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EQUIPMENT AND ITS MAINTENANCE

With the first issue of this year we began to group in one department, now named "Equipment and Its Maintenance," the various short technical articles which formerly were scattered throughout each issue. A paper which covers every activity of the big and highly specialized field of electric railroading necessarily must print much matter that is essential only to a portion of its readers. This extension of the departmental plan which has been used in our news columns for years thus has the merit of keeping a certain class of electrical and mechanical data in the same relative position in each issue. By this means even the most casual reader will see all that is likely to interest him. While the character of the material is not new, we hope that its publication in a more prominent form will stimulate the writing of many similar articles by the very men who are solving daily the technical problems of the industry. We realize that the practical railway man has not got a great deal of time to write, but there is no reason why he should not be willing to send us occasionally a short description of any new device or method which he believes would help his fellow workers out of trouble in like circumstances. In short, we want the mechanical or electrical man, whether he is in the power, line, track or car department, to look upon "Equipment and Its Maintenance" as a feature of the ELECTRIC RAILWAY JOURNAL peculiarly his own.

LIGHT WANTED ON ELECTRIFICATION DECISIONS

It would greatly clarify the situation on the different systems of steam railroad electrification if each company when making a decision should state clearly the reasons which led to its adoption of the one finally selected. In the case of the Melbourne electrification, for example, Mr. Merz frankly published the figures which had led him to recommend high-tension direct current. Consequently, others had the opportunity of checking his data with quotations supplied by the manufacturers of the several systems. Several decisions to electrify steam railroad track with one or another of the different systems have been reached in this country, but no definite statement of the reasons for the choice made has been made public by the railroad company. It is time also that further details should be available in regard to the cost of maintenance of the different systems in use, as this has a direct relation to the cost of operation. At present there is a noticeable absence of data of this kind from several of the roads which have electrical equipments in operation. It is not fair to other railroads considering electrification to oblige them to take up the subject absolutely from the beginning, but this is almost necessary under present conditions.

INDECISION ON MUNICIPAL OWNERSHIP IN TORONTO

Within the last few weeks the conditions surrounding the proposed municipal purchase of the Toronto Street Railway and the Toronto Electric Light Company have become more involved than ever, largely as a result of the vacillation of the public authorities in acting upon Mayor Hocken's plan. When this plan was originally proposed and adopted the Board of Control ordered the corporation counsel to prepare a definite agreement based upon it, and this resolution was adopted by the City Council. On Dec. 16 a resolution was presented to the Board of Control to the effect that the negotiations for the purchase should be ended, but the resolution was voted down. On the day following the pendulum swung the other way, and upon reconsideration the resolution was adopted by the board. Scarcely any time elapsed, however, before the City Council completely nullified this action of the Board of Control and voted to continue the purchase negotiations. Thus matters stood on Jan. 1 at the time of the city election, and it cannot be said that the result of this election has served to clear the atmosphere. At first glance it would seem that the governing idea in the minds of the majority was opposition to the street railway purchase, but, although Mayor Hocken was reelected by a bare plurality over a young man whose only platform was that he was opposed to the purchase, yet by a decisive vote the people returned a Board of Control composed of men who either were in favor of the purchase or had not opposed it. Evidently the citizens of Toronto looked with favor upon Mayor Hocken's

recommendation for the creation of a commission of independent citizens to study the traction situation, and they returned municipal governing bodies that will at least keep the transportation question open until some plan is definitely submitted to the people for approval. In circumstances like these any predictions as to the ultimate outcome of the purchase plan seem futile. That there is a decided opposition to the city's taking over the property is certain, this being due partly to a distaste for municipal ownership and partly to the fact that the intangible values, as ascertained by Bion J. Arnold, were higher than most of those in favor of the plan expected. It is pertinent to state, in this latter connection, however, that no one has yet proved them wrong. The fact is that the cost of taking over a prosperous railway, the task of creating and managing a unified and expanded service for the whole city and the responsibility of basing these extensions upon estimated future growth and development are burdens which the people of Toronto may well be reluctant to assume. Whether the glamour of municipal ownership, however, will completely fade before the eyes of the citizens of Toronto upon a more complete investigation is a possibility of the future rather than a fact at present assured.

COLLECTIVE LIFE INSURANCE

The acceptance by 2000 employees of the partnership insurance offer made by the Third Avenue Railway, New York, in accordance with the plan described at length in our issue for Aug. 23, 1913, marks a noteworthy extension of welfare work on a businesslike basis. Hitherto the company has had only a mutual benefit association of the usual type. This association pays a death benefit of $250, but now those association members who enter into the insurance plan will receive in place thereof a life insurance policy for $1,000. The partnership feature of this agreement is that the company contributes $4 a year for every $7 paid by the policy holder. To the employee this arrangement means that for the trifling sum of 15 cents a week his family will not be left in total distress in the event of his death. To the company it means that the expenditure of less than 9 cents a week per individual will prove a substantial incentive for the best men to remain in its employment.

The "actuarial" aspect of this bulk insurance plan is, of course, of particular interest because the assessments are so much less than any mutual benefit association could afford to set. The obvious reason for this condition is that on any single railway the fluctuating mortality from year to year must be absorbed by a few hundred or few thousand persons, whereas the policy holders of an important life insurance company are numbered by hundreds of thousands. Hence it would be dangerous to apply the standard mortality tables to any one place because extraordinary local epidemics or unhealthful weather conditions would not be canceled by a lower death rate elsewhere.

The Third Avenue Railway has avoided this risk by having a standard insurance company underwrite all of the policies collectively. In this way it also avoids the burden of operating a separate insurance department. That the insurance company should be able to grant materially lower rates may be readily understood inasmuch as it is relieved of three sources of great expense. The first of these is the abolition of examinations, made possible because the applicants as a whole present a low risk on account of their high average health. The second expense saved is the separate solicitation and underwriting of thousands of small policies, and, finally, there is no expense of collection of premiums because all of the accounts are guaranteed by the railway. The saving in the actual cost of a policy to the employee by this system of collective insurance with part payment by his employer is especially evident in comparison with the cost of the industrial policies usually taken out by men who earn platform wages. These industrial policies are naturally the most costly since the premiums are usually collected in amounts of less than one dollar.

It is not astonishing, therefore, that the employees of the Third Avenue Railway should have accepted the insurance proposition in such large numbers. As an indication of the trend of the times, it is worth mention that a still larger railway system is planning to go even farther by insuring absolutely free of cost all men who have been in its employ for a given number of years. The great attraction of collective partnership or free insurance, in general, is that it can be adopted as evidence of good will by many a company which could not afford an increase in wages or the costlier forms of welfare work.

SAFETY IN THE REPAIR SHOP

The increasing attention now being paid to safeguarding workmen from accidents in industrial plants suggests the desirability of similar campaigns in repair shops. Here and there, no doubt, a good deal of consideration has been given by railway companies to this subject, but a good many accident hazards remain to be eliminated and comprehensive studies of dangerous conditions in machine and woodworking shops generally offer helpful suggestions. Some studies of this kind have been made by the accident insurance companies and a recent bulletin published by one of them throws considerable light on the whole subject of industrial accident prevention.

For instance, it is generally assumed by most of those who have not looked into accident prevention from the practical end that mishaps in the shop are attributable for the most part to the absence of safety devices in places where danger is known to exist. But in reality there are many other contributory causes. Ignorance, carelessness, unsuitable clothing, poor lighting, ill-conditioned and crowded departments and defects in machines and buildings all bear upon the problem. In the railway car shop there is a low density of labor which tends toward greater safety in the performance of work, but the hazards associated with open belts and gears, with exposed shafting, poor wiring,

loose material and equipment and poor lighting deserve careful study on many roads.

In the car shop no less than in the industrial plant employees should receive so far as possible complete and detailed instructions as to their work, special emphasis being laid upon the dangerous features, with particular regard to newly employed men and apprentices. Attention should be directed not only to the dangers incident to each individual's particular employment but also to hazardous conditions in his immediate vicinity. Whenever a man is transferred from one department to another or is placed in charge of a different machine, he should be fully instructed in his new duties and warned of any dangers that may be associated with its unfamiliar operations. A workman who repeatedly receives even minor injuries while performing the same kind of work should be transferred to safer employment or even dismissed, if necessary, to eliminate a poor moral hazard exerting a dangerous influence upon fellow-employees. In the car shop as well as in the factory an unbuttoned coat or a torn sleeve may lead to a fatal accident in connection with machine rotating parts which look more or less harmless to the inexperienced eye.

Obviously the best time to make safety provisions is when the machines are being laid out in the drafting room, and it is gratifying that designers of heavy machine tools are giving more and more thought to protective features. The designer can take care of the safeguard problem in the cheapest way while working on the details of the machine, but if the machine is built without regard to these features, it is often difficult and sometimes impossible to add effective protection after construction. Hence the shop foreman or master mechanic should specify to the tool builder certain safety requirements and these should be demanded when the tool is bought.

Only brief mention can be given of the safeguards which are rapidly becoming standardized in shop practice, for their application depends in detail upon local conditions. The protection of moving parts by metallic nettings instead of solid metal screens is a step forward on account of the increased facility of inspection afforded. Gear wheels always need careful protection, especially when they are within reach of the floor or near bearings or other machine parts requiring frequent attention. It is not uncommon to find gears which are only partly hooded or covered with a guard having too narrow a width. Complete inclosure of reversible gears and spoked wheels and the use of counterbored set screws turned flush with the surrounding surfaces are important protective measures, and unrailed platforms, detached belt shifters, unspiked or uncapped ladders and exposed electric contacts within reach of the floor are all potent sources of trouble. Skilled labor abounds in most car repair shops in all departments, and the average of intelligence is far above that of the ordinary mill worker. But the high standard of employees is no excuse for the absence of preventive measures indicated as necessary by periodical surveys of such establishments.

EFFICIENCY IN SERVICE CARS

The shabby, unkempt service cars of many electric railways look more like traction outcasts than like apparatus of high efficiency. In fact, it has been so customary to build service cars out of odds and ends and to operate them with valetudinarian motors and control that it is almost a shock to find some that have actually been designed and equipped to do their work in the best possible way. The small system on which a single service car of each type suffices may be readily excused for following the practice of using second-hand material because better equipment could not be exploited to its maximum efficiency and the savings possible in energy consumption. crew time and maintenance from such modern service cars might not be enough to offset the higher first cost of a really new car. The large system, however, owes it to itself to see whether its fleet of junk-type service cars cannot profitably be displaced by cars which are capable of bigger mileage because of specialized design and modern equipment. This is clearly an instance where true economy will be found to lie in the installation of equipment designed for the work in hand.

Of two cases in point, one is afforded by an all-steel stores car which will operate the mileage of the three older cars, and the two men required to operate it will perform with greater ease the work formerly done by six. No elaborate calculations are required to show what this means in reducing labor cost and energy consumption, but there are also the less tangible advantages that one well-equipped car will have fewer mishaps than three poorly equipped cars and that a spick and span vehicle advertises the company to its patrons more commendably than three near-pensioners in rolling stock.

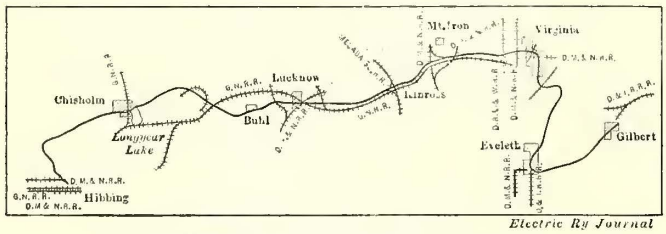
A second case is that of a company which has followed the same idea in the design of a steel ballast car which hauls 9 per cent more load per trip than three of the old-time trailers. The better unloading apparatus and motor equipment on this car also make it easy for it to do one more trip per day than the old trains. In this instance two men perform easily a job which before was a hard task for four men.

As many of the lines on the system in mind have heavy traffic, the reduction in track space from 80 ft. to 49 ft. for given loads is not to be despised. A recent accident where the last car of an old ballast train broke away on a grade and dashed off the curve into a house also proved an effective, though unexpected, argument for the superior safety of single big-car operation. One of the most satisfying facts is that the company which uses the new ballast cars is no longer flooded with complaints such as threatened to wipe out the prosperous business which it had created in the transportation of stone. It is not pretended that the new cars are altogether inconspicuous, but they do give an impression of massive strength and efficient design which make a pleasing contrast to strings of ever-tilting "dumpies," shedding stones in their journey, as Hans of the fairy tale marked his path by dropping pebbles between his home and the forest.

New Interurban Railway in the Minnesota Iron Range

A Description of the Mesaba Railway, a 35-Mile, 725-Volt Line with Interesting Construction and Operating Features and a Complete Cab-Signal System

The new Mesaba Railway in the Minnesota Iron Range district is a good example of an interurban electric line recently built in a growing community. The population served by this 35-mile line exceeds 55,000 and is distributed among nine cities and "locations," as the mining settlements are called, varying in size



Mesaba Railway—Map of Route

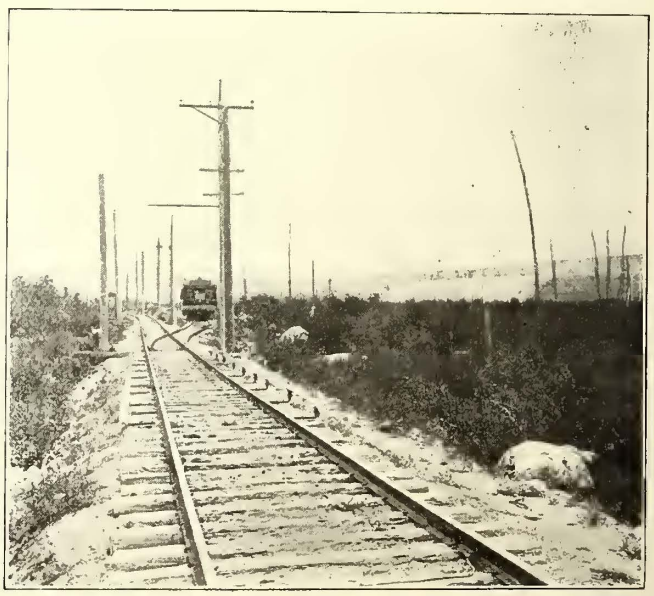
from 500 to 15,000 people. This population is largely made up of the laborers in the open-pit iron mines along the Iron Range, which extends in an east and west direction across that part of Minnesota lying 80 miles north of Duluth and Lake Superior. Although this great iron ore district is served by a network of steam railroads, none of them is interested in a passenger business. All their energies are being directed toward increasing the ore tonnage, which is a most profitable source of revenue.

In considering the possibilities of an electric railway through this district the promoters of the Mesaba Railway found that at least one of the steam roads, the Duluth, Missabe & Northern Railroad, furnished passenger train service between most of the important towns, but that transfers were necessary at junction points on an indirect route, and long delays between trains were frequent. The principal industry of the district was iron mining and lumbering, and there was a natural channel of intercommunication between the "locations" and the cities. This fact was quite evident from the amount of passenger traffic between these centers, even under the inconvenient service offered by the steam roads before the advent of the electric line.

Another inducement to the promotion of an electric line in this locality was the possibility of a lighting and power business, inasmuch as the service rendered to most of the larger communities was by isolated, inefficient generating plants. Already three of the larger cities have made contracts with the railway company, and others are negotiating for a similar service. Then, too, the present terminals of the electric line are well within the iron-mining district. A territory almost as rich in iron ore deposits as that now served and one which abounds in "locations" and growing towns lies both to the west and east. The intention is to extend the line in the near future to serve these communities, and ultimately a lighting and power business will be developed in the entire territory.

Some unusual difficulties were encountered in the construction of this line, although the natural topography is that of a slightly rolling country which, under ordinary conditions, would require the average amount of grading to produce a normal interurban line. These difficulties took the form of great mounds of earth stripping removed from the surface of the open-pit iron mines. To project the line through these would have increased the cost of grading to a point where it would have been prohibitive. Hence, it was decided to build the line around them with easy curves and at the same time obtain a reasonable grade line. Other characteristics of this country which tended to increase the cost of construction included sink-holes or bogs in which it was practically impossible to obtain a permanent bearing, and at other points the line was constructed through fields of large boulders.

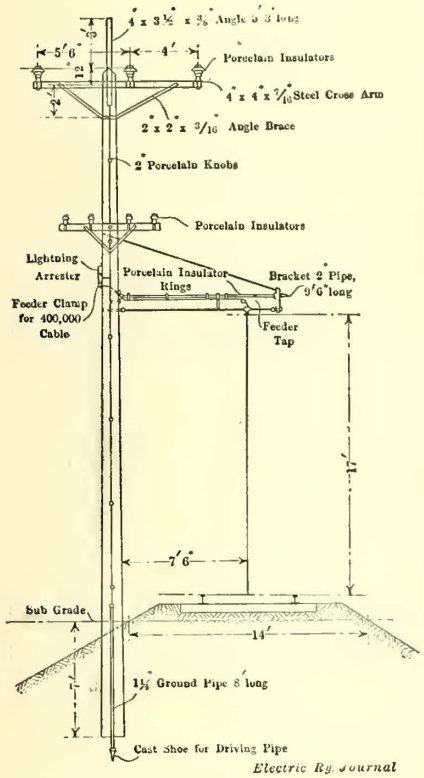
Mesaba Railway—General View Showing Character of Country and Construction



Mesaba Railway—View Showing Siding and Contact Rails for Signal System

TRACK AND ROADWAY

The line was built on a private right-of-way, 50 ft. in width, through the rural districts and in the streets through the cities and villages. As the rural population was very small with little or no farming, it was unnecessary to fence the right-of-way. Fortunately, too, there were but few streams requiring bridges. In fact, the only waterways of any consequence were a few shallow lakes. To offset the advantage of a scarcity of waterways, however, numerous railroad crossings were necessary. Some were obviated from an operating standpoint by grade separations, and others were crossed at grade. Grade crossings were introduced only where a grade separation was not feasible or was unwarranted because the track was one on which only a few trains were operated each day. The most important of these grade separations was at Kinross, where combination wooden-trestle approaches to a steel girder cross the intersection of two steam roads. A view of this crossing is shown in one of the illustrations.



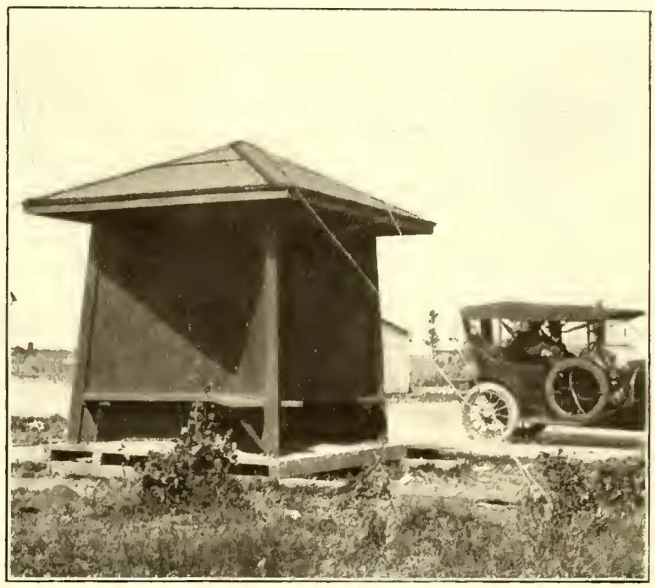
Mesaba Railway—Typical Roadway Section

The standard roadway construction employed includes a 14-ft. roadbed on embankments with 3-ft. ditches on each side of the roadbed in excavation. The track is laid on 6 in. of gravel ballast taken from a pit on the company's right-of-way and consists of 6-in. x 8-in. x 8-ft. tamarack ties, 70-lb. A. S. C. E. rail, 24-in. angle bars and 26-in. Ohio Brass Company's compressed terminal bonds. The latter are quite unusual as they are of the concealed type, but as they are longer than the joint, the terminals are exposed. This arrangement permits of easy inspection to determine when the bonds become defective.

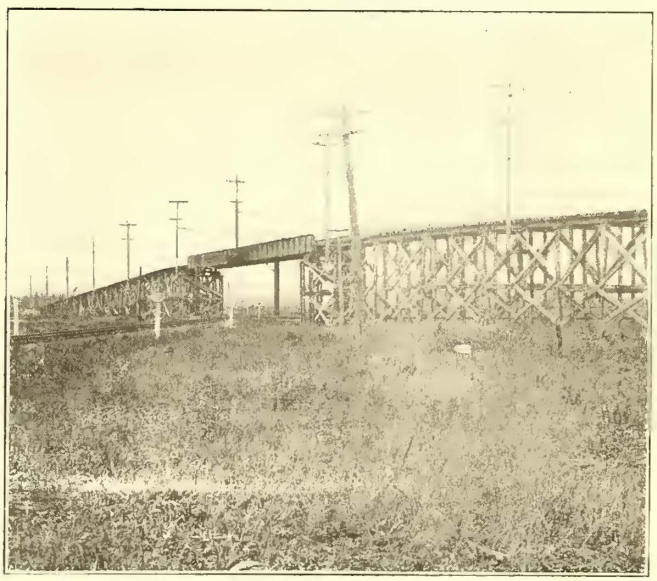
OVERHEAD CONSTRUCTION

Except for one or two unusual features, the overhead lines conform to general practice. The trolley is supported on pipe mast-arms, 17 ft. above the top of the rail, and in turn the mast-arm is attached to a 40-ft. Idaho cedar pole which also carries the telephone, signal and transmission line wires.

One novel feature in the overhead line construction is the cross-arm used to support the transmission lines. This arm is a 4-in. x 4-in. x 7/16-in. structural-steel angle, set 2 ft. off center, in order to give a 4-ft. clearance between the two transmission lines on one side of the pole and a 5-ft. 6-in. interval between the middle line and the third line on the opposite side of the pole. Another structural angle, 4 in. x 3½ in. x ⅜ in. in section and 5 ft. 3 in. in length, is bolted to the side of the pole opposite the transmission line cross-arm and serves to support the ground wire. A direct ground is obtained by a connection both to the transmission line cross-arm and the structural angle supporting the ground wire above the top of the pole. This ground wire is carried down the side of the pole on 2-in. porcelain knobs and connected to ground by 1¼-in. pipe 8 ft. long. The base of this pipe is provided with a cast-iron shoe for driving, and the top has a special grounding cap. In appearance this cap resembles an ordinary hexagon nut, except that it is tapped out only on one side to fit over the head of the 1¼-in. ground pipe. A horizontal slot is cut in the cap 7/16 in. below the top, and a tapered hole slightly off center is drilled from the top of the cap through this slot. The depth of the slot and the location of the tapered hole are such as to leave sufficient space between the inside edge of the slot and the hole to wedge securely the grounding wire when a pin is driven into the tapered opening.



Mesaba Railway—Typical Way Shelter



Mesaba Railway—Combination Wooden Trestle Approaches to Steel Girder Bridge at Kinross

POWER STATION

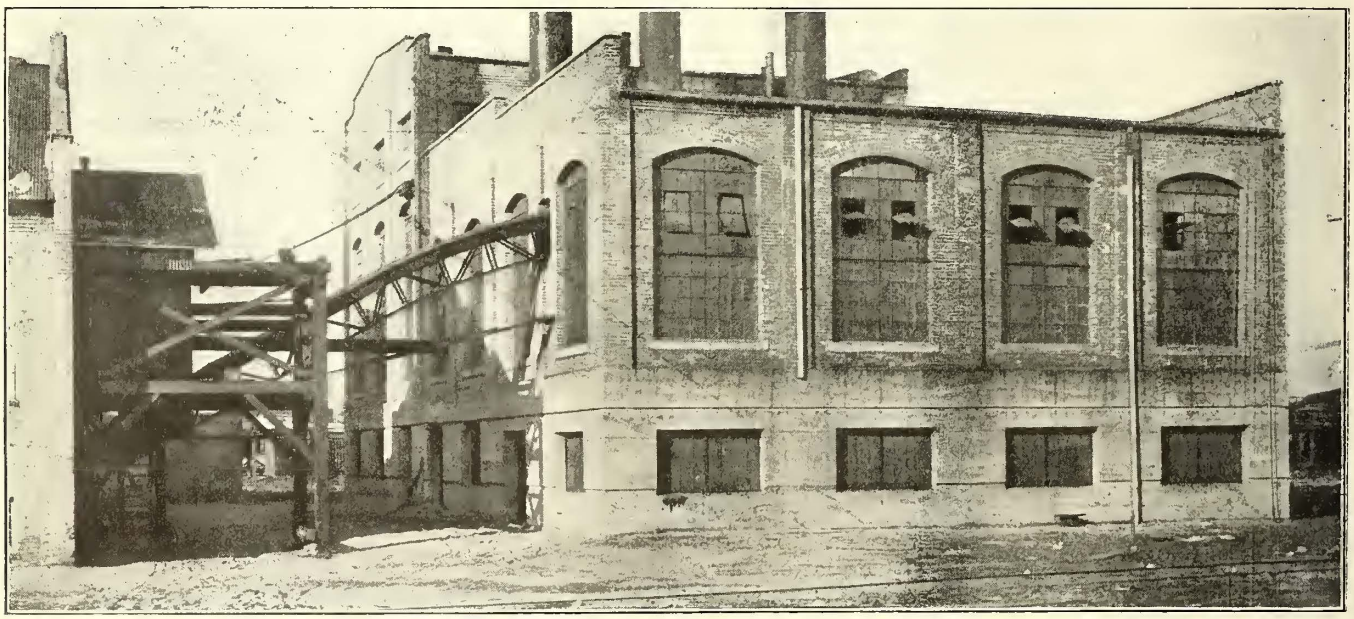
The power station of the Mesaba Railway Company is situated on the property of the Virginia & Rainy Lake Lumber Company, approximately one-quarter mile from the main track where it enters the city of

Virginia. At this location it was possible to obtain refuse from the lumber mill for fuel, and water is taken from a lake situated but a short distance from the power-house site. This location was selected also because it was desirable for a substation.

Owing to the high cost of coal in this locality, the large quantity of wood fuel available from the lumber mill was practically a governing factor in the selection of this power-house site. Prior to the construction of the power house, however, it was ascertained that there was a large surplus of fuel over that required to operate the lumber company's generating plant. The character of this fuel, which consists of wet or green sawdust and small pieces of pine wood, may be seen in the illustration showing the fuel deck. An overhead conveyor from the mill of the Virginia & Rainy Lake Lumber Company delivers this fuel into the firing room of the electric railway power station. The sixteen openings in the bottom of the conveyor trough, uniformly spaced across the boiler room, are opened and closed by hand levers. Twelve of them supply chutes which deposit the fuel directly into the fire box, and four open into short spouts which deposit it on the fuel deck. The quantity deposited on the fuel deck during the six days of the week when the lumber mill is in operation is sufficient to last during the period when the mill shuts down from Saturday night to Monday morning. During this time it is necessary to charge the fireboxes by hand.

Wood fuel made it necessary to equip the fireboxes with unusually large grate areas, and each contains approximately 90 sq. ft. No attempt is made to spread the fuel over the grate after it has passed through the firing doors from the fuel deck. It forms a cone-shaped pile on the grate under each firing door and burns around the edge of the pile. As it is necessary for the fireman to attend to the fuel chutes on a floor directly over the fireboxes, the essential insulation against heat was obtained by supporting the floor on a Dutch oven extension with thick arches.

It was originally intended that the line voltage of the Mesaba Railway would be 1200 volts, but before actual construction had begun it was decided that the motor generators should be designed for 750 volts d.c. and operate at 600 volts. Shortly after operation started it was found the traffic was much heavier than anticipated and that the copper was barely sufficient during the peaks. Accordingly, it was decided to take advantage of the higher pressure for which the generators were designed and raise the voltage to 750. This could be done without any other serious difficulty, as the railway motors, although designed for 600-volt operation, were of the interpole type which permitted an increase in pressure to 750 volts without danger to economy of operation. Sixty cycles have been used for the transmission frequency, partly because of the lighting and power business and partly because that is the frequency used in the Virginia & Rainy Lake Lumber Company's power plant. A three-phase line has been installed between the two switchboards so each station may synchronize with the other in case an interruption does occur, and as an extra precaution, the main steam headers of the two stations are also connected.



Mesaba Railway—Generating Station at Virginia, Minn.

The power house proper is in a building 60 ft. x 120 ft. in plan. It is built on concrete foundation supported by piling, and the superstructure is of steel, brick and concrete. The power house building is divided into two sections, namely, the boiler room and the generator room, and each is built with a basement. The boiler equipment embraces three 300-hp Edge-Moor horizontal water-tube boilers with four fuel chutes and firing doors to each. These boilers were designed for 175-lb. pressure at 75 deg. superheat and were guaranteed to develop 450 hp each, with a 1-in. draft at the breeching outlet. They are served by three 150-ft. guyed steel stacks 4 ft. 6 in. in diameter. The boiler feed water is heated to approximately 204 deg. in Hoppes heaters, which are served by a turbine-driven boiler-feed pump. The feed-water heater is supplied with exhaust steam from the boiler-feed pump, the general service pump and the turbine-driven exciter.

The generating equipment includes two 750-kw, 600-volt, three-phase, 60-cycle horizontal condensing turbines operating at 80 per cent power factor and 3600 r.p.m. At the present time one of these units is held as a spare, but the rapid increase in the load anticipated in the near future, owing to new contracts for light and power service, will soon require the spare unit to be placed in regular service. The governors on the turbo-generators are controlled by a motor from the switchboard and each generator panel is also equipped with a wattless component indicator. Station excitation is obtained from a 35-kw, 125-volt, 3600-r.p.m. non-condensing turbine exciter. In conjunction with this self-

contained unit, a motor-driven exciter designed to run in parallel has been installed for regular service, the turbine exciter being used only in case the plant is shut down. The motor-driven exciter set consists of a 75-hp, 1200-r.p.m., 600-volt, three-phase induction motor direct-connected to a 60-kw, 125-volt compound-wound exciter.

In the portion of the turbine room used as a substation two 300-kw, 750-volt synchronous motor-generator sets have been installed. These are General Electric two-bearing machines with compound-wound generators which feed the line at 750 volts d.c. One of these units serves as a spare at the present time. The motor-generator sets are served by three 250-kva water-cooled transformers.

A switchboard gallery is located in one corner of the turbine room and the space under it is utilized for the transformer equipment. All circuits to the switchboard are arranged so that no switches are on the high-tension side of the transformers. This arrangement as well as the location of the switchboard gallery over the trans-

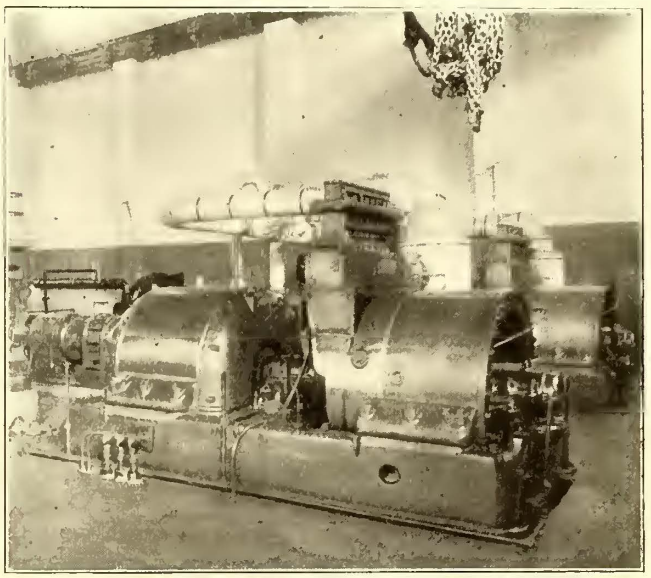
Mesaba Railway—Fuel Deck Over Boiler Room Floor

formers reduced the copper to a minimum and at the same time provided ample room for operation. The switchboard contains fifteen panels and a swing bracket at each end. All wiring between the switchboard and the generator and substation units is housed in metal conduit embedded in the concrete building floors, and the board is thoroughly grounded.

SUBSTATIONS

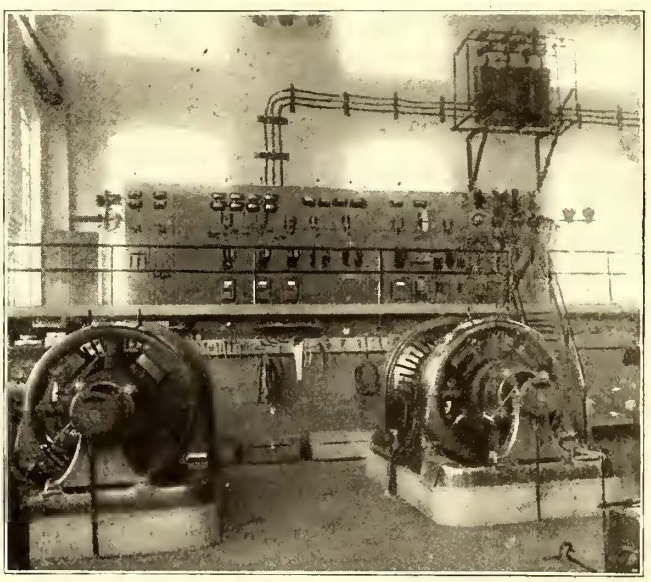
At present the substation in the power house and the substation at Chisholm, 20 miles west, are all that are required to operate the line. A transmission line, consisting of three No. 2 copper wires, connects the power station with the Chisholm substation, and current is transmitted at 22,000 volts. Two 400,000-circ. mil d.c. feeders feed both ways from the power house. One connects it with the Chisholm substation and the other extends east to Gilbert. A 300,000-circ. mil feeder is installed between Chisholm and Hibbing, the west terminus of the line.

