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### HIGHER RATINGS FOR STEAM BOILERS

Less than ten years ago manufacturers and conservative engineers in general looked with comparative few adventurous spirits who maintained that operation of steam boilers at 200 per cent rating was eminently proper and who drew specifications calling for operation at 150 per cent of normal manufacturers' rating. This view has now been very widely accepted, yet to-day conservatism in this regard seems to be just as far behind the leaders as it was five years ago. Since the possibilities of compactness possessed by the underfeed stoker have become evident the evaporation of 7 lb. of water per square foot of heating surface is no longer an upper limit, as rates of 15 lb. are within easy reach. On the Interborough Rapid Transit Company boiler operation at 300 per cent of rating is a normal condition during the rush hour and 400 per cent is so common that it ceases to excite comment. Yet it has been found at these supposedly extreme rates of driving that actually fewer flues are lost than under the old conditions where boilers hardly ever exceeded their manufacturers' rating. In the three Interborough power stations, totaling over 90,000 hp of boilers, only about twenty-four flues are taken out per year, notwithstanding the fact that the boilers are of the standard type which a few years ago would have been operated at one-fourth of the present rate. In the light of these results it behooves every steam user to change his opinions about boiler rating if he has not done so during the last decade.

### MUNICIPAL OR STATE CONTROL

The judgment of the committee on franchises of the National Municipal League is that the regulation of public utilities in large cities should be divided between purely local authorities and a state commission. As shown

in the abstract published last week, the committee believes in effect that a state commission should have control over the issue of securities, the system of accounts and reports and fundamental questions relating to integrity of the investment, but that the city should have power to control matters relating to occupation of the streets and the character of service rendered and should be in a position to municipalize utilities when it desires so to do. Rates would be made by co-operation of both bodies. We think that purely local regulation of public utilities has been proved to be ineffective. A body exercising supervision over an entire state is in a position to administer its duties without regard to local claims or prejudices. A local body would be likely to be swayed by the clamor of the community. The suggestion of the committee is open to the criticism that if a local community has control over service it might so regulate that service as to make the rates inadequate. If this occurred, the return on the securities outstanding might be affected. There would then be a situation where the local commission was demanding a service greater than the rates would justify, with the result that the return on the investment would be endangered or lowered. A system of single control is better than one of dual form because it does place a measure of responsibility for the success of operation upon the body which exercises control over service. A community should not seek both to exercise broad powers and to escape responsibility for its action. We do not believe this is the purpose of the plan recommended in the report, but it appears to be the effect of it.

### ADVERTISING IN "AERA"

The November issue of *Aera* contains a large number of articles which are excellent arguments for fairer treatment of the electric railway companies at the hands of the public authorities. Editor Clark has evidently returned from the Atlantic City convention with renewed inspiration for the work which he has been selected to direct. We regret, however, that the *Aera* advisory committee considers it necessary to solicit advertisements again to obtain the funds to continue this work. This same feeling of regret, we understand, is shared by the chairman and all of the other members of the *Aera* advisory committee, and the plan was adopted only as a last resort. The plain facts are these: The association requires about \$18,000 a year to carry on the publicity work which it is endeavoring to accomplish through *Aera* and has been able to find no other way of defraying this expense. The committee in charge of the magazine has announced that it has no intention or desire to spend any part of this money in publicity which can be secured by the association without cost. Instead, and this statement is made on the authority of C. Loomis Allen, chairman of the advisory committee, the pur-



pose is to devote the magazine to the cause of securing better relations between the public and the railway companies and to the furtherance of the interests of the association. As soon as this work can be carried on by the association without the financial aid obtained from advertisements in *Aera* the advertising will be discontinued, for, obviously, the magazine, from an ethical viewpoint, would be in a much stronger position if it should carry no advertising. This announcement, we are confident, will be gratifying to many members of both the Manufacturers' and the American associations, who have felt that it was not wise for the American Association to embark in the publication of a commercial magazine.

#### A PIECEWORK DILEMMA

The point is often made that the trade union with its day-rate minimum assumes that all of its craftsmen are equally efficient and that they should be paid accordingly. Employers are not likely to admit this allegation, but sometimes they act as if they also believed in a dead level among workmen. A case in point is afforded by the president of a large electric railway system who is consistently opposed to piecework or premium systems. His opposition is not based on any fear of labor troubles or the special conditions of electric railway maintenance but simply on the assumption that no shopman can possibly be worth more than \$2 to \$2.50 a day. The shop superintendent of this railway has been able to strengthen his argument for a piecework system by making a careful study of practices in other shops, and he has concluded that a large increase in the production of motor coils and other well-defined jobs could be brought about by some form of premium system. In fact, he has calculated that the abolition of the day rate would produce a net saving of about 20 per cent in labor cost. He is also convinced that the piecework system would actually result in better workmanship because the present day rates are too low to appeal to good shopmen. This has been the result on most roads where the piecework system has been introduced. But it seems to take a long time to overcome the prejudice against a workman earning more than the ordinary wages of his craft even when his production is correspondingly greater. After all, the prime concern of an economical management as related to shop accounts should not be the wages of individuals but the total cost of maintenance per car mile.

#### PREDETERMINATION OF ENERGY TO PROPEL CARS OR TRAINS

The problem of predetermining the energy required to propel a car or train according to a given schedule is one of great importance in the design of electric railways, as upon its correct solution depends the power capacity of motors, locomotives, substations, transmission lines and power stations.

Like most problems which have been solved for the benefit of the electrical industry, it has been independently attacked by a number of engineers, each contributing a part of the complete solution, the names of A. H. Armstrong, S. T. Dodd, C. T. Hutchinson and C. O. Mailloux being particularly conspicuous. The complete solution of

the problem was given in 1902 by C. O. Mailloux in a now classical paper read before the American Institute of Electrical Engineers. Since that date a number of others have attacked the problem from various aspects, notably C. T. Hutchinson, G. H. Anderson, W. S. Valentine, L. A. Freudenberger and F. W. Carter, not to mention others.

The essential features of the problem are as follows:

A train run is made up of four periods which must be treated separately and then combined. These are the controller, free motor, coasting and braking periods. The run over a given distance, in a given time, against given resisting forces, may be accomplished by various combinations of these four periods. For example, we may have a run at a low maximum speed but with rapid acceleration and braking, or at high maximum speed with slow acceleration and braking, and yet make the same average speed. The energy consumed by the car or train in making the run will depend upon the acceleration or retardation during each period and the duration of each period.

Two problems immediately arise out of this: first, to determine the energy consumption for a given equipment and, second, to determine what motor equipment will give the most economical run, considering both energy losses and fixed charges on equipment. It is, therefore, obvious that any exact solution of these problems must consider not only the dynamical relations involved but also the electrical characteristics of the equipment. Neither of these problems has ever received an exact direct solution, although exact cut-and-try and approximate direct methods are available.

The nature of the dual problem may be realized if we consider an attempt by an imaginary motorman to make the run between two stations in a given time. A motorman trying to accomplish this feat will not know how long to accelerate on controller and motor or how long to coast and brake. He will, in nearly every case, arrive too early or too late, and only after repeated trials can he make the run in the exact time required. Suppose the motorman repeats this performance, accelerating or braking each time, at different rates, until he finds a combination which will enable him to make the run in the specified time with the least energy consumption. Finally, imagine him to repeat the entire performance several times with different motors on the car each time. The problem we are now considering, then, is how to accomplish what this imaginary motorman has done, but without the use of actual cars and motors.

The cut-and-try method of predetermining train performance, described in Mr. Mailloux's paper, is a semi-graphical and semi-analytical process of imitating the above-described performance on paper, using curves showing the motor characteristics instead of the motors themselves and the mathematical expression of the laws of motion instead of the natural operation of those laws. The method is an extremely ingenious one, not difficult to apply, and should of course be exact as it is based upon all the essential elements in the case, although values must be assigned to such factors as train resistance, braking characteristics, efficiency of motorman, etc. But, as some engineers who have had continuous work of this kind have found this method somewhat long to apply, efforts have been made toward an em-



pirical process for every-day use, using as a basis the principles described in Mr. Mailloux's paper.

Thus, in 1903, C. T. Hutchinson, in a paper read before the American Institute of Electrical Engineers, attempted to do this by substituting for an indefinite number of motor curves a single set of motor curves representing an average for all motors, although it may be noted that recent motors do not all conform with these curves. In the same year G. H. Anderson, utilizing a principle developed in 1902 by Mr. Hutchinson, introduced another short cut by showing that with speed-time curves of a given shape, whatever their scale, the energy consumption in watt-hours per ton mile is the same for any given product of the average speed and the square root of the number of stops per mile, thereby making one calculation serve for several runs.

Shortly after the appearance of Mr. Hutchinson's paper, F. W. Carter, of Rugby, England, brought out an approximate analytical method, based upon the use of empirical formulas representing the relations between tractive effort and speed and between current and speed. These formulas were used instead of motor curves, resulting in a purely analytical treatment of the subject (*Journal I. E. E.*, 1903). Later D. C. Woodbury devised a similar, though unpublished, method, using empirical formulas for speed-time and speed-current curves. Neither of these methods attained much vogue owing to their complicated and empirical nature.

Numerous minor refinements of the Mailloux and Hutchinson methods have been published in this journal and elsewhere, but they have been rather in the nature of short cuts in the calculations than developments in the fundamentals of the process.

Within the last year or two the subject of train dynamics has become connected with the battle of the systems. This occurred in England, when Philip Dawson published the results of energy tests on the electrified zone of the London, Brighton & South Coast Railway, which employs a single-phase system.

F. W. Carter promptly questioned these results, on the ground that when checked by simple dynamical formulas they showed an impossibly high efficiency. The vigorous defence of the original figures and the sustained activity of Mr. Carter's attacks have afforded our English friends some very interesting reading. This debate has served to bring the dynamical aspect of the problem to the front, where it has been kept by Mr. Carter in a series of able contributions to the Institution of Electrical Engineers and the technical press of Great Britain.

The empirical method published in our last issue by Messrs. Del Mar and Woodbury is evidently inspired by Mr. Carter's insistence upon keeping the dynamical elements of the problem in view. It has been used for several electrification estimates of importance and, we understand, has proved itself of great use if its approximations are not overlooked. This method undoubtedly affords the shortest path yet devised from the timetable to the load diagram. It also enables the calculator to traverse this path without ever losing sight of the fundamentals of the problem and, at the same time, affords him a ready means of ascertaining the effect of altering any of the variables.

It is to be hoped that the authors will amplify their

statements about motor and controller efficiencies by showing how these quantities vary with the type and length of run. The method at present assumes an average efficiency of 70 per cent for motors and controller. If this could be replaced by figures, dependent on the type and length of run; the method would be materially improved. We understand that the authors are working on this phase of the problem.

#### SPECIAL-CAR SERVICE

Too much care cannot be taken to insure that special-car service shall be maintained at high standards, once the tariff for such accommodations is fixed at levels which provide a fair profit above the cost of the facilities rendered. In some cases appearances indicate that the provision of a special car merely calls for manning the first available piece of rolling stock of the desired capacity with a crew picked up at random in the lobby nearest the loading point and turning the outfit loose upon the system with the least possible margin of time in which to make the assigned schedule. It should be borne in mind by operating officers that no matter how much indifference the public may exhibit in its regular journeys, the average man expects something a little out of the ordinary when he rides on a special car. The extent to which luxuries of various kinds may be introduced into such service naturally depends upon local conditions. One party may be made happy for the evening by the provision of a home-made buffet in one of the vestibules, and another may become enthusiastic in support of the company by virtue of a conductor well informed on the historic or other interesting places along the route. There is almost no limit to the variety of special features which may be turned to account, but it is not these matters that we wish to emphasize. What is important is the maintenance of the best possible normal service in special-car operation.

By this is meant a thorough inspection of every such car before it moves out of the house, a degree of cleanliness which leaves nothing to be desired, the selection of trim, neat motormen and conductors for such runs, the adjustment of seats, cushions and windows to meet the legitimate requirements of comfort-loving patrons, the removal of loose signs and notices which add nothing to the convenience or pleasure of the trip, and the provision of ample illumination. The use of a car sorely needing paint inside or outside, or the furnishing of one with old-fashioned carbon incandescent lighting on a scale that prevents anything but heroic attempts to read on an irregular stretch of track, is more likely to discourage further patronage of special-car service than to stimulate its growth.

Some consideration should also be given to the kind of people who are to use such a car when rolling stock is assigned to this class of service. A women's club traveling 20 or 30 miles will sing the praises of the company for months if wicker chairs and a neat strip of carpeting or matting are installed in place of the usual equipment, while a glee club of college boys traveling to give a concert in a neighboring suburb will vote every time for the street railway which assigns one of its fastest and most up-to-date cars for its use, with all the latest engineering "wrinkles," these always proving of absorbing interest to



youthful individuals of the male sex. Strict attention to punctuality is as important in making special-car service a success as in the operation of regular schedules, and the handling of the pecuniary side of the case, while business-like, should preferably be conducted in an inconspicuous way. With a fixed price for special-car service the ordinary fare restrictions and limits may be set aside so far as external appearances go, and the company's patrons should be encouraged to realize their independence of regulations necessary for the conduct of traffic upon the usual lines of travel.

#### CHEMISTRY IN THE BOILER ROOM

At the last meeting of the New England Street Railway Club, reported in last week's issue, attention was called to the really great desirability of utilizing the services of the industrial chemist in connection with street railway work. One of the many examples cited in support of the contention was the fact that much money is wasted in buying coal without any accurate knowledge of its composition and heating value, and that fuel consumption may readily be decreased by intelligent selection under existing conditions.

The point in general is manifestly well taken. Nothing is less businesslike than to buy coal without clearly established specifications, which provide a basis for periodical analyses of the fuel as it is delivered, and where power is produced in reasonably large amounts it is possible to effect large savings through allowances for variations in quality which occur even in coal from a single mine. Without an analysis, in cases of this kind, the purchaser would be penalized with no warning other than possible indefinite complaints made by the firemen or that his weekly coal bills were running higher than usual. Of course, the coal might from time to time have a higher heating value than that of the sample upon which the contract was awarded, but this contingency is hardly likely to occur very often.

On the other hand, it is unwise for the manager or engineer of a railway to consider that a chemical analysis only is sufficient to settle problems surrounding the actual selection and combustion of fuel, as might be implied from the general statement as to its undoubted value. As a matter of fact, such an analysis ends with a determination of heating value and chemical composition of the coal. But the details of the best methods of combustion are largely also a matter of mechanics, and, to secure the best results the special knowledge growing out of practical experience in the boiler room is also required, so that, relatively speaking, the chemical reactions involved are subordinate in character.

From the purely chemical point of view, for example, one would be warranted in abandoning the use of a coal with an ash which fused at a temperature of 2300 deg. Fahr. if the boiler furnaces produced a temperature of 2800 deg. Yet a capable operating engineer would know that it was necessary to change neither the fuel nor the furnace under such conditions, and without any analysis of the reasons for the procedure would keep the grates cool by a steam jet and would avoid disturbing the fire with a slash-bar so that the ashes would stay at all times

in the cool zone below the point of most active combustion. Clinkers would still be formed, but they would be so small that they would not cause trouble in cleaning fires nor would they be likely to affect the efficiency by clogging the air passages in the grates.

Again, from the standpoint of chemical analysis the ash content of any coal is quite valueless. Yet on chain grate stokers a coal with but little ash may heat the grates to such an extent as to raise the repair bill to impossible proportions, and a change from a comparatively low-grade fuel to one containing only 4 per cent or 5 per cent of ash might be prohibited in a plant equipped with chain-grate stokers even though the latter coal gave more heat units for each dollar expended than did the former. Under such conditions the expedient of feeding in a layer of ashes under the coal has met with success in some cases, the layer of ashes keeping the grates reasonably cool. But in either case the ash is a distinct if indirect necessity, so that its presence from a practical standpoint can hardly be said to be detrimental.

#### PERPETUAL INVENTORY PLAN

As a rule, the work of making a stock inventory causes a complete though temporary halt in the storeroom routine and is a source of no end of worry and extra work for the storehouse department. In many instances, where the quantity of material is large, extra help is required to complete the annual or semi-annual inventory within a reasonable time. The added expense due to the extra help and the innumerable opportunities for error in rushing through a tedious task of this kind result in an inaccurate check of the actual quantities of material on hand at any given time. A few of the larger electric railway companies have recently introduced what is termed a perpetual inventory plan which has removed most of the difficulties and inaccuracies belonging to the usual method of taking inventory, and it has proved very satisfactory in operation.

To adopt the perpetual inventory plan, one must first ascertain the number of kinds of material in the storeroom. With this information, it is possible to arrange a schedule whereby only a few items are inventoried each day during the year, with the result that no extra effort is required. Then, too, the work may be done by the stock clerks, who are thoroughly familiar with the different materials handled almost daily in filling orders. There is no real reason why an accurate check on all the material in the storeroom should be desired at any particular time. If the storekeeper has a check, from time to time, of the stock on hand to compare with his book records, it is just as practical as though all his information was supplied to him at one time. On the other hand, the perpetual inventory plan has many advantages in that it does not interfere with the routine filling of orders, it does not require the employment in the storeroom of additional help unacquainted with the materials in stock, and there need be no rush on the part of the bookkeeping department to bring the stock ledgers up to the particular day or date upon which a complete inventory was taken.

In actual operation, the plan is not only feasible, but it has proved most desirable from an efficiency and economy standpoint.



## THE TREND OF HEAVY ELECTRIC TRACTION IN EUROPE

Within the past year there have been numerous discussions abroad upon the methods and apparatus of heavy traction. We have commented upon them from time to time, but it may not be out of place here to summarize the situation as it now exists.

After the general introduction of electric traction for service the main growth for the heavier service was naturally along lines upon which experience had already been obtained, and such problems of heavy traction as presented themselves for solution abroad, as here, were dealt with as extensions of ordinary tramway service; that is to say, at 500 volts or 600 volts direct-current service, with occasional excursions into slightly higher voltages still conveniently applicable to motors of the ordinary type. Perhaps the first large project which looked away from this precedent was the electric road planned by the late Dr. Adams between Chicago and St. Louis, a project frost-bitten by the financial stress of 1893. It therefore came about that the chief advances in heavy traction in this country followed, from lack of better precedent, the development of interurban service, and the earlier efforts culminated in the Baltimore & Ohio tunnel locomotives.

Abroad, engineers began to consider traction by the then comparatively new three-phase motors, which had constituted part of the Adams project. And the first serious beginning in traction by other means than by direct current was made in the electrification of the Italian lines on the basis of three-phase methods. These roads, although subject to the initial difficulties that beset all new projects, were worked out to successful operation and have since been largely increased in mileage and traffic. The famous Berlin-Zossen experiments of ten years ago gave a further impetus to work in this direction. Meanwhile, nothing much was being done abroad in heavy direct-current work, although the encouraging results which were obtained in America stimulated interest in the matter. Then came the single-phase railway motor, worked out almost simultaneously on both sides of the Atlantic. The work done in this country put a.c. traction to the front here, and the activities of the Italian, French and German engineers soon brought the same system into prominence there. Meanwhile there had been side channels taken, like the application of the Ward-Leonard system with conversion on the locomotive, and the French rectifier locomotive which came at a little later period.

With this hasty sketch of the development of affairs we may turn to consider the situation as it now exists abroad. The Italians still adhere in the main to the three-phase lines, although single-phase work is making an appearance. From an operative standpoint the results seem to continue excellent, and the big locomotives of the Simplon tunnel make it perfectly evident that the system is thoroughly operable and reliable; but north of the Alps the compensated series single-phase locomotive in one or another of its protean shapes seems to occupy the center of the stage. It is no easy matter to ascertain what particular form of compensated motor is in use in any given installation. In published descriptions of apparatus the details of the wind-

ing are generally suppressed, and all that can be said is that the motors belong to the compensated single-phase group in some one of its half-dozen varieties, sometimes more than one type of connection being used in the same apparatus as it changes from starting to running conditions. The new Lötschberg road, with its 2500-hp locomotives, is perhaps the most conspicuous of the single-phase roads, although there are several other admirable lines with somewhat lighter service on the Continent and in Scandinavia, where the system has been taken up seriously. The rectifier scheme seems rather to have dropped out of sight, although it has not been entirely abandoned in France. As regards the operative characteristics of the single-phase locomotive, they are generally conceded to be good, the chief criticism directed at them being their weight and some reported difficulties from heating and commutation during the period of acceleration. It is generally believed, however, that these latter difficulties are not serious, and it has been the pretty general experience on the single-phase European lines that the operative results have been on the whole excellent. Obviously, the chief advantage of the single-phase and the three-phase systems is the extremely important one of high voltage on the trolley wire and, consequently, the great simplification and reduction of cost in the conducting system. As the matter stands at present, then, it may be summarized in saying that the tendency all over Europe is strongly toward the single-phase equipment, the three-phase not being at all abandoned but less frequently apparent in connection with new projects.

Meanwhile what about the direct-current system at increased voltage? In brief, it occupies somewhat the same position that it does in our own country, strongly advocated by engineers used to d.c. practice, occasionally employed on a modest interurban scale, working admirably as a rule but not yet adopted to any great extent on the heavier work here. There are some capital high-voltage d.c. lines in Europe, most of them at voltages under 1200, like the very interesting Bernese-Oberland Railway, but occasionally going higher. At least one big and admirably designed locomotive for 2400 volts total has been constructed and tested, and the reports from it are good. Neither here nor abroad, however, has the system had a really thorough try-out on a considerable scale, a scale comparable, for example, with the larger single-phase and three-phase roads now in operation.

Just why the case should stand thus is not altogether evident. If it is that 2400 volts is still somewhat too low for efficient current collection and distribution, such a condition should simply be a spur to higher voltages. Indeed, with the present experience in building high-voltage d.c. machinery and the use of interpole construction which has so facilitated its design, better things should be possible. The experience of M. Thury with large high-voltage d.c. machines makes it altogether evident that the limit of the commutator has not yet been reached in railway work. When somebody really gets at the problem and puts out a big locomotive operating with not less than 5000 volts on the trolley wire, things will look differently from the d.c. standpoint. A comparison between such a locomotive and a high-voltage single-phase locomotive would be most instructive.



# Recent Improvements on the Berkshire Street Railway

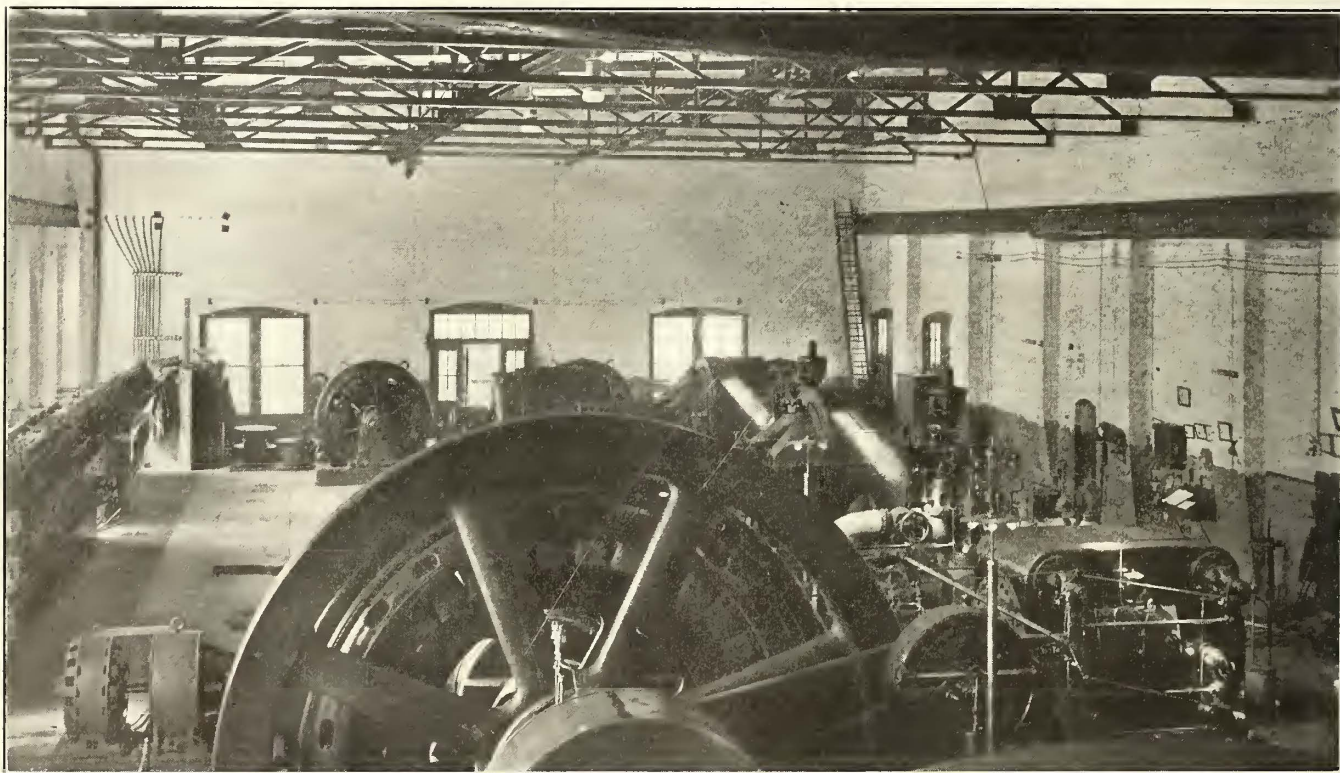
This Article Describes the Power Generation and Transmission and Distribution System, Including Work Now Under Way

One of the longest electric interurban transportation systems in New England is the Berkshire Street Railway, which operates about 135 miles of track in western Massachusetts, Connecticut, Vermont and New York. This road has recently been greatly extended and improved so that it is now one of the interurban lines in the East whose engineering features are essentially a product of the last two or three years. The Berkshire Street Railway operates a frequent interurban schedule between Pittsfield and North Adams, Mass., and cares for passenger and freight busi-

ness. These betterments have all been planned and supervised by the engineering organization of the company.

## EARLIER POWER SUPPLY

Prior to March, 1911, the Berkshire system received power from a main generating plant at Pittsfield over 13,200-volt transmission lines, the local car service being cared for by 600-volt d. c. distribution from substations at Housatonic, Lee, Pittsfield and Pownal. Two 300-kw rotaries were in service in all substations except the last named, where the unit was 200 kw. A small amount of



Berkshire Improvements—Remodeled Plant, East Street Station, Pittsfield, Showing the Later Installation of Mixed-Pressure Turbines

ness in the valleys of the Housatonic and Hoosac rivers. Its territory embraces the popular watering places of Lenox, Stockbridge and Great Barrington. The length of the main line from Canaan, Conn., to Hoosick Falls, N. Y., is 97 miles. The company is controlled by the New York, New Haven & Hartford Railroad under a special act of the Massachusetts Legislature and is operated along the advanced lines of practice developed by the electric railway branch of the larger organization.

## OUTLINE OF IMPROVEMENTS

Within the past two years the system of power supply has been greatly improved, substations and transmission lines have been built and the carhouse facilities have been much extended. In addition, a line of high-grade construction is now being built between Lee and Huntington, Mass., to provide a connecting link between the Berkshire system and the electric railway network of central and eastern Massachusetts. Extensions to South Egremont, Mass., and Canaan, Conn., have been completed.

power was obtained from a 500-kw engine-driven plant at Hoosick Falls, N. Y. With the completion of the Hoosac Tunnel electrification by the Boston & Maine Railroad and the establishment of a modern high-class steam turbine station at Zylonite, near North Adams, Mass., for the tunnel service, provision was made for the operation of a portion of the Berkshire load by the new plant; the transmission lines were rebuilt and extended and a standard 33,000-volt service was inaugurated between the southern part of the system and Zylonite. The Pittsfield plant was rebuilt sufficiently to permit its operation in multiple with the Zylonite station on the high-tension side, and new rotary converter substations were erected at Sheffield, Lee and Cheshire. The Housatonic and Pownal substations were retained in service and plans have since been made for an open-air substation at Otis for the Lee-Huntington extension. North of Zylonite the transmission voltage was standardized at 11,000 volts, which is the pressure used in the Hoosac Tunnel electrification.



PRESENT HIGH-TENSION SYSTEM

The accompanying diagram of the existing transmission lines of the Berkshire system shows the general scheme of power supply. Two 33,000-volt trunk lines are run from Zylonite through Pittsfield to Lee, and these lines will shortly be extended eastward to Otis, where two 300-kw rotaries will be installed. The distance from Zylonite to Pittsfield via the high-tension lines is 18 miles and from Pittsfield to Lee the line length is 15 miles. South of Lee there are two lines, one operated at 13,200 volts and serving the Housatonic substation, and the other operated at 33,000 volts and supplying energy to the Sheffield substation, near the Connecticut state line. A single line is carried northward to the Pownal substation, in Vermont, from Zylonite. The capacity of substations now in service or planned for the immediate future is as follows:

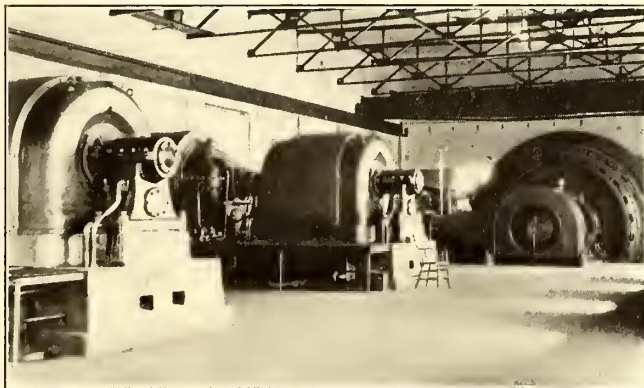
Location	No. Rotaries	Kw Capacity
Pittsfield	3	2250
Zylonite	3	1300
Lee	2	600
Sheffield	2	600
Otis	2	600
Housatonic	2	600
Cheshire	2	600
Pownal	2	400
Total	18	6950

The company also has a 200-kw portable substation which is ordinarily located near Williamstown, Mass., while a second will be utilized in the Huntington district after the extension from Lee is completed.

The Zylonite station now contains two 5000-kw, 11,000-volt, twenty-five-cycle Westinghouse turbo-generators, and the Pittsfield station contains four units aggregating 3166 kva. Two of these are revolving-field generators direct-driven by horizontal cross-compound condensing engines, the other two being mixed-pressure turbo sets of Westinghouse make which are ordinarily operated in connection with the engines and utilize the exhaust of the latter. The entire output of the Pittsfield station is used by the Berkshire Street Railway, while about 1500 kw maximum is drawn by the road from the Zylonite station.

PITTSFIELD GENERATING PLANT

The Pittsfield station improvements include the rewinding of the engine-type generators from 13,200 volts to 370 volts; two additional 380-hp Aultman & Taylor water-tube boilers, two additional mixed-pressure turbo units, an additional feed-water heater, pumps, and the installation of three rotary converters, with switchboard changes and re-

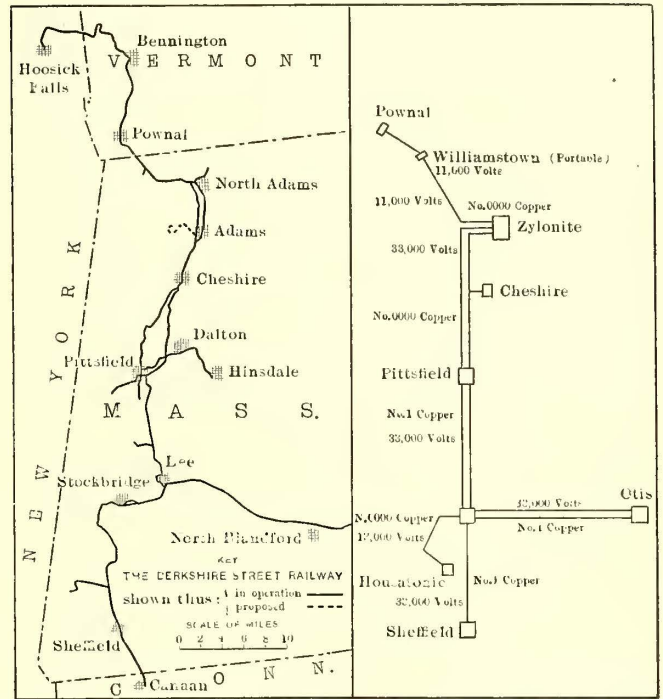


Berkshire Improvements—Mixed-Pressure Turbines and Engine-Type Generator at East Street Station, Pittsfield

mote control for operating oil circuit-breakers in a new transformer station adjacent to the generating plant.

The plant is located about 1 mile outside the business center of Pittsfield and adjacent to the operating headquarters and principal carhouse and repair shop of the system. Coal is delivered by gravity to a storage yard of 8000-ton

capacity paralleling the main line of the Boston & Albany Railroad. The station is 144 ft. long over all and 104 ft. wide, and in addition to the four generating units mentioned above contains six 380-hp boilers hand-fired and equipped with Reagan grates, Westinghouse-LeBlanc condensers for service with the mixed-pressure turbines and



Electric Ry. Journal

Berkshire Improvements—Maps of System and Distribution Lines

Warren jet condensers connected with the engine installation. The latter are not used except in emergencies. A general plan of the remodeled station is shown.

