increased. However, one sure method of avoiding difficulty is by separating the cables and supporting them firmly in their relative positions, a distance of 12 in. being sufficient on the normal types of equipment to reduce the repulsive force, even on a dead-short-circuit, to a point where its effects are easily controlled. On a single-phase locomotive, for example, taking a normal accelerating current of, say, 8000 amp at the motors, the repulsive force between two cables, even if they carried the entire current, would then average only 5.3 lb. per linear foot, varying between 0 lb. and 10.6 lb. with each half cycle, and this pressure would hardly be sufficient to set up abrasion of the insulation against the cable supports, provided they were set reasonably close together.

The municipal council of the city of Carlsbad, Austria, has under consideration a number of projects for improvements of some importance. The project for a 7-mile, meter-gage street railway, reported in 1910, has been revived and a new concession has been secured from the government. As the City Council plans to make this a municipal enterprise, there is a great deal of opposition by property owners, who see prospects of increased taxes to meet bond interest, and by hotel keepers, who fear that the value of their property will suffer on account of the noise of the traffic and the cheap transportation which will take their guests to the attractive suburbs. Thirty-four cars will be required.

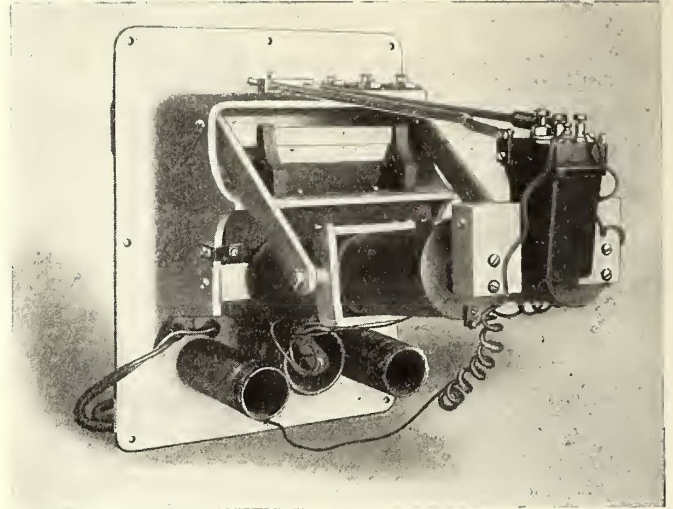
HEADWAY CLOCK TO SHOW WHEN CAR IS DUE

The accompanying illustration is a drawing of a new headway clock which has recently been installed on suburban lines of the street railway system at Metz, Germany. The lower half of the dial of this clock is divided into the number of minutes which represent the longest headway on the system. The minute hand, which travels over these numbers, moves from the highest figure to zero, thus showing within how many minutes the next car is due. This scheme is very convenient for the prospective passenger, for without consulting a watch or timetable he can see at once how long he must wait for the next car. The clock is installed at regular stops and is operated as follows: On reaching the stop the conductor leaves the car and by means of a key sets the indicator for the prevalent headway of, say, ten or fifteen minutes. The setting of the minute indicator also winds up the clock spring for a complete run over the dial. When the indicator reaches zero it remains there for two minutes to take up minor delays in the schedule. If the delay exceeds two minutes, the indicator moves beyond zero to the section marked "out of service." This last position, therefore, indicates that there has been some unusual blockade. The clock is installed in a cast-iron housing with wooden top and may be mounted on an ordinary pole. The dial is about 9 in. in diameter. The housing is larger than necessary as the space above the dial is used for advertisements. This foregoing description is based upon an article in the *Deutsche Strassen u. Kleinbahn Zeitung*.



Headway Clock at Metz

the required results. Based upon the principle of the oscillograph, but with its movement confined to a straight line, the new instrument, illustrated herewith, indicates the peak of the voltage wave at the limit of oscillation along that line. It does not show the character of the wave or form of its peak, but it does give very clearly the reading for that peak, whatever the shape of the wave may be. This peak voltage meter, in



Rear View of Peak Voltage Meter Showing Vibrator Containing Box and Other Details of Construction

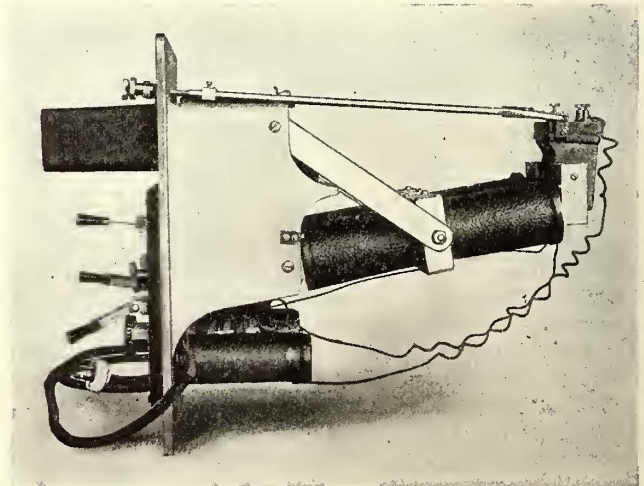
its original crude form, was used successfully in the Simplex factory for some time and thus thoroughly tested out. It has been completed in its present form after an experimental period extending over two years. Arrangements are now being made to market it.

The voltmeter, which is of switchboard type, measures about 10 in. x 12 in. on the front and 14 in. deep. It consists essentially of a heavy electromagnet, between the poles of which the vibrator is placed. By a suitable arrangement of lamp, mirror and lenses, a beam

VOLTMETER FOR INDICATING PEAK VOLTAGES

In testing insulated wires and cables the ordinary voltmeter often fails to measure adequately the stresses to which the dielectric is subjected. Voltmeter readings which are based on the integration of the sine wave—or the square root of the mean square of instantaneous values—give little or no indication of unusual peaks in the voltage wave or of surges in the circuit. The need of an instrument which would give such readings arose in high-voltage work, for in such tests of wires and cables the peak of the wave is what counts in breaking down the insulation. So long as a sine wave is maintained the ordinary voltmeter indicates the peak voltage (a definite percentage above the voltmeter reading); but in cable testing there is a large charging current due to the electrostatic capacity of the cable. As this current is likely to distort the wave form, the ordinary voltmeter may give no definite information as to peak voltage.

After trying and discarding both a spark gap, which proved to be too easily affected by outside conditions, and an oscillograph, which is too delicate an instrument for factory use, the engineers of the Simplex Wire & Cable Company, Boston, Mass., proceeded to develop for their own use apparatus which would give



Side View of Peak Voltage Meter Showing Magnet Coils and General Construction

of light is thrown on a ground glass scale in front, graduated in volts. This instrument is connected, through a potential transformer, directly on the high-voltage circuit, the current being so small that the apparatus can be left in the circuit all the time. It can be quickly calibrated at any time by applying direct current of known voltage.

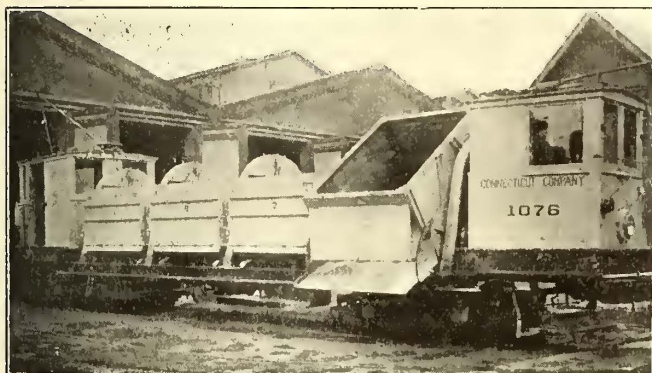
MOTOR-OPERATED STEEL DUMP CARS

Since June, 1913, the New Haven lines of the Connecticut Company have been using one and the Hartford lines of the same company four steel motor cars of the multiple-dump design shown in the accompanying drawings and illustrations. This car is the invention of one of the officials of the Connecticut Company, and it

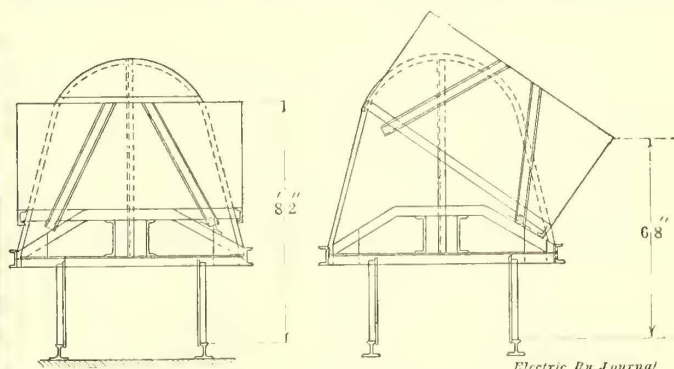
speaking, the multiple dump car has reduced the cost of operation in the ratio of 7.5 to 5. An auxiliary advantage of this car is that when used for macadam work the dumping can be regulated so neatly that track scrapers may be dispensed with.

GENERAL DIMENSIONS AND CONSTRUCTION

One of the first five cars built is shown in the halftone illustrations. These cars were made 48 ft. 8 in. over all



Steel Multiple Dump Car—View Showing Position Taken by Shelf When Dumping a Section



Steel Multiple Dump Car—Body in Normal Position and in Dumping Position with Sides Closed for Loading

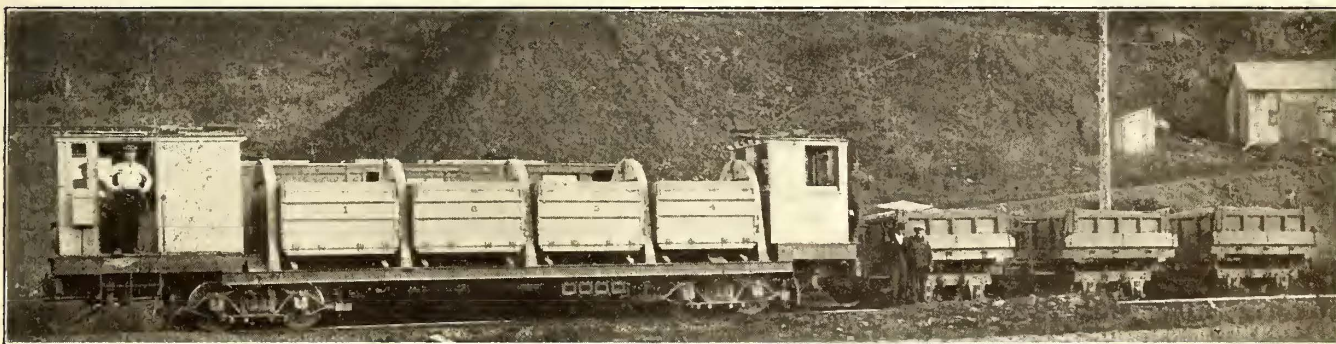
is built by the Wason Manufacturing Company, Brightwood, Mass. Such rolling stock naturally costs more than a home-made outfit of odds and ends, but its substantial construction and specialized design effect savings in operating cost which more than offset the bigger investment. Aside from this, it is wise to have every vehicle of the company free from unsightliness and inefficiency, no matter what purpose it serves.

and were fitted with four "dumpies" and a motorman's cab at each end. Except for the cabs, they are constructed of steel throughout, weighing 40 tons empty and 72 tons loaded. They are equipped with GE-80 motors and K control and are always operated singly. The motor for the dumping mechanism is of 6-hp capacity. Each of the four compartments can hold 8 tons of trap rock.

The all-steel car is much cheaper to operate than the former train of ballast cars because its larger capacity, automatic dumping mechanism and self-contained propulsion equipment make it possible for one workman to dump easily in three minutes a load of 24 cu. yd. compared with the hard work of three men to dump in ten minutes a load fully 2 cu. yd. less. As a double-end, individual motor car, it can be maneuvered forward and backward with greater ease and safety than a train, nor does it have couplings to break on down grades or elsewhere. That it takes far less track space is evident from the accompanying halftone on which are paralleled a

Experience with these cars showed that it was possible to cut down the weight without affecting stability. A lighter design, therefore, is now being incorporated in the smaller cars. The latter will have three 8-ton compartments and weigh approximately 90,800 lb. loaded. A description of this design follows:

The new cars are 39 ft. 7½ in. long over all, 8 ft. 3 in. wide, 8 ft. 5 in. from the top of the rail to the top of a compartment and have 19-ft. 3¾-in. truck centers. The underframe consists of side sills of 7-in channels, 9¾-lb. section, with 5-in. x 3-in. x ⅜-in. angles at the ends; two center sills of 15-in. channels, 33-lb. section, end



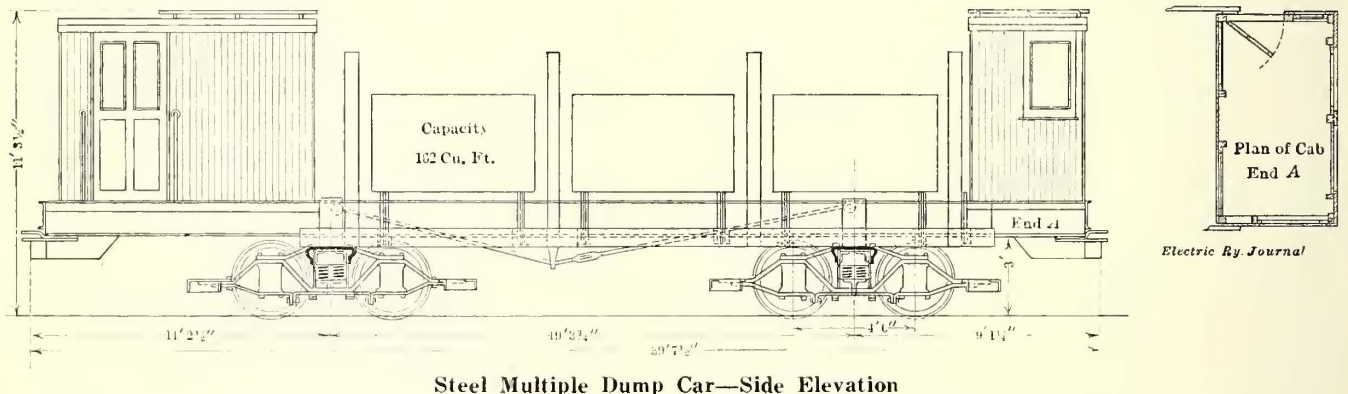
Steel Multiple Dump Car—Single-Motor Car of 24 Cu. Yd. Capacity Placed Alongside Train of Old Ballast Cars of 22 Cu. Yd. Capacity to Show That Latter Is 44 Ft. Longer

single 49-ft. steel dump car of 24 cu. yd. capacity and a 93-ft. combination of motor car locomotive and four trailers of 22 cu. yd. capacity. On right-of-way and other free-running sections this car is operated at speeds of 25 m.p.h. to 30 m.p.h. with perfect safety, which fact, taken in connection with its dumping mechanism, permits the cars at Hartford to run seven trips a day instead of the six trips customary with trains. Roughly

sills of 12-in. channels, 20½-lb. section and truss rods of 1½-in. round iron upset at center to 1¾ in. and connected with turnbuckle. Both the top and bottom plates of the bolsters are of 10-in x 1-in. wrought iron or steel. The floor, end and apron plates of the body are ¼ in. thick. The trucks are of the Wason No. 30 type with 4-ft. 6-in. wheelbase and carry heat-treated axles with 4¼-in. x 8-in. journals and Symington journal boxes.

The dumping sections are operated from one cab by a 6-hp motor through drum and cable mechanism. The operator requires only twenty seconds to dump any single compartment in either direction. The sideboards open and close automatically with the raising or lowering of the dumping body. These boards, in opening, make an extended shelf or apron so that the trap rock or other material will be dumped far enough away from the track to avoid interference with the steps of passenger cars. The hoisting devices cut out automatically, so that when the body is raised high enough to dump the motor stops working; also when the body comes back in place the motor is automatically cut out and stops, thereby making it impossible for an inexperienced man to damage the machinery. The dump car is so geared that the maximum time for dumping and restoring the three sections is from two to three minutes. This speed makes it possible to use the dump car for hauling material and dumping it on track of all but the busiest lines without detriment to the regular schedule of passenger cars.

On most of the dump cars now in use it is necessary for the crew to unlock or open the sideboards from the ground, either with a bar or handle, thus delaying the operation of the car and subjecting to possible injury the men who unlock the sideboards. In this car these disadvantages are avoided by the self-operating doors on the dump car bodies, which require no attention from the crew because they act automatically in unison with the bodies when elevated to discharge the load.



Steel Multiple Dump Car—Side Elevation

When the cars are to be used on construction work and it is necessary to shovel from the ground into the car, special catches are used in order that the sideboards may be fastened to the body and the bodies elevated to such a point that the top of the lower sideboard is only 6 ft. 8 in. from the ground. This enables the laborers to shovel from $4\frac{1}{2}$ cu. yd. to 5 cu. yd. of material into the body, whereupon power may be applied to right the compartment. The weight of the car body and trucks, without load, air brake or power electrical equipment, is 44,000 lb.

A PROPOSED HOLLOW CONCRETE POLE

The Natural Reinforced Concrete Pole, Pile & Pipe Company, of Denver, Col., has been organized for the purpose of developing the use of reinforced concrete for constructing poles and pipes in place of wood and steel, a new process patented by R. M. Jones covering the basic method of manufacture. In this scheme the concrete for the poles is not cast in the usual manner but is rolled upon a collapsible central core by means of a moving belt. The concrete is carried in a loop in the belt and is subjected to heavy pressure by large rolls on either side so that the concrete, although it is mixed quite dry, is worked sufficiently to cause the excess

water to run from the surface. The reinforcement is centrally located in the concrete walls and is made up of twisted square bars which are carefully woven with steel-wire warp.