The substation at Chisholm is operated in conjunction with the passenger and freight station, a single agent serving both. The substation proper is housed in a one-story building constructed of brick and steel. The three-phase transmission line enters this structure by way of a structural-steel bracket and 15-in. tile openings through the building wall. It is supported on the building wall inside the station by insulated pipe brackets, and after passing through choke coils and disconnecting switches this 22,000-volt line is connected to the 200-kva, 22,000-to-600-volt self-cooled transform-



Mesaba Railway—750-kw Turbo-Generators

ers by way of oil switches. The transformer set is installed immediately back of the switchboard that occupies the transverse center of the substation building, which is 24 ft. by 44 ft. in plan. The floor space opposite the transformer section is occupied by two 300-kw motor-generator sets, which convert the sixty-cycle a.c.



Mesaba Railway—View of Motor-Generator Sets and Switchboard Gallery

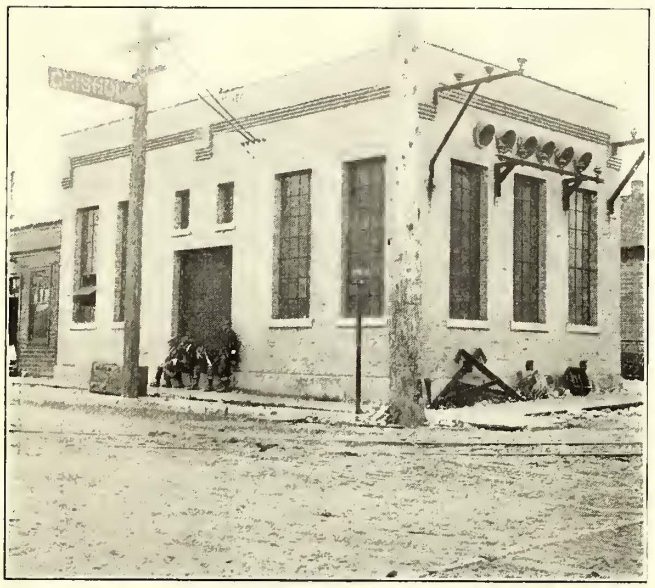
into d.c. at 750 volts. Both interior and exterior views of this substation are shown in the illustrations.

SIGNAL SYSTEM

A complete installation of the Simmen system of railway signaling has been installed on this line. The dispatcher set includes a nine-lever board, interlocked and equipped with time and location recording mechanism and record sheets such as have been described in the

ELECTRIC RAILWAY JOURNAL. Six telephone dispatcher lines are also connected into the board, and each line is equipped with a bell of a different tone instead of the usual drop.

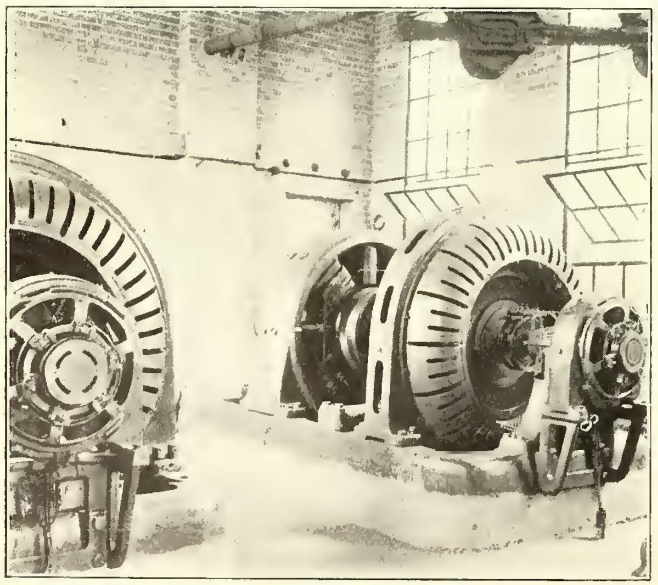
The third-rail installations on this 35-mile line provide for a block approximately 6 miles in length, with



Mesaba Railway—Exterior of Chisholm Substation

home and distant rails protecting each siding. The third-rail locations were also selected with a view to eliminating difficulties which might arise through drifting snow. The method of installing the third-rails conforms to the standards employed on the Indianapolis & Cincinnati Traction line, as well as the Nashville-Gallatin Interurban line. Certain refinements in the operation of this signal system, however, have been included.

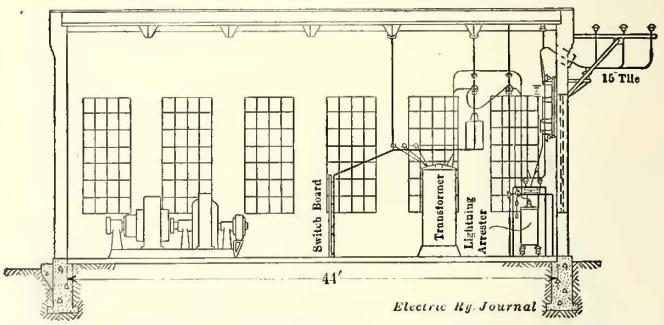
Probably the most important of these additions to the system is the directional movement protection, which is



Mesaba Railway—Motor-Generator Sets in Chisholm Substation

essentially as follows: When a west-bound train is about to take possession of the block the circuits are arranged so that an east-bound train receives a red light if it attempts to oppose the west-bound train in the same block. Each block may be set for either an east or west-bound movement, but the moment it is set for one the other is disengaged. This might be accomplished in the usual way—that is, by two separately controlled circuits—but the Simmen system accomplishes the east-bound and west-bound control over a single wire. The principal features of this arrangement include three phases of control. One gives a green light to an east-bound movement by energizing a third-rail positive, another gives a west-bound movement a clear light by energizing the third-rail negative, and a stop indication is given to each by totally de-energizing the rail.

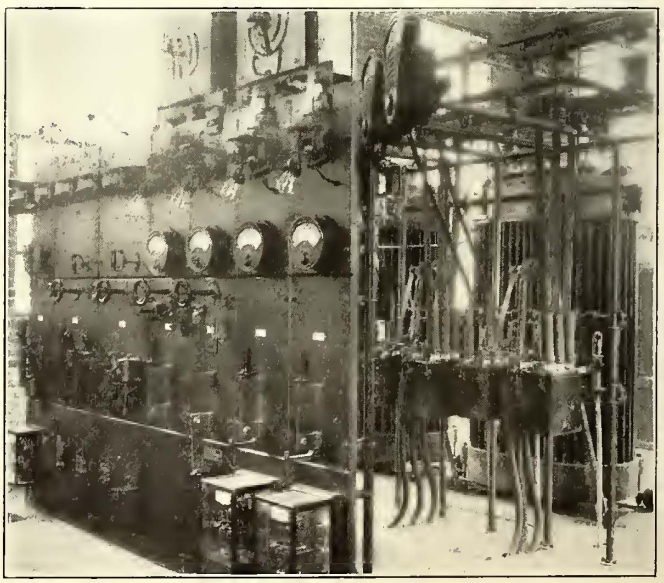
In further explanation of this feature, suppose that all east-bound movements require a positive current to produce a green light, then all east-bound trains with a green light must be governed by a positively energized rail. In this example the east-bound movement is pro-



Mesaba Railway—Cross-Section of Chisholm Substation

tected by making all west-bound movements clear with a negative current. Hence, if a west-bound train passes a positively energized rail, it receives a red indication.

The operating advantages of this arrangement are that the east-bound train may take a siding, and in case there are two or more sections of the west-bound train, the east-bound train must be in the clear before the west-bound train can receive a proceed signal. If all rails are negatively energized—that is, if they are providing a clearance signal for west-bound trains—the



Mesaba Railway—Switchboard and Transformer Section of Chisholm Substation

east-bound car is held at that siding until all the sections of the west-bound train have passed, and it cannot leave until the dispatcher changes the levers and positively energizes the rail.

The added cost of this construction over the simple form of control, such as is used on the Toronto & York

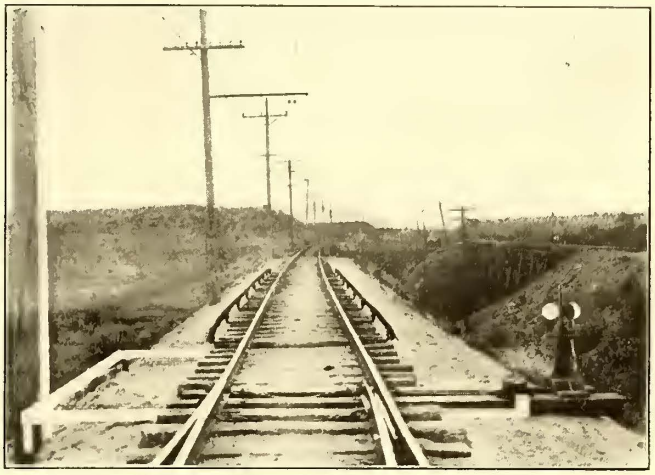
Radial Railway, is practically negligible. The principal addition necessary in the installation is the additional batteries in the dispatcher's office. These two batteries are arranged with one positive to ground and the other negative to ground. To obtain the advantage of the directional indications, it is also necessary to change the ordinary relay on the car to a polarized relay and install a directional switch.

In actual practice it has been found that the propulsion current, which is positive to trolley and negative to track, tends to go through the signal circuits. Accordingly, it has been necessary to increase the battery positive to the signal line so as to overcome this shunted propulsion current. It has also been found that the amount of propulsion current flowing over the signal lines increases with the number of defective bonds. Hence a periodical test of the signal circuits provides a close check on the bonding conditions of a line. When the shunted propulsion current becomes excessive it produces a red cab signal, owing to the fact that the signal current is counteracted by leakage of the propulsion current.

On the Mesaba Railway signal lines a 40-volt signal current was used in one direction, and the propulsion current assists in energizing the signal lines with the proper polarity. In the other direction it was necessary to use 80 volts, as the signal current is decreased by the propulsion current leakage, which is of the opposite polarity. The voltage of the current in arranging this signal system for directional indications depends on the relative location of the power house and the dispatcher's office. No difficulty has been experienced, however, in the operation of the directional indication, and it has now been installed on the lines of the Indianapolis & Cincinnati Traction and of the Nashville-Gallatin Interurban Railway as well as on the Mesaba Railway.

The directional switch provided in the cab of each car in addition to the polarized relay has three positions—one for west-bound movement, one for east-bound movement and a neutral position which entirely disconnects the car batteries. The latter position is used when the car is in the carhouse or is making a long lay-over on a side track. Although the position of the directional switch is under the control of the motorman, it does not depend on the human element. In case the directional switch is not in the proper position, a car cannot receive a green light because the terminal third-rails can be energized only with one polarity, namely, only positive for east-bound and negative for west-bound terminal rails.

The east-bound and west-bound movement has made possible the use on each car of a single shoe, which makes contact with those third-rails on the right-hand side of the track. The removal of one shoe from the single-end car more than offsets the added cost of the polarized relay. On a double-end car, however, two shoes are required, and also a small four-pole switch. Two poles of this switch connect the shoes, and the other two poles connect either one or the other set of cab signals. If a motorman changes from the front to the rear cab, he cannot get the cab signal permitting him to proceed until this four-pole switch is in the proper position.

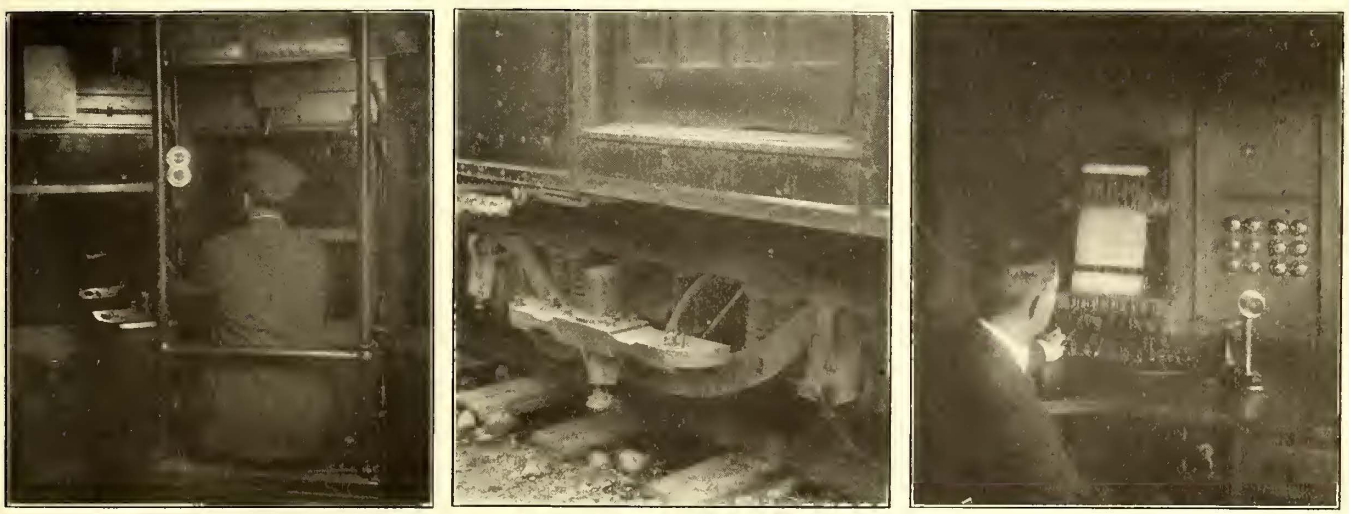


Mesaba Railway—View at Center Siding Showing Signal Rails and Switch Box

Open-switch protection is also provided in a simple and inexpensive way. This is done by passing the signal wire through an ordinary switch box before connecting it to the third-rail. In this way, when the switch is open or partly open, the signal current cannot reach the third-rail as the circuits are broken at the switch box.

The passage past a non-energized third-rail produces a red cab signal on the car at the distant rail, which is 2000 ft. away from the home rail on this road. Both trailing and facing open-switch protection are feasible, because, after passing through the switch box, the energy may take a secondary line connecting the home and distant signals on both sides of the point to be protected.

The length of the third-rail as well as the size and



Mesaba Railway—Signals in Vestibule of Car—Revolving Contact Shoe—Equipment in Dispatcher's Office

quality of the signal wires were adopted only after careful investigation. Heretofore it has been the practice to use a copper-clad wire for signal wire, but the Mesaba Railway employed a No. 10 galvanized-iron wire with glass insulators. This represented a saving in the cost of the signal circuits and the iron wire has been just as satisfactory in the operation of the signal system as the copper-clad wire. The third rails are 70 ft. in length and are made up of two sections riveted together. Recent speed tests have shown that a 25-ft. rail was sufficient in length to give the necessary time element for relay action at a speed of 89 m.p.h. A 70-ft. rail was used merely to provide a factor of safety.

At the Hibbing and Gilbert terminals the track was in paved streets and a third-rail signal installation was not practicable. To meet this condition the signal circuits were extended to the telephone booths at the terminal, where red and green light signals similar to those in the car were installed. These lamps were connected in and operate on the principal signal circuit, which is opened and closed manually. When the motorman or conductor obtains an order from the dispatcher over the telephone he closes the signal circuit and obtains the light indication before starting his run.

ROLLING STOCK

The initial rolling stock equipment for the Mesaba Railway includes five motor passenger cars, five motor combination cars, four trail cars and two express, baggage and freight cars. The general dimensions of the passenger motor cars are as follows: Length over buffers, 47 ft.; length over vestibule, 47 ft. 2 in.; length of car body, 37 ft.; length of main compartment, 25 ft. 7 in.; length of smoking compartment, 11 ft. 5 in.; length of vestibule, 5 ft.; seating capacity, fifty; weight of car body, approximately 26,000 lb. The general dimensions of the express motor cars are as follows: Length over buffers, 46 ft.; length over car body, 43 ft. 4 in.; length inside for freight, 35 ft.; weight of car body, approximately 21,000 lb.; weight complete with trucks, air-brake equipment and motors, approximately 27 tons.

The most important consideration in the design of the passenger equipment was to provide protection against the extremely cold weather common in this locality. In order to accomplish this end the cars have double side walls sheathed outside with ⅛-in. x 34-in. steel plates, and the windows are provided with removable storm sashes. Owing to the fact that a large percentage of the passengers carried are ore workers in soiled clothing, it was deemed advisable to make interior finish in dark oak and to upholster the seats in rattan.

These cars were designed and built by the Niles Car & Manufacturing Company for local interurban service, medium speed and frequent stops. They are of a composite construction with two 6-in. I-beams reinforced under the platforms with ½-in. x 5-in. steel plates in the center sill and two ⅝-in. x 7¾-in. steel plates in the side sills. The body is thoroughly rodded and trussed and reinforced with steel plates. Each side of the car body at the rear end and the right side at the front end are fitted with 31-in. single-swing doors, triple steps with safety treads and steel trap doors. The car bodies are mounted on Baldwin locomotive trucks, equipped with four GE-201 600-volt interpole motors rated at 50 hp. They are equipped with the GE type-K control and Westinghouse combination automatic and straight air brakes. Other special equipment includes the Peter Smith Heater Company's forced-draft heaters and Ohmer registers. Car illumination is obtained from 145-volt lamps, arranged five in a series and direct-connected to the 750-volt propulsion circuits.

OPERATION

From the beginning of operation an hourly schedule has been maintained over the entire line. In many instances this service has not been adequate, and it was necessary to utilize all the passenger equipment the company had on hand to move the traffic. Most of the extra service takes the form of a two-car train consisting of a motor and trailer. At the present time the largest proportion of passenger traffic is between Virginia and Evelyth. The Mesaba Railway carhouse is especially well located to handle this, as it is just west of Virginia, where a trailer may be added to the car going to Evelyth and may be removed from the car on the return trip. The Egry train order system is used exclusively and all telephone booths and other points at which orders are received from the train dispatcher are equipped with Egry dispatchers.

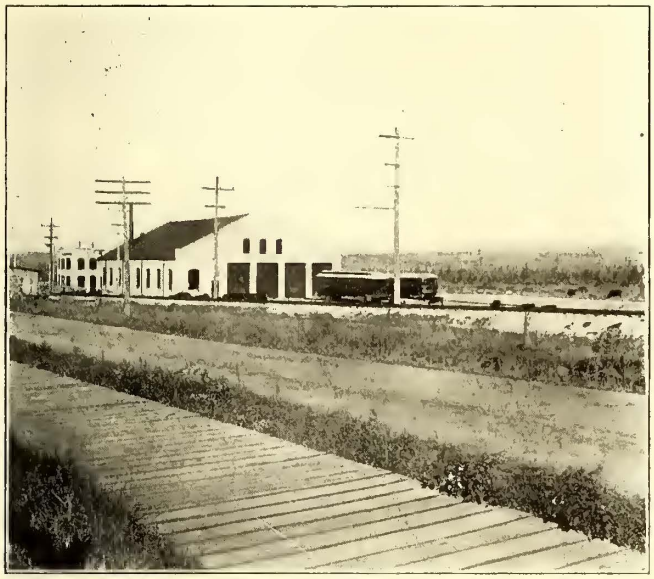
Mesaba Railway—Side View Passenger Motor Car—Interior View.

Owing to the fact that the Mesaba Railway has just begun operation, the freight service has not been thoroughly developed. At present an l.c.l. express business is being handled at rates approximately 30 per cent above standard steam-road freight rates. As the territory served is almost frontier in character, the novelty of it all has not worn off, and the shippers as well as the consumers are just beginning to realize the value of the high quality of express service which the electric line can offer. This business is developing rapidly, however, and undoubtedly will become quite an item in the gross revenue of the company in the near future. As evidence of what may be expected when all classes of traffic have been fully developed, the present gross earnings average 49 cents per car mile.

COMBINATION CARHOUSE AND SHOPS

As mentioned earlier in this article, the carhouse and shops are located just west of Virginia, on a strip of property, 200 ft. in width, paralleling the main track between Virginia and Hibbing. The carhouse proper

was a brick, steel, wood and concrete structure, 86 ft x 122 ft. in plan, but since this article was prepared this carhouse and an adjoining two-story office building were destroyed by fire. As originally built, four tracks ran through the carhouse, and two of them passed over a repair pit, 56 ft. in length, situated at one end of the building opposite the repair shop space. The shop and storeroom occupied a 20-ft. aisle on one side of the carhouse, and the former was inclosed with brick partitions. The eight track entrances, four at each end of the carhouse, were provided with rolling steel doors so that the building could be entirely inclosed. Immediately after the fire the company constructed temporary quarters for the cars and, as soon as weather will permit, intends to replace the temporary structure with a permanent carhouse and shops.



Mesaba Railway—General View of Carhouse and Shops Before Destruction by Fire

The Mesaba Railway was built by the present owners, assisted by the Cleveland Construction Company, of Cleveland, Ohio. The former did all the grading, bridging and track laying, and the latter acted as electrical engineer in charge of all electrical design and construction.

MEETING OF AMERICAN ECONOMIC ASSOCIATION

An account was published last week of the opening sessions of the American Economic Association at Minneapolis.

Prof. Karl F. Theodor Rathgen, of the Colonial Institute of Hamburg, Germany, was the first speaker to discuss the paper by Mr. Brooks on "Syndicalism." He disagreed mildly with Dr. Brooks. Syndicalism, he said, was essentially a growth of the Romance nations, partly because in these nations there had been no great trades union organizations. It had very little hold on German workingmen. It was the socialism of the small workshop, not of the large enterprise. He thought that syndicalism would split up, one portion going into trades unions and another would gradually disintegrate because it underestimated the persistent force of society as organized at the present day.

Several other speakers took part in the discussion. One remarked that if syndicalism could only discipline itself it might bring about a tremendous change in the social structure. Another doubted if anything like true syndicalism had ever been experienced in this country. A third gave a brief account of the situation in New Zealand. Still another speaker expressed the hope that the American Federation of Labor would be able to reach the unorganized mass of laborers in this country, which it has not done hitherto. Mr. Eastman, of St. Paul, declared that the movement was serious and was entitled to respect and sympathy. A professor from Ohio State University who had been in England recently praised the effort making there to give college training to labor leaders with the understanding that they were to stay in their own class and help their fellows and not to grow out of it as a result of their education.

THE TRUST QUESTION

Professor Gray, of the University of Minnesota, presided at the closing session of the afternoon of Dec. 30. The principal paper was by Prof. Willard E. Hotchkiss, Chicago, Northwestern University, on "Recent Trust Decisions and Business." In regard to the enforcement of the Sherman law the speaker said it might be a question whether the Attorney-General, with due regard to his oath of office, could in the future safely omit to take cognizance of specific acts of *prima facie* violation when the court had already established the illegality of similar practices. In the main the enforcement of the Sherman law has had, and still has, a patriotic and beneficial purpose. However, the serious need of a definition for "fair competition" was clear. The speaker devoted considerable attention to the efficiency of trusts and concluded that the alleged superior efficiency of combinations had not yet been established.

DISCUSSION

Prof. E. Dana Durand, of the University of Minnesota, advocated an amendment to the Sherman law defining the limitations of fair competition. Railroads were recognized as monopolies, but to regulate monopoly of the manufacturing industry was a far different proposition. Another question to be asked was, If the trusts were dissolved could competition be restored? Professor Durand thought that it could be in the long run. The bringing of a suit for the dissolution of a trust or for violation of the Sherman law should not rest in the discretion of a single individual. There should be a permanent government industrial commission to advise the Attorney-General and the Supreme Court in the matter.

Prof. W. A. Rawles, Indiana University, favored an exhaustive investigation by an interstate industrial commission, the amendment of the patent laws and federal control over industrial capitalization and accounting.

Others who discussed the question were Dr. F. L. McVey, University of North Dakota; Prof. J. E. Le Rossignol, University of Nebraska; Prof. G. E. Putnam, University of Kansas; Prof. M. S. Hildman, Stanford University, and Dr. W. W. Folwell, University of Minnesota.

NEW OFFICERS

At the business sessions of the association Dr. John H. Gray, professor of economics in the University of Minnesota, was elected president of the association, and Prof. A. A. Young, of Cornell University, was elected secretary and treasurer. The next annual meeting will probably be held in Princeton, N. J.

The London County Council has been considering the opportunities for co-ordinating, as far as possible, the various electric systems in London and expanding them on economical lines. The committee that has this matter in hand was granted $14,550 for obtaining expert opinion, and though the experts' report is not expected for some time, it is rumored that the proposals are likely to be of a drastic character.

Rapid Transit Report in Philadelphia

Further Details Concerning Report of A. Merritt Taylor, Director of Department of City Transit, for New Subway and Elevated Lines—Tables Showing Estimated Increase in Gross Revenue, Future Investment, Overhead Percentages, Rate of Return and Time-Saving

The ELECTRIC RAILWAY JOURNAL of Aug. 9, 1913, and of Oct. 4, 1913, contained brief accounts of the two-volume report of A. Merritt Taylor, director of the department of city transit, on the subject of an enlarged subway and elevated system for Philadelphia. Volume I, mentioned in the first of the above-named issues, contained the general recommendations for new rapid transit routes, while Volume II, described in the other issue, was devoted to maps and plans, mostly in colors. The engineering portion of this report was prepared under the supervision of Ford, Bacon & Davis as consulting engineers.

Undoubtedly the most interesting features of the entire report are its completeness and the rapidity with which it was prepared. Director Taylor was appointed by Mayor Blankenburg on May 27, 1912, and with an allowance of one or two months for organization the submission of the report on July 24, 1913, meant that only about one year was required for its completion. During this time, too, Director Taylor devoted a portion of his energy to obtaining the necessary legislation at Harrisburg. Under the all-Philadelphia program for improved transit facilities three bills were necessary—the first a revenue-producing bill, making the personal property tax a county instead of a state tax and thereby raising the borrowing capacity of Philadelphia by $45,000,000; the second a bill authorizing a city expenditure of $40,000,000 to be realized from the sale of bonds and to be restricted to the building of subways, wharves, docks and other permanent improvements, and the third a bill providing that as soon as the people had approved the issuance of the bonds for subway building the city might proceed to make contracts without first waiting for the bonds to be sold. These bills were passed, other details were arranged, and on Nov. 4 the voters of Philadelphia registered their approval of a first bond issue of $1,800,000 to cover the cost of removing sewers on the Broad Street subway and to pay engineering and organization costs, etc.—all in much less time than it has taken for the details of rapid transit construction to be thought of, planned and consummated in other cities.

When the rapidity with which the entire plan has been worked out is considered, the completeness of the report rendered becomes all the more striking. Philadelphia is the first American city that has ever had a careful scientific analysis made of the business possibilities of a proposed rapid transit system. In some cases estimates have been made for various additions as they have been required, or partial estimates for future traffic on one particular line, but this is the first case where the probable traffic, gross receipts, net operating revenue and return on the investment for an entire system have all been calculated on a scientific basis for a definite period of years, with exact allowances made for the future cumulative investment in property and equipment necessitated by the future increase in population and traffic.

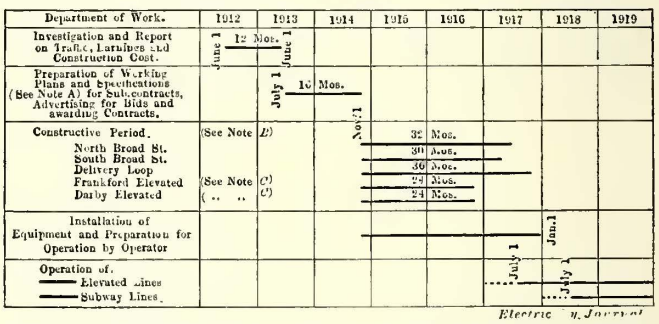
Aside from the exemplary completeness of the report as a whole, however, several concrete methods of traffic analysis used therein deserve a more amplified description than was accorded them in the two issues of this paper previously mentioned.

As stated in those issues, the report recommends for immediate construction a four-track subway in Broad Street from the City Hall northward to Pike Street and a two-track subway southward from the City Hall to League Island, with a central delivery subway loop at Fifteenth, Walnut, Eighth, Arch and Filbert Streets. It also proposed several elevated railway extensions. The total cost of these lines is estimated at $57,587,000, of which $34,682,000 is to be paid by the city and $22,896,000 by the lessee for the equipment of the difficult sections in the business district.

The diagram, reproduced herewith, shows the estimated time for engineering and completion.

ESTIMATED INCOME FOR 1921

From a mass of data systematically compiled the engineers estimated the future traffic from 1918 to 1930. An allowance was made for light traffic during the early years, but for the year ended June 30, 1921, the operating revenue was estimated at $5,705,200 and the operating expenses at $2,729,200, leaving net earnings for the year of $2,976,000. From this amount there were subtracted deductions from income to the extent of



Note A—No allowance has been made for delays due to obtaining state and local legislation and the testing of its legality by the courts or delays due to injunctions, determination of routes, station locations, sizes of subways, etc., financing, securing of operating contractor and submitting loan ordinance for public approval. This time assumes no delay will occur in obtaining engineering organization for preparation of these plans owing to requirements of the Civil Serice Commission.

Note B—No allowance has been made for delays caused by delinquencies of contractors, legal or other unforeseen obstructions.

Note C—Estimated time based on connection to present Philadelphia Rapid Transit line.

Philadelphia Report—Diagram Showing Estimate of Minimum Time Required for Engineering and Construction of Subway and Elevated System

$534,100, and a surplus applicable to the return on the investment was ascertained, amounting to $2,441,900, or 4.1 per cent. The rate of return on the investment for the individual new lines was as follows: North Broad Street subway line, 2.9 per cent; South Broad Street subway line, 5 per cent; Frankford elevated line, 8 per cent, and Darby elevated line, 4.4 per cent. The average subway return was 3.2 per cent and the average elevated 6.4 per cent.

In arriving at the above estimated surplus of $2,441,900, the unit costs of operation were determined from the present unit costs on the Market Street line and by comparison with those on subway and elevated systems in other cities. Deductions were then made for taxes to the extent of 0.5 per cent on the entire investment, for reserve funds for contingent operating expenses in the amount of 3 per cent of the total operating expenses and reserve funds for renewals to the extent of 0.3 per cent for subway lines and 0.5 per cent for elevated lines upon the cost of construction and equipment.

FUTURE DEVELOPMENT OF RAPID TRANSIT SYSTEM

With the recommended lines previously mentioned forming the main trunks, extensions or branches, according to the report, should be built later in the outskirts to act as feeders, and the main lines should be supplemented by others until a complete system is formed. The estimated increase of gross revenue on the surface and rapid transit system as recommended and projected for the period from 1920 to 1960 is shown by Table I.

TABLE I—ESTIMATED INCREASE OF GROSS REVENUE ON SURFACE AND RAPID TRANSIT SYSTEM WITH ADEQUATE FACILITIES SUCH AS THOSE RECOMMENDED AND PROJECTED

	Population within city limits	Gross revenue		Increase for ten years
		Amount	Per capita	
1920	1,825,000	$28,105,000	$15.40	$7,921,700
1930	2,108,000	35,836,000	17.00	7,731,000
1940	2,391,000	43,635,750	18.25	7,799,750
1950	2,669,000	50,997,900	19.10	7,342,150
1960	2,936,000	57,986,000	19.75	7,008,100
Total	.....	.....	....	$37,802,700

The estimates of population for Philadelphia contained in Table I are based on a study of the growth of population in New York, Chicago, Philadelphia and Boston during the last fifty years. Besides New York, Philadelphia is the only one of these cities that shows a steady growth or cumulation as the decade increases; but, unlike New York, its increase indicates a gradually declining tendency. On the basis of population and gross revenue statistics for 1890, 1900 and 1910, the gross revenue per capita was plotted in a curve, showing an increase of 3 per cent per year between 1900 and 1910. The viewpoint was taken, however, that so large a rate of growth is unlikely to continue, and the future revenue per capita at the present fare standards was projected at a decreasing rate of increase, being 1.3 per cent per year from 1913 to 1919. This factor of gross revenue per capita, applied to future estimated population, made possible the approximation of future gross revenue shown in Table I.

Of the increased revenue shown in Table I a portion is required to support additional investment in the surface car system for additional track, cars and equipment, at a ratio of $4 of investment for $1 of increase of revenue. This figure of $4 is obtained by allowing 10 per cent for interest, taxes and depreciation or sinking fund, to be carried by net earnings equaling 40 per cent of the gross revenue. After the revenue necessary to support the additional surface system investment is deducted the remainder is available to support rapid transit lines. In order to determine how much additional investment in rapid transit lines such increased revenue would permit, it is assumed that the operating expenses and taxes will be 50 per cent of the gross revenue, and that the interest and sinking fund, including depreciation at 2 per cent, will amount to 7 per cent on the investment. The application of this 7 per cent to the 50 per cent of gross earnings remaining as net earnings shows that for each dollar of additional revenue approximately $7 of investment would be supported.

From these figures Table II is derived, showing the investment in rapid transit facilities that can be supported.

TABLE II—POSSIBLE FUTURE INVESTMENT IN RAPID TRANSIT LINES

Year available	Total	Necessary to support increased investment in surface system	Remainder available to support increased investment in rapid transit system	Increased investment made possible at seven times increased gross revenue
1920	$7,921,700	$2,190,000	$5,731,700	$40,121,900
1930	7,731,000	1,868,750	5,862,250	40,035,750
1940	7,799,750	1,898,750	5,901,000	41,307,000
1950	7,342,150	1,798,750	5,543,400	38,803,800
1960	7,008,100	1,565,000	5,443,100	38,101,700
Total fifty years	$37,802,700	$9,321,250	$28,481,450	$199,370,150

ESTIMATED COST OF CONSTRUCTION AND EQUIPMENT

As it is manifestly important that the new rapid transit lines be operated in conjunction with the existing surface car lines, which are natural gatherers and distributers of rapid transit traffic, so as to afford the greatest facilities to the greatest number of people, only such estimates for cost of construction and equipment are made in the report as assume the operation of the system in conjunction with the lines of the Philadelphia Rapid Transit Company. The general design of the proposed lines, exclusive of single construction details fixed by route selection, is as follows:

1. Minimum radius of track curves, 165 ft., and maximum ascending grades, 5 per cent.
2. Twelve-foot headroom and 12-ft. track centers for subways.
3. No grade crossings in subways.
4. Steel-frame construction for side walls and roof of subway.
5. Subway floor finished with cement and track laid on short fixed ties without ballast.
6. Solid floor construction for elevated lines.
7. Open cut on South Broad Street line south of Bigler Street.
8. Provision for third-tracking portions of proposed elevated lines.
9. Type of car generally similar to present Market Street subway-elevated car with three wide doors spaced more efficiently.