MIXED-PRESSURE TURBINES

Coal is delivered in the boiler room by hand cars of 2600-lb. capacity running upon a 20-in. gage industrial railway and passing over a set of platform scales at the entrance. Natural draft is provided by a brick stack 175 ft. high and 10 ft. inside diameter. The boilers are arranged in three batteries on one side of a firing aisle 18 ft. wide, and the new feed-water heater and pumps are located at the west end of the room, with space for an office in one corner. The plan shows in a striking manner the compactness of a turbine as compared with an engine installation, all the auxiliary condensing equipment being located in the basement. The mixed-pressure turbines were installed 20½ ft. apart on centers to provide ample space for auxiliaries below the engine-room floor. Each of the engine-driven generators is rated at 750 kva and operates at 96 r.p.m., the turbine-driven generators being rated at 833 kva each and running at 1500 r.p.m. All deliver three-phase energy at 370 volts to the bus to give direct supply to the three local 750-kw rotary converters. All the d. c. feeders centering in Pittsfield are supplied from these rotaries, the outgoing cables being tagged by 3-in. x 6-in. tabs for convenience in repairs or testing as shown in the accompanying halftone. The engine room is served throughout its entire area by a 15-ton hand-operated crane of 61-ft. span.

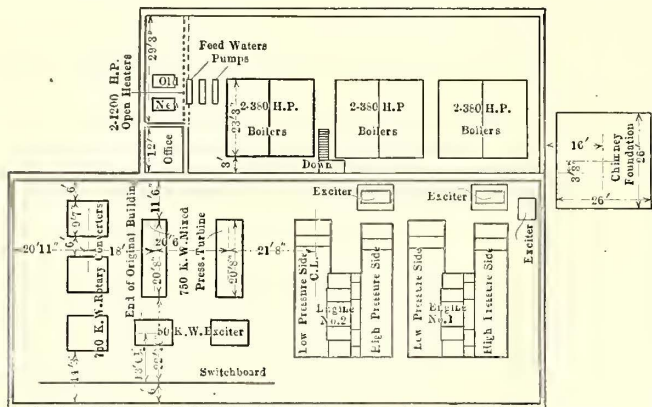
The station burns Cambria coal and operates upon a live steam pressure of 160 lb., from 10 lb. to 20 lb. back pressure (absolute) being used between the low-pressure engine cylinders and the turbines. The turbine bearings are lubricated by an oil-pressure system operated at 5 lb., the governors being of the oil-pressure type and operated at 40



lb. per square inch. The supply of live steam to the turbines, in case the engine exhaust is insufficient, is obtained through a reducing valve and automatic valve actuated by the governor. The auxiliary oil-pumping equipment of these turbines is self-contained and with the incidental piping is largely placed outside the machine casings under

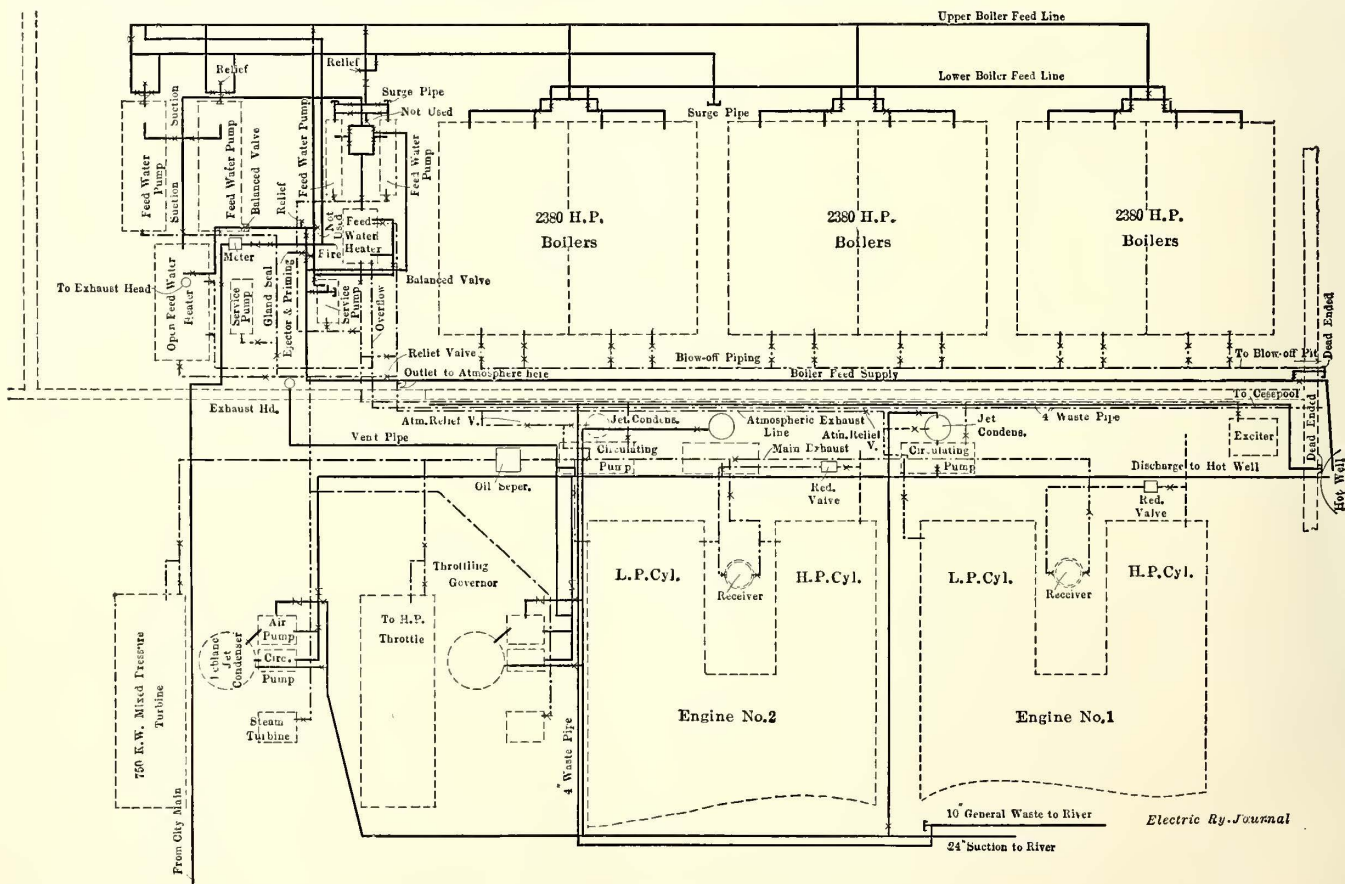
PIPING ARRANGEMENT

The piping arrangements in connection with the station improvements were planned for flexible operation. The engines take live steam from a 14-in. main header running the entire length of the boiler batteries, and the turbines are connected with the main header by 6-in. pipes, appropriate reducing valves being provided for the turbine service. The water piping provides for boiler feed either from the city mains or from a hot well which receives the condensation from the turbine as shown in the accompanying diagram. Condensing water is drawn from the Housatonic River through a 24-in. suction pipe leading to the Le Blanc condensers, and the boiler-feed system is laid out with more than the usual care to forestall interruptions. Duplicate feed lines are run to each battery. In normal operation water from the hot well is pumped through a National heater of the open type by one or both Blake feed pumps, city water being used only for make-up necessities. Two other feed pumps and a Cochrane heater formerly used in connection with the engine-driven plant are also located in the pump section of the boiler room, and either set of pumps may be operated upon either or both sets of boiler-feed lines. The feed lines are equipped with balanced valves controlled by floats in the heaters. As the heaters fill, the valves are automatically closed, throwing pressure back upon the pump governors and cutting down the rate of water input from the pumps. Oil from the engines which passes through the turbines into the hot well is separated from the water of condensation by gravity and discharged through an overflow into the river. The water in the hot well is maintained at a depth of about 6



Berkshire Improvements—Plan of East Street Power Station, Pittsfield

an open platform just below the bedplate edges, insuring economy in space requirements. Air for generator ventilation is drawn into the machines through screened intakes on the west and south sides of the building at the ground level. The air ducts are run along the basement ceiling to



Berkshire Improvements—Water and Exhaust Piping Plan of East Street Power Station, Pittsfield

the generators, and the discharge of heated air from the latter is into the basement, which is 12 ft. high and provided with several openings into the engine room. The capacity of the plant was increased about 70 per cent for a given fuel consumption by the installation of the mixed-pressure turbines.

ft., and the feed-water suction line enters the well near the bottom. By this means no trouble is experienced from the oil in the operation of the boilers. Service and fire pump connections are made in the boiler room on the inside of the city meter.

The exhaust piping provides for the usual disposal of



steam from pumps and auxiliary apparatus by connections with the feed-water heater lines, and a complete system of heater overflow lines is provided. The exhaust from the low-pressure engine cylinders is turned into a main in the basement and passed through an oil separator before being delivered to the turbines. Auxiliary steam connections at the engines permit live steam at reduced pressure to be turned into the low-pressure cylinders in case of trouble on the high-pressure side of the engine.

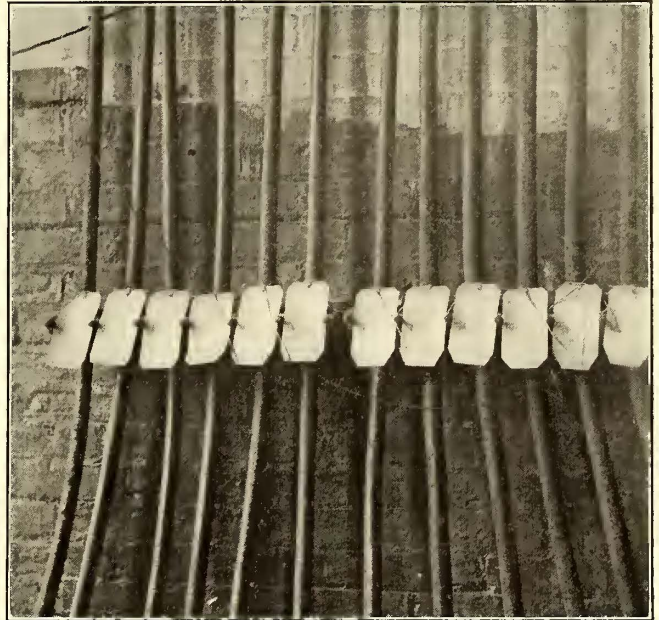
#### EXCITER PLANT

Five exciters are in service at the East Street station. In normal operation the load is carried by two 50-kw sets of the motor-driven type. One 50-kw and two 20-kw steam-driven exciters are installed, and all these machines deliver current at 125 volts to the exciter bus. The motor-driven units are each operated from the 370-volt, three-phase bus, induction motors being used. The two smaller steam-driven exciters are run by turbines, the large unit being engine-driven. Auto-transformers for the rotaries are located in the basement between the foundations of these machines, and in starting a 125-volt current is applied by means of a double-throw switch, a transfer being made to the 370-volt bus as soon as the rotary reaches full speed. The turbine room is illuminated by five 5-amp, 110-volt multiple inclosed flaming-arc lamps suspended from the roof.

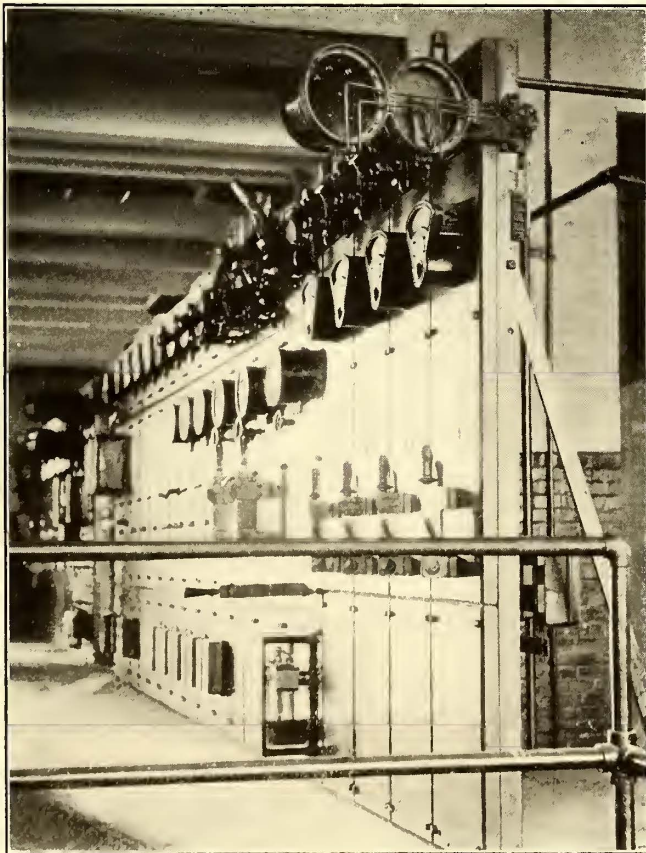
#### OPERATING FEATURES OF SWITCHBOARD

From the generators and rotaries the conductors are carried to the station switchboard in fiber conduit laid in the floor. The switchboard consists of an a.c. and d.c.

connections to the transformers, raising the station voltage to 33,000, are governed by remote-control switches mounted on the a.c. board in the engine room, the oil switches in the high-tension leads being mounted on a gallery in the transformer house. These circuit-breakers are of the solenoid type. The station is operated continuously, but



**Berkshire Improvements—Tagging Feeders for Convenient Reference at East Street Power Station, Pittsfield**



**Berkshire Improvements—Railway Feeder Panels on Extension of Switchboard Platform, Zylonite Substation**

section. Inside the East Street station there is now no high-tension apparatus, as all the transformer and line equipment associated with the 33,000-volt transmission is located in a fireproof substation on the opposite side of the street. No oil circuit-breakers are required in the power station proper. The high-tension lines and bus con-

nections to the transformers, raising the station voltage to 33,000, are governed by remote-control switches mounted on the a.c. board in the engine room, the oil switches in the high-tension leads being mounted on a gallery in the transformer house. These circuit-breakers are of the solenoid type. The station is operated continuously, but

between 12:15 a. m. and 5:20 a. m. daily the generators are shut down and one rotary is allowed to maintain voltage on the trolley and supply any local lighting required, the machine being run off the 33,000-volt transmission lines through the transformer station and 370-volt bus. The Zylonite power station generating equipment is never entirely shut down intentionally, as the demands for service in the Hoosac Tunnel are particularly heavy during the night hours, when the volume of freight traffic on the Boston & Maine system reaches a maximum.

#### HANDLING HIGH-TENSION ENERGY AT PITTSFIELD

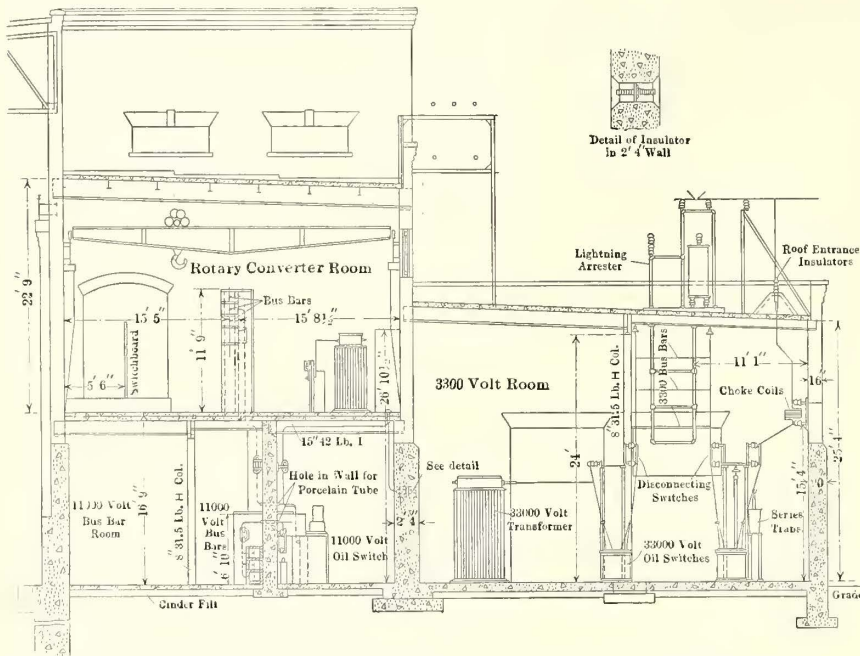
The Pittsfield transformer station is 47 ft. long x 41.5 ft. wide inside, its height being about 45 ft. In general design it has many features in common with the company's typical substation at Lee, which will be described later, but the absence of rotary converter and switchboard equipment in the building materially simplified the arrangement. There are two floors in the structure in addition to the roof. It contains two banks of transformers, each composed of three 500-kva oil-cooled units, located on either side of a middle aisle 11 ft. wide, on the first floor; six sets of solenoid type oil circuit-breakers mounted on the second floor, and four sets of lightning arresters of the aluminum-cell type located on the roof. The frame of the brick-walled building is composed of steel columns and I-beams, with reinforced concrete second floor and roof. The ground floor is of concrete without reinforcement, and the walls are carried on concrete footings 4 ft. square at the bottom, 5 ft. 6 in. deep, 22 in. square at the top and reinforced by two discarded steel rails in each case. A hand-operated traveling crane of 8-ft. span traverses the center aisle and serves the first and second floors.

All high-tension exposed conductors are of copper tubing. The installation provides a common three-phase bus for four 33,000-volt lines, two of which connect with Zylonite and two with Lee and other substations at the south of Pittsfield. Each line has an independent set of lightning arresters and oil circuit-breakers, the usual dis-



connecting switches being installed on each side of the oil breakers. All the lines are paralleled on the transformer station bus, which extends around three sides of the building. The 370-volt cables from the East Street station are carried under the street to the transformer house in 3-in. socket-jointed fiber conduit laid in concrete, sixty ducts

latter cables laid in floor conduits connect with the rotaries, disconnecting switches being provided only between the rotaries and the transformer secondaries. Short runs of cable then connect the rotaries with the d.c. buses at the rear of the switchboard in the usual manner. Two three-phase, 11,000-volt lines leave the substation, one serving the Boston & Maine Railroad passenger station and shop power demands and the other supplying the northerly substations of the street railway. The local d.c. requirements are met by four 500,000-circ. mil feeders supplying current at 600 volts to the trolley lines on the east and west sides of the Hoosac River and to the local lines in the cities of Adams and North Adams, the villages of Blackinton and Sands Springs. The substation is about 54 ft. x 74 ft. in plan.



Berkshire Improvements—Cross-Section of Two-Story Zylonite Substation

being provided for the anticipated service requirements. The remote control and pilot wires, current transformer leads, etc., are also carried in these conduits to the main switchboard. The connections enable the substations south of Pittsfield to be fed directly from Zylonite or directly from Pittsfield without connection with the former station, in addition to the normal scheme of multiple operation.

ZYLONITE SUBSTATION

The Zylonite substation is formed by a steel-framed extension of the tunnel power house, which was illustrated in the *ELECTRIC RAILWAY JOURNAL* for Sept. 16, 1911. In general, the installation permits the operation of one 300-kw and two 500-kw rotary converters for local d.c. railway service and the supply of 33,000-volt energy to the two transmission lines feeding the substations south of this point. One 11,000-volt line serves the portable substation near Williamstown and the fixed substation at Pownal, Vt. The transformer and oil-switching arrangements to handle these services required the building of a somewhat complex substation structure at Zylonite to secure safe and convenient operation with so many high-voltage and low-voltage circuits.

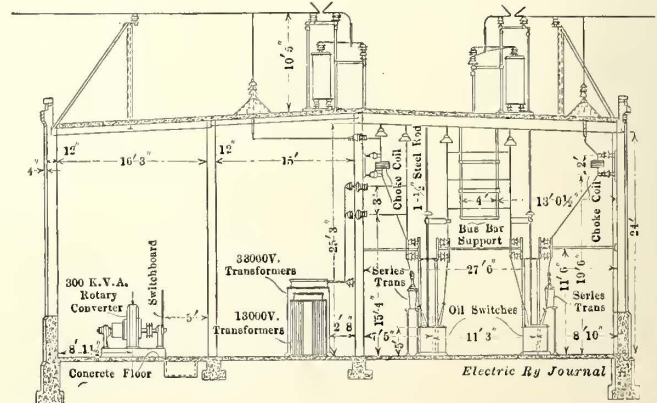
The substation is two stories in height and contains a switchboard extension, the three rotary converters, their starting panels and reactances, with a bank of three transformers for each machine on the upper floor, which is on substantially the same level as the main turbine room of the station, the ground floor being occupied by an 11,000-volt bus room, an 11,000-volt oil-switch room and a 33,000-volt transformer, oil-switch and bus room. The main station buses are carried horizontally in concrete compartments built on the second floor at the rear of the main switchboard. From these leads are run downward to an operating 11,000-volt bus on the ground floor, an oil circuit-breaker being provided between the main and lower buses so that the street railway service may be entirely disconnected when desirable. From the lower buses cables are run through disconnecting and oil switches to the rotary converter transformer banks on the floor above. From the

HANDLING HIGH-TENSION LINES AT ZYLONITE

The high-tension transformer and oil-switch installation provides for the single or multiple operation of two banks of 500-kva oil-cooled transformers upon a common low-tension primary bus and a common high-tension secondary bus, the outgoing 33,000-volt lines being taken off the latter with bus sectionalization. High-tension oil switches are installed in the outgoing lines between the transformer secondaries and the bus and also between the bus and the lightning arrester equipment, which is of the usual Westinghouse aluminum-cell type, and with choke coils located on insulated supports carried on the interior wall of the high-tension room. The spark gaps and arresters are situated on the roof, as shown in one of the accompanying drawings.

SWITCHBOARD OPERATION AT ZYLONITE

The operating switchboard has auxiliary remote control switches governing the entire a.c. installation and a complete set of instruments for measuring and recording all energy delivered to the substation. Current for the remote-control system is obtained from a storage battery. Synchronizing plugs and indicators are provided in connection with the tying together of the Zylonite and Pittsfield plants at this point, and all direct current delivered to the trolley feeders is passed through an integrating wattmeter before it leaves the switchboard. A 10-ton Whiting hand-operated



Berkshire Improvements—Cross-Section of Lee Substation

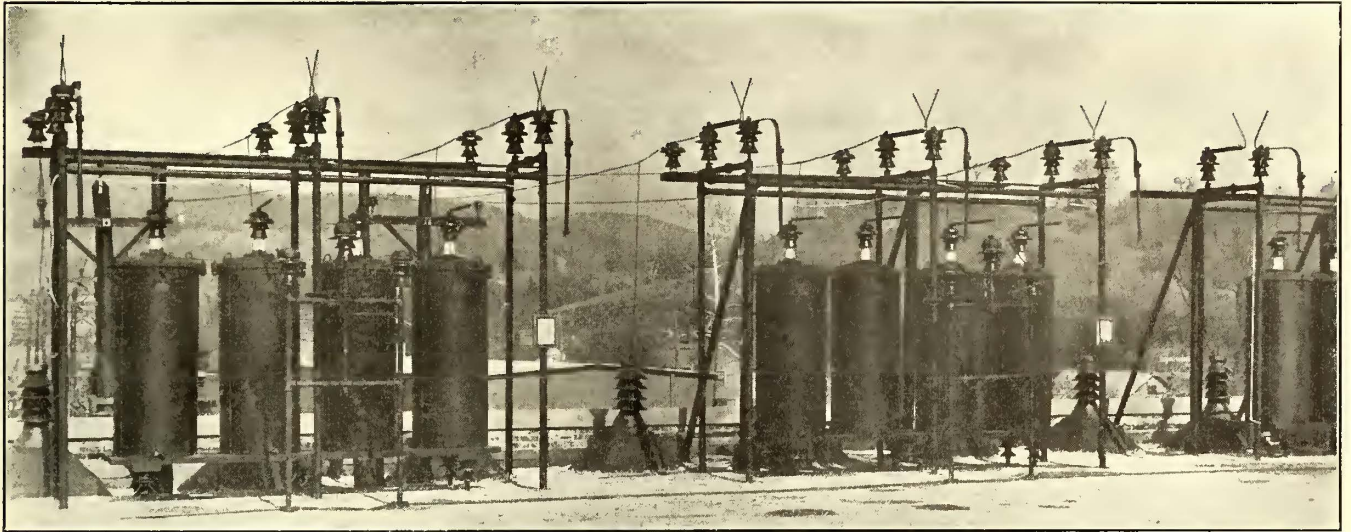
crane serves the rotary room. The rotaries are of the six-phase type, as they handle the unbalanced load of the system better than three-phase machines. The tunnel electrification imposes an unbalanced load of about 10 per cent upon the station, one phase of the Y-winding of each turbo-generator being grounded;



TYPICAL 33,000-VOLT SUBSTATION OF COMPANY'S DESIGN

The company's substation at Lee, Mass., is the most important electrical operating point south of Pittsfield and typifies in every detail its most recent indoor construction for high-voltage work. At this substation two 33,000-volt

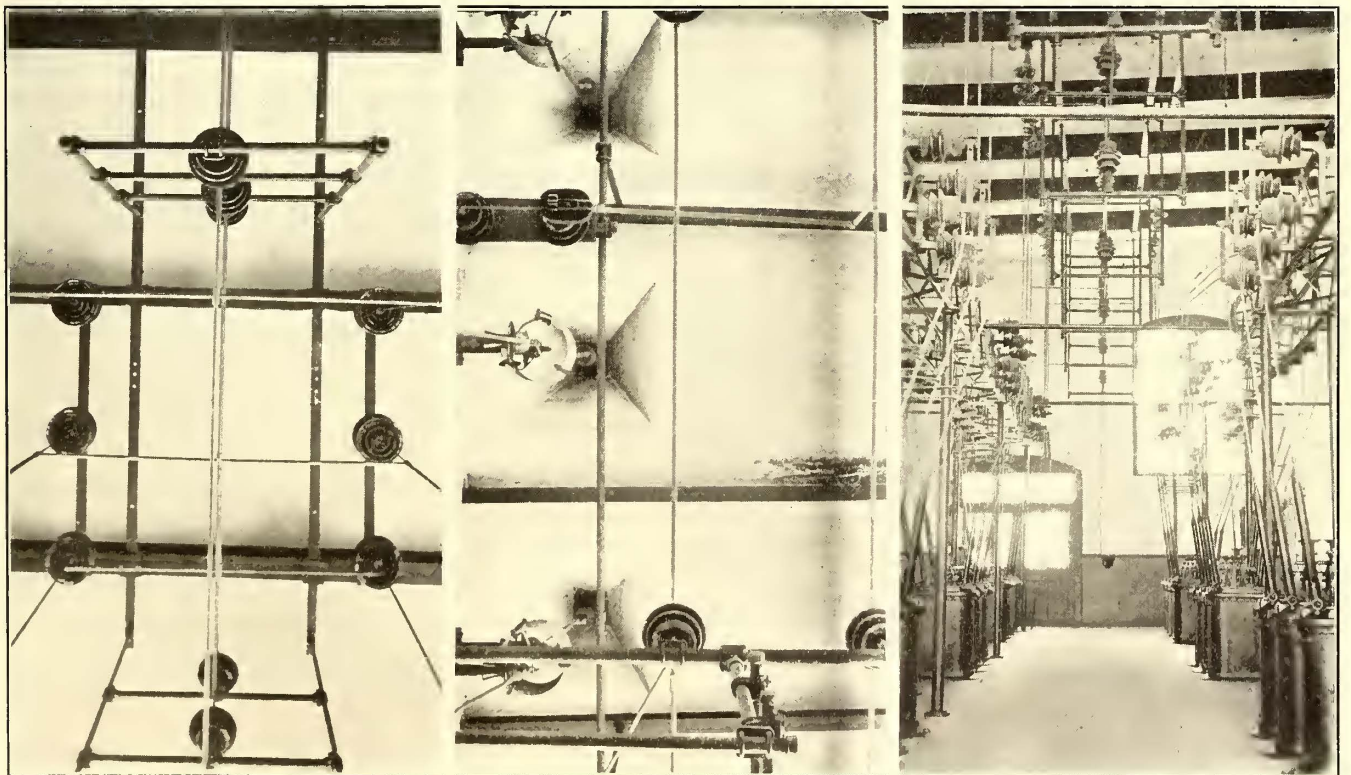
line construction. The building is about 64 ft. x 81 ft. in plan, one story in height, the distance from the floor to the roof beams being about 25 ft. It is a steel-framed structure with brick walls, concrete, tar and gravel roof and concrete floor and foundations. The design is such as to avoid



Berkshire Improvements—Lightning Arresters at Lee Substation

lines enter from Pittsfield; two 33,000-volt lines leave for the Otis substation on the so-called Springfield route; one 33,000-volt line continues to Sheffield, and one 13,000-volt line is carried to the Housatonic substation. As at Pittsfield, the 33,000-volt lines are all brought to a common bus, and the local transformers and rotary converters are sup-

doubling back of circuits, and the advance of energy through the building is continuous. There are three fire-proof sections, one 27.5 ft. wide, devoted to buses and high-tension oil switches; one, 15 ft. wide, to transformer banks, and the third, 16 ft. wide, to the rotaries and switchboard. The roof is occupied by the incoming and outgoing lines



Berkshire Improvements—Views from Below of the High-Tension Buses and Entrance Cones, Sheffield Substation; General View of the Bus and Oil-Switch Layout, Lee Substation

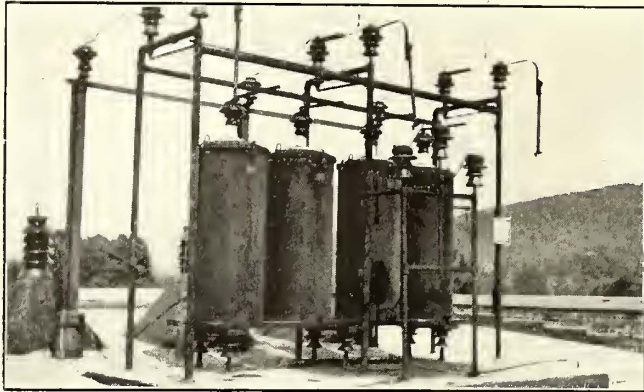
plied from this. The 13,000-volt line to Housatonic substation is fed through two banks of 110-kw. three-phase transformers supplied from the 370-volt rotary converter bus of the substation.

The chief interest of the substation is its high-tension

and their lightning arrester equipment. The 33,000-volt lines from Pittsfield are dead-ended on insulators supported on steel framing about 19 ft. above the roof, the spark gaps for the lightning arresters being mounted on insulators just beyond the dead-ending frames and supported on



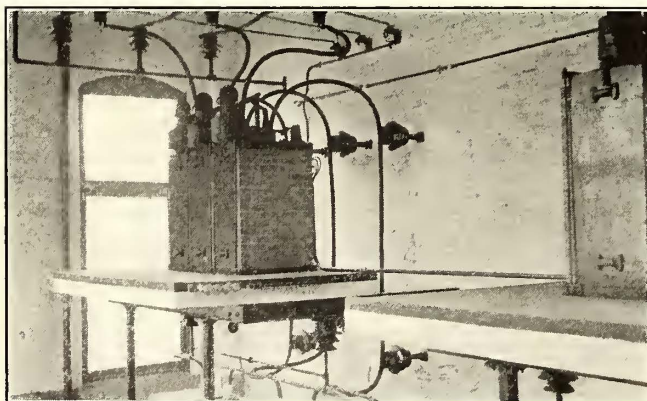
pipng set into an insulated platform carrying the arrester cells. Vertical drop leads are taken off the incoming lines and carried through special reinforced concrete roof entrances provided with a five-part Locke No. 304 porcelain insulator to the bus room interior, whence they connect with choke coils, disconnecting switches and oil switches before leading to the buses.



**Berkshire Improvements—Lightning Arresters at Sheffield Carhouse**

The disconnectors are mounted on pin-type insulators set on horizontal axes and attached to a box girder structure composed of steel channel irons supported on vertical pipe standards. Current transformer connections are made around Ohio Brass No. 9462 insulators inserted in the high-tension leads, which are all of 3/4-in. hollow copper tubing. The oil switches, which are of the usual solenoid-operated, remote-controlled type, are mounted in rows upon the floor under the disconnecting switch structures on each side of the high-tension bus supports and about 12 ft. below them. The bus tubing is carried horizontally upon pin-type Thomas insulators supported on pipe framing hung from the roof, and the leads from the switches to the buses are anchored to the ceiling structure by two-part suspension insulators, lateral taps being made at the level of the buses to the latter. All current transformers in the high-tension leads are mounted on platforms 5 ft. above the floor, the platforms being carried in each case by four 3-in. iron pipes.