The poles may be in any length desired up to 35 ft. in monolithic form. For greater lengths two sections are spliced by casting a short core of solid concrete inside of two poles set end to end, the reinforcing bars of each being extended beyond the ends into the core. The hollow construction makes the poles very light, comparatively speaking, and the casting machines are said to be relatively small, weighing about 30 tons and costing completely installed about \$20,000. A casting machine is reported to be able to turn out one pole every fifteen minutes at a labor cost of approximately \$1.50. The makers estimate the cost of the poles and fittings for a three-phase transmission line at about \$976 per mile, using wooden poles spaced at 120-ft. intervals. With the new concrete poles spaced at 176-ft. intervals the cost is stated to be about \$966 per mile, the greater span being permitted on account of the greater strength inherent in the concrete poles.

A NEW SYSTEM FOR TRACK-CIRCUIT SIGNALING WITHOUT PRELIMINARIES

The latest method of single-track automatic block signaling without preliminaries, developed by the Union Switch & Signal Company and known as the traffic direction block, or "T D B" system, was briefly

described in the ELECTRIC RAILWAY JOURNAL for Oct. 4, 1913. Since that time several actual installations have been completed and, in consequence, additional details of the engineering features have become available. The features of the system aside from the elimination of preliminaries are the facts that two cars are permitted between sidings for following movements and that there is but one track circuit and four signals for each opposing block, the differentiation between opposing and following blocks being made because there are two following blocks contained in each opposing block which extends from siding to siding. A description of the arrangement of the apparatus that effects these conditions is given in the following paragraphs and diagrams on page 199.

Each opposing block has one track circuit with two track relays, one at each end, and a transformer which supplies current at the center of the block. Each track relay will be shunted by any car which may be on the track circuit between the track relay itself and the transformer feeding it. Also, each track relay will be shunted by a car within a short distance on each side of the transformer. There is, therefore, a territory on each side of the transformer within which a car will shunt both relays.

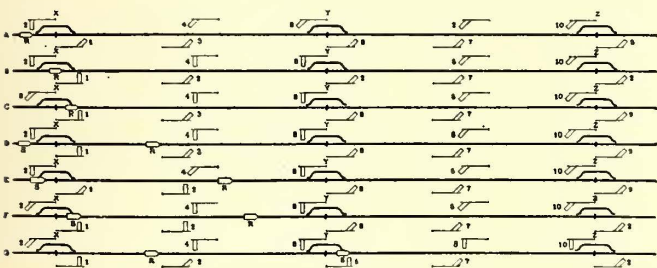
Referring to the illustrations, it will be seen that in

the block between X and Y there will be one track relay at signal 1 and another track relay at signal 6. Normally, signals 1 and 6 are controlled by both track relays or the entire section of track between signals 1 and 6. Signal 3 is controlled by the track relay at signal 6, and signal 4 is controlled by the track relay at signal 1.

An eastbound car entering the block X-Y at X will de-energize the track relay at signal 1, and thereby set signals 1, 4 and 6 at stop. As signal 3 is controlled by the track relay at signal 6, it will not be set at stop until the car reaches the point where it affects this track relay.

The car, in setting signal 4 at stop, energizes a line relay which is used to clear signal 1 after a car has passed signal 4. This line relay cuts out the control of signal 1 from the track relay at signal 6. As the car proceeds, passing signal 3, the track relay at signal 6 is de-energized, setting signal 3 at stop and still holding the other three signals at stop. When the car passes signal 4, the track relay at signal 1 is again energized and signal 1 is cleared. Incidentally, signal 4 is cleared because the track relay at signal 1 is energized, but this has no effect on east-bound movements. When the car has passed signal 6 all signals and relays again assume their normal positions unless a second car has entered the block at signal 1 before the first car passed signal 6. The operation for west-bound cars is similar.

The line relay is active only in connection with east-bound movements; west-bound movements have no



Block Signal System—Progressive Positions of Semaphores for Following Cars

effect upon it. Therefore a west-bound car will set signal 1 at stop when signal 6 is passed. Another line relay is used to limit the control of signal 6 in a similar manner for west-bound movements.

The circuits are so arranged that but one of the two line relays can be energized at any one time. It will be evident that if an east-bound car should pass signal 1 at the same time that a west-bound car passed signal 6, signals 3 and 4, being directly controlled by the track relays, would afford positive protection.

It is not necessary to have any certain sequence of car movements. An east-bound car could proceed past signal 1 and afterward back out of this block instead of proceeding through, and all apparatus would again become normal when the car had left the block. The same would happen if a west-bound car should enter at signal 6 and then back out. The arrangement of circuits in conjunction with a standard relay so that it will be active for one direction of traffic only is not novel, nor does it involve complication of apparatus or circuits.

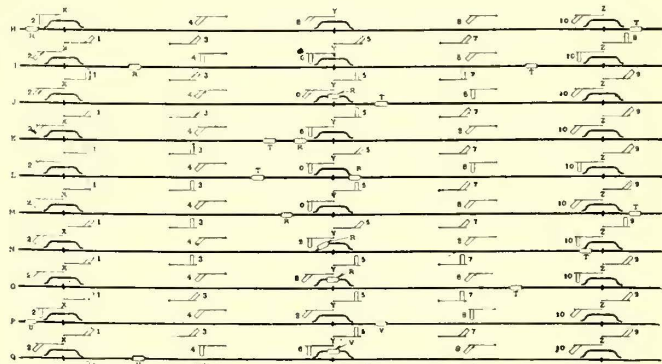
INSTALLATIONS

This signal system is now either in service or being installed on the interurban railways shown in the following table, in which a block is considered as the territory from siding to siding:

	Miles	Blocks
Chicago, Lake Shore & South Bend Railway	55	20
Indianapolis, Columbus & Southern Traction Company	22	13
Chicago, South Bend & Northern Indiana Railway	9.5	5
Louisville & Northern Railway & Lighting Company	3.5	2
Ohio Electric Railway	4.2	2
Scranton & Binghamton Railroad	10.1	9
	104.3	51

On these lines the semaphore signals, where used, are of the style "B," electrically lighted, two-position type, working in the upper left-hand quadrant. They are equipped with induction motors and the mechanisms are at the bottom of the posts. On the Chicago, Lake Shore & South Bend and the Chicago, South Bend & Northern Indiana all signals are semaphores. On the other roads light signals are used between sidings. These light signals are equipped with two 8-in. lenses each, and they carry hoods to screen the lenses from sunlight and backgrounds to increase the visibility. Behind each lens are two 25-watt, 16-cp tungsten lamps. The semaphore signals are directly controlled by the track relays, whereas the light signals require line relays which operate on 110-volt circuits controlled by the track relays.

All signal apparatus is designed for sixty-cycle operation except on the Scranton & Binghamton and the Ohio Electric Railway, where twenty-five-cycle current is used. The signal slot coils are controlled by line wire



Block Signal System—Progressive Positions of Semaphores for Opposing Cars

circuits through the track relay contacts, whereas the signal motor circuits receive their current from transformers at the sidings. They are on purely local circuits. Transformers with two secondaries, one for the track circuits and one to deliver 110 volts, supply current at the center of the block for the track and to line and intermediate signal circuits. Other transformers with one 110-volt secondary each, placed at the turnouts, supply current for the siding semaphore signals and line circuits. These transformers are provided with taps as required, and all receive current from the 2200-volt a.c. mains.

On the five 600-volt, d.c.-propulsion roads the impedance bonds have a capacity of 500 amp per rail. The impedance bonds on the Chicago, Lake Shore & South Bend, where alternating current at 6600 volts is used, have a capacity of 200 amp per rail. Circuit controllers connected to the switch points require the switches to be set for the main line before the signals at the sidings can assume the clear position.

It is reported that work on the Granada-Maracena tramway will begin at once. This line, beginning in Granada, Spain, follows the Alcantete national highway to the Sur de España Railway bridge part way and then the district highway to Maracena.

News of Electric Railways

Communication from Company Regarding Franchise Negotiations in Toledo

At a meeting of the railways and telegraph committee of the City Council of Toledo, Ohio, on Jan. 15, F. R. Coates, president of the Toledo Railways & Light Company, asked that the city take steps at once toward arranging a conference on the franchise question with the representatives of the company. He explained that the company desires to furnish the best service obtainable at the lowest possible cost, but that it will not be able to operate on a 3-cent fare, as provided in an ordinance, in effect on March 27, passed by the old Council. Mr. Coates suggested that the city name two representatives and that he and one of the company's attorneys represent the company, the four to choose a fifth man from among the business men of the city. The committee appointed a sub-committee, consisting of Mayor Keller, City Solicitor Thurstin and Councilman Harry T. Irwin, C. C. Kilbury and F. M. Dotson, to confer with the railway officials and report some plan of procedure to the Council by Feb. 1.

In addressing the committee Mr. Coates said in part:

"The corporation I represent is extremely anxious to get down to cases on this franchise question. We want to be fair with the city and all persons in the city. The interests of Toledo are our interests and we want to provide the best possible street car service at the lowest possible cost to our patrons. All we ask is as fair consideration from the city. A report of investigators who examined the company's books for 1912, of which the company and the city have copies, shows that it is impossible for the company to provide adequate service at a 3-cent fare.

"This report and our records prove that the ordinance passed by the last Council, to become effective March 27, is unjust and prohibitive of continued street car service from the company. The company asks only a fair income from its investment, which any corporation must have in order to retain capital and do business. I believe the people of the city want the company to have the fair wage it asks. Prompt and fair examination of the situation by both interests should result in an early and satisfactory franchise agreement being reached."

In his first communication to the City Council City Solicitor Thurstin recommended that the municipal pledge of 3-cent fares and universal transfers be adhered to, that street railway and other utility privileges be awarded to the corporations which made the best bid and that interurban lines operate through the city on separate and independent franchises.

In his first message Mayor Keller recommended low street railway fares and said that municipal ownership is the ultimate end of all negotiations with the company.

Inaugural Address of Mayor Hocken of Toronto

Mayor Hocken of Toronto, Ont., on Jan. 12 delivered an inaugural address covering a wide range of subjects. Referring to the street railway question, he announced that the agreement which it is proposed to submit to the ratepayers has been prepared. He said in part:

"If the provincial government could be induced to enter into negotiations for the acquisition of the Toronto & York Radial Railway outside the city and the electrical plant now controlled by Sir William Mackenzie, it would clean up the franchise within the city of Toronto and practically over the whole of Ontario."

He urged members of the Council to avoid being "stamped" into decisions against their own judgment. The possibility of the extension of the civic car lines was outlined, the prophecy being that these would be extended to connect with the existing city system at points like Lansdowne Avenue and Royce Avenue and at Dovercourt Road and Van Horne Street.

At the request of the Mayor, a committee has been appointed by Council from the different public bodies for the purpose of digesting all the information available upon the

street railway transportation question, and with power to make any further investigations that the members may deem desirable, in order to prepare a recommendation to submit to the properly qualified ratepayers.

Comptroller Church brought forward the question of providing further civic car lines at the session of the Board of Control on Jan. 16, and it was decided that Works Commissioner Harris should report on a civic belt line at the Beaches to connect with the Gerrard and Danforth car lines, on Windermere Avenue to connect with the portion of the Mimico Division of the Toronto & York Radial Railway, which the city will purchase, on the Lansdowne Avenue extension, and on a belt line in Ward Seven. He also seeks to have the corporation counsel report on the cancellation of the stub-line franchise at the Beaches.

Subway Matters Considered in Chicago

Plans for subways for the surface railways of Chicago, to cost in the aggregate \$32,385,000, were tentatively agreed upon by the subway committee of the local transportation committee of the City Council on Jan. 10. Recommendations of the board of supervising engineers already submitted involve an estimated expenditure of \$27,285,000. George Weston of the board of supervising engineers was asked to prepare plans to extend the system, principally on the West Side, as far as possible with an additional expenditure of \$5,100,000. The subway routes tentatively adopted by the committee and the estimated cost of the tunnels are given below:

Clark Street, North Avenue to Twenty-second Street..	\$11,500,000
Washington Street from the tunnel under the river to Michigan Avenue, Michigan Avenue from Washington Street to Jackson Boulevard, Jackson Boulevard to Van Buren Street tunnel, including also an extension west on Washington Street to Sangamon Street.....	7,900,000
Robey Street, Fullerton Avenue to Diversey Boulevard	990,000
Robey Street, Blue Island Avenue to Thirty-second Street	2,290,000
Robey Street, Thirty-ninth Street to Forty-sixth Street.	2,420,000
Ashland Avenue, Clybourn Place to Clybourn Avenue..	1,030,000
California Avenue, Grand Avenue to Kinzie Street.....	1,155,000
Total	\$27,285,000

The first two items are for subways complete, including track equipment and power distribution system. The last five items are exclusive of whatever sum is necessary for private property easements.

Under a suspension of the rules approval was obtained on Jan. 12 of a resolution providing for the printing of 50,000 subway petition blanks to be circulated under the direction of the local transportation committee. The form in which it is planned to present the question follows:

"Shall the city of Chicago use its traction fund, to the extent the same shall be sufficient, to construct an initial system of municipally owned passenger subways in Chicago, such system of subways to be extended from time to time as traffic conditions shall require, and when constructed, the use thereof, to the extent specified in the following named ordinance, to be leased on a fair basis to the surface street railways of Chicago to Feb. 1, 1927, and to be operated by them in connection with the unified operation of their systems, for a single 5-cent fare with universal transfers, all pursuant to the terms and provisions of an ordinance passed by the City Council of Chicago prior to April 7, 1914?"

On Jan. 15 Bion J. Arnold presented to a sub-committee of the Council committee on local transportation a report supplementing the recommendations he made last October. He showed how the bores could be extended into districts aldermen said were "ignored" in the first report. In addition to the Clark Street subway under the central section and the west side double route using the existing tunnels under the river, he charted extensions for the benefit of the west, the northwest, and the southeast sections of the city. The cost of the two initial routes Mr. Arnold has placed at \$17,909,000. The extensions would cost \$8,868,000 more. The opening of five stretches of "closed" street of the west side, already approved by the Aldermen, would cost \$7,540,000, he figured. Further, he proposed the creation of underground car storage facilities that would cost \$1,000,000.

These figures total \$35,317,000 for the subway structure, and the estimate of the cost of equipment, including tracks, station furnishings, lighting, ventilating, and signaling, is \$1,606,000. The routes and estimates of cost furnished by Mr. Arnold in his report were:

	Subway Structure	Equipment
Clark Street, Nineteenth Street to North Avenue	\$11,093,000	\$407,000
Washington Street, Michigan Avenue, Jackson Boulevard and Franklin Street, between east ends of tunnels.....	6,816,000	184,000
Car storage facilities under Michigan Avenue and Grant Park, Washington Street to Jackson Boulevard	1,000,000	276,000
Totals	\$18,909,000	\$867,000
North Robey Street, Fullerton Avenue to George Street	926,000	64,000
South Robey Street, Blue Island Avenue to Thirty-third Street	2,214,000	76,000
North Ashland Avenue, Clybourn Place to Fullerton Avenue	968,000	62,000
South Robey Street, Thirty-ninth Street to Forty-sixth street	2,332,000	88,000
North California Avenue, Grand Avenue to Fulton Street	1,100,000	55,000
Totals	\$7,540,000	\$345,000
West Washington Boulevard, west end of the tunnel to Union Park.....	2,979,000	125,000
Jefferson Street or Desplaines Street to Milwaukee Avenue, thence to Chicago Avenue	2,831,000	111,000
Indiana Avenue, Sixteenth Street, under Grant Park to Washington Street.....	3,058,000	158,000
Total of extensions.....	\$8,868,000	\$394,000
Grand totals	\$35,317,000	\$1,606,000

President Wilson's Message

Among the significant statements made by President Wilson in his message on anti-trust legislation which he read to Congress on Jan. 20 were the following:

"It will be understood that our object is not to unsettle business or anywhere seriously to break its established courses athwart. On the contrary we desire the laws we are now about to pass to be the bulwarks and safeguards of industry against the forces that have disturbed it. What we have to do can be done in a new spirit, in thoughtful moderation, without revolution of any untoward kind.

"The country is ready to accept a law which will confer upon the Interstate Commerce Commission the power to superintend and regulate the financial operations by which the railroads are henceforth to be supplied with the money they need for their proper development to meet the rapidly growing requirements of the country for increased and improved facilities of transportation. We cannot postpone action in this matter without leaving the railroads exposed to many serious handicaps and hazards. The prosperity of the railroads and the prosperity of the country are inseparably connected.

"The business men of the country desire the advice, the definite guidance and the information which can be supplied by an administrative body, an interstate trade commission.

"In connection with producing industries there ought to be an administrative commission capable of directing and shaping such corrective processes, not only in aid of the court, but also by independent suggestion if necessary.

"Inasmuch as our object and the spirit of our action in these matters is to meet business half way in its processes of self-correction and disturb its legitimate course as little as possible, we ought to see to it that penalties and punishments should fall, not upon business itself, to its confusion and interruption, but upon the individuals who use the instrumentalities of business to do things which public policy and sound business practice condemn.

"We are agreed, I take it, that the holding companies should be prohibited, but what of the controlling private ownership of individuals or actually co-operative groups of individuals? Shall the private owners of capital stock be suffered to be themselves in effect holding companies? Shall we require the owners of stock when their voting power in several companies which ought to be independent of one another would constitute actual control to make election in which of them they will exercise their right to vote? This question I venture for your consideration.

"I hope that we shall agree in giving private individuals who claim to have been injured by the exterminating forces of combination the right to found their suits for redress

upon the facts and judgments proved and entered in suits by the government where the government has upon its own initiative sued the combinations complained of and won its suit, and that the statute of limitations shall be suffered to run against such litigants only from the date of the conclusion of the government's action."