The cost of construction on the above basis also includes the following percentages for overhead charges: on subway construction, 30 per cent; on elevated construction, 25 per cent, and on equipment on either subway or elevated construction, 20 per cent. These percentages are based on itemized construction costs as shown in Table III.

TABLE III—OVERHEAD PERCENTAGES

	Subways, per cent	Elevated, per cent	Equipment, per cent
Incidentals and contingencies	10	7½	5
Engineering and contingencies	10	7½	5
Organization, administration, legal and financial expenses	3	3	7½
Interest during construction (average)	7	7	2½
Total	30	25	20

The item to cover incidentals and contingencies was adopted after a consideration of the difficulties to be encountered and the uncertain elements included in each class of construction and equipment. The engineering and superintendence percentage, comparing with approximately 7.9 per cent of the amount of the contracts and extra charges on the New York rapid transit system and with approximately 10.5 per cent of the construction cost on the Boston subway, includes the cost of the transit commissioner's report and the cost of maintaining and operating the department of city transit during the period of design and construction. The allowance for the cost of organization, administration, legal and financial expenses compares with 2 per cent of the cost of structures on the New York rapid transit system. The interest during construction was 6.4 per cent in New York and 8 per cent in Boston.

There is also included in the cost of construction the total cost of real estate pertaining to right-of-way and right-of-way easements, estimated at $2,761,000. Credits, however, may be made to the subway investment of $1,920,000 for reserve space for water mains and of $236,000 for excavated material to be used by the city for street filling.

Additional equipment will be needed from year to year with attendant expenditures for substation capacity, electrical distribution system, yards and shops. A subway on Chestnut Street with elevated connection will probably be required by July 1, 1927, costing

$7,226,000 with equipment. Taking into account these additions to investment, the report gives the estimated total cumulative cost of construction and equipment of the recommended system from the beginning of operation of all lines, including interest during construction, as ranging from $57,578,000 in 1919 to $73,393,000 in 1930.

RATE OF RETURN ON INVESTMENT

Rates of return of 3.2 per cent for the average subway and 6.4 per cent for the average elevated line have been mentioned heretofore in connection with the return on the investment that has been recommended for the immediate future. If, however, the additional debits and credits to investment as indicated in the preceding paragraphs be taken into account, the rates of return are somewhat increased for the later years, varying from 4.1 per cent in 1921 to 6 per cent in 1930 and averaging 5.21 per cent.

ECONOMIC VALUE OF PROPOSED SYSTEM

The effect of the development of high-speed transportation upon the taxable value and utility of real estate is shown by the Market Street subway-elevated line, both in West Philadelphia and in the business district along Market Street. From 1900, before the Market Street line was projected, to 1912 the assessed valuation of real estate west of Market Street increased 90.9 per cent as compared with a 127.6 per cent increase east of Market Street, 25.7 per cent on Chestnut Street, 38.7 per cent on Arch Street and 22.3 per cent in the other sections of the city outside the business district.

SURVEY OF PRESENT TRAFFIC

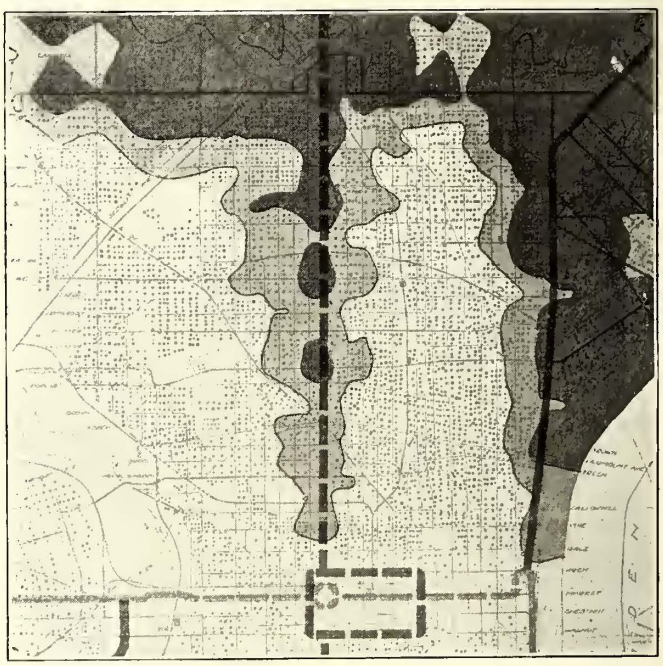
In considering the construction of a rapid transit system it was of vital importance that the volume, origin and destination and channel of flow of each portion of the present traffic movement during each hour of the day be determined accurately and without substantial approximations or assumptions. This was done by means of a traffic survey on the lines of the Philadelphia Rapid Transit Company extending from Oct. 14, 1912, to Nov. 18, 1912, and later on the suburban lines of other companies terminating in the vicinity of Philadelphia. The traffic survey was more complete in scope and detail than any ever before attempted, and its success was made possible largely because the information was obtained for the use of the city and because the co-operation of the public was secured through wide publicity which was given through the courtesy of the newspapers.

In making the survey, Mr. Taylor's own idea was followed out in that each passenger was labeled and records were made of both the beginning and the ending of the ride. Two observers were placed on approximately every fifth car of each line practically during the entire day. The record obtained from each passenger embodied the following information: (a) time of day; (b) route of car; (c) direction; (d) street of entrance; (e) street corner of destination; (f) route on which destination is situated if reached by transfer or exchange tickets; (g) fare presented—whether cash, exchange ticket, transfer or free; (h) transfer or exchange ticket issued, if any.

During the period of the survey a group of lines was under observation each day, excluding Saturdays, Sundays, holidays and other days when abnormal conditions prevailed, the purpose being to obtain information on normal business days. To check the results, the survey was repeated on several lines, and the two records in each case were found to agree closely. The magnitude of this undertaking is apparent when it is considered that about 284,500 passengers were counted, representing a similar number of slips or tickets with the above information recorded thereon, which had to be carefully compiled.

TIME ZONES AND TIME SAVING

The most important factor bearing upon the proposed rapid transit system and causing in large part the growth of population, increase in land values and taxable assessments in the district served is the time saved by the high-speed system over the existing surface systems. In connection with this point the Philadelphia report contains some interesting data and novel maps. In order to determine accurately the extent and influence of this time-saving element, Map No. 24 in Volume II of the report was prepared, showing as of July 1, 1912, the time zones of transit for the present traffic by the shortest possible existing routes outward from the business section on Market Street between Eighth Street and City Hall or on Broad Street between Arch and Walnut Streets. The following constants were



Philadelphia Report—Portion of Map Showing Estimated Time Saving by Rapid Transit Lines as Compared with Present System

used: the average subway-elevated speed, 16 m.p.h.; the average surface car speed, 8 m.p.h., and the average pedestrian speed, 3 m.p.h. A differential of three minutes was allowed for walking up and down the stairs at subway-elevated stations. Using these same constants the investigators prepared Map No. 25, showing the time zones after the construction of all the rapid transit lines recommended for the immediate future.

TIME-SAVING CONTOUR MAPS

The most striking and novel map, however, is No. 26, reproduced in part herewith, which is used for the first time and which shows graphically by contour lines at five-minute intervals the time-saving that will be effected by the proposed lines on an equal fare basis as compared with the electric railway system as of July 1, 1912. These time-saving contours were obtained by superimposing Map No. 25 over Map No. 24 and by connecting the intersections made by the time contours or zone boundaries on Map No. 25 with those on Map No. 24 which differ by the same interval. The points of zero time saving or equal time of transit by the present system and by the proposed system were obtained in the same manner.

POPULATION BENEFITED

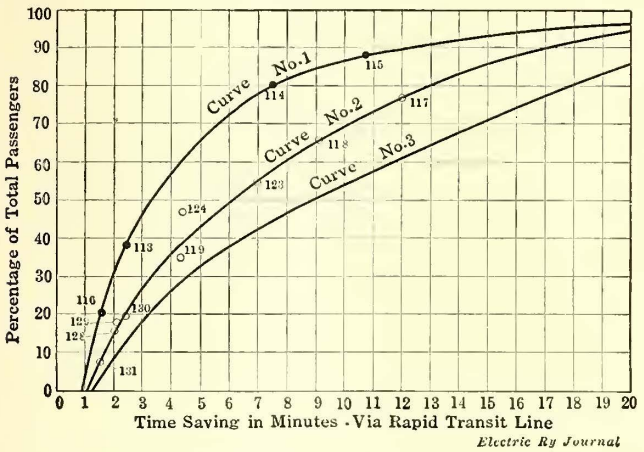
Inasmuch as the distribution of population throughout the city was shown on the time-saving map, it was possible to estimate the number of people that will be

convenienced by the proposed facilities. Tributary to the proposed North Broad Street line, approximately 338,000 people, as of 1912, would save time in traveling to and from the central business district; tributary to the South Broad Street line, 122,000 people would save time; tributary to the Frankford line, 298,000 people would save time. The present subway-elevated line in West Philadelphia saves time for approximately 165,000 people, making a grand total, when the four proposed lines are built, of 983,000 persons benefited, or 60 per cent of a total population within the city limits estimated at 1,623,200 in 1912. A large part of the remaining 40 per cent is within the central part of the city and is served more expeditiously by surface lines to the business district. These people will, of course, be benefited in traveling to outlying districts or to other parts of the city.

CASH VALUE OF TIME SAVING

The time saving thus estimated has a distinct economic value. If estimated at an average of 15 cents per hour, the cash value of the time saved by each line

Curve No. 1—For Traffic Between Delivery District and Sections on Rapid Transit Line
Curve No. 2—For Traffic Between Sections Requiring Extra Transfer by Rapid Transit Line
Curve No. 3—For Traffic Between Sections Requiring Two Extra Transfers by Rapid Transit Line



Points show actual division of traffic in West Philadelphia, numbers indicating traffic sections. represents traffic sections through which Market Street Elevated line runs. O represents traffic sections reached by surface transfer lines from Market Street Elevated line.

Philadelphia Report—Curves Showing Relation of Passengers Using Rapid Transit Lines to Time Saving

of the proposed system would be as shown by Table IV for the traffic as of the fiscal year 1913 and as estimated for 1921.

TABLE IV—AMOUNT AND MONEY VALUE OF TIME SAVING BY PROPOSED RAPID TRANSIT LINES COMPARED WITH PRESENT SYSTEM

	Time saving (minutes)		Equivalent money value (at 15 cents per hour)	
Years to June 30	1913	1921	1913	1921
North Broad line	275,377,000	420,600,000	$689,000	$1,052,000
South Broad line	67,381,000	104,000,000	168,000	260,000
Frankford line..	108,467,000	151,000,000	271,000	377,000
Darby line	48,941,000	100,000,000	122,000	250,000
Total	500,166,000	775,700,000	$1,250,000	$1,939,000
Value capitalized at 5 per cent..		.....	25,000,000	38,780,000

RAPID TRANSIT TRAFFIC IN PROPORTION TO TIME SAVING

From the traffic survey made in West Philadelphia and a study of the time-saving maps previously mentioned, fixed relations were developed between the time saving in minutes and the proportion of passengers using the high-speed lines in preference to the surface lines. This relation between the division of traffic and time saving is shown in a distinctly novel manner by the curves in the accompanying diagram. The upper curve shows the proportion of passengers from traffic sections along the high-speed line to the delivery district. The middle curve shows the proportion for traffic sections reached by surface transfer lines. The lower curve is estimated for cases where two transfers are involved.

These three time-saving curves were all determined for time saving to the central delivery district. They were used, however, in estimating the probable volume of certain other movements between traffic sections in the areas served by different rapid transit routes, proper allowances being made for inferior delivery and for extra transfers. While the division of local traffic varies, the averages for all such movements are found to follow the middle and lower curves, which indicates that the few stops or points of delivery on the rapid transit line place it at a disadvantage equivalent to that of one transfer. For short distances, however, where the time saving is small, the actual proportions of rapid transit traffic are higher than are indicated by the curves.

SUBWAY VERSUS ELEVATED LINES

In discussing the relative cost of subway and elevated lines, the report states that a subway system with two tracks without equipment will average $1,000,000 per mile of track as compared with about $400,000 per mile of track for an elevated structure with solid floor, or about two and one-half times as much. Travel in subways is less comfortable than on elevated lines, it is stated, and with modern design the objections to the latter are largely eliminated; hence free use of elevated lines has been made in the recommendations embodied in the report.

DESIRABILITY OF OLD-LINE EXPRESS COMPANIES ON ELECTRIC RAILWAYS

Practically all the interurban roads, either those of large mileage in themselves or with interchange relations with other electric lines, have contracts with old-line express companies. Generally the basis of contract is on a guarantee per month or year, with the railway company sharing in a percentage of the gross over and above a fixed amount, and this provides a fixed source of revenue without the assumption of any liability and without requiring additions to the regular traffic organization.

Generally the guarantee is more than the electric railway might expect in the way of net revenue from operating its own express company. The old-line express is handled in the regular express or local passenger cars under the supervision of a messenger furnished by the express company. The way station agent receives a commission for the business he handles for them, and this enables the traction company to employ more competent men without increasing salaries. The fact that very little is required on the part of the railway company, except space in the regular cars and a special service from time to time, which is furnished at an extra charge, makes the guaranteed return practically all net.

On roads where the old-line express company is operating and the electric railway company carries on a dispatch freight business, one does not interfere with the other, and they are not considered competitive. In fact, most of the contracts made between electric railways and old-line companies provide for the operation by the railway of a local interurban express which, if properly handled, represents practically all the business which the railway could obtain if it were operating its own service exclusive of that of the old-line express company.

ELECTRIC RAILWAY REPORTS OF BUREAU OF CENSUS

Preliminary figures of the forthcoming quinquennial report on the electric railways of Maine, Vermont, New Hampshire and West Virginia have been given out by Director W. J. Harris of the Bureau of the Census, Department of Commerce. The statistics relate to the years ended Dec. 31, 1912, and June 30, 1902. The totals include electric light plants operated in connection with electric railways and not separable therefrom, but do not include reports of mixed steam and electric railways or railways under construction during the census year which had not begun operations.

The detailed figures as presented in the accompanying table for Maine show that during the decade 1902-1912 there were substantial gains in the industry. shows an increase of horse-power of 565.1 per cent, chiefly in hydroelectric power. The number of operating companies was the same in 1912 as in 1902.

The figures for New Hampshire show that during the decade 1902-1912 there were substantial advances. The gross income shows a gain of 107 per cent, while the net income increased only 22 per cent. Revenue passengers increased in number 109.4 per cent and the number of persons employed 119.1 per cent. The miles of line increased during the decade 40.2 per cent and the number of companies 15.4 per cent.

The West Virginia figures show that during the ten years ended in 1912 substantial gains were made in the electric railway field in that State. The increase of the twenty operating companies reported in 1912 over 1902 was twelve, or 150 per cent, and their aggregate

Comparative Financial and Operating Statistics for Electric Railways of Several States

	Maine		Vermont		New Hampshire		West Virginia	
	1912	1902	1912	1902	1912	1902	1912	1902
Number of companies	17	20	10	9	15	13	22	8
Operating companies	16	19	9	9	13	7	20	8
Lessor companies	1	1	1	.....	2	6	2	.....
Miles of line	186.16	304.71	96.65	76.20	217.42	155.03	357.10	133.06
Miles of single track	536.38	331.55	102.85	80.55	246.26	167.65	390.72	140.00
Miles of single track in state (a)	530.49	328.50	120.83	86.05	268.15	174.45	318.21	140.56
Cars, number	794	598	155	105	368	287	521	287
Passenger	519	476	119	80	304	244	457	272
All other	275	122	36	25	64	43	64	15
Electric locomotives	8	.....	2	.....	2	.....	.....	.....
Persons employed	1,771	1,034	268	190	837	382	1,861	667
Salaried employees	175	65	43	25	68	25	144	46
Wage earners (average number)	(b)1,596	969	(b)225	165	(b)769	357	1,717	621
Power plant equipment:								
Horse-power, total	40,090	13,065	7,655	1,151	4,102	4,015	.....	.....
Steam and gas engines, including turbines—								
Number	31	25	14	5	8	13	44	34
Horse-power	14,526	9,740	3,000	1,011	1,920	4,015	25,740	12,050
Waterwheels—								
Number	24	23	12	2	2	.....	.....	.....
Horse-power	25,564	3,325	4,655	140	2,182	.....	.....	.....
Kilowatt capacity of dynamos	31,234	9,371	6,744	1,621	2,735	2,513	19,995	7,490
Output of stations, kilowatt hours	54,148,656	25,578,242	6,867,675	1,804,195	5,356,050	5,172,718	59,854,180	11,744,895
Current purchased, kilowatt hours	20,818,159	(c)	2,121,669	(c)	12,198,773	(c)	6,296,842	(c)
Passengers carried	53,184,598	27,506,582	8,761,648	4,561,523	26,651,471	12,234,120	54,802,105	22,183,794
Revenue	47,049,038	25,495,164	8,135,725	4,274,806	23,673,362	11,304,908	51,457,150	21,706,870
Transfer	5,008,992	2,011,418	517,841	286,717	2,708,290	929,212	2,331,733	476,924
Free	1,126,568	(e)	108,082	(c)	269,819	(c)	1,013,222	(c)
Car mileage (passenger, express, freight, etc.)	11,124,224	6,815,671	1,776,244	1,412,528	4,726,181	3,214,879	11,380,865	6,734,171
Condensed income account, operating companies:								
Gross income	(d)$3,593,617	(d)$1,571,562	(e)$631,241	$249,228	(f)$1,250,391	(f)$604,131	$3,585,626	(g)$1,102,171
Operating expenses	2,002,617	1,127,660	345,268	201,179	987,934	478,849	1,825,694	652,862
Gross income less operating expenses	1,591,000	443,902	285,973	48,049	262,457	125,282	1,759,932	449,309
Deductions from income (taxes and fixed charges)	1,193,095	337,050	169,912	45,089	211,831	83,786	956,177	265,842
Net income	397,905	106,852	116,061	2,960	50,626	41,496	803,755	183,467

(a) Excluding track lying outside of state of companies within state and including track in state owned by outside companies.
(b) Number employed Sept. 16, 1912.
(c) Figures not available.
(d) Income from sale of electric current for light or power included in 1912, $789,166, and 1902, $102,318.
(e) Includes income from sale of current for light and power in 1912.
(f) Income from sale of current for light and power included: 1912, $386,598, and 1902, $126,117.
(g) Income from sale of current for light and power included in 1902, $10,625.

The gross incomes of the sixteen operating companies reported in 1912 show an aggregate gain of $2,022,055, or 128.7 per cent, over 1902. A noticeable feature of operations of the decade 1902 to 1912 is the net income increase of 272.4 per cent, due, possibly, to consolidations, there being a decrease in the number of companies of 15 per cent. Other notable gains were in miles of line, 59.5 per cent, revenue passengers carried, 84.5 per cent, and transfer passengers, 149 per cent.

The figures as presented for Vermont show substantial gains during the decade 1902-1912. The gross income less operating expenses shows an increase of 495.2 per cent, while the number of revenue passengers carried shows an increase of 90.3 per cent and the number of miles of line an increase of only 26.8 per cent during the decade 1902-1912. The power equipment income shows an increase of $2,483,455 (225.3 per cent), and their net income an increase of $620,288 (338.1 per cent). The miles of track increased 250.72 (179.1 per cent), and the number of revenue passengers carried was 29,750,280 more in 1912 than in 1902, an increase of 137.1 per cent.

On the Paris subways a comparison of the figures of 1912 with those for 1911 shows that there is an increase of 5,339,106 fares for the former year. This is due to the larger number of return and collective tickets sold. First-class tickets decreased by more than 500,000. The receipts of the subway for 1912 were as follows: From return tickets, $3,083,265; first-class, $1,581,315; second-class, $5,733,845; collective tickets, $685; supplementary charges, $58,170; total, $10,457,280.

REPORT OF COMMITTEE ON RAIL, AMERICAN RAILWAY ENGINEERING ASSOCIATION

The October, 1913, *Bulletin* of the American Railway Engineering Association contained a report of the committee on rail, subdivided into two discussions. In one H. B. McFarland, engineer of tests Atchison, Topeka & Santa Fé System, and a member of this committee, discussed the "Influence of Seams or Laminations in Base of Rail on Ductility of the Metal."

Six rails for special investigation were selected from a lot of failed rails that had been sent to the laboratory for test. This lot included rails from different manufacturers, of different section and of different weight. Three weights of rails were investigated—75-lb., 85-lb. and 90-lb. rails. Three different rail sections were investigated—A. S. C. E., A. R. A. and Santa Fé. The rails investigated came from four different manufacturers—Illinois Steel Company, Maryland Steel Company, Colorado Fuel & Iron Company and Lackawanna Steel Company.

In selecting the rails for investigation, no particular regard was given to the manufacturer, as the principal idea was to secure specimens with dissimilar failures in order to determine whether or not seams and laminations such as are found in the base of rails failing with characteristic half-moon base failures and with square and angular breaks could be traced through all rails. All of the rails, with the exception of the 90-lb. rail from the Gary plant of the Illinois Steel Company, were of Bessemer steel. One of the rails, that from the Lackawanna Steel Company, was a titanium rail. The rest of the rails represented a very large percentage of rails now in track service.

A careful study of detailed and average results obtained from this investigation concerning laminations in base of rails leads to certain general conclusions:

1. Rails failing in track may generally be found to contain, upon investigation, numerous black seams in the base.
2. Base seams are not continuous throughout a rail and vary in depth at different intervals.
3. Seams materially decrease tensile properties of the metal in the rail base.
4. Seams decrease strength of rail bases for decreased temperatures.
5. Transverse strength of rail base is decreased about 10 per cent, owing to seams in the base.
6. The seams in the rail base may be periodical, owing to methods of manufacture causing variation in tensile properties at different portions of the rail.

To reduce rail breakage efforts have been made to increase the rail section, when probably the decreased strength of the rail is due more to physical defects contained therein than to the weight of the sections. More attention should be given to the elimination of base seams and the direct production of a rail with a uniform homogeneous structure.

The second discussion on rails was a report on "Seams in Rails as Developed from Cracks in the Ingot," by M. H. Wickhorst, enginer of tests, rail committee. An investigation was made concerning the development of seams in billets and rails from cracks in the surface of the ingot. A cold ingot with a badly cracked surface was taken and its four sides "skinned" off in a planer to show well the condition of the surfaces. The four sides were photographed and photographs were also made at succeeding stages, showing the surfaces of blooms and rails.

The work was done at South Bethlehem, Pa., at the works of the Bethlehem Steel Company, which furnished the facilities and material.

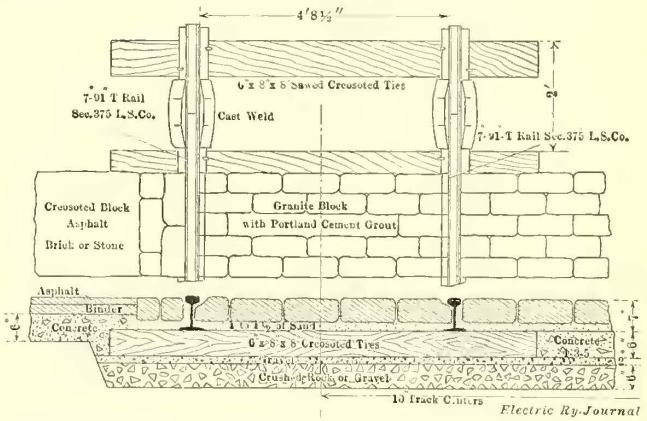
The cracks in the ingot were, in a general way, transverse or obliquely transverse of the ingot. When first bloomed, the cracks on the right and left sides of the ingot as it first entered the blooming rolls opened up or "yawned" open, forming double V's, one inside the other. Further blooming elongated and closed in the cracks, forming them into elongated Y-shaped flaws or clusters of them. Still further rolling finally resulted in long narrow Y-shaped seams in the rail, or clusters of them, generally several feet long, as shown up by pickling in sulphuric acid. The cracks on the top and bottom sides of the ingot as it first entered the rolls did not open up and finally disappeared so far as could be determined by the appearance of the surfaces of the blooms and rails after pickling in sulphuric acid.

The difference in behavior of the cracks on the top and bottom sides in rolling from the behavior of those on the right and left sides suggests the interesting conclusion that the metal ahead of the rolls is compressed, while that between the rolls is pulled. The work indicated that seams resulting from cracks in the ingot will be on the web of the rail if what were the right and left sides of the ingot as it first entered the rolls form the sides of the rail, and that they will be on the top of the head and bottom of the base if these sides of the ingot form the tread and base of the rail.

To sum up, the cracks on the right and left sides of the ingot as it first entered the blooming rolls resulted in seams in the rails, while the cracks on the top and bottom sides of the ingot did not result in seams. Seams may therefore possibly be oriented to appear on the sides of the rail or on the tread and the bottom of the base.

TWIN CITY MAINTENANCE-OF-WAY NOTES

The city of Minneapolis did a great deal of paving during the past summer, mostly with creosoted wood blocks. As a consequence the Twin City Rapid Transit Company has taken the opportunity to relay more track and special work than it would otherwise do. A total of 52 per cent of the total street length in the city is

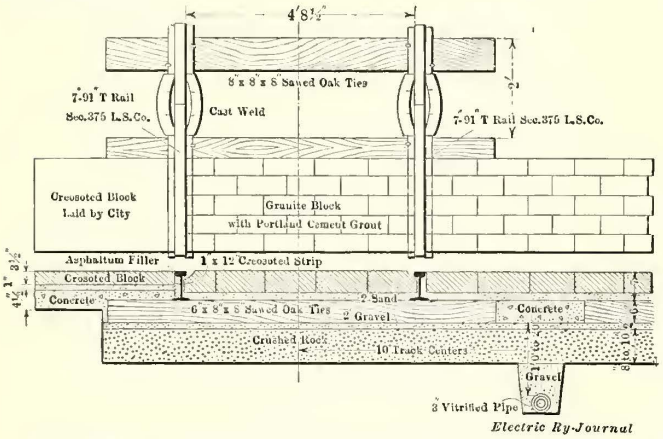


Cross-Section Track Construction Without Special Drainage

now paved. The railway company has 170 miles of single track within the city limits. Among the items of new equipment bought for this work were a Brown hoist crane car and a second truck-mounted concrete mixer. The mixer is motor-driven, but the car is not.

Two forms of track construction were installed last year, one for streets with good natural drainage, the other for track laid on the heavy blue clay soil which is found in some parts of the city. As this clay contains a great deal of water, the track must be artificially drained. Drainage is accomplished by means of a drain tree which slopes from the manhole summits to

connections to the city sewers midway between manholes. Cross-sections and plans of these two standard constructions are shown in the accompanying illustrations. The cast-welded joints illustrated are used in the paved streets and Continuous joints elsewhere. The molds for making the cast joints are cast in the company's shops.



Cross-Section of Track Construction Equipped with Drainage Tiling

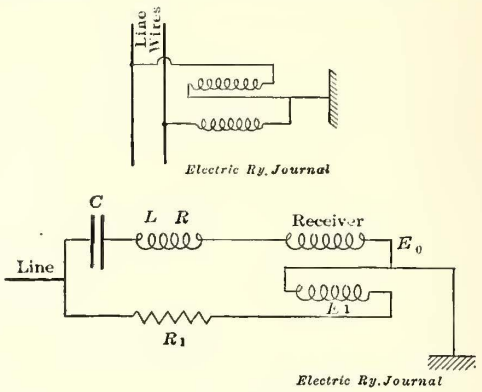
As shown in one of the accompanying drawings, a novel feature of the track construction is the use of cast-iron drip boxes with grating covers which are placed about a block apart. The boxes are mounted on concrete bases and are connected by drain pipe with the city sewers. It is possible to do this as the sewer system in Minneapolis, as well as in St. Paul, is a combined one which takes care of storm water as well as regular sewage.

While the company buys special work from the leading manufacturers, its shop facilities have made possible much home manufacture of built-up crossings, switches, frogs and even of entire track layouts. The 6-in. construction is largely of built-up type, while steel castings are used for the 7-in. pieces. A regular laying-out floor is provided, and on this templates for use in the shop are prepared. Full-size drawings are made for switches and mates. All special work, whether purchased or manufactured, is set up and fitted in a yard provided for the purpose. The same men set the work up in the yard and the street. Thus, mistakes at the location are avoided.

The Santa Fé Electric Tramway Company, Argentine Republic, is said to be interested in extending its lines 12 miles to the city of Esperanza. A concession will be applied for.

AVOIDING TELEPHONE AND TELEGRAPH DISTURBANCES FROM SINGLE-PHASE LINES

G. Girousse, engineer of State telegraphs, France, discusses in the Dec. 6, 1913, issue of *La Lumière Electrique* several methods which are available for reducing or preventing single-phase distribution systems from disturbing telephone and ground-return telegraph circuits. Four remedies are mentioned, namely: using compensating devices, shifting the circuits to pole lines at least 1 mile distant from the high-tension route, placing them underground, and doubling them by adding return wires. All remedies but the first are rejected by M. Girousse as too costly. He states that for telegraph lines very satisfactory results have been obtained with the following inexpensive schemes as first tried in the latter part of 1911 on the 6000-volt, twenty-five cycle Maritime Alps, 10,000-volt, twenty-five-cycle Haute-Vienne and 12,000-volt, twenty-five-cycle Oriental Pyrénées single-phase systems. Since then complete installations have been made for the first two lines named, and equipments for the Oriental, Haute and Basse Pyrénées lines will soon be in place.

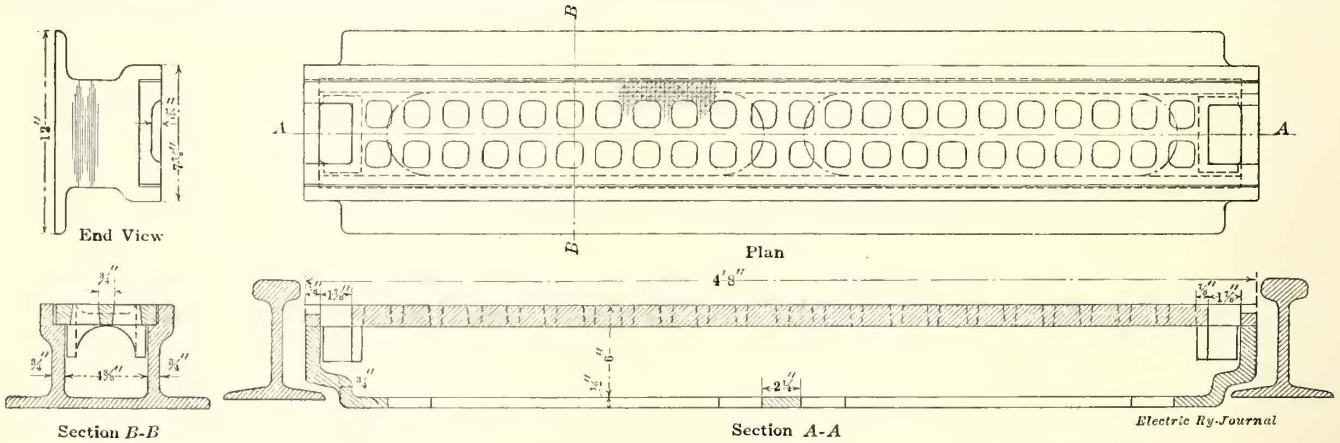


Methods of Protection from Telephone and Telegraph Disturbances

PROTECTION OF TELEGRAPH CIRCUITS

As shown in the accompanying wiring diagram, use is made of a receiver which has two coils with the same number of turns and connected differentially. One of the coils is in series with a condenser C and a self-inductance L; the other is in series with a resistance R_1. As the telegraphic current is continuous, it does not traverse the former coil, and, consequently, the receiver acts in the normal fashion.

If the two circuits present the same resistance and the same reactance, the disturbing alternating cur-



Plans of Cast-Iron Track Dips

rent will divide in two parts alike in amount and phase, and consequently the receiver will not be disturbed. It is clear that these conditions are satisfied theoretically when there is resonance between the capacity C and the self-inductance L for the frequency of the disturbing current, and that R, the resistance of the self-inductance coil, is equal to the resistance R_1. When the conditions are carefully determined in advance, an arrangement of this kind will give good results without necessity for regulation from time to time.

PROTECTION OF TELEPHONE CIRCUITS

Telephone circuits require two important precautions, good insulation and minimum inductance. The insulators should be of the industrial type with large petticoats instead of the present French type with two bells. The petticoat insulators are much easier to maintain, particularly in cleaning, and they cost little more. The insulating points on telephone circuits which leave most to be desired are the underground sections, which until lately have been freely installed at crossings with heavy-current transmission lines. These underground sections, especially at the junctions with aerial lines, constitute the weakest points of a telephone circuit and should be avoided wherever possible. To minimize induction, the number of transpositions must be increased. It would probably suffice to make such transpositions every 125 meters (410 ft.).

M. Girousse states that it is also necessary to take certain precautions at the telegraph offices, for it is useless to insulate the line carefully if the office equipment suffers ground losses. To remove the interurban circuits from the bad influences due to losses either on the lines or the inside equipments, it is best to isolate the circuits by means of transformers. Excellent transformers which insulate against high-tension current are now available.