From the buses the 33,000-volt energy is led through



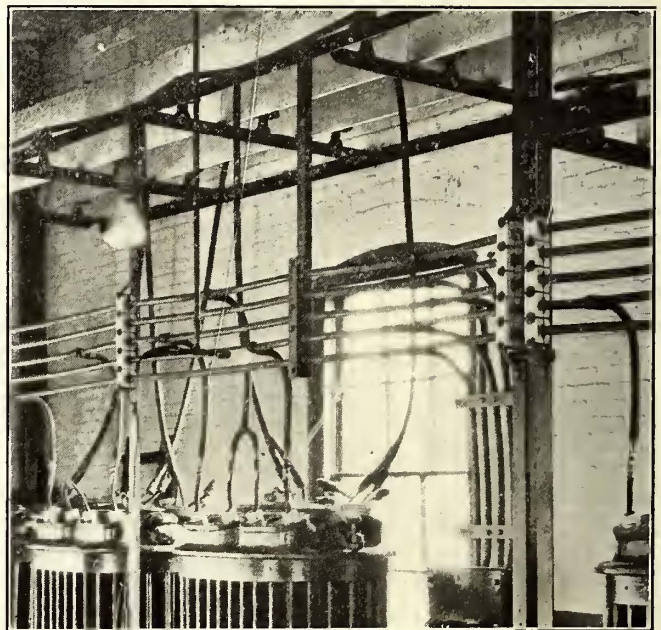
**Berkshire Improvements—Oil Switch, Special Mounting at Cheshire Substation**

disconnecting and oil switches to the outgoing lines and to the transformer banks for rotary converter service. In the latter case the leads are carried through a 12-in. brick fire wall separating the bus room from the transformer room, Ohio Brass insulating bushings being used. In general, a spacing of 3 ft. is maintained between adjacent high-tension conductors throughout the substation. From the

transformer secondaries 370-volt cables are run to the rotary starting panels through floor ducts, and thence to the rotaries. A covered trench 3 ft. wide and 2 ft. deep is located behind the switchboard to facilitate access to the cables. The d.c. side of the installation contains no features of unusual character. The local feeder service is handled by three 500,000-circ. mil cables running respectively north, south and east from the substation and supplying the nearer portions of the main line and Huntington extensions with 650-volt energy. All the oil switches have over-load relays.

#### OTHER SUBSTATIONS

The Sheffield, Cheshire and Pownal substations need no extended description. At Sheffield a building 40 ft. x 38 ft. in dimensions houses two rotaries and two banks of 110-kva transformers, with two sets of oil switches, there being two rooms in the installation with a 12-in. fire wall between. The high-tension leads are brought into the building through multi-petticoated insulators and entrance cones, the latter being shown in a worm's-eye view herewith. No oil switches are provided in the incoming line between the



**Berkshire Improvements—Protecting 11,000-Volt Buses by Asbestos Boards, Pownal (Vt.) Substation**

arrester equipment and the high-tension bus, but the usual automatic breakers are inserted between the latter and the transformers. Separate starting panels are provided for the rotaries in this installation.

#### NOVEL OIL-SWITCH INSTALLATION

At Cheshire all the equipment is housed in a 20-ft. x 42-ft. room, the noteworthy feature being the installation of the oil switches on reinforced concrete platforms above the transformer banks because the substation was originally designed for 22,000-volt instead of 33,000-volt operation. The details of the oil-switch supports are shown in the accompanying halftone, the platform in each case being 10 ft. above the floor, carried on I-beams and pipe stands and consisting of a concrete slab and granolithic surface 9 ft. long x 8.5 ft. wide, with reinforcing bars as indicated. Six 125-kw transformers are in service, and the local feeders consist of one northbound and three southbound cables. In the Pownal substation asbestos panels separate the 11,000-volt buses as shown in the accompanying photograph. Two sets of 75-kw transformers are in service, the oil switches being located at the rear of the switchboard in the single operating room of the substation.

#### NEW OPEN-AIR SUBSTATION OF COMPANY'S DESIGN

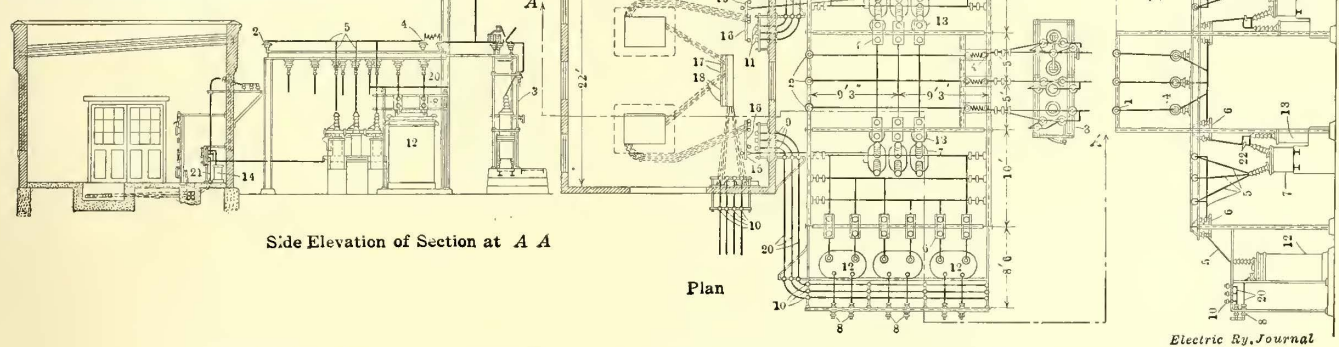
A departure from previous standards of design is shown



in the Otis or Summit substation now under construction by the company. As shown in the accompanying drawing this installation will house two rotary converters, a d.c. switchboard and two starting panels in a brick building 21 ft. x 22 ft. in plan, all of the high-tension apparatus being located out of doors within an inclosure of I-beam and

370-volt and 650-volt circuits, the latter connecting the rotaries with the operating switchboard's d.c. bus section and thence with the outgoing feeders. Strain insulators will be extensively used in supporting the high-tension conductors within the inclosure; the oil switches will be of the automatic type with manual re-setting from the substation

Item No.	List of Electrical Material	No. Req'd	Item No.	List of Electrical Material	No. Req'd
1	Strain Insulators Similar to G.E. Co's No. 9598	45	14	Phase Starting Compensator	2
2	33000 V. Pin Insulator with Iron Pin for Mounting on Flat Surf.	3	15	Transformer Panel	2
3	G.E. 33000 V. L.N.G. Arrester 3 Electrolytic complete	1	16	A.C. Rotary Starting Panel	2
4	G.E. 33000 V. L.N.G. Arrester Choke Coil, Pin Ins. on Steel Base	3	17	D.C. Rotary Panel	2
5	1/2" Outside Dia. Copper Tube with Connectors Apprx.	375 ft.	18	D.C. Feeder	2
6	G.E. 300 Amp. 33000 V. S.T. Disc. Sw. Outdoor Susp. Type	18	19	G.E. Form K. 300 V. D.C. Aluminum L.T. Arr.	2
7	G.E. Oil Sw. Aut. Trip. Hand Op. 3 P.S.T. Outdoor	2	20	700 000 G.M. Cable Apprx.	275 ft.
8	G.E. 7500 V. 600 Amp. Discosa Sw. Steel Base	12	21	700 000 G.M. Cable Apprx.	275 ft.
9	Porcelain Wall Tubes 12" Long 1 1/2" Ins. Dia.	10	22	Brass Comp. Insulating Joint	4
10	690V Pin Insulator for 700 000 C.M. Feeder with Pin for Pipe Mtr.	44			
11	Porcelain Cleats for 700 000 C.M. Feeder	18			
12	G.E. Type H.A. 25-110 K. W. 33000/385 V. Traser. (Outdoor Bush.)	6			
13	G.E. 35000 Current Transformer (Outdoor Type)	4			



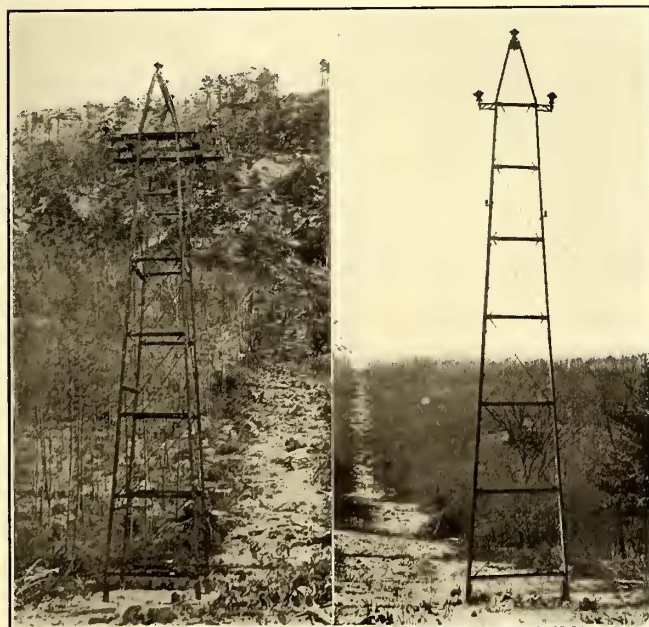
Berkshire Improvements—Plan and Elevations of Otis Open-Air Substation

pipe-frame construction. After passing through lightning arrester choke coils attached to pin-type insulators on an overhead platform the incoming current is to be delivered to a set of horizontal buses composed of 7/8-in. hollow copper tubing and attached to GE outdoor disk type switch insulators, one set being on each side of the main inclosure. At the above insulators connections will be made to disconnecting switches controlling the supply of energy to cor-

starting panels, and transformers, oil switches and lightning arresters will be mounted on heavy concrete foundations raised from 6 in. to 30 in. above the ground. The incoming 33,000-volt leads will be spaced 5 ft. apart outside the inclosure, and from 26 to 33 in. apart in bus sections.

STEEL TOWER LINES

In connection with the installation of the 33,000-volt lines the company has adopted steel tower construction as its standard, and for double-circuit supports it is using an Archbold-Brady A-frame, upon which the bottom wires are carried 36 ft. from the ground on pin-type insulators, the vertical spacing between conductors being 42 in. They carry two circuits of No. 1, seven-strand copper and are set a standard distance of 400 ft. apart. The towers are in general set 5 ft. 6 in. in the ground, the principal members being 7-in., 9.75-lb. channels, with 5/8-in. diagonal brace rods between the horizontal frame members. Views are given of a number of special towers used where long spans were required. The longest span on the system is one of 1025 ft., in Great Barrington, Mass., where a square tower for each end, 48 ft. high, was built in the field from two standard A-frames. Another square tower near Lenox, Mass., is used at each end of a 620-ft. span. In the former case three and in the latter two insulators in seriatim were used for the mechanical support of each phase. Much of the tower construction is located upon a private right-of-way 50 ft. wide. On single-circuit towers the line wires are carried in 36-in. equilateral triangles. On square towers, which are also used at angles in the line, the conductors are clamped to steel straps which span the tops of the insulators. Locke No. 319 triple-petticoated insulators are used on the lines.



Berkshire Improvements—Part of Longest Span on Berkshire System—Single-Circuit Tower Line in Great Barrington

responding oil switches and auxiliary bus tubing. From the latter connection will be made through additional disconnecting switches to the transformer banks, beyond which will be located the 370-volt cable connections leading into the substation building and ending at the rotary starting panels. The usual floor ducts will care for the

LOG SHEETS AND LOAD CURVES

In both generating plants a daily log sheet is kept to show labor and material costs and quantities required in regular operation, with the totals and unit costs per kilowatt-hour. The peak load in the afternoon ordinarily runs between 3000 kw and 3500 kw, and about half the requirements of the system are supplied by each of the two generating stations. Between midnight and dawn the load is carried by the Zylonite station, one rotary converter being operated at Pittsfield.



# Contracts for Purchased Power

Several Typical Forms of the Agreements Between Electric Railways and Power Companies to Cover the Purchase of Power for Operating Cars Are Outlined and Compared in Detail

Within the last few years there has existed a decided tendency for electric railways to purchase power from local power companies instead of generating it themselves. One reason for this is the fact that the low cost of operation of large central stations coupled with the opportunity for obtaining a diversity of load and reducing the maximum peak permits power to be sold in many cases at a rate lower than the cost of generation in electric railway power plants. In addition, the purchase of power relieves the railway of a considerable portion of the initial investment necessary to establish its business and this, especially at the present time, is an item of no mean importance. Another incidental advantage is the opportunity which is afforded to the railway for having the undivided attention of its staff devoted to the problems of transportation. Since the practice of obtaining power from outside sources has passed the experimental stage, giving a reasonably well-defined set of standard prices to the consumer, the custom has been taken up, within the past five years, by a large number of electric railways.

The companies which have entered into such contracts have by no means been limited to those of any given size nor indeed to those of any particular location, although the availability of cheap water power seems to act as a decided stimulus in producing contracts. An example of this will be found in New York State, where the presence of a number of large hydroelectric power plants has reduced the cost of electricity to unusually low figures. In the *ELECTRIC RAILWAY JOURNAL* for June 7, 1913, a list of the railways purchasing power within that State was published, together with the prices which were paid by them for electricity, and this list shows that the magnitude of the railway system was an immaterial factor, as properties of the smallest as well as of the largest size are included.

Power appears to be almost universally purchased in alternating-current form, owing, no doubt, to the fact that the substations for supplying the direct-current overhead lines of street railways have to be located solely with regard to the requirements of the railway, as well as the fact that 600-volt rotary converters are not available for any use other than that of railway service. There are, however, several cases where power companies have been in position to build and equip certain substations mainly to carry the direct-current load of a railway, and in such special cases no difficulties either in operation or in arrangement of terms for the service to the railway have been apparent.

## BASIS FOR MAKING POWER RATES

The item of the cost of power is a much more important matter upon the larger city systems with their long hauls and liberal transfer privileges than it is upon the smaller, shorter roads, and on the systems which have arranged for a large block of purchased power the details of the contract under which it is purchased have necessarily had to be worked out with considerable care. In general, such contracts take the form of an agreement whereby the final price paid by the railway is based upon a combination of charges, one of which is made to cover the interest and depreciation of the power company's plant and is really independent of the amount of power furnished.

This is variously called the demand charge, the service charge or the primary charge. It is established by the maximum amount of energy which is demanded by the railway. In other words, the charge is made because of the fact that the power company is holding itself in readiness to serve the railway with a certain amount of energy

and for that reason is presumably reserving a certain amount of steam and electrical equipment to carry the railway load whether the railway is using power or not.

This demand charge appears to be fairly well established at a figure close to \$1 per month, or \$12 per annum, per kilowatt of demand. This provides theoretically for a return of 12 per cent upon the investment of \$100 per kilowatt capacity of the equipment which has to be installed to take care of the maximum peak load called for by the railway, and in large power stations a cost of \$100 per kilowatt of maximum capacity, including transmission lines to the railway substations, is certainly liberal. At a cost of \$83.50 per kilowatt of normal capacity, the estimated investment required for the latest and largest station of the Commonwealth Edison Company in Chicago, a return of \$12 per annum amounts to 14½ per cent.

In practice, however, the actual rate of return from the demand charge is subject to a number of important factors. The maximum demand seems never to be based upon the instantaneous peaks and but seldom upon the one-minute or five-minute peaks, the hourly basis affording a simpler method and one less liable to material errors. Naturally the establishment of the maximum peak from the average load during an hour places the burden of carrying the sudden swings which always occur in railway loads upon the power company without compensation. Approximately speaking, the necessity for providing for the instantaneous peaks eliminates the possibility of rating the generators upon their maximum momentary capacity, as much of this overload capacity of the machines is thus absorbed.

Another factor influencing the real percentage of return afforded by the demand charge is the necessity for providing spare units as a reserve against break-down. This excess of capacity may, of course, be reduced in the cases of the very large stations, but even in plants of 80,000-kw to 100,000-kw capacity a margin of about 10 per cent seems to be considered to be the minimum. The proper amount of reserve capacity is, of course, actually dependent upon the size of the units in proportion to the total capacity of the plant as well as upon the relation of the overload capacity of the prime movers to the extent by which the maximum swing is in excess of the hourly peak or whatever other arbitrary figure is used as a basis for the demand charge.

## KILOWATT-HOUR CHARGES

In addition to the demand charge there is another component which enters into the final price paid for purchased power. This is variously called the energy charge, the unit charge, the kilowatt-hour charge or the consumption charge. It consists of a charge made for each unit of energy, or kilowatt-hour, actually used by the railway, and for large consumptions it is usually made as a flat rate per kilowatt-hour.

There is, of course, an opportunity for wide variations in the establishment of the energy charge. With large plants the over-all efficiency is approximately constant, and the labor charge for operation can vary but little even in widely separated localities where wage scales are radically different. The cost of fuel, however, comprises a large part of the energy charge, in some cases even 70 per cent, and as the price of coal is subject to wide variations in accordance with the locality, the energy charge is really not capable of being estimated, even roughly, for any particular case without a knowledge of all conditions surrounding it. It is, however, an interesting fact that in three of the largest



power contracts yet made the energy charge amounts to about 0.4 cent per kw-hr. consumed.

The use of the combination of the demand charge and the energy charge automatically takes care of variations in load factor. A railway load with very high peaks in the rush hour will naturally have a high demand charge, and the final price paid for power will be larger than that paid when the demand charge is relatively small owing to low rush-hour peaks and a relatively high load factor. With a load factor of 30 per cent and a demand of 1 kw, the monthly energy consumption will be 216 kw-hr. and the energy charge at 0.4 cent per kw-hr. will amount to 86.4 cents per month, the number of kilowatt-hours per month being determined by multiplying the total number of hours in a month by the demand in kilowatts and by the load factor, or  $720 \times 1 \times 0.30$ . If the demand charge is \$1 per kilowatt of demand per month, the total cost of power will be made up by adding the two charges together and will amount to \$1.864. As the energy consumption amounts to 216 kw-hr., however, the final price will amount to \$1.864 divided by 216, or 0.863 cents per kw-hr.

If, under the same conditions, the load factor is raised to 50 per cent by reducing the demand to 0.60 kw and maintaining the energy consumption at the original figure of 216 kw-hr., the demand charge is reduced to 60 cents per month, while the energy charge remains at 86.4 cents per month. The total cost of power per month will then be \$1.464, and this divided by the monthly consumption of 216 kw-hr. gives a final price of 0.678 cent per kw-hr. This final price per unit of energy is more than 20 per cent below that obtained in the former case, where the load factor was only 30 per cent. Both prices are based upon charges which should be obtainable under all ordinary circumstances when power is purchased in quantities, such as would be represented by demands of, say, 10,000 kw or over.

#### POWER CONTRACT FORMS

The basis for power contracts described in the preceding outline is so widely used that in some respects it may be considered as a standard at the present time. Actual contracts, however, modify the figures to some extent and provide for contingencies in a much more elaborated form. To present an example of the general trend of these elaborations, the power contracts of the Chicago City Railway, the Cleveland Railway Company and the Philadelphia Rapid Transit Company have been compared, and in the following paragraphs extracts from all of them are cited to show the methods used in establishing a working agreement.

The contract of the Chicago City Railway was made in 1908, and those of the Cleveland and Philadelphia systems were closed during 1912. The life of contract in all three cases is, however, specified as ten years. This period would seem to be the most satisfactory for several reasons, prominent among which is the fact that it assures a reasonably long period of earning for the generating machinery which must be installed by the power company for the sole purpose of carrying the railway load. On the other hand, a longer period of time might eventually require the railway company to pay an unreasonably high price for power on account of developments which are unforeseen at the present time and would very materially reduce the market value of electrical power. The period of ten years for the life of a power contract may, in fact, be said to be long enough to insure stability and a proper return for the power company, but not so long as to involve the railway improperly.

The character of current supplied by the power company is, of course, so thoroughly standardized under present methods as to require little more than formal mention. At Chicago and Philadelphia current is supplied in three-phase, twenty-five-cycle form. At Cleveland three-

phase, sixty-cycle current is furnished, the substations of the railway company being equipped with specially designed 1500-kw rotary converters suitable for this frequency, as described in the *ELECTRIC RAILWAY JOURNAL* for April 5, 1913.

The voltages for the three systems are respectively 9000, 13,200 and 10,000-11,000. In the Cleveland contract the indefinite specification for voltage is modified by a clause to the effect that the voltage shall have "reasonably close regulation for railway purposes, provided the apparatus of the railway company is of approved design and pattern and in accordance with good practice for such operations." At Philadelphia a 3 per cent variation above or below is permitted from the normal periodicity of twenty-five cycles, and also from the normal voltage of 13,200.

The power factor specified at Chicago and Philadelphia is 100 per cent, approximately, and this, considering the extent of standardization existing in twenty-five cycle rotary converters, is a perfectly normal proposal. At Cleveland, however, the power factor is guaranteed by the railway company at 90 per cent or better, although apparently no specific penalty is imposed if the guaranteed figure should not be maintained. But a penalty and bonus clause is added to the paragraph on this subject which states that if the average monthly power factor varies from 90 per cent in computing the monthly settlement the actual demand as measured in kilowatts shall be arbitrarily increased or decreased in inverse proportion to the variation of the load factor from 90 per cent. This puts a premium of very material value upon the maintenance of a high load factor, for the demand charge amounts to about one-half of the total charge for power, and at Cleveland the maintenance of a 99 per cent power factor will reduce by 9 per cent the figure upon which the demand charge is based. Under ordinary circumstances this will reduce the power bill nearly 5 per cent.

The treatment of the power factor in the Cleveland contract is also unusual because the method of measurement is specified. The tangent of the average monthly angle of lag is determined by multiplying, by the factor 1.732, the ratio of the sum and the difference of the readings of two single-phase watt-hour meters installed on the supply circuit. From the tangent of the angle of lag the cosine of the angle of lag, or power factor, is determined by reference to the standard tables.

The "demand," or the figure from which the demand charge is calculated, is in all three cities established each month from hourly peaks of any three consecutive days of the month which may be selected by the power company. At Cleveland only one hour from each of the three consecutive days is selected, and this must be an even clock hour, as from 5 p. m. to 6 p. m. At Chicago and Philadelphia two hours are selected on each of the three days, one in the morning and one in the evening. The average of these hourly readings is used as the demand for the month. The arrangement works out very much to the advantage of the railway company, for it hardly ever happens that the three heaviest peaks in any month occur on consecutive days. The Philadelphia and Chicago contracts also have the advantage that they include in the average the figures from both the morning and the evening peaks, and, as is well known, the morning peak is by no means as severe as that in the evening. At Chicago the original contract has recently been modified in some respects, and one of the changes provides that the extra power required for heating cars when the outside air is below a temperature of 15 deg. shall be excluded in determining the maximum demand.

At Cleveland maximum and minimum figures are specified as limits for the demand, namely, 15,500 kw and 10,000 kw, and the minimum demand charge made by the



power company is based on the latter figure, whether the power is required or not. In this contract, however, there is another clause which provides that when the demand for power in any month has increased beyond 14,300 kw the minimum which shall be paid for during any succeeding month when the load may be light shall be 70 per cent of the highest demand previously made by the railway company. In other words, the final basis for the minimum demand allows for periods of light traffic a margin of 30 per cent below the heaviest previous monthly demand.

In the Philadelphia and Chicago contracts, however, the minimum guaranteed demand which must be paid for by the railway, whether the power is supplied or not, is equal to the maximum demand which has been established in any previous month. The Philadelphia contract obligates the railway to pay for 15,000 kw, and if during any month the demand, as determined by the previously described method, shall exceed 15,000 kw, this increased demand, until it is exceeded by a subsequent still greater demand, shall represent for that month and every succeeding month the minimum demand for which the railway is obligated to pay. On Nov. 15, 1913, the railway company has agreed to take an additional 5000 kw, making the arbitrary minimum demand equal to 20,000 kw. The permissible normal increase in demand beyond 20,000 kw is not definitely stated in this contract, so that it would appear that both power company and railway had been satisfied that the estimates of the demands would prove to be very close to the results obtained in actual operation.

At Chicago the provisions for minimum or guaranteed demand are quite similar to those in the Philadelphia contract. The former contract, however, states that the power company shall stand ready to supply an increase of 10 per cent in excess of the arbitrary minimum, which is set at 30,000 kw for the last nine years of the contract. This excess, however, must not be used by the railway for supplying large numbers of new cars nor for the acquisition of new lines.

From the foregoing it is evident that the Cleveland contract has a distant advantage for the railway in the matter of demand charge. The reduced load in the warm months permits a corresponding reduction in demand charges during these months, while in the other two contracts a high peak in any one month establishes a guaranteed demand for all time in the future, which must be paid for whether the energy is needed or not. The point is an important one and constitutes a marked difference between the contract forms.

For large increases in the demand for power such as would be required for a new substation or for new cars or new lines, all three contracts require written notice in advance from the railway companies. At Chicago and Cleveland a notice of five months is specified for increases up to 4000 kw, and ten months' notice is required for any amount greater than this. At Philadelphia a longer time is evidently considered desirable for the installation of new machinery, so that six months' notice is required for a 3000-kw increase and twelve months' notice for more than that. An interval of five months between written notices of increases in demand is required at Philadelphia and Chicago. Ten months is specified at Cleveland.

#### PURCHASED POWER PRICES

The demand charge for the original Chicago contract is based on a flat rate of \$1.25 per kw per month. This, however, has been reduced in a subsequent modification of the contract so that it now provides for a sliding scale as follows:

Demand in Kw	Demand Charge per Kw
Up to 30,000 kw.....	\$1.25
Excess over 30,660 kw up to 60,000 kw.....	1.00
Excess over 60,000 kw up to 90,000 kw.....	0.91½
Excess over 90,000 kw up to 120,000 kw.....	0.87½
Excess over 120,000 kw.....	0.83½

At Cleveland also the demand charge is based upon a sliding scale, although the effect of the higher rates for the first blocks of power is absolutely negligible in the large figures which are actually involved. The demand charge for the first 500 kw is \$1.475 per month, and for the second 500 kw, \$1.45 per month. For all service in excess of 1000 kw the demand charge is \$1 per kw per month, and this makes practically a flat rate for the demand charge. At Philadelphia the demand charge is made on a flat rate of \$1 per kw per month without any exceptions.

The charges for energy in the original Chicago contract are 0.415 cent per kw-hr. during the first one and one-half years of the contract, and thereafter 0.4 cent kw-hr. The Philadelphia contract also specifies an energy charge at a flat rate of 0.4 cent per kw-hr. In the recent modification of the Chicago contract a sliding scale is used which begins with a rate of 0.4 cent per kw-hr. for the first 5,000,000 kw-hr. consumed. For each successive block of 5,000,000 kw-hr. consumed in addition up to 40,000,000 kw-hr. the price for that block is cut 0.005 cent, so that for any monthly consumption in excess of 40,000,000 kw-hr. the price for the excess is 0.36 cent. Another novel feature in the modified Chicago contract is a provision for an extra charge to be made in case the price of coal of customary heating value exceeds \$1.90 per ton, the normal price in Chicago. This additional charge is obtained in dollars by dividing the total number of kilowatt-hours consumed in two years by 1000 and multiplying the result by the average excess in price over \$1.90 per ton, the result being based on a consumption of 2 lb. of coal per kw-hr. In case the price should drop below \$1.40 per ton, the power company is to pay an equivalent rebate to the railway.

At Cleveland a sliding scale is used which specifies an energy charge of 0.95 cent for the first 50,000 kw-hr. used in any month; 0.90 cent for the next 50,000 kw-hr.; 0.45 cent for the next 400,000 kw-hr., and 0.40 cent for the next 1,800,000 kw-hr. For any monthly consumption in excess of 2,300,000 kw-hr. the price for the excess amount is 0.38 cent per kw-hr.

At Cleveland and Philadelphia a minimum load factor of 35 per cent is definitely specified, and if this is not maintained, the energy charge will be based upon this instead of the actual energy consumption. At Cleveland the load factor is defined by the "quotient obtained by dividing the kilowatt-hours consumed in any month by 720 times the maximum demand for such month," thus permitting a comparatively wide range for the minimum energy charge.

In the Philadelphia contract the 35 per cent load factor is defined as that number of kilowatt-hours which will equal 35 per cent of the total number of kilowatt-hours which would be produced in any month if the energy represented by the maximum demand for that month was exerted during every hour of the month. This calculation involves the consideration of the varying number of days in the month, which, in the Cleveland contract, is approximated by the use of the figure 720, the number of hours in a thirty-day month. Otherwise it establishes the minimum number of kilowatt-hours which must be paid for at a practically constant figure, because the maximum demand, upon which the 35 per cent load factor is based, is likely to be fixed by the record load of some preceding month. At Chicago no provision is made for maintaining a minimum load factor with the exception that after the seventh year of the contract the railway is permitted to utilize sources of power other than those of the original contracting power company, but if it does so, the load factor must be maintained at 35 per cent under penalty of paying for an equivalent number of kilowatt-hours whether they are used by the railway or not.



## TRANSMISSION AND MEASUREMENT

Underground transmission lines are, in all three cases, maintained by the power company, but the substations including the transformers are operated and maintained by the railway. At Cleveland and Chicago the power is measured by instruments at the switchboard of the power company, but the transmission loss is guaranteed by the power company to be not more than 5 per cent. At Philadelphia, and also in the new Chicago contract, power is measured at the railway company's high-tension busbars in the substations, and in consequence the power company very properly stands the transmission loss. The measuring instruments in this case are maintained by the power company.

Duplicate high-tension lines or their equivalent are required at Philadelphia, but at Cleveland the interruption of supply is covered by a clause requiring due diligence on the part of the power company in maintaining service and providing a rebate on the demand charge for any interruption in excess of five minutes. Length of transmission lines to new substations is covered at Cleveland only indirectly by the call for a minimum demand of 2000 kw for each new station built. At Philadelphia the railway is required to pay 10 per cent per annum on the cost of all such lines having a length in excess of the length of the existing lines.

In all cases meters are read at noon on the last day of the month. Their accuracy is required to be within 2 per cent, and they are to be tested each month in the presence of the railway's representative at the expense of the power company. The Cleveland contract, in addition, permits testing on demand but not more often than bi-weekly except at expense of the railway. Special tests may be made at any time upon written request. Corrections which are made in readings on account of errors in meters in excess of 2 per cent are to apply to the previous month only.

## MISCELLANEOUS CONSIDERATIONS

At Cleveland and Philadelphia an arbitration board composed of three members is specifically outlined for the purpose of settling questions as to the meaning of the contract. The resale of power is prohibited in every case, and the power companies are not held responsible for non-delivery of power due to causes beyond their control, although the railway companies are to have rebates equivalent to the demand charge during the period of interruption. In the Philadelphia contract a period of ninety days is allowed to the power company before the contract may be canceled to permit it to effect a remedy of any trouble which is covered by a decision of the arbitration board.

## NIAGARA POWER CONTRACT FORMS

The contracts outlined in the foregoing paragraphs are designed upon a basis especially suitable for ordinary industrial and railway power supplied from a steam station. Such service involves moderately low load factors, and the steam stations supplying the power are not required to carry an unusually heavy overhead charge due to an enormous first cost. However, the same conditions do not apply to hydroelectric projects where the actual cost of producing electricity is almost nothing, but where the overhead charges on the station site and machinery are exceedingly high.

Owing to the totally different set of conditions which faced their operation the large hydroelectric stations at Niagara Falls developed, after their installation, a method of making prices for purchased power which was radically different from the customary plan of using a combination charge to cover separately the interest on investment and the actual cost of operation. The new method, which is to a large extent peculiar to the Niagara Falls projects, is designed to encourage the building up of twenty-four-hour loads. Industries with even the moder-

ately high load-factor of 33 per cent would naturally keep the expensive machinery in the hydroelectric stations idle for two-thirds of the time, and in consequence would have the equivalent effect of tripling the investment in an initially costly plant. The matter could naturally have been settled by charging prices high enough to cover the overhead charges on investment, but this would not have distinguished sharply between the twenty-four-hour loads which were desired by the power company and the ten-hour loads which were not, so that there was developed the plan of giving a very low rate as a readiness-to-serve charge, which had to be paid whether or not any power was consumed.

This standard rate, generally called the "firm power" rate, is a yearly charge, although it may be divided up and paid in monthly instalments. It is generally based on the horse-power-year, the mechanical unit being used instead of the kilowatt presumably for ease in comparison with engine-driven plants where the substitution of electric power was under consideration. There are a number of contracts outstanding in which the annual rate for firm power is only \$16 per hp, equivalent to 0.245 cent per kw-hr., if used on load factor of 100 per cent, or equal to a monthly service charge of \$1.79 per kw. This extremely low charge has led to the development of a large industrial load of which a good portion is composed of electrochemical projects which maintain a continuous draft of current, and the result has been that the load factor of the Niagara stations is over 80 per cent.