Strike in Hazleton

Thirty-five conductors and motormen employed by the Lehigh Traction Company, Hazleton, Pa., went on strike on Jan. 1. Recognizing the responsibility resting on it, the company has endeavored to reach a satisfactory adjustment of the differences. Under the existing agreement governing the wages of the motormen and conductors of the Lehigh Traction Company, the following scale is in force: First year, \$1.98 a day, or 22 cents an hour; second year, \$2.07 a day, or 23 cents an hour; third year, \$2.16 a day, or 24 cents an hour. The demands made by the men are briefly 35 cents an hour, or \$3.15 a shift of nine hours, with time and half-time for overtime, or 52½ cents an hour. The company submitted the following proposition, to wit: First year, 23 3/9 cents an hour; second year, 24 4/9 cents an hour; third year, 25 5/9 cents an hour; for overtime, 26 cents an hour. This is equivalent to an advance of more than 7 per cent. In a statement which it issued the company said in part:

"The revenue derived from the operations of the company does not warrant an advance in wages, even to the extent of the increase proposed by the company. It is only in anticipation of a greater volume of business in the future that the officials of the company feel justified in offering the increase proposed.

"To accede to the demands thus made would invite serious consequences to the bondholders and stockholders of the company. It must be remembered that during the twenty years of its operation the company has thus far been unable to declare a dividend upon its stock. We cannot, as officers, justify an advance which the earnings of the company will not warrant. To do so would lead to financial disaster.

"The second point in controversy is the demand of the employees that all questions, including rates of wages, which cannot be agreed upon between a committee of employees and the officers of the company shall be submitted to arbitration. The company is willing to arbitrate all questions except the right to hire, discharge and discipline employees. Inasmuch as the agreement stipulates the rate of wages, there is nothing in that feature to submit to arbitration."

In the negotiations which preceded the strike the company endeavored to treat its employees and their committee with deference and courtesy. It was requested that no decisive step be taken in the matter, nor should negotiations be broken off, until Jan. 10. This was done so that the public might take steps in the interest of its own convenience. The company received assurance that at least two full days' notice would be given before the inauguration of any strike. In this matter the employees did not evince good faith. The strike was precipitated with only one day's notice.

Group Insurance for San Francisco Employees

On Jan. 1 the United Railroads, San Francisco, Cal., took out group insurance for all of its employees who have been in the service of the company three years or more. All of those who have been in the service of the company between three and four years were insured for \$250 each; those employed four to five years, \$500 each; five years and over, \$1,000 each. The individual is not furnished with a policy, as the men are all insured in the name of the company, but each employee was presented with a card which will entitle his or her beneficiary to receive from \$250 to \$1,000, in accordance with the plan. The insurance was placed without cost to the employee. At the time the company notified its employees of the group insurance plan it advised them of an increase in wages. These matters were covered by the following notice issued to trainmen and employees:

"The new administration of the United Railroads has thus

far occupied itself chiefly with two considerations—the improvement of its service and the welfare of its employees. Notwithstanding the very severe conditions existing in the money markets of the world, the company has thus far been able to comply with all the requests of the city and state officials and with many of the requests of the improvement clubs of the city. It has investigated every complaint and endeavored in each instance to remove the causes of the criticism.

"It has appreciated that with the present high cost of living it must go to the limit of its resources in improving the condition of its employees, and to this end it proposes to inaugurate the three following plans:

"First—The families of all employees of the company who may die while in the employ of the company will, without any expense for premiums or otherwise, receive \$250 after three years' service, \$500 after four years' service and \$1,000 after five years' service. Even at the present time this benefit would accrue to the families of about 1600 employees.

"Second—Beginning with Jan. 1, 1914, the wages of platform men who have served six months will be increased 1 cent an hour; the wages of those having served one year or more will be increased 2 cents an hour.

"Third—In view of the fact that the paramount duty of the company is to avoid the killing and maiming of people, and that to accomplish this we must have the loyal and skillful co-operation of our platform men, it is proposed to offer a special reward for such co-operation. The basis for the proposed plan will be the money paid during the year 1913 for damage claims, and to the extent that in succeeding years the amount of such claims may be diminished we shall distribute among the platform men the entire amount so saved, in proportion to their actual hours of employment during the year in which the saving was effected."

Jesse W. Lilienthal, president of the United Railroads, San Francisco, Cal., has issued a statement in regard to the company's future policy relative to the improvement of the service rendered and the welfare of its employees.

Annual Report of Chicago Smoke Abatement Committee

The committee which is investigating smoke abatement and electrification of railway terminals for the Chicago Association of Commerce has submitted its annual report for the year 1913. Researches concerning sources of atmospheric pollution have been completed, and the conclusions are now being prepared for final presentation. The committee has investigated types of locomotives which might be substituted in the terminal district of Chicago for the existing steam locomotives. In these investigations it has conferred with those interested in the development of an internal combustion engine-locomotive and has studied the storage battery as applied to traction. No locomotive of these general types has as yet been produced in any country which is capable of performing satisfactorily the present-day switching and other services in the railway terminals of Chicago.

The changes which would be necessary in the existing structures of the steam railroads, such as overhead bridges, station platforms, signal masts and bridges, track circuits, etc., in order to install the third-rail or overhead contact systems are being listed and their cost estimated to the end that upon the completion of this phase of the work complete data on all phases of the work may be available.

Revocation of Union Depot Franchise in Cincinnati Recommended—Other Events

The ways and means committee of the City Council at Cincinnati, Ohio, has recommended the revocation of the White-Bleekman union depot franchise, notwithstanding the fight made by Mr. Bleekman to retain it. City Solicitor Bettman has, however, prepared another franchise ordinance which will separate the steam railway and electric railway depot plans and provide for commissions for each to see that the terms of the franchises are carried into effect. The determination to revoke the depot franchise was brought about through delay in beginning the construction at the time specified in the franchise.

The final changes in the general re-routing plan adopted

by the Council some months ago were put into effect by the Cincinnati Traction Company on Dec. 27, 1913, so far as it was possible to do until still further changes are made in the tracks in the down-town district.

William F. Molloy has been recently bound over to the grand jury by Municipal Judge Alexander in the sum of \$1,000 each on the charges of assault with intent to kill and hurling missiles at a street car. The alleged acts took place during the strike of the employees of the Cincinnati Traction Company last May. He is said to have confessed that he threw a bag of cement and a heavy window weight from an upper floor of the new Union Central Life Building, then in course of construction. The cases against John Brulard and Walter Maley, who were arrested on similar charges, have been dismissed.

Conference Regarding Cleveland Subway

After a conference on Jan. 13 with W. R. Hopkins, A. B. du Pont and Thomas Schmidt of the Cleveland Underground Rapid Transit Company, Mayor Newton D. Baker of Cleveland, Ohio, announced that the city's plan for building an underground terminal at the Public Square and a subway between that point and West Ninth Street would in no way interfere with the company's plans. The subway proposed by the city will cost about \$1,600,000, according to estimates made by the city's engineering department. The city has requested the Cleveland Underground Rapid Transit Company to co-operate with it in the construction of the subway.

Councilman Stolte started a movement recently to reduce the salaries of a number of city officials and employees and included Peter Witt, the street railway commissioner, in this number. He proposed to reduce Mr. Witt's salary from \$7,500 a year to \$7,000. Mr. Witt announced that he would resign if his salary is reduced.

Differences of opinion over rates are said to have delayed the establishment of freight service by the interurban lines entering Cleveland. The merchants want a tariff only slightly above the steam railroad rates. The interurban roads furnish practically an express service and the managers of the companies say that they cannot furnish this service with profit to themselves at the rates the merchants desire.

Protest Against Order of Ohio Commission.—Attorneys Thomas Hogsett, Cleveland, and John C. Welty, Canton, representing the Northern Ohio Traction & Light Company, appeared before the commission on Jan. 14 to protest against the order of the commission requiring concrete foundations for the local tracks in Massillon. T. H. Davis, Massillon, city solicitor, appeared in behalf of the town.

Further Negotiations for Batavia Property.—W. R. Brown, representing the Railway Storage Battery Car Company, New York, N. Y., has been in communication with the Mayor of Batavia and the committee which is endeavoring to assist the Buffalo & Williamsville Electric Railway to sell its line in Batavia, N. Y. If Mr. Brown does not buy the line, the Mayor says he will organize a company to take over the property.

Utilities Board in the Philippines.—The appointment of a public utilities commission in the Philippines was announced to the War Department on Jan. 16, 1914, by Governor-General Harrison. Judge Mariano Cui has been named Chairman, to serve six years, and the other members are Stephen Bonsal, four years, and Clyde A. DeWitt, two years. Judge Cui long has been prominent in Philippine affairs, Mr. Bonsal was Governor Harrison's secretary, and Mr. DeWitt, an attorney, has been in the Philippines since 1902.

Drivers of Vehicles Must Exercise Reasonable Care.—In a decision dismissing the action of the owner of a horse-drawn vehicle for damages caused by the vehicle being knocked over by one of the cars of the Montreal Park & Island Railway, Montreal, Que., the judge stated that while those in charge of cars must take every means to render their operation as safe as possible, cars are a public necessity and have the right-of-way on their tracks and it is the duty of others using the streets to respect that right-of-way.

Mr. Harvey Approves Withdrawal of Kansas City Franchise.—Ford Harvey, one of the receivers for the Metro-

politan Street Railway, Kansas City, Mo., approved the action of his colleague on returning to Kansas City from Chicago recently. He said: "I think it was unfortunate that Mr. Dunham was forced to withdraw the franchise ordinance from the consideration of the council committee, but nothing else could be done under the circumstances. Mr. Dunham had no alternative. His action meets with my approval."

Finding of Arbitration Board in Cincinnati.—The board of arbitration which has been considering the differences between the Cincinnati Traction Company and its motormen and conductors made public its finding at a meeting on Jan. 14. The vote was unanimous. The finding comprised the terms submitted to the men some time ago and approved by them. The board consisted of Walter A. Draper, representing the company; John Frey, representing the men, and Herman Schneider, dean of the University of Cincinnati, as umpire.

The Potters of Providence.—The Providence *Sunday Journal* of Jan. 4, 1914, contained a review of the connection of A. T. Potter and A. E. Potter, father and son, with street railway and electric railway development in Rhode Island. A. T. Potter has for some time been vice-president of the Rhode Island Company, operating in Providence and elsewhere in Rhode Island, and A. E. Potter was recently elected president of the company to succeed Howard Elliott, who is now chairman of the board. The article was accompanied by excellent likenesses of both the Potters.

Columbus to Provide for Municipal Ownership.—A special committee of the charter commission of Columbus, Ohio, is working on the sections that will provide for municipal ownership of public utilities. Franchises granted under the charter are to be operative for twenty-five years and no renewal is to be made earlier than two years before the expiration of the grant. Exclusive franchises will not be permitted. Nothing in the ordinance or contract granting a franchise is to prevent the city from acquiring the property of the utility by condemnation proceedings or in any other lawful way.

Bids for Additional Rapid Transit Sections in New York.—Bids for two more sections of the new rapid transit railroads in the Bronx were advertised for on Jan. 19, 1914, by the Public Service Commission for the First District of New York. One of the sections is on the White Plains Road extension of the existing subway, and the other on the Jerome Avenue branch of the Lexington Avenue subway. The White Plains Road section is known as Section No. 1 of Route No. 18. The section on the Jerome Avenue branch of the Lexington Avenue line is known as Section No. 2 of Route No. 16, and extends from about 182d Street to Woodlawn Road, the terminus of the line. Bids for this section will be opened on Feb. 10. The railroad in both sections will be a three-track elevated line.

New Jersey Supreme Court Upholds Commission.—On a writ of certiorari to determine the legality of a permit of the Board of Public Utility Commissioners of New Jersey to the Phillipsburg Horse Car Railroad granting permission to reconstruct its lines with tracks of standard gage, the Supreme Court sustained the action of the commission as against the pre-existing contract between the car line and the municipality. The court held that the power conferred upon the town to regulate the exercise of the franchise of the railroad was in the nature of a police power that might be modified or repealed by the Legislature as public expediency demanded. The court stated that the change of gage ordered by the commission was not intended to change the legal status of the road or vary its obligations to the municipality under the provisions of any special statute applicable to it.

Tax Question in Ohio.—Attorney-General Hogan of Ohio has requested the Supreme Court to pass upon the question as to whether railroads which lease their properties to other companies must pay the Willis law tax of three-twentieths of 1 per cent on their capital stock. The question was raised in the case of the State against the Cleveland & Pittsburgh Railroad, the property of which is operated by the Pennsylvania Railroad under lease. The Common Pleas Court decided for the State, but the decision was reversed by the Court of Appeals. This court has been asked to certify the case to the Supreme Court for review. The Common Pleas

Court gave judgment for \$85,000 in favor of the State. Should the State win in the end, it is said that the back taxes will amount to more than \$1,000,000. Several inter-urban roads, as well as street railways and light and power companies, are interested in the case.

Separate Operation of the Fort William-Port Arthur Line.—The municipal departments of Fort William and of Port Arthur, Ont., have made a temporary arrangement for the operation of a through service between the two cities just as in the past when the municipal electric railway between the two cities was under the management of a joint board appointed by the cities. Cars and crews will run through, but the fare boxes will be changed at the boundary between the cities. It is provided that if, in the regular schedule time of operating this through service, cars should be detained longer in one city than in the other, that city in which cars are detained shall pay the extra operating cost. Each city is to have distinctive tickets. The wages of the employees are to be the same in both cities. The power wires are to be equipped with a section breaker at the boundary line, but a cut-over is to be arranged so that either city can feed the other's line in case of an emergency. A by-law is to be submitted at Fort William to authorize the city to raise \$238,000 to improve and extend the system in Fort William.

Track Material Wanted for Subway Work in New York.—In preparation for the temporary operation of the Fourth Avenue subway in Brooklyn, the Public Service Commission for the First District of New York has prepared a form of contract for track materials, etc., to be used in equipping the subway. Heretofore it has been the practice of the city to let a contract for the equipment of subways and allow the contractor to purchase the materials. With the dual system, however, there is so much of this work to be done that the commission has decided to go into the market itself and purchase rails, ballast, spikes and other articles necessary for placing the subways in shape for operation. Public hearings on this contract have been held, and the commission will soon advertise under it for proposals to supply the quantities of such materials estimated as necessary for the equipment of the Fourth Avenue subway between Manhattan Bridge and Eighty-sixth Street station. The engineers estimate that 3399 tons of No. 1 open-hearth rails, 200 tons of No. 2 open-hearth rails, 260 tons of manganese rails, 45,850 cu. yd. of ballast, 6820 cu. yd. of concrete and 1,765,000 ft. of ties will be used in the equipment of the line.

Subway Construction Contract Re-awarded.—The Supreme Court having declined to order the Public Service Commission for the First District of New York to allow the Thomas J. Buckley Engineering Company to change the figures in its bid, the commission has awarded the contract for Section No. 2 of Routes Nos. 4 and 38, the Seventh Avenue subway in Manhattan, to the Degnon Contracting Company, for \$3,059,522. Bids for this section were first opened on Oct. 1, 1913. The Thomas J. Buckley Engineering Company was the lowest bidder. The chief engineer of the commission made an unfavorable report on the Buckley bid, on the ground that the company lacked the experience and equipment necessary to perform one of the most difficult pieces of work on the new subway system. The commission thereupon rejected all bids and readvertised the section. The bids under readvertisement were opened on Dec. 2, 1913, and according to the official figures the Degnon Contracting Company was the lowest bidder, at \$3,059,522. The Thomas J. Buckley Company was the third lowest bidder, and claimed that it would have been the lowest if a mistake had not been made in transcribing certain figures in its bid to the official copy submitted to the commission. The Buckley company then asked the court for an order to prevent the commission from awarding the contract to the Degnon company and to authorize the commission to allow it to change its figures. This the court refused to grant.

Judgment in Easement Case in Seattle.—The failure of Peabody, Houghteling & Company, Chicago, representing the bondholders of the Seattle, Renton & Southern Railway, Seattle, Wash., to appear in the condemnation proceedings instituted by the city of Seattle for the widening and changing of grades on Rainier Avenue has resulted in the entering of a default judgment of \$10 for

all of the right-of-way claimed by the company and the bondholders between Jackson Street and Kenyon Street, on the line of the Seattle, Renton & Southern Railway, valued at \$1,200,000, and on which the company will be forced to expend \$475,000 to bring its tracks to the new grade and make other improvements proposed by the city for Rainier Avenue, including paving. This judgment does not in any way affect the right of the company to retain and operate its tracks on the street. Scott Calhoun, receiver of the company, was prevented from appearing as the attorney for the bondholders after appearing for the company. The right of John G. Higgins and W. A. Peters, who have represented the bondholders in other litigation, was questioned through their failure to show credentials, and Judge Humphries entered the judgment for \$10, claiming that nearly a year ago the bondholders had defaulted by not being represented in court when the original condemnation proceedings were before the court. In 1907 a franchise was granted to W. R. Crawford for the Seattle, Renton & Southern Railway, with the provision that he deed the right-of-way, acquired by purchase and dedication, to the city for street purposes. The quitclaim deed for the property was delivered to the city by the terms of the franchise grant in 1908. A few months before the delivery of the deed, however, all of the property was mortgaged and the trustee of the mortgage declined to become a party to the transfer. Assistant Corporation Counsel Howard M. Findley, who represented the city in the proceedings, will ask the City Council to accept the award of the jury and the acceptance of the award will be the signal for the resumption of improvement work on Rainier Avenue and intersecting streets.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

MASSACHUSETTS

More than 350 bills have been filed for the consideration of the incoming Legislature. Among the measures are the following: To authorize the Public Service Commission to employ auditors; to regulate the sale of securities similar to the Kansas "blue sky" law; to amend Section 33, Part 3 of Chapter 463, Act 1906, so that a street railway may, with the approval of the Public Service Commission, purchase for its sinking fund and other special funds its own or stocks and bonds of other companies; to permit street railways with the approval of the Public Service Commission to issue bonds, coupon notes and other evidences of indebtedness payable at periods of more than twelve months to such an amount in excess of the amount of capital stock at time actually paid in as determined in Chapter 620, Acts 1908; to have annual returns on street railways and returns for assessment of the commutation taxes cover the same periods of time in each year.