On some of the existing installations the derangement of lines within the influence of induction from single-phase track circuits has been caused frequently by carbon lightning arresters. The extreme sensitiveness of this arrester is usually a valuable quality, but when its nearness to single-phase circuits causes excessive operation the particles of carbon become detached.

This disintegration causes leakage to ground which cannot be neglected. Therefore it is desirable to replace such apparatus either by horn or vacuum-type lightning arresters. This change will eliminate the destruction of the arresters, but it is still necessary to have a device to avoid shocks. If transformers were used, they would protect the office force, but they would not protect the workmen on the line. In order to eliminate all dangerous high tensions, grounding discharge coils should be installed. These coils should be of the Cailho type which are used for telegraphing on telephonic circuits. This coil, however, as ordinarily made, is not intended to take care of the high-voltage currents induced by single-phase circuits. A modification for the latter purpose known as the Perego coil is the one which has given good results on the telephone circuits of the Oriental Pyrénées lines.

CONCLUSIONS

In conclusion, M. Girousse states that the single-phase lines as usually installed up to the present time offer grave difficulties to telephone and telegraph circuits. It is desirable that these troubles be made negligible. While it is difficult to make these changes on existing lines, the methods described do permit the satisfactory operation of telephone and telegraph circuits at a very small additional expense.

THE NEW TARIFF IN THE ELECTRIC RAILWAY INDUSTRY

The Wilson-Simmons-Underwood tariff bill, which went into effect at midnight Oct. 4, 1913, has been the subject of inquiries from several correspondents of the ELECTRIC RAILWAY JOURNAL, and in answer there is submitted herewith a comparison of the new rates and those of the old Payne-Aldrich tariff law of 1909. The list, of course, includes only such items as are of direct interest in the electric railway field, no attempt being made to cover materials of general use, although the rates on these underwent the largest reductions.

As a whole, a very decided decrease in import duties has taken place, particularly on foodstuffs and fabrics, and the free list has been very largely extended, including in the new law most raw materials as well as books for special purposes, scientific apparatus, most forms of iron and steel, and works of art. The changes in rates on materials generally used by electric railways are shown in the following table:

	Old Rate	New Rate
Axles (not on wheels)	¾c. per lb.	10 per cent
Aluminum, plates, bars or rods	11c. per lb.	3½c. per lb.
Asbestos yarn	25 per cent	20 per cent
Woven in fabrics	40 per cent	20 per cent
Bauxite, crude	$1 per ton	Free
Bearings, ball, or roller	45 per cent	35 per cent
Bolts	1⅛c. per lb.	10 per cent
Ceramics:		
China and porcelain (vitrified)	55 per cent	50 per cent
Other earthy or mineral substances	35 per cent	25 per cent
Calcium carbide	25 per cent	Free
Carbon:		
Brushes	30 per cent	25 per cent
Electrodes	30 per cent	25 per cent
Pots for electric batteries	20 per cent	15 per cent
Chair cane made from rattan or reeds	10 per cent	10 per cent
Chains	45 per cent‡	20 per cent
Cork, bark	8c. per lb.	4c. per lb.
Copper:		
Plates, rods, strips and pipes	2½c. per lb.	5 per cent
Sheathing or yellow metal	2c. per lb.	5 per cent
Chemical compounds	25 per cent	15 per cent
Glass:		
Common window glass	1¾c. per lb.*	1c. per lb.*
Incandescent bulbs	45 per cent	30 per cent
Glue and glue size	2½c. per lb.	1c. per lb.
Iron and steel:		
Plain steel bars and castings	30 per cent§	15 per cent
Boiler or other plates	0.5c. per lb.†	12 per cent
Structural steel	0.4c. per lb.†	10 per cent
Tubes, pipe or flues	30 per cent§	20 per cent
Sheets, galvanized or coated	0.7c. per lb.	15 per cent
Indurated fiber ware	35 per cent	25 per cent
Iron castings	0.8c. per lb.	10 per cent
Leather, rough or for belting	5 per cent	Free
Lead pigments	2½c. per lb.	25 per cent
Manufactures of india rubber or gutta percha	35 per cent	10 per cent
Manufactures of hard rubber	35 per cent	10 per cent
Manufactures of amber asbestos or wax	25 per cent	10 per cent
Machine tools and steam engines	30 per cent	15 per cent
Mica:		
Manufactures of	10c. per lb. plus 20 per cent	30 per cent
Ground	20 per cent	15 per cent
Magnesia, calcined	7c. per lb.	3½c. per lb.
Nails (wire) and staples	0.4c. per lb.*	Free
Oils, mineral and fish	Free	Free
Paints, enamels, colors, stains, frostings, fluxes, etc.	30 per cent	15 per cent
Quicksilver	7c. per lb.	10 per cent
Rails, T, flat and girder	0.175c. per lb.	Free
Railway fishplates or splice bars	0.3c. per lb.	10 per cent
Rope:		
Cables and cordage of manila, etc.	¾c. per lb.	½c. per lb.
Cables and cordage of hemp only	2c. per lb.	1c. per lb.
Wire cables	40 per cent	30 per cent
Screws, wood	5c. per lb.	25 per cent
Steel alloys:		
Titanium, tantalum or tungsten under $200 per ton	25 per cent	15 per cent
Same, but valued at over $200 per ton	20 per cent	15 per cent
Tin, block	Free	Free
Tools, blacksmith and track	1¾c. per lb.	10 per cent
Varnishes	25 per cent	10 per cent
Wheels for cars, either steel or iron	1¼c. per lb.	20 per cent
Wood:		
Railroad ties	10 per cent	10 per cent
Telephone, trolley, lighting poles	10 per cent	10 per cent
Wires:		
Telegraph, telephone and other wires of metal and rubber	40 per cent‡	15 per cent
Galvanized or coated with metal—add	0.2c. per lb.	No addition
Not otherwise provided for	35 per cent‡	15 per cent
Zinc, block	1⅜c. per lb.	15 per cent

*Varies somewhat according to size. †Varies slightly with value.
‡Minimum. §Approximate.

In some instances the actual rates are variable and in such cases on account of space limitations approximations have been made as shown.

New Steel Cars for Chicago Elevated Railways

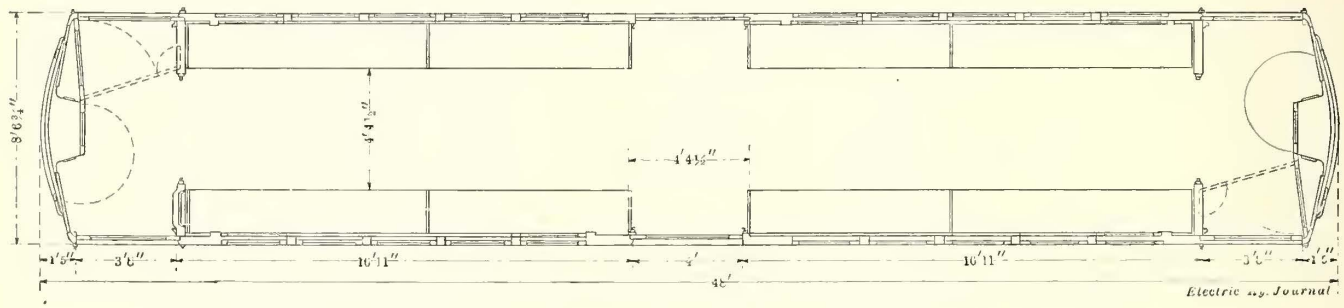
A General Description of One of the 128 All-Steel Cars Recently Ordered for Chicago—The Features Include Fireproof Interior Finish, Special Bolsters and Center Bearings

The Chicago Elevated Railways on Jan. 1, 1914, placed an order for 128 all-steel, arched-roof cars. This is one of the largest contracts for this type of equipment to be closed within the past few years, if not the largest ever placed at one time by an electric railway company. Of the total number ordered, sixty-two will be motor cars and sixty-six trail cars. Before adopting this design samples of the materials and equipment purchased for the new cars were carefully tested by placing them on cars in regular service. The all-steel construction was selected because a fireproof car was desired which, at the same time, would not weigh more than the heaviest cars now used by this company. This design was also considered more economical from a maintenance standpoint, as it was believed that this type of car would give a much longer life than those of composite construction.

For the past four years the growth of the elevated railways has been limited by the capacity of the Union Loop. This had a capacity for 700 cars an hour, and about this number were being looped by the four divisions of the elevated railway system, then owned by as many different companies. About three years ago these were put under a single operating management, following which negotiations for their merger with the surface lines were undertaken by the City Council. In the latter part of 1912 these negotiations were broken off, and in the summer of 1913 the Elevated Railways applied to the City Council for the right to rearrange the loop structure to permit through routing of cars. This request was granted with the result that the capacity of the loop was increased from 700 to 1200 cars per hour.

From 1909 to 1913 the passenger traffic had increased but little. Consequently, there was no necessity for additional rolling stock. However, following the inauguration of through routing, which was accompanied by the introduction of universal transfers, the traffic showed an increase of more than 3 per cent in one month. In order to meet the abnormal growth as well as future demands, the new all-steel cars have been purchased.

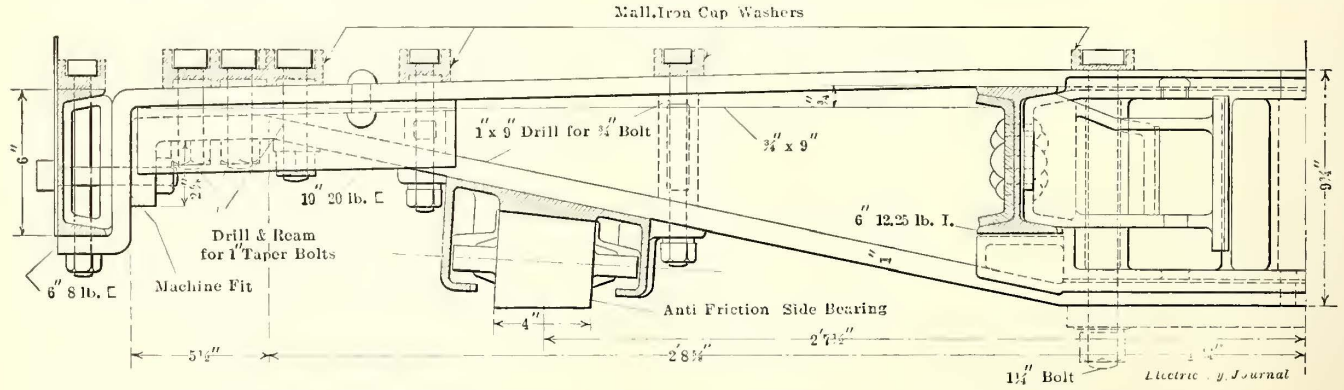
The old type of elevated railway car had only two doors, which were insufficient to expedite boarding and alighting to a point where schedules would not be retarded during the present rush hours. To meet this difficulty, the new cars are equipped with three doors, one at each end of the body and one in the center. Their adoption necessitated the use of longitudinal seats, which, however, permit a larger standing load.



Chicago Elevated Car—Floor Plan Showing Arrangement of Seats and Vestibules

The principal general dimensions of the car body are as follows:

Distance between center of trucks	33 ft. 8 in.
Length of car body on center line over end plates	48 ft. 0 in.
Length of car body over corner posts	37 ft. 10 in.
Extreme width of car over window sills	8 ft. 8 3/16 in.
Width of sliding door opening	3 ft. 8 in.
Height of car from top rail to top of roof	12 ft. 3½ in.

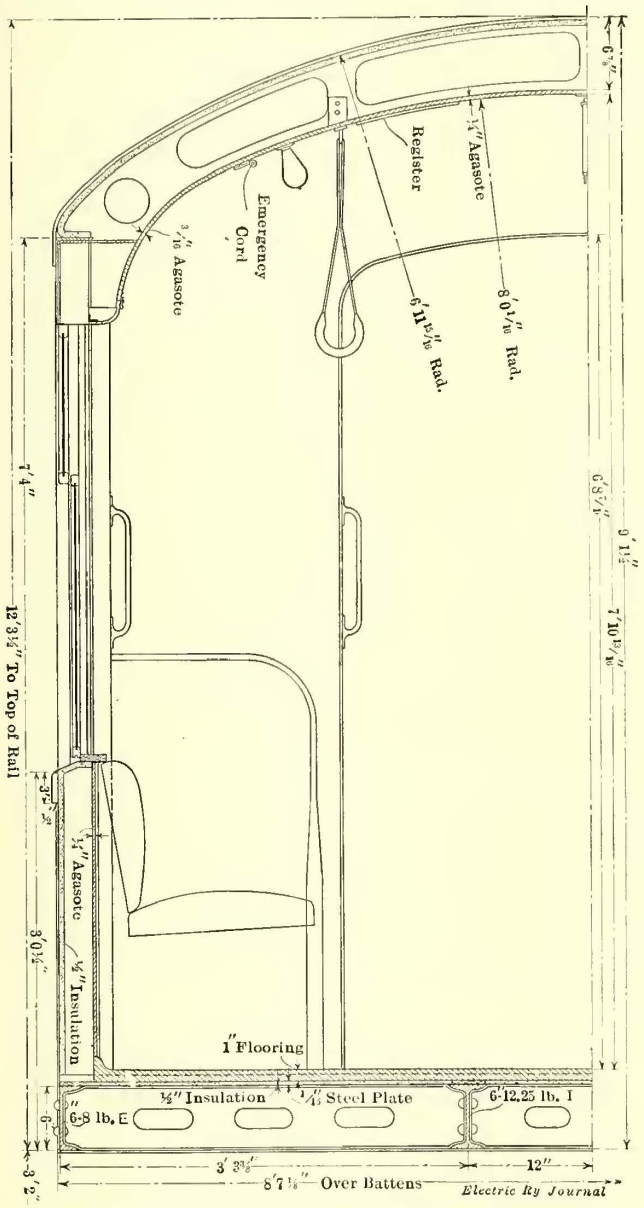


Chicago Elevated Car—Cross-Sectional Elevation of Body Bolster and Longitudinal Sills

The car body is built throughout with structural steel and pressed-steel shapes and is designed with continuous, structural-steel center sills and plate side girders. The lower members of the side girders form the side sills, and the upper members form the letterboard and deck plate above the windows. The floor and side framing is designed to include cross-bearers which transfer the floor load to the side trusses. Special precaution against the destructive effect of collisions is provided for in the end vestibule framing. The entire

car body, exterior and interior, is made fireproof and is thoroughly insulated against extremes of heat and noise, as well as the effect of vibration. In fact, the structural steel is so arranged that no part is exposed to both the outside and inside of the car except the sashes. The underframe is composed of 6-in. channels and I-beams, which form the side sills and end sills and center sills respectively. Hedley anti-climbers are riveted to the end sills.

Another important feature of the underframing included in the design is contained in the body bolsters.



Chicago Elevated Car—Cross-Section of Car Body

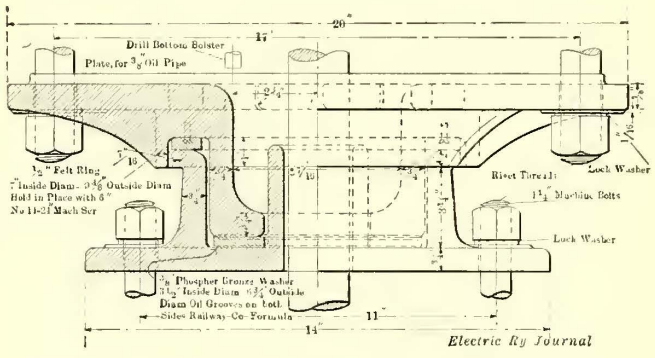
These are made of two soft-steel plates with a cast-steel separator in the center. The steel casting in addition to serving as a separator for the top and bottom plates is designed to form a housing for the draft springs by extending it beyond the bolsters toward the end of the car body. The center bearing plates are also of special design and provide for self-lubrication, giving also large contact and wearing areas. The center plates are designed with an oil well surrounding the upper member of the bearing plate which, when filled with oil, permits this member to operate in oil. Each bolster is equipped with a roller side bearing.

The side and end framing of the car body is made up of pressed-steel sections, sheathed on the outside below the windows with 3/32-in. cold-rolled steel plates which are secured to the posts, belt rail, side sills and other parts by rivets. Agasote 3/16 in. in thickness is fastened back of the letter board and between the posts, and ⅛-in. agasote on the sides that face the window posts between the top of the sash and the deck plates. Agasote ¼ in. in thickness extends from the underside of the deck plate to the head lining and from the floor to the windows. In fact, the entire interior finish of the car excepting the arm rests on the windows is supplied in agasote, finished mahogany. The floors are to be of a fireproof, sanitary composition.

At each end of the car are provided vestibules which afford entrance from each side and from the ends. The right-hand corner of each vestibule, on the motor cars, contains a motorman's brake valve, air gage, master controller and other necessary apparatus inclosed in a cab formed by a door hinged to swing approximately 120 deg. This door in one position forms the cab, and in the other it engages with a swinging panel which forms a part of the finished bulkhead.

The body is fitted with six sliding doors, two at each end of the car and two in the center. These doors recede into pockets provided in the car body and are operated with pneumatic apparatus, either from the guard's niche or from the motorman's cab. They are made of pressed steel, suitably insulated, and are 1¼ in. in thickness, being equipped with rubber cushions and weather stripping. The vestibules are fitted with doors at the ends to permit an uninterrupted passage from one car to another.

Twelve windows are provided on each side of the car body, the upper sash being fixed and the lower sash arranged to raise. The sashes are made of bronze and fitted with brass stops and curtain grooves. Both the upper and lower sashes are glazed with 3/16-in. plate glass, set in rubber channels. As mentioned earlier in the article, the car body is provided with four longitudinal seats 16 ft. 4¾ in. in length. These are provided with 2-ft. 6½-in. spring backs built into the car body. Both the back and the seat are upholstered in canvas-lined rattan of small mesh. Twenty-four



Chicago Elevated Car—Self-Lubricating Center Plates

sanitary hand straps, six on each side of the car ceiling in each end of the car body, are provided for the convenience of standing passengers.

An electric heating system of the forced-ventilation type, and provided with a thermostat control, will be installed in each car. This system is to be operated in conjunction with eight exhaust ventilators installed in the roof of the car. Each ventilator is provided with register control and the six in the car body will be connected to two continuous operating mechanisms. All electric wires both for the heating system and the lighting circuit are inclosed in metal conduit, provided with junction boxes and other necessary fittings to insulate it thoroughly.

The steel car bodies are mounted on Baldwin locomotive trucks equipped with General Electric field-controlled motors. The motors are operated by Westinghouse multiple-unit control similar to that now in general use on the elevated railways. Other special equipment includes automatic air brakes of the Westinghouse schedule AMR type, arranged for quick recharge and graduated release. The entire order, including the sixty-two motor and sixty-six trail cars, was placed with the Cincinnati Car Company, Cincinnati, Ohio.

JOINT CONFERENCE ON STEEL-WHEEL SPECIFICATIONS

A meeting of the sub-committee on steel wheels, committee on equipment American Electric Railway Engineering Association, was held at the association headquarters, New York, on Tuesday, Jan. 6. Those in attendance were J. P. Barnes, Syracuse, chairman of the sub-committee; W. E. Johnson, Brooklyn, and E. Dietz, Brooklyn, also representing the electric railways; G. Aertsen, Midvale Steel Company; A. A. Stevenson, Standard Steel Works; L. W. Conroy and H. P. Tiemann, both of the Carnegie Steel Company, representing the manufacturers of steel wheels.

The subject of discussion was Appendix B, Section 1, of the 1913 report of the committee on equipment, namely, "Proposed Specifications for Solid-Wrought Carbon-Steel Wheels for Electric Railway Service."

One important point brought out in the discussion was on chemical composition. It was pointed out that the specification applied only to the basic process, and that the silicon content requirement, in particular, worked unnecessary hardship upon the user of the acid process. Arrangement was therefore made to add a chemical composition based on the acid process in which the silicon content of 0.10 to 0.30 per cent will be set at 0.15 to 0.35 per cent with no change in the other constituents except carbon.

There was some discussion as to whether or not the meaning of segregation was modified by the word "injurious" in clause 2, reading: "The ingots from which the blanks are made shall have sufficient discard to insure freedom from injurious pipes and segregation." This was referred to the committee as a whole.

Clause 5 was elaborated to include "necessary identifying records" with complete record of each shipment.

In clause 6 "laminations" was substituted for "flaws." Following this, Mr. Tiemann offered to submit in writing for the consideration of the committee on equipment a number of similar verbal improvements. This offer was accepted.

Clause 7 was modified to eliminate the bracketed words in the following: "or, if specified by the purchaser, wheels may be furnished [with the contour] unmachined." Two sets of tolerances for the choice of the purchaser will also be submitted to the equipment committee. These tolerances will be given in the present tabulated forms, the textual repetitions now in use being omitted as far as possible. The possibility of increasing certain tolerances will also be considered. An eccentricity clause will be added to cover dimensions of the hub more closely than at present; also that the thickness of the wall shall not vary more than $\frac{3}{8}$ in. at any one point.

Clause 9, "Branding," is to be modified to include manufacture from one-wheel ingots, and the method of identification and branding may also be changed somewhat. It will be recommended that clause 10 (e) be changed to read that rejection based on tests be reported within ten working days from the receipt of "samples" instead of "wheels." In clause 10 (f) the words "a rehearing" are also to be replaced by the word "reconsideration." Part of clause 10 (g) on wheel replacement was abbreviated to read "that may prove defective in material or workmanship."

The questions of chemical analysis and hardness tests irrespective of composition were considered in connection with mating. It is proposed to add a ladle analysis to clause 4 of the Engineering Association's specification. It was suggested that the association appoint a committee to secure data from the electric railways on wheel life obtained under specified conditions, and then to check these results by securing from the manufacturers all pertinent physical and chemical information as shown by the heat numbers.

As to check analysis, clause 4, it was suggested that "drillings taken from two holes may be analyzed separately or mixed at the discretion of the engineer."

After a discussion on the changes which appeared desirable in the standard car-wheel measurements by means of tapes, gages and templates, the meeting was adjourned.

PLANS FOR AMERICAN ELECTRIC RAILWAY ASSOCIATION DINNER

Further details in reference to the annual dinner of the American Electric Railway Association, which is to be held on the evening of Thursday, Jan. 29, have been made public. As stated previously, the dinner is to be held at the Hotel Waldorf-Astoria in connection with the midyear conference in New York. An interesting program has been arranged. Charles N. Black, president of the American Electric Railway Association, will preside. The speakers will include Guy E. Tripp, chairman of the board of directors of the Westinghouse Electric & Manufacturing Company; Cornell S. Hawley, president of the American Electric Railway Manufacturers' Association, and Henry W. Anderson, vice-president of the Virginia Railway & Power Company, Richmond, Va.

E. B. Burritt, secretary of the association, has sent a letter to members calling attention to the plans. As announced some time ago, the dinner this year is to be in the nature of a pay-as-you-enter" affair. Tickets will be $10 each.

A number of committees of the various associations will hold meetings at the time of the midyear conference. Among the committee meetings announced up to the present time are the following: joint committee on block signals, Jan. 29; committee on way matters, Jan. 28; committee on power distribution, Jan. 28.

COMMITTEE AFFAIRS OF THE AMERICAN ELECTRIC RAILWAY ENGINEERING ASSOCIATION

President J. H. Hanna of the American Electric Railway Engineering Association has announced the following committee on standards: H. H. Adams, chairman; Martin Schreiber, vice-chairman; F. R. Phillips, B. F. Wood, G. W. Palmer, Jr., E. R. Hill, C. S. Kimball, W. H. Roberts, F. B. H. Paine, E. B. Katté, G. H. Pegram and Norman Litchfield.

In connection with the work of the committee on way matters of the American Electric Railway Engineering Association, the following sub-committees have been appointed:

Proper foundation for tracks in paved streets: R. C. Cram, C. H. Clark and E. H. Berry.

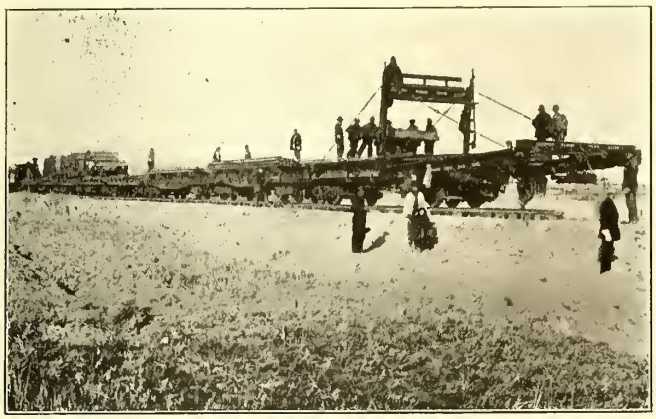
Use of T-rail in paved streets: E. H. Berry, W. F. Graves and J. B. Tinnon.

Pavement for use in connection with girder and high T-rails: H. F. Merker, C. H. Clark and C. S. Kimball.

Alloyed steel rails: G. W. Gennet, Jr., E. P. Roundey and H. F. Merker.

SALT LAKE & UTAH RAILROAD

Service between Salt Lake City and Provo, Utah, on the Salt Lake & Utah Railroad will begin the first of the year. The new line is known locally as the "Orem Line," for W. C. Orem and F. M. Orem are its chief promoters. The portion of the new line to be put in service in January is 48 miles long. Present plans

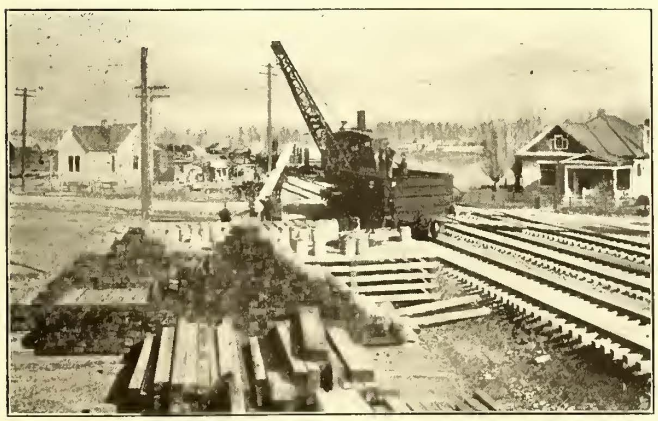


Salt Lake & Utah Railroad—Track-Laying Machine

provide for an early extension of the line to Payson, 20 miles south of Provo, and ultimately to Nephi, 25 miles south of Payson.

All of the grading of the right-of-way has been completed to Provo, and track laying by machine is progressing at the rate of a mile a day, using 75-lb. steel with Continuous rail joints and 2880 ties to the mile. The line's heaviest grade is 1½ per cent, made to reach a very thickly populated, intensive fruit-growing tract on Provo Bench, near Provo. The heaviest grade outside this point is 0.8 per cent. The line's sharpest curve is 8 deg.

The line will use catenary construction and 1500-volt direct current. A fifty-year contract for power has been made with the Utah Power & Light Company. Electrification will not be finished until about April 1, 1914, prior to which time gasoline motors will be used. Forty-two-ton cars, manufactured by the Niles Car Company, Niles, Ohio, will be used, and hourly service will be maintained. The electrical equipment is Westinghouse.



Salt Lake & Utah Railroad—Material Yard, Salt Lake City

The Orem line will connect with the Salt Lake & Ogden electric line, known as the "Bamberger Road," at Salt Lake City. Joint terminal facilities have been bought at Salt Lake City by the Salt Lake Terminal Company, a corporation owned equally by the two railroads. The terminal station is in the business center of the city, with entrances on four streets. The Provo terminal is situated close to the business center of that city.

The new railroad reaches a population of 50,000 persons south of Salt Lake City, which has a population of about 110,000. It passes through twenty towns and villages. For more than half its length it traverses thickly settled farming areas that have no railroad facilities at present.

The financing of the line has been completed and all equipment has been ordered. The work has been done rapidly, considering the heavy nature of the construction necessary to maintain the low grades and curves. Work was begun in March, 1913, and only a few miles of track remain to be laid.

COMMUNICATION

PERPETUAL INVENTORIES FOR STOREROOMS

PITTSBURGH RAILWAYS COMPANY
PITTSBURGH, PA., Dec. 30, 1913.

To the Editors:

Concerning the proposed association of purchasing agents discussed in your editorials and in several communications recently, it seems to me that Mr. Ingle, assistant purchasing agent of the Rockford & Interurban Railway Company, has hit the nail squarely on the head when he says that the electric railway purchasing agents and storekeepers should form an association to discuss subjects of interest to them. At any rate, they should become familiar with the various recommended practices of the Railway Storekeepers' Association, to which Mr. Ingle refers. If the perpetual inventory plan, mentioned in your editorial of Dec. 6, is used by any considerable number of electric railway managements it is time that we got together to find out what should be done along such lines. This perpetual inventory plan may have been good enough before we knew any better—I should say about ten years ago—but if it is possible that any considerable number of companies do business on this basis, it is the more reason why some action should be taken on the part of those companies to find out the up-to-date methods of carrying on their business.

The Railway Storekeepers' Association has accomplished wonders in securing from general managers, etc., recognition of the importance of the functions of the stores department. Its proceedings are textbooks on up-to-the-minute management. The Railway Storekeepers' Association would be pleased to receive, as members, representatives of electric railway purchasing and stores departments; in fact, quite a few are members at the present time. It is inconceivable how an association of that kind could be in existence for ten years without having the representatives of electric railways clamoring for admission.

The president of the association has informed the writer that within a few weeks a determined effort will be made on the part of the association to bring into its membership representatives from the electric railways, and it will endeavor to discuss topics of particular interest to them at its next convention.

B. F. YUNGBLUTH, General Storekeeper.

[The "perpetual inventory plan," described in the editorial in our issue of Dec. 6, has recently been introduced into the storerooms of a very large electric railway company in the Central States. It represents one of the steps taken by the efficiency engineering department of the company in its motion time studies. —EDS.]

Equipment and Its Maintenance

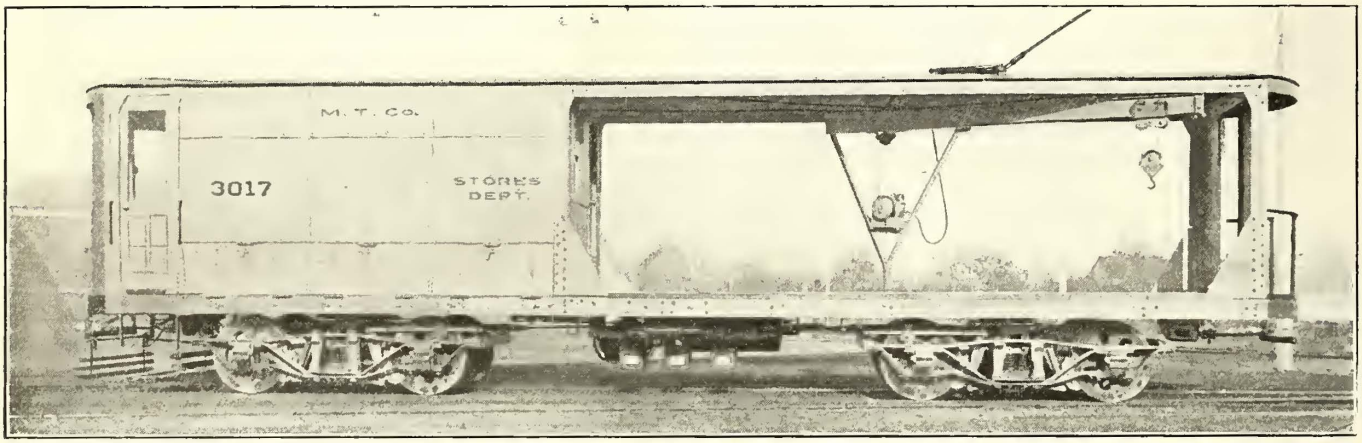
Short Descriptions of Mechanical and Electrical Practices from Every Department of Electric Railroading

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

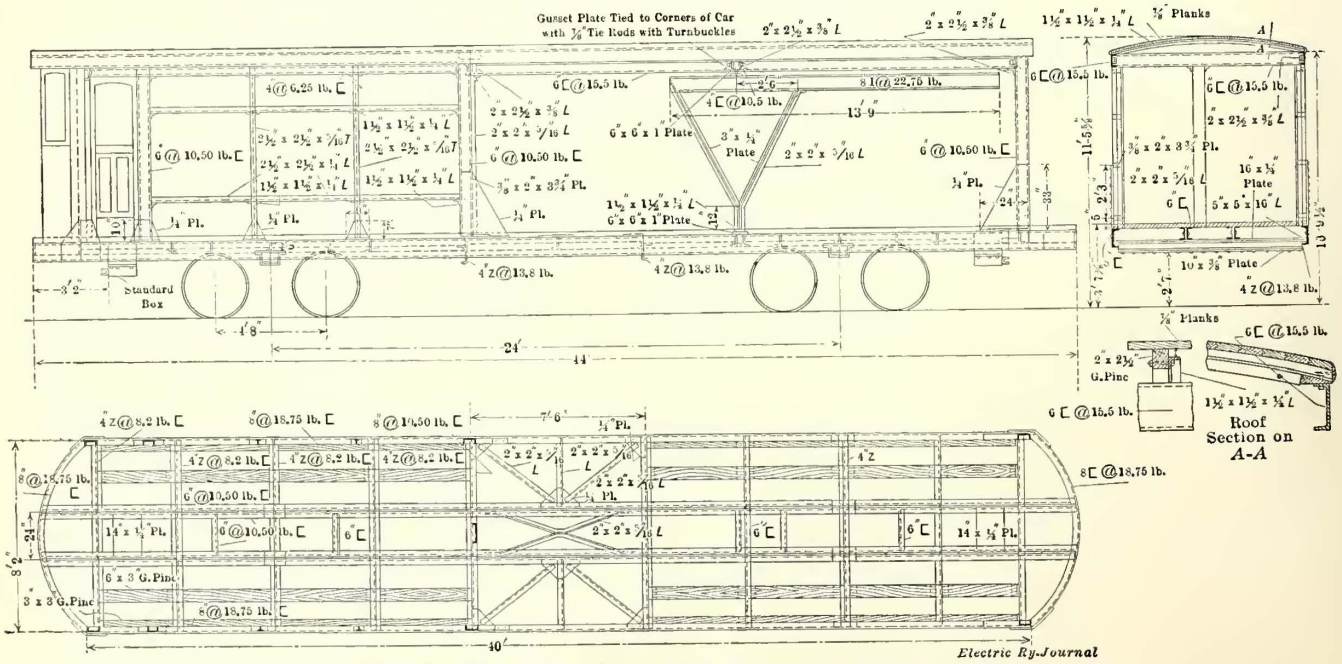
STEEL STORES CAR FOR MONTREAL

The Montreal Street Railway has recently designed and constructed a steel car for handling stores which is provided with more efficient conveniences than is customary in rolling stock for this purpose. Owing to its larger size, better equipment and labor-saving facilities, the new car has replaced three supply cars which were formerly used to handle all stock and scrap between the Youville shops and five carhouses. Its daily run approximates 35 miles. The company feels that the investment of $1,800 for construction of a special body is well worth while when contrasted with the saving which the car effects in power and maintenance.