When this power is supplied to street railways an extra charge at a higher rate is made to cover the peaks in the load. The extra charge is made in two ways, one as an additional price charged for every kilowatt-hour consumed and the other as an excess price charged only for the peaks which extend above the firm power line. In the former case the firm power is based on the average of the highest daily one-minute peaks, and the additional charge approximates 0.5 cent, so that the final price is somewhere between 0.5 cent and 0.75 cent, depending upon the load factor. Where the additional charge is made to cover the peaks beyond the firm power line the excess kilowatt-hours cost about 1 cent, so that the final price lies between this figure and 0.245 cent. In order to take full advantage of the latter price, it is customary in the district served by the Niagara companies to keep steam stations and even small hydroelectric plants of their own floating on the line to help out during the peaks of the rush hours.

## SPECIFICATIONS OF BROOKLYN RAPID TRANSIT LOCOMOTIVES

The Brooklyn Rapid Transit System, noted in the *ELECTRIC RAILWAY JOURNAL* of Nov. 8, 1913, as having purchased two 55-ton electric locomotives from the General Electric Company, has specified that these locomotives will be similar to those which the company is now operating for switching and light freight service, but that they will vary somewhat in construction. They will be equipped with four GE-212 200-hp, 600-volt, box-frame commutating-pole motors and will be operated by Sprague-General Electric type M control. A feature of these locomotives is the fact that the control provides for three speed connections. There are seven steps in series, six steps in series-parallel and five steps in parallel, which permits operating over a wide range in speed. They are equipped with both overhead trolley collectors and third-rail shoes. The control allows for the usual multiple-unit operation if desired. The service for the locomotives consists of hauling trains which have been made up at the Bush Terminal docks in Brooklyn to deliver freight to the outlying manufacturing districts.



# Service Order for Milwaukee Lines

Decision of Railroad Commission of Wisconsin Directs Increase in Service to Meet New Prescribed Standards of Loading—Margin Over Allowed Rate of Return Deemed Sufficient by the Commission to Warrant Changes

An order was issued by the Railroad Commission of Wisconsin on Nov. 25 prescribing an increase in service on the Milwaukee city lines of The Milwaukee Electric Railway & Light Company. The order is the result of an extended study of traffic conditions by the engineering staff of the commission. In connection with the standards of service which it directs, the decision considers the financial position of the company as a result of the decreased rates of fare placed in effect by order of the commission. It concludes, however, that there is a sufficient margin over a return of 7½ per cent on the valuation fixed by the commission to justify an enlargement of service. An abstract which gives the principal points of the decision, except those relating to the re-casting of the statement of income account and the valuation and similar aspects of the case, follows:

"In the course of the hearings, traffic data covering each of the company's lines and resulting from an extended series of observations made by members of the commission's engineering staff during the summer of 1912 and the winter, spring and summer of 1913 were introduced by C. M. Larson, chief engineer of the commission, who explained in detail the methods of investigation used. Several trips were made over each line, and a record was kept of the number of passengers in the cars at various points. The points of greatest load were selected for making traffic counts. Men were stationed at the designated street corners and instructed to record for each passing car the car number, the run number, the time of arrival or departure, the line and destination and the number of passengers riding. The number of passengers was ascertained by actual count or by estimate. The observers were informed as to the seating capacity of each type of car in operation, and with this information they were able to estimate very accurately the number of passengers on a car, whether at light, medium or heavy load. In order to ascertain the accuracy of those taking the count, tests were made by having two men observe the same car, one counting the number of passengers exactly and the other estimating the number on the basis of his knowledge of the seating capacity, adding the number of persons standing or deducting the number of vacant seats. It was found that the observers were very accurate in their estimates.

"In addition to the data gathered by the commission's staff, the company and the city both offered the results of traffic counts on the various city lines. The company's observations, which were usually for a one-day period only, were made by employees, and the results were submitted in evidence in the form of charts comparable with those introduced by the commission. The counts taken by the city were made under the assumption that each car had a seating capacity of forty-eight. In making use of these data they have been corrected to allow for the proper seating capacity.

"There are about 374 rebuilt and old-type cars (numbered from 1 to 500), and these have a seating capacity of forty-two in the summer and forty in the winter, owing to the space occupied by the stove. There are 100 cars numbered from 501 to 600, which are known as the '500' type and have seats for fifty passengers at all seasons. The cars numbered 601 and over are known as the '600' type, and there are about sixty of them. They seat fifty passengers in summer and forty-eight in winter.

"The observations show clearly that on a number of the

company's lines excessive crowding has occurred day after day during the rush hours. Many cars with seats for only forty passengers were observed carrying eighty, ninety, 100 or 110 persons.

## STANDARDS OF SERVICE FOR NON-RUSH HOURS

"A public service corporation which undertakes to supply street railway service should furnish sufficient equipment to supply seats for all passengers who desire such service, unless there exist operating or financial conditions which make it impossible or impracticable to do so. The testimony and the numerous exhibits offered in this proceeding disclose no conditions which warrant a deviation from this principle, except during three relatively short periods of the day, which may be designated as the morning, noon and evening rush hours. For the remainder of the day adequate service should contemplate the operation of a sufficient number of cars so that all passengers desiring to occupy seats may reasonably expect to do so, except under abnormal conditions.

"The traffic data before the commission show that on some of its city lines the company has voluntarily provided for a considerable part of the non-rush period more service than is necessary to comply with this standard and still maintain a reasonably frequent movement of cars. On other lines passengers have been obliged to stand day after day during the non-rush hours, when the traffic demand could have been readily foreseen and provided for. It appears from the testimony that the company has used as a basis for its non-rush hour schedules a load factor of 100 per cent for hourly periods. At the hearings and in its brief the position was taken that this standard is consistent with reasonably adequate service. It was argued that the flow of traffic is naturally uniform, and that variations in the flow causing crowded conditions on cars are due almost entirely to distortions of headway which are the result of bridge and railroad crossing delays not subject to the company's control.

"Study of data, however, makes it evident that the variation in the loading of cars cannot be attributed entirely to distortions of headway, although this factor undoubtedly has some influence in the matter. The company has, in our opinion, emphasized too strongly the importance of railroad crossing and bridge delays as affecting it.

"Delays at railroad crossings continue throughout the year and undoubtedly cause considerable distortion of headway at times, but within the next year or two it is expected that the grade crossings which cause the greatest complaint will be eliminated. The company has argued at length that delays from these sources and the consequent distortion of headway are not within its control, and that it should not be penalized by the requirement that sufficient service be provided to give all persons a seat under such conditions. It is apparent, however, that these conditions are within the company's control at least to a considerable extent. Separation and re-routing of lines would help overcome such difficulties. But even though some causes of distortion should exist which cannot be changed by the company, it should not regard itself as penalized if some additional service is required to alleviate such conditions. The traffic data show clearly that there is a wide variation in the loading of cars during the non-rush hours, and whatever the cause of this condition may be, while it exists it must receive consideration in determining the amount of service necessary.



"With this variation of loading in mind, it is obvious that if on the average in a given period only 100 seats are provided for every 100 passengers riding, a large number of persons will be obliged to stand day after day. The traffic data submitted by the company, as well as those gathered by the city and the commission, show that this has been the case in the past under schedules drawn on the basis of a load factor of 100 per cent. This standard is, in our opinion, too low for adequate service. A greater number of seats per passenger on the average must be supplied in order that all passengers may be properly accommodated.

"As a result of the calculations made by the engineering staff of the commission, which cover thousands of observations on all of the Milwaukee lines, and from which abnormal conditions have been eliminated, it appears that during the non-rush hours an average of 133 seats for every 100 passengers demanding service should be provided in order to fulfil the requirements of adequate service.

"On several of the city lines the amount of travel at some periods of the day is so light that if only sufficient cars were operated to supply 133 seats for every 100 passengers riding, the time interval between cars would be too great to accommodate the public properly. For this reason it is necessary to specify what shall be the minimum headway at such periods.

#### STANDARDS OF SERVICE FOR THE RUSH HOURS

"The testimony shows that at the peak of the evening rush period the company now operates about 242 per cent as many cars as are used normally in the non-rush hours. This great increase in the number of cars is necessary to supply fifty seats for every 100 passengers on the average during the period of maximum strain. If the standard which we have fixed for the non-rush hours in order to provide a seat for each passenger—namely, 133 seats for every 100 passengers on the average—should be applied to the evening peak period, it is obvious that the number of cars operated would have to be about two and two-thirds times as great as at present. It would be impossible to operate this number of cars through the center of the city on the existing tracks without very seriously congesting the street traffic, and it is doubtful whether, even with additional track facilities, it would be practicable from an operating standpoint so to increase the service.

"But aside from all financial considerations it is improbable that the residents of Milwaukee would ever be satisfied with such an arrangement during the rush hours. Speed is an important consideration when people are going to and from their work, and comparatively few persons would be content to see cars go by in which there is comfortable standing room available and to be obliged to wait until a car arrived with some vacant seats in it. Observations in Milwaukee show that many passengers insist on boarding the first car which comes along even though it is crowded. This habit, however, may be accentuated by the fact that in the past passengers have had no reason to believe that the next car would be less crowded than the one they were trying to board; and the operation of more cars may mitigate this tendency. With these operating, financial and social considerations in mind, it is, in our opinion, impracticable, if not absolutely impossible, to supply every passenger with a seat during the period of maximum loading, and any order requiring such service would not be reasonable under the existing conditions. However, we believe that a much larger proportion of the passengers riding in the rush hours can be supplied with seats than was the case at the time the traffic data were taken.

"The company's assistant general manager testified that he regards as proper, fair and equitable, and not as a crowded condition for the peak period, a load in which one-half of the passengers are obliged to stand. He asserted that on some of the Milwaukee cars an even greater

load than this can be carried without serious discomfort to passengers. The company introduced the report of the Chicago Board of Supervising Engineers, in which an average load for half-hour periods in the rush hours of seventy passengers for cars having a seating capacity of forty, or a load factor of 175 per cent, was recommended as a basis for rush-hour schedule making in Chicago. It also placed in evidence and quoted with approval the report of Ford, Bacon & Davis to the Pennsylvania Railroad Commission in 1911, in which 4 sq. ft. of aisle and platform space per standing passenger was recommended as furnishing comfortable standing room.

"The commission's engineers later conducted a series of observations in order to ascertain how many passengers can comfortably stand in the various types of cars and still allow for the free movement of persons boarding or alighting from cars under ordinary operating conditions. These observations were made on cars in regular operation during the morning and evening peak periods, and the passengers observed included various classes of people such as mechanics, clerks, business men and shoppers. The observers passed through the cars during the various stages of loading and noted the number of persons in each part of the car when, in their opinion, the inclusion of any more would seriously retard the free circulation of passengers. This estimate of a reasonable standing load is based upon an even distribution of standing passengers throughout the various parts of the car. If this even distribution is not maintained, fewer passengers can be allowed to stand without causing material delay, due to the retardation of the movement of passengers boarding and alighting from cars.

"The commission's estimate of seating capacity does not agree with the company's estimate. It is conceded that it is possible to seat passengers according to the company's estimate by crowding the short longitudinal seats. The commission's estimate of forty-two, fifty and fifty is an average between the two extremes. Under winter conditions there are two seats less in the rebuilt and '600' type cars, making the average forty, fifty and forty-eight respectively.

"In considering the comfort of passengers and efficiency in the movement of cars in Milwaukee, the conditions on cars of different types in other cities and recommendations with regard to them have had very little weight. The testimony does not show that the cars used in Philadelphia or Chicago are comparable with the cars used in Milwaukee in this regard, and without a careful comparison of dimensions and the arrangements of platforms and seats any conclusions drawn from such sources would be unsafe. We regard the total capacity of the various types of Milwaukee cars, as ascertained by our engineers from actual observations on cars in operation, as the maximum loads which cannot normally be exceeded without subjecting passengers to unreasonable discomfort and delay. The maximum comfortable loads for winter and summer are as follows: rebuilt and open platform, winter 70, summer 72; '500' type, winter 93, summer 93; '600' type, winter 93, summer 95.

"Having thus determined the maximum loads, it becomes necessary to ascertain what average loading should be adopted in drawing schedules in order that under normal conditions few cars, if any, shall exceed the maximum. The company throughout this proceeding has taken the position that the flow of traffic in the rush period is naturally uniform and that most of the variation in loading is due to bridge and railroad crossing delays and the consequent distortion of headway, which are not subject to the company's control. It is expected that delays at railroad crossings will soon be largely eliminated by the process of grade separation. It also appears that too much importance has been given by the company to bridge openings as affecting distortion of headway in the rush hours.

"It should also be noted that many of the trippers oper-



ated in the rush hours start from the business district and are not affected by either bridges or railroad crossings. Furthermore, as pointed out with reference to the non-rush hours, the effect of such delays can be mitigated to a considerable extent by changing the routing of a number of lines.

"The company argues, on the presumption that the flow of traffic is naturally uniform, that it is reasonable to use the maximum comfortable loading as an average for arranging schedules. In other words, it maintains that if a load of 100 passengers on a car with seats for fifty is fixed upon as the maximum load consistent with the comfort and free movement of passengers, it is reasonable to schedule only enough cars to supply on the average fifty seats for every 100 passengers riding in a given period. In support of this position reference was made to the report of Ford, Bacon & Davis to the Pennsylvania Railroad Commission, which was introduced in evidence. An examination of the full report, however, shows that Ford, Bacon & Davis recognize a distinct variation in the flow of traffic in the rush hours. The use of the maximum comfortable load based on 4 sq. ft. of aisle and platform space per standing passenger as an average load for schedule-making purposes was recommended only as a temporary expedient pending the construction of additional equipment.

"The commission's engineering staff had made a comprehensive study of all of the traffic data submitted in this case in order to ascertain how much variation in the flow of traffic exists in Milwaukee during the rush hours under normal conditions. From this study it is very clear that the flow of passengers during the peak period is far from regular. Its irregularity, in fact, appears to be so great that under normal conditions it will be difficult to prevent some cars being loaded beyond their comfortable carrying capacity without placing an absolute restriction upon the load which any car may carry, or without much more complete supervision than is now afforded by the company. It is our judgment that the minimum standard for the rush hours consistent with adequate service is a standard under which for the half-hour of maximum travel in each rush period an average of sixty-seven seats shall be provided for each 100 passengers demanding service.

#### TRANSITION BETWEEN RUSH HOURS AND NON-RUSH HOURS

"The company's assistant general manager in discussing standards for service for the rush hours in his testimony expressed the opinion that the maximum load factor should apply only to the fifteen-minute period representing the peak of the traffic curve. From this point, he said, the ratio of seats to passengers should gradually increase so as to conform to the non-rush standard at the beginning and end of the rush hours. This principle, we believe, is substantially correct. It is certainly true that no more passengers should be required to stand than is necessary, and the standard applicable to the period of maximum strain should not be applied when the strain is less great immediately before and after the peak. However, it is practicable to maintain the non-rush standard of 133 seats for every 100 passengers over a part of the rush hours without materially increasing the cost of service. This can be accomplished by adding sufficient cars, as the traffic increases, to maintain the non-rush standard until the full quota of cars necessary for the rush-hour standard in the peak half-hour is in operation. These cars can then be run until the traffic falls off to such an extent that the non-rush standard is being complied with, after which they can gradually be taken off until at the end of the rush hours only the normal non-rush equipment will be in operation. This arrangement will increase the period during which trippers are used and will make necessary the operation of a somewhat greater total number of cars during the entire rush period than would be necessary to give the required service for the maximum half-hour. It will therefore increase the platform duty of tripper crews, but, as pointed

out by the company, these crews are now employed for such a short period that in order to secure sufficient men a somewhat higher wage than would be needed for a longer spread of duty is required. However, this method of transition between the two standards will make appreciably shorter the period during which some passengers must stand.

#### SUPERVISION

"Traffic officers with authority over trainmen should be stationed at the important transfer intersections and at such other points as will materially assist in the movement of traffic and the maintenance of schedules during the rush hours. These officers should, in so far as practicable, limit the loads on individual cars to the comfortable carrying capacity of the various cars. From forty to forty-five such traffic officers as a minimum will be necessary properly to supervise the Milwaukee system.

"The fare collectors now stationed at a number of important loading points to allow passengers to enter at the front door of cars have added much to the efficiency of the service by facilitating the movement of cars. The number of fare collectors should be increased so that at all important loading points passengers may enter the cars at the front door as well as at the rear door in rush hours.

#### SCHEDULES

"In its brief and in its oral argument the city of Milwaukee has taken the position that to be effective the order of the commission should specify definite schedules for each city line in addition to fixing standards of service for rush and non-rush periods, for the purpose of accurately checking the service. The company, on the other hand, has laid great stress upon the necessity of a flexible schedule and has taken the position that schedule making is a managerial detail which should be left for the company to control. The company's position in this regard we believe to be correct.

#### OTHER FEATURES OF SERVICE

"Much testimony was introduced with regard to car construction as affecting the comfort and convenience of passengers. Criticism was directed against the bar and chain which are placed on the small platforms of the rebuilt cars, presumably for the purpose of separating incoming from outgoing passengers. Since these bars and chains cause much inconvenience to passengers and serious delay in loading and are in no sense beneficial to passengers, they should be removed. All cars in service will be required to carry both dashboard route signs and roof destination signs. In view of the complaints relative to the width of seats, the height of steps and other features of car construction, we regard it as necessary that in the future all plans for new passenger cars and for the remodeling of old passenger cars shall be submitted to the commission for approval with regard to such matters as are, in its opinion, important as affecting adequate service. Proposed changes in signs on the cars now in service should be submitted to the commission for approval.

#### DOUBLE TRANSFERS

"The question of double transfers in Milwaukee has been considered by the commission in previous decisions. On the basis of the investigation made by the staff in this case, it is our opinion that in order to facilitate travel and relieve congestion in the downtown district it is now necessary that this matter should receive general consideration. The company should make a study of the matter and extend the double transfer system where it is necessary to secure the desired results, and if this is not accomplished in a satisfactory manner, it will be necessary for the commission to make further investigations and formally consider this question.

#### NEW EQUIPMENT

"Our engineering staff has estimated the number of cars which are necessary to comply with the standards of service ordered herein, under the traffic conditions shown by



this proceeding, and it appears that with the addition of the thirty new cars this fall a sufficient number will be available to care for the traffic conditions disclosed by this investigation. The flow of street car travel has probably been augmented since these traffic counts were taken and it will unquestionably continue to increase with the growth of population and the extension of the city boundaries. To comply with the standards the company will be obliged to add more equipment as the traffic conditions demand it."

## REVISED INCOME ACCOUNTS

The commission presented analyses to show the reasons why it readjusted the earnings, operating expenses and valuation of the company. Such income accounts for the years 1912 and 1913 are given in the accompanying table:

READJUSTED ACCOUNT		
	1912	1913*
Revenues .....	\$4,131,811	\$4,181,016
Total expenses .....	2,827,012	2,983,213
Maintenance of way and structures.....	130,454	142,412
Maintenance of equipment .....	262,103	261,756
Power .....	390,334	364,689
Conducting transportation .....	1,064,844	1,094,746
Expense burden .....	106,191	184,973
Injuries and damages .....	185,931	198,474
Other reserves .....	35,000	35,000
Taxes .....	207,601	227,774
Depreciation .....	444,554	473,389
Surplus available for return on investment.....	1,304,799	1,197,803
Fair value .....	11,600,000	12,000,000
Return on investment at 7½ per cent.....	870,000	900,000
Excess above return .....	434,799	297,803

\* Year ended June 30, 1913.

The order of the commission continues:

"The surpluses have been gradually decreasing from year to year. This is shown by the fact that they amounted to \$691,819 in 1911, \$559,534 in 1910, \$619,897 in 1909 and \$477,903 in 1908. The operating expenses have increased more rapidly than the earnings, partly because of gradually increasing prices in material and labor, although these increases have been less since 1907 than they were for an equal period preceding that year, and partly because of expenditures for deferred maintenance. The charges for interest and profit during the past few years have also been above normal, owing to the fact that the company had reached the point where increases in the business required greater than the ordinary expenditures for new property or extensions. During the three years preceding Jan. 1, 1910, for instance, the city company expended \$1,208,630 in new additions for railway purposes, while during the three years following this date it expended \$3,173,969.

"The present value of the property as given or used herein is also about \$600,000 greater than it would have been had it been determined on the straight-line rather than on the sinking fund basis. For growing utilities, where rate adjustments cannot in the very nature of things be of very frequent occurrence, and for which, owing to the law of increasing returns, the net earnings both actually and relatively are gradually increasing, fairness often demands that the returns allowed for the first year or at the time the rates are adjusted should be below rather than above the normal figures. As the commission in its order allowed something above 7.5 per cent for returns on what may be regarded as a high value of the property used, it is a question whether on facts now before it the commission was not more liberal toward the company than it should have been.

"From the facts at hand it also appears that the reductions in the earnings by the order will be offset by the natural increase in the gross earnings of the company within a little more than one year after the said reduction in the rates in question went into effect. It is difficult to see in what respects the commission went further on the reductions provided in the rates in the fare case than was its plain duty under the circumstances.

"The surpluses above operating expenses and returns on the investment should be reduced by about \$35,000 for in-

creases in wages; by about \$50,000 for interest and depreciation on the paving which the company must put in under the late decisions of the courts; by about \$21,000 in 1913 and about \$63,000 in 1912 for reductions in earnings due to the order in the fare case, which reductions as thus given are based upon the company's experience during the past year and are somewhat lower than the estimates made by the commission at the time the fare case was decided, and by certain rentals for 1912 arising out of the extension of single-fare limits in the fare case.

"These reductions from the surplus when taken together amount to about \$106,000 for 1913 and \$161,000 for 1912. When these amounts have thus been deducted from the surplus of \$297,803 for 1913 and \$434,798 for 1912, the balances which remain for improvements in the service and other purposes amount to \$191,803 for 1913 and \$273,798 for 1912. These surpluses, even if somewhat overstated, because of the fact that the experience of the company during the past year may not fully show the effect of the reductions in the rate by the order in the fare case, are considerably greater than the additional cost of needed improvements in the service. It does not appear to us that the allegations of the company to the effect that the order of the commission in the fare case is unreasonable and unjust are sustained by the facts.

## COST OF ADDITIONAL SERVICE

"In a brief submitted by the company the contention was made that the cost of each additional car for peak-hour service would be \$2,804. This figure requires revision as it is based upon the assumption that each car added will cause a pro rata increase in all operating expenses and investment costs. For instance, it is contended that an increase of \$1,000 for housing facilities and \$3,200 for power plant capacity will be incurred for each additional car; that the allowance for general expenses per car added would be \$226, and that all expense of superintendence and supervision would be proportionately increased.

"Now, it is certain that in a street railway plant as large as the one in question there is a considerable margin between the rendition of a minimum and maximum amount of service with a given plant capacity and a given operating expense budget, and that with a disproportionate increase in the investment costs and operating expense the service can be increased to a certain extent for a few hours during each peak-hour day.

"A memorandum submitted by the engineering staff based upon a field investigation held that new additions to car-houses would not be required owing to the installation of about a 10 per cent addition to rolling stock. As to power plant capacity the memorandum stated as follows: It appears to us that an allowance of approximately \$15,000 should be made for the installation of a 1000-kw rotary and its accessory apparatus in the Oneida Street station. With this addition it is believed that the situation will be handled in a satisfactory manner as far as concerns any increase of cars which the commission may order on the basis of our service investigation.

"An outlay of \$15,000 exclusive of rolling stock appears to be the requirement. The brief of the company placed the cost per car at \$6,500, and this figure will be accepted for the computation in this study.

"In regard to operating expenses, it is considered that the depreciation on buildings, fixtures, poles, feeders, underground and overhead transmission, paving and telephone system which primarily is due to weather will not be affected by an increase in traffic, while the depreciation due to wear on track, trolley, cars, generators and prime movers will be affected. Allowing for depreciation in total on the new equipment in cars and the rotary, the depreciation on all other equipment was accordingly placed at 35 per cent variable and 65 per cent non-variable. These percentages were established by a detailed examination of



each group of property contained in the appraisal of Jan. 1, 1910, and subsequent appraisals.

"Regarding other expenses the same policy was pursued. A detailed study was made of the company's classification of accounts and a segregation was made on the basis of the three years 1910, 1911 and 1912. These studies resulted in placing the percentages for the three years as follows: 1910, variable 75.58 per cent, non-variable 24.42 per cent; 1911, variable 79.82 per cent, non-variable 20.18 per cent; 1912, variable 79.41 per cent, non-variable 20.59 per cent.

"The above percentages exclude power and a separate study of this item placed the variable proportion at 90 per cent and the remainder, 10 per cent, non-variable with peak-hour service. In arriving at the divisions such expenses as superintendence of way, equipment, transportation and traffic, together with maintenance of paving, removal of snow and ice, maintenance of buildings, fixtures and grounds, tickets, transfers, maintenance of overhead and underground transmission systems, miscellaneous and general expenses were obviously considered non-variable within the limits of this study.

"In computing the cost per car per annum for peak-hour service in the first instance, 3.77 hours was taken as the average duration of peak service, and this with 250 peak service days and a speed of 8 m.p.h. resulted in 7540 car miles per annum per car. After making allowance for the fact that about 10 per cent of the cars would be shopped continually for overhauling, and after revising the total expenses upon a normal basis with proper apportionments between the city and traction companies, the variable costs per car mile for operating expenses amounted to an average of 13 cents. The total variable expenses per car per annum upon the above basis total \$980. The investment costs, after allowing 5 per cent for depreciation, 1.8 per cent for taxes and 7½ per cent for returns, average \$935 per car per annum. The total cost when allowing for 7.54 car miles per peak day is a little over \$1,900 per car per annum. Assuming an addition of thirty cars for peak service, the total annual outlay would be about \$57,000, and upon the addition of fifty cars the total cost would approximate \$95,000. Assuming an average of 275 peak days, the annual cost for thirty additional cars would slightly exceed \$60,000 and for fifty cars would equal about \$100,000. Upon the basis that the additions for service will require about 1600 car miles additional per day, the total cost would equal about \$99,000 with 250 peak days and \$104,000 with 275 peak days.

"It will be seen that the car service requirements which are ordered herein will consume but a portion of the excess available for additional service and leave a considerable margin for other purposes."

### HOME-MADE COMMUTATOR SLOTTING MACHINE

The slotting machine employed by the Duluth Street Railway Company, Duluth, Minn., has given most effective service for a number of years. It was designed and built by the mechanical department at a cost of approximately \$75, exclusive of the cost of the second-hand motor which drives it. The machine consists of a wooden horse provided with adjustable bearings to support the armature and sliding mandrel for the saw attached to it by a bar-iron frame. The saw is driven by a 550-volt d. c. motor at about 1500 r.p.m. Each end of the armature shaft rests on a pair of 2-in. rollers, which may be raised and lowered. The saw shaft bearing casting is mounted on two slide bars with adjustable stops which give any length of stroke up to a 10-in. maximum, and it is moved back and forth by a long hand lever. A 6-in. fan has been applied to the shaft just inside the slotting saw to blow the mica and copper dust away from the commutator when the machine is in operation. A GE-213 motor can be slotted in twelve minutes.

### ENGLISH RAILROAD OFFICIALS INVESTIGATING ELECTRIFICATION IN THE UNITED STATES

As noted elsewhere in this issue, A. H. Stanley, general manager London Underground Railway, is escorting through the United States a party of officials of the Midland Railway, one of the great trunk lines of England, for the purpose of studying American electrification. Some interesting particulars on the plans of this company and its operating conditions were obtained by a representative of this paper this week in an interview with Sir Guy Granet, general manager of the Midland company. Sir Guy said that the electrification question had become an acute one with his company, partly on account of the recent acquisition of the London, Tilbury & Southend Railway, a system with some 70 miles of route. At the present time the facilities of the company for handling its very heavy suburban traffic in and out of London are very limited, and some of it is being conducted over the Whitechapel & Bow extension of the Metropolitan & District division of the London Underground Railway.

The problems which his company has before it, he said, are three in number. First comes the electrification of the Tilbury line, which must be electrified on account of its very congested condition. Second, but more remote, is the electrification of the main line of the Midland Railway from London to Bedford, a distance of 50 miles. In this instance the electrification would be undertaken chiefly to build up still further a rapidly growing suburban traffic. A third proposition, and one which appeared extremely attractive although probably still more remote, is the substitution of electric for steam traction on certain sections with heavy mineral traffic to make possible the handling of bigger trains over heavy grades. As he expressed it, the Midland Railway passes over the backbone of England, and in the mining districts it has grades much more severe than are common on other British railways.

He had already seen the New York Central and New Haven installations at New York and was very much impressed with them. The use of electric switching locomotives was of special interest to him in connection with his freight service. While he had come to no conclusions on the subject of system, it was reasonable to suppose that the choice in each case would depend upon the kind of traffic to be served. At London, for instance, it might be desirable to choose a system of propulsion and rolling stock which could be used in connection with the local underground railways. An important question was that of clearances because the standard size of cars could not be used in the London tubes. However, the question of having the local underground railways serve shorter suburban sections was under consideration. The sentiment among steam railroad men in England at this time was not for the general electrification of railways but for its application to relieve congestion and for suburban lines where electrification would permit more trains and consequent increase of commuter traffic. He added that much steam railroad electrification was under way or in contemplation at London.

It is the purpose of Sir Guy and his party to visit all the important electrifications as far as Chicago and to return to England about the end of the year. The system of which he is general manager operates more than 1400 miles of track, exclusive of 600 miles or more of lines over which the Midland Railway has running powers. Among other questions which Sir Guy will consider on this trip will be those of using steel cars in place of wooden cars, the elimination of grade crossings and the relations between the railroads and public utility commissions.

It is expected that the first section of the electric underground railway between the Plaza de Mayo and Plaza Once, Buenos Aires, Argentina, will be opened for public service toward the end of November of this year.



# Maintenance of Way in Syracuse

On the Syracuse Lines of the New York State Railways Special Attention Has Been Paid to Systematization of the Work of Track Maintenance—An Outline of the New Procedure Is Published Together with Schedules of Operations of the Department

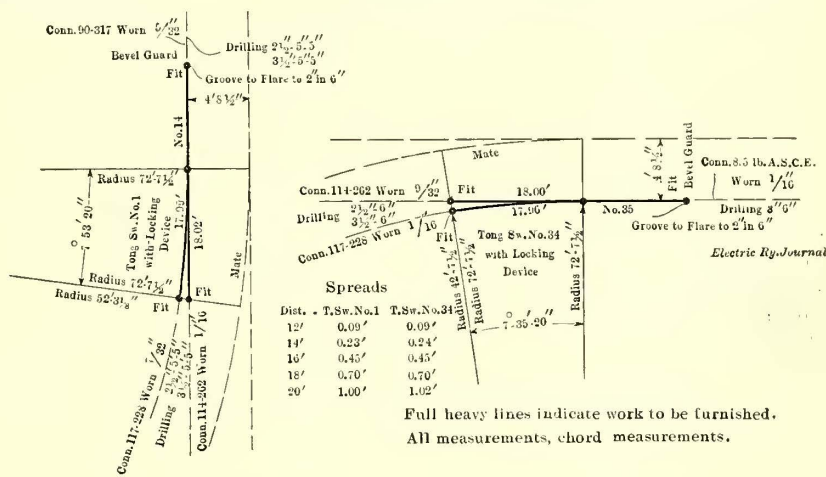
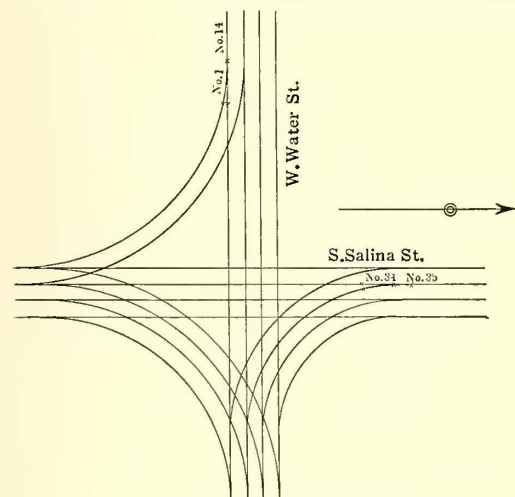
In and about Syracuse the New York State Railways operates more than 90 miles of track of varied type and condition. The greater portion is of modern construction employing 90-lb., 9-in. girder or tram rail on stone or gravel ballast. The total number of rail sections used, however, is nearly thirty. Nearly one-half of the track is in brick-paved streets, the rest being divided among earth or gravel, asphalt and medina-stone paving in the order named. More than one-tenth of the track is on the side of streets or in parking. Most of the joints are of the channel type.

On Jan. 1 of this year a new plan of inspection and report was put into operation so that the work of maintenance and improvement can go on in a more systematic manner. The schedule of items in this system was as follows:

NEW YORK STATE RAILWAYS—SYRACUSE LINES

Maintenance of Way Department—Schedule of Reports and Inspections.  
 Jan. 1.....Submit statistical track report to general manager  
 Budget to general manager city and interurban lines.