NEW YORK

The legislative committees were named on Jan. 19. On Jan. 20 Assemblyman Sullivan, of Chautauqua, introduced a bill providing for a maximum railway passenger fare of 2 cents a mile but giving the Public Service Commission power to exempt any railroad upon proof that it could not earn a reasonable compensation at that rate. A bill similar to this was vetoed by Governor Hughes in 1907. Senator Griffin, of the Bronx, has re-introduced his bill of last year providing for a 5-cent fare on all steam and electric railways between stations in one borough of New York City and stations in an adjoining borough. Mr. Thompson, of Niagara County, has introduced a bill in the Senate to extend the time within which the line of the Electric City Railway may be finished and put in operation. Senator Carswell has introduced a bill amending the stock corporation law by making the provisions of the section relative to the consents of stockholders to mortgage the corporation's property and the certificate showing such consent applicable to the mortgaging of real property situated within the State and belonging to a foreign corporation. The measure has been referred to the judiciary committee.

The following act to amend the railroad law in relation to the minimum number of employees to be employed in the operation of street surface railroads has been introduced in the Assembly and referred to the committee on railroads:

"Section 1. Article 5 of Chapter 481 of the Laws of 1910, entitled 'An act in relation to railroads, constituting Chap-

ter 49 of the Consolidated Laws,' is hereby amended by adding at the end thereof a new section, to be Section 210, to read as follows: 'Sec. 210. Crew for surface car. No passenger car of any street surface railroad propelled by animal or horse power, cable or electricity, shall be operated upon such street surface railroad, its extensions or branches unless there shall be employed thereon at least one employee additional to the person operating and in charge of the motive power propelling the same, and the person or employee in charge of the motive power of such car shall have no other or further duties while actually so engaged than are incidental to the operation of the same. A person or corporation violating the provisions of this section shall be liable to a penalty of \$50 for each violation.' This act shall take effect immediately."

OHIO

Former Senator John N. Stockwell, one of the chief supporters of Mayor Newton D. Baker of Cleveland, has forwarded to Governor Cox of Ohio a draft of a bill that he will ask to be enacted into a law at the special session of the Legislature to be convened soon. This will provide that bonds may be issued in excess of the legal debt limit by cities to provide funds to acquire or construct public utilities within or without the city, provided such utilities produce sufficient income at the time they are acquired to cover the interest charges, pay operating expenses and provide a sinking fund. The bonds are to be a lien on all the property of cities following this plan. It is plain from the letter accompanying the measure when he transmitted copies of the draft to members of the Legislature that Governor Cox does not wish to father this bill at the present time. A bill similar to this passed the House at the last session.

RHODE ISLAND

A resolution creating a legislative committee to inquire into the advisability of the State acquiring the electric railways in Rhode Island has been introduced in the Senate by Senator Munroe, of Providence. The resolution has been referred to the judiciary committee with instructions to report to the Legislature before March 1, 1914. Recommendations for legislation requiring public utilities to submit uniform accounts and information concerning the physical valuation of their property are made in the second annual report of the Rhode Island Public Utilities Commission. Legislation is also asked providing for the employment of inspectors qualified to supervise and inspect the several utilities. The request for a law requiring the submission of reports to the commission is made necessary, the report states, by the apparently unintentional repeal of sections of the general laws which prescribed the obligation. The legislation sought is substantially similar to that now in force in Wisconsin.

PROGRAM OF ASSOCIATION MEETING

"Safety First" Convention

The "Safety First" convention will be held at the University of Nevada, Reno, Nev., on Jan. 26-27, under the joint auspices of the University of Nevada and the Nevada Industrial Commission. The chairman of the first day will be Governor Oddie of Nevada. The vice-chairman will be William E. Wallace of the Brotherhood of Railroad Trainmen, and W. R. Scott, general manager of the Southern Pacific Company. The following papers will be read on the first day: "The 'Safety First' Movement in Nevada," by John J. Mullin, secretary of the Nevada Industrial Commission; "Safety First" on the Oregon Short Line," by L. E. Abbott, safety commissioner of the Oregon Short Line; "Safety First in Practice," by Frank W. Ingram, secretary of the Locomotive Firemen," Sparks, Nev.; "Safety Regulations for Power and Light Companies" (speakers to be announced later). There will also be a discussion on "Electric Headlights," to be opened by Prof. J. R. Schrugham, and moving pictures illustrating safeguarding in some of the large industrial plants of the United States. The meeting on the second day will be devoted largely to the question of "Safety First" in mining. There will be a banquet in the evening of Jan. 27 given by the Engineers' Club of the University of Nevada.

Financial and Corporate

Stock and Money Markets

Jan. 21, 1914.

Greater buoyancy than usual was manifested on the New York Stock Exchange to-day, and increased activity was shown in the bond market. The average price of railways and industrials was 72.06, a level last reached on Sept. 15, 1913. The favorable flotation of state bonds improved the tone of railroad bonds. Rates in the money market to-day were: Call, 1 3/4 @ 2 per cent; sixty days, 2 3/4 @ 3 per cent; ninety days, 3 1/4 @ 3 3/4 per cent; four and five months, 3 1/2 @ 3 3/4 per cent; six months, 3 3/4 @ 4 per cent.

A strong tone was shown on the Philadelphia Exchange to-day. Union Traction sold down to 45 1/2, but recovered to 46.

The Chicago Stock Market showed activity in the stock issues and strength in bonds to-day. Chicago Railways stocks and bonds were in fair demand.

In Boston general advances were recorded, mining issues being most called.

Trading in the general list was active in Baltimore to-day. Bond sales totaled \$150,000, par value.

Quotations of traction and manufacturing securities as compared with last week follow:

	Jan. 14	Jan. 21
American Brake Shoe & Foundry (com.)	89	90
American Brake Shoe & Foundry (pref.)	128 1/2	131
American Cities Company (com.)	36	36
American Cities Company (pref.)	63	64 1/4
American Light & Traction Company (com.)	31 3/8	32 8
American Light & Traction Company (pref.)	107	105 1/2
American Railways Company	38	39
Aurora, Elgin & Chicago Railroad (com.)	37 1/2	37 1/2
Aurora, Elgin & Chicago Railroad (pref.)	80	80
Boston Elevated Railway	90	88 1/2
Boston Suburban Electric Companies (com.)	7	7
Boston Suburban Electric Companies (pref.)	*58	60
Boston & Worcester Electric Companies (com.)	*6 1/2	*6 1/2
Boston & Worcester Electric Companies (pref.)	37	39
Brooklyn Rapid Transit Company	89 5/8	91 1/2
Capital Traction Company, Washington	112	112 3/8
Chicago City Railway	160	140
Chicago Elevated Railways (com.)	25	20
Chicago Elevated Railways (pref.)	75	70
Chicago Railways, pteptg., ctf. 1	*91	96 1/2
Chicago Railways, pteptg., ctf. 2	30	32 1/2
Chicago Railways, pteptg., ctf. 3	6	7
Chicago Railways, pteptg., ctf. 4	2	2 1/2
Cincinnati Street Railway	102 1/2	106
Cleveland Railway	105 1/4	104
Cleveland, Southwestern & Columbus Ry. (com.)	5	5
Cleveland, Southwestern & Columbus Ry. (pref.)	26	26
Columbus Railway & Light Company	18	18
Columbus Railway (com.)	50	62
Columbus Railway (pref.)	77 1/2	80
Denver & Northern Railway	70	70
Detroit United Railways	80	71
General Electric Company	144 1/2	147 3/4
Georgia Railway & Electric Company (com.)	120	120 1/4
Georgia Railway & Electric Company (pref.)	83	83
Interborough Metropolitan Company (com.)	15 5/8	15 5/8
Interborough Metropolitan Company (pref.)	62	61 7/8
International Traction Company (com.)	30	*3
International Traction Company (pref.)	90	*90
Kansas City Railway & Light Company (com.)	15	15
Kansas City Railway & Light Company (pref.)	30	30
Lake Shore Electric Railway (com.)	*6	*6
Lake Shore Electric Railway (1st pref.)	*92	*92
Lake Shore Electric Railway (2d pref.)	*24	*24
Manhattan Railway	125	130
Massachusetts Electric Companies (com.)	12 1/2	12
Massachusetts Electric Companies (pref.)	64	63 1/2
Milwaukee Electric Ry. & Light Co. (pref.)	95	95
Norfolk Railway & Light Company	24 3/4	*24 3/4
North American Company	70	72 5/8
Northern Ohio Light & Traction Co. (com.)	57	70
Northern Ohio Light & Traction Co. (pref.)	101	101 1/2
Philadelphia Company, Pittsburgh (com.)	41	41 1/2
Philadelphia Company, Pittsburgh (pref.)	41	42 1/2
Philadelphia Rapid Transit Company	19 7/8	20
Portland Railway, Light & Power Company	48	48
Public Service Corporation	107	107
Third Avenue Railway, New York	45 1/2	47 1/4
Toledo Traction, Light & Power Co. (com.)	20	20
Toledo Traction, Light & Power Co. (pref.)	80	80
Twin City Rapid Transit Co., Minneapolis (com.)	105 1/4	107 3/4
Union Traction Company of Indiana (com.)	11 1/2	11 1/2
Union Traction Company of Indiana (1st pref.)	80	80
Union Traction Company of Indiana (2d pref.)	14	14
United Rys. & Electric Company (Baltimore)	25	25 1/4
United Rys. Inv. Company (com.)	20	21
United Rys. Inv. Company (pref.)	39	39
Virginia Railway & Power Company (com.)	50	53 1/2
Virginia Railway & Power Company (pref.)	95	95
Washington Ry. & Electric Company (com.)	88 1/4	89
Washington Ry. & Electric Company (pref.)	88 1/2	89
West End Street Railway, Boston (com.)	71	73
West End Street Railway, Boston (pref.)	89	90
Westinghouse Elec. & Mfg. Company	67 1/2	69 1/4
Westinghouse Elec. & Mfg. Co. (1st pref.)	116	117

* Last sale. a Asked.

ANNUAL REPORT

Third Avenue Railway

The following statement of earnings of the Third Avenue Railway, New York, N. Y., for the six months ended Dec. 31, 1913, has been made public in accordance with the terms of the adjustment mortgage of the company:

	1913	1912
Operating revenue:		
Transportation	\$5,456,890	\$4,799,774
Advertising	47,750	43,999
Rents	90,797	77,751
Sale of power	58,426	61,718
Total operating revenue	\$5,653,864	\$4,983,242
Operating expenses:		
Maintenance of way	\$425,653	\$480,893
Maintenance of equipment	373,005	311,934
Power supply—horse car operations	1,679	.....
Power supply—electric	379,963	398,161
Operation of cars	1,425,224	1,250,016
Injuries to persons and property	302,486	225,819
General and miscellaneous expenses	273,240	296,606
Total operating expenses	\$3,181,250	\$2,963,429
Net operating revenue	\$2,472,614	\$2,019,812
Taxes	399,643	349,895
Operating income	\$2,072,971	\$1,669,917
Interest revenue	37,138	28,100
Gross income	\$2,110,109	\$1,698,017
Deductions:		
Interest on first mortgage bonds	\$274,640	\$279,265
Interest on first refunding mortgage bonds	315,800	315,800
Interest on adjustment mortgage bonds	563,400	281,700
Interest on notes payable—others	90,845	40,500
Interest on receiver's certificates	.....	1,045
Interest, miscellaneous	.....	249
Track and terminal privileges	7,479	6,919
Miscellaneous rent deductions	6,849	7,399
Amortization of debt, discount and expense	2,188	.....
Sinking fund accrual	15,000	15,000
Depreciation	255,000	220,000
Total deductions	\$1,531,201	\$1,167,717
Net income	\$578,908	\$530,300

* Results of operations of belt line railway corporation included in system from April 1, 1913.

F. W. Whitridge, president of the company, says in part: "It appears from this statement for the past six months that the surplus earnings over and above all interest charges, depreciation and other proper deductions were \$578,908, making \$969,000 for the calendar year, and I accordingly recommended the payment of the full interest of 2 1/2 per cent on the adjustment bonds on April 1, 1914.

"The detailed budget of the expenditures necessary or desirable during the next year speaks for itself, but I might add that the proposed new substation at Fifty-fourth Street will effect a saving of about \$17,000 a year. The budget as far as the track department is concerned depends upon the work actually undertaken by the city and is made up from the budget of the city engineers, which is not always final. The major part of the expenditures is upon the Union Railway. The territory in which that company operates is developing from a rural or suburban community to an urban district, numerous streets are being changed from macadam or earth roads to paved streets, and the grading of streets and the laying of sewers is work which results in considerable expense to the railroad companies and is likely to continue so for some years to come.

"A day seldom passes that I am not asked about a dividend on the stock. Our accounts are kept in accordance with the rules of the Public Service Commission, and if the figures are misleading the odium must be shared by the commission. Our present surplus earnings are not applicable to dividends at all, because it is necessary and desirable, and, so far as I can foresee, it will continue to be necessary and desirable, to expend these earnings upon the property for several years to come.

"It would therefore not be honest to pay a dividend until the property is in such condition that our allowance for depreciation will thereafter care for its needs over and above the ordinary maintenance, and further until the effect of the new subways on our earnings has been ascertained."

The first semi-annual distribution on the \$22,536,000 of income bonds of the company was made on April 1, 1913. It was for 1 1/4 per cent. The second distribution was made on Oct. 1, 1913. It was for 1 1/2 per cent.

Foreign Option on Oakland Properties Exercised

In the ELECTRIC RAILWAY JOURNAL of Aug. 30, 1913, mention was made of an option running until Jan. 1, 1914, given on the properties of the San Francisco-Oakland Terminal Railways. The advisory committee representing the holdings of F. M. Smith in the United Properties Company and trustees of the company have now arranged with George C. Moore, representing the Investment Registry, Ltd., and B. Fitzgerald, representing Basil Montgomery, Fitzgerald & Company, both of London, Eng., to conclude the deal. As soon as the new interests find it possible a new board of directors will be chosen and active steps taken to determine the needs of the properties. The San Francisco-Oakland Terminal Railways was incorporated in 1912. It owns and operates 241.62 miles of track comprising street and interurban railway lines of Oakland, Berkeley, Richmond, Emeryville, Alameda, San Leandro and Hayward, and five ferryboats between San Francisco and Pier-head, Oakland, connecting with its own electric lines. Provision has been made for the extension of \$3,000,000 of notes of N. W. Halsey & Company to Sept. 12, and the \$1,100,000 of Key Route Basin notes to Nov. 20. The plans, however, are contingent upon the action of the California Railroad Commission, whose approval must be secured. At the office of the Smith-Tevis-Hanford Company, New York, N. Y., which dealt in the securities of the companies, it was stated that no announcement in regard to the negotiations would be made by that company at this time.

Chicago (Ill.) Railways.—A dividend of \$4 has been declared on the participation certificates, Series 1, of the Chicago Railways and an initial payment of \$2 on the Series 2, both payable on Feb. 10, 1914, to holders of record of Jan. 26.

Columbus Railway & Light Company, Columbus, Ohio.—On Jan. 13 the stockholders of the Columbus Edison Company voted to sell the property of the company to the new Columbus Railway, Power & Light Company. About 90 per cent of the stock was voted.

Coney Island & Brooklyn Railroad, Brooklyn, N. Y.—The old board of directors of the Coney Island & Brooklyn Railroad elected in 1912, consisting of J. H. Walbridge, Howard Fitzgerald, George H. Prentiss, Allen McCulloch, S. W. Huff, William A. Day, Duncan C. Cannon, John A. Thake and Edward W. Clucas, was succeeded recently by S. W. Huff, formerly president of the company and now vice-president of the Brooklyn Rapid Transit Company; Charles D. Meneely, vice-president and treasurer of the Coney Island & Gravesend Railway; Walter St. John Benedict, a director of the Coney Island & Gravesend Railway; C. L. Woody, of counsel for the Brooklyn Rapid Transit Company; Frank D. Tuttle, a director of the Nassau Electric Railway; W. A. Day and J. H. Walbridge, Mr. Huff, Mr. Day and Mr. Walbridge being the only directors re-elected. At a subsequent meeting of the board a dividend of 6 per cent was declared on the \$2,983,900 of stock outstanding, \$2,637,000 of which was recently acquired by the Brooklyn Transit Company through the Coney Island & Gravesend Railway. This dividend is the first distribution since February, 1907, and it is announced that it will be paid before the property of the company is turned over to the Brooklyn Rapid Transit Company. At the meeting at which the dividend was voted, W. A. Day, who is president of the Equitable Life Assurance Society, and J. H. Walbridge, who is president of the Lalance & Grosjean Company, both protested against the action and resigned as directors. Mr. Walbridge contended that the payment of the dividend would practically exhaust the cash resources of the company. According to report, the earnings were at the yearly rate of 7 1-3 per cent upon its capital during most of last year and of 8 per cent during the last quarter. It is said that practically all of the stock of the Coney Island & Brooklyn Railroad acquired by the Brooklyn Rapid Transit Company through the Coney Island & Gravesend Railway was purchased by the Brady interests at an average price of about \$75 a share. It will be turned in to the Brooklyn Rapid Transit Company at par.

Danbury & Bethel Street Railway, Danbury, Conn.—At the meeting of the directors of the Danbury & Bethel Street Railway, Danbury, Conn., on Dec. 24, 1913, the resignations

of M. H. Griffing and A. E. Tweedy as directors were accepted, also the resignation of Mr. Tweedy as president and Mr. Griffing as treasurer. No new directors were elected to fill the vacancies. John Sanders, who has been manager, was also elected president, and S. W. C. Jones secretary and treasurer.