The principal framing members of this car, including the roof, are of standard commercial shapes as shown in the drawing. Part of the car is open to permit room for a crane track, hoist, etc., for handling wheel sets and other heavy parts from either side of the car. Another interesting feature is the use of a double floor in the inclosed section to form a compartment in which armatures can be kept free from injury. The car is built with solid ends to insure increased bulkhead stiffness and to protect the crew.



Steel Stores Car of the Montreal Street Railway, Which Has Replaced Three Non-Specialized Cars

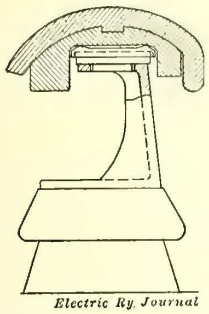


Framing Plan of the Stores Car of Montreal Street Railway

The car is 44 ft. over all, is operated with four GE-80 motors and K-28 controller and weighs 47,600 lb. It was designed at the Youville shops under the direction of D. E. Blair, superintendent of rolling stock.

PROTECTED THIRD-RAIL

S. G. Redman, Newcastle-on-Tyne, and C. H. Merz, London, who is consulting engineer for the high-tension d.c. Melbourne electrification, have recently devised the protected type of third-rail shown in the accompanying drawing. The principal novelty of this construction is the special form of inverted channel which is designed to serve as the current conductor. This channel is of irregular form, as the non-contacting flange is used to secure more cross-sectional conductivity and to keep the contact-making flange in place. The rectangular base of this channel is supported on a flat insulator, an intermediate bracket and a foundation insulator. The capping of the conductor channel may be of fiber, stoneware or other material keyed into the conductor as indicated.

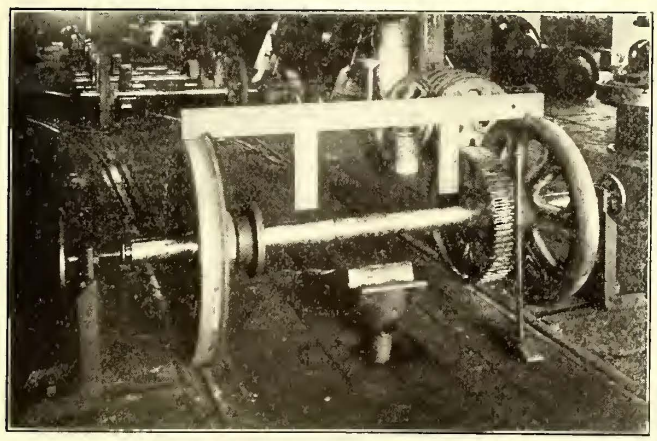


Protected Third-Rail

WHEEL AND GEAR TESTING AT CINCINNATI

In order to be positive that all wheels and gears are true and accurately pressed on the axle before they are placed under trucks, the Cincinnati Traction Company has installed a testing set in its machine shop. This set shows not only that the wheels are true but that they as well as the gears are accurately centered and that the axles are perfectly straight. The outfit employed for this purpose consists of a hydraulic jack to lift the wheels to a pair of adjustable centers arranged beside a track leading from the machine shop. The jack is installed under the floor at the exact center of the track, and the head rises through an opening. The centers are set on concrete foundations on each side of the track in line with the jack.

When it is desired to test a pair of wheels they are set so that the axle will engage with the head of the jack, which then raises the wheels until they may be supported on the centers. In this position the centering

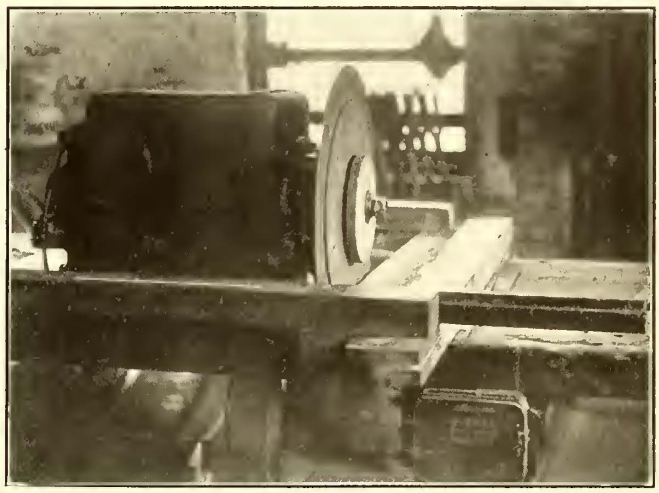


Cincinnati Traction Company's Wheel and Axle Testing Sets and Templet

of the wheels and straightness of the axle are checked by spinning the wheels and noting whether there is variation in the space between any fixed object, usually a sledge handle, and the face of the wheel or gear. This testing set is shown in the illustration above. The wooden templet also shown is employed to check the location of the gear on the axle in relation to the position of the wheels.

CUTTING CONDUIT AT ALBANY

Some time ago the United Traction Company, Albany, N. Y., rigged up the old compressor motor shown in the accompanying halftone to serve for cutting conduit at its several shops from time to time.

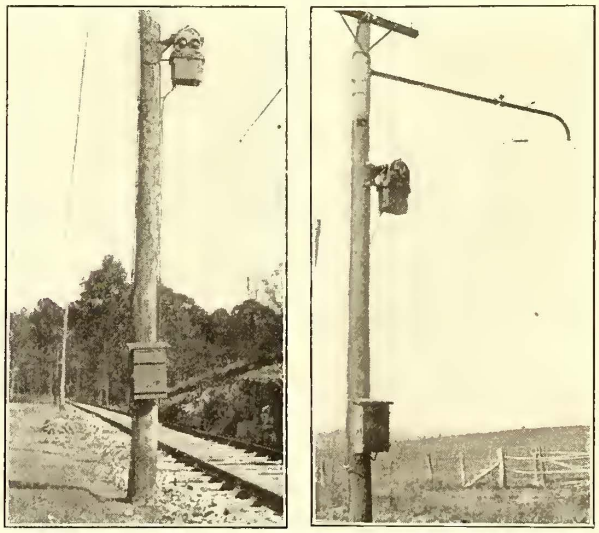


Compressor Carrying Dasher-Iron Disk and Grindstone for Cutting and Smoothing Conduit

The compressor was readily adapted for this purpose by mounting on the shaft a disk of dasher iron for cutting the conduit and a plain grindstone for removing the burrs at the edges afterward.

SIGNALS ON WASHINGTON & GREAT FALLS RAILWAY

The Washington & Great Falls Railway & Power Company extends from Bethesda, Md., to Great Falls, and it is operated with cars and energy supplied by the Washington Railway & Electric Company. This



Automatic Signals as Installed on the Washington & Great Falls Railway

line was built to develop an extensive tract of land for high-class residential purposes in the environs of Washington. From Wisconsin Avenue and Bradley Lane to Great Falls the distance is 10.2 miles, comprising six blocks of single track. Spring switches and stands are used at the turn-outs which are located at Offutt, Wilson, Kefauver, Bradley and Lynch. About 1000 ft. east of the switch point at Bradley is a stub

siding to a quarry, which, however, is only temporary. The line has a maximum grade of 5 per cent and many curves, the longest tangent being ¾ mile. Bracket catenary construction is used almost entirely, this including a No. 0000 grooved trolley suspended from a ⅜-in. Siemens-Martin messenger cable on 30-ft. and 35-ft. chestnut poles. The present transmission potential is 6600 volts but it will be raised to 13,200 volts. The trolley potential is 600 volts.

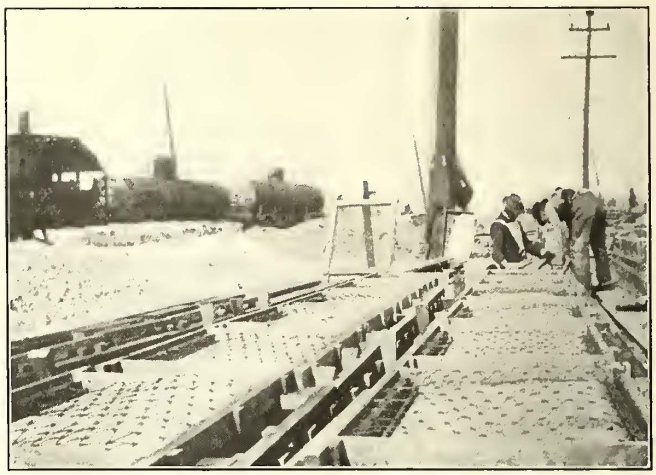
The time of a trip is forty-three minutes. Cars keep to the main line at sidings except at a meet. Signal protection is afforded by ten Nachod automatic signals, type CD, as illustrated. These signals permit following, while preventing all opposing moves until the block is clear. The principal features of this signal were described in the Electric Railway Journal for June 22, 1912, page 1083. The signal installation for a block of single track between sidings comprises two signals and four trolley contactors. The signals are located at the switch points whereas the trolley contactors are from one to two spans in advance of the signal. The signals permit any desired safe car movement. A work car, for instance, may shift around the terminals of the block in any manner without disarranging the signals of a regular car in the block. Two No. 12 copper-clad line wires are required for the signals.

PACIFIC ELECTRIC RAILWAY'S CONCRETE SHELTERS

The Pacific Electric Railway, operating in the territory contiguous to Los Angeles, Cal., recently desired to adopt a more permanent type of shelter than the customary wooden building. Since brick was too expensive for buildings of this size, reinforced concrete was suggested. Upon investigation, however, it was found that reinforced concrete structures of the monolithic type would cost too much, but that one constructed according to the unit system might be built within the limit of cost desired. Upon invitation designs and estimates were submitted which were acceptable.

By the unit method, as the name implies, the different structural elements of the building are cast in molds or forms on the ground as separate units. As soon as these have hardened sufficiently they are removed from the forms and placed in a stockyard where they are allowed to season from one to four weeks, after which they are erected much after the manner of structural steel. The connections are made by means of bars projecting into the joint and embedded in a rich concrete grout. The joints are placed at predetermined places made necessary by the structural requirements, and the completed building is a structure not differing in essentials from the monolithic type.

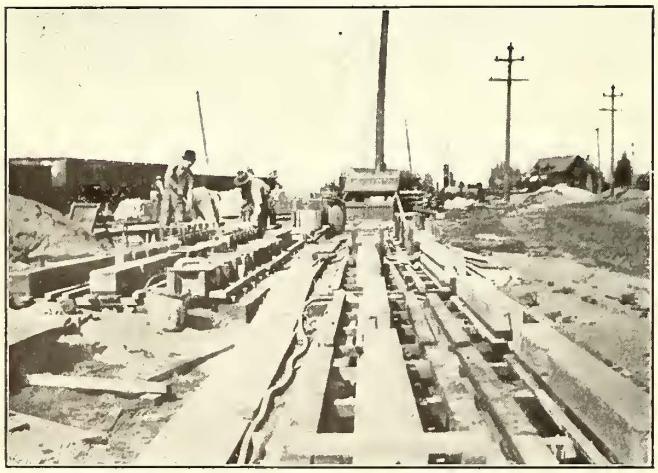
While several large electric railway structures have been built in this way, notably the Luzerne Street and Callowhill Street carhouses of the Philadelphia Rapid Transit Company and the Fairview office and carhouse of the Lehigh Valley Transit Company, Allentown, Pa., this is the first instance in which minor structures for electric railways have been tried. The following description and the accompanying photographs should convey a clear idea of the character of these shelters.



Pacific Electric Shelters—Casting Yard, Showing Roof and Wall Slabs with Forms Ready for Pouring

The buildings are 8 ft. 3 in. x 12 ft. outside dimensions, with a clear height of 8 ft. Each building contains 119 units, the weight of which varies from 400 lb. for the columns, which are the heaviest pieces, to about 33 lb. for the lightest pieces. The units can be handled by three or four men and thus require no expensive equipment for their erection. A complete structure contains 4.85 cu. yd. of concrete exclusive of the column footings, which, owing to variation in grades, are cast monolithic, being mixed and placed by hand. All the units are cast at a central casting yard by a force of from three to four four men and are loaded on a car and transported to the building site ready for the erecting gang.

The roof slabs of these stations are 2 ft. 6 in. x 2 ft. 2 in. in size and weigh 190 lb. each. They were cast with



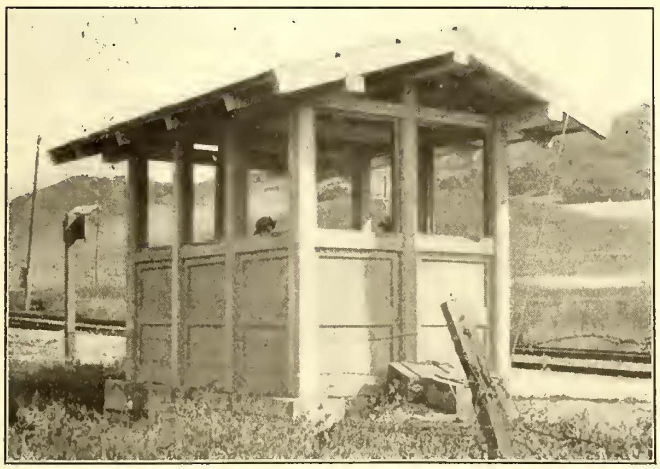
Pacific Electric Shelters—Rafters, Columns and Copings After Removing Forms

Pacific Electric Shelters—View of Completed Building, Except for Setting of Window Frames and Door

a 1½-in. overlap, which, with the red coloring that was used in the finish, gave the appearance of a tile roof. No waterproofing was used in the concrete for the roof. It consists simply of a rich mixture, well worked and hard troweled to a smooth finish, giving a water-tight roof with no other covering. The slabs are reinforced with American Steel & Wire Company's standard wire mesh.

The tops of the wall slabs which form the exterior of the station are troweled to a smooth, straight surface, which is brushed afterward to remove the trowel glaze from the surface. The undersides of the slabs are left as they come from the forms, as they are smooth enough to give a good finish to the building interior. All columns, girders and lintels have one side troweled and brushed and the other three sides left as they came from the forms, the forms being so constructed that no seams show in the finished concrete. These units were reinforced with wire mesh and small deformed bars.

The erection of these shelters after the monolithic footings were in place was carried on about as follows: The columns were set in sockets provided for them and grouted in place. Then the wall slabs and sills which fit in slots in the columns were set in place and grouted. Next, the lintels were set and grouted, followed by the girders and finally the roof slabs, and all were carefully grouted with a rich concrete. All units were connected and held by projecting steel bars or dowels which, on being grouted, provided a perfectly rigid connection. The completion of the shelter included placing the unit benches and laying the floors. The units were all very carefully marked before they were removed from the forms, so as to make the erection simple. The marking conformed to that shown on the erecting plan. Under ordinary conditions it was found that one of these buildings could be completed in from four to six days and that the cost did not exceed that of a wooden building of the same type by more than 12 or 15 per cent. No arrangements were made for heating these stations as the California climate made this unnecessary; but this, of course, could be done very simply and conveniently by installing some standard type of electric heaters under the benches.



Pacific Electric Shelters—Rear and End View of Completed Building Showing Column Footings

In the accompanying illustrations it will be seen that the shelters are simple, permanent structures, very attractive to the eye. In fact, the Pacific Electric Railway is so well pleased with this type of building that it has been made standard, and the company will construct about 200 of them along its lines. The Van Sant-Houghton Company, of San Francisco, designed these shelters for the Pacific Electric Railway as Western representative of the Unit Construction Company, St. Louis, Mo., the patentee of the method of construction.

RECENT TRACK WORK OF THE UNITED RAILWAYS & ELECTRIC COMPANY OF BALTIMORE

During 1913 the United Railways & Electric Company's way department was very busy owing to the extensive paving operations of the city of Baltimore. As a result 17 miles of single track were overhauled, although only 6½ miles actually required reconstruction. In addition to this work the company reconstructed in the course of ordinary maintenance 3 miles of single track and, on account of the operations of the State Roads Commission, ¾ mile of single track—making a total of 20¾ miles of single track overhauled during 1913 up to Dec. 1. The only extension of any consequence made during the year was on Monument Street, between Washington Street and Patterson Park Avenue, involving 0.33 mile of single track.

A noteworthy feature of the company's track construction is the continued use of either gravel or broken-stone ballast, which, under Baltimore conditions, has so far proved to be entirely satisfactory. It is worthy of mention that the standard riveted and welded thermit joint described in the ELECTRIC RAILWAY JOURNAL, Dec. 21, 1912, has not had a single failure since its adoption.

During the year 1913 the Lorain Steel Company electrically welded 2983 joints on old 9-in. girder tracks. The company's experience with this joint was identical with that elsewhere, namely, that, while it makes a very satisfactory joint and serves to prolong the life of old rails, it has about 1 per cent of failures owing to breaks during the first year after application.

ARCH-ROOF CARS WITHOUT BODY DOORS FOR HARRISBURG RAILWAYS

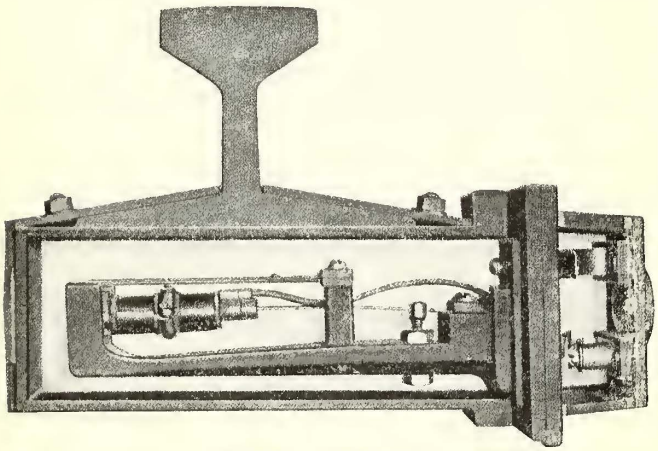
The Harrisburg Railways Company has lately received from The J. G. Brill Company seven arch-roof cars. This design, as illustrated, is an example of the strong tendency, even in Northern climates, toward the omission of body-end doors. The cars are 47 ft. 1 in. over the vestibules, 30 ft. 8 in. over the body, 8 ft. 5½ in. wide over all and 7 ft. 10⅞ in. wide over the sills. The vestibule doors open at right angles to and beyond the car-body line as illustrated. The height from the sill to the trolley base is 8 ft. 9⅞ in. The underframe is of steel, the body of wood and the headlining of agasote. Bronze is used for the interior trim. The bodies are mounted on No. 27 M.C.B.-1 trucks carrying four Westinghouse 101-B-2 motors. These cars are also furnished with the car builders' exhaust ventilators, Hedley anti-climbers, Peacock handbrakes, National air brakes, Consolidated heaters and the General Electric Company's arc headlights. The seating capacity is forty-four.

Arch-Roof Pay-Within Car with Exhaust-Type Ventilators for the Harrisburg Railways

IMPROVED HIGHWAY CROSSING SIGNAL CONTROL

In the issue of this paper for Dec. 21, 1912, an account was published of the highway crossing signal system made by the Protective Signal Manufacturing Company, of Denver, Col. Since that time a number of these signals have been installed by electric and steam railways. The system consists of a signal bell, operated by battery or trolley current and controlled by oscillators attached to the running rails. When desired, an illuminated crossing sign may be use in connection with the bell.

The most novel feature of this highway crossing signal system is the oscillator, in which a change has been made since the original type was illustrated in this journal, the oscillator being arranged to work on a closed instead of an open circuit. Briefly described, the present oscillator is a contact-opening device, which is clamped to the under side of the track rail and operated by the motion of the rail caused by the passage over it of the train or car. On single track an oscillator is placed at either side of the crossing to be protected, the distance from the crossing being governed by the speed of the traffic. The movement of a car over either of the end oscillators opens the circuit, drops a relay and starts the bell ringing. The bell-operating mechanism has a timer in connection with it so that it will stop ringing after any predetermined period, unless it has been stopped by the train passing an oscillator. Where movements from side tracks are to be



Section of Oscillator

protected against, additional oscillators are placed in the branch tracks leading toward the crossing where the bell is located.

The oscillator itself is a simple, rugged contacting device inclosed in a waterproof iron casing, so arranged that it may be fastened mechanically, in a rigid way, to the base of the running rail. All of the binding posts and connections are coated to prevent corrosion, and the contacts are made from iridium platinum. The essential electrical parts within the case, such as the vibrator and its connections, are thoroughly insulated from the casing and from the conduit, which forms a waterproof lead for the wires carrying the control to the near-by pole line.

These oscillators, the manufacturer states, have shown through severe service tests that they will withstand the shocks of the heaviest high-speed trains and yet are sensitive to the movement of lighter electric railway cars. One of the important features is their simplicity, both mechanically and electrically.

This system of highway crossing protection requires no bond wires, no track circuits and no insulated joints. Therefore it does not interfere with existing signal systems and operates on a separate and distinct circuit, which, if desired, can be entirely free from the trolley circuit.

The manufacturer states that by the introduction of a small motor these oscillators can be used to control the operation of automatic signals, the current supply being obtained from the power line. Some of the many uses which this oscillator is now fulfilling, in addition to the control of this company's highway crossing bell, are those of the control of annunciators, tower indicators, time relays, electric horns and similar protective indications.

CONCENTRATION OF ENERGY PRODUCTION IN CHICAGO

Practically all the energy requirements of the surface and elevated railway companies of Chicago are now supplied by the Commonwealth Edison Company. Recently three of the old elevated railway generating stations have been taken over by the central-station company—the Fullerton Avenue station of the Northwestern Elevated Railroad Company, the Loomis Street station of the Metropolitan West Side Elevated Railway Company and the Fortieth Street station of the South Side Elevated Railroad Company. The station-operating forces of the elevated-railway companies have been incorporated into the operating department of the Commonwealth Edison Company. It is probable that eventually all of the railway generating stations will be shut down, although some of them, notably the South Side company's station, have an excellent record of economy. Five railway substations also have been taken over by the substation department of the Commonwealth company.

The highest total-output maximum of the Commonwealth Edison Company up to Nov. 1, 1913, was 257,830 kw. This occurred on Oct. 31, 1913. The highest peak of last winter was 232,950 kw on Dec. 11, 1912. It is estimated that this winter's total-output maximum will be about 300,000 kw. The highest twenty-four-hour kilowatt-hour output up to Nov. 1 of last year was 3,365,900 kw-hr. and was recorded on Oct. 30, 1913. It is probable that the maximum day's output for this winter will be 3,700,000 kw-hr. or more.

The number of employees on the pay roll of the Commonwealth Edison Company on Nov. 6, 1913, was 4713. This large number is accounted for not only by the additions from the railway companies but by the large amount of construction work that the company is carrying on at present.

THE STREET RAILWAY AND COMMERCIAL GEOGRAPHY

In connection with the study of commercial geography in schools in Boston and its vicinity, the Bay State Street Railway Company supplies folders and maps free of charge to educational institutions, and thereby encourages interest in trolley facilities over a wide area. Recently the general passenger agent of the company addressed a letter to the superintendents of schools in upward of 200 cities and towns served by the company's 940 miles of line, inclosing a map of eastern Massachusetts, southern New Hampshire and eastern Rhode Island and offering to furnish such maps upon request for instruction purposes. About 2000 maps have thus far been sent to schools, and the company also supplies the maps tinned at each end for wall hanging. Among the responses received was a letter from the superintendent of the immigrant department of the Fall River (Mass.) Y. M. C. A., which stated that the company's maps are being successfully used in thirteen schools for foreigners in this representative mill city.

News of Electric Railways

Seven Additional Subway Construction Contracts Awarded

On Dec. 31, 1913, the Public Service Commission for the First District of New York executed seven new construction contracts for as many different sections of the dual system of rapid transit. It also awarded the construction contract for Section No. 6 of the Seventh Avenue subway in Manhattan to the Rapid Transit Subway Construction Company, the lowest bidder, for $2,292,943. This section lies in Seventh Avenue between Thirtieth and Forty-second Streets. The total of the seven contracts executed was $11,106,038, bringing the total amount of contracts awarded to date to about $91,000,000. This is more than half of the money which the city is pledged to contribute toward the cost of construction of the new system. The contracts executed were as follows:

Section No. 2 of Route No. 39, which is the greater part of the New Utrecht Avenue elevated railroad in Brooklyn; Post & McCord, Inc.	$1,672,190
Section No. 1-A of Routes Nos. 19 and 22, which is that part of the Southern Boulevard and Westchester Avenue branch of the Lexington Avenue subway between 147th Street and Whitlock Avenue; Rodgers & Hagerty	2,253,159
Section No. 1 of Route No. 16, which is that part of the Jerome Avenue branch of the Lexington Avenue subway (elevated construction) between 157th Street and 182d Street; Oscar Daniels Company	1,077,978
Section No. 3 of Routes Nos. 4 and 38, which is that part of the Seventh Avenue subway in Manhattan running under Varick Street and Seventh Avenue extension from Beach to Commerce Street; Degnon Contracting Company	2,185,063
Section No. 5 of Routes Nos. 4 and 38, which is that part of the Seventh Avenue subway in Manhattan running under Seventh Avenue from Sixteenth to Thirtieth Street; Canavan Brothers Company	2,401,306
Section No. 2 of Route No. 18, which is that part of the White Plains Road extension of the existing subway (elevated construction) running over White Plains Road from Burke Avenue to 241st Street; Alfred P. Roth	958,484
Route No. 50, which is the extension of the Steinway tunnel from its present terminus in Queens Borough to the Queensboro Bridge Plaza (subway and elevated construction); Degnon Contracting Company	557,856
Total	$11,106,038

The Public Service Commission for the First District has received several protests from magazine publishers against the approval of a renewal contract between the Interborough Rapid Transit Company and Artemus Ward, of Ward & Gow, for the advertising and news-stand privileges on the existing subway and elevated lines in Manhattan and the Bronx. The old contract expired on Dec. 31, 1913, and the commission was informed that the Interborough Company intended to renew it for a period of fifteen years. The Autosales Gum & Chocolate Company, Ulysses D. Eddy president, wrote to the commission that it was prepared to enter into such a contract upon much more advantageous terms to the city and to the Interborough Company than the terms proposed in the renewal contract, and it asked for a hearing before the commission takes action. Other publishers criticise the practice of the company under the old contract of making an extra charge to magazine publishers for the display of their publications on the subway and elevated news stands.

Mayor Hocken of Toronto Re-elected

Mayor Hocken of Toronto, Ont., who favors the purchase of the property of the Toronto Railway and the Toronto Electric Light Company by the city, was on Jan. 1, 1914, re-elected Mayor. F. G. McBrien, aged twenty-six, Mr. Hocken's opponent, ran on the platform "A vote for Hocken is a vote for the Mackenzie deal." The people also returned a board of control which will support the Mayor. Corporation Counsel Geary of Toronto announced on Jan. 3 that the work of drafting the agreement for the purchase of the property of the Toronto Railway and Toronto Electric Light Company had so far progressed that he would be able to submit it to the other side probably by Jan. 15.

Corporation Counsel Geary on Jan. 3 notified Works Commissioner Harris of the passage by the ratepayers of the by-law to raise $89,393 for the purchase of the portion of the Mimico division of the Toronto & York Radial Railway from Sunnyside to a point west of the Humber bridge. Two plans are under consideration, one to permit the Toronto & York Radial Railway to continue to operate the line temporarily and the other to operate a civic car line.

On Dec. 23 the City Council of Toronto by a vote of twelve to ten refused to ratify a motion passed by the Board of Control to the effect that all negotiations for the purchase of the property of the Toronto Railway and the Toronto Electric Light Company should be ended, as noted in the ELECTRIC RAILWAY JOURNAL of Dec. 27, 1913. Alderman Wanless offered a motion that the negotiations to clean up the franchises be continued, that an effort be made to have the purchase price reduced, that a vote be taken on Jan. 1, 1915, and that all the franchises of the Toronto Railway in and out of the city be included in the agreement of purchase. A vote was not taken. Mayor Hocken wrote on Dec. 24 to the Toronto Board of Trade, the Canadian Manufacturers' Association, the Trades and Labor Council and the University of Toronto asking that these bodies appoint each a representative to form a commission with a view of sifting all the evidence in the traction situation and seeking to evolve a solution of the problem out of the several schemes proposed. The Mayor suggested that Sir William Meredith, Chief Justice of Ontario, be asked to act as chairman of the commission, which has been done.

Chief Justice Meredith has written Mayor Hocken that he will be glad to act as chairman of the proposed commission to investigate Toronto's transportation problems and to report on the various schemes that have been advanced. Mayor Hocken has also received replies from the Board of Trade and the Canadian Manufacturers' Association.

Akron Franchise Before Council Again

Earnest efforts have been made to frame a franchise ordinance at Akron, Ohio, which will be satisfactory to both the city officials and the Northern Ohio Traction & Light Company. The City Council has held a number of meetings to consider various phases of the ordinance which was outlined in the ELECTRIC RAILWAY JOURNAL some time ago, with the result that numerous changes have been made in it both as to wording and meaning. Officers of the company say that the grant now presents a wide departure from the points agreed upon between the company and the committee of the Chamber of Commerce in the beginning and that it will be impossible to accept it in its present form.

The clause of the ordinance relating to service has, perhaps, been the greatest stumbling block. Certain members of Council have insisted that it be very rigid. In the latest draft the company is subject to a fine of $50 a day for the violation of any requirement made by the Council and the burden of proof as to the reasonableness of the requirement is placed upon the company. As now amended the ordinance provides that the company shall build 1 mile of track for each 2000 increase in population. This is a reduction of 3000 from the original figures and would greatly increase the new construction work. An attempt has also been made to provide that the city may name a buyer for the property at the end of ten years, instead of fifteen, as originally stipulated. The company objects to the requirement that all single-truck cars be retired from service within two years. It insists that the term should be ten years. The clause relating to cars will allow the city at any time to order improvements in cars or the purchase of new cars. The company has withdrawn proposition No. 2 to the effect that it will undertake to make the additions which the city seeks to require without an extension of franchise.

The principal features of the ordinance before the Council before it was amended were summarized in the ELECTRIC RAILWAY JOURNAL of Dec. 13, 1913, page 1251.

Attempt to Break Terre Haute Agreement

It is charged that attempts are being made to induce the employees of the Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., to abrogate their agreement with the company of Nov. 11, 1913, under which the Public Service Commission of Indiana is named as an arbitration board to settle any grievances not settled between the employees and the company. Early in December 80 per cent of the employees met and appointed a "grievance committee" to represent them whenever any matters might arise to be taken up with officials of the company, and the men expressed themselves as being desirous of maintaining their relations with the company in this manner. Organizers from outside succeeded, however, in enrolling a few men and forming a local of the Amalgamated Association. Representatives of this local then presented to the company a set of so-called "grievances" providing for an arbitration board and covering many classes of employees not in service in the Terre Haute division.

The company declined to receive these grievances on the ground that more than 80 per cent of the employees had previously delivered to the company a signed statement to the effect that they had no grievances to present at that time and asking the protection of the company and the public from labor agitators who sought to intimidate them into violating their contract with the company, to which Governor Ralston was a party. The company further stated that it could not consider the appointment of any arbitration board other than the Public Service Commission, as specified in the agreement of Nov. 11, and suggested that the grievances in proper form be filed with the commission. This was done later.

The work of trying to create dissatisfaction among the employees continued during December, and plans were made by the organizers to call a strike about Jan. 4.

On Jan. 3 the Fidelity Trust Company, Philadelphia, Pa., filed a suit in the federal court for the district of Indiana, at Indianapolis, asking for a restraining order and temporary injunction against the officials of the State Federation of Labor, United Mine Workers of America, Central Labor Union of Terre Haute, the local officers of the Amalgamated Association and the outside organizers to prevent them from calling a strike or interrupting the operation of the lines of the Terre Haute division. The petition of the Fidelity Trust Company shows the conditions existing between the company and its employees, and represents that the payment of the interest on bonds of the company under the mortgage of which the Fidelity Trust Company is trustee would be imperiled by the failure of the company to operate its cars and conduct its light, power and steam-heating business from which it derives its revenue. Writs were at once issued by the federal court and served by a United States marshal on each of the labor leaders, with notice to appear on Jan. 7 and file answer Jan. 23 to the complaint. This action evidently changed the plans of the labor men in regard to calling the strike at the mass meeting of Jan. 4, and there has been no interference with the operation of the lines of the Terre Haute division of the system.