Sept. 15 to 30.....Inspection of joints by general foreman, city lines.  
 October.....General improvement inspection by general manager, if necessary.  
 Inspection of rail, joints, ties, ballast, cattle guards, fences, miscellaneous, interurban lines, by roadmaster.  
 Inspection of bridges, platforms, miscellaneous, city and interurban lines, by engineer maintenance of way.  
 Report of inspection of joints, city lines, to engineer maintenance of way, by general foreman.  
 Nov. 1.....Report of inspection of rails, joints, ties, ballast, cattle guards, fences, miscellaneous, interurban lines, to engineer maintenance of way, by roadmaster.  
 Inspection of track and pavement, city lines, by engineer maintenance of way.  
 Nov. 1 to 15.....Inspection of rail, joints, ties, ballast, cattle guards, fences, miscellaneous, interurban lines, by engineer maintenance of way.  
 Inspection of special work, all lines, engineer maintenance of way.  
 Nov. 15.....Report of inspection of special work to general manager.  
 Nov. 15 to 30.....Inspection of bridges, platforms, miscellaneous, city and interurban lines, by general manager, if necessary.  
 General check inspection, four times during year.



Syracuse Track—Typical Drawing Made Up to Accompany Requests for Quotations on Special Work

Jan. 15.....Submit general annual report of work done to general manager.  
 Revise maps on walls in general manager's office and engineer maintenance of way's office.  
 April 1 to 15.....Inspection of joints, track, pavement, city lines, by general foreman.  
 Inspection of bridges, platforms, miscellaneous, interurban lines, by roadmaster.  
 Inspection of rail, joints, ties, ballast, miscellaneous, interurban lines, by roadmaster.  
 April 15.....Report of special work, city lines, with estimates to general manager.  
 Report of inspection of track and pavement, city lines, to engineer maintenance of way, by general foreman.  
 Report of inspection of rail, joints, ties, ballast, miscellaneous, interurban lines, to engineer maintenance of way, by roadmaster.  
 Report of inspection of bridges, platforms, miscellaneous, interurban lines, by engineer maintenance of way.  
 April 15 to May 1...Inspection of track and pavement, city lines, by engineer maintenance of way.  
 Inspection of bridges, platforms, miscellaneous, interurban lines, by engineer maintenance of way.  
 Inspection of joints, ties, ballast, rail, miscellaneous, interurban lines, by engineer maintenance of way.  
 May 1.....Report of inspection of joints, city lines, by engineer maintenance of way.  
 Report of rail, joints, ties, ballast, miscellaneous, interurban lines, with estimates to general manager.  
 Report of bridges and platforms, city and interurban lines, with estimates to general manager.  
 August.....Inspection of bridges, platforms, miscellaneous, city and interurban lines, by assistant engineer and roadmaster.  
 September.....Report of inspection of bridges, platforms, miscellaneous, city and interurban lines, to engineer maintenance of way, by assistant engineer and roadmaster.  
 General improvement inspection by engineer maintenance of way.

In addition to the regular schedule, the engineer of maintenance of way has tabulated the steps to be taken in connection with different features of the work in order that no essential item may be overlooked. This table is also given herewith.

NEW YORK STATE RAILWAYS, SYRACUSE LINES

Proceedings to be followed in connection with relaying tracks in city where T-rail is used:  
 First.—Submit plan of desired form of construction to city engineer.  
 Second.—Have resolutions passed by common council giving permission to use T-rail.  
 Proceedings to be followed in connection with unpaved city streets which are to be paved:  
 First.—If it is desired to use T-rail, proceed as above.  
 Second.—Notify the city engineer whether or not we intend to do our own work within four months after receiving plans and specifications of the work from the city.  
 Extensions of tracks in city streets:  
 First.—Prepare necessary plans and submit resolutions to the common council for a franchise.  
 Second.—Get consents from property owners.  
 Third.—Get necessary permission from the Public Service Commission.  
 Extension of tracks in towns:  
 First.—Get franchise from the town.  
 Second.—Get consents from property owners, if necessary.  
 Third.—Get necessary permission from the Public Service Commission.  
 Fourth.—If track is to be built on a state highway, get permission from the state highway commission.  
 Extensions of tracks in villages:  
 First.—Get franchise from the village.  
 Second.—Get consents from property owners.  
 Third.—Get necessary permission from the Public Service Commission.  
 Fourth.—If track is to be built on a state highway, get permission from the state highway commissions.

In Syracuse the every-day routine inspection is performed by two switch repairmen, who regularly inspect all



switches, and a track walker who examines joints, paving, etc., for defects and the track for correctness of gage. The switch repairmen are provided with a wagon and they cover a section of the track daily, reporting every day upon their work. The regular track walking is a new feature recently added to the work of the department. The track walker is followed by a force of two repair men who have with them a two-wheel cart containing tools and the small supplies ordinarily needed, such as tie rods, bolts, etc. In case the repair is too large for them they report the condition to the foreman. The men are expected, however, to reduce the work of the large repair force.

An emergency trackman is also kept at one of the car-houses at night to take care of trouble reported by telephone. If a repair is too large for him to handle, he calls out the necessary help. This man is very useful in winter in watching for snowstorms, as, while the ordering out of plows and sweepers is the work of the transportation department, the way department must be prepared to remove snow from the streets. The night man reports daily as to conditions met during the preceding night.

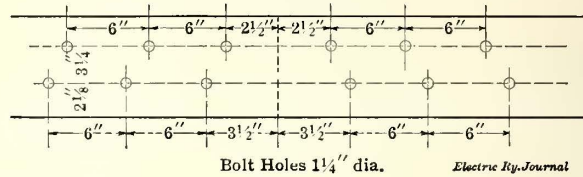
In order that the engineer of maintenance of way may keep in touch with the day's work, the foremen and road-master report at his office in person between 5:30 p. m. and 6 p. m. daily. They state where they are to be the next day and what work will be under way. Each foreman also turns in a daily report on a regular form showing the actual work accomplished, the number of men employed and the time put in so that the costs of the work can be calculated.

In the case of large repairs or of new work an inspection form is turned in when the work is complete. In addition to spaces for the description and location of the work, the job order, the date and general remarks, spaces for brief comment are provided for grading, ties, rails, rail fastenings, surface, concreting, drainage, paving, clearance manholes, joint bonds, cross bonds, special work cables, pole rake, ground around poles, joints in span wire, clamps, strain insulators, ears, splice sleeves, anchor plates, trolley alignment, trolley height, guys, feeder insulators, feeder ties and tree insulation.

The matter of derailments has been given special attention by the way department in recent years. In Syracuse a number of different sizes of flange must be provided for, as several interurban lines use the track. In the case of derailments, no matter how trivial, reports are made by the car crews to the claim department, which in turn reports to the way department. The cause of the trouble is investigated and reported back to the claim department. If no definite cause appears from the above investigation the general superintendent is notified and a special study of the

good results have been secured by the use of paving pitch instead of cement for resetting. The pitch hardens immediately and the expense of stationing watchmen at the repaired work to prevent wagons from breaking up the paving is thus eliminated.

All materials for the way and other departments are received about 2 miles from the center of the city at the



Syracuse Track—Standard Drilling for Joints Shown as Part of Specifications for Special Work

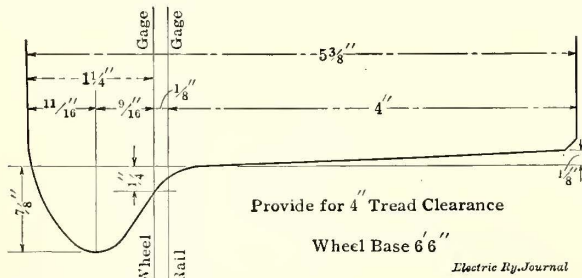
Eastwood yard. The yard has an ideal location to permit interconnection of the adjacent steam and electric railways. There is ample storage track for freight cars and convenient spaces for the piling of supplies. At one end is the concrete pole yard in which the supply of poles for Syracuse and Utica is produced. The yard is provided with a derrick having a 60-ft. boom operated by a 20-hp electric hoist. This is used for unloading rails and special work. A cement house having a capacity for 1000 barrels is conveniently located.

Special work is purchased under standard specifications with which are included sketches showing the general arrangement and location for the replacement and a diagram showing the exact dimensions for the material to be furnished. A typical sketch sent out with special work specifications is shown in the accompanying illustration. The general specifications which are sent out to all contractors for special work are given in full in the accompanying table:

NEW YORK STATE RAILWAYS—SYRACUSE LINES  
General Specifications for Special Work

- Frogs and switches: Bid on both hard center and solid manganese construction.
- Angle blocks: To be of such length as will measure not less than 6 in. across end. All fillets to be bolted or cast in place.
- Bolts: All bolts to have hexagon nuts.
- Drilling: Bolt holes as shown in accompanying drawing.
- Rails: To be 9-in. groove girder unless otherwise specified.
- Quoting: In quoting prices give section of rail to be used in work.
- Tie rods: Furnish tie rods spaced 6 ft. apart, 3/8 in. x 2-in. section.
- Manufacturer must furnish three prints of each order and must give all data given on company's prints. Show sketch of drilling in new work.
- Manufacturer will not allow for joints where rail lengths are given.
- All compromise joints to be numbered on work and drawing.
- Place our drawing number on your drawing.
- Plane out guard on outside rail.
- Plane out head on inside rail.
- Numbers of pieces to be painted on web of rails.
- Drill four 1-in. holes in bed of tongue switches.
- Track is to gage 4 ft. 8 1/2 in. unless shown otherwise.
- Standard wheel tread as shown in accompanying drawing.
- Groove openings to be as follows:

Radius:	Inside	Outside
35 ft. to 39 ft. inclusive.....	1 3/4 in.	1 7/8 in.
40 ft. to 50 ft. inclusive.....	1 11/16 in.	1 3/4 in.
51 ft. to 71 ft. inclusive.....	1 5/8 in.	1 11/16 in.
72 ft. to 95 ft. inclusive.....	1 9/16 in.	1 11/16 in.
96 ft. straight.....	1 1/2 in.	1 1/2 in.
Straight:		
50 ft., switch and mate.....	1 11/16 in.	1 3/4 in.
75 ft., switch and mate.....	1 9/16 in.	1 11/16 in.
100 ft., switch and mate.....	1 1/2 in.	1 5/8 in.



Syracuse Track—Standard Tire Contour Shown as Part of Specifications for Special Work

case is made, often an experimental one. In most cases the trouble is found after a short study.

In repairing small track defects, 4-ft. sections of new rail are inserted and the joints are ground to a smooth surface. This is done in the case of broken rail heads and with joints too badly battered to warrant grinding. In making scattered repairs to brick or broken stone paving,

The Town Council of Bristol (Eng.) has decided to apply to Parliament for powers to raise money to purchase and work the tramways if deemed advisable. The tramway system is owned and operated by the Bristol Tramways & Carriage Company. The Corporation has an option to purchase the tramway in 1915 as it existed before the 1904 extension of the city boundaries. The city portion of the Hanham Light Railway, however, cannot be purchased until 1928, while the portion of this light railway outside the city and the other tramways owned by the company (except 1 mile) can be purchased in 1946 at their fair market value as a going concern.



**EQUIPMENT DEFECT RECORDS OF THE SAN ANTONIO TRACTION COMPANY**

Car equipment service records are as essential on a small railway property as on a large one, but there is a question as to the extent to which it will pay a small company to conduct such investigations. The San Antonio (Tex) Trac-

day shop foreman. Space for his report also is provided on the back of the trainman's car report form. As these cards are filed each day they are used to form a complete record of work done by months. In addition to this form, check reports of pull-ins are made out and sent to the master mechanic's office by both the dispatcher and the carhouse foreman. A report containing a description of the small

REPORT OF INSPECTION		REPAIRS MADE				
CAR No. _____ has been inspected and found in condition as follows:						
Signed _____ Day Night Foreman		Signed _____ Day Night Foreman				

Fig. 1—Foreman's Report of Work Done on Shopped Cars

tion Company, however, has enjoyed very profitable results from the adoption of the simple record forms hereinafter described. The data for these records are obtained largely from the heads of the different shop departments and incidentally they serve as reports of work done. The in-

formation originates at three sources, namely, from the trainmen, the inspectors and the downtown trouble man. A trainman's car report of the usual form is placed in each car at the beginning of the day. At the close of a run the defects of the car are checked off by the crew, which there-

repairs made by the downtown trouble man is also received daily. To identify every armature removed for repairs, a tag containing two detachable coupons is tied to it upon removal, and a record of the number, type, number of car

SAN ANTONIO TRACTION COMPANY																											
ARMATURE No. _____												PURCHASED _____															
TYPE _____												SOLD OR SCRAPPED _____															
CAR NO.	MOTOR NO.	DATE		COILS			COMMUTATOR			BAND			SHAFT			MECHANICAL DEFECT				DATE REW'D	PINION			REPAIRED BY	MILEAGE		
		IN	OUT	GR.	OC.	BRK. L	W.O.	C.R.	FLAT	LOOSE	B.R.K.	W.O.	SPRG.	B.R.K.	RUB P. P.	NOT BR'G	W.O. BR'G	STRUCK BY L	LOOSE		W.O.	B'R'K					

Fig. 2—Office Record Card of Armature Repairs

from which it was removed, motor number, date taken out and cause of removal is filled in. After the armature has been returned to service a description of the repairs made is furnished. The two coupons are then detached, one remaining in the office of the armature repair department for

formation originates at three sources, namely, from the trainmen, the inspectors and the downtown trouble man. A trainman's car report of the usual form is placed in each car at the beginning of the day. At the close of a run the defects of the car are checked off by the crew, which there-

SAN ANTONIO TRACTION COMPANY									
PINION RECORD									
PINION No.	TYPE	BOUGHT FROM	PRICE	DATE		CAUSE OF REMOVAL	MILEAGE		
				IN	OUT				

Fig. 3—Back of Armature Card Carrying Pinion Record

upon delivers the report to the carhouse foreman for transmission to the master mechanic's office. The inspector who receives the trainmen's reports notes the actual defects, if any, in the allotted spaces on the back (Fig. 1) of the trainmen's card, and the car is taken out of service. The necessary repairs are made the following day, and a report which covers them in detail is prepared and signed by the

record and the other going to the master mechanic's office. From the latter coupons the office card record (Fig. 2) of armature repairs is compiled at the end of each month. The back (Fig. 3) of the armature card is used for the pinion record. As the pinions are removed when the armature is in for repairs the two records may logically be kept on the same card. When the pinion mileage is desired, it is



necessary only to compute the armature mileage up to the date the pinion was removed. Similar service records of wheels, axles, gears and air compressors or armatures are obtained from the trainmen and carhouse foreman's reports.

SAN ANTONIO TRACTION COMPANY											
MECHANICAL DEPARTMENT											
Report for month of _____ 191__											
TYPE OF CARS		REPAIRS	REPAIRS	CHANGES OF TYPE, PLATFORM DIMENSIONS, OR NUMBER							
Closed Pass Cars		REPAIRS	REPAIRS	CAR NO.							
Open " "		REPAIRS	REPAIRS	CHANGE OF TYPE AND PLATFORM DIMENSIONS							
Comb " "		REPAIRS	REPAIRS								
Total Pass Cars owned											
Work Cars											
Flat Cars											
Total Cars owned											
				NO. OF CARS IN SHOP FIRST OF MONTH		NO. OF CARS TAKEN IN TO SHOP DURING MONTH		NO. OF CARS RETURNED TO ROAD DURING MONTH		NO. OF CARS IN SHOP AT END OF MONTH	
				This Year	Last Year	This Year	Last Year	This Year	Last Year	This Year	Last Year
Cars rebuilt, overhauled, and painted											
Cars repaired (not rebuilt and overhauled)											
Cars revarnished (not rebuilt, overhauled, painted)											
LUBRICATION				MILEAGE OF EQUIPMENT PARTS							
CLASS		COVERED CAR MILES		NAME		NO. OF MONTHS		AVERAGE MILEAGE		Total of Repair Bill in	
		This Year	Last Year			This Year	Last Year	This Year	Last Year	This Year	Last Year
Journal				Wheels							
Gear & Pinion				Axles							
Motor Bearings				Brake Shoes							
Brake Rigidities				Gears							
Air Comp.				Pistons							
Total				Axle Bearings							
Tracks Overhauled				Arm. Bearings							
Motors											
Fields Removed											
Armatures											
Rebound											
Repaired											
Bearings Filled											
MONTH		TOTAL CAR MILES									
REMARKS											
CAUSES IN FROM ROAD DURING HOURS OF SERVICE											
				CAUSE REPORTED		NO. OF CARS		FOUND ON		FOUND DELIVERED	
						This Year		Last Year		This Year	
				Defective Brakes							
				" other truck parts							
				" Motors							
				" other electric parts							
				" Car Body							
				" Motorman's valve							
				" Governor							
				" Compressor							
				" Cylinder							
				" other air parts							
				For inspection							
				To change car							
				Dismissed on the road							
				Total Rebuilds for Defects							
				Car Miles per Run-In—This Year							
				Last Year							
Signed _____ Master Mechanic											

Fig. 4—Monthly Report for Manager

A daily report of car miles run is supplied by the dispatchers. This form contains the number of all cars in operation classified as to service. The report contains the total mileage for each car, that for all cars and that for all cars up to the day of the month the report is made. The total service mileage for any part of the equipment may be computed from this report.

It will be seen from the foregoing that data on all important parts of the rolling stock are secured with little clerical work either on the part of department heads or the man who compiles the data. A complete record of each car is tabulated also when a new car is received for service to serve in part as a check on the accuracy of repair reports in which the types of equipment are named. The back of this card is used for recording the car-painting data as well as information regarding damage in service.

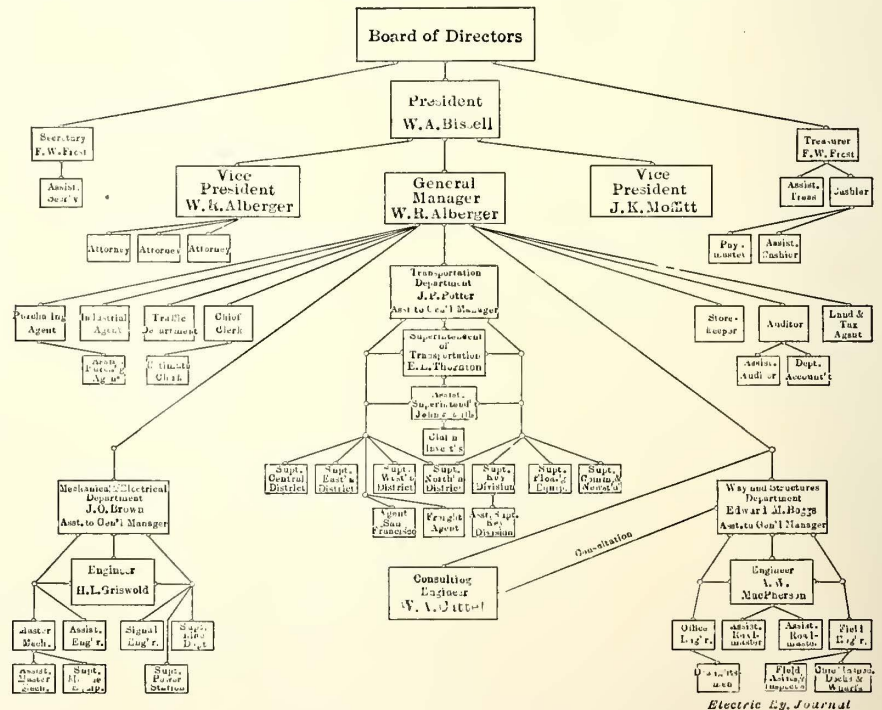
A basis of comparison for efficiency is obtained from the monthly service record. This form records day by day the number of each class of defects which led to run-ins and also shows the number of cars returned to service in each instance. On the back of the same card a similar record is made to cover motor troubles. A daily total of the mileage run by all cars, as taken from the dispatcher's daily car-mile sheet, is written on a loose-leaf sheet, and this with the de-

fect record forms the basis of the monthly statement showing defects per car mile. At the end of each month a classified report of defects (Fig. 4) and of work done in the shops is compelled for the office of the general manager. This is an abstract of the card record of all defects and gives comparative figures for the same month of the preceding year.

The use of these records has given the hint for a remarkable improvement in all parts of the equipment. For instance, the bearing mileage of the fifty-six double-truck 4400-lb. and forty-nine single-truck 25,000-lb. cars has been increased in two years from 4994 miles to 26,094 miles and the pinion mileage from 18,778 miles to 38,634 miles, while at the same time the cost of lubrication has been reduced from 34 cents per 1000 motor-car miles to 23.9 cents per 1000 motor-car miles. The bearing mileage improvement represents results gained for GE 54, 52 and 800 motors. The very low mileage discovered by means of the earlier records, compared with those of other companies for similar equipment, showed the master mechanic that something must be wrong with his upkeep methods. Hence he studied each defect carefully and bettered his shop methods accordingly. The bearing mileage, for instance, has been increased by keeping up dowel pins, by machining motor caps so as to hold bearings rigidly and by keeping dust caps in place. The improvement in the mileage of general electric grade F pinions is explained by better lubrication. The life of chilled-iron wheels also has been increased from 18,000 miles to 40,000 miles by changing from a 1/4-in. gage allowance to pressing exactly to gage. From these few examples it will be seen how important service records proved to this company in giving such a significant basis for comparison with other properties.

ORGANIZATION CHART AT OAKLAND

Through the courtesy of W. R. Alberger, general manager San Francisco-Oakland Terminal Railways, the accompanying organization chart of that company is presented. This chart has recently been compiled, and copies



San Francisco-Oakland Organization Chart

have been made for use in the offices of the company. It will be found of interest in connection with other charts of operating organizations which have been published in this paper.



**POWER DISTRIBUTION ON THE TWIN CITY SYSTEM**

The steam power plant which supplements the output of two water-power plants from which the system of the Twin City Rapid Transit Company is supplied with power has been undergoing material changes. The plant originally contained four 5000-hp vertical reciprocating engines, which have been replaced by one 14,000-kw turbine and three 15,000-kw turbines, and the space originally planned for a fifth engine has been occupied by two 5000-kw turbines for the past eight years. The distributing system has also been improved by the addition of two new substations, Girard and University, while new equipment has been installed in the Snelling substation to replace that removed to furnish the newer and smaller substations. As the system as a whole is in excellent form to handle the rapidly increasing demands for power and as the distribution system has never been fully described, some details are given in the following paragraphs.

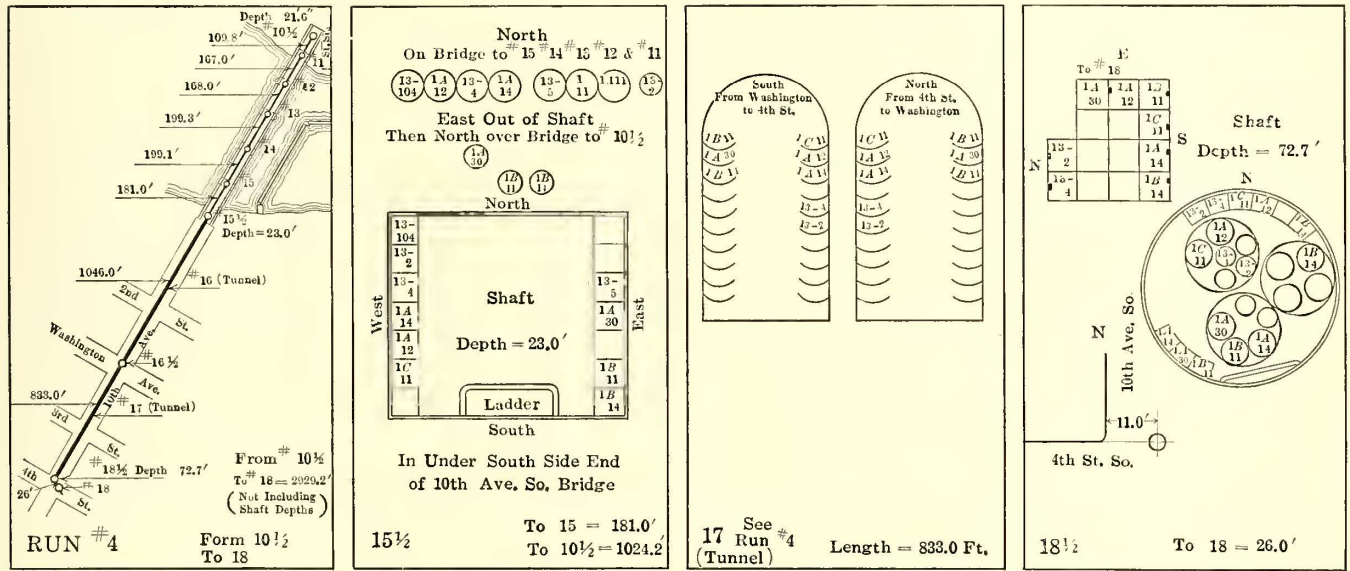
In the first place it should be noted that the power situation in the Twin Cities is rather unusual. The Mississippi River flows through both cities and in Minneapolis falls

miles in extent, containing a population of 600,000 and served by 402 miles of track.

There are, in addition to the city lines, four interurban lines connecting the Twin Cities and two suburban lines, one running to Stillwater and South Stillwater, the other west to Excelsior and Deephaven. Fourteen substations are now in operation with the equipment shown in the table.

With the exception of the new 3000-kw units in the Snelling Avenue substation, the rotary converters are all of the non-interpole type. Barring a few of the 600-kw size, they are all six-phase. The frequency of the system is thirty-five cycles, and the transmission voltage is 13,200. Air-blast transformers are used in all substations.

The latest substation put into commission is the one on Girard Avenue, and, while substation construction is now so well standardized that a detailed description is unnecessary, a few points in connection with this one will be mentioned. The general arrangement of the station is standard as far as the placing of converters, reactances, transformers, oil switches, blowers, etc., is concerned. The cells for the oil switches are of concrete, cast in place in sections of three, six or nine. Alberene stone slabs, 2 in.



Twin-City Power Distribution—Sample Pages of Loose-Leaf Record for Feeders

about 70 ft. in a distance of half a mile. While the flour mills have prior rights to a part of the available water-power, there is still enough water for several thousand kilowatts left for the railway company. The company utilizes the full flow of the river at a head of 16 ft. to 20 ft.

thick, are placed on top of the cells. The high-tension bars are of 5/8-in. round copper. They are placed in the basement below the switch cells and are not inclosed.

In spite of the large size of the rotaries, due to their being of the non-interpole type, the capacity of the substation is good for its size, 44 ft. x 44 ft. outside. The capacity can be doubled without great expense by extending the rear, space having been reserved for this purpose between the building and the operator's residence which the company has constructed at the back of the lot.

At the Snelling substation, about midway between the centers of St. Paul and Minneapolis, 1500-kw rotaries have been replaced with the latest type of G. E. 3000-kw commutating-pole machines. These occupy no more space than their predecessors. The commutating poles are provided with two windings, the usual series coils and an auxiliary adjusting shunt winding. The series coils have the usual resistance and inductive shunts. The rotaries have fourteen poles and operate, therefore, at 300 r.p.m. on thirty-five-cycle current. A new type of air-blast transformer having no outside casing is used. The direct exposure of the active iron to the outside air assists the ventilation. These transformers are rated at 1050 kva each and are provided with 15 per cent reactance. Ventilating air at 1 1/2 ounces pressure is furnished by a duplicate blower set located in the basement.

SUBSTATION EQUIPMENT, TWIN CITY RAPID TRANSIT COMPANY			
Substation	Location	No. of Rotaries	Capacity of Rotaries Total
11	Eleventh Street	5	1,500 7,500
13	Lower dam power plant	4	600 2,400
14	Lake Street	2	1,500 3,000
15	College Avenue	5	1,500 7,500
16	Snelling Avenue	2	3,000 6,000
20	Wildwood	2	600 1,200
21	Stillwater	2	600 1,200
23	Hopkins	3	600 1,800
25	Excelsior	3	600 1,800
28	Thirty-second Avenue	2	1,500 3,000
29	Hope Street	2	1,500 3,000
30	Minnehaha	2	1,500 3,000
31	University	2	1,500 3,000
32	Girard Avenue	2	1,500 3,000
Total			47,400

in the "lower dam" plant and also the surplus available at St. Anthony Falls above that required by the flour mills at about 50-ft. head. The railway company also has a 60,000-kw supplementary steam plant located close to the water-power plants. The power generation is thus concentrated at a central point convenient for transmission in all directions. The district served covers an area 16 miles by 48

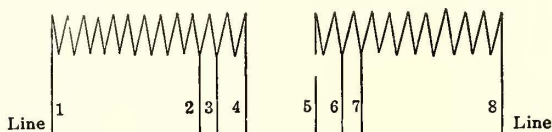


The transformer connections are arranged for multiple-voltage starting of the rotaries, the secondaries being divided into eight sections, as shown in the accompanying diagram, so as to give 143, 215, 286 and 430 volts. Of these voltages 143, 286 and 430 are used in starting by manipulation of switches on the low-tension board. The high-tension side has taps for five voltages between 12,500 and 11,250. In addition to the rotary converter equipment this substation, which is adjacent to the large car shops of the company, contains two 300-kw induction-motor d.c. generator sets to provide shop power. The motors take three-phase a.c. power from the low-tension side of the transformers at from 430 volts to 440 volts, and the generators, which are of the three-wire type, deliver direct current at 220 volts between outside wires, 110 from each to neutral.

In all but a few of the high-tension lines from power house to substation more than one connection is furnished,

paralleled on a separate bus section. Three feeders are taken off from each large turbine bus and four from the small turbine-engine bus. There are also two separate sets of feeder buses. By means of a double set of switches connected to each large turbine unit these may be connected around their own buses to the separate feeder buses and the small turbine-engine unit buses respectively. By this very complete system of interconnection of busbar sections any desired combination of feeds and generating units can be obtained. Motor-driven exciters are operated from two different bus sections, to one of which is also connected a large neutral-grounding transformer. This is used because delta connection of transformers is used in the old lower dam plant, which may, at times of light load, be called upon to carry it all, thus leaving the lines without any grounding connection. A 600-kw, three-phase, oil-cooled transformer with primary star-connected and secondary delta-connected is grounded at the neutral and used for this purpose.

HIGH TENSION



Volts	Amps.	Join taps
12,500	84.0	4 and 5
12,190	85.1	4 and 6
11,875	88.4	3 and 6
11,565	90.8	3 and 7
11,250	93.3	2 and 7

LOW TENSION

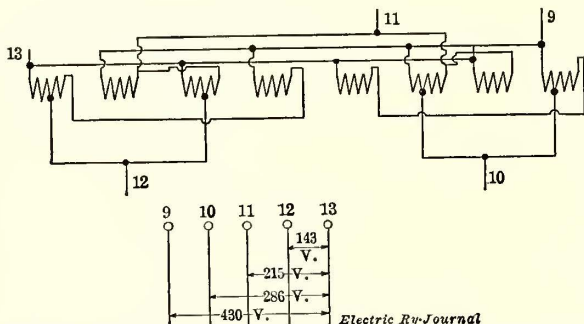


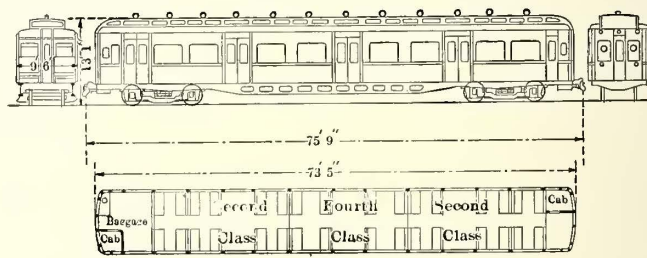
Diagram and Table of Transformer Connections, Snelling Avenue Substation

the exceptions being at points where substations can assist each other over the d.c. lines. Three-conductor cable is used, and No. 0000 is the standard size of wire. The cable system is so extensive that a card catalog for keeping track of it has been devised. Each cable section has its history recorded separately, and the record is kept up to date. By the use of the plan of using few sizes and keeping close watch of the condition of the cables it has been found possible to provide for emergencies with a stock of reasonable size. At the substations home-made pot-heads of spun copper are used with entire satisfaction.

In the lower dam power plant the eight a.c. generators are divided into two equal groups, and the corresponding busbars are connected by sectionalizing switches. Jumpers are provided on two units in each section by means of which they can be connected direct to rotary converters, cutting out the busbars entirely. In the Hennepin Island plant the four generating units are divided into two equal sections also. In the steam plant the switching arrangements are more elaborate. The generators buses for the one 14,000-kw and two 15,000-kw turbine units are in three sections with sectionalizing switches between. The two 5000-kw turbine units and the one 3500-kw engine unit are

D. C. MOTOR CARS FOR FRENCH STATE RAILWAYS

The French State Railways recently decided to electrify a number of important suburban lines in the vicinity of Paris. The first order of the department is for eighteen motor cars which are to go on the Paris-Invalides-Ver-sailles division. These cars, as shown in the accompanying drawings, are of the multi-side-door type, four pairs of sliding doors being used on each side to give access to one baggage and three passenger compartments. End doors are also provided. Each car is equipped with cross seats



Elevations and Plan of French D. C. Motor Car

with a total capacity for sixty-four passengers. As the traffic is of heavy suburban character, the cars have been equipped with Sprague-Thomson-Houston direct-current multiple control similar to that already used on the systems of the Metropolitan and Nord-Sud Railways at Paris. The car body is built of steel, composition flooring and other fireproof materials. The sides are double, air being used as a heat insulator. The heaters are placed under the seats. The interior finish of the car is in green. Boi-rault automatic couplers are used.