Detroit (Mich.) United Railway.—The Detroit United Railway has sold to William A. Read & Company, New York, N. Y., \$2,000,000 of two-year 6 per cent collateral notes, dated Feb. 5, 1914, approved by the Michigan State Railroad Commission. The notes are redeemable on thirty days' notice at 102 and interest. The collateral pledged on the notes is composed of stocks and bonds of the Detroit United Railway and underlying companies. The notes have been issued to pay temporary loans which were made to secure funds for extensions and betterments.

East St. Louis & Suburban Company, East St. Louis, Ill.—Most of the \$14,000,000 of capital stock of the East St. Louis & Suburban Company having been deposited under the reorganization project, E. W. Clark & Company announce that the plan has been declared operative. Stockholders who desire to subscribe for the convertible bond issue are being asked to present their interim receipts and pay the amounts due, on Feb. 2, when the new bonds will be distributed. Stock certificates will be ready for delivery in March. A new company, The East St. Louis & Suburban Company, has been incorporated under the laws of Delaware. The original corporation was chartered in New Jersey, with \$7,000,000 of preferred and \$7,000,000 of common stock outstanding. The new capitalization is: 6 per cent five-year convertible bonds, \$2,000,000; 5 per cent cumulative preferred stock, \$6,000,000; common stock, \$6,000,000. Dividends on the preferred stock of the old company will be paid as usual on Jan. 31, for the quarter ending that date, to holders of interim receipts and shareholders of record Jan. 15. The new convertibles will bear interest from Feb. 1.

Grand Valley Railway, Brantford, Ont.—The city of Brantford has appealed from an order of the court appointing E. B. Stockdale liquidator of the Grand Valley Railway, and has requested that another appointment be made. G. H. Watson, who appeared for the company, while not opposing the application, suggested that a representative of the first mortgage bondholders should be appointed to act with Mr. Stockdale. Judgment was reserved. The offer of W. P. Kellett to purchase the Brantford Street Railway will be renewed at the meeting of the bondholders of the Grand Valley Railway in Toronto, Ont., about Jan. 21.

Mexico (Mex.) Tramways.—The Mexico Tramways has passed up the 1¼ per cent quarterly dividend on the common stock of the company, due at this time. It is stated that the dividend on the common stock will be suspended until peace is restored in Mexico. The company has paid 7 per cent per annum since 1910.

New York (N. Y.) Railways.—The directors of the New York Railways have decided not to take any surplus money out of the accident reserve fund to make up the difference in interest on the 5 per cent income bonds sufficient to permit the payment of 3.37 per cent for the six months ended Dec. 31, 1913, which would make a full 5 per cent for the twelve months. The earnings available for the income for the six months ended Dec. 31, 1913, will, it is said, be possibly between 2¼ per cent and 2½ per cent, so that the full payment for the calendar year will not be more than 4 per cent. The action was taken on the recommendation of the income bondholders' committee, which is composed of five members of the board. Swartwout & Appenzeller, New York, N. Y., who, it is said, represent the holders of several millions of the bonds, contend that the balance of the 8 per cent set aside for "injuries to persons and property" not actually needed in 1913 should be turned back into surplus earnings available for the income bonds. The firm says: "To return the balance from the injury account in accordance with the terms of the indenture means the full 5 per cent will have been earned, and will necessarily be paid as interest on these bonds for the year 1913. The indenture does not leave it to the discretion of the directors to determine the amount set aside for contingencies, but gives a definite rule based on actual expenditures."

Oakland, Antioch & Eastern Railway, Oakland, Cal.—The Oakland, Antioch & Eastern Railway has applied to the Railroad Commission of California for authority to issue \$700,000 of 6 per cent four-year convertible gold notes and to use the proceeds for liquidating outstanding indebtedness. It is proposed that the notes shall be convertible at 85 into the company's bonds.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—Lee, Higginson & Company, Boston, Mass., and Harris, Forbes & Company, New York, N. Y., are offering for subscription at 99 and interest to yield about 6¼ per cent \$7,000,000 of Puget Sound Traction, Light & Power Company five-year 6 per cent first mortgage gold bonds, dated Jan. 15, 1914. The issue is callable as a whole but not in part at 101 and interest on any interest date until and including Feb. 1, 1917, and on any interest date thereafter at par and accrued interest. The coupon bonds are in the denominations of \$1,000 and \$500 each, with the privilege of registration as to principal only. Fully registered bonds are in the denominations of \$1,000, \$5,000 and \$10,000. The total authorized issue of the bonds is \$15,000,000. Of this sum there is outstanding the allotment now offered, namely, \$7,000,000. There is in the company's treasury, \$500,000, and \$7,500,000 is reserved for additions, etc., at 75 per cent of their cost.

Toledo Railways & Light Company, Toledo, Ohio.—In order to bring about conditions necessary to the reorganization of the Toledo Railways & Light Company, Toledo, Ohio, Henry L. Doherty, Frank W. Frueauff and Charles T. Brown, representing Henry L. Doherty & Company, New York, filed a petition in the United States District Court on Jan. 16, asking for a receiver for the Toledo Railways & Light Company. This suit was based upon a judgment for \$84,000 secured in the Common Pleas Court shortly before the petition was filed. Judge Killits was in New York at the time and expected to be absent until Jan. 29. At the annual meeting of the stockholders of the Toledo Railways & Light Company on Jan. 15 twenty-one directors were elected. In addition to those who had been serving on the board, E. H. Close, S. D. Carr and Walter Stewart were made members of the board. Henry L. Doherty was elected chairman. The board organized with the following officers: Frank R. Coates, president; Rathben Fuller, Toledo, and Frank W. Frueauff, New York, vice-presidents; S. D. Carr, Toledo, treasurer; C. E. Murray, Toledo, secretary; E. E. McWhinney, Toledo, assistant secretary; W. F. Troth, assistant treasurer.

Toronto (Ont.) Railway.—The first of Bion J. Arnold's estimates of future earnings of the Toronto Railway was confirmed on Jan. 5, when the figures of the company's business for the calendar year 1913 were made public at the city auditor's office. Mr. Arnold forecasts gross receipts from the company's system of \$5,992,855 from Jan. 1 to Dec. 31, 1913. The actual receipts were \$6,056,004. The city's share of the earnings for the year amounts to \$939,990, compared with \$798,958 in 1912. The rental paid by the company for the use of streets, which is at the rate of \$800 per mile of single track, will approximate \$92,000, compared with \$90,953 in the previous year. Thus the payments of the company to the city will total about \$1,032,000 for 1913, compared with nearly \$890,000 in the previous twelve months. The gross receipts of the company in 1912 were \$5,448,050, and the increase represented by the receipts of 1913 is \$607,954, or more than 11 per cent. The receipts for 1913 were about \$13.60 per capita, on a population estimate of 445,590.

United Railroads, San Francisco, Cal.—Jesse W. Lilienthal, the new president of the United Railroads, is quoted as follows regarding the affairs of the corporation: "As long as I am president of the company none of the earnings will be diverted to the stock until the funded debt is properly secured. The only exception to this is the preferred stock, which secures \$5,000,000 cash advanced to the company to rehabilitate the property after the fire of 1906. I have had prepared a budget for 1914 based upon a reasonable probability of earnings and expenses. After meeting all essential charges and setting aside a small amount for construction, I estimate that we shall have left a surplus amounting to \$1,000,000, after providing for all sinking funds."

Dividends Declared

Augusta & Waterville Street Railway, Lewiston, Maine, quarterly, 1½ per cent, preferred.
 Brazilian Traction, Light & Power Company, Toronto, quarterly, 1½ per cent, ordinary.
 Chicago (Ill.) Railways, \$4, participation certificates, series 1; \$2, participation certificates, series 2.
 Columbus (Ohio) Railway, quarterly, 1¼ per cent, preferred.
 Connecticut Railway & Lighting Company, Bridgeport, Conn., quarterly, 1 per cent, common and preferred.
 East St. Louis & Suburban Company, East St. Louis, Ill., quarterly, 1¼ per cent, preferred.
 Grand Rapids (Mich.) Railway, quarterly, 1¼ per cent, preferred.
 International Traction Company, Buffalo, N. Y., 2 per cent, preferred.
 Jacksonville (Fla.) Traction Company, quarterly, 1¼ per cent, common; quarterly, 1½ per cent, preferred.
 Milwaukee Electric Railway & Light Company, Milwaukee, Wis., quarterly, 1¼ per cent, preferred.
 Railway & Light Securities Company, Boston, Mass., 3 per cent, common; 3 per cent, preferred.
 York (Pa.) Railways, \$1.25, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, MAINE						
Period		Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Nov., '13		\$65,372	*\$28,704	\$36,668	\$17,354	\$19,314
1 " " '12		61,681	*27,368	34,313	17,239	17,074
12 " " '13		758,775	*344,605	414,170	207,571	206,599
12 " " '12		704,076	*704,076	316,678	387,398	197,801
CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.						
1m., Nov., '13		\$97,032	*\$59,424	\$37,608	\$26,072	\$11,536
1 " " '12		91,293	*55,362	35,931	22,678	13,253
12 " " '13		1,200,004	*713,937	486,067	295,930	190,137
12 " " '12		1,053,047	*627,765	425,282	263,095	162,187
CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE						
1m., Nov., '13		\$195,100	*\$110,630	\$84,470	\$63,576	\$20,894
1 " " '12		176,866	*98,068	78,798	56,510	22,288
12 " " '13		2,324,384	*1,298,822	1,025,562	707,207	318,355
12 " " '12		2,123,117	*1,225,875	897,242	637,931	259,311
EAST ST. LOUIS & SUBURBAN RAILWAY, EAST ST. LOUIS, ILL.						
1m., Nov., '13		\$245,851	*\$146,149	\$99,702	\$49,940	\$49,762
1 " " '12		224,023	*118,852	105,171	48,598	56,573
12 " " '13		2,690,543	*1,572,337	1,118,206	590,451	527,755
12 " " '12		2,426,947	*1,327,747	1,099,200	576,068	523,132
INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.						
1m., Dec., '13		\$3,089,802	\$1,158,100	\$1,931,702	\$1,087,799	\$843,903
1 " " '12		3,008,276	1,182,234	1,826,042	1,106,128	719,914
6 " " '13		16,326,195	6,334,073	9,992,122	6,719,548	3,272,574
6 " " '12		15,943,213	6,499,085	9,444,128	6,617,157	2,826,971
MONONGAHELA VALLEY TRACTION COMPANY, FAIRMONT, W. VA.						
1m., Dec., '13		\$87,791	\$34,266	\$53,525	\$26,174	\$27,351
1 " " '12		71,731	25,192	46,539	24,454	22,085
12 " " '13		960,262	346,712	613,550	298,048	315,502
12 " " '12		847,896	331,527	516,370	260,777	255,593
NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.						
1m., Nov., '13		\$189,660	*\$106,246	\$83,414	\$39,828	\$43,586
1 " " '12		181,156	*98,268	82,888	36,994	45,894
12 " " '13		2,198,392	*1,313,997	884,395	461,301	423,094
12 " " '12		2,068,622	*1,186,649	881,973	431,739	450,234
PHILADELPHIA (PA.) RAPID TRANSIT COMPANY						
1m., Dec., '13		\$2,141,522	\$1,248,860	\$892,662	\$808,663	\$83,999
1 " " '12		2,065,830	1,221,530	844,301	762,640	81,661
6 " " '13		12,239,538	7,136,035	5,103,503	4,796,161	307,342
6 " " '12		11,926,124	7,086,774	4,839,350	4,560,921	278,429
PORTLAND (MAINE) RAILROAD						
1m., Nov., '13		\$75,113	*\$50,468	\$24,645	\$21,695	\$2,950
1 " " '12		76,071	*57,798	18,273	10,254	8,019
12 " " '13		1,033,142	*698,666	334,476	167,636	166,840
12 " " '12		976,504	*695,489	281,015	120,657	160,358
PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.						
1m., Nov., '13		\$576,244	*\$272,250	\$303,994	\$176,425	\$127,569
1 " " '12		570,863	*288,933	281,930	151,765	130,165
12 " " '13		6,703,123	*3,301,122	3,402,001	1,984,520	1,417,481
12 " " '12		6,611,849	*3,306,962	3,304,887	1,742,338	1,562,549

*Includes taxes.

Traffic and Transportation

Massachusetts Public Service Commission Hears Watertown Fare Petition

The Massachusetts Public Service Commission heard on Jan. 13 the petition of the selectmen of Watertown for a 5-cent fare within the municipality on the connecting lines of the Middlesex & Boston Street Railway and the Boston Elevated Railway. Chairman Monks of the Board of Selectmen urged a 5-cent fare on the ground that it would develop the community.

Matthew C. Brush, second vice-president of the Boston Elevated Railway, cited the provisions of the company's charter which entitle it to a 5-cent fare for every continuous ride in the same general direction and pointed out the inability of the company to grant fare concessions of any nature in its present financial condition. Mr. Brush said that the situation in Waltham is similar to that in Medford, Malden and Hyde Park, where patrons of lines connecting with the Boston Elevated Railway desire a 5-cent fare embracing the entire system. The arguments addressed by the company to the joint commission upon metropolitan traffic conditions apply with equal force to Watertown. During the past sixteen years the frequency of service, the carrying capacity of cars and the schedule speed have been increased in Watertown far more rapidly than has the population and the community receives first-class service in every particular.

George M. Cox, general manager of the Middlesex & Boston Street Railway, pointed out that his company operates 1 1/3 miles of track in Watertown between Watertown Square and the Waltham city line. Crews are changed at the former point and an additional 5-cent fare collected by the receiving company. Mr. Cox said that the revenue derived from this stretch of track does not exceed the total excise tax which the company pays to the town. The line is chiefly of value in connection with through travel between Waltham and Boston. He reviewed the company's history in connection with the establishment of 6-cent fares on certain lines and said that the company was not in a position to carry passengers at reduced rates. Last year the company paid 4 per cent dividends and had a surplus of \$436. Instead of reducing its fares it should raise its rates and do something in the way of increasing wages out of the additional income. Mr. Cox contended that if the mill owner finds it difficult to obtain suitable employees on account of the cost of transportation he should add the necessary 10 or 20 cents a day to the worker's wages.

Chairman McLeod said that neither the board, the Legislature nor the courts are authorized to ask the Boston Elevated Railway to charge less than a 5-cent fare. He said it would be unfair to require connecting companies to carry passengers without adequate compensation. The joint board is now at work upon the problem of fare relations involved in the case of the Boston Elevated and connecting companies, but no solution has been found by which persons whose journeys originate on one system and terminate on another equitably can be required to pay only one fare for each trip.

Handling the Ford Employees

Following the establishment of a seven-for-a-quarter rate of fare, the Detroit (Mich.) United Railway found that on account of the sale of strips of tickets on the cars much time was lost in loading cars at the plant of the Ford Motor Company, which employs 16,500 men. To remedy this a ticket office was established in the Ford plant where employees could purchase tickets without loss of time or chance of error. The ticket office is in a permanent booth convenient for the men and ticket sales have averaged about \$100 a day, or 400 strips of tickets, since the plan was adopted. The operating department of the railway reports a considerable improvement in handling the rush which occurs when the factory dismisses its employees.

The Ford Motor Company releases shifts of its staff at 3 p. m., 4.30 p. m. and 11.40 p. m., the largest number leaving the factory at 3 o'clock. To take care of the riders the railway stores thirty-three cars at 3 o'clock, twenty-five

cars at 4.30 and sixteen cars at 11.40 p. m. All of these cars operate on Woodward Avenue in addition to the regular one-minute line during the afternoon hours. While the tripper cars are not for the exclusive use of the Ford employees it has been found that the cars really become exclusive. In addition to the Woodward Avenue service the railway operates the Hamilton line under a six-minute schedule and the Victor line under a ten-minute schedule. Both of these lines operate within a short distance of the Ford plant and assist in the transportation of the employees.

The Detroit United Railway has tried on several occasions through its own efforts and the Board of Commerce to perfect an arrangement with manufacturers employing large forces of men whereby the working hours would be differently arranged, so that the company might be enabled to provide adequate rush hour facilities. Unfortunately, these efforts have not met with success, no concerted action having been taken by the employers to assist in relieving the situation.

Massachusetts Commission Issues Bay State Findings

The Public Service Commission of Massachusetts issued six orders on Jan. 2 in connection with service and fares on various parts of the Bay State Railway system. Upon the petition of the Mayor and the city solicitor of Beverly relative to transfer privileges and service improvements the board points out that on the Beverly-Wenham line the traffic is of insufficient volume to justify the commission in recommending the use of larger cars, double-truck cars being used in the regular winter service and single-truck equipment being run only in extra service. In compliance with the board's suggestion the company has installed transfer privileges to Gloucester Crossing at the Salem-Peabody line; on North and Tremont Streets; at the Salem-Marblehead and Salem-Swampscott lines, and at intervening points between these and Town House Square, Salem. A shelter has been erected at North Beverly on the Gloucester-Essex line and a starter has been provided at Beverly on Sundays and holidays, when the traffic is heavy in the North Shore district.

Regarding service conditions in Lawrence, the board states that the citizens of the district who appealed to the board had legitimate cause for complaint but that the conditions have been greatly improved by the installation of a double-tracked line in Newbury Street and the furnishing of additional cars. The commission points out that while exceedingly heavy rush-hour travel on the lines in the Lawrence division makes it almost impossible to avoid occasional crowding of the cars, the changes made have resulted in a substantial improvement in the service. In Essex about 1 mile of new track has been built and the entire line between Gloucester and Beverly has been improved. Further improvements in the roadbed and track are indicated for the coming summer season.

On the petition of citizens of Lynnfield requesting a 5-cent fare from any part of Lynnfield to Central Square, Lynn, via either Saugus or Newhall turnout, Peabody, the commission finds that the line appears to be operated at a loss to the company and that the extension of fare limits demanded by the petitioners is unreasonable. Favorable action upon the petition would involve the granting of a 5-cent fare for transportation for a maximum distance of more than 9 miles. Improvements in the roadbed on this line are recommended.