Recommendations of the New Jersey Commissioners

The report of the Board of Public Utility Commissioners of New Jersey for the year 1913 contains a number of suggestions for future legislation. The board urgently recommends the prompt enactment of laws giving it additional authority to control the issuance of securities by public utility corporations. The three supplementary acts urged in this respect are outlined as follows:

"1. Legislation specifically empowering the commission to require proof when approval of proposed securities issues is asked that there has been an adequate attempt on the part of the petitioners to ascertain and to obtain the highest price at which such securities may be sold; and in default of satisfactory proof thereof to impose as a condition of granting such approval the advertising for sealed competitive bids for such securities, accompanied by certified checks guaranteeing the responsibility of the bidders.

"2. An act amending the present law under which the board's approval of the purpose of proposed security issues is made a prerequisite to such approval, whereby said clause shall be defined by a prescribed rule indicating in general terms in what respect the purpose of the issue may be scrutinized by the board with a view to approval or disapproval thereof.

"3. An act making void all security issues by public utilities whether put out by way of sale or by way of pledge or hypothecation, and making such unauthorized issue a misdemeanor unless the prior approval of the board has been granted."

Three other recommendations for supplementary legislation were also made by the board, these relating to the procedure in the elimination of grade crossings and limitation of the bonded debts that may be incurred by railroads and prescribing more precisely the terms under which public utilities may lease or be leased. These recommendations as outlined by the board are as follows:

"1. The establishment of specific procedure in cases involving the elimination of grade crossings, determining with greater precision who are parties to such proceedings and permitting parties other than public utilities and municipalities directly affected to be served with notice of the hearing by advertisement in the newspapers, and imposing upon the petitioners the duty of furnishing a general plan of elimination sufficient to determine the feasibility of said elimination and of approximating the cost thereof.

"2. An amendment to the general railroad act, and in particular of Section 70 thereof, whereby the limitations to be imposed upon the bonded debt that may be incurred by a railroad company incorporated in this State, or by a foreign corporation as regards its property situate in this State, may be made uniform, whether said company is operated independently or under lease, or by virtue of merger or consolidation with another railroad company.

"3. Legislation prescribing more precisely the terms under which railroad companies or other public utilities may lease or be leased to railroads or other public utilities, such legislation to fix the maximum term of the lease and to make mandatory the requirement that the property of the lessor company shall be at all times capable of identification either physically or by the fixing of the value thereof upon the books of said lessor company and lessee company respectively."

Reference is also made in the report to the Supreme Court decision in the Phillipsburg horse car case in which the board's order permitting the company to change the gage of its tracks was upheld. The importance of this decision was in the fact that the order of the board was upheld, notwithstanding that it was in conflict with a local ordinance granting a franchise to the railroad.

The Indianapolis Arbitration

On Dec. 29 the Indianapolis Traction & Terminal Company resumed the presentation of its testimony in the hearing before the Public Service Commission of Indiana regarding the matter of wages and working conditions of employees of the company. A number of motormen and conductors testified as to conditions before the strike of Nov. 1, stating that they had not known of any feeling of dissatisfaction among the men. They described how the mobs threatened them and pulled some of them off the cars. The local managers of the Western Union Telegraph Company and Postal Telegraph-Cable Company produced copies of a number of telegrams sent by J. J. Thorpe and other labor leaders and organizers prior to and during the strike. The commission ruled that as an arbitration board it had no power to require the production of the telegrams, but that as the Public Service Commission of Indiana it did possess such power, and that it was as the Public Service Commission that the commission had issued subpoenas for the managers to produce the telegrams at the hearing.

The majority of the witnesses, both old employees and men on the extra list, indicated to the commission that the graduated scale of wages would be preferable to the flat rate. The commission asked local officers of the union to produce a statement giving the total number of members of the local union, and just how much it costs to maintain this local a year. Chairman Duncan stated that all this money must come from the street railway because the men

pay their dues out of their wages, and the commission wished to ascertain just what additional burden membership in the association imposed on the men.

Governor Ralston testified on Dec. 31 as to how he and Ethelbert Stewart, a representative of the Department of Labor, acted as intermediaries in the settlement of the strike. The Governor told of a form of agreement submitted by the union men and transmitted by him to the company. The company objected to one line of this form of agreement because it involved recognition of the union. Testifying in regard to the first form of grievances presented by the employees after the settlement agreement was signed, Governor Ralston said that Ethelbert Stewart objected to this form when shown to him and said that it did not in any way comply with the original agreement and that it represented "Thorpeism" and he would so tell Mr. Thorpe. On account of a death in the family of Chairman Duncan, the commission adjourned to Jan. 5.

On Dec. 5 James P. Tretton, assistant superintendent of the company, presented a mass of technical data regarding the operation of cars, schedules, etc. John J. Mahoney, superintendent, testified that there has been a deterioration in discipline among the men since the strike and that accidents have been more frequent. Mr. Mahoney told the commission that the company did not object to proper arbitration of grievances of the employees or men who were discharged, and that the men have always had the right to take their cases to the highest officials of the company. Figures were introduced showing that receipts of the city property have fallen off since the strike; that the earnings of the company for the forty days preceding the strike were $4,833 more than for the corresponding period of 1912, while for the forty days since Nov. 8, the day on which the strike ended, the receipts have been $15,376 less than for the same period of 1912. The company's average daily earnings for the forty days subsequent to Nov. 8, 1913, were $7,695 as against an average of $8,080 for the same period of 1912. For the forty days prior to Nov. 1, 1913, the average daily earnings were $8,269 as against an average of $8,148 for the corresponding period of 1912.

The following statement was submitted by the company, showing the amount of wages paid annually by the company to employees of the various departments, the totals under the present demands of the employees, the amount of increase and the per cent of increase:

	Present wages per annum	Maximum asked per annum	Increase entailed	Per cent increase demanded
Motormen and conductors.	$510,287	$732,907	$221,620	43.65
Shop employees	176,460	293,798	117,926	66.82
Carhouse employees	55,491	106,133	50,641	91.26
Power station employees..	32,291	50,749	18,458	57.16
Track department	293,294	476,766	183,472	62.55
Totals	$1,067,825	$1,660,355	$592,529	55.49

Charts were also handed to the commission showing the actual distribution of total earnings, adding to actual revenue from each passenger an arbitrary proportion of earnings from other sources. The figures shown for the year 1912 were as follows:

	Cents
Maintenance of way and structures	0.004372
Maintenance of equipment	0.003184
Power	0.005471
Conducting transportation	0.009281
Injuries, damage and insurance	0.001708
Administration expenses	0.002517
Taxes	0.003029
Fixed charges	0.013548
Sinking funds	0.001322
Balance for construction, dividends, etc	0.001813
Total	0.046245

Statements were also filed with the commission showing how the bonds of the Indianapolis Street Railway and bond and stock issues of the Indianapolis Traction & Terminal Company were applied to the construction of terminal buildings and stations, power station machinery, cars and equipments, new track construction, etc., and the proportion of stock and bonds issued as part consideration for the purchase of the property, franchise and assets of the Citizens' Street Railroad, which was taken over by the Indianapolis Street Railway. A statement showing the number of cars purchased under car trust certificates was also filed with the commission, giving the amount of such certificates still outstanding.

Otto Frenzel, president of the Merchants' National Bank, Indianapolis, appeared as the last witness for the company, giving his views as to the business outlook for the next three years, which is the length of time the decision of the commission will be binding upon the company and its employees. Mr. Franzel said in part:

"In my judgment it is not the proper time now to expand. A general curtailment in industrial and commercial lines has been going on for the last twelve months. The financial conditions of the country were such that this had to be done in order to avoid serious disturbances and possibly a panic. This has resulted in many men being let out of employment. It makes no difference what conditions come up to make the future look brighter, they cannot be brought to bear on general conditions so as to justify going ahead full tilt as in the past."

Counsel for the employees submitted a statement showing that the local union had 1270 members on Jan. 1, 1914, and that the annual receipts from dues from this membership would be $15,240, of which half would go to the international organization and half to the local. The president of the local receives a salary of $1,320 a year, financial secretary $1,320 a year, recording secretary $192 a year, twenty delegates to the Central Labor Union $120 a year, five dues collectors $210 a year, hall and office rent $456, telephone $18, light, stationery and stamps (estimated) $84, and monthly buttons $185 a year.

Amendments to Kansas City Ordinance Considered

One of the important developments of the week ended Jan. 3, 1914, in connection with the consideration of the new franchise ordinance of the Metropolitan Street Railway, Kansas City, was a proposal to use Convention Hall as an interurban passenger station. The suggestion was informal, but was approved by Frank Hagerman, attorney for the receivers for the company. Convention Hall is located at Thirteenth and Central Streets and would be available for a depot with a few changes. Most of the sessions of the Council committee hearing amendments to the ordinance were spirited. Mayor Jost charged Alderman Edwards with attempting to "load" the ordinance with so many amendments that the receivers for the company would be forced to decline the grant. The following amendments were accepted and held for further consideration:

Preserving in the contract an agreement to build the Woodland and Prospect Avenue crosstown lines as assents for them were secured during the life of the existing franchise.

Including the surrender of all existing franchises held by the companies connected with the Metropolitan Street Railway.

Excluding franchise value from the capital value.

Third man to arbitrate technical questions when the board of control disagree, he to be disinterested, experienced and competent to pass on such questions to be arbitrated.

The board of control to furnish proper equipment without unnecessary delay.

Alderman Hoffman's amendment providing for six tickets for a quarter or twenty-five for $1 is pending. The receivers stated, however, that such a provision would mean bankruptcy for the company.

On Jan. 6 a letter was read from R. J. Dunham, one of the receivers for the company, asking that the committee cease consideration of the ordinance and leave the disposition of the property to the bondholders and creditors. Mr. Dunham asserted that the committee had not dealt fairly or sincerely with the receivers in its work, and he made his request in view of that fact. Alderman Edwards, who has held out for six tickets for 25 cents since the committee has been in session, suggested that before adjourning the committee report the ordinance back to the Council unfavorably. Though Alderman Hoffman seconded this motion, the adjournment was made without voting on it. The letter from Mr. Dunham was addressed to Forrest A. Brown, chairman of the joint committee, and read as follows:

"It has been apparent for some time that certain mem-

bers of your committee are not in sympathy with Mayor Jost and his policies, and that they are determined to 'play politics' against him upon every feature of the pending proposition for the people to vote for or against a settlement of the street railway problem. The purpose seems to be to offer every conceivable and impossible amendment, not to better the proposed contract, but to belittle the efforts of the Mayor and in the end prevent the people from voting upon the proposition. It was at first hoped there was some mistake about the purpose. The last few meetings, however, have demonstrated that the matter is being deliberately precipitated into a political contest over an effort to settle a vexatious problem upon non-political and business grounds.

"In view of the foregoing situation, speaking for myself in the absence of my associate, Mr. Harvey, and subject to his approval, I think there is nothing to do but to ask you to withdraw your further consideration of the ordinance, leaving the disposition of the property to the bondholders and creditors. Vast interests are in jeopardy and enormous sums of money must be raised to put the property in shape to meet the demands of the public. The contract must be approved by a high court, the Public Service Commission and the people at large. To permit the franchise to be made a football in politics upon the eve of a city election is not only unfair to those to whom it is to be submitted, but makes ludicrous every effort made by the receivers in good faith to adjust the matter upon broad principles."

Committee on Interurban Lines at New Orleans.—The Association of Commerce of New Orleans, La., has announced the appointment of a special committee of seven to investigate the question of interurban development in its relation to New Orleans.

Missouri Road to Install Block Signals.—J. R. Harrigan, general manager of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., appeared before the Missouri Public Utilities Commission recently to urge the commission to permit the company to issue securities of a par value of $125,000 to provide funds to install a block signal system on the road.

Portland, Eugene & Eastern Railway to Begin Operations in January.—Officials of the Portland, Eugene & Eastern Railway, a subsidiary of the Southern Pacific Company, have announced that the electrification of the line between Portland and McMinnville will be completed in January and that electric trains will then be placed in operation. McMinnville is located 30 miles north of Dallas, Ore., and ultimately the Portland, Eugene & Eastern Railway will electrify the entire line from Portland as far south as Eugene.

Hearing on Signals Before Missouri Commission.—Signal officials of steam and electric roads operating in Missouri met at Jefferson City recently for the purpose of discussing methods of installing and operating signals for the protection of life and property. The meeting was held at the call of the Missouri Public Utilities Commission, which is expected to issue orders covering this phase of the service shortly. Tentative orders were recently issued, but will not become permanent until an announcement to that effect is made.

Progress with Electrification of London & Port Stanley Railway.—The city of London, Ont., has concluded an agreement with the Père Marquette Railway by which that company will continue the arrangement whereby the Michigan Central Railroad enters London as a tenant of the Père Marquette Railway until the electrification of the London & Port Stanley Railway is completed. The commission which has been appointed to take charge of the London & Port Stanley Railway is making every effort to get the work of electrification under way, and it is expected that the city will be ready to operate the road with electricity by September, 1914.

Installing Signals Between Seattle and Tacoma.—The material has all been ordered and some of the preliminary work has been done on the work of setting up the signals to be used in the Puget Sound Electric Railway Company's new block signal system between Seattle and Tacoma, Wash. The signals are to commence from the Tacoma end at Puyallup Avenue, in the East End of Tacoma, and will stop at the Meadows Race Course, in Seattle. The signals will cover the 28¾ miles of interurban line between the two cities. The signals are being furnished by the General Railway Signal Company, Rochester, N. Y. They are of the automatic three-position type and will be placed about 1½ miles apart.

Open Subway Suggested for Philadelphia.—Plans for an open subway in the South Broad Street boulevard, below the Plaza, and to extend to League Island Park, have been submitted to the art jury by A. Merritt Taylor, transit director of Philadelphia. The plans are for an open subway which will cost approximately $950,000 less than a covered subway. Mr. Taylor urges the necessity of the immediate adoption of the suggestions as the contract has been awarded for the completion of the boulevard, and its construction under present specifications will interfere with the plans for the subway. Bridges will span the subway at street crossings, the embankments will be planted with shrubs and ornamental trees, and iron railings and balustrades will guard its approach.

Annual Report of Boston Transit Commission.—The nineteenth annual report of the Boston (Mass.) Transit Commission has been made public. It consists of the usual data as to the cost of subways built in Boston since the organization of the board in 1894, a discussion of recent progress in subway construction, engineering studies and reports. Under the supervision of the commission $22,213,860 has been expended and of this $2,062,733 represents the cost of the Boylston Street subway to June 30, 1913. This line is reported as 75 per cent completed between the western portal and Arlington Street. The commission is to report to the next Legislature upon the choice of a terminal, Park Street and Post Office Square being under consideration. Steady progress has been made upon the extension of the Cambridge subway connection toward the South Station, the structure being now under construction as far east from Park Street as Arch Street. The Bowdoin Square extension of the East Boston tunnel is also well along. Many engineering data are included in the report of Edmund S. Davis, chief engineer. This report is incorporated in the volume, together with various appendices containing compilations of legislation, bids and other matter related to the commission's activities.

PROGRAMS OF ASSOCIATION MEETINGS

Southwestern Electrical & Gas Association

Through a mistake in printing the circular of Nov. 17, announcing the place and date of the 1914 convention of the Southwestern Electrical & Gas Association, the dates were given as May 22, 23, 24 and 25. This was an error. The convention will be held at Galveston, Tex., on May 20, 21, 22 and 23, 1914.

American Wood Preservers' Association

The tenth annual convention of the American Wood Preservers' Association will be held at the St. Charles Hotel, New Orleans, La., Jan. 20, 21 and 22, 1914. The session on the morning of Jan. 20 will be given over to the address of welcome, the presentation of the president's address and the report of the secretary-treasurer. At the session on the afternoon of Jan. 20 the report of the standing committee on preservatives will be presented by the chairman, E. F. Bateman, and the entire session will be devoted to the subject of preservatives. At the morning session on Jan. 21 the subject "Wood Block Pavement" will be considered, while in the afternoon the subject "Ties, Timbers, Piling and Cross Arms" will be considered. Plant operation and miscellaneous subjects will be considered at the forenoon session on Jan. 22. G. B. Shipley, chairman, will present at this session the report of the standing committee on plant operation and Lambert T. Ericson, assistant superintendent of the Port Reading creosoting plant, will read a paper "Mechanical Handling of Railroad Cross Ties and Timbers at Timber Preservation Plants."

Financial and Corporate

Stock and Money Markets

Jan. 7, 1914.

Nearly all the important issues traded in on the New York Stock Exchange made gains to-day. Among the exceptions were Union Pacific and Baltimore & Ohio, there being considerable uncertainty as to the effect of the distribution of Baltimore & Ohio stock by the Union Pacific. In the last half of the forenoon price movements were narrow and without much importance. There was a generally firm tone to the trading during the last hour. Rates in the money market to-day were: Call, 2@3 per cent; sixty days to six months, 4½@4¾ per cent.

In the Philadelphia market local utility issues were the strongest features at the opening. Union Traction advanced to 45⅛.

Specialties were the feature of the stock market in Chicago to-day. The volume of business was fair, but prices were irregular.

Except for a drop of a point in American Telephone, the losses were confined to small fractions in Boston.

The market in Baltimore was strong to-day and trading was fairly active. The sales of stock totaled 468 shares and the sales of bonds $59,700, par value.

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

	Dec. 30	Jan. 7
American Brake Shoe & Foundry (com.)	90	90
American Brake Shoe & Foundry (pref.)	127	127
American Cities Company (com.)	36	36
American Cities Company (pref.)	61	60¼
American Light & Traction Company (com.)	335	337
American Light & Traction Company (pref.)	106	106
American Railways Company	38	38
Aurora, Elgin & Chicago Railroad (com.)	42	38½
Aurora, Elgin & Chicago Railroad (pref.)	83	83
Boston Elevated Railway	85½	87⅝
Boston Suburban Electric Companies (com.)	7	7
Boston Suburban Electric Companies (pref.)	58	*58
Boston & Worcester Electric Companies (com.)	*6½	*6½
Boston & Worcester Electric Companies (pref.)	36½	36½
Brooklyn Rapid Transit Company	87⅞	88
Capital Traction Company, Washington	111	112¾
Chicago City Railway	160	160
Chicago Elevated Railways (com.)	25	25
Chicago Elevated Railways (pref.)	75	75
Chicago Railways, ptcptg., ctf. 1	90	91
Chicago Railways, ptcptg., ctf., 2	28	27¾
Chicago Railways, ptcptg., ctf. 3	7	6
Chicago Railways, ptcptg., ctf. 4	1¾	2
Cincinnati Street Railway	102	102
Cleveland Railway	103½	104¾
Cleveland, Southwestern & Columbus Ry. (com.)	*5½	5
Cleveland, Southwestern & Columbus Ry. (pref.)	30	26
Columbus Railway & Light Company	18	18
Columbus Railway (com.)	59¼	47
Columbus Railway (pref.)	88	76
Denver & Northern Railway	*80	70
Detroit United Railways	80	a80
General Electric Company	138¾	140¾
Georgia Railway & Electric Company (com.)	120	120
Georgia Railway & Electric Company (pref.)	84	84
Interborough Metropolitan Company (com.)	14¾	15
Interborough Metropolitan Company (pref.)	60	61
International Traction Company (com.)	*30	30
International Traction Company (pref.)	*90	90
Kansas City Railway & Light Company (com.)	*20	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	125
Massachusetts Electric Companies (com.)	13	11
Massachusetts Electric Companies (pref.)	63½	64
Milwaukee Electric Ry. & Light Co. (pref.)	*95	95
Norfolk Railway & Light Company	*24¾	24¾
North American Company	67	67
Northern Ohio Light & Traction Co. (com.)	58	60
Northern Ohio Light & Traction Co. (pref.)	101	101
Philadelphia Company, Pittsburgh (com.)	40⅞	39
Philadelphia Company, Pittsburgh (pref.)	40	40
Philadelphia Rapid Transit Company	18½	18¾
Portland Railway, Light & Power Company	53	48
Public Service Corporation	107	109
Third Avenue Railway, New York	41⅝	43½
Toledo Traction, Light & Power Co. (com.)	20	20
Toledo Traction, Light & Power Co. (pref.)	80	80
Twin City Rapid Transit Co., Min'apolis (com.)	106	104¾
Union Traction Company of Indiana (com.)	*11½	11½
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
United Rys. Inv. Company (com.)	21¼	20
United Rys. Inv. Company (pref.)	39	39
Virginia Railway & Power Company (com.)	50	50
Virginia Railway & Power Company (pref.)	98	95
Washington Ry. & Electric Company (com.)	85½	85¾
Washington Ry. & Electric Company (pref.)	87	87
West End Street Railway, Boston (com.)	69	69
West End Street Railway, Boston (pref.)	90	87
Westinghouse Elec. & Mfg. Company	65½	66
Westinghouse Elec. & Mfg. Co. (1st pref.)	116¼	116¼

* Last sale. a Asked.

ANNUAL REPORT

British Columbia Electric Railway Company, Ltd.

The revenue and expenditure statement of the British Columbia Electric Railway Company, Ltd., for the fiscal year ended June 30, 1913, is as follows:

Gross income	£542,489
Registration fees, etc.	421
Total income	£542,910
Renewals, maintenance	£140,654
Directors' fees and percentage in accordance with articles of association	8,733
Office rent and salaries, printing and stationery, advertising, general, legal, traveling, audit and agency expenses	8,900
Trustees' fees	837
Capital amortization fund	2,361
Total	£161,486
Net income	£381,424
Interest:	
On 4½ per cent first mortgage debentures	£10,039
On 4½ per cent (Vancouver Power) debentures	4,625
On 4¼ per cent perpetual consolidated debenture stock	110,518
Total	£125,182
Surplus for period	£256,242
Brought forward from last year	7,732
Surplus as per balance sheet	£263,974

Michael Urwin, secretary of the company, in his annual report to the stockholders in London on Dec. 19, 1913, said in part:

"For the twelve months to June 30, 1913, the gross receipts show an increase of $1,035,869, or over 17 per cent, and the net earnings, including income from investments and subsidiary companies, show an increase of $77,552, or 4 per cent, over the preceding year, but the surplus over the amount required to pay interest and dividends has fallen from £67,670 to £28,242.

"There has been added to the reserve fund £67,544, representing the premiums or amount by which the price paid into the company's treasury exceeded the par value of £1,320,000 new share capital issued during the year, less expenses thereon, and after deducting the expenses and discount on an issue of £750,000 4¼ per cent debenture stock issued in January last. The reserve fund will now amount to £553,000.

"The growth of the company is indicated by an increase of 72.07 miles of single track in operation during the year and an increase of 148 in the total number of cars of all kinds. The number of passengers carried during the year was 71,973,822, an increase for the year of 9,819,656. The number of lamps in use at June 30, 1913, was 920,916, an increase for the year of 185,490.

"The dam and other works at Lake Coquitlam, which have been under construction for three years, were completed in July last. The company now has an available reserve of over 57,000,000 kw-hr. of electrical energy. The new power house at Lake Buntzen has been completed, and the first of the three additional units to be installed therein is now in operation. A satisfactory contract has been entered into with the Western Canada Power Company, under which the company agrees to purchase a gradually increasing amount of power during the next twenty years. The extension of the Jordan River hydroelectric power installation has been proceeded with during the year that has just closed.

To secure the necessary water storage to supply the additional units a permanent reinforced concrete dam of the Ambursen type has been completed. By the completion of this dam the total maximum available water storage is increased to 927,900,000 cu. ft., equivalent to a reserve of approximately 14,500,000 kw-hr. of electrical energy. The installation of the auxiliary steam plant at Brentwood Bay, 12 miles from Victoria, has been completed and has a present capacity of 6000 hp. In June last the new Saanich suburban line was formally opened for traffic. This line, approximately 23 miles in length, runs through the center of the Saanich peninsula and opens a very fertile tract of country which up to the present time has always been without satisfactory railway connection with the city of Victoria."

Corporate Financing During 1913

In an article published in the Jan. 2 issue of the *Wall Street Journal* it is stated that a careful revision of the figures of corporate financing in the United States during the past two years discloses the fact that the year 1913 was not $90,000,000 behind 1912 in the total of new issues sold. The aggregate originally shown for 1912 included some issues—notably $170,000,000 Interborough Rapid Transit bonds—which were underwritten in that year but none of which was actually sold until 1913. Revision of the 1912 figures to eliminate all securities not marketed during that year brings the total down to $1,779,482,520, which compares with an amount of approximately $1,690,282,000 in 1913.

In view of the unsettled conditions that prevailed in the investment market in the past year, this total of $90,000,000 below 1912 is remarkable. To do that much financing in a year like 1913, however, short-term notes had to be used to a much greater extent than in previous years. Over $200,000,000 fewer bonds were sold last year than in 1912 and nearly $300,000,000 less than in 1911; while $123,000,000 more notes were disposed of than in 1912 and $236,000,000 more than in 1911. Last year $194,000,000 less stock was sold than in 1911. The following table shows the change from bonds to notes in the past two years and also the decline in the use of stocks as a corporate financing medium:

	1913	1912	1911
Stocks	$423,481,210	$431,524,720	$617,787,450
Bonds	650,417,600	855,127,280	948,586,000
Notes	616,383,500	492,830,520	379,659,000
Total	$1,690,282,310	$1,779,482,520	$1,946,032,450

The increase in note issues in 1913 was largely due to the fact that railroads financed nearly half of their requirements by that method. The following figures show the changes in the forms of securities used by the different groups of companies:

	1913	1912
Railroads		
Stocks	$234,157,600	$130,100,000
Bonds	303,777,600	323,329,000
Notes	420,701,000	279,389,000
Public Utilities		
Stocks	68,218,850	100,236,720
Bonds	280,595,000	358,427,280
Notes	104,732,500	159,469,520
Industrials		
Stocks	121,109,760	201,188,000
Bonds	66,045,000	173,371,000
Notes	90,950,000	53,972,000
Total	$1,690,282,310	$1,799,482,520

Railroads secured more than half the money on new security issues in 1913, in comparison with less than half the preceding year. The division of new securities among the different classes of companies during the past two years was as follows:

Railroad issues, $958,636,200 in 1913 and $732,818,000 in 1912; public utility issues, $453,546,350 in 1913 and $618,123,520 in 1912; industrial issues, $278,099,760 in 1913 and $428,531,000 in 1912.

The important public utility issues in the electric railway field durng 1913 were as follows:

(1) Bonds.—Interstate Railways, $3,832,000; South Carolina Light, Power & Railways, $3,000,000; Toledo Traction, Light & Power Company, $5,822,000; Chicago Railways, $8,000,000; Los Angeles Railway, $3,000,000; New York State Railways, $2,748,000; Philadelphia Rapid Transit Company, $4.500.000; New Orleans Railway & Light Company, $4,000.000; Interborough Rapid Transit Company, $50,000.000, and Pacific Gas & Electric Company, $5,000.000.

(2) Stocks.—Boston Elevated Railway, $4,000,000; Cleveland Electric Railway, $3,600,000; United Light & Railways Company, $2,000,000; National Properties Company, $1,649,000; Public Service Company of Northern Illinois, $2,000,000; Central Arkansas Railway & Light Company, $1,500,000, and Northern Ohio Traction & Light Company, $2,640,000.

(3) Notes.—Massachusetts Electric Companies, $3,100,000; Cities Service Companies, $5,090,000; Middle West Utilities Company, $3,500.000; Public Service Company of Northern Illinois, $2,500,000; Birmingham-Tuscaloosa Railway & Utilities Company, $3,500,000, and Interborough-Metropolitan Company, $1,500,000.

J. P. Morgan & Company Resign from Directorates

Announcements have been made of the resignations of members of the firm of J. P. Morgan & Company from the directorates of a number of organizations in which the firm has been interested. J. P. Morgan retires as a director from eighteen companies, including the New York Central & Hudson River Railroad, the New York, New Haven & Hartford Railroad, the New York, Westchester & Boston Railway, the Millbrook Company and the Rhode Island Company. The other members of the firm, Charles Steele, H. P. Davison, W. H. Porter and Thomas W. Lamont, have also given up some of their directorships. In the statement given out to the press Mr. Morgan says: "An apparent change in public sentiment in regard to directorships seems now to warrant us in seeking to resign from some of these connections. Indeed, it may be, in view of change of sentiment upon this subject, that we shall be in a better position to serve such properties and their security holders if we are not directors. We have already resigned from several companies and we expect from time to time to withdraw from other boards upon which we feel there is no special obligation to remain."

Bay State Street Railway, Boston, Mass.—A semi-annual dividend of 3 per cent was paid on Dec. 31 on the $20,517,200 of common stock of the Bay State Street Railway, practically all of which is owned by the Massachusetts Electric Companies. This dividend compares with 2½ per cent on June 30, 1913, 3 per cent on Dec. 31 and 2 per cent on June 26, 1912, and 3 per cent on Dec. 30, 1911.

Bristol & Plainville Tramway, Bristol, Conn.—New officers have been elected as follows for the Bristol & Plainville Tramway, control of which has passed to Richter & Company, Hartford, Conn., as noted in the ELECTRIC RAILWAY JOURNAL of Dec. 6, 1913, page 1208: Charles H. Tenney, chairman of the board; A. B. Tenney, president; D. Edgar Manson, vice-president; Morris L. Tiffany, secretary and treasurer; Charles H. Tenney, Springfield; A. B. Tenney, Boston; John T. Trumbull, Plainville; Rolin J. Plumb, Terryville; Robert F. Briggs, Waterbury; Noble E. Pierce, Bristol, and W. H. Putnam and Ferdinand Richter, Hartford, directors.

California Railway & Power Company, San Francisco, Cal.—The Bankers' Trust Company, agent, has drawn by lot for redemption 1000 shares of the prior preference stock of the California Railway & Power Company. Notices will be mailed to stockholders owning shares so drawn for redemption.

Cape Girardeau-Jackson Interurban Railway, Cape Girardeau, Mo.—The Cape Girardeau-Jackson Interurban Railway has asked the Public Service Commission of Missouri for permission to dispose of the line in Cape Girardeau to the Light & Development Company, St. Louis, the transaction involving a transfer of $300,000 of stock.

Cleveland (Ohio) Railway.—The directors of the Cleveland Railway have authorized a 10 per cent increase in the capital stock, or $2,164,000. The matter is now to go before the stockholders and the State Utilities Commission for approval. Stockholders are to be permitted to subscribe for the new stock at the rate of one share for ten now held. They will have the privilege of paying half the subscription on April 1 and half on July 1, or all on April 1. The right to subscribe goes to holders of record of March 1. The money to be obtained from the stock is to be used for improvements that have been approved by the city authorities.

Columbus Railway & Light Company, Columbus, Ohio.—At the annual meeting of the stockholders of the Columbus Railway & Light Company, on Jan. 5, 1914, owners of practically 75 per cent of the stock voted to dispose of the operating contracts and assets to the new Columbus Railway, Power & Light Company. This step cancels the lease between the Columbus Railway & Light Company and the Columbus Traction Company. The lease of the Columbus Railway property is also assigned to the new corporation, as well as that of the Columbus Edison Company. The stockholders of the Columbus Railway & Light Company are to receive $3,000,000 of the common stock of the new company after the payment of an assessment of

20 per cent on the present $5,000,000 of stock outstanding. The refusal of the stockholders of the Columbus Light, Heat & Power Company to allow the cancellation of the lease will necessitate the continuance of the old company in existence. The plans for the consolidation of the companies were reviewed in the ELECTRIC RAILWAY JOURNAL of Dec. 27, 1913, page 1352.

East St. Louis & Suburban Company, East St. Louis, Ill.—Francis Brothers & Company, St. Louis, are offering at 95 and interest to yield over 7 per cent a small lot of the new convertible 6 per cent gold bonds of the East St. Louis & Suburban Company, dated Jan. 1, 1914, due Jan. 1, 1919, par $1000, $500 and $100. These bonds are convertible at any time prior to July 1, 1918, into an equal amount of 6 per cent cumulative preferred stock, with 33 1/3 per cent in common stock in addition.

Erie & Central Pennsylvania Railway, Titusville, Pa.—On Dec. 8 the property of the Erie & Central Pennsylvania Railway was sold at foreclosure sale at the instance of the Franklin Trust Company, trustee, to W. N. Bonynge, New York, for $56,000. A new company, known as the Titusville & Cambridge Railway, with a capital stock of $1,000,000 and no bond issue, has been organized to take over the railway, which has at present about 1 mile constructed. It is reported that it is the intention of the new owners to complete the line under construction between Titusville and Cambridge Springs. The original plan calls for an electric railway line to connect Erie with Titusville by means of Cambridge Springs and to continue southward to Oil City and Punxsutawney.

Goldsboro (N. C.) Traction Company.—The Goldsboro Traction Company has been sold at foreclosure sale by R. W. Winston, Jr., to the Mercantile Trust & Deposit Company, Baltimore. Since this foreclosure sale the railway property has been re-sold by the Mercantile Trust & Deposit Company to interests who intend to take it over and run it, but at the present time no definite information is available in regard to this second sale.

Hershey (Pa.) Transit Company.—The Lebanon & Campbellstown Street Railway and the Hummelstown & Campbellstown Street Railway have merged into the Hershey Transit Company; capital, $75,000. The directors are M. S. Hershey, president, Hershey; W. H. Lebkicker, Lancaster; S. C. Stecher, Hummelstown, and J. B. Leitheiser and John E. Snyder, Hershey.