The motor equipment per car consists of two 230-hp field-control, commutating-pole units mounted on one truck. Current is taken from a 650-volt protected third-rail by means of a shoe which is designed for both bottom and top contact service. The weight of the motor car completely equipped is 68 metric tons. The main dimensions of the car are as follows: length over couplers, 75 ft. 9 in.; length of body, 73 ft. 5 in.; width, 9 ft. 6 in.; height, 13 ft. 1 in.

The next motor cars to be furnished will be mounted on three axle trucks and carry four 165-hp motors. These cars will weigh 83 metric tons when fully equipped.

The Argentine government has been authorized to grant concessions to the Lacroze Tramway Company for constructing branches to its existing electrical tramway system, the branches to be not more than 12.4 miles each in length. The company has forwarded plans for twelve such branches, and the necessary contract will be prepared.



**COAL-HANDLING PLANT OPERATED BY THE ILLINOIS TRACTION SYSTEM AT ST. LOUIS**

The St. Louis Consumers' Coal Company, a subsidiary of the Illinois Traction System, has installed a coal-handling plant at St. Louis, Mo., to remove screenings from run-of-mine coal. The conditions which made such a move



**I. T. S. Coal-Handling Plant—Weighing Office**

advisable were as follows: The St. Louis Consumers' Coal Company was originally incorporated for the purpose of supplying coal from Worden, Ill., to the Illinois Traction System's generating station at Venice, Ill. Its output of run-of-mine coal was larger than that needed by the generating station, but to haul the excess amount to the next station at Riverton, Ill., a distance of 100 miles, would have increased its cost above the price at which fuel could be obtained from mines near Riverton. Hence the company decided to carry the coal to Venice, use the screenings at its generating station there and sell the rest of the output across the river in St. Louis, where it could be disposed of profitably to the retail trade.

This double arrangement not only meant a saving in transportation charges, but it also met most satisfactorily the fuel requirements of the coal trades served. The St.



**I. T. S. Coal-Handling Plant—Loading Spouts Underneath Bridge**

Louis coal trade demanded lump coal. At the same time better economy would be possible at the Venice generating station if screenings were supplied in sufficient quantity to make the crushing of lump coal unnecessary. The only thing lacking, therefore, was the installation of a coal-handling plant in St. Louis to remove screenings from the run-of-mine coal or lump coal transmitted a long distance.

Accordingly a new coal-handling plant has been equipped to do this work, and as a result all the coal for the retail trade in St. Louis finds a ready market because of its freedom from screenings. The quantity of fine coal obtained by this plan is almost sufficient to equal the demand of the Venice generating station for that kind of fuel, but some is purchased from other mines in the vicinity of St. Louis.



**I. T. S. Coal-Handling Plant—Reloading Tipple as Seen from Bridge Deck**

The new plant has been constructed under the St. Louis approach to the McKinley Bridge over the Mississippi. This location permits drop-bottom cars to discharge the coal into bunkers from a third track at the bridge level. The accompanying illustration show the plant, the type of car used in coal delivery service and also the office building. This building conforms to the standard architecture used by the Illinois Traction system.

The plant embraces six coal bunkers situated under the third track and having a total storage capacity of 600 tons. Coal is dumped from special 80,000-lb.-capacity drop-bottom cars through the bridge approach deck to the bunkers below. These bunkers in turn discharge over screens which permit the fine coal to fall through to spouts feeding a continuous bucket conveyor. The lump coal flows by gravity to other spouts provided with a hopper arrangement. This, when opened by a hand lever, dumps the coal into the retail delivery wagons stationed underneath. Teamsters desiring coal are required first to drive over a scale beside the office in one corner of the plant. From this point a paved loop leads under the loading spouts back to another scale at the office, where the loaded wagons are weighed and the tare deducted. The convenience of being able to obtain a wagon load of coal without shoveling has greatly increased the retail trade of the company in St. Louis.

To avoid the expense of operating the conveying system continuously to remove the screenings to an overhead tipple, bins have been provided under each screen with a storage capacity of approximately 4 tons. When several of these storage bins become full the conveyor is put into operation, and the screenings are removed to a reloading tipple at one end of the plant. At this point the screenings are elevated to a bunker set over the same track that is used for unloading the cars. This bunker has a storage capacity of approximately 200 tons. When a sufficient



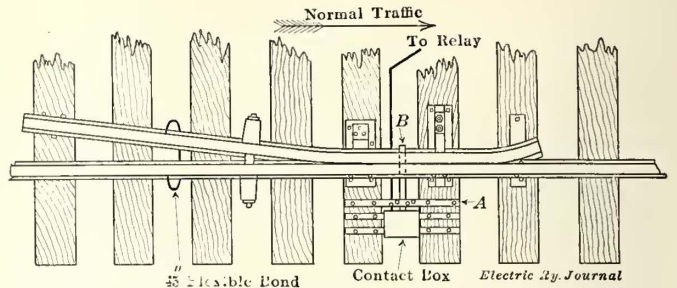
quantity of screenings have accumulated to make several carloads, the cars are run under the bunker and loaded for the Venice generating station. Both the horizontal and the vertical conveyors are driven by a motor housed in the loft over the bunker in the reloading tiple.

**A HOME-MADE CROSSING SIGNAL**

Just before leaving the New York State Railways W. J. Harvie, now with the Hagerstown (Md.) & Frederick Railway, designed a simple and inexpensive crossing signal which has since been constructed and placed in successful operation on the former system. The principle of this crossing is shown in the accompanying wiring diagram. The signal is set by a mechanically operated track switch, placed about 1000 ft. from the crossing, which grounds a wire connected with the winding of a relay. It is disconnected from the trolley by means of a second track switch placed beyond the crossing.

The track switch consists of a standard wing rail such as is used in making up frogs, a simple contact box and a mechanical connection between the two. The wing rail is

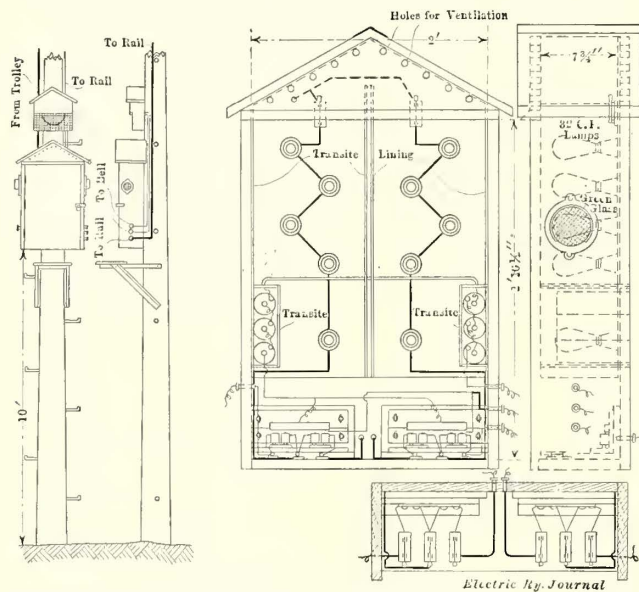
sistance to limit the relay current. The lamps are lighted only during the short duration of contact of the track switch. They serve, however, to give an indication to the motorman that the switch has been operated. After the contact-making end of the relay armature has been pulled down by magnet No. 1 it remains down by virtue of the facts that it is carefully balanced and that considerable



Simple Crossing Signal—Assembly of Track Switch

magnetism remains in it. The gong circuit is opened by the energizing of the second magnet, No. 2 in the figure, by the track switch located just beyond the highway. For the purpose of testing out the relay circuits small knife switches are located in the bottom of the relay box.

The equipment as described has been in experimental operation for a year or so and has proved its essential effectiveness. Two faults developed which have been remedied by simple expedients. The location of the batteries in the lamp box was found to be unsatisfactory because the heat from the lamps dried the cells out rapidly. A separate lamp box was, therefore, found necessary. Another fault was that the relay armature was found to be unreliable in its action owing to the uncertainty of its residual magnetism. It is proposed to remedy this difficulty

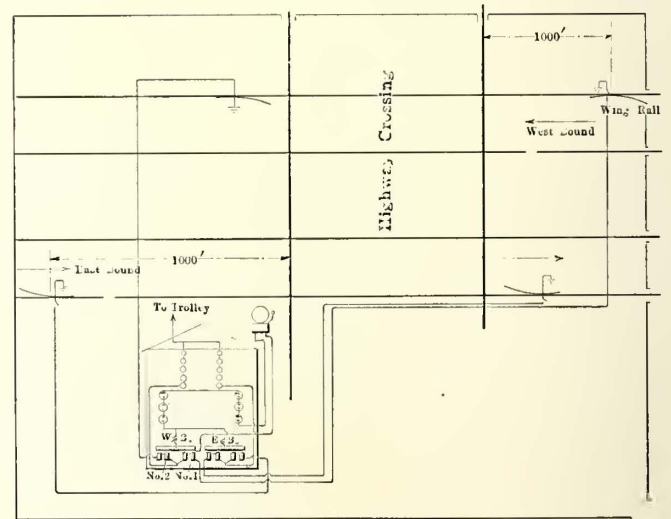


Simple Crossing Signal—Layout of Relay and Lamp Box and Installation of Same on Pole

pivoted at the entering end by means of three spikes and it is held in contact with the rail by means of soft rubber bushings. The wing rail slides on steel plates, one of which is provided with a strap passing through a slot in the web of the wing rail to hold it down.

The contact box contains two copper contact strips mounted on a wood block at such an angle that the contact-making piece can slide without danger of sticking. Under the contact strips is a brass connecting plate bent to the contour of the block. The contact box is supported on two steel straps which are bolted to the ties. A third strap carries a guide for the contact bar, one end of which is bolted to the base of the rail, being bent over into a hook form to secure a good hinge joint. The other end of the contact bar carries a small brass contact piece.

The relays, as indicated in a third drawing, consist of double pairs of bobbins—in fact, bell magnets—each pair when energized through the track switch pulling on one end of a pivoted iron armature which also acts as a contact maker. Referring to the wiring diagram, it will be noted that a west-bound car, on entering the signal section, energizes magnet No. 1 of relay H'B which completes the local gong circuit. In this is a dry battery. A set of signal lamps, connected in the track-switch circuit, is lighted directly through the track switch. It also furnishes re-



Simple Crossing Signal—Wiring Diagram

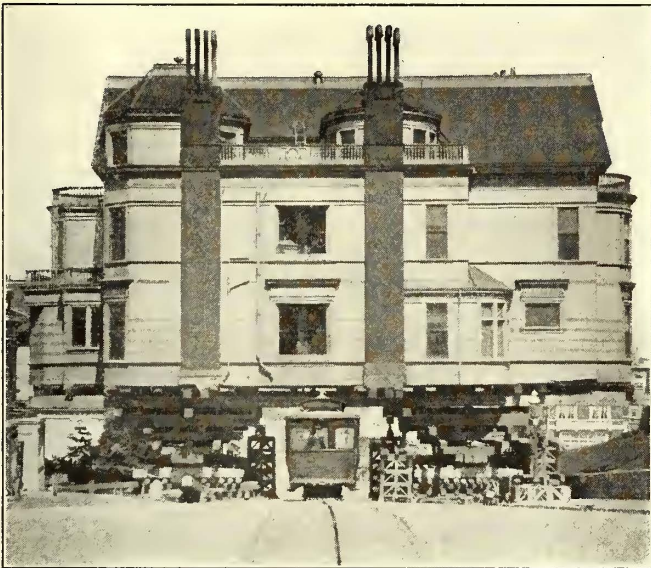
by means of a metal ball rolling in a channel on the upper side of the armature. This will descend to the low end of the armature, retaining the latter in either position and supplementing the force due to the residual magnetism. This crossing signal has not been patented by Mr. Harvie.

The Public Service Commission has published statistics showing that 312 persons lost their lives on steam lines and 53 on street railways in Pennsylvania during the months of July, August and September. The number of injured in street railway accidents was 949, the report showing an increase of six in the number killed and a decrease of 166 in the number of injured. On both steam and electric lines the killed numbered 365 and injured 4009.



## MOVING HOUSE OVER STREET CARS IN OPERATION

The accompanying halftone shows how a large house was moved along a narrow street without blockading street-car or vehicle traffic. The house is a private residence which was moved from its location on Washington Street between Octavia and Gough Streets, San Francisco, to a new site in the adjoining block. The width of the street



Moving Large House Over Single-Track Cable Line in San Francisco

along which the house was carried is 68 ft. 9 in. between property lines and 38 ft. 9 in. between curb lines. A single-track cable line runs along the center of the street, and the width of the house was too great to permit of its being moved longitudinally along either side of the street at ground level without obstructing the car track. The street railway objected to any interference with its service, so the contractor resorted to the expedient of jacking the structure to a sufficient height to permit cars to pass beneath it. Cribwork was then placed on the skids to support the house in the position shown, and moving operations were performed in the ordinary way. In this manner the house was moved down a 16½ per cent grade.

## SAWDUST FOR EXTINGUISHING OIL FIRES

In a paper presented before the American Society of Mechanical Engineers at its annual meeting held during the past week Edward A. Barrier said that sawdust was an excellent extinguishing agent for fires in volatile liquids, especially those of a viscous nature. The efficiency of the sawdust, was, he said, undoubtedly due to its blanketing action in floating upon the surface of the liquid and thus excluding the oxygen of the air, and its efficiency was greater on viscous liquids than on thin liquids since it floated more readily on the former than on the latter. Sawdust itself was not easily ignited and when it did become ignited it burned without flame and the burning embers did not have sufficiently high temperature to reignite the liquid. The character of the sawdust, whether from soft or hard wood or whether or not it contained very much moisture, was apparently of little influence, so that the drying out of sawdust which was kept in manufacturing establishments did not affect its efficiency.

It was found that the addition of sodium-bicarbonate greatly increased the efficiency of sawdust, as shown both by the short time and by the decreased amount of material necessary to extinguish fires. A further advantage of the addition of bicarbonate of soda was that it decreased the

possible danger resulting from the presence of sawdust in manufacturing plants, as after its addition it would be difficult, if not impossible, to ignite the mixture by a carelessly thrown match or any other ready source of ignition.

## MEETING OF THE ALABAMA ASSOCIATION

The annual meeting of the Alabama Light & Traction Association was held on Nov. 21, 1913, at the office of the Mobile Gas Company. R. L. Ellis, manager of the Selma Lighting Company, was elected president of the association; T. K. Jackson, manager of the Mobile Electric Company, was elected vice-president, and H. O. Hanson, assistant manager of the Mobile Gas Company, was re-elected secretary and treasurer. The names of the members of the executive committee of the association elected at the meeting follow: A. H. Ford, manager of the Birmingham Railway, Light & Power Company; C. C. Henderson, the former president of the association; C. E. White, manager of the Montgomery Light & Water Power Company; R. L. Rand, manager of the Anniston Electric & Gas Company, and A. R. Smith, general manager of the Demopolis Electric Light & Power Company. The session of the association was concluded with a banquet on the evening of Nov. 21 in the Cawthorn Vineyard, tendered to the delegates by the officers of the Mobile Electric Company and the Mobile Gas Company. After the address of C. C. Henderson, president of the association, R. H. Smith, manager of the Greensboro Water & Light Company, read a paper on "The Operation of a Power Plant in a Small Town." T. K. Jackson introduced the subject of "Some Pertinent and Impertinent Questions." R. L. Ellis read a paper on "The Oil Game." The pulmotor was demonstrated for the benefit of those present by employees of the Mobile Electric Company.

## MEETING OF PENNSYLVANIA ASSOCIATION

About a score of members of the Pennsylvania Street Railway Association attended the annual meeting of that body, held at the Harrisburg Club, Harrisburg, Pa., on Dec. 2. Charles O. Kruger, Philadelphia, presided in the absence of the president, H. R. Fehr, of Allentown. No papers were read, but there was a general discussion of the "safety first" question. Mr. Kruger told about the work being done in Philadelphia along that line. He advocated greater publicity as a means for the prevention of accidents. Others who spoke on the subject were C. L. S. Tingley, Philadelphia, and Gordon Campbell, York.

Another important subject under discussion was the proposition of amalgamation with the Keystone Railway Club, an association composed of master mechanics, engineers, accountants and other officials of street railways of Pennsylvania. The preponderance of sentiment was favorable to this proposition and the furtherance of the merger was left with a committee composed of Capt. W. S. Rockwell, Pottsville; C. L. S. Tingley, Philadelphia, and Gordon Campbell, York. The members of this committee will arrange a meeting later with a committee of the Keystone Railway Club. A meeting of the two organizations will be held next spring to ratify any action taken by the committees.

The following officers were elected for the ensuing year: President, C. L. S. Tingley, Philadelphia, vice-president American Railways; vice-president, W. A. Rigg, Reading, vice-president Reading Traction Company; secretary and treasurer, Dr. Harry M. Stine, Harrisburg; executive committee, the president and vice-president, and F. B. Musser, president Harrisburg Railways; T. B. Donnelly, West Penn Railways, Connellsville; H. F. Crowley, American Railways, Philadelphia, and W. S. Rockwell, Eastern Pennsylvania Traction Company, Pottsville.

The election of officers was followed by a luncheon.



## NEW COMMITTEES OF THE ACCOUNTANT ASSOCIATION

The following committees of the American Electric Railway Accountants' Association have been appointed to serve during the 1913-14 year:

### COMMITTEE ON A STANDARD CLASSIFICATION OF ACCOUNTS

- H. L. Wilson, chairman, Boston Elevated Railway.
- W. F. Ham, Washington Railway & Light Company.
- W. B. Brockway, with Ford, Bacon & Davis, New York.
- W. H. Forse, Jr., United Traction Company of Indiana.
- F. E. Smith, Chicago Railways Company.

### COMMITTEE ON INTERLINE ACCOUNTING

- L. T. Hixson, chairman, Terre Haute, Indianapolis & Eastern Traction Company.
- Irwin Fullerton, Detroit United Railway.
- E. L. Schmock, Cleveland, Painesville & Eastern Railroad.

### SPECIAL COMMITTEE FOR STUDY OF BEST METHODS OF COLLECTING AND ACCOUNTING FOR VARIABLE RATES OF FARE, ACTING WITH COMMITTEE ON COST OF PASSENGER TRANSPORTATION SERVICE

- M. R. Boylan, chairman, Public Service Railway, Newark, N. J.
- C. H. Allen, with Stone & Webster, Boston, Mass.
- W. B. Brockway, with Ford, Bacon & Davis, New York, N. Y.
- R. J. Clark, Kansas City Railway & Light Company.

### COMMITTEE ON OVERHEAD CHARGES

- P. S. Young, chairman, Public Service Railway, Newark, N. J.
- Edwin Gruhl, Milwaukee Electric Railway & Light Company.

### SPECIAL COMMITTEE ON PREPAYMENT-CAR OPERATION, ACTING WITH COMMITTEE ON FARES AND TRANSFERS OF THE TRANSPORTATION & TRAFFIC ASSOCIATION

- M. R. Boylan, co-chairman, Public Service Railway, Newark, N. J.
- C. N. Huggins, Portland Railway, Light & Power Company.

### COMMITTEE ON EDUCATION

- F. J. Pryor, Jr., chairman, American Railways Company.
- F. B. Lasher, Harrison Williams, New York, N. Y.
- J. H. Neal, Boston Elevated Railway.
- W. H. Forse, Jr., United Traction Company of Indiana.
- N. E. Stubbs, United Railways & Electric Company, Baltimore, Md.

### COMMITTEE TO REPRESENT ASSOCIATION AT CONVENTION OF RAILROAD COMMISSIONERS

- W. F. Ham, chairman, Washington Railway & Electric Company.
- C. N. Duffy, Manila Electric Railroad & Light Company.
- N. E. Stubbs, United Railways & Electric Company, Baltimore, Md.

### COMMITTEE CO-OPERATING WITH THE UNITED STATES BUREAU OF THE CENSUS

- A. L. Linn, Jr., chairman, Harrison Williams, New York, N. Y.
- W. H. Forse, Jr., United Traction Company of Indiana.
- M. R. Boylan, Public Service Railway, Newark, N. J.

### JOINT COMMITTEE WITH THE ENGINEERING ASSOCIATION ON ENGINEERING ACCOUNTING

- F. B. Lasher, co-chairman, Harrison Williams, New York, N. Y.
- J. A. McGowan, Terre Haute, Indianapolis & Eastern Traction Company.
- J. M. Joel, New York State Railways.
- J. C. Collins, New York State Railways.
- M. W. Glover, Mobile Light & Railroad Company.
- J. H. Hanna, co-chairman, Capital Traction Company, Washington, D. C.

- H. H. Adams, Chicago Railways Company.
- E. O. Ackerman, Columbus Railway & Light Company.
- John Sibbald, Fonda, Johnstown & Gloversville Railroad.
- George Weston, Board of Supervising Engineers, Chicago, Ill.

### JOINT COMMITTEE WITH ENGINEERING ASSOCIATION ON LIFE OF RAILWAY PHYSICAL PROPERTY

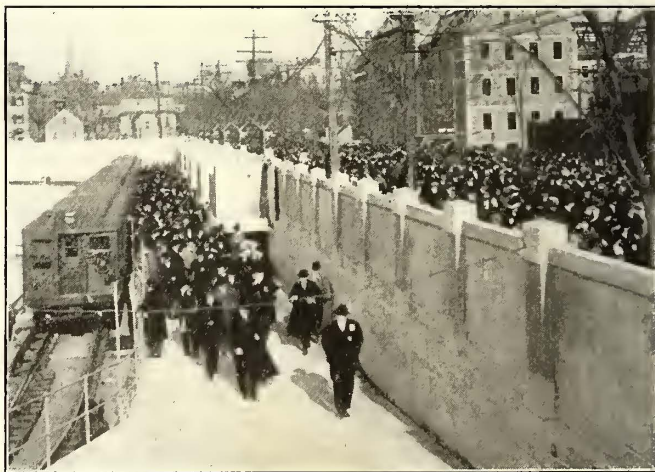
- R. N. Wallis, co-chairman, Fitchburg & Leominster Street Railway.
- A. R. Patterson, Stone & Webster, Boston, Mass.
- H. E. Weeks, Tri-City Railway & Light Company.
- Martin Schreiber, co-chairman, Public Service Railway, Newark, N. J.
- R. B. Rifenberick, Detroit United Railway.
- Edwin Gruhl, Milwaukee Electric Railway & Light Company.

### JOINT COMMITTEE WITH TRANSPORTATION & TRAFFIC ASSOCIATION ON EXPRESS AND FREIGHT ACCOUNTING

- Walter Shroyer, co-chairman, Union Traction Company of Indiana.
- E. L. Kasemeier, Ohio Electric Railway.
- H. H. Read, Bay State Street Railway.
- J. K. Choate, co-chairman, J. G. White Management Corporation, New York, N. Y.
- G. H. Harris, Birmingham Railway, Light & Power Company.
- E. C. Springer, Lehigh Valley Transit Company.

## HANDLING TRAFFIC AT HARVARD-YALE FOOTBALL GAME

At the recent Harvard-Yale football game at Cambridge, Mass., the Boston Elevated Railway Company transported about 22,000 people to and from the Harvard Stadium without the slightest congestion on either its surface or rapid



Football Crowd—Arriving at Stadium Station for Game

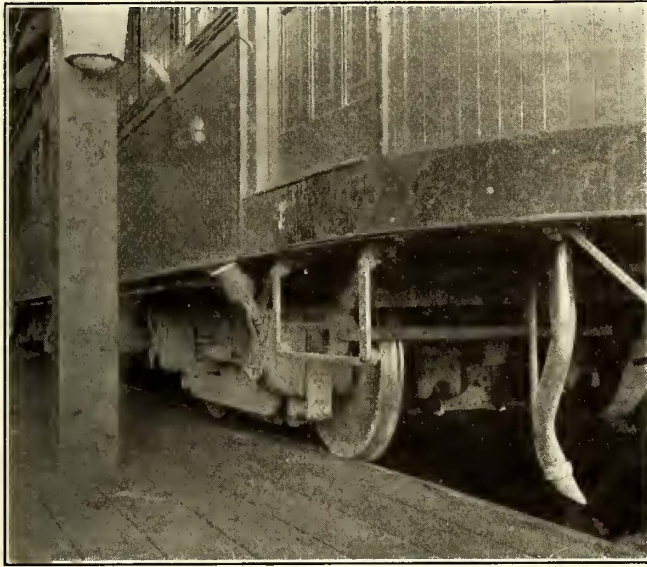
transit lines. The accompanying photograph shows a train-load of passengers arriving at the Stadium station, which is a special out-door installation equipped with a single platform and with numerous exits which are converted into entrances and manned by extra ticket sellers at the close of games in the Stadium. The station occupies one side of the storage yard for subway trains adjacent to the company's Eliot Square shops, and in the football season trains are looped through the yard from Harvard Square before returning to Park Street, Boston. The running time from Park Street to the Stadium station was 10 minutes. At Park Street the trains were run upon both sides of the loading platform during the period of heaviest traffic, and another factor in the smooth handling of the service was the opening of five entrances and the manning of twenty-three ticket offices at this station when the travel was at its



height. It is estimated that nearly a half hour was saved to those who used the Cambridge subway compared with the time formerly required by passengers to make the trip to the Stadium in Cambridge from Boston via surface lines exclusively.

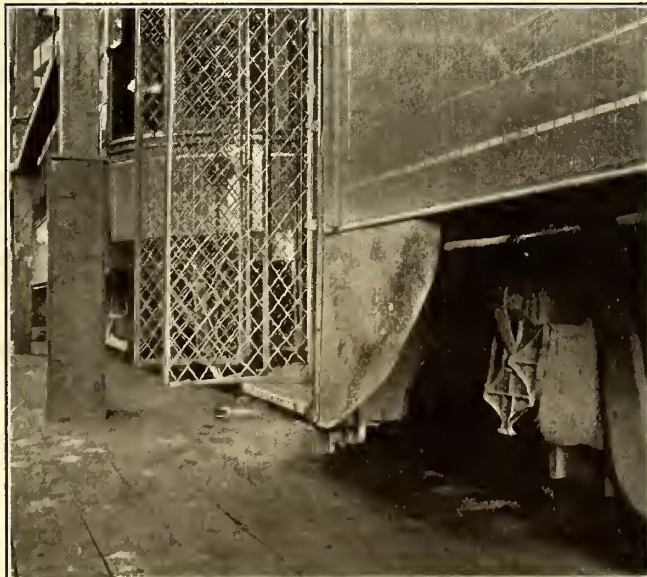
### SHEAR PLATE AND FOLDING STEPS IN DULUTH

The Duluth Street Railway Company has had considerable difficulty in the past with collisions between its cars and wagons in which the front and rear steps of its single-end cars have been damaged or torn away. To eliminate this



Folding Steps in Two Positions on Duluth Cars

trouble a folding step has been adopted for the front end of the car and a shear web has been applied just in front



Shear Plate on Duluth Cars

of the rear step, and this construction has been adopted as standard on all cars.

The step at the front end of the car is of the stirrup type, purely for the use of the motorman, as the car is of the single-end type, and, when folded, this step is high enough so that a wagon wheel hub will pass under it. The step is of bar iron and is pivoted at the points of attachment to the car body and between the horizontal bar and the uprights.

This permits the step to collapse under the car side sill when struck by a wagon wheel. The view shows it in both positions, it being supported in the collapsed position by a hand.

The shear plate at the rear step is simply a protective device to force a wagon wheel away from the step and gates. It is bolted to the side sill and end sill in the vertical angle formed by the side sill and steps and is held rigidly in position by a forged bracket. The web is triangular-shaped with the hypotenuse of the triangle dished or rounded into the center of the car body so that the shearing action is away from the car. A view of the shear plate is also published.

### DINNER OF PUBLIC POLICY COMMITTEE OF N.E.L.A.

The public policy committee of the National Electric Light Association, of which Arthur Williams is chairman, gave an informal dinner Dec. 4 at the Union League Club, New York, and had as its guests the public relations committee of the American Electric Railway Association and representatives of the telephone interests, the gas interests and the steam railroad interests. The dinner was followed by an informal discussion as to the best means of telling the story of public utility corporations in a manner to lead the public and the municipal, state and federal authorities to see the difficulties and problems in the operation of public utilities so that the corporations should receive fair treatment at the hands of the public and authorities. The general sentiment expressed was that the public intended always to be fair and acted fairly when it had full information upon which to base its judgment.

The work accomplished by the public policy committee of the National Electric Light Association during the past several years was briefly outlined by Arthur Williams, who acted as toastmaster, and the statement was made by several of those who spoke that the National Electric Light Association, although the youngest of the public utilities, had led in this work; that it had recognized from the start that regulation by state and municipal authorities had come to stay and that by accepting the policy of regulation the industry had profited. The work of the public policy committee of the National Electric Light Association in educating its own members in the proper methods of dealing with the public and authorities was also emphasized.

Howard Elliott, president of the New York, New Haven & Hartford Railroad, briefly outlined the work done in this connection by the Northern Pacific Railroad while he was president of that company. T. N. Vail, president of the American Telephone & Telegraph Company, and U. N. Bethel, president of the New York Telephone Company, described the work along similar lines done by the telephone interests. Others who spoke were George B. Cortelyou, president of the Consolidated Gas Company, of New York; Charles L. Edgar, president of the Edison Electric Illuminating Company of Boston; O. D. Young, vice-president of the General Electric Company, and Charles A. Stone and Edwin S. Webster, of Stone & Webster.

All present seemed deeply impressed with the importance of the subject discussed and to feel that the effect of the meeting would be reflected in improved relations between the public utility companies and the public.

Those in attendance included Walter R. Addicks, U. N. Bethel, H. G. Bradlee, Everett W. Burdett, Robert A. Carter, George B. Cortelyou, Henry L. Doherty, Charles L. Edgar, Leavitt L. Edgar, Howard Elliott, W. W. Freeman, Lewis B. Gawtry, H. J. Hemmens, Samuel Insull, Julius Kruttschnitt, John W. Lieb, T. C. Martin, Joseph B. McCall, James H. McGraw, J. B. Murray, Thomas E. Murray, E. W. Rice, Jr., Samuel Scovil, Charles A. Stone, Guy E. Tripp, Theodore N. Vail, Edwin S. Webster, Arthur Williams, Col. T. S. Williams and O. D. Young.



## COMMUNICATIONS

### COUNTING NICKELS BY WEIGHT

QUINCY RAILWAY COMPANY

QUINCY, ILL., Nov. 21, 1913.

To the Editors:

On page 987 of your Nov. 1st issue we note a description of a weighing and counting machine. For a small property we have found it very convenient to use ordinary grocers' scales in sacking our nickels. When we count our fare boxes we find it convenient to hold fifty nickels in the counter's hand at one time. This, being \$2.50, is contained ten times in \$25, the amount of nickels we put in each sack.

In counting the fare boxes each handful is deposited in the scales, and the conductor receives the credit for \$2.50 in the count. The last handful that is put in the scale tips the balance, which is set at 5 lb. 6 1-4 oz. The scoop is then emptied into a sack which is marked with the company's name, and "\$25" is stamped on it. The odd change, such as nickels which do not amount to \$2.50, also dimes and pennies, is put into trays, the same as were used with the old method of counting. Our fare boxes are of the ordinary type which will take any size of coin including tickets.

W. A. MARTIN, Superintendent.

### PROPOSED ASSOCIATION OF PURCHASING AGENTS

ROCKFORD & INTERURBAN RAILWAY COMPANY

ROCKFORD, ILL., Nov. 28, 1913.

To the Editors:

I note various opinions as to the advisability of the formation of an Electric Railway Purchasing Agents' Association in your issue of Nov. 22, and I believe that the organization of an electric railway purchasing agents and storekeepers' association along the lines of the steam railroads' Railway Storekeepers' Association would be a good thing. Much benefit should result from the interchange of ideas as to the most efficient methods of handling stock and in the establishment of standards for purchases, etc.

The purchasing and storekeeping departments of the electric railways have not received in the past the recognition which their relative importance to the entire organization merits. This is not the case on the steam roads of the country, where the full development of these departments has been encouraged.

CHARLES A. INGLE,  
Assistant Purchasing Agent.