The board has denied the petition of the selectmen of Whitman for free transfer privileges enabling passengers to ride between the center of Brockton and any part of Whitman for a 5-cent fare. Several years ago the fare between the two municipal centers was reduced from 10 cents to 5 cents upon the recommendation of the Railroad Commission. Later the company, of its own volition, extended the fare limit so that passengers could ride from Brockton through to Winter Street, Whitman, for a 5-cent fare. Seven-cent commutation tickets are also furnished during certain hours of the day from any part of Whitman to any part of Brockton. These tickets are good for a maximum distance, including transfers, of 12.24 miles. The board points out that the situation is similar to that represented in the petition from the town of Abington, which

recently was acted upon adversely by the Railroad Commission, and says: "The commission is of the opinion that street railway transportation is now furnished the residents of Brockton and adjacent towns at as low rates as prevail in any portion of the State where similar conditions of transportation exist and at as low rates as the company can reasonably be asked to furnish, consistent with a proper maintenance of its service."

Stock Bonus Without Cost to Beneficiaries

The directors of the Monongahela Valley Traction Company, Fairmont, W. Va., voted on Dec. 31, 1913, to distribute \$22,400, par value, of the company's preferred stock among employees who had been in its service for two years or longer. There were 224 men—motormen, conductors, line foremen, track foremen and substation men—who were beneficiaries under the plan. Each man received on Jan. 3 one share of preferred stock, on which dividends at the rate of 5 per cent a year are being paid. The action of the company was in recognition of faithful and efficient service. It is believed that the Monongahela Valley Traction Company is the first public service corporation in the United States to distribute cash bonuses in the form of stock among a limited number of its employees without cost to the beneficiaries. The stock which the directors of the company voted as a bonus to the men is quoted at \$85 a share. The communication addressed by James O. Watson, the general manager of the company, to each man entitled to participate in the distribution follows:

"At a special meeting of the directors of this company held to-day, you were unanimously voted one share of the preferred stock of the company in appreciation of two years of efficient service. Stock will be ready for delivery at the company's offices on Jan. 3."

Operation of Two-Car Trains Extended in Buffalo.—The International Railway, Buffalo, N. Y., has extended the operation of two-car trains to the Elmwood Avenue line during the rush hours. The Main Street, Broadway and Elmwood lines now have the benefit arising from two-car train service.

Increase in Wages on West Virginia Line.—Announcement has been made by S. M. Gallaher, superintendent of the Charleston (W. Va.) Interurban Railroad, of an increase in wages of all motormen and conductors, ranging from 1 cent to 3 cents an hour, according to length of service.

Increase in Fare Unit on Massachusetts-Rhode Island Line.—The Providence & Fall River Street Railway, Swansea Center, Mass., has notified the Public Service Commission of Massachusetts of a proposed increase in its rates of fare for local passengers from 5 to 6 cents per passenger per fare zone, effective on Feb. 1, 1914.

Conference to Consider Uniform Rules in Michigan.—The Michigan State Railroad Commission called a meeting of electric railway officials for Jan. 21 to appoint a committee to formulate a tentative set of rules for the uniform operation of interurban electric railways, which will be discussed and amended for permanent adoption.

"Safety First" Folder for Detroit Employees.—The Detroit (Mich.) United Lines has issued a four-page folder, 3½ in. wide by 6¼ in. high, for all its employees, but for motormen and conductors particularly, and has distributed copies as a part of the present "safety first" campaign. The folder is printed in purple and red.

New Transfer Regulation of Hudson Valley Railway.—The Hudson Valley Railway, Glens Falls, N. Y., has announced that hereafter transfers will, upon request to the conductor at the time last zone fare is paid, be issued from interurban cars to cars of Glens Falls local lines for all points within Glens Falls reached by local lines.

Resolution Ordering Rear Doors in Near-Side Cars.—An ordinance embodied in a resolution which calls upon the International Railway, Buffalo, N. Y., to install emergency doors in the rear of its new near-side cars in Lockport has been passed by the Council of that city. The company will have nine months' time in which to comply with the ordinance.

Kansas Park Dismantled.—The Topeka (Kan.) Street Railway, which closed Vinewood Park, a summer resort, 5 miles from Topeka, several years ago, has dismantled the park arcade and stored it at Topeka. The park was established about five years ago for the purpose of stimulating traffic between Topeka and Vinewood. The resort failed to attract the Topeka public, and it was closed.

Smoking Forbidden in Buffalo.—Smoking has been forbidden on all cars of the International Railway within the city limits of Buffalo with the exception of a few cars on the Lockport, Niagara Falls and Rochester interurban lines. This action on the part of the company was prompted by recent statements of the commissioner of health in Buffalo. The company proposes eventually to eliminate smoking compartments on all of its cars on all lines.

Accidents During Rush Hours in New York.—During the morning rush hour on Jan. 20 accidents tied up the subway and the Third Avenue elevated in New York. The two accidents occurred almost at the same time. For about fifteen minutes both uptown and downtown subway traffic was stalled because of an accident at Ninety-sixth Street. The Third Avenue elevated accident occurred just above New Chambers Street, when a loose shoe tore up the third-rail and threw one of the cars off the track.

Answer Filed to Fare Complaint.—The Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio, filed an answer on Jan. 14 to the complaint of citizens of Berea that the rate of fare between that place and the Lorain Street depot in Cleveland is too high. The cash fare is 1½ cents a mile and commutation tickets are sold at 1¼ cents a mile, making the cash fare 15 cents, or on commutation tickets 12½ cents. The company claims that these rates are not excessive and asks the commission to allow them to stand.

Discrimination Charged at Buffalo.—The Public Service Commission of the Second District of New York has received a complaint against the International Railway, Buffalo, stating that the company in selling tickets at Niagara Falls under certain conditions of time and distance, at the rate of ten tickets for 25 cents, is discriminating against Buffalo passengers. It is further alleged that the service in the city of Buffalo is inadequate, that the routing of cars between the east and west sides of the city is not in the interest of a majority of the riders, and that the rates of fare charged in Buffalo are unreasonable.

Report of Missouri Commission.—Of 877 public service corporations existing in Missouri, only twenty-one are electric railways, according to the report of the Public Utilities Commission. This is as compared with ninety-nine steam roads. The report covers only the eight and one-half months of the commission's existence. During that time it adjusted 136 complaints, while 103 more are pending. Of 231 informal complaints filed, 172 have been adjusted and fifty-nine are pending. No classification of the complaints was made in the report. The commission has inspected 3594 miles of track, caused fifty miles to be relaid, and will inspect the entire steam and electric railroad mileage of Missouri during the coming year. The expenses of the commission, aside from the salaries of \$5,500 for each member, have aggregated \$34,598. The revenue from fees was \$35,308.

The Automobile a Menace.—That the carelessness of the drivers of automobiles is responsible for most of the railroad and interurban crossing accidents was the opinion expressed at a meeting of claim agents of Texas railroads held at Galveston recently and attended by representatives of both steam and electric railways. R. M. Watson, claim agent of the Northern Texas Traction Company, Fort Worth, presided. Among the speakers were Isaiah Hale, safety commissioner of the Santa Fé system at Topeka; Gail Goodlee, inspector of transportation of the San Antonio & Aransas Pass at San Antonio; L. W. Ernest, claim agent of the San Antonio and Aransas Pass at San Antonio, and R. N. Graham, of the Houston Electric Company. Mr. Graham's subject was "Educating Automobile Drivers." The problems arising from accidents due to trespassing were discussed, and a committee was appointed to investigate the matter and report at the annual meeting of the association, which will be convened in Galveston, Tex., next July.

Organization of Unified Chicago Surface Lines

The Chicago Surface Lines, the official name of the unified properties of the Chicago Railways and the Chicago City Railway, came into existence with the first meeting of the board of operation provided under the unification ordinance. This meeting was held on Jan. 16, 1914. Henry A. Blair, John M. Roach, Charles C. Adsit and Wallace Heckman were elected to represent the Chicago Railways and Leonard A. Busby, Ira M. Cobe and F. O. Wetmore were elected to represent the Chicago City Railway. Mr. Blair was elected chairman of the board, and his duties include a wide supervision



L. A. Busby

W. M. Weatherwax

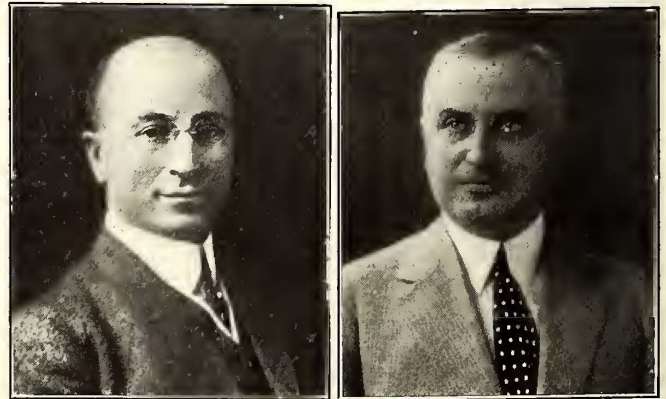
of the affairs of the surface lines and extensive activities as a member of the executive committee. Mr. Cobe was elected chairman of the executive committee. Mr. Blair and Mr. Busby will be associated with him on this committee. John J. Mitchell, of the Illinois Trust & Savings Bank, was elected umpire to determine any differences that may be referred to him. At this first meeting the following officers were elected: President or operating head of the merged lines, L. A. Busby; vice-president, Williston Fish; general auditor, John J. Duck; treasurer, Markham C. Orde; assistant treasurer and secretary, Fred D. Hoffman; assistant secretary, Frank L. Hupp and general counsel, W. W. Gurley. Immediately following his election as president Mr. Busby selected the heads of the different departments of the merged properties coming under his supervision. H. B. Fleming, vice-president and chief engineer of the Chicago City Railway, was appointed chief engineer of the unified lines; W. M. Weatherwax, superintendent of transportation of the Chicago City Railway, was appointed superintendent of transportation; J. Z. Murphy, chief engineer of the Chicago Railways, was appointed electrical engineer; Sidney Ossoski, formerly general claim agent of the Chicago Railways, was appointed general claim agent; F. C. Evans, purchasing agent of the Chicago City Railway, was appointed purchasing agent; J. J. Duck, formerly auditor of the Philadelphia (Pa.) Rapid Transit Company, was appointed general auditor, and John R. Guilliams, formerly general attorney of the Chicago Railways, was appointed general attorney, litigated cases.

Leonard A. Busby, the newly elected president of the Chicago Surface Lines, was born in Jewett, Ohio, in 1869. His boyhood was spent on the farm. He was educated in the public schools and was graduated from the Ohio Wesleyan University in 1894, as first honor man. In June, 1895, he completed a course in the law school of Northwestern University, and began his professional career as a law clerk in the offices of Lyman & Jackson, of which firm he became a member in 1898. Mr. Busby continued the general practice of law until 1906, when he was appointed counsel for the receiver of the Calumet Electric Street Railway, Chicago. Later he was appointed counsel for the Calumet & South Chicago Railway. In 1910 he was made general counsel for the Chicago City Railway and the various lines controlled by the Chicago City & Connecting Railways Collateral Trust. In January, 1912, he was elected president of the Chicago City Railway, the Calumet & South Chicago Railway, the Southern Street Railway and the Hammond, Whiting & East Chicago Railway.

H. B. Fleming, formerly vice-president and chief engineer

of the Chicago City Railway, has been appointed chief engineer of the Chicago Surface Lines. Since its beginning Mr. Fleming has represented the Chicago City Railway on the Board of Supervising Engineers, Chicago Traction. He has been connected with the Chicago City Railway for the last fourteen years. His engineering education was obtained at Washington University, St. Louis, Mo., and after receiving his bachelor's degree he did post-graduate work at that university and obtained his master's degree. After completing his engineering education Mr. Fleming was made assistant engineer in the water department of the city of St. Louis, and later entered street railway work in the operating and engineering departments of the National Railway, St. Louis. This company was absorbed by the St. Louis Transit Company and he continued to serve in the engineering department until 1900. After resigning from the St. Louis Transit Company Mr. Fleming entered the service of the Chicago City Railway as superintendent of tracks and buildings. In 1905 he was appointed chief engineer of the Chicago City Railway and in 1907 he was appointed a member of the Board of Supervising Engineers, Chicago Traction. In March, 1912, he was elected vice-president and a director of the Chicago City Railway, which positions he held in addition to serving as chief engineer of the company. Mr. Fleming will have charge of track and roadway, shops and equipment, buildings, material and supplies and wreck wagon service with the Chicago Surface Lines. He is a member of the American Society of Civil Engineers, the Western Society of Engineers, the Western Railway Club and the American Electric Railway Engineering Association.

W. M. Weatherwax, who for the last eight years has been in charge of the transportation department of the Chicago City Railway, has been appointed superintendent of transportation of the Chicago Surface Lines. Mr. Weatherwax was born on a farm near Lansingburgh, now Schaghticoke, N. Y., in 1866. He was educated in the country schools and worked on the farm during vacation time. He began street railway work as a conductor on the Troy & Lansingburgh Street Railway, Troy, N. Y., in 1884. He left railway work after a few months' service and came to Chicago. He was then eighteen years old. His first employment in the West was with the Northern Transportation Company, where he advanced successively from watchman to lookout and finally to wheelsman of a large lake freighter running between Chicago and Ogdensburg, N. Y. In 1886 he entered the service of the Chicago City Railway as a driver of tow horses. He was soon thereafter transferred to general carhouse service. He was next made a conductor, in which



J. R. Guilliams

Sidney Ossoski

position he remained until April, 1890, when he was advanced to assistant foreman in charge of cars and trainmen at one of the carhouses. In April, 1893, he was made foreman in charge of one of the carhouses, and later was transferred to what is now known as the Englewood carhouse with the same title until the position was redesignated division superintendent. His last important promotion came in November, 1906, when he was made superintendent of transportation of the Chicago City Railway, which position he has held continuously since then.

John Z. Murphy, who for the last fourteen years has been chief engineer of the Chicago Railways, has been appointed

electrical engineer of the Chicago Surface Lines. He entered street railway work in 1889, with the West Chicago Street Railway, then a cable line, as chief operating engineer in charge of outside mechanical equipment including cables and machinery in the cable slots. At the time this company changed from cable to electric power Mr. Murphy was placed in charge of the construction of power houses. In 1900 J. M. Roach, president of the Union Traction Company, appointed Mr. Murphy chief engineer in charge of all engineering work. He continued in that position when the Union Traction Company was absorbed by the Chicago Railways. For the last seven years Mr. Murphy has represented the Chicago Railways on the Board of Supervising Engineers, Chicago Traction. Mr. Murphy will have charge of power stations, substation distribution, metering and tunnels with the Chicago Surface Lines.

Sidney Ossoski has been appointed general claim agent of the Chicago Surface Lines. He was born in 1874 at Hornell, N. Y., and after graduating from the high school of that place completed a course at Cornell University in 1893. Later he was graduated from the Columbia Law School, after which he attended the University of Berlin, in Germany, for one year. He was admitted to the bar in 1897 at Rochester, N. Y., and later practised law in New York City. Mr. Ossoski specialized in corporation law until he entered the service of the Chicago Railways as secretary of the finance committee in 1908. In 1911 he was appointed general claim agent of that company.

F. C. Evans, who for the last year has been purchasing agent of the Chicago City Railway, has been appointed purchasing agent of the Chicago Surface Lines. Mr. Evans was born in Burlington, Ia., in 1887, and was graduated from high school and business college. He entered the service of the Chicago City Railway as a stenographer in 1907. Subsequently he was promoted to the position of assistant purchasing agent and in May, 1912, was appointed purchasing agent of that company.

J. J. Duck, who resigned as auditor of the Philadelphia (Pa.) Rapid Transit Company on Dec. 31, 1913, has been appointed general auditor of the Chicago Surface Lines. Mr. Duck was born in Bristol, England, in 1867, and soon after his graduation from Mount St. Mary's College, England, in 1883, he came to America. He entered railroad service as a clerk in the Englewood freight station, Chicago, Ill., of the Lake Shore & Michigan Southern Railway, where he remained until 1890, when he accepted a position as clerk in the accounting department of the Chicago & Eastern Illinois Railroad in Chicago. After successively passing

the position of auditor of the Philadelphia Rapid Transit Company, under the Stotesbury-Mitten management.

John R. Guillems, formerly general attorney of the Chicago (Ill.) Railways in charge of litigated cases, has been appointed general attorney of the Chicago Surface Lines. Mr. Guillems was born in Hendricks County, Ind., in 1873. He was educated in the common schools and the State Normal School at Danville, Ind., and was graduated from Lake Forest University law school in 1894. After leaving college he read law in the offices of W. C. Gouty, then general coun-



H. B. Fleming



J. Z. Murphy

sel of the Chicago & Northwestern Railroad. In August, 1902, he was appointed assistant attorney in the State of Wisconsin for that company, but resigned in December, 1906, to become connected with the trial department of the Chicago Union Traction Company. After serving that company and later with the Chicago Railways during the period of negotiations which resulted in the 1907 settlement ordinances, he was appointed head of the trial department in 1908. In March, 1911, he was made general attorney for the Chicago Railways.

New Haven Underwriting Syndicate Dissolved

Messrs. Morgan, Stone and Milner have resigned as directors of the New York, New Haven & Hartford Railroad. Their successors have not yet been chosen. The directors of the company have approved unanimously the arrangement made between Howard Elliott, chairman of the board, and the Department of Justice for disposition of the so-called outside properties. These comprise the Maine Steamship Company, Merchants & Miners' Transportation Company, Connecticut Company, Rhode Island Company and Boston & Maine Railroad. The directors have taken no action on any new plan of financing, but have voted to return to stockholders money subscribed for extensions, permission to issue which was denied by the Massachusetts Supreme Court. Members of the syndicate formed by J. P. Morgan & Company to underwrite the company's twenty-year convertible 6 per cent debentures have received the following letter from the syndicate managers: "In accordance with the decision of the Supreme Court of Massachusetts, the company has withdrawn its offer of Oct. 15, 1913, of rights to subscribe to new 6 per cent convertible debentures. Our contract with the railroad is thereby terminated and we therefore hereby dissolve the syndicate."