Idaho Railway, Light & Power Company, Boise, Idaho.—Judge Dietrich in the United District Court at Boise on Dec. 23, upon application by the Westinghouse Electric & Manufacturing Company as creditor to the extent of about $40,000, placed the property of the Idaho Railway, Light & Power Company in the hands of General Manager O. G. F. Markhus as receiver. The receiver will take direct charge of all the company's power properties, which include the Swan Falls power plant and the transmission lines, and the distributing plants at Nampa, Caldwell, Middletown, Star and Eagle. The company's traction properties, including the local street-car system and the interurban lines between Boise, Nampa and Caldwell, will be operated through the Idaho Traction Company as lessee. Thus the traction properties are not directly affected by the receivership, although it is stated that they may be included later.

Interborough Rapid Transit Company, New York, N. Y.—The full allotment of Interborough Rapid Transit Company first mortgage 5 per cent bonds, amounting to $78,000,000 for the first year, have been taken by J. P. Morgan & Company, the head of a syndicate which is to underwrite the $170,000,000 of bonds necessary to provide funds to complete the subway and elevated construction and improvement program in New York. Of the total bonds sold by the company about $16,000,000 were utilized in paying off $15,000,000 of notes; about $35,000,000 to retire $33,000,000 of old bonds, and the balance for actual construction work. During each of the next two years the firm agrees to take $30,000,000 of the bonds and in the fourth year $32,000,000, which will absorb the entire $170,000,000.

Ithaca (N. Y.) Street Railway.—The foreclosure sale of the Ithaca Street Railway, which, as noted in the ELECTRIC RAILWAY JOURNAL of Oct. 25, 1913, was set for Dec. 2, 1913, has been postponed until Jan. 13, 1914. The sale of the New York, Auburn & Lansing Railroad, in accordance with a reorganization plan submitted to the Columbia & Knickerbocker Trust Company, was to have taken place at the same time as the foreclosure sale of the Ithaca Street Railway, but the exact date of sale of the former road has not been set.

Joliet & Southern Traction Company, Joliet, Ill.—The sale of the property of the Joliet & Southern Traction Company, set for Jan. 28, as noted in the ELECTRIC RAILWAY JOURNAL of Dec. 20, 1913, will take place instead on Feb. 11 at Geneva, the county seat of Kane County. Several dates of sale have been mentioned, but this date has been set by the court itself.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—Application has been made by The Milwaukee Electric Railway & Light Company to the Wisconsin Railroad Commission for permission to issue $3,500,000 of 4½ per cent refunding and extension mortgage twenty-five-year bonds. These bonds are to be deposited as additional security under the general and refunding mortgage 5's of 1911, as from time to time the general and refunding bonds may be issued, the collateral bonds being issuable at the rate of only $1,000,000 yearly.

New York, New Haven & Hartford Railroad, New Haven, Conn.—In connection with the recent conferences between Attorney-General McReynolds and Howard Elliott, chairman of the board of directors of the New York, New Haven & Hartford, for a readjustment of the New York, New Haven & Hartford Railroad without litigation, the railroad on Jan. 6 filed with the Interstate Commerce Commission a petition that it be allowed to continue the operation of its present steamship lines. The Interstate Commerce Commission is drawn into the New Haven readjustment because under the Panama Canal act it has jurisdiction to determine whether a joint rail and water service "is of advantage to the convenience and commerce of the people." The New Haven petition recites that its rail and water service throughout New England is of public benefit. It is understood that the main point of difference between the Department of Justice and the railroad is over ownership of the electric railways now controlled by the New Haven railroad. It is said that the Department of Justice may pass up to the Interstate Commerce Commission the two correlated questions of the New Haven's ownership and control of the steamship lines and the electric railways.

Northern Ohio Traction & Light Company, Akron, Ohio.—With the view of providing for floating debt incurred for improvements, the Northern Ohio Traction & Light Company recently sold to Borton & Borton, Cleveland, an additional $210,000 of 6 per cent cumulative preferred stock, subject to the approval of the Ohio Public Utilities Commission. This leaves available of the original $3,000,000 issue only $150,000, which is held for double tracking. It is announced that the shareholders will vote on Jan. 24 on increasing the authorized limit of the preferred shares to $5,000,000 for the purpose of financing further additions, extensions, etc., from time to time required. It will be provided that no additional preferred stock shall be sold except when the annual net earnings applicable to dividends are equal to three times the preferred dividends on the preferred outstanding and that about to be issued. At the meeting on Jan. 24 the stockholders will also be asked to approve the action of the directors in providing payment of the federal income tax on the various bond issues of the company. The official circular also states that the stockholders will vote on acquiring the title to the property and rights of the Northern Ohio Power Company, which owns a power plant at Cuyahoga Falls.

Omaha & Council Bluffs Street Railway, Omaha, Neb.—The Omaha & Council Bluffs Street Railway on May 1 will redeem the $1,846,000 of outstanding bonds of the Omaha Street Railway by an issue of $2,000,000 of first consolidated 5's due Jan. 1, 1928. This new issue has been purchased by A. B. Leach & Company, New York, N. Y., and is being offered at 97 and interest.

Pekin & Petersburg Interurban Railway, Pekin, Ill.—The property of the Pekin & Petersburg Interurban Railway has been sold by the master in chancery to Walter E. Lautz, representing the bondholders.

Rhode Island Company, Providence, R. I.—According to the report of the Rhode Island Company for the year ended June 30, 1913, filed with the State Board of Public Utilities, the company paid into the treasury of the New York, New Haven & Hartford Railroad for the year ended June 30, 1913, dividends of 6 per cent, amounting to $581,130 on the $9,685,500 of outstanding stock. The dividend record of the company follows: June 30, 1909, 5 per cent; 1910 and 1911, 6 per cent; in 1912, 3 per cent. The surplus of the company for the year ended June 30, 1913, was $88,920, while the accumulated surplus at the close of the year was $1,129,528.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—On Dec. 12 the San Francisco-Oakland Terminal Railways paid the six months' interest at the rate of 7 per cent per annum on $2,500,000 of 6 per cent ten months' gold notes of the Oakland Railways due June 12, 1913. The *San Francisco Chronicle* states: "Although the notes bear only 6 per cent the interest was paid at the rate of 7 per cent in consideration of the forbearance of the holders, who did not press the collection of the principal at maturity."

Sheboygan Railway & Electric Company, Sheboygan, Wis.—The stock control of the Sheboygan Railway & Electric Company was recently transferred to local capitalists headed by Peter Reiss and John Reiss. Ernest Gonzenbach, president and general manager, and W. O. Morgan, vice-president, have resigned, and Peter Reiss has been elected president of the company.

Stone & Webster, Boston, Mass.—Stone & Webster have issued a sixteen-page pamphlet describing the securities of the following companies managed by the Stone & Webster Management Association, which they offer and recommend at this time, subject to previous sale and change in price: Connecticut Power Company, Dallas Electric Company, Eastern Texas Electric Company, Galveston-Houston Electric Company, Mississippi River Power Company, Northern Texas Electric Company, Public Service Investment Company, Puget Sound Traction, Light & Power Company, Railway & Light Securities Company, Sierra Pacific Electric Company and Tampa Electric Company. The circular is introduced with a complete list of the properties under the management of the Stone & Webster organization.

West End Street Railway, Boston, Mass.—A bill in equity was filed in the United States District Court in Boston on Dec. 31 by Amy Curtis, of Pau, France, as the owner of thirty-five shares of preferred and fifty shares of common stock of the West End Street Railway, against that company and the Boston Elevated Railway, with the view of preventing the sale of the former to the latter under an Act of the Legislature in 1911. The suit makes numerous allegations against the validity of this legislation. It is further charged that the legislative act, sanctioning the merger of the Boston Elevated Railway with the West End Street Railway on expiration of its lease in 1922, is illegal, unconstitutional and void. Following a formal vote last year approving the merger, a suit was brought by a bondholder. The decision was adverse to the complainant.

Dividends Declared

Athens Railway & Electric Company, Athens, Ga., quarterly, 1¼ per cent, preferred.

Aurora, Elgin & Chicago Railroad, Wheaton, Ill., quarterly, 1½ per cent, preferred; quarterly, three-quarters of 1 per cent, common.

Bay State Street Railway, Boston, Mass., 3 per cent, common.

London (Can.) Street Railway, 3 per cent.

Metropolitan West Side Elevated Railway Company, Chicago, Ill., quarterly, 1¼ per cent, preferred; 1 2/10 per cent, common.

Omaha & Council Bluffs Street Railway, Omaha, Neb., quarterly, 1¼ per cent, common and preferred.

Ottumwa Railway & Light Company, Ottumwa, Ia., quarterly, 1¾ per cent, preferred.

Scioto Valley Traction Company, Columbus, Ohio, quarterly, 1¼ per cent, first preferred and preferred.

South Side Elevated Railroad, Chicago, Ill., quarterly, 1¾ per cent.

Western Ohio Railway, Lima, Ohio, quarterly, 1¾ per cent, first preferred; quarterly, 1½ per cent, second preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

Period		Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Nov.,	'13	$76,365	*$73,271	$3,094	$15,344	†$12,250
1 " "	'12	72,621	*72,217	408	11,723	†11,315
5 " "	'13	465,957	*379,174	86,255	75,358	10,897
5 " "	'12	443,058	*385,418	57,640	62,537	†4,897

CONNECTICUT COMPANY, NEW HAVEN, CONN.

1m., Nov.,	'13	$645,252	*$550,349	$94,903	$88,371	$6,532
1 " "	'12	608,315	*442,332	165,983	86,498	79,485
5 " "	'13	3,760,009	*2,640,578	1,119,430	448,779	670,651
5 " "	'12	3,476,689	*2,287,038	1,189,650	432,902	756,747

GRAND RAPIDS (MICH.) RAILWAY

1m., Nov.,	'13	$100,791	*65,421	$35,370	$11,787	$23,583
1 " "	'12	100,776	*58,883	41,893	14,363	27,530
12 " "	'13	1,279,595	*790,569	489,026	168,463	320,563
12 " "	'12	1,235,219	*694,788	540,431	175,530	364,901

LEHIGH VALLEY TRANSIT COMPANY, ALLENTOWN, PA.

1m., Nov.,	'13	$191,199	*$57,262	$133,937	$71,339	$62,598
1 " "	'12	184,852	*53,803	131,049	45,282	85,767
12 " "	'13	1,764,998	*740,281	1,024,717	578,144	446,573
12 " "	'12	1,526,777	*650,079	876,697	502,255	374,442

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, MAINE

1m., Nov.,	'13	$51,794	$34,835	$16,959	$15,338	$1,621
1 " "	'12	47,844	31,211	16,633	14,400	2,233
12 " "	'13	672,493	422,884	249,609	178,637	70,972
12 " "	'12	615,746	387,669	228,077	173,121	54,956

MONONGAHELA VALLEY TRACTION COMPANY, FAIRMONT, W. VA.

1m., Nov.,	'13	$83,639	$32,295	$51,345	$25,782	$25,563
1 " "	'12	70,715	25,995	44,720	24,768	19,952
12 " "	'13	872,471	312,446	560,025	271,874	288,151
12 " "	'12	776,165	306,335	469,831	236,324	233,507

NEW ORLEANS RAILWAY & LIGHT COMPANY, NEW ORLEANS, LA.

1m., Oct.,	'13	$594,640	$304,425	$290,215	$207,436	$82,779
1 " "	'12	569,524	282,800	286,724	188,720	98,004
10 " "	'13	5,677,294	2,681,247	2,681,247	2,030,350	650,897
10 " "	'12	5,448,504	2,841,839	2,606,665	1,855,450	751,215

NEW YORK (N. Y.) RAILWAYS

1m., Oct.,	'13	$1,302,080	$761,366	$540,714	$367,787	$172,927
1 " "	'12	1,293,180	761,732	531,348	371,702	159,546
4 " "	'13	4,961,204	2,972,060	1,989,144	1,483,913	505,231
4 " "	'12	4,878,954	2,901,104	1,977,850	1,498,850	479,000

NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.

1m., Nov.,	'13	$24,344	*$16,926	$7,419	$7,626	†$207
1 " "	'12	24,729	*25,530	802	7,105	†7,907
5 " "	'13	185,514	*131,835	53,679	38,367	15,312
5 " "	'12	181,103	*150,493	30,611	34,917	†4,306

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

1m., Nov.,	'13	$36,658	*$54,336	$17,679	$9,576	†$27,255
1 " "	'12	28,605	*43,214	14,609	13,992	†28,601
5 " "	'13	186,918	*248,301	61,383	46,664	†108,047
5 " "	'12	121,110	*234,686	113,575	59,958	†173,533

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

1m., Oct.,	'13	$26,434	*$17,047	$9,388	$7,593	$1,795
1 " "	'12	24,643	*16,389	8,253	7,438	815
12 " "	'13	293,812	*194,748	99,064	89,270	9,794
12 " "	'12	283,399	*188,299	95,100	85,857	9,243

REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO

1m., Nov.,	'13	$251,260	*$151,014	$100,246	$43,517	$56,729
1 " "	'12	233,971	*133,957	100,015	43,662	56,353
12 " "	'13	2,979,608	*1,817,448	1,162,161	536,967	625,134
12 " "	'12	2,638,427	*1,578,557	1,059,871	529,417	530,454

RHODE ISLAND COMPANY, PROVIDENCE, R. I.

1m., Nov.,	'13	$413,312	*$319,898	$93,415	$109,223	†$15,808
1 " "	'12	410,844	*280,875	129,968	102,056	27,912
5 " "	'13	2,470,001	*1,693,502	776,499	530,879	245,620
5 " "	'12	2,416,980	*1,491,550	925,429	510,279	415,150

ST. JOSEPH RAILWAY, LIGHT, HEAT & POWER COMPANY, ST. JOSEPH, MO.

1m., Nov.,	'13	$110,092	*$59,878	$50,214	$20,231	$29,983
1 " "	'12	100,787	*54,495	46,292	19,710	26,582
12 " "	'13	1,245,949	*709,251	536,698	240,881	295,817
12 " "	'12	1,170,366	*667,616	502,750	236,058	266,692

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1m., Nov.,	'13	$751,113	$374.947	$376,166	$148.325	$227.841
1 " "	'12	700,676	347.885	352,791	153,575	199,216
11 " "	'13	8,085,035	4,086,321	3,998,715	1,619,764	2,378,951
11 " "	'12	7,485,814	3,796,657	3,689,156	1,581,366	2,107,790

*Includes taxes.
†Deficit.

Traffic and Transportation

Hearing on Brockton & Plymouth Fares and Service

The Massachusetts Public Service Commission recently gave a hearing at its offices in Boston upon fares and service conditions on the Brockton & Plymouth Street Railway, the petitioners being represented by H. B. Davis, a citizen of Plymouth, and the company by Thomas Hunt, of Gaston, Snow & Saltonstall, Boston. The petitioner requested the restoration of a more frequent car service between the Hotel Pilgrim, and Kingston carhouse and requested the board to examine the financial condition of the road with special reference to the continuance of the existing 6-cent fare unit.

Howard F. Eaton, local manager of the company, stated that under the present schedule cars are operated on two-hour intervals between the Hotel Pilgrim and Cliff Street, Plymouth, the previous service being rendered on a half-hourly basis. The petitioners object to the reduction in service, although under the present schedule hourly cars are operated as far from the center of Plymouth as Cliff Street, which is 0.8 mile from the Hotel Pilgrim. The witness stated that the territory between Cliff Street and the hotel is practically unoccupied during the winter, with the exception of possibly half a dozen houses adjacent to the track. Under the new schedule running time between the hotel and the Kingston carhouse has been reduced from 58 to 45 minutes, the distance being 8 miles. The new schedule calls for five cars, the old timetable demanding six. The inauguration of the new schedule saves the road about $11 per day in platform expenses. Chairman McLeod stated at this point that no great amount of evidence is necessary to convince the board that the change in schedule as effected is not desirable, and that the giving of service every two hours cannot be regarded as the rendering of service under modern conditions in a community like Plymouth, unless the company can show that absolute compulsion or financial conditions have rendered that kind of service necessary.

A. S. Pratt, of Boston, district manager for the Stone & Webster Management Association, then took the stand. He stated that the changes in the schedule were made for economical reasons and that the estimated saving in five months' operation is $2,789. Between Plymouth and Kingston the time has been cut about eight minutes. Traffic counts showed an average of 3.4 passengers on the trips which were eliminated. Mr. Pratt stated that the company pays Stone & Webster about $5,500 per year for its management. The capitalization of the road consists of $260,000 net of bonds outstanding, $110,000 of preferred stock and $295,000 in common stock. The preferred stock was issued through the prestige of Stone & Webster to assist the company in caring for a floating debt of about $150,000. The company has never paid a dividend upon its common stock, and it has been unable to meet proper depreciation charges by about $100,000.

The company's operating costs rose as follows between the years ended Sept. 30, 1909, and Sept. 30, 1913: ratio of total expenses to gross earnings, 70 to 72.6 per cent; ratio of maintenance cost to gross earnings, 16.3 to 18.5 per cent; total expenses per car mile, 18.2 cents to 18.9 cents; wages of platform per car hour, 45.4 cents to 52.3 cents; wages of platform men and car-service expenses per car mile, 4.79 cents to 5.40 cents; maintenance of rolling stock per car mile, 2.21 cents to 2.72 cents. The average revenue per passenger mile is about 1.5 cents. A comparison of the road's receipts for five years under a 5-cent fare unit and for the same period under a 6-cent fare showed average yearly earnings of $103,340 under the former and $111,583 under the latter. During the summer months of the last period about half the passengers obtained a 5-cent fare by the purchase of park tickets. Mr. Pratt stated that the money saved by the new schedule is to be devoted to the purchase of new trucks and to re-wiring of cars at about $100 each. The road earns $5,400 a mile, and to be reasonably prosperous it should earn at least $6,400. The witness described in detail the managerial methods of Stone & Webster, emphasizing the benefits of centralized operation and incidentally pointing out that the average saving to companies under Stone & Webster management through centralized purchasing upon future delivery contracts in force Dec. 2 was 16.6 per cent over and above what the companies would have been obliged to pay if they were not able to participate in these contracts. At the close of the hearing Chairman McLeod stated that the board would probably require some modification in the present schedules leading toward a more frequent service.

The Public Service Commission has issued orders refusing to require the Bay State Street Railway to grant transfer privileges resulting in a 5-cent fare between all parts of Brockton and Whitman or to establish a 5-cent fare between Lynnfield and Central Square, Lynn. In the former case the board points out that the territory receives electric railway service at as low rates as any other portion of the State where similar conditions obtain, and in the latter decision the commission states that it appears that the company is obliged to operate the line at a loss on account of sparse traffic and that the institution of a 5-cent fare would result in a maximum ride of 12.24 miles at that rate.

Baltimore Company Adopts Pension System

On the recommendation of William A. House, president, the United Railways & Electric Company, Baltimore, Md., has adopted a pension plan for the benefit of its employees. The entire expense of the plan is to be borne by the company. All employees other than those on a salary are entitled to the pensions, subject to the following provisions:

"Those who have attained the age of seventy years, whether incapacitated or not.

"Any employee sixty-five to sixty-nine years of age who has become incapacitated.

"Any employee who has not reached the age of sixty-five, but who has been in continuous service for at least thirty years and who has become incapacitated, may be retired with the amount of pension as fixed in paragraphs 'c' or 'd' below.

"Any employee after twenty years of continuous service, if physically or mentally disabled in the company's service."

Pension allowances are divided into four groups as follows:

"(a) If in continuous service twenty years and less than twenty-five years, 30 per cent of the average monthly wage received during the ten years immediately preceding retirement.

"(b) If in continuous service twenty-five years and less than thirty years, 35 per cent of the average monthly wage received during the ten years immediately preceding retirement.

"(c) If in continuous service thirty years and less than thirty-five years, 40 per cent of the average monthly wage received during the ten years immediately preceding retirement.

"(d) If in continuous service thirty-five years or more, 50 per cent of the average monthly wage received during the ten years immediately preceding retirement."

Texas Traction Company's Christmas Letter to Employees

J. F. Strickland, president of the Texas Traction Company and Southern Traction Company, Dallas, Tex., in continuance of his policy of *esprit de corps*, sent each of his employees the following Christmas letter, handsomely bound:

"During the past year we have not only operated the Texas Traction Company but we have completed a line to serve our neighbors in the South.

"The increased patronage extended to us over the Texas Traction Company's lines, and the manner in which we have been received in the South, assures us that we have the co-operation of those who become our patrons. We have constructed these railways for the purpose of serving our neighbors, and we want to serve them better than they have been served before. We want to give first consideration to their safety, and after considering 'safety first,' we want our patrons to be our guests. As our system increases in size and a greater number of people place themselves in our care, the organization becomes more dependent upon us.

"I believe in the fellowship of men. When one of our men extends an extra amount of consideration to the aged, the infirm, or the woman with children and bundles beyond her ability to manage, I do not believe that he is doing it because he is paid for it, but because he is a man and ready to assist in carrying the burdens of others.

"When Texas was young the driver of the stagecoach knew his patrons, could call them by their first names and give them the best he had because he knew they were 'his folks.' Under present conditions it is not possible for us to know all our patrons so intimately, but they are 'our folks,' and the human service which money cannot buy is the service which causes our patrons to feel that they have received something which makes them glad that they have met us.

"A few days ago I overheard a gentleman remark that our trainmen were a very superior lot of men who treated the passengers as though they were members of their own families. I did not know the gentleman, so could not grasp him by the hand and thank him for his remark; but I felt that I had received my Christmas present, for the trainmen are the part of our family through which our guests, the public, receive the impressions on which they base their opinions regarding our entire family.

"Gentlemen, I cannot meet each of you personally to extend a Christmas greeting and godspeed for the New Year, so I am taking this means of grasping your hand and thanking you for your loyal co-operation during the past year. May Christmas Day bring added happiness to you, and may the new year continue to add happiness and prosperity for you and yours."

New Year's Greeting to New York Employees

T. P. Shonts, president of the Interborough Rapid Transit Company and the New York Railways, New York, N. Y., addressed the following communication to the employees of these companies on Jan. 1, 1914:

"Were it possible I should like to shake hands with each employee of the New York Railways on this the first day of the new year and extend to each, on behalf of directors, fellow officials and myself, not only our hearty congratulations and best wishes for the incoming year but our sincere appreciation of loyalty and co-operation in the operation of these properties during the past year; but as it is impossible to deliver this greeting in person, I wish to convey the same sentiments by means of this message to each fellow employee.

"Along with these sentiments there is one request which I would make of all employees, and that is that during 1914 they keep constantly in mind that one of the most important policies of the company is clearly and fully expressed in the words 'safety first.'

"The transportation business as an occupation is and always will be more or less hazardous, and I desire to remind each employee that he owes to himself, to his family, to his fellow employees and to the public the duty of doing at all times all that he can to make his employment and the operation of cars and trains as safe as possible. If this thought is kept constantly in mind, it is certain to result in greater safety to all."

Christmas Entertainment and Profit Sharing in Washington

More than 2000 children of the employees of the Washington Railway & Electric Company, Washington, D. C., gathered at the National Theater on Dec. 30 to participate in the thirteenth annual Christmas entertainment given by the company. There were doll babies for the girls, sleighs and skates for the boys, games for both boys and girls. Every child received a present. However, the part of the show which attracted most attention was the baby contest, a new feature of the Christmas entertainment. Ninety babies were entered. The children were carried to the theater in special cars, and tickets were furnished them for their return, it being impracticable to run specials for the return trip, owing to the heavy traffic in the late afternoon. Clarence P. King, president of the company, opened the festivities with a short address.

The sum of $30,081 was paid out on Jan. 2 by the company to its employees, the payment being the men's share under the company's profit-sharing plan of the profits for 1913. Employees to the number of 830 participated in the profit-sharing, the list including conductors, motormen, depot clerks, starters and other classes of employees. The checks, each representing one man's share of the 1913 profits, were accompanied by a personal letter from Mr. King. The profit-sharing plan was originated by Mr. King and was put in operation a year ago, when the sum of $19,123 was distributed among the employees. In explaining the profit-sharing plan Mr. King said: "The profit-sharing plan was founded on the experience of the year 1911, when 26 per cent of the car earnings (less 4 per cent District of Columbia tax) was paid out for trainmen's wages, accidents and damages, the company agreeing that should the 26 per cent amount to more than the said wages, accidents and damages for 1912 the surplus should constitute a profit-sharing fund and be distributed in cash at the end of the year. Under this plan each one-year man received Jan. 2, 1913, a check for $28.72. To-day it gives to the same man $42.53."

Through Service Between Buffalo and Rochester.—Through service between Buffalo and Rochester is to be established on Jan. 12, 1914, according to announcement by the International Railway, Buffalo, N. Y. A traffic agreement has been made between the International Railway and the Buffalo, Lockport & Rochester Railway.

New Ruling in Regard to Dogs on Detroit Cars.—Because of annoyances to which passengers have been subjected the Detroit (Mich.) United Railway has announced that after Feb. 1 no dogs except lapdogs will be permitted on limited cars, and dogs will be permitted only on the rear platforms of local cars.

Sunday Operation Authorized in London.—A by-law to authorize the operation of street cars in London, Ont., on Sundays was carried on Jan. 1 by more than two to one, despite the vigorous opposition of the Lord's Day Alliance and other religious bodies. The by-law will be ratified by the Council and the service will probably be inaugurated by the London Street Railway on the first Sunday in February.

Poem About Last Cable in Kansas City.—The Metropolitan Street Railway, Kansas City, Mo., is distributing copies of the poem, "Tribute to the Twelfth Street Cable Line," written by Walter P. Neff following the closing of the cable in Kansas City on Oct. 12. The poem was printed in the Kansas City *Daily Drovers' Telegram* and several thousand copies were reproduced by the officers of the Metropolitan Street Railway.

Warning Lights in Toronto.—The Toronto (Ont.) Railway has installed red and green lights at all intersections on its street railway system. The approaching car faces the green light. On through lines there are two of these lights. They tend to prevent the over-running of switches and indicate the corners to automobile drivers. The civic authorities have followed this up by painting the lower part of the globes of all the street lamps blue, thus giving a signal to all the automobile drivers that they are nearing a corner.

Safety Primer for Kansas Schools.—A safety primer for use in the public schools of Kansas probably will be adopted by the state textbook commission. It will include all of the warnings issued by electric and steam roads regarding the proper way to get on and off cars, danger of crossing the street behind a car and other points which have been embraced in the "safety first" movement of the past few years. The primers will be furnished free of charge to the children, according to present plans, and will be used in the lower grades chiefly.

Change in Fare at East St. Louis.—A circular issued by the East St. Louis & Suburban Company, East St. Louis, Ill., announces that the collection points between Collinsville and Edwardsville will be School House, Bucks and Cottonwood. This will increase the fare from Maryville to Edwardsville 5 cents. The circular explains that present zones for collection are in violation to the public utility act in that there is a discrimination in favor of passengers riding from Maryville to Edwardsville. The distance from the Y at Collinsville to Maryville is 3.91 miles; from Maryville to Court House in Edwardsville, 6.79 miles.

Detroit Accident Record for Year.—Announcement is made by the Detroit (Mich.) United Railway that of some 310,000,000 passengers carried last year on its city and interurban lines only two passengers lost their lives in collisions. Of forty-one so-called "street car" deaths in Detroit twenty-five were directly due to lack of care on the part of the victims themselves. Of the remaining sixteen fatalities, the report says, many of them cannot be listed as "unavoidable" because the exercise of precautions would have avoided them. The company is pointing to the number of avoidable accidents as a lesson to the public in the present "safety first" campaign.

Illinois Utilities Commission Enforces Anti-Pass Law.—The Public Utilities Commission of Illinois has interpreted a clause in the new public utilities law relating to issuing free transportation to the effect that it was intended that only police and firemen in uniform should be permitted to ride free and then only within the corporate limits of the city. In conformance with this interpretation the Chicago Elevated Railways served notice on the city of Chicago that the city employees' tickets must be redeemed at 5 cents instead of 4 cents per ticket as formerly has been the rule. The surface railways and the Illinois Central Railroad also served similar notice on the city that they propose to conform to the commission's interpretation of the anti-pass law.

Portland's Progress.—W. T. Buchanan, of the Portland Railway, Light & Power Company, Portland, Ore., contributed an interesting article, "Portland's City Transportation and Electrical Energy," to the Portland *Spectator* recently. In concluding the article Mr. Buchanan said: "Portland stands well to the forefront in its transportation facilities and in its supply of electrical energy. It is listed among the cities of the country where these two conditions for the operation of business are involved as standing well up in the front ranks, and all doubt as to Portland's ability to handle passenger traffic or the necessary power to run the factory has been wiped out through the foresight of the owners of the Portland Railway, Light & Power Company."

Transporting Letter Carriers in Seattle.—Following a conference recently between Postmaster Edgar Battle and officials of the Puget Sound Traction, Light & Power Company, Seattle, Wash., an agreement was reached whereby the order of the company requiring all employees of the post office to pay car fare will not be enforced until March 1. Under the old system the government paid for transportation at the rate of $50 annually for carriers on duty whose territory was more than 1 mile from the central office. Believing it to be impossible to make a flat rate in the future whereby under a $50 pro rata all post office employees could ride indiscriminately, the company notified the government some time ago that a change in the system must be made.

Handling Convention Crowd in Kansas City.—The Metropolitan Street Railway, Kansas City, Mo., received many compliments for the way in which it handled the recent Student Volunteer Convention. About 5000 college men, most of whom were unacquainted with the car routes, attended the convention. The company issued instructions to car crews to exercise special courtesy and stationed a number of guides at various points in the city. The guides were provided with cards, upon which they wrote information for the students in regard to transfers, the correct cars to use, etc. The information bureaus were maintained during the entire week of the convention. Many of the students were from foreign countries. Many Canadian dimes were offered to the company, while one student proffered Chinese money.

Accidents in New York.—According to the report of the National Highways Protective Society twenty-five persons were killed by automobiles in New York City in December. This makes a total of 302 killed by automobiles in New York City in 1913, of which number 149 were children. In 1912 the number killed was 221, of whom 103 were children. The number of automobile fatalities in December was five more than in the corresponding month of 1912, but thirteen less than November, 1913. Six persons were killed in December by the electric railways in New York City as against thirteen a year ago, making a total of 106 such fatalities as compared with 134 for 1912. In the State of New York, outside of this city, in December, nine persons were killed by automobiles, ten by electric railways and three by wagons. This makes a total for the year of 150 deaths by automobiles on the highways, seventy-nine by electric railway and thirty-two by wagons, as compared with 127 by automobiles, seventy-nine by electric railways and twenty-eight by wagons for 1912.

Municipal Railway Superintendent on Discipline.—The treatment of employees as men eager to "make good," quick to respond to sympathy and with a keen sense of justice was the keynote of an address on "The Welfare of Employees," by S. Doughty, superintendent of the Regina (Sask.) Municipal Railway, before the Engineering Society of Regina. Mr. Doughty said that the highest efficiency was possible only when the employee took a personal interest in his work. This could be obtained when the employer showed his men that he considered their welfare as well as the profits of the business. He cited the recreation room opened in Regina about a year ago and called attention to the care which the management directed toward the welfare of the men. Although a car mileage of 691,281 had been made, the amount paid out by the company in damages was only $84. Mr. Doughty recommended the adoption of the merit system and the rule that no man should be discharged without a thorough investigation of all the phases of the complaint against him.

Route Guide in Philadelphia.—The Philadelphia (Pa.) Rapid Transit Company has issued a route guide to its street car lines. The guide is in the form of a booklet 2½ in. wide by 4 in. high, and contains 104 pages. The booklet is introduced with the statement that it is issued by the company for free distribution to the public, a list of the places being given where the guide can be obtained. The index affords, perhaps, the best idea of the scope of the subjects which the publication covers. The subjects follow: bureau of information, car sign system, chartered car rates, fare limits—suburban lines, index to routes, house-numbering plan, how to obtain copies of this guide book, how to reach points of interest, lost articles, pairing of streets, rates of fare, telephone numbers, Willow Grove Park. The routes in Philadelphia are all numbered and the destination of cars is indicated by signs giving the route number displayed on the cars. This is probably the most elaborate example in the United States of a route number guide published by an electric railway.

Buttons and Service Marks in Kansas City.—The Metropolitan Street Railway, Kansas City, Mo., issued an order recently eliminating brass buttons on uniforms. The order affects all of the 1800 carmen employed. The change, it was announced, was for the benefit of employees. Some of the conductors and motormen could afford only one suit of clothes or had their service hours so arranged that they could not change to citizen's clothes between runs. The brass buttons will be replaced with the ordinary black ones, and the men will not be conspicuous when attired in their uniforms off duty. Each employee heretofore has been decorated with ten buttons, which were the property of the company. In addition the order embraces the use of stars. Heretofore employees have received one star for every five years of service. In the future employees who have served more than five years and less than ten will be decorated with one star. When ten years is reached the star will be replaced by a gold button, which bears the number of years served. The button is somewhat like a lodge pin, is attached to the lapel of the coat and can be removed easily.

Safety Exhibit in Brooklyn.—At the monthly meeting of the Brooklyn committee of public safety, held on Jan. 3, 1913, it was announced that T. S. Williams, president of the Brooklyn Rapid Transit Company, had offered a special contribution of $1,000 to serve as a basis for the organization of a safety exhibit in Brooklyn. The primary impulse toward the proposed Brooklyn exhibition was the interest shown by the public in the exhibit of the Brooklyn committee of public safety and the Brooklyn Rapid Transit Company at the recent International Exposition of Safety and Sanitation devices at the Grand Central Palace, Manhattan, referred to in the ELECTRIC RAILWAY JOURNAL of Dec. 27, 1913, page 1321. This initial Brooklyn safety ex-

hibition will not be competitive in the sense that awards, diplomas or medals will be given to the different exhibitors, but will be arranged for the purpose of giving the people of Brooklyn, and especially the school children, a clearer idea of the work of the committee of public safety, and furthermore to afford the industrial interests of Brooklyn an opportunity to show to the public the work they are doing in their own plants to protect the lives and limbs of their own workers.