### PRESENTATION OF THE GRASHOF MEDAL

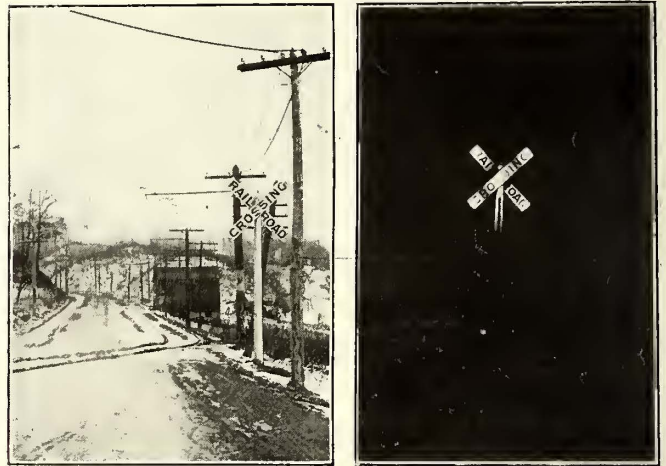
On Wednesday, Dec. 3, the Grashof Medal, given by the Verein Deutscher Ingenieure for accomplishment in the field of engineering, was formally presented through the American Society of Mechanical Engineers to George Westinghouse. At the presentation, which was held in the auditorium of the Engineering Societies Building in New York City, Dr. W. F. M. Goss, retiring president of the American Society of Mechanical Engineers, presided, and he introduced as the first speaker Col. E. D. Meier, who explained that the possession of the medal, coming as it did from the greatest engineering association of the world, was one of the highest honors to be attained in the profession and gave an account of the announcement of the award of the medal last summer in Germany.

Colonel Meier was followed by Herr Fr. Romberg, Privy Councilor of the German Empire, who addressed the meeting in a speech which was replete with feeling and which was received with vigorous applause from the large audience. Mr. Westinghouse was, unfortunately, prevented by illness from attending the presentation and, in consequence, Dr. Goss, in the name of the American Society of Mechanical Engineers, delivered the medal to James Hartness, president-elect, for transmittal to its new owner.

### ILLUMINATED CROSSING SIGN ON NEW YORK STATE RAILWAYS

On the Rochester division of the New York State Railways a very satisfactory method has been devised for illuminating the crossing signs which are set up at intersections of country roads with the company's suburban or interurban lines. The plan consists in placing six incandescent lamps on both sides of the customary cross-arm signs, one lamp being located at each end of each cross-arm with a pair of lamps at the intersection. The six lamps on each side of the sign are divided into groups of three and connected together so that three lamps on each side are in series on a separate circuit. In consequence, if one lamp should burn out or a circuit should otherwise be broken, the six lamps on the other circuit would still illuminate the sign on both sides and give warning in both directions.

This scheme provides an unusual degree of illumination, much better in fact than is obtained by a bank of lamps set together and throwing their light on the sign, as it has been found that the signs are easily visible from a distance



ILLUMINATED CROSSING SIGN ON NEW YORK STATE RAILWAYS

of one and one-fourth miles. The introduction of the new method of illumination has, therefore, created very favorable comment from the public and has undoubtedly served in the reduction of crossing accidents. Two views of one of these crossing signs are shown, one having been taken in the daytime and the other at night when the sign was illuminated, the latter demonstrating the brilliance with which the sign stands out.

### UNUSUAL SUIT FOR DAMAGES

A remarkable suit for damages for injury by shock has recently been brought against the New York Railways and is being tried in Part V of the Supreme Court of New York. The plaintiff, Isaac Kaufman, claims to have received the shock from stepping on a slot rail on Thirty-fourth Street near the corner of Broadway. The testimony for the defense showed that both slot rails are effectively grounded by tie rods to the outside rail, by bolts which hold the slot rail to a cast-iron yoke every 5 ft. and by the fish-plates which connect the ends of the slot rails. Moreover, the point where the accident is said to have occurred is a point of great traffic, where vehicles with steel tires are constantly spanning both slot rails. Nevertheless, the attorney for the plaintiff is claiming that through rust the rail may have become insulated from the ground and become charged through a defective insulator underneath. Among the witnesses before the defense were W. B. Potter, Thomas F. Mullaney, Prof. George A. Seaver and Prof. Samuel Sheldon.



### A WIDE-ANGLE SIGNAL LENS TEST

A test of lenses for railway signal lights was recently held at the grade crossing at Oak Island, N. J., of the Central Railroad of New Jersey and the Lehigh Valley Railroad, for the purpose of comparing the effectiveness of the spheroidal lens made by the Armspear Manufacturing Company, New York, with that of the standard railway signal or marker lens. The weather during the tests was clear and cool with a full moon. It was found that the standard red rear-end marker lights were visible for 1847 ft. along a line measured on the extreme edge of the zone of light. This angle of visibility was 23 deg. on one side of the track. Under the same conditions the spheroidal lens showed at 2973 ft. with an angle of visibility of 53 deg. on one side.

A standard 4-in. green lens for a switch lamp was found to carry 1319 ft. with a 16-deg. angle, as against 2428 ft. by a spheroidal lens with an angle of visibility of 55 deg., and a standard 5-in. white semaphore lens carried 1699 ft. over an angle of 21 deg. on one side, an equivalent spheroidal lens giving a distance of 2622 ft., with an angle of 51 deg. In a test for the range of visibility on straight track, or along the center line of the lens, the red spheroidal train marker lens was found to be lost as a signal only after a distance of 7077 ft. had been covered.

### A NOVEL DESIGN FOR TRAVELING CRANES

The Brown Hoisting Machinery Company, Cleveland, Ohio, has recently placed upon the market a single I-beam crane with a unique design of truck or end frame. The construction which is shown in the accompanying illustration permits the crane to be used under conditions of very limited head room, making it especially suitable for use in power houses, storerooms, substations and similar structures where the height of building is largely determined by crane clearances.

The I-beam is of the usual size sufficient for the required



Cast-Steel Truck for Single I-Beam Crane

capacity and span, and on its lower flanges is carried the trolley with a chain hoist or electric hoist to lift the load. The end frames or trucks are, however, made from a one-piece steel casting of light weight, and they support the I-beam on planed surfaces in the center, the point of support being well below the level of the truck axles. The I-beam is bolted to clips attached to the upper part of the truck and is also held in place by a dowel on the truck frame, which fits into a small recess on the underside of the bottom flange of the I-beam. Each truck is supported on two truck wheels and has a bearing on each side of the wheels, thus permitting the use of very small axles.

On account of the simple construction the crane may be easily and quickly erected even in close quarters, and on account of the flexibility no part appears to be subject to undue strain even on uneven rails. A squaring shaft is, however, extended across from one truck to the other, connecting with one wheel of each truck, and this insures uniform travel of both ends of the crane. The smaller cranes up to 1-ton capacity and with spans below 20 ft. have no traveling mechanism, being propelled by pushing or pulling on the load, but for the larger sizes a hand travel chain and sprocket is provided, and this for the largest capacities is fitted with double reducing gears so that the heaviest weights may be moved with ease.

### COMBINATION LIGHTING AND TROLLEY POLES IN NIAGARA FALLS, N. Y.

The International Railway, of Buffalo, N. Y., recently made an installation of combination lighting and trolley poles on the main street of the city of Niagara Falls under somewhat unusual circumstances. The poles, which were purchased by the city from the Electric Railway Equipment Company, of Cincinnati, are shown in the accompanying illustration, and they are provided with slots below the ground line so that if desired in the future the feeders now carried upon them may be placed in conduit below sidewalk level. The material used in the pole construction is 7-in., 6-in. and 5-in. standard-weight tubing.

The poles were installed in Falls Street in accordance with a plan for lighting which had been under consideration in Niagara Falls for many years and which was crystallized by a comparatively recent offer of the Hydraulic



Combination Lighting and Trolley Pole

Power Company to furnish free electric current for the lighting system. Early last June the city asked E. G. Connette, president International Railway Company, if the trolley poles could not be removed from the street in furtherance of the plan. Mr. Connette consented not only to remove the trolley poles but to place the new poles for the city and to transfer the trolley wires and feeders to them without charge. The work of installation was commenced last August and was completed inside of three months' time.

The installation consists of 112 poles, each of which is equipped with a double bracket for supporting a pair of G. E. inverted arc lamps of about 800 cp each. The poles are spaced at 70-ft. intervals, thus giving one of the best street-illuminating systems in the country.

In an attempt to operate a spare steam turbo-alternator as a synchronous motor to improve the power factor care should be taken to see that the best possible vacuum is maintained at all times. The reason for this is that if the turbine blades revolve in air inside the turbine casing they soon get extremely hot from friction with the air. In a perfect vacuum, of course, this would not occur so that when a turbo-generator is used for this purpose the condenser air pump must be operated.



## LONDON LETTER

*(From Our Regular Correspondent)*

Application has been made to the Light Railway Commissioners for permission to construct a new tramway to link up the colliery villages between Barnsley and Mexborough. The urban councils of Wombell, Wath-on-Dearne, Bolton-on-Dearne and Thurnscoe have formed themselves into a joint board to build the lines. The population of the district to be served is about 135,000. Although Barnsley is the largest town in the district to be served by the line, it has refused to co-operate with the other towns. The estimated cost of construction is £100,000.

Glasgow has not yet come to an agreement with the counties of Lanark, Renfrew and Dumbaron in regard to extensions which it desires to make into these counties. A conference has been held between a sub-committee of the Glasgow Corporation Tramways and representatives of the counties, who have made demands that the Corporation should bear the whole cost of road widening, a large portion of the cost of the up-keep of the roads in which the tramways are operated and make an annual payment for any extra expenditure necessary by the counties. The committee has replied that it can only recommend the Corporation to treat each case of road widening on its merits, and that it cannot recommend the Corporation to maintain any portion of the road outside that on which the tramway track is laid and 18 in. beyond each of the outer rails, as under the general tramways act of 1870, and that it cannot recommend the Corporation to make any payments to the counties.

Glasgow has an interesting problem before it in the proposed extension of one of its tramway routes under Gilmore Hill, on which Glasgow University is situated. The line would extend in a tunnel from Gibson Street about half a mile under the hill to Byres Road, where tramways already exist. If it is decided that the line should follow the route of University Avenue, the Corporation will communicate with the university authorities in regard to the precautions which it proposes to take to minimize the disturbance from electrical current and vibration.

The City Council of York has decided to obtain parliamentary powers for running trolley buses on one of its routes, at a cost of about £4,300, and has agreed to a system of trolley buses on a new route which will cross the River Ouse on the proposed new bridge. This route is to cost about £3,000 for equipment. It has also been decided to insert in the bill a provision to give the Corporation general power to provide and run buses in the city.

The proposal of the National Electric Construction Company to install a system of petrol-electric tramcars in Oxford has been rejected by the Oxford Corporation.

The borough electrical engineer, the borough surveyor and the town clerk have reported to the Stirling Town Council in regard to the proposal to have the Corporation purchase the existing tramway and equip it with electricity. The report deals with a system of municipal tramways between Bridge of Allan and Bannockburn and considers the question of further extension to Cowie, Denny, Dunblane, Tullibody, Cambus and Alloa, Blairlogie, Menstrie, etc., serving a total population of 65,261. The estimated cost of the line between the Bridge of Allan and Bannockburn is £78,100, and the yearly income is estimated at £9,744. The operating expenses are placed at £4,981.

The Gloucester City Council has decided to combine the electrical supply and the tramways undertakings under one management, the general manager of the tramways system having been appointed to the general managership of the Southampton Corporation Tramways.

In regard to the application by the Aberdeen Suburban Tramways for permission to run trail cars on its lines, the Board of Trade has stated that it has no objection to the use of trail cars on tramways as proposed, provided suitable arrangements are made for turning.

The Greenock Corporation has decided against the proposal to purchase the Greenock & Port Glasgow Tramways.

The plan to construct an electric railway under the Tyne, between North and South Shields, has been revived. The

Tyne is about 1200 ft. wide at the site of the proposed railway and the only communication between North and South Shields is by ferry service, which last year was utilized by more than 6,000,000 passengers. The length of the proposed railway would be about three-quarters of a mile, and a single train would maintain a six minutes' service.

The efforts of the London County Council to increase its traffic receipts are meeting with success, and for some weeks the receipts have been up by about £2,000 a week. It is a striking justification of the policy of cheaper fares, the issue of return tickets at reduced rates and a more vigorous policy of advertising. The Council intends to make another effort to bring its tramways into the heart of London. Parliamentary sanction will be sought in the forthcoming session for three short extensions which would make the system on the north side of the Thames much more valuable. Efforts will be made to extend the tramways from the present terminus in Farringdon Road to a point near Ludgate Circus. The Council also will make an effort to extend its tramways from the present terminus at Aldgate to Mark Lane Station and from Aldgate to Aldgate Station. Similar attempts have been defeated in Parliament on two previous occasions, and the motor bus continues unchallenged in the city proper.

The Council of London reports that the experiment with trail cars, which have been running under the provisional sanction of the Board of Trade, has been a success, and the consent to the running of trail cars on the Merton circular route, which was received for three months last June, has now been extended without any definite limit. The Council will apply for permission to adopt the trail cars as desired for the whole of the tramway system. The Council is gradually removing the colored headlights on tramcars and substituting numbers in their place.

The Midland Railway will ask for permission at the next parliamentary session to electrify the London and Tilbury section of its line. This section was transferred to the company a year and a half ago. The transfer was sanctioned by a House of Commons committee on the condition that the company would apply to Parliament in 1914 for powers to electrify and to carry out the electrification within seven years of obtaining these powers. The chairman of the Midland Railway recently stated that this would involve an expenditure of about £1,000,000. As noted elsewhere in this issue, officers of the company are now in the United States studying electrification.

It was announced recently that the Underground Railways was prepared, on conditions, to continue its Bakerloo tube railway from the present terminus at the Elephant and Castle Station to the Crystal Palace, thus providing South London with a much needed quick service. In the meantime the Kearney High-Speed Railway has decided to postpone the presentation of a bill for the construction of a railway from the Strand to the Crystal Palace.

Work has now been commenced in the vicinity of Teddington in connection with the electrification of the London & Southwestern Railway. The Kingston circular route will be the first section to be electrified, and it is hoped that this line will be in operation before the end of next year. Electric services on the Hampton Court and Shepperton branches, and on the Hounslow loop line, will be added as soon after as possible, and eventually the electrification will be extended to Guildford. In designing the new rolling stock, the company has adhered to the compartment type of vehicle, although the almost universal practice on electric railways is to use the long car with vestibule entrances at each end. This has been considered almost necessary in electric traction owing to the greater acceleration of electric trains, as it is thought dangerous to have so many doors to handle at each stopping as would be necessitated by the compartment type of vehicle. The compartment type of coach is doubtless the most popular in England, but considering the fact that the trains can attain a speed of from 20 to 30 m.p.h. before clearing a station the question of doors becomes an important one.

The agitation in Birmingham in favor of all-night tramcars for the convenience of night workers and night travelers has assumed definite shape, and it is expected that the subject will be laid before the City Council at an early date by way of the presentation of a memorial.

A. C. S.



# News of Electric Railways

## Low Fare Ordinance Passed in Toledo

The Council of Toledo, Ohio, has passed and the Mayor has signed an ordinance to require the Toledo Railways & Light Company to establish a 3-cent fare on all its lines after March 27, on which date the franchise for the so-called Robinson lines in Toledo expires. The ordinance was introduced by City Solicitor Schreiber, was placed on passage without going to a committee and was enacted with only one dissenting vote and almost without discussion. The measure follows:

"That upon the following terms and conditions, and upon no other, consent, permission and authority are hereby granted to the Toledo Railways & Light Company to continue from day to day only after March 27, 1914, to operate its cars on the streets and portions of streets whereon franchises expire on said March 27, 1914, the operation to be in conjunction with all the rest of the street railway lines of the Toledo Railways & Light Company in Toledo, so that the whole system will be operated as a unit and as one continuous system.

"The operation of street cars after March 27, 1914, on the streets and parts of streets whereon franchises expire on March 27, 1914, shall be subject to the same terms and conditions as prevailed thereon under the grants prior to March 27, 1914, and shall be further subject to all of the conditions imposed on the said Toledo Railways & Light Company by an ordinance passed July 26, 1911, pertaining to operation of street cars by the Toledo Railways & Light Company, and shall be further subject to the condition that the charge which the said Toledo Railways & Light Company may name and receive for one continuous passage over the entire or any part of its street railway system, including the streets upon which franchises have expired and those upon which franchises shall not have expired, shall not exceed the sum of 3 cents for each passenger, nor the sum of 1 cent for each child under eight years of age, children in arms free, and that any passenger demanding a transfer ticket at the time of paying his fare shall be entitled without extra charge to a transfer from the route upon which he shall have paid his fare to any other route except in a substantially opposite direction on a route parallel or substantially parallel to said first route, and to ride continuously to any point upon such second route within the limits of the city, provided he transfer to the first car with adequate accommodations that runs past the point of transfer.

"This ordinance is subject to revocation or amendment in whole or in part, expressly or by implication, at any time at the will of Council, and the Council may at any time increase the obligations of the company for permission to operate upon said lines covered by said franchises, and the continuing by said company of the operation of its cars on lines covered by said franchises expiring March 27, 1914, shall be deemed an acceptance of this ordinance and all the terms hereof.

"In case the Toledo Railways & Light Company refuses or fails to comply with the terms of this ordinance promptly and according to the tenor and effect thereof, then the city solicitor shall be, and he is hereby, authorized and directed to take such legal action as may be proper and necessary to enforce the provisions of this ordinance or require the company to abandon the streets covered by the franchises above mentioned."

The rates of fare under the present temporary agreement are 3 cents between 5.30 a. m. and 7.30 a. m. and between 4.30 p. m. and 6.30 p. m., and six tickets for a quarter at other hours.

F. R. Coates, president of the company, has written a letter to the Council protesting against the ordinance. He says that the action of the Council was unfair and that the company cannot operate its cars under the provisions of the new ordinance without jeopardizing the investment represented by the company's property. After reciting the events leading up to the agreement between the company and the city to permit accountants in the employ of the city and under salary from the company to inspect the books of the

company to ascertain how 3-cent fares four hours a day worked out, Mr. Coates wrote:

"In view of the fact that there could be no purpose in this examination, made, as we have said, by accountants appointed by the city, unless the same was to be used as a basis in arriving at an ordinance, we beg respectfully to suggest that your action, taken without any consideration of the accountants' report and without any notice to this company, was somewhat hasty and we respectfully protest against the same. Since the writer's connection with this company it has received fair treatment from this administration, and we believe on second thought you will consider your action hasty, and in the interests of fair play repeal the same."

The communication from Mr. Coates has been referred to the committee on railroads and telegraph of the Council.

## Extension to Michigan Central Depot in Detroit

On the evening of Nov. 24 the Common Council of Detroit, Mich., reversed its decision of the week previous and by a vote of twenty-eight to four gave the Detroit United Railway permission to build a loop to the new Michigan Central Railroad station as an extension of Michigan Avenue. Alderman Reid made the motion to reconsider the vote on the question, which had been originally defeated by a vote of sixteen to fourteen. He also made the motion to adopt the committee report containing the Michigan Avenue loop recommendation.

Officials of the Detroit United Railway stated recently that work on the Michigan Avenue extension to the new station will be commenced within a few days and that the rails will be down within three weeks if the weather is favorable. All material, rails, ties, switches and the like, is already on hand, but it is the intention of the company to construct a temporary track at present. Work on the permanent track will be begun as early in the spring as possible.

Henry B. Ledyard, chairman of the board of the Michigan Central Railroad, said that trains will not be run into the station until street-railway connections are completed.

In order to learn the first cost of construction, the Street Railway Commission has asked the city accounting department and the engineer's department to furnish men to check up the work on the loop as it is done. The accounting department will keep up a complete set of books and these must correspond with the report of the engineers, who will check all the material used as well as the work done on the extension.

## Newark Franchises Advanced

All but two of the twenty-nine franchise ordinances granted by the Board of Works of Newark, N. J., to the Public Service Railway for the improvement of its transportation facilities have been approved by Philander Betts, chief engineer of the State Board of Public Utility Commissioners, in a report made to that body. Four of the ordinances are vital to the plan of the proposed terminal building in Park Place, Newark, which calls for the expenditure of several million dollars. These are all approved by Mr. Betts, who concluded his recommendations as follows:

"Personally I should be inclined to continue efforts to have the city make the necessary changes in the city plan to provide more parallel routes. The company, on the other hand, has chosen to go ahead with the plan for a terminal, and as the responsibility for street railway service is, in the first instance, with the company, I believe it should be allowed to proceed with its plans.

"I therefore recommend that the board give its approval to ordinances Nos. 1, 2, 3 and 4, which are necessary for connections to the terminal building.

"I repeat my recommendations that the board give its approval to ordinances Nos. 10, 11, 13, 14, 15, 20, 21, 26 and 27.



"I repeat my recommendation for the approval of ordinances Nos. 16, 22, 23 and 24.

"I strongly advise rearrangements of routes, and therefore now recommend that the board give its approval to ordinances Nos. 5, 6, 7, 9 and 12."

Mr. Betts then makes additional recommendations as follows:

"(1) That the ordinance providing for the terminal should be immediately approved in order that work may be commenced as soon as possible.

"(2) That the ordinance providing for re-routing in so far as recommended above be approved.

"(3) That Bloomfield, Paterson and Central Avenue cars be immediately re-routed in accordance with the arrangement recommended above.

"(4) That the track connections in Washington Street be arranged for without delay and, if possible, constructed this winter.

"(5) That the track connections through Kinney Street, Van Buren Street and Gotthart Street be constructed so as to be available for use during the next summer season."

#### Compensation for Joint Use of Poles Fixed

The decision in the arbitration proceedings to determine the terms and conditions upon which the city of Richmond, Va., and the Virginia Railway & Power Company are to make joint use of poles has been rendered by Judge Beverly T. Crump, who, as sole arbitrator, has fixed the rental at \$1 a year for each pole used. The question arose with the building of the city electric plant. The city, in order to avoid the duplication of poles in the city streets, made use of the poles of the Virginia Railway & Power Company in stringing its transmission lines. It was agreed by both parties to submit the terms for the joint use of each other's poles to arbitration. Acting in pursuance of a Council joint resolution authorizing the city engineer to name a suitable disinterested person to act as arbitrator, Mr. Bolling recommended the appointment of Beverly T. Crump, at that time a private practising attorney. The recommendation was approved by both the Council and the power company, and hearings in the matter began on Sept. 11, 1913.

Judge Crump finds that the city used 1201 of the power company's poles in 1911. In 1912 the city used 1886 poles. Under the \$1 a year rental determined upon in the award, the city owes the Virginia Railway & Power Company \$3,087 in pole rentals to Jan. 1, 1913. The annual rental of \$1 entitles the licensee to the use of one pole for the space of one standard eight-pin cross arm, not to exceed 10 ft. in length, the cross arm and attachments not to occupy more than 26 in. of the pole. Additional space on the pole, if provided, shall be charged for at the rate of 40 cents for each 13 in. Additional cross arms are to be spaced at 26 in. and are to cost the licensee 80 cents each a year. The award provides in detail for the various contingencies that may arise in the joint use of poles. The company contended that the fee for the use of each pole should be \$2, while the city contended that a rental of 75 cents a year for each pole used jointly by the licensee and the owner was adequate compensation to the owner.

#### Proposed New Haven Readjustment

A conference was held at Washington on Dec. 1 in regard to the measures to be taken by the officers of the New York, New Haven & Hartford Railroad for the readjustment of the company and its subsidiaries to bring the properties into compliance with the Sherman anti-trust act as interpreted by Attorney-General McReynolds. The conference was participated in by the Attorney-General; Howard Elliott, chairman of the board of directors of the New York, New Haven & Hartford Railroad; E. D. Robbins, general counsel of the company; Edgar J. Rich, general counsel of the Boston & Maine Railroad; L. S. Storrs, vice-president of the Connecticut Company, and John W. Crim, of counsel for the New York, New Haven & Hartford Railroad. Later the representatives of the company conferred with T. W. Gregory and Jesse C. Adkin, assistants to Mr. McReynolds. It is understood that the Attorney-

General desires the separation of the New York, New Haven & Hartford Railroad from the Boston & Maine Railroad, the separation of the New Haven railroad from the Connecticut Company and the Rhode Island Company, the relinquishment by the New Haven railroad of its control of steamship lines and the nullification of the New Haven railroad's agreement with the Boston & Albany railroad. The hope is expressed that the representatives of the Department of Justice and the officers of the New Haven railroad and other companies will be able to agree upon a plan for dismemberment. If such an agreement for dismemberment is reached and the New Haven railroad and the other companies comply with it in the time fixed under an "agreed decree" by some United States district court, further civil proceedings will not be undertaken on behalf of the government against the company.

#### Labor Developments in Indianapolis

Immediately following the conclusion of the strike in Indianapolis, J. J. Thorpe, of the Amalgamated Association, and other labor organizers attempted to unionize the city and interurban trainmen of the Terre Haute division of the Terre Haute, Indianapolis & Eastern Traction Company, proceeding in much the same manner as with the Indianapolis city men. The company, however, had already completed an agreement with the men of the Terre Haute division drawn in the same form as that which was signed by the interurban men of its other divisions. All of the employees expressed themselves as desiring to enter into this agreement with the company, which would give them the right to submit matters to the Public Service Commission of Indiana if they could not be adjusted between themselves and the company, and the agreement, which was dated Nov. 11, 1913, was finally executed by Governor Ralston, Robert I. Todd, president of the Terre Haute, Indianapolis & Eastern lines, and each of the city and interurban trainmen of the Terre Haute division of the company. At the same time the following statement was published, signed by every employee of the company and addressed to the public:

"We, the undersigned, employees of the Terre Haute division, Terre Haute, Indianapolis & Eastern Traction Company, desire to state that we are satisfied with our wages, hours and conditions of service. The company has treated us well and we desire to continue in our places without interruption from any source.

"There is no trouble or controversy between the company and its own employees on the subject of wages or anything else. Threats have been made and are being made that we will be forced to abandon our positions by outside persons, not employed by the company, on account of the labor conditions prevailing in Indianapolis and elsewhere.

"We ask the sympathy and protection of the public officials and the law-abiding citizens of Terre Haute, so that we may continue to do our duty to the company and the traveling public and support our families."

Attempts were made by the labor organizers to induce the men to repudiate their agreement with the company and to organize and strike, but these efforts met with no success. On Nov. 29 officials of the United Mine Workers and the American Federation of Labor submitted a form of agreement to the company through officials of the Chamber of Commerce, the latter explaining that they were transmitting the document merely through request of the labor officials. This paper provided that the employees should be allowed to form an organization without any interference, that men discharged for activity in attempting to form a union should be reinstated, etc. The company replied to the officials of the Terre Haute Chamber of Commerce, explaining the terms of the agreement which had been entered into between the company and its employees, to which agreement the Governor of Indiana was a party, and further stated that there was no controversy between the company and its employees. The company expressed its opinion that from years of actual experience of persons charged with the responsibility of operating properties of like character it was not in the interest of the trainmen, the company, its patrons or the public that the men should be members of labor organizations; that the company had in a proper and lawful way made known its feeling on the question, but beyond that had never interfered and would not in the future inter-



fere either directly or indirectly with the action of its employees in regard to that question. The company then stated that no employee had been discharged on account of his affiliation with any labor organization and that every employee who had been dismissed was discharged for some specific breach of duty or discipline.

On Nov. 29 the labor officials and organizers notified the Governor, the city officials of Terre Haute and merchants in that city that, following a mass meeting to be held that day, a strike would probably be called. As nothing has developed to this date, it seems evident that they reconsidered their action in the matter and decided that it would be inadvisable to take any such step.

The Public Service Commission of Indiana, after conferring with attorneys representing the Indianapolis Traction & Terminal Company and its employees, announced the date of the first hearing of the grievance presented recently by the employees to the company and referred to the commission as Dec. 4. The hearing was continued on Dec. 5 and then an adjournment was taken to Dec. 9. The commission expects to devote four days of each week to the hearing until it is completed, reserving Mondays and Saturdays for other business. The sessions will be held in the Senate Chamber of the State House and will be open to the public.

The Chicago, South Bend & Northern Indiana Railway has executed agreements with the employees of its city lines in South Bend and the interurban divisions, including the lines of the Southern Michigan Railway. These agreements, to which Governor Ralston is a party, have been signed by every employee of the company and are practically the same in form as the agreement executed between the Terre Haute, Indianapolis & Eastern Traction Company and its employees, providing for arbitration by the Public Service Commission of all matters which may arise in the future and which cannot be adjusted between the company and its employees.

All of the grievances submitted by employees of the Indianapolis & Cincinnati Traction Company have been adjusted amicably between the trainmen and the company, with the exception of the demand for a flat wage scale of 35 cents an hour and a rearrangement of schedules on the two divisions. These matters have been referred to the Public Service Commission. The men withdrew several demands, and others in regard to operating conditions were modified and agreed to by the company. The demand for the right to organize and wear union buttons was revised and agreed to as follows:

"The treatment of its trainmen by the company and its negotiations, conferences and agreements with them shall be without difference or discrimination of any kind, on the part either of the company or any of its trainmen, on account of membership or non-membership or former membership or non-membership in any organization. The fact of such membership or non-membership shall not, by the wearing of badges or other insignia or otherwise, be advertised by any of the trainmen or in any way control or affect their treatment of or dealings with each other, in connection with the operation of the road."

The company also agreed that regular runs by regular trainmen of less than nine hours should be paid for as nine hours. The demands for time and one-half for overtime and that all straight runs should not be over ten and one-half hours were amended as follows:

"Pay time and one-half shall be allowed for all time worked by regular men other than on their regular scheduled runs; but this shall only apply to cases where before or after their regular runs regular men are called to do additional extra work, either on extra runs or other regular runs."

"All straight passenger runs shall not be over twelve hours. This shall not apply to swing passenger runs or to freight runs."

The other demands were in regard to local operating conditions, choosing of runs, time for reporting, etc., and were amended and adjusted without difficulty.

The trial of the thirty-three policemen who rebelled when instructed to ride on cars during the recent strikes in Indianapolis ended rather spectacularly on Nov. 24, when two of the three members of the Board of Safety voted to reinstate the policemen. Superintendent of Police Hyland at once tendered his resignation, after thirty years' service

in the police department, and immediately afterward William E. Davis, chairman of the Board of Safety, resigned, both stating that they could not remain longer in their respective offices and retain their self-respect. Corporation Counsel Kealing and City Attorney Walker made strong pleas for the dismissal of the men. The evidence during the hearings, which lasted several days, disclosed the fact that Mayor Shank was responsible for the condition of affairs which existed during the strike of the car men, and that while he had not issued direct orders, he had personally told the men that they would not be expected to ride on cars or endanger their lives in protecting property or employees of the Indianapolis Traction & Terminal Company. Public sentiment was very strong against the Mayor when it was seen that it was largely due to his interference that the lack of protection by the police had permitted the tie-up of the city lines during the strike, and a committee of prominent business men, representing the commercial organizations, at once demanded the resignation of Mayor Shank, stating that if the then impending teamsters' strike was called he would be impeached.

On Nov. 28, after being informed by the labor men organizing the teamsters that further labor trouble was imminent, Mayor Shank resigned, and the office of Mayor fell automatically upon City Controller Harry R. Wallace, who at once took oath of office. Mayor Wallace at once appointed a new Board of Safety and confirmed the appointment of Acting Superintendent of Police Coffin. An almost entire reorganization of the police force followed, and men with military training were appointed to command the squads of police. When the teamsters' strike was called on Dec. 1 positive orders were issued by the Mayor, Board of Safety and Superintendent of Police that no interference with business would be permitted, and as a result, while a much larger body of men is on strike than during the street railway troubles, sympathizers who congregate on the streets are promptly dispersed by the police. Mayor Wallace has made it known that in the event of any further trouble developing on account of the street railway organizers attempting to bring about a sympathetic strike, policemen must absolutely obey orders and ride upon street cars and wagons if instructed to do so.

#### Method of Procedure of Washington Commission

H. C. Eddy, engineer of the Public Service Commission of the District of Columbia, has issued the following statement summarizing the methods of procedure of the department of the commission under his jurisdiction:

"Up to the present time the work of the department has been confined chiefly to matters relating to street railway operation and construction and the investigation of accidents occurring in connection with the operation of the various utilities in the District. In connection with the street railway work the department is divided into two bureaus, known as the bureau of traffic and the bureau of equipment. The former makes all investigations and handles all complaints relative to service, and the latter relative to maintenance of cars, tracks, etc.

"Two inspectors are constantly employed making observations of traffic conditions on various lines. Records are taken at the most congested points of the number of cars operated, schedules maintained, seating capacities of the cars and number of passengers carried. This is done not only during rush-hour periods, but at all hours of the day and night. Observations are sometimes taken simultaneously at two or three points on the same line, in order to ascertain traffic conditions. These observations are recorded on regular forms and filed in the office. Where service is found to be inadequate the matter is taken up with the company concerned, and the operation of additional cars has frequently resulted. By means of these observations and others taken at the ends of lines, a check is kept on the companies' schedules and on orders of the Interstate Commerce Commission and Public Utilities Commission, of which there are many now in effect on the various lines in the District.