The Ottawa (Ont.) Electric Railway gave notice some time ago that on and after Dec. 1 an extra fare would be charged to all passengers who rode from Holland Avenue, the western limit of the city, to Britannia and intermediate points. As a result of an application filed with the Board of Railway Commissioners on behalf of the city, asking the commission to investigate the company's tariffs and its alleged unwillingness to make any further extensions in the city before the expiration of the franchise in 1923, an order was issued restraining the company from putting the proposed increase in rates in effect before Jan. 1. The application was subsequently withdrawn, on the understanding that the matter will be brought up again toward the end of the year.



J. J. Duck



F. C. Evans

through the various branches of the accounting department, he was made chief clerk of the department in 1900. The following year he was appointed assistant auditor and assistant secretary of the company and continued in that position after the road was purchased by the St. Louis & San Francisco Railroad and after it was absorbed by the Rock Island System. In October, 1907, Mr. Duck resigned from steam railroad service to accept the position of assistant auditor of the Chicago City Railway, then under the management of T. E. Mitten. After about one month's service he was elected auditor of the company, which position he retained until June, 1912, when he resigned to accept

Personal Mention

Mr. L. C. Gilman, the newly elected president of the Spokane, Portland & Seattle Railway, has been elected president of the Spokane & Inland Empire System, Spokane, Wash.

Mr. E. N. Sanderson, who has been vice-president of the Federal Light & Traction Company, New York, N. Y., has been elected president of the company.

Mr. William J. Wood, Evansville, Ind., formerly chairman of the Railroad Commission of Indiana, which has been succeeded by the Public Service Commission, has been appointed a special examiner for the Interstate Commerce Commission.

Mr. Edward Hewitt has been appointed joint freight agent in Tacoma, Wash., of the Tacoma Railway & Power Company, the Puget Sound Electric Railway and the Pacific Traction Company. Mr. Hewitt was formerly connected with the Great Northern Railway for many years in different capacities.

Mr. George F. Maddock has been appointed manager of the department of examinations and reports of H. M. Bylesby & Company, Chicago, Ill. Mr. Maddock has been assistant professor of engineering at a prominent university, manager of several utility properties, has had the engineering, designing and direction of a large amount of utility plant construction, and for several years was works manager of a large steam engine manufacturing plant.

Mr. W. D. Scott has been appointed general manager of the Oregon Electric Railway and the United Railways, Portland, Ore., with jurisdiction over the operating, mechanical and purchasing departments. Mr. Scott has also been appointed general manager of the Spokane, Portland & Seattle Railway and the Oregon Trunk Railway, Portland, Ore., with jurisdiction over the operating, mechanical and purchasing departments. The office of general superintendent has been abolished.

Mr. John S. Kennedy has been appointed secretary of the employees' benefit fund committee of the New York Telephone Company, the Bell Telephone Company of Pennsylvania, the Chesapeake & Potomac Telephone Company and associated companies. Mr. Kennedy has been connected with the New York Telephone Company since May, 1913. He was formerly secretary of the Public Service Commission of the Second District of New York. Before that he was connected with the Railroad Commission of the State of New York.

Mr. Roger Clarkson Mills, who has been secretary of the Sioux Falls (S. D.) Traction System, has been elected secretary-treasurer of the company. Mr. Mills was graduated from Iowa Agricultural College, enlisted for the Spanish war and was transferred to the quartermaster's department, in which he served first in the field and then in the transport service. Later he was transferred to headquarters at San Francisco, then to Seattle, Fort Townsend and Spokane in the construction department. After eight years of service he resigned to take up farming in Michigan where he conducted a fruit farm at Benton Harbor and a grain, dairy and orchard farm at Dowagiac.

Mr. Andrew Kalbach, formerly manager and engineer of the New York City Interborough Railway, which is now controlled by the Third Avenue Railway, New York, N. Y., has been appointed deputy commissioner of street cleaning in charge of the Bronx by Mayor Mitchel of New York. Mr. Kalbach was graduated from Annapolis. In 1903 he resigned from the navy to become assistant engineer for the Rapid Transit Subway Construction Company, New York, N. Y. He was subsequently appointed general manager and engineer of the New York City Interborough Railway, the majority of stock of which was controlled at that time by the Interborough Rapid Transit Company.

Mr. J. H. Harvey, now superintendent of the Forty-eighth and Harrison division of the Metropolitan Street Railway, Kansas City, Mo., joined the company in 1903. His first work was as timekeeper in the construction department of the company. He continued in that capacity from March until September of that year, when he was made chief timekeeper. For six years he had charge of this important

phase of the accounting department. In June, 1909, he was made secretary to the president and held that position until December of the following year. He was then advanced to superintendent of employment. After serving three years at the head of the employment department, he was made superintendent of the Forty-eighth and Harrison division of the company.

Mr. John Sanders, general manager of the Danbury & Bethel Street Railway, Danbury, Conn., since October, 1912, has in addition been elected president of the company to succeed Mr. Arthur E. Tweedy, who has also retired as a director. Mr. Sanders was connected with the railway and construction engineering department of the General Electric for several years and was also connected for three years with the Aetna Construction Company and the Sperry Engineering Company, New Haven, Conn., in charge of the installation of the power equipment, overhead construction and the rolling stock of the Shore Line Electric Railway. Previous to that he was connected with the New London & East Lyme Street Railway and the Bridgeport & Danbury Street Railway as engineer.

Mr. Daniel L. Fennell, the new secretary to the general superintendent of the Metropolitan Street Railway, Kansas City, Mo., has devoted practically his entire business career to electric railway work. Mr. Fennell became connected with the company in 1903 as timekeeper in the construction department. He held this place for four years and was then promoted to timekeeper of the shops. In 1909, after a brief period as assistant superintendent, Mr. Fennell became division superintendent of the Holmes Street division, and since that time has been with the transportation department of the road. In 1912 he was placed in charge at Forty-eighth and Harrison, the most important division operated by the company. After holding that place more than a year, Mr. Fennell was made secretary to the general superintendent. Mr. Fennell is a native of Kansas City and was educated in that city.

Mr. Edward Hammett has been appointed general manager of the Sheboygan Railway & Electric Company, Sheboygan, Wis., to succeed Mr. Ernest Gonzenbach, whose resignation as vice-president and general manager of the company was announced in the *ELECTRIC RAILWAY JOURNAL* of Jan. 10, 1914, following the sale of the controlling interest in the company to local interests in Sheboygan. Mr. Hammett has been superintendent and purchasing agent of the company since March, 1910. He was born in Wheaton, Ill., and entered railway work with the Aurora, Elgin & Chicago Railroad under Mr. Gonzenbach, who was then electrical engineer of that company. Mr. Hammett was promoted rapidly while with the Aurora, Elgin & Chicago Railroad, and finally entered the selling field as district manager of the Electric Service Supplies Company at Pittsburgh, Pa., from which position he resigned to become connected with the Sheboygan Light, Power & Railway Company, the predecessor of the Sheboygan Railway & Electric Company.

Mr. S. F. Hazelrigg, for many years vice-president and general manager of the Richmond Light & Railroad Company, New Brighton, N. Y., has tendered his resignation, effective Feb. 1, and will devote his time to the Atlantic Coast Electric Light Company and other properties on the Jersey coast of which he is president. Mr. Hazelrigg has been connected with the Staten Island company since 1902, and in addition to being vice-president and general manager of the Richmond Light & Railroad Company he is vice-president and director of the Asbury Park & Sea Girt Railway, president and director of the Atlantic Coast Electric Light Company, president and director of the Atlantic Coast Electric Railway, president and director of the New Jersey & Staten Island Ferry Company, director of the Sea Coast Traction Company of Asbury Park, N. J., director of the Seashore Electric Railway, president and director of the Southfield Beach Railroad, president and general manager and director of the Staten Island & Midland Railway, and secretary, treasurer and director of the West End & Long Branch Railway. He is also connected with a number of industrial and banking institutions.

Mr. Frederick E. Webster has resigned as assistant clerk of the Public Service Commission of New Hampshire to accept the position of treasurer of the Massachusetts North-

Construction News

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

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

RECENT INCORPORATIONS

*Southern Traction Company, Bowling Green, Ky.—Application for a charter has been made by this company in Kentucky to build an electric railway in Bowling Green. Capital stock, \$20,000. Officers: Charles Roemer, president; J. S. Lewis, vice-president and general manager; Lon D. Hanes, secretary, and Joseph W. Ford, treasurer.

*Pease River Tramway & Navigation Company, Ottawa, Ont.—Application is being made to the Canadian Parliament for the incorporation of this company, to build an electric railway from Smith's Landing, on Pease River, to Fort Smith, on the northern boundary of Alberta; a line from Vermilion Rapids easterly along the northern bank of the Pease River to Vermilion Falls, with branch lines, and to operate steamships on the Pease, Slave and Mackenzie Rivers. Pringle, Thompson, Burgess & Cote, Ottawa, Ont., are solicitors for the applicants.

*Beaver Valley & Ohio Railway, Beaver Falls, Pa.—Chartered in Pennsylvania to build an electric railway in Beaver Falls. Capital stock, \$20,000. Incorporators: W. A. Goehring, Zelenople, president; M. G. Gibbs, Pittsburgh, W. A. Goehring, Jr., R. R. Goehring, F. R. Latshaw and F. B. Hall, all of Zelenople.

FRANCHISES

Birmingham, Ala.—The Birmingham, Ensley & Bessemer Railway will ask the Council for franchises in Birmingham to extend its lines to Norwood, Avondale, Southside, West End, Powderly and Bessemer.

Sausalito, Cal.—The Marin Electric Railway has asked the Council for a franchise to build an electric line in Sausalito and extend it to Mill Valley. [E. R. J., Dec. 6, '13.]

Stockton, Cal.—The Stockton Electric Railway has asked the Board of Supervisors for a fifty-year franchise to extend its lines on El Dorado Street to Castle, across the Lower Sacramento Road and through Tuxedo Park in Central Court to the western boundary of the park.

Pocatello, Idaho.—J. B. Browning, Pocatello, and associates have asked the Council for a fifty-year franchise in Pocatello. [E. R. J., Nov. 22, '13.]

Herrin, Ill.—The Southern Illinois & St. Louis Railway has received a franchise from the Council on Monroe Street in Herrin. The company has secured franchises from the City Councils of Johnston City and Marion. This is part of a plan to build an electric railway between Marion and Harrisburg with branch lines to Benton and to Johnston City and Herrin. William Rothman, Chicago, is interested. [E. R. J., Jan. 3, '14.]

Onondaga, N. Y.—The New York State Railways has asked the Council for a franchise to double-track its line in Seneca Street from South Salina to its present double-track in Onondaga.

*Newbern, N. C.—The City Council is asked to grant a franchise to build an electric railway from a point near the Union Station in Newbern to the Eastern Carolina Fair grounds and to Glenburnie Park.

Lawton, Okla.—The Lawton Railway & Light Company has asked the Council for a franchise in Lawton. It is planned to build a line through Lawton and extend it to Fort Sill.

Galt, Ont.—The by-law authorizing the renewal of the franchise of the Galt, Preston & Hespeler Railway for twenty-five years with power to make certain extensions and improvements of its lines in Galt has been carried by a large majority.

*Portland, Ore.—The Heights Trust Company has asked the Council for a franchise to build electric lines in Portland to connect with the lines of the Portland Railway, Light & Power Company's lines in Portland.

Ellwood City, Pa.—The Mahoning Valley Street Railway has asked the Council for a franchise in Ellwood City.

eastern Street Railway and the Rockingham County Light & Power Company, Portsmouth, N. H., with headquarters at Haverhill, Mass. For a number of years Mr. Webster was connected with the accounting department of the Concord & Montreal Railroad. When that property was leased to the Boston & Maine Railroad he resigned the position of chief clerk to become treasurer and auditor of various subsidiary companies of John P. Squire & Company. In 1903 he was appointed chief clerk and accountant of the New Hampshire State License Commission, and in 1911, when the Public Service Commission of that State was organized, he was appointed assistant clerk of the commission in charge of its office and accounting matters. Mr. Webster prescribed the system of accounts adopted by the commission, supervised the issuance of the annual reports of the commission, and gave such instruction to the reporting utilities as was needed in order to comply with the requirements of the department.

Mr. W. W. Stephens, who has succeeded Mr. J. H. Harvey as superintendent of employment of the Metropolitan Street Railway, Kansas City, Mo., became connected with the auditor's office of the company in 1892. Later he was made paymaster and placed in charge of all transfers. At that time the company paid all of its men by check and the paymaster devoted only about one day of the week to the work of signing checks. As manager of transfers, Mr. Stephens did some excellent work, directed largely toward economy of action with conductors. At that time the conductors were punching transfers four times. This number was halved by the company, following recommendations by Mr. Stephens. The two-color system was adopted. Green slips were used to indicate morning and white to indicate afternoon and night. The date was printed on the transfers, instead of punched, as had been the practice up to that time. Only two punches are now made by conductors, denoting the time and direction. When the Metropolitan Street Railway began paying its men, with the exception of those in the offices, in cash, a paymaster was appointed to give all of his attention to this work. Mr. Stephens has since then devoted most of his time to the transfer and accounting departments.

Mr. P. H. Korst, who is general manager of the Janesville (Wis.) Electric Company, was elected president of the Wisconsin Electrical Association at the sixth annual convention held in Milwaukee on Jan. 15 and 16. Mr. Korst was born fifty years ago at Chillicothe, Ohio. After leaving high school in 1880 he engaged in telephone work and later became an expert for the Wood Arc System. He took the Thomson-Houston factory expert course in 1888, after which he became manager and secretary of the Badger Electric Company at Racine, Wis. He remained at Racine eleven years until the sale of the property to The Milwaukee Electric Railway & Light Company. He has been manager of the Janesville Electric Company for the last thirteen years. He was a charter member of the old Northwestern Electrical Association and also of its successor, the present Wisconsin Electrical Association. In 1908 he was elected president of the Northwestern Electrical Association.



P. H. Korst

OBITUARY

Edwin Emerson Nolan, head of the materials disposition department of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., died on Jan. 13. Mr. Nolan began work with the Westinghouse Electric Company in 1887. In 1898 he was sent by the company to France to establish a factory at Havre. In 1902 he returned to the United States and was placed in charge of the materials disposition department. Mr. Nolan was born in Chicago on Aug. 10, 1857.

Plainview, Tex.—A. E. Harp, Plainview, has asked the Council for a franchise to build either an electric or a gaso-line railway in Plainview.

Bremerton, Wash.—Gustav Rust, Seattle, and associates have received a franchise from the Council to build an electric railway in Bremerton. It is proposed to connect Hood's Canal and other points on Puget Sound with Bremerton. It is stated that a site has been secured on the Hama River near Bremerton on which it is planned to build a new power house to cost \$350,000.

Cashmere, Wash.—Hyman Harris, Wenatchee, has asked the Council for a franchise in Cashmere. This is part of a plan to build a 35-mile electric railway from Malaga to Leavenworth. [E. R. J., Dec. 20, '13.]

Shelton, Wash.—A. E. Hillier, Shelton, has asked the City Council for a franchise for an electric railway and power lines in Shelton.

TRACK AND ROADWAY

Alabama City, Gadsden & Attalla Railway, Gadsden, Ala.—Work will be begun at once on the extension of the Walnut Street line in Gadsden from Twelfth Street as far as the steel works in South Gadsden.

North Alabama Traction Company, New Decatur, Ala.—During the next few weeks this company will award a new paving city contract in New Decatur.

Fresno & Clovis Interurban Railway, Fresno, Cal.—Preliminary arrangements have been completed and construction will be begun at once on the section of the line on Blackstone Avenue in Fresno. It will extend from Fresno to Clovis and the foothills of the Sierra Nevada Mountains. F. S. Granger, Clovis, promoter. [E. R. J., Dec. 27, '13.]

Glendale & Montrose Railway, Glendale, Cal.—This company is rebuilding about 8 miles of its lines in Glendale.

San Diego (Cal.) Railway Electric Railway.—A 3-mile extension will be built in San Diego during the year.

Stockton Terminal & Eastern Railway, Stockton, Cal.—During the year this company plans to build an extension between Bellota and Jenny Lind.

Carolina & Georgia Railway, Augusta, Ga.—Work will be begun on Feb. 1 to build this 108-mile railway between Aiken and Greenwood. A few miles have already been graded from the Greenwood end of the line. James U. Jackson, Augusta, president. [E. R. J., Dec. 27, '13.]

Idaho Traction Company, Boise, Idaho.—An extension from Boise to Barber is being contemplated by this company.

Chicago (Ill.) Railways.—It is planned to build 27 miles of new track in Chicago during the year.

Northern Illinois Electric Railway, Chicago, Ill.—An extension from the end of the present line to Rochelle, 13 miles, will be constructed during the year.

Chicago, Ottawa & Peoria Traction Company, Ottawa, Ill.—Plans are being made to tear up a branch line 1½ miles in length in La Salle.

Rock Island Southern Railway, Rock Island, Ill.—During the year this company will finish the construction of its line into Galesburg.

Bluffton, Geneva & Celina Traction Company, Bluffton, Ind.—An extension east from Geneva to Celina, Ohio, is being considered by this company.

Columbus Street Railway & Light Company, Columbus, Ind.—About 3 miles of new track is being built by this company in Columbus.

Fort Wayne & Springfield Railway, Decatur, Ind.—Plans are being considered to extend this line to Portland, Ind.

Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.—Plans are being made by this company to extend its lines in Bloomington.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—Grading has been completed between Bonner Springs and Kansas City and tracklaying will be begun at once. Preliminary surveys are being made for the extension to Lawrence. J. D. Waters, Bonner Springs, president. [E. R. J., July 19, '13.]

Independence, Neodesha & Topeka Traction Company, Independence, Kan.—This company, which plans to build a

17-mile line between Independence, Neodesha, Altoona and Topeka, has elected the following officers: T. J. Booth, president; H. E. West, vice-president; W. M. Nees, second vice-president, and R. E. Eakin, secretary and treasurer. [E. R. J., Jan. 10, '14.]

Salina Street & Interurban Railway, Salina, Kan.—A 2-mile extension will be built by this company in Salina during the year.

Kansas Central Traction Company, Topeka, Kan.—Petitions have been presented to the Columbus City Council for an election to authorize an issue of \$10,000 of bonds as a bonus to this company, which will build an interurban line between Altamont and Columbus. Oswego and other towns have issued bonds for that purpose. [E. R. J., Jan. 10, '14.]

Topeka (Kan.) Railway.—During the year this company plans to build a 1½-mile extension in Topeka.

*Central City, Ky.—Plans are being considered to build an electric railway from Central City to Greenville in a westerly direction and from Central City to Drakesboro in a southerly direction, thus placing Central City in touch with twenty-five small towns. Applications for franchises will soon be made. No names are yet given of those interested in this project.

New Orleans Railway & Light Company, New Orleans, La.—It is planned to build 7.06 miles of new track in New Orleans during the year.

Rockland, Thomaston & St. George Railway, Rockland, Maine.—Approximately 2 miles of new track will be built during the year in Rockland.

Electric Short Line Railroad, Minneapolis, Minn.—This company plans to build a line southwest from Minneapolis via Wayzata, through Sibley County and Nicollet County, via New Sweden, Granby, Nicollet and crossing the Minnesota River at Judson. From there the line will pass through Butternut and cross the Watonwan River at Cresco and then on to Fairmont and into Iowa.

Twin City Rapid Transit Company, Minneapolis, Minn.—Plans are being considered to build an extension from Hibbing via Keewatin, Nashwaul, Taconite, Holman, Coleraine and Bovey to Fayton. The company will soon ask for franchises.

St. Paul Southern Electric Railway, St. Paul, Minn.—During 1914 the Interurban Construction Company plans to build for the St. Paul Southern Electric Railway about 36 miles of new track to connect Hastings, Cannon Falls, White Rock and Zumbrota.

Hattiesburg (Miss.) Traction Company.—During the year this company plans to build 2 miles of new track in Hattiesburg.

Meridian Light & Railway, Meridian, Miss.—About 1¼ miles of new track will be built by this company during the year in Meridian.

Billings, Mont.—The Big Horn Canyon Irrigation & Power Company has completed plans for the construction of 2½ miles of electric railway from Custer to the mouth of the Big Horn River. Construction will be begun in the immediate future. [E. R. J., Jan. 10, '14.]

Missouri Interurban Railroad, Sedalia, Mo.—Surveys have been completed for this 40-mile line to connect Sedalia and Prairie Home via Smithton, Otterville and Bunceton. Construction will not be begun until the entire right-of-way has been secured and financial backing has been obtained. Officers: A. W. Nelson, Bunceton, president; J. W. Mellor, secretary, and B. H. Colby, Security Building, St. Louis, chief engineer. [E. R. J., July 22, '11.]

Freeport (N. Y.) Railroad.—Plans are being made to build an extension through Grove Street northward into Railroad Avenue and eastward, making its terminus in front of the Long Island depot in Freeport.

Beach, N. D.—Plans are being made to build an electric railway from Baker, Mont., via Dennis, Carlyle, Alpha and Williams to Beach, N. D. [E. R. J., Jan. 3, '14.]

Cincinnati (Ohio) Traction Company.—Plans are being considered to build an extension on Fairfax Avenue in Cincinnati to Wold.

Toledo & Western Railroad, Toledo, Ohio.—This company is asked to consider plans to build an extension from Alfordton to Hillsdale.

Kingston, Portsmouth & Catarauqui Electric Railway, Kingston, Ont.—This company has awarded a contract to the United States Steel Products Company for the supply of rails to be used on its lines on King Street and Princess Street in Kingston.

London & Lake Erie Railway & Transportation Company, London, Ont.—Plans are being prepared for extensions of this company's lines, work on which it is said will be begun in the spring.

Toronto Suburban Street Railway, Toronto Junction, Ont.—Grading has been completed and track is being laid on the extension from Weston to Woodbridge.

***Sandy, Ore.**—A company has been formed in Sandy to build a 7-mile electric railway from Sandy to Boring. The County Court, Clackamas County, has the matter in hand at this time.

Lehigh Valley Transit Company, Allentown, Pa.—This company plans to spend \$150,000 on improvements of its lines. It has decided to rebuild its tracks in New Jersey and purchase equipment to rebuild the Phillipsburg Horse Car Railroad, 7 miles.

***Reading, Pa.**—A company is being formed to build a 40-mile double-track electric railway between Reading and Allentown via the East Penn Valley. Surveys have been completed. No names are yet given of those interested in the project.

Scranton & Binghamton Traction Company, Scranton, Pa.—Work will be begun at once on extensive improvements which will cost about \$500,000.

Montreal (Que.) Tramways Company.—A new belt line in Westmont, which joins the upper and lower levels of the city, has been placed in operation.

Jackson Railway & Light Company, Jackson, Tenn.—Surveys have been begun on the extension to West Jackson via Poplar Street.

Maryville-Knoxville Interurban Railway, Knoxville, Tenn.—Work has been begun by this company on the Maryville end of the line. This 14-mile railway will connect Maryville, Rockford, Little Rock, Vestal and Knoxville. John M. Clark, Barryville, secretary. [E. R. J., Jan. 10, '14.]

***Nashville, Tenn.**—The commercial interests of Nashville are considering plans to build an electric line to the Hermitage, several miles from Nashville.

Nashville (Tenn.) Traction Company.—An increase in the capital stock of this company from \$500,000 to \$2,500,000 has been authorized. The organization of the Nashville & Detroit Construction Company, which is to do the construction work for the traction company, has been completed. W. O. Parmer, Nashville, president [E. R. J., Dec. 20, '13.]

Corpus Christi Street & Interurban Railway, Corpus Christi, Tex.—During the next three months this company will award contracts to build 2 miles of new track in Corpus Christi.

Dallas (Tex.) Consolidated Electric Railway.—The line on Bryan Street from St. Joseph Avenue to Garrett Avenue will be double-tracked by this company in the near future.

Texas Traction Company, Dallas, Tex.—The extension to St. Vincent's Sanitarium has been completed and it is planned to build soon another extension on Binkley Street to the new Sherman Hospital in Sherman.

Houston (Tex.) Electric Company.—Among the improvements planned by this company will be a new line on Main Street from Capitol Avenue to Dallas Avenue and on Dallas Avenue from Main Street to Louisiana Street, in Houston.

Marshall (Tex.) Traction Company.—During the year about ½ mile of new track will be laid in Marshall.

Temple, Tex.—Preliminary surveys have been completed for the proposed 30-mile electric line between Temple, Lott and Marlin. Kansas City capital is understood to be ready to construct the line as soon as financial conditions are adjusted. No names are yet given of those interested in the project. [E. R. J., Nov. 15, '13.]

Ogden (Utah) Rapid Transit Company.—Plans are being made to begin work at once on the extension to Logan and one from Hermitage, in Ogden Canyon, to Huntsville. The material for these lines has been ordered.

Utah Light & Railway Company, Salt Lake City, Utah.—It is planned to extend the Wandamere line to Fourteenth South Street from the park in Salt Lake City.

Charleston (W. Va.) Interurban Railway.—A 25-mile extension from Charleston to Montgomery is being planned by this company.

Elkins (W. Va.) Electric Railway.—A 1-mile extension between Harding and Roaring Creek Junction will be built during 1914.

Morgantown & Southern Railway, Morgantown, W. Va.—During the year it is planned to build 2 miles of new track in Morgantown.

Minneapolis, Merrill & Marinette Railway, Merrill, Wis.—This company states that its 35-mile line will be operated by steam.

SHOPS AND BUILDINGS

Glendale & Montrose Railway, Glendale, Cal.—This company expects to build a new carhouse in Glendale. The structure will be 40 ft. x 60 ft. A waiting room, 30 ft. x 40 ft., will also be built.

Chicago & Interurban Traction Company, Chicago, Ill.—Plans are being considered by this company to build a new passenger station at Crete, near Chicago Heights.

Chicago & Milwaukee Electric Railway, Chicago, Ill.—Work will be begun at once by this company on its new depot on Stanley Street in Chicago.

Oskaloosa Traction & Light Company, Oskaloosa, Ia.—New concrete repair pits, new tracks and other improvements are being made by this company at its carhouse in Oskaloosa.

Massachusetts Northern Railways, Greenfield, Mass.—Plans are being made for the enlargement of this company's carhouse in East Templeton. The addition will cost about \$10,000.

Montreal (Que.) Tramways.—This company has purchased from the Canadian Light & Power Company a block of land in the parish of Lachine on which it plans to build new carhouses.

POWER HOUSES AND SUBSTATIONS

Danbury & Bethel Street Railway, Danbury, Conn.—This company has recently placed a contract with the General Electric Company for a 600-kw, 2300-volt, sixty-cycle turbo-generator, 25-kw turbo-exciter set, 17½-kw motor-driven exciter set, two 200-kw, sixty-cycle rotary converters and six 65-kw step-down transformers. This apparatus will be installed within the next four months. In the near future the company plans to enter the lighting field. It is now making arrangements for the construction of a transmission line from Danbury to Newton, about 9 miles distant. This company plans to install new material in its power house at Danbury, and in order to do this it will be necessary to remove the present direct-current turbo-generator. The new alternating-current machine will be placed on the foundation which is now occupied by the direct-current machine.

Durham (N. C.) Traction Company.—This company is installing at its power house in Durham two new boilers and auxiliaries of 752 hp at a cost of \$12,800.

Dominion Power & Transmission Company, Hamilton, Ont.—Plans are being considered by this company to build a new steam plant in Hamilton in the spring. The plant will represent an expenditure of over \$3,000,000.

El Paso (Tex.) Electric Railway.—Among the improvements planned by this company in the near future will be the construction of several additions to its power plant in El Paso.

Ogden (Utah) Rapid Transit Company.—This company has dismantled in the past sixty days its complete steam-power plant and is now utilizing the space formerly occupied by the steam plant equipment for electrical substation equipments, having entered into a contract to purchase all necessary power for the next ten years.

Manufactures and Supplies

ROLLING STOCK

Cleveland (Ohio) Railway is in the market for fifty center-entrance cars.

Jacksonville (Fla.) Traction Company is in the market for ten passenger cars.

Detroit United Railway, Detroit, Mich., is in the market for fifty single-truck cars.

Dallas Consolidated Electric Street Railway, Dallas, Tex., is in the market for fifteen passenger cars.

Rockford, Beloit & Janesville Railway, Beloit, Wis., is in the market for four city cars.

Northern Ohio Traction & Light Company, Akron, Ohio, is in the market for ten city and five interurban cars.

Northern Texas Traction Company, Fort Worth, Tex., is in the market for twenty passenger cars.

Puget Sound Traction, Light & Power Company, Seattle, Wash., is in the market for eleven passenger cars.

Danbury & Bethel Street Railway, Danbury, Conn., is contemplating the purchase of two or three cars, probably single-truck, within the next three or four months.

Glendale & Eagle Rock Railway, Glendale, Cal., expects to purchase four double-truck forty-four-passenger California cars, one 30-ton flat car and one 30-ton freight box car.

Wellsburg, Bethany & Washington Railroad, Wellsburg, W. Va., is completing a new switch from its main line to a coal mine and will equip its road with a car of about 12 tons to 20 tons capacity.

Austin (Tex.) Street Railway, noted in the ELECTRIC RAILWAY JOURNAL of Nov. 1, 1913, as expecting to purchase four closed cars, has ordered these cars from the American Car Company, which expects to ship them in the middle of March.

Ogden (Utah) Rapid Transit Company, noted in the ELECTRIC RAILWAY JOURNAL as being in the market for city cars, has ordered from the American Car Company six 42-ft. city cars, to be complete in every detail, shipment to be made about March 1, 1914.

Corpus Christi Street & Interurban Railway, Corpus Christi, Tex., expects to purchase within four weeks and would like data and prices at once on two new single-truck pay-as-you-enter cars, 32 ft. over all, seating capacity about thirty persons, with two GE motors under same.

Ohio Electric Railway, Cincinnati, Ohio, noted in the ELECTRIC RAILWAY JOURNAL of Dec. 20, 1913, as having ordered five all-steel center-entrance cars from the Cincinnati Car Company, has specified the following details for these cars:

- Seating capacity.....70
- Weight car body...24,000 lb.
- Bolster centers, length...32 ft.
- Length over vestibule, 50 ft. 2 in.
- Width over sills....8 ft. 6 in.
- Width over post at belt.9 ft.
- Width, sill to trolley base9 ft.
- Interior trim....mahogany
- Underframemetal
- Air brakes.....West.
- Bolsters, body, two steel "Z" bars
- Bolsters, truck...cast steel
- Bumpers....stationary type
- Car trimmings.....Dayton
- Center bearings, half ball, special design
- Control system, double-end HL
- CouplersTomlinson
- Curtain fixtures, Nat'l Lock Washer
- Curtain material...Pantasote
- Gongs...rotary pedal alarm
- Hand brakes, Cin. Car Co. std. with "Pittsburgh" drop brake handle
- Heating system.Peter Smith
- HeadlightsDayton
- Journal boxes.....M.C.B.
- Motors, West.No.303. double
- Roofsturtle-back
- Sash fixtures.....Dayton
- Seats, Cin. Car Co. special design
- Seating material, slat construction
- Side bearings...roller type
- Step treads.....Mason
- Trolley retrievers...Knutson
- Trolley base.....bayonet
- Trolley wheels.6-in. O.E. std.
- Trucksspecial design
- VentilatorsUtility
- Wheels...34-in. rolled steel
- Special devices, etc., Hedley anti-climber, wear-proof aisle mats, Alert fire extinguisher

TRADE NOTES

Paducah Pole & Lumber Company, Paducah, Ky., which is one of the largest handlers of poles for traction and other purposes in that section, has established a branch yard at Metropolis, Ill., on the other side of the Ohio River.

Hart & Hegeman Manufacturing Company, Hartford, Conn., at its annual meeting appointed Shiras Morris as president and treasurer to succeed the late Alfred H. Pease. Mr. Morris was formerly secretary and treasurer of this company. Other officers appointed were: vice-president, Charles A. Pease; general sales manager, McKew Parr; secretary, Arthur L. Shipman.

Cutter Electrical & Manufacturing Company, Philadelphia, Pa., has opened a new branch office in Indianapolis, Ind., under the direction of Linn O. Morrow, whose territory will include southern Indiana and Illinois, Kentucky, Tennessee and Missouri. Mr. Morrow has been connected with this company for over six years, having spent about four years in the engineering department. The Indianapolis office will be under the supervision of H. F. Darby, Jr., Chicago district manager.

ADVERTISING LITERATURE

C-A-Wood-Preserver Company, St. Louis, Mo., has issued copies of a report of the United States Department of Agriculture on successful results obtained from volatility tests made with this company's preservative, in comparison with creosote L-54. Results show that the coal tar creosote lost considerably more oil by volatilization than the wood preserver.

Joseph Dixon Crucible Company, Jersey City, N. J., is distributing a booklet entitled "Joseph Dixon, One of the World-Makers," written by Elbert Hubbard and published by the Roycrofters, East Aurora, N. Y. The booklet contains a short biography and personal estimate of Joseph Dixon, together with a sketch of the development of the Joseph Dixon Crucible Company.

General Electric Company, Schenectady, N. Y., has issued Bulletin No. A4189, devoted to small plant d.c. three-wire switchboards of 125 volts and 250 volts and 10 kw to 100 kw. Bulletin No. A4199 illustrates and describes railway motor gears and pinions and contains curves and data on this subject. Bulletin No. A4143 describes belt-driven alternators, known as Form B. Bulletin A4197 describes electric fans.

General Railway Signal Company, Rochester, N. Y., has issued a catalog which contains a detailed description of a.c. block signals on the Southern Railway by W. J. Eck, signal and electrical engineer Southern Railway, and which also includes arguments in support of the a.c. block signal system as compared with the d.c. system, from the viewpoints of maintenance, cost of operation, reliability, length of track circuits, signal lighting and other facilities.

Hess-Bright Manufacturing Company, Philadelphia, Pa., is distributing a reprint from the Journal of the American Society of Mechanical Engineers entitled "Comparative Tests of Three Types of Lineshaft Bearings," by C. C. Thomas, E. R. Maurer and L. E. A. Kelso. The types of bearings included in the tests were ring-oiled bearings lined with babbitt metal, roller bearings and Hess-Bright ball bearings. Curves illustrating the results of these tests show in favor of the ball bearings a low comparative consumption of power by friction at given loads and speeds per bearing.

Weir Frog Company, Cincinnati, Ohio, has issued Catalog No. 9, a bound handbook of 225 pages, describing and illustrating fully its various designs of frogs, switches, crossings and all kinds of track work. At the end of the catalog is arranged a useful set of tables containing dimensions of different types of track construction, such as turn-outs for stub switches, split switches and spring frogs; three-throw turn-outs, with split or stub switches and cross-overs. Other tables show tie dimensions for each kind of track, the total number of feet (board measure) in cross-ties per mile of track, tons of rails required per mile of given weights per yard, number of joint fastenings to the ton of rails, rail spike data, splice bars and bolts per mile of track, middle ordinates in inches for curving rails, decimal parts of a foot for each 1/64 in., and rail dimensions and weights.