Decreased Accidents in Detroit.—Under the caption "Decreased Accidents," *Electric Railway Service*, which is published in the interest of the Detroit (Mich.) United Railway, says in part in the issue for Jan. 2, 1914: "It is very clear to the operating department of the Detroit United Railway that the near-side stop by street cars is one of the best moves ever made in the interests of 'safety first.' Police Commissioner Gillespie, who advocated the measure, and the Common Council that passed it deserve much credit. The near-side stop has effected a marked decrease in the number of accidents and particularly in the number of severe accidents. One marked improvement as a result of the near-side stop has been to make automobile drivers more careful. They are expecting to meet people coming from cross streets to catch the cars and hence are not crossing the streets with the old time speed when approaching street cars. And the beauty of the near-side stop is that it is in harmony with the operation of the traffic squad, which must continue to grow as the city grows. You obey the traffic signal and stop before you cross—not afterward. The near-side stop is a big factor in the 'safety first' of everybody."

Miraculous Escape of Child Struck by Car.—One of the local papers at Chickasha, Okla., describes in part as follows the miraculous escape without injury on Dec. 28, 1913, of a three-year-old boy who ran in front of a car of the Chickasha (Okla.) Street Railway: "The car struck the baby and he went down in front between the rails. He was rolled over and over beneath the car, but luckily always between the rails. He was picked up, lying on his left side with his head almost touching the east rail. His knees were doubled up in front of him, his arms folded and his entire posture was much as if he were asleep in his own bed at home. The child was taken into a neighboring house, where a hasty examination was made. Later he was taken home, where physicians attended him. Nothing but a scalp wound and a spot on the back of the head where a small section of the skin had been rubbed off could be found. The little fellow passed a comfortable night and no complications are expected." W. H. Wadsworth, superintendent of the Chickasha Street Railway, says that the car which struck the child was equipped with a Diamond single truck and GE-1000 motors. The greatest clearance possible as measured by Mr. Wadsworth was 5½ in. On Dec. 31 the child was apparently none the worse for his experience.

Helping the Farmer Market His Produce.—Believing that the development of interurban traffic involves careful and painstaking study of peculiar trade conditions which may affect the business, the Louisville & Interurban Railroad, Louisville, Ky., has been carrying on a campaign for business from the truck gardeners in the surrounding territory with interesting results. R. H. Wyatt, general freight and passenger agent of the company, found that Jefferson County growers, whose production of onions, potatoes and cabbage is one of the largest in the United States, insisted on hauling their goods to Louisville and delivering them in person to the commission houses, getting their money before turning over the produce. Personal investigation by the officers of the interurban company demonstrated that the farmer lost much valuable time in hauling and developed the fact that the farmers distrust the commission men and refuse to ship the goods on consignment. Mr. Wyatt has suggested the organization of an association of truck growers and the establishment by the association of its own commission house in Louisville, where an officer of the organization would handle the produce. The farmers are preparing to carry the idea out. Mr. Wyatt believes that when this is done the work which the company has been carrying on will be evidenced in a large increase in inbound traffic over the Louisville & Interurban Railroad.

Personal Mention

Mr. A. B. Tenney has been elected president of the Bristol & Plainville Tramway, Bristol, Conn., to succeed Mr. Miles Lewis Peck.

Mr. B. F. Wood, formerly an assistant engineer of the Pennsylvania Railroad, has been appointed chief engineer of the United Gas & Electric Engineering Corporation, New York, N. Y.

Mr. C. H. Tenney, of C. H. Tenney & Company, Boston, Mass., has been elected chairman of the board of directors of the Bristol & Plainville Tramway, Bristol, Conn., a newly created position with the company.

Mr. H. H. Vreeland, who was president of the Metropolitan Street Railway, New York, N. Y., which has been succeeded by the New York Railways, has been elected chairman of the board of the Royal Typewriter Company.

Mr. Orville F. Berry, who was chairman of the Illinois Railroad & Warehouse Commission, which has been succeeded by the Illinois Public Utilities Commission, has been appointed a special examiner with the Interstate Commerce Commission.

Mr. D. A. Hegarty has resigned as manager of the railway and electrical departments of the New Orleans Railway & Light Company, New Orleans, La. Mr. Hegarty has been connected with the company since July, 1911. Before that he was vice-president, general manager, treasurer and director of the Little Rock Railway & Electric Company, Little Rock, Ark. Mr. Hegarty has been connected with electric railway work since the pioneer days and for a number of years was stationed in New York as manager of the Railways Company General.

Mr. Thomas M. Jenkins, former general manager of the East St. Louis & Suburban Railway, East St. Louis, Ill., has been appointed general manager of the St. Louis & O'Fallon Coal Company, which was acquired recently by the Busch interests. Mr. Jenkins will serve as general manager of the mines and also will supervise the transportation of coal to St. Louis on the St. Louis & O'Fallon Railroad and the Manufacturers' Railway, St. Louis. Mr. Jenkins was also formerly connected with the Albany (N. Y.) Railway, now the United Traction Company, and was general manager of the Cincinnati, Newport & Covington Railway, Cincinnati, Ohio, and vice-president and general manager of the Danville Light, Power & Traction Company, Danville, Ky.

Mr. Ernest Gonzenbach has resigned as president and general manager of the Sheboygan Railway & Electric Company, Sheboygan, Wis., following the sale of the controlling interest in the company to local interests in Sheboygan. Mr. Gonzenbach intends for the present to devote himself to the further development of a fruit and dairy farm on which he has lived for several years and on which he has been raising fine fruits and pure-bred dairy stock. He took charge of the property at Sheboygan on Jan. 1, 1905, as general manager. Later on he was elected treasurer of the company and subsequently vice-president, treasurer and general manager. He was finally elected president and general manager. He has been completely responsible for the management and operation of the company since that time. Mr. Gonzenbach was pleasantly surprised on New Year's Day by a call from a committee of employees who presented him with a solid silver table service. Mr. Gonzenbach acknowledged this gift in a card of appreciation which he addressed to each of the employees, stating that the success which he attained with the property was in great part due to the loyalty of the men who served under him. Mr. Gonzenbach is Swiss by birth and education, but came to this country immediately after leaving school. After an electrical experience in power house work in Chicago he completed the Thomson-Houston expert course at Lynn, Mass. In 1895, as electrical engineer in St. Johnsbury, Vt., he constructed several electric light and transmission plants in that vicinity. In 1898 he entered the employ of the Westinghouse Electric & Manufacturing Company, and in 1900 became electrical engineer of the Albany & Hudson Railroad, one of the early third-rail roads. Subsequently he accepted a similar position with the Aurora, Elgin & Chicago Rail-

road, then under construction, after which he was engaged for two years as consulting engineer, principally in the construction of the Youngstown & Southern Railway. In 1909 Mr. Gonzenbach was elected president of the Wisconsin Electrical Association.

Mr. Slaughter W. Huff, who, as announced in the ELECTRIC RAILWAY JOURNAL of Jan. 3, 1914, will be elected vice-president of the Brooklyn (N. Y. Rapid Transit Company and other companies in the Brooklyn Rapid Transit System to succeed Mr. J. F. Calderwood, was born in Virginia and was graduated from the electrical engineering course at Cornell University. He entered the electric railway field when it was practically in its infancy. His first experience was obtained in the shops of the Union Railway, Richmond, Va., at the time that Mr. Frank Sprague turned over his work to the local company. Subsequently Mr. Huff became general manager of the Raleigh (N. C.) Street Railway. He has been associated in various capacities with the Baxter Electric Railway & Power Company, Baltimore; United Railway & Electric Company, Baltimore; United Railroads of San Francisco and the Virginia Passenger & Power Company, Richmond, Va. He resigned as general manager of the last-named company in 1908 to become president of the Coney Island & Brooklyn Railroad, the controlling interest in the stock of which is now to be taken over by the Coney Island & Gravesend Railway, a subsidiary of the Brooklyn Rapid Transit Company. As president of the Coney Island & Brooklyn Railroad Mr. Huff had charge of a property with some 50 miles of track, reaching the principal points of Brooklyn and doing a large business to Coney Island in the summer. He became identified with the Coney Island & Brooklyn Railroad following a change in ownership and during his connection with the property the system has been very largely reconstructed and modernized. The property with which Mr. Huff now becomes connected constitutes a system of about 600 miles of surface single track and 71¼ miles of elevated single track, while the extensive subway system under the dual plan now under construction will add very considerably to this mileage.

S. W. Huff

OBITUARY

George Hendrie, the general manager of the first street railway to be built in Detroit, Mich., is dead. Mr. Hendrie was connected with street railway development in that city from 1864 to 1891.

W. E. Davidson, secretary of the Pearson Mexican corporations having head offices in Toronto, Ont., which include the Mexican Light & Power Company, Mexican Tramways and the Mexican Northwestern Railway, died on Dec. 25 on a steamer in the Gulf of Mexico.

Bernard Corrigan, who was president of the Metropolitan Street Railway, Kansas City, Mo., from 1902 to 1911, died of heart disease in that city on Jan. 6, after a few hours' illness. Mr. Corrigan was born in Canada in 1847 and settled in Kansas City in 1868 with his two brothers. The Corrigans entered the contracting field, and in 1875 Bernard Corrigan and one of the brothers acquired the old mule car system of Kansas City with the exception of the Westport line. This was owned by the late Nehemiah Holmes, father of Mr. Walter Holmes and Mr. Conway F. Holmes. In 1886 Mr. Corrigan and his brothers equipped the line which they had taken over with the cable and later sold the property to the Metropolitan Street Railway. The brothers then turned their attention to steam railroad construction work. Mr. Corrigan again re-entered the railway field in 1902, when he was elected president of the Kansas City Railway & Light Company, which holds all of the stock of the Metropolitan Street Railway and the Kansas City Electric Light Company.

Construction News

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

An asterisk (*) indicates a project not previously reported

RECENT INCORPORATIONS

***San Francisco Peninsula Railway, San Francisco, Cal.**—Application for a charter has been made by this company in California to build a 100-mile electric railway, some of it double-track, from San Francisco to Monterey via Watsonville.

***Illinois County Railroad, Centralia, Ill.**—Application for a charter has been made by this company in Illinois to build an electric or steam interurban railway to connect Irvington, Salem, Centralia, Central City, Junction City, Sandoval and Odin. Capital stock, $300,000. Incorporators: G. E. Ellis, R. A. Warner, E. E. Fyke, H. M. Warner and F. L. Pfeiffer, all of Centralia.

***Rochester & Hillsboro Railroad, Taylorville, Ill.**—Application for a charter has been made by this company to build an electric railway from Springfield to Hillsboro with a branch from Rochester to Taylorville. Capital stock, $100,000. Incorporators: Frank M. McGowan, Nathaniel J. Hamilton, A. Barker, M. D. Barker and Jesse H. Thomas, all of Springfield.

Madisonville-Nortonville Light, Power & Traction Company, Madisonville, Ky.—Incorporated in Delaware to build a 12-mile electric railway between Madisonville, Earlington, Mortons Gap, Barnsley and Nortonville in Kentucky. James Breathitt, Jr., Hopkinsville, is interested. [E. R. J., Jan. 3, '13.]

***Northwestern Electric Railway, Columbia**, S. C.—Incorporated in South Carolina to build an electric railway between Easley, S. C., and Augusta, Ga. Capital stock, $100,000.

Fort Worth & Denton Interurban Railway, Fort Worth, Tex.—Chartered in Texas to build an electric railway between Fort Worth and Denton. Capital stock, $500,000. Incorporators: E. E. Baldridge, N. Harding, George T. Reynolds and B. O. Smith, all of Fort Worth. [E. R. J., Dec. 20, '13.]

FRANCHISES

Dixon, Cal.—The Sacramento Valley West Side Electric Railway has received a fifty-year franchise from the Council on First Street in Dixon. This 160-mile line will extend through the west side of the Sacramento Valley. C. L. Donohoe, Willows, president. [E. R. J., Jan. 3, '14.]

Dixon, Cal.—The Northern Electric Railway, Chico, has received a fifty-year franchise from the Council on First Street, Dixon, provided the State Railroad Commission will allow the crossing of the Southern Pacific Railroad tracks in the north part of Dixon to be made at grade.

East St. Louis, Ill.—The East St. Louis Railway has received a twenty-year franchise from the Council on Natalie Avenue and Twenty-fifth Street to Jones Park in East St. Louis.

Galesburg, Ill.—The Rock Island Southern Railroad has received a franchise from the Council on South Kellogg Street from Berrien Street to Main Street in Galesburg.

Nowata, Kan.—The Union Traction Company has asked the Council for a franchise in Nowata.

Topeka, Kan.—The Topeka Railway has asked the Council for a franchise to extend its line from Washburn College to Seabrook.

Madisonville, Ky.—The Madisonville-Nortonville Light, Power & Traction Company has asked the Council for a franchise in Madisonville. James Breathitt, Jr., Hopkinsville, is interested. [E. R. J., Jan. 3, '13.]

West Monroe, La.—The North Louisiana Electric Railway has received a franchise from the Council in West Monroe. Negotiations are under way between this company and the City Council to have this railway enter Shreveport via the new bridge. This 120-mile line will connect Shreveport and Monroe via Homer, Minden, Ruston and West Monroe. A. B. Blevins, Shreveport, president. [E. R. J., Dec. 27, '13.]

Cape Girardeau, Mo.—The Cape Girardeau-Jackson Interurban Railway has asked the Public Service Commission for permission to build an interurban line between Cape Girardeau and Jackson, a distance of 5½ miles.

Middletown, Ohio.—The Dayton, Middletown & Cincinnati Railway has received a franchise from the Council in Middletown. E. H. McKnight, general manager. [E. R. J., Nov. 22, '13.]

Galt, Ont.—A by-law will be submitted on Jan. 15 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.

Portland, Ore.—George F. Heusner, Portland, who recently received a franchise to build an electric railway from Kenton to the West Side business district of Portland, has signed the acceptance of the franchise, which compels him to begin work within sixty days. [E. R. J., Dec. 6, '13.]

Oswego, Ore.—The Portland, Eugene & Eastern Railway has received a franchise from the Council in Oswego.

Bentleyville, Pa.—The Monongahela, Ellsworth & Washington Street Railway has received from the Council an extension of time on its franchise to complete its line in Bentleyville. James Bryant, Pittsburgh, engineer. [E. R. J., Sept. 6, '13.]

Chattanooga, Tenn.—The Chattanooga Traction Company has received a franchise from the Council in Chattanooga.

Tacoma, Wash.—Following the defeat of the $87,000 bond issue at a recent election, the City Council has introduced an ordinance for its first reading which announces an intention to build a tideflats electric line by the creation of a $35,000 fund. It has not yet been decided whether the line will be operated by the city or by the Puget Sound Electric Railway. The intention of the Council is to build this line at once.

TRACK AND ROADWAY

Little Rock Railway & Electric Company, Little Rock, Ark.—During the year it is planned to build about 1½ miles of new track in Little Rock.

Clear Lake Railroad, Lakeport, Cal.—During the year 23½ miles of new track will be built.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—Final arrangements have been made by this company and the City Council for the extension on Washington Street to San Pablo Avenue in front of the new city hall in Oakland. The city will call for bids for the construction of the track and the traction company will supply the necessary connections at the terminals. When completed the tracks will be leased to the company.

San Diego, (Cal.) Electric Railway.—A 2½-mile double-track line will be laid through City Park during 1914.

Sacramento Valley West Side Electric Railway, Willows, Cal.—Permission has been asked by this company to begin the construction of its line between Rio Vista and Red Bluff at a point in Solano County where the Oakland, Antioch & Eastern Railway crosses the proposed line and to build north from there through Dixon and Davis to Woodland, 31 miles. C. L. Donohoe, Willows, president. [E. R. J., Dec. 20, '13.]

Tampa (Fla.) Electric Company.—From 1 to 3 miles of new track will be laid in Tampa during this year.

Idaho Falls (Idaho) Electric Railway.—This company has received a certificate of public convenience and necessity from the Public Utilities Commission at Boise to build 34 miles of interurban lines out of Idaho Falls in two directions in the vicinity of Idaho Falls. James L. Milner, Idaho Falls, president. [E. R. J., Dec. 20, '13.]

Alton, Granite & St. Louis Traction Company, Alton, Ill.—A 1-mile extension of the city line in Alton will be built during the year.

Peoria, Galesburg & Western Railroad, Galesburg, Ill.—This company has filed with the recorder of Knox County a mortgage for $1,500,000 in favor of the Fort Dearborn Trust & Savings Bank, of Chicago, to secure a bond issue for the construction of the line to connect Peoria and Galesburg. William T. Irwin, Peoria, is interested. [E. R. J., May 31, '13.]

Iowa City (Ia.) Electric Railway.—From 1¾ to 2 miles of new track will be built in Iowa City during 1914.

Independence, Neodesha & Topeka Traction Company, Independence, Kan.—Work has been begun on the construction of a 17-mile section of this line between Independence and Neodesha. Robert P. Woods, Kansas City, engineer. [E. R. J., Nov. 15, '13.]

***Kansas City, Kan.**—E. G. Havens and G. C. Broudt, Kansas City, plan to build an electric railway between Kansas City and Topeka, via Lawrence. Most of the right-of-way has been donated. The present plans for the route are to parallel the Atchison, Topeka & Santa Fé Railway from Kansas City to Lawrence, where it will cross the Kansas River and run parallel with the Union Pacific Railroad tracks to Topeka.

Kansas Central Traction Company, Topeka, Kan.—Right-of-way has been secured and work has been begun on this 60-mile line to connect Coffeyville and Columbia via Edna, Altamont, Oswego, Hallowell and Sherwin. Philip Strack, Parsons, president. [E. R. J., Dec. 27, '13.]

Topeka (Kan.) Railway.—The West Eighth Street line extending to Summit Street, the city limits of Topeka, has been placed in operation. The line will soon be extended to Gage Park.

***New Orleans & Mobile Interurban Railway, New Orleans, La.**—Plans are being considered to build an electric railway to connect New Orleans and Mobile via Bayou, St. Louis, Pass Christian and Gulfport.

***Quebec Railway, Presque Isle, Maine.**—This company has received permission from the Railroad Commissioners to build a 100-mile electric railway through Aroostook County from Washburn westward to Wade and Portage Lake, thence to the Province of Quebec across the Allagash at the foot of Long Lake on a bridge 25 ft. high. From the Allagash it is to extend northwest to the St. John River and at Township 12, Range 15, it will cross on a 40-ft. trestle. Preliminary arrangements are being made and it is planned to begin construction in the spring. No names are yet given of those interested in the project.

Detroit, Monroe & Toledo Short Line Railway, Detroit, Mich.—About 3 miles of new track will be laid during the year.

Electric Short Line Railroad, Minneapolis, Minn.—The 15-mile section of the line between Minneapolis and Long Lake has been completed and during the month the bridge over the Great Northern tracks at Long Lake will be completed and then 27 miles of new track will be placed in operation.

Minneapolis & Northern Railway, Minneapolis, Minn.—About 15 miles of new track will be laid during 1914 between Minneapolis and St. Joseph.

Missouri & Kansas Interurban Railway, Kansas City, Mo.—The proposed extension of this company's line from Olathe to Ottawa will be built by a company to be incorporated as the Southwestern Electric Railway, according to present plans. W. B. Strang will apply for a charter for the new company in the near future.

United Railways, St. Louis, Mo.—This company is asked to consider plans to extend its Taylor line north to Broadway and its Grand Avenue line north to Broadway in St. Louis.

Springfield & Western Railroad, Springfield, Mo.—Preliminary surveys have been made from Mount Vernon west to Joplin via Stotts City, Clarkson, Sarcoxie and Duenweg. The total distance, including a 9-mile branch from Jenkins Creek to Carthage, is 54 miles.

***Billings, Mont.**—Surveys for a 68-mile electric railway to the mouth of the Big Horn Canyon have been made by the Big Horn Canyon Power & Irrigation Company in preparation for building a large dam.

Jamestown & Buffalo Street Railway, Buffalo, N. Y.—Surveys have been completed and part of the right-of-way secured to build this line to connect Falconer, Lavant, Poland, Kennedy, Ellington, Clear Creek, Leon, South Dayton, Fair Plain, Wesley, Persia, Gowanda, Collins, Lawtons, North Collins, Eden Center, Eden Valley, Water Valley, Hamburg and Buffalo. Among those interested are J. B. Anderson, Ellington; R. G. Crandall, Kennedy; F. E. Bard

and Clarence G. Mead, Gowanda, and Frank N. Rowe, South Dayton. [E. R. J., Nov. 29, '13.]

New York State Railways, Rochester, N. Y.—Among the improvements planned by this company during the year will be to double-track the Euclid Avenue section of the Dudley-East Genesee line and to relay 8 miles of track.

Cape Breton Electric Company, Sydney, N. S.—Plans are being considered to extend this line into New Waterford.

Dayton, Middletown & Cincinnati Railway, Middletown, Ohio.—Surveys have been completed by this company for its line to connect Dayton and Cincinnati via Middletown. E. H. McKnight, Middletown, general manager. [E. R. J., Nov. 22, '13.]

Toledo Railway & Light Company, Toledo, Ohio.—During 1914 about 10 miles of track will be relaid in Toledo.

Ottawa & Morrisburg Electric Railway, Ottawa, Ont.—Work has been postponed until the spring on this line to connect Ottawa and Morrisburg. J. G. Kilt, Citizens' Building, Ottawa, president. [E. R. J., Sept. 13, '13.]

***Penetanguishene, Ont.**—The City Council of Penetanguishene is considering plans to build an electric railway to connect with the Canadian Pacific Railroad at Port McNicoll and has asked the Hydro-Electric Power Commission for plans and specifications.

Forest Hill Electric Railway, Toronto, Ont.—Plans are being made to begin work on this line in the spring. The first section to be constructed will be from the city limits of Toronto along Forest Hill Road to Eglinton Avenue and along Eglinton Avenue west. [E. R. J., Nov. 8, '13.]

Wayne County Traction Company, Honesdale, Pa.—The directors of this company have voted to extend this line from the city limits of Honesdale to Tanner's Falls, a distance of 6 miles.

Shippensburg, Newburg & Western Railway, Shippensburg, Pa.—Levi Weast has been appointed receiver for this company. An appraisement of the company's property will soon be made and it will be sold at public auction. This was a projected 13-mile line to connect Shippensburg, Middlespring, Newburg, McKenney and Roxbury. [E. R. J., Sept. 27, '13.]

Sioux Falls (S. D.) Traction System.—During 1914 this company will build 1 mile of new track in Sioux Falls.

Maryville-Knoxville Interurban Railway, Knoxville, Tenn.—The contract to build 12 miles of this railway between Knoxville and Maryville has been awarded to R. B. Oliver, Knoxville. Work will be begun at once. Morton Butler, Chicago, Ill., president. [E. R. J., Dec. 20, '13.]

Tennessee & Kentucky Railroad, Nashville, Tenn.—An application for a charter amendment has been made by this company to permit a change in the proposed route. The company was recently incorporated to build an electric line to Russellville, Ky., via Goodlettsville, Tenn., and now it is proposed to make Franklin, Ky., the terminus in place of Russellville. [E. R. J., Aug. 30, '13.]

Nashville Railway & Light Company, Nashville, Tenn.—This company has amended its charter so as to extend several of its lines in Nashville.

Texas Traction Company, Dallas, Tex.—Plans are being made to double-track and extend some of the lines in Denison.

El Paso (Tex.) Electric Railway.—Improvements which will entail an expenditure of $500,000 will be made by this company in the near future on its lines in El Paso.

***Meridian, Tex.**—The Meridian Chamber of Commerce and the Young Men's Business League of Waco are considering plans to build an interurban electric railway between Waco and Cleburne via China Springs, Valley Mills, Clifton, Meridian, Walnut Springs and Glenrose, a distance of 25 miles. Meridian proposes to provide right-of-way and a cash bonus. J. J. Powers, Waco, is interested.

Utah Light & Railway Company, Salt Lake City, Utah.—The 13-mile extension between Salt Lake City and Centerville has been placed in operation.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis.—During 1914 about 4 miles of new track will be laid between Eau Claire and Altoona.

Wisconsin Southern Railway, Fond du Lac, Wis.—This company will build 23 miles of new track during the year.

SHOPS AND BUILDINGS

Pacific Great Eastern Railway, Victoria, B. C.—Following the inauguration of the electric railway service in the north shore section of this company's lines on Jan. 1, the company has distributed material to build five new passenger stations which will be established along the line.

Rock Island Southern Railroad, Monmouth, Ill.—Plans are being made to build a new passenger station on Main Street in Galesburg.

Louisville & Interurban Railroad, Louisville, Ky.—This company has completed the construction of additional tracks at its freight terminals at Brook Street and Green Street in Louisville, giving it a capacity of twenty additional cars. It has also secured a permit to build a shed to cover the additional trackage and has acquired adjoining land for the purpose of constructing a new freight-handling station to be used exclusively for handling in-bound freight.

Worcester (Mass.) Consolidated Street Railway.—This company is asked to consider plans to build a new depot at Lincoln Square in West Boylston.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—Plans are being made to build a new carhouse in West Federal Street on the site of the present building owned by the company in Lowellville. Additional land has been acquired and the entire lot will be used for the new structure.

Oregon Electric Railway, Portland, Ore.—Arrangements have been completed to begin construction at once on a new passenger station in Independence.

Seattle (Wash.) Electric Company.—A temporary depot will be built by this company on Third Street between Stewart Street and Virginia Street in Seattle.

POWER HOUSES AND SUBSTATIONS

Pacific Electric Railway, Los Angeles, Cal.—Plans are under way to build a new substation near the corner of First Street and E Street in San Bernardino. The cost is estimated to be about $15,000.

Morris County Traction Company, Morristown, N. J.—This company plans to build soon a new power plant in Morristown. The cost is estimated to be about $250,000.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—This company is placing orders for a boiler room extension and other minor improvements in its Lowellville power plant. The company expects to purchase three 600-hp boilers, stokers, coal bunkers and miscellaneous boiler room equipment, also transformers and motor set.

Galt, Preston & Hespeler Railway, Ltd., Galt, Ont.—New transformers and a new rotary converter which will approximately double the present power capacity are being installed at the company's power plant in Galt.

Cleburne (Tex.) Street Railway.—Plans are being considered to build a new power plant in Cleburne.

El Paso (Tex.) Electric Railway.—Plans are being made to build additions to the power plant in El Paso.

Salt Lake & Utah Railway, Salt Lake City, Utah.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for six 250-kw, 750-volt d. c., three-phase, sixty-cycle, 1200-r. p. m., a. c. self-starting rotaries mounted on a common bedplate for operation in series at 1500 volts d. c.; six 150-kva, 44,000 to rotary voltage, single-phase, sixty-cycle O. I. S. C. transformers with triple secondaries, to operate any two or three rotaries at one time, and two switchboards for the above consisting of seven panels each.

Utah Light & Railway Company, Salt Lake City, Utah.—The new substation at Centerville has been placed in operation.

Manitowoc & Northern Traction Company, Manitowoc, Wis.—Plans are being considered to increase the equipment at this company's power house at Little Manitowoc in the spring. A new 110-ft. smokestack is being built at this power plant.

Manufactures and Supplies

ROLLING STOCK

Louisville (Ky.) Railway expects to build additional center-entrance trail cars this year.

Lackawanna & Wyoming Valley Railroad, Scranton, Pa., expects to purchase fifteen 100,000-lb. capacity self-cleaning coal cars.

Central Illinois Public Service Company, Mattoon, Ill., expects to purchase one double-truck, single-end interurban passenger car.

Portland (Me.) Railroad, noted in the ELECTRIC RAILWAY JOURNAL of Nov. 29 as having ordered ten passenger cars from the Wason Manufacturing Company, has specified the following details for this equipment:

Seating capacity.....44	Couplers.....Brill radial
Bolster centers, length, 18 ft. 8 in.	Curtain fixtures....National
Length of body...30 ft. 8 in.	Curtain material..Pantasote
Length over vestibule, 41 ft. 8 in.	Destination signs....Hunter
Width over sills..8 ft. ½ in.	Fenders or wheelgaurds, Brill
Width over posts at belt, 8 ft. 1⅝ in.	Gongs .....Dedenda
Height, sill to trolley base .....9 ft. 5 in.	Hand brakes.....Peacock
Height from top of rail to sills .....31½ in.	Journal boxes.....Brill
Body .....composite	Motors .....G. E.
Interior .....mahogany	Push button signal...Consol.
Underframe .....metal	Registers ...Sterling-Meaker
Air brakes .....G. E.	Roofs .....arched
Bolsters, body, wrought iron and steel	Sanders .....Kilbourn
Brakeshoe .....Brill	Sash fixtures.....tandem
Bumpers, Hedley anti-climber	Seats, style....Brill Winner
Car trimmings.....bronze	Seating material.....rattan
Center bearings.....Brill	Side Bearings.....Brill
	Springs .....Brill
	Step treads.....Am. Mason
	Trucks .....Brill 51-E-1
	Ventilators .....Globe
	Wheels .....Griffin F. C. S.

TRADE NOTES

John A. Roebling's Sons Company, Trenton, N. J., has issued a New Year's circular letter to commemorate its seventy-fifth anniversary.

Philadelphia Toboggan Company, Germantown, Philadelphia, Pa., has issued a catalog describing its various types of carrousels, for use in amusement parks reached by electric railways.

Perry Ventilator Corporation, New Bedford, Mass., has received an order to equip with ventilators fifty of the new cars which are being built for the Montreal Tramways by the Ottawa Car Manufacturing Company.

American Abrasive Metal Company, New York, N. Y., at the first International Exposition of Safety and Sanitation held recently in New York, was awarded a gold medal diploma for its Feralun safety treads for anti-slip surfaces.

Steel City Electric Company, Pittsburgh, Pa., has appointed the George A. Schardt Company, Empire Building, Pittsburgh, Pa., as its sales representative in the territory comprising Pennsylvania west of Altoona and the State of West Virginia.

R. D. Nuttall Company, Pittsburgh, Pa., has appointed W. A. Allen, formerly with the Carnegie Steel Company, as commercial engineer. This company reports that a prominent road operating in the hills of western Pennsylvania has in service one of its untreated normal cast-steel gears that has made 583,000 miles and is said to be good for at least 100,000 miles more.

International Engineering Corporation, Ltd., of Toronto, has been organized with main offices at 49 Exchange Place, New York, N. Y. The officers of this new organization are: President, J. W. Burke; vice-president, T. C. Gillespie; secretary, H. P. Du Bois; treasurer, H. M. Lloyd. Contracts have already been taken for the extension and electrification of the Quito (Ecuador) Tramways.

Lord Manufacturing Company, Brooklyn, N. Y., announces the resignation of W. R. Garton, its vice-president and general manager. Mr. Garton has been active in the electrical field for many years. He began in the construction and operation of telephone, electric light and railway properties and has given much time to the supply and manufacturing business. His temporary address will be 851 East Nineteenth Street, Brooklyn, N. Y.

ADVERTISING LITERATURE

Ohmer Fare Register Company, Dayton, Ohio, has issued a folder entitled "The Management of Men" in connection with its fare registers.

B. G. Marshall has issued a reprint from the *Architect and Engineer* entitled "What Makes Iron Rust," which points out the chemical conditions in impurities of iron and steel products which tend to invite electrolysis and consequent corrosion.

H. M. Byllesby & Company, New York, N. Y., engineers, have issued a card describing the extent of their engineering interests. This company is retained permanently in a consulting and supervising capacity by thirty-five electric, gas, street railway, telephone and water works properties operating throughout the United States.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued Circular No. 1104, describing its complete line of portable meters. Another catalog, issued in conjunction with the Baldwin Locomotive Company, describes the construction details of electric mine locomotives, including controllers, circuit-breakers, trolleys and gathering reels. These mine locomotives are manufactured in four different types, as follows: traction wheel gathering locomotives, tandem, three-motor gear and side-rod locomotives.

Illinois Appoints Public Service Commission

The five members of the new State Public Service Utilities Commission of Illinois have been appointed by Governor Dunne. James E. Quan, of Chicago, the chairman, is a personal friend of the Governor and has been engaged in the wholesale grocery business. His present appointment is his first public office. He is a Democrat. Richard Yates, of Springfield, lawyer, is fifty-three years old and was Governor of Illinois from 1901 to 1905. He is a Republican. Frank H. Funk, of Bloomington, was formerly State Senator. He was the Progressive party candidate for Governor in 1912. Walter A. Shaw, of Chicago, is a civil engineer and a member of the Western Society of Engineers and the American Waterworks Association. He has been a member of the Rivers and Lakes Commission of the State and has been president of the American Engineering & Construction Company of Chicago. Mr. Shaw obtained his college degree as civil engineer from Valparaiso University. He has done engineering work in connection with sewerage in Chicago and Louisville. He is a Democrat. Owen P. Thompson, of Jacksonville, is a lawyer and resigned as presiding justice of the Fourth Appellate District of the State to accept appointment as a member of the board. He is a Democrat.

The commission will have headquarters in Springfield, but will also have an office in Chicago and will divide its time between the two cities. The first complaint received was from the city of Springfield, which seeks a reduction in the gas rate from $1 to 80 cents per 1000 cu. ft.

No Bids Received to Construct Chicago's Municipal Subway

Proposals to construct, equip and operate rapid transit subways in the city of Chicago were advertised to be received up to Jan. 5, 1914. On the date the bids were to be opened none had been received. In fact, the only communication on the subject obtained by the Harbor and Subway Commission was an offer to bid on the municipal subways by an English construction company. This failure of the subway system recommended by Mayor Harrison to attract private capital gave new impetus to the movement for a limited subway for the use of surface lines as recommended by Bion J. Arnold.