"In order to ascertain conditions of traffic throughout the city, now that winter travel has reached the normal point, observations are being taken on all lines. One hundred and seventy-four observations have been made



since Oct. 15. Inspectors also are continually on the alert to see if the regulations of the commission are being complied with. The bureau of equipment makes inspection of cars both in course of operation and at the carhouses. Cars in operation are inspected at terminals, when safety appliances are tested. Carhouse inspections consist of minute inspection of entire equipment. All these inspections are made at uncertain and unexpected moments. Defects found are generally reported to the companies with direction to repair them.

"All accidents in which persons are killed or injured are reported to the commission on forms provided by the board. These forms are required to be returned within three days of the date of an accident. When it is deemed necessary and advisable, a thorough investigation of the accident reported is made by representatives of the engineering department, the information thus obtained being for the commission's own use."

#### Experimental Farm Proposed by Electric Railway

In order better to promote the agricultural interests of those living along the line of one of its suburban lines, and incidentally to lay the foundation for a constantly increasing freight traffic over the line, the directors of the Bangor Railway & Electric Company, Bangor, Maine, have voted to purchase a farm and conduct it as an agricultural experimental station. A few years ago the Bangor Railway & Electric Company took over the Bangor & Northern Railway, which was being operated at a loss, and by changing the power and doing missionary work in the territory served by the line turned it into a paying proposition. The farm which the company proposes to take over consists of 125 acres about 6 miles from Bangor, and an engineer is now engaged in laying it out so that it may be used to the best advantage for demonstration purposes. There will be one-acre plots, highly cultivated for raising various kinds of crops. The farm will be equipped with driveways about the acre plots so that they may be easily seen at all times and the company will reconstruct the roadway in front of the farm in a manner best suited for a Maine highway. Model farm buildings will be erected, including a dairy and barns. The barns will represent the last word in sanitary equipment and hygienic arrangement. The foundation and floors will be of concrete, and electricity will play an important part in the operation of this department. Electric milking machines will be introduced, and the churns and other equipment for the dairy will be operated by electricity.

#### Settlement of General Electric Strike

A settlement between the General Electric Company and the striking employees at the Schenectady works was reached on Nov. 20. As a result the employees returned to work on Dec. 1. There was no disorder at any time and, so far as the demeanor of the men went, it remained to the last more of a "demonstration," as the men called it, than a strike. The announcement of the committee of employees in regard to the settlement follows in part:

"We do not question the right of the company to reduce its force when necessary in such manner as may be deemed best by the management. After careful consideration we believe that the action in calling a strike was largely due to a misunderstanding. Such employees as remained at work are to be subjected to no annoyance and every effort will be made to maintain cordial and loyal relations with the company."

The company agreed on its part to reinstate in other places within a week the two employees who were laid off and in whose behalf the "demonstration" of employees was called and agreed further not to discriminate against any of its employees on account of their participation in the strike.

**Boston Elevated Wage Arbitration.**—The arbitration board which heard evidence in the case of the employees of Boston Elevated Railway has extended for one week the time within which briefs of counsel must be filed with the board. The date now is Dec. 6.

**Hearing in Regard to Batavia Purchase Postponed.**—Capitalists of Batavia, N. Y., who are planning to buy the

Buffalo & Williamsville Electric Railway, have asked for an extension of time to consider the purchase, and for that reason the hearing before the Public Service Commission of the Second District of New York on the application of the present owners to abandon the franchise in Batavia has been adjourned until Dec. 20. The hearing was scheduled for Nov. 28.

**Contracts to Be Let for San Francisco Municipal Lines.**—M. M. O'Shaughnessy, city engineer of San Francisco, announces that contracts will let about Jan. 1, 1914, for a second municipal carhouse, to cost \$150,000, and for equipment to the following amounts: Rails, rail joints and fastenings, \$250,000; tie rods and nuts, \$5,000; tie plates, \$20,000; rail spikes, \$5,000; redwood cross ties, \$50,000; copper rail bonds, \$10,000; track special work, \$200,000; trolley poles, \$40,000; cars, \$700,000; total, \$1,280,000.

**Revision of Banking Laws.**—The sub-committee on savings banks of the Van Tuyl Commission appointed to prepare a revision of the laws of New York State relating to banking has under consideration recommendations to permit savings banks to make loans on Stock Exchange collateral, which would make them a factor in the call money market; authorizing the investment of savings deposits in equipment trust obligations of railroads, as well as general mortgage bonds, and requiring the gradual accumulation of larger surpluses of guaranty funds.

**Conscience Money Letter.**—T. J. Minary, president of the Louisville (Ky.) Railway, has received a letter postmarked Grand Rapids, Mich., inclosing \$70, which is to reimburse the company for thefts committed while the writer of the letter was in its employ as conductor. The letter follows: "Dear Sir: It greatly worried me; was constantly on my conscience. Could not live happy until it's paid. Took it all—nickel at a time, while conductor. Pay you, good interest on principal. Inclosed find \$70. All I ask is to forgive me. Wish I had a job now—be honest as the days are long. Very respectfully yours, An Honest Thief."

**Statement Regarding Pittsburgh Subway Ordinance.**—The Pittsburgh (Pa.) Subway Company has concluded as follows a statement which it has issued explaining the application presented to the Council by the company asking for franchise rights: "The ordinance which we have presented represents our idea of a proper franchise. We think the simple form adopted by us is far better than the complicated and incomprehensible one that has become a fashion in subway ordinances in Pittsburgh. We believe that the ordinance advocated by us would be far more effective in protecting the city than any ordinance that has been presented before, while it would not hamper the company as much as the others in doing good work. We commend the new ordinance to respectful consideration."

**Right of Company to Lay Tracks on Highway.**—The Kentucky Court of Appeals has reversed the Jefferson Circuit Court of Louisville in dissolving an injunction against the fiscal court of Jefferson County in favor of the Louisville & Interurban Railroad. The question involved was the right of the traction company to lay tracks on a public highway. The company had secured a right-of-way covering the highway from the fiscal court; but this was later revoked, and the laborers employed by the company were arrested when they began construction work. The Court of Appeals holds that if in its double-tracking it encroached upon the highway to any unreasonable extent it was violating the law. The interurban company must now either build only a single track or secure right-of-way on the other side of the line.

**Federal Regulation of Stock and Bond Issues Proposed.**—Representative Sims, of Tennessee, introduced in the House on Nov. 29, 1913, a bill providing for federal regulation of the stock and bond issues of all interstate carriers, but aimed only at issues which post-date the enactment of the proposed legislation. It prohibits any such company from issuing stocks or bonds without the approval of the Interstate Commerce Commission after investigation by a public hearing. The bill, however, would exempt from its provisions notes issued by the carrier which mature not more than one year after their date, but such notes are not at any time to aggregate more than 5 per cent of the total of the stocks and bonds of such carrier which may have been



issued and are outstanding. Representative Esch, of Wisconsin, has introduced a bill proposing a method of federal control of railway securities.

**Conservation Through Electrification.**—G. Percy Cole, of the Canadian General Electric Company, addressed the members of the Canadian Railway Club recently on "The Conservation of Natural Resources Through the Electrification of Railways." He spoke of the enormous cost of running locomotives by coal and estimated that the annual consumption of coal by locomotives in Canada and the United States is approximately 110,000,000 tons. He said that if it were possible to reduce this consumption two-thirds a yearly saving of \$147,000,000 would be effected. Dr. L. A. Herdt and Professor McKay, of McGill University; L. C. Ord, of the Canadian Pacific Railway; W. H. Winterrod, electrical engineer of the Canadian Pacific Railway, and R. H. Wheeler, electrical engineer of the Canadian Northern Railway, took part in the discussion.

**Well Equipped and Managed.**—The Decatur *Daily Democrat* contained in its issue of Nov. 25, 1913, an article, "Well Equipped and Managed," in which the attention of the readers was called to the efficient organization which the company has built up. Referring to the personnel of the company, the article said: "Mr. Quinn, the receiver, does not take very much of the credit for the present conditions, but in his modest way gives full credit to the men who have had actual charge of the work. W. H. Fledderjohann, manager of the road, is a persevering and never-tiring worker and he is a real manager with an eye on every department every minute. He deserves to win out and everybody believes he will. He is assisted in his work by competent help. The only idea in this article is to impart to our readers information in regard to the plant and the management and to impress you with the idea that it is safe and a pleasure to travel over the Decatur interurban. We believe the road has a future, and we are sure it is well managed in every department."

**Decisions by United States Supreme Court.**—In the case brought by the Kansas City Southern Railway, which alleged that the section of the interstate commerce act which authorizes the commission to require the carriers to conform to a uniform system of accounting is an unreasonable regulation, the United States Supreme Court on Dec. 1 held that the system is a reasonable and necessary regulation. The Supreme Court in a decision rendered on Dec. 1 also upheld a decree which had denied a petition of the Louisville & Nashville Railroad to have an order of the Kentucky Railroad Commission set aside. The railroad attacked the validity of the McChord law, under which the railway commission had acted, on the ground that the law conferred on the State commission powers that the railroad called "judicial." Justice Hughes delivered the opinion, in which he held that the right of a carrier to make intrastate rates is subject to the authority of the State. He declared that the proceedings prescribed by the McChord law to ascertain the facts on which a rate is to be judged as to its reasonableness are not judicial as the railroads contended, but legislative.

**Franchise Draft for Kansas City Voters.**—Acting under instructions from Judge William C. Hook, Robert J. Dunham and Ford F. Harvey, receivers of the Metropolitan Street Railway, Kansas City, have notified all registered voters that they will receive shortly a condensed draft of the proposed new franchise as well as the ordinance in full. The receivers asked the voters to read the grant carefully and form an opinion on its merits or demerits. Judge Hook recently advised the receivers to inform the Kansas City public fully regarding the proposed franchise. The public attended the recent meetings of the Council committee and advanced suggestions. The committee in urging all who are interested in the franchise to attend the meeting even placed advertisements to this effect in the daily papers. The question of whether or not street cars shall be allowed on the plaza in front of the new Union Depot is still pending. It appears likely, however, that cars will run to the door of the depot on one or two lines, at least. Various improvement associations of Kansas City have asked that the lines be designated on which extensions will be made under the new franchise. The ordinance now provides for extensions without naming the districts.

**Arnold and Wallace Agree on Chicago Terminal Recommendations.**—John F. Wallace, employed by the terminal committee of the Chicago City Council, and Bion J. Arnold, employed by the terminal plan committee, an independent organization, as experts to investigate and make recommendations on the rearrangement and development of Chicago steam railroad terminals, have reconciled the differences between their two reports. As a direct result of this agreement the terminal committee unanimously voted to permit the new Pennsylvania station to be erected at the site desired by the company. The committee based its decision for action upon that part of the agreement covering the desirability of two central stations in addition to the present Northwestern station. Although the committee acted unanimously on this proposition, it was provided that the ordinance should embrace a number of concessions to the city before it would be voted to send it to the City Council for final passage. The drafting of the ordinance governing the location of the Pennsylvania passenger and freight terminals was put in the hands of a commission consisting of five members of the terminal committee and the corporation counsel. These are to be assisted by John F. Wallace, Bion J. Arnold and Walter L. Fisher, representing the citizens' terminal committee; Paul Lazenby, chief engineer of the Chicago Plan Commission, and Robert Redfield, special attorney for the Pennsylvania Company.

## PROGRAMS OF ASSOCIATION MEETINGS

### New York Electric Railway Association

As announced previously in the *ELECTRIC RAILWAY JOURNAL*, the eighteenth quarterly meeting of the New York Electric Railway Association will be held in assembly room No. 1 on the fifth floor of the Engineering Societies Building, 29 West Thirty-ninth Street, New York, on Dec. 9, 1913, at 10 a. m. Luncheon will be provided by the association and served in an adjoining room at 1 p. m. There will be no informal dinner the evening previous to business session. The general subject of the meeting will be public relations and the introductory remarks will be made by C. Loomis Allen, chairman of the committee on public relations. Addresses will be made by Edward E. McCall, chairman of the Public Service Commission of the First District of New York; C. S. Sims, second vice-president of the Delaware & Hudson Company, Albany, N. Y.; J. C. DeLong, president of the Syracuse (N. Y.) Lighting Company; J. H. Pardee, president of the J. G. White Management Corporation, New York, N. Y., and Joseph K. Choate, vice-president of the J. G. White Management Corporation, New York, N. Y. An open discussion by those in attendance will follow.

### Central Electric Railway Accountants' Association

The annual meeting of the Central Electric Railway Accountants' Association will be held at the Hollenden Hotel, Cleveland, Ohio, on Dec. 12 and 13, 1913. The executive committee of the association will meet at 10 a. m. on Dec. 12, and at 1 p. m. the regular business session will begin. During the session there will be presented the address of the president, the report of the standing committee on freight accounts, the report of the standing committee on passenger accounts and the report of the committee on query box questions. The session will be concluded with the following address:

"Proposed Changes in the Classification of Accounts of Electric Railways," by W. H. Forsc, Jr., treasurer of the Union Traction Company of Indiana.

The program of addresses for the session of the association on Dec. 13 follows:

"New Federal Income Tax Law," by L. T. Hixson, auditor of the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., and by H. B. Cavanaugh, auditor of the Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.

"Some Essentials of Public Service Accounting," by A. F. Elkins, auditor of the Columbus, Delaware & Marion Railway, Cincinnati, Ohio.

General discussion: "Proper Method of Accounting for Flood Losses," led by A. F. Elkins.



# Financial and Corporate

## Stock and Money Markets

Dec. 3, 1913.

In the late trading on the New York Stock Exchange to-day buying orders on a large scale were executed, with the result that advances of from one to two points were recorded in a number of issues. These advances were shared in by the low-priced industrials, and they made gains proportionate with the rest of the list. The steady accumulation of New Haven resulted in a further advance in that issue. Rates in the money market to-day were: Call, 5 @ 6 per cent; sixty days, ninety days and four months, 5 @ 5 3/4 per cent; five and six months, 4 3/4 @ 5 per cent.

Considerable strength was displayed in the trading in Philadelphia to-day. The market was broad and the demand for bonds was good.

A strong tone featured the stock market in Chicago to-day and the leaders scored gains. Bonds were steady.

In Boston the tone of the market was strong to-day and with few exceptions advances were recorded. There was little demand for bonds.

Trading on the Stock Exchange in Baltimore to-day was narrow and dull. The bulk of the transactions was in United Railways & Electric.

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

	Nov. 22	Dec. 3
American Brake Shoe & Foundry (common).....	87	87
American Brake Shoe & Foundry (preferred).....	128	127
American Cities Company (common).....	36	36
American Cities Company (preferred).....	64 1/2	64
American Light & Traction Company (common).....	334	333
American Light & Traction Company (preferred).....	106	106
American Railways Company.....	38 3/4	38
Aurora, Elgin & Chicago Railroad (common).....	a41	a42
Aurora, Elgin & Chicago Railroad (preferred).....	82	82
Boston Elevated Railway.....	85	85
Boston Suburban Electric Companies (common).....	7	7
Boston Suburban Electric Companies (preferred).....	60	60
Boston & Worcester Electric Companies (common).....	*6 1/2	*6 1/2
Boston & Worcester Electric Companies (preferred).....	39	39
Brooklyn Rapid Transit Company.....	87 1/2	87 1/2
Capital Traction Company, Washington.....	111 1/2	110
Chicago City Railway.....	160	160
Chicago Elevated Railways (common).....	25	25
Chicago Elevated Railways (preferred).....	75	* 75
Chicago Railways, ptepts., ctf. 1.....	90	90
Chicago Railways, ptepts., ctf. 2.....	26 1/2	28
Chicago Railways, ptepts., ctf. 3.....	5 1/2	7
Chicago Railways, ptepts., ctf. 4.....	2	2
Cincinnati Street Railway.....	105	110
Cleveland Railway.....	104	104 1/2
Cleveland, Southwestern & Columbus Ry. (common).....	*5 1/2	*5 1/2
Cleveland, Southwestern & Columbus Ry. (preferred).....	*30	*30
Columbus Railway & Light Company.....	18	18
Columbus Railway (common).....	59 1/2	59 1/2
Columbus Railway (preferred).....	88	88
Denver & Northwestern Railway.....	*111	*111
Detroit & United Railway.....	68	80
General Electric Company.....	139	139
Georgia Railway & Electric Company (common).....	119	118 3/4
Georgia Railway & Electric Company (preferred).....	85 3/4	85
Interborough Metropolitan Company (common).....	14 3/4	14 1/4
Interborough Metropolitan Company (preferred).....	58 1/2	58 3/4
International Traction Company (common).....	*40	*40
International Traction Company (preferred).....	*95	*95
Kansas City Railway & Light Company (common).....	*22	*22
Kansas City Railway & Light Company (preferred).....	*30	*30
Lake Shore Electric Railway (common).....	*7	*7
Lake Shore Electric Railway (1st preferred).....	*92	*92
Lake Shore Electric Railway (2d preferred).....	*25	*25
Manhattan Railway.....	130	130
Massachusetts Electric Companies (common).....	10 1/2	10 1/2
Massachusetts Electric Companies (preferred).....	64	66 1/2
Milwaukee Electric Railway & Light Co. (preferred).....	*100	*100
Norfolk Railway & Light Company.....	*25 1/4	*25 1/4
North American Company.....	70 1/2	70
Northern Ohio Light & Traction Company (common).....	66 1/4	66 1/4
Northern Ohio Light & Traction Company (preferred).....	97	97
Philadelphia Company, Pittsburgh (common).....	39 1/2	39
Philadelphia Company, Pittsburgh (preferred).....	39	39
Philadelphia Rapid Transit Company.....	18 3/4	18 1/4
Portland Railway, Light & Power Company.....	56	56
Public Service Corporation.....	107	107
Third Avenue Railway, New York.....	39 3/4	40 1/4
Toledo Traction, Light & Power Company (common).....	30	30
Toledo Traction, Light & Power Company (preferred).....	80	80
Twin City Rapid Transit Co., Minneapolis (common).....	104	105
Union Traction Company of Indiana (common).....	*13	*13
Union Traction Company of Indiana (1st preferred).....	*83	*83
Union Traction Company of Indiana (2d preferred).....	*25	*25
United Rys. & Electric Company (Baltimore).....	25 1/2	25 1/2
United Rys. Inv. Company (common).....	17	19
United Rys. Inv. Company (preferred).....	34	35 1/2
Virginia Railway & Power Company (common).....	56	56
Virginia Railway & Power Company (preferred).....	93 1/2	93 1/2
Washington Ry. & Electric Company (common).....	86 1/2	86 1/2
Washington Ry. & Electric Company (preferred).....	86	86
West End Street Railway, Boston (common).....	67 3/4	68 1/2
West End Street Railway, Boston (preferred).....	90	90
Westinghouse Elec. & Mfg. Company.....	65	64 3/4
Westinghouse Elec. & Mfg. Company (1st preferred).....	112	112

\*Last sale. a Asked.

## ANNUAL REPORTS

### New South Wales Government Railways & Tramways

The report of the New South Wales Government Railways & Tramways for the year ended June 30, 1913, contained the following financial statement:

	1913		1912	
	Railways	Tramways	Railways	Tramways
Earnings .....	£6,748,985	£1,754,566	£6,491,473	£1,581,393
Working expenses ....	4,643,881	1,572,190	4,169,591	1,331,413
Balance .....	£2,104,104	£182,376	£2,321,882	£249,980
Interest on capital.....	1,917,200	214,832	1,906,369	192,284
Surplus .....	£186,904	* £32,456	£415,513	£57,696

\*Deficit.

The total capital expenditure on tramway lines open for traffic on June 30, 1913, was £6,699,305. The expenditure charged to the tramway capital account during the year amounted to £1,034,981. The total tramway earnings amounted to £1,754,566, as compared with £1,581,393 the previous year, being an increase of £173,173, or 10.95 per cent. The tramway working expenses amounted to £1,572,190, as compared with £1,331,413 for the previous year, or an increase of £240,777. The percentage of expenditure to receipts is 89.61 per cent, as compared with 84.19 per cent the year before. The net result, after providing for working expenses and interest on the capital invested, is a tramway deficit of £32,456, as compared with a surplus of £57,696 the previous year. During the year 294,455,452 passengers were carried, as compared with 266,789,546 in the previous year, or an increase of 27,665,906, without any tram accident resulting in loss of life to any of the passengers. The earnings per tram mile during both 1912 and 1913 were 1s. 3 1/2d. The working expenses per tram during 1913 were 1s. 2d. and during 1912 1s. 1d., giving a return per tram mile during 1913 of 1 1/2d. and during 1912 of 2 1/2d. The tram mileage during 1913 was 26,954,767 and during 1912 24,362,219.

The permanent way, works, buildings, rolling stock, machinery and plant were maintained in good working condition. In connection with the maintenance of the tramway tracks 57,500 tons of road metal were used, and 162,490 sq. yd. of wood paving and 53,460 sq. yd. of macadam were top-dressed with tar, while 8 miles 13 chains of track were treated with carborundum rail grinder for corrugation. Thirteen miles 67 chains of line have been relaid, 4 miles 3 chains duplicated, and a number of connections, storage sidings, loops, etc., have been provided at various points to facilitate the running of the cars. Nine new waiting rooms at various points and water tanks at St. Leonard's and Kensington were erected.

During the year 157 eighty-passenger bogie motor cars, eighteen fifty-passenger four-wheeled motor cars, nine ballast trucks, seven trail ballast trucks and two motor-driven water sprinklers have been added to stock. Four steam trail cars, two trail water sprinklers and one steam motor were condemned and two trail cars were sold, the original cost in each case being written off from capital to working expenses. One four-wheeled motor car was converted to a service vehicle. There were 389 electric cars overhauled and repainted; 650 electric car trucks received overhaul and general repairs; 2597 armatures were rewound, and a large number of others received minor repairs.

One 7500-kw turbo-alternator, with auxiliary motors, has been installed and was brought into operation on Dec. 25, 1912, and one 500-kw turbo-alternator is being erected. Two 850-kw direct-current generators have been replaced by three 1000-kw rotary converters with the necessary switch gear and transformers, and two additional 1000-kw converters are now being erected. The total electric current output for the year was 89,113,036 kw-hr., of which the alternating-current supply was 78,090,695 kw-hr. and the direct-current 11,022,341 kw-hr., being a total increase over the figures for the previous year of 11,578,757 kw-hr., or 14.93 per cent.

The total staff employed on June 30 numbered 41,322, the average throughout the year being 39,831, viz.: railways, 30,661; tramways, 9170, as compared with 26,574 and 7921 respectively for the previous year, or an increase of 5336.



The value of the concessions and advances made to the whole of the staff, whether engaged on capital or working expenses account, represent a cost at the rate of £282,230 per annum, in which the wages staff participates to the extent of £226,378 per annum.

Keen interest in ambulance work continues to be displayed by the staff generally. The total strength of the corps is now 7014, as compared with 5988 last year—an increase of 1026, or 17 per cent. Ambulance instruction classes have been established at 175 places and the attendance of members has been good. Complete ambulance equipment has been provided at all depots and important stations, as well as in the brake vans of all main line and through trains, the total appliances distributed for use being 524 stretchers, 242 chests, 152 small boxes, seven hand-wheel litters, one ambulance wagon and equipment for surgeons' first-aid purposes at Sydney, Newcastle and twelve important country stations.

The statement for the year of the government railways superannuation account shows that the contributions to the account at June 30, 1913, numbered 24,026. The number of employees retired from active service and placed on pensions during the year was 282 and the total number of pensioners on the fund at June 30, 1913, was 709. There was paid in pension allowances during the year the sum of £37,698, making a total of pensions paid since the inception of the account of £61,191. There remains a credit balance June 30, 1913, of £60,210.

#### Cape Electric Tramways, Ltd.

The profit and loss statement of the Cape Electric Tramways, Ltd., Cape Town, S. A., for the twelve months ended June 30, 1913, follows:

Profits of the Cape Town and Port Elizabeth Companies.....	£83,268
Interest on investments, etc.....	2,441
Transfer fees.....	35
Total.....	£85,744
General and office expenses:	
Rent, rates and taxes, salaries, professional and legal charges, cables and telegrams, traveling expenses, printing and stationery, income tax, etc.....	£3,266
Directors' fees.....	1,300
Trustees' fees.....	200
Total.....	£4,766
Net income.....	£80,978
Interest on debentures.....	£25,077
Amount set aside for redemption of 6 per cent mortgage debentures.....	11,900
Amount set aside for redemption of "B" 5 per cent mortgage debentures.....	11,050
Premium on 6 per cent mortgage debentures redeemable July 1, 1913.....	714
Total.....	£48,741
Profit for period.....	£32,237

L. Breitmeyer and S. W. Jameson, chairman and secretary of the board of directors, respectively, say in part:

"After taking into account the balance brought forward from last year, a net credit balance of £35,079 remains in the profit and loss surplus. From this sum the reserve fund has been credited with the sum of £8,000, leaving a balance of £27,078.

"The result of the operations for the past year continues to show a further increase in earnings on the figures of the previous year in both Cape Town and Port Elizabeth, and enables the directors to recommend the payment of a dividend of 5 per cent free of income tax on the ordinary share capital of the company. This will absorb the sum of £24,561, and the balance of £2,517 it is proposed to carry forward to next year's account.

"During the past year the tramways in Cape Town carried 14,779,709 passengers and the receipts amounted to £144,222, as against 13,733,656 passengers earning £135,369 for the year 1911-12.

"In Port Elizabeth 4,155,711 passengers were carried, earning £43,036, as against 3,747,913 passengers earning £39,823 for the year 1911-12. To meet the expansion of the traffic in Port Elizabeth, arrangements have been made to increase both rolling stock and power plant."

Extracts from the reports of the general managers at Cape Town and Port Elizabeth for the year ended June 30, 1913, were attached to the above report, giving greater details as to the workings of the companies.

J. A. Barkley, general manager of the Cape Town Companies, says in part:

"The total revenue for 1913 was £144,222, as compared with £135,369 in 1912; the operating expenditure in 1913 £77,858, in 1912 £70,736, and the gross profit in 1913 £66,363, in 1912 £64,633, an increase of £1,730.

"A substantial increase has been made in the operating expenditure, owing largely to the increase in the rate of wages. The increased price of fuel has also been a serious factor in the increased expenditure, while the age of the rolling stock and permanent way has necessitated the increase in their cost of upkeep in order to give and to maintain the efficient service demanded by the Cape Town public.

"There has also been a large increase in the number of passengers carried as compared with former years. This growth of traffic has necessitated additional rolling stock, the requisition for which was made by the company early in January.

"The power station expenditure shows an increase of £1,869. This is partly due to the increased power consumption, due to the increased traffic and mileage, the output totaling 3,434,309 units, an increase of 212,667 units over the previous year. The increased cost of fuel accounts for approximately £1,268.

"Many of the older and larger cars need to be gradually overhauled and repaired, and this can be done more efficiently when new cars now on order are received. As regards the permanent way, the time has now arrived when provision will have to be made for renewing the older portion of the track, which will require to be relaid within the next four or five years.

"A number of unavoidable accidents occurred during the year, but the large majority were trifling in character. The total amount paid on this account was £304.

"The mileage of the company shows an increase of 32,838 miles over the previous year. At the golf links 675 ft. of track was completed at a cost of £411; of this the permanent way cost £336 and the overhead line £75.

"During the year under review the total revenue amounted to £43,036 and was earned as follows: Traffic receipts, £42,283; miscellaneous receipts, £753, or a total of £43,036. These figures show an increase as compared with the previous year of £3,277 and a decrease of £64 in miscellaneous receipts.

"The operating expenditure for the year was £25,311, or 58.8 per cent of the revenue, and an increase of £2,648 over last year. The increase in earnings of the company was £3,213, or 8.069 per cent, an average monthly increase of £268.

"During the year considerable progress was made in the beach improvement scheme at Humewood. Some 1400 ft. of promenade has been made up and further extensions are in progress. A fine new bathing house is in course of construction, and considerable improvements in the surroundings are being carried out. The Humewood track was extended about 1400 ft. along the promenade at a cost of £842, and was opened for traffic on Dec. 25, 1912."

#### Allgemeine Elektrizitäts Gesellschaft

The report of the Allgemeine Elektrizitäts Gesellschaft, Berlin, Germany, for the fiscal year ended June 30, 1913, shows that during the year the company manufactured electrical apparatus with a total rating of 2,533,985 kw. This output included one 20,000-kw, three 15,500-kw and four 11,500-kw turbo-generators. The total business was \$15,000,000 in excess of the preceding year. The net earnings of \$7,226,121 enabled the company to pay a dividend of 14 per cent on a capitalization of \$38,725,000, to add \$250,000 to the employees' welfare fund, to give \$300,000 in premiums to officials and to make other payments, including taxes and reserve. The report states that the development of metallic filament lamps has decreased the output of carbon lamps and arc lamps. The new 1/2-watt nitrogen lamp is making very gratifying progress and is now manufactured in capacities of 600 cp to 3000 cp. The electric railway business is also very satisfactory, particularly in orders for high-tension d.c. apparatus and for single-phase heavy railway equipment. Orders are in hand for twenty-seven electric locomotives.



### Columbus Railway & Light Company Reorganization

The committee of ten having in charge the reorganization of the street railway and electric light properties of Columbus, Ohio, at a meeting held on Nov. 26, 1913, declared the plan operative as modified by the circular letter sent out on Nov. 10. Meetings of the stockholders of the various companies concerned have been called and as a sufficient number of shares of stock have been deposited with the committee to carry out the plan, it only remains for the legal formalities to be complied with to bring about this reorganization, which has been under consideration for some months past.

The plan as modified contemplates the union of the Columbus Railway and the Columbus Edison Company properties with the Columbus Railway, Power & Light Company property.

The Columbus Light, Heat & Power Company property will be controlled under the lease to the Columbus Railway & Light Company as it has been for some years past.

Modification of the plan will cause some change in the arrangement by which stockholders of the Columbus Railway & Light Company were to receive stock in the new company on the dissolution of the Columbus Railway & Light Company, but the committee is working out a plan which, it is believed, will be satisfactory to these stockholders.

### Special Stock Exchange Committee to Study Financing Abuses

The governors of the New York Stock Exchange have adopted the following resolutions calling upon the president to name a committee of five or more members to make a special study of means for remedying the abuses of corporation financing:

"Whereas the questions involved in the incorporation, promotion and capitalization of corporations and the flotation of their securities vitally affect the securities listed on the New York Stock Exchange, as well as the great quantity of securities not so listed; and

"Whereas it is the desire of this exchange to co-operate as far as possible in bringing about the adoption of uniform measures for the greater protection of the investing public through more careful supervision of corporate organization with greater publicity and fuller and more frequent reports of operations than has been customary with many companies in the past, now, therefore, be it

"Resolved, That a committee of five or more be appointed by the president to make the above-mentioned matters the subject of special study, with the object of aiding in such solution of these questions as will tend to increase the safety and integrity of American investments and at the same time afford every encouragement to legitimate enterprise.

"Said committee shall report from time to time to the governing committee."

### Canadian-American Power Hearing Concluded

The hearing on the application made by the Canadian-American Power Corporation to the Public Service Commission of the Second District of New York to capitalize its contract with the Niagara Falls Development Company at \$3,000,000 and import 46,000 hp from Niagara Falls, Ont., was closed on Dec. 1. Martin S. Decker, chairman of the commission, made this explanation:

"The matter is closed on the records of the commission. The Buffalo & Lake Erie Traction Company no longer figures in the application now before the commission, and for that reason the commission cannot see why this matter should not be closed and eliminated from its records."

This means that if the majority bondholders of the Buffalo & Lake Erie Traction Company desire to reorganize the company and then acquire the capital stock of the Buffalo, Lockport & Rochester Railway another application will have to be filed with the commission.

Decision was reserved by the commission on the application of the Canadian-American Power Corporation.

The plan of reorganization of the Buffalo & Lake Erie Traction Company as modified some time ago provided

for the acquisition by that company of the securities of the Canadian-American Power Corporation and the property of the Buffalo, Lockport & Rochester Railway.

### Corporation Expense Returns in Massachusetts

The Massachusetts Public Service Commission has ruled that each company subject to its supervision shall after Oct. 1, 1913, submit, in form the commission prescribes, a sworn quarterly statement showing:

All payments by it, directly or indirectly, to any newspaper, periodical or advertising agency, or any employee thereof, with all other payments for advertising or other publicity, excluding expenses of timetables, telephone directories, circulars and pamphlets of information.

All salaries and expenses of regular legal department, not including payments for damages and payments for legal services, to any person resident or doing business for the company in Massachusetts although not regularly connected with its legal department.

All payments for any services in connection with legislation in Massachusetts, or action of any public officer.

All sums paid directly or indirectly for influencing nominations or elections of any political party or policy.

Sworn statement of all contracts as to advertising, publicity, legal work or work connected with legislation or influencing opinion, with copies of such contracts and of all votes of directors in respect to the same.

All other payments charged by steam railroads to "other expenses" and by street railways to "general expenses," and by other corporations expenses of the same general nature. Such statement is to show the name and address of payees, amounts and dates of payment and nature of services.

Any company having annual gross of or less than \$50,000 may, on application, in discretion of the commission, be excused from this order on substitute terms the commission may designate. Any corporation having annual gross greater than \$50,000 may, for good cause shown, be so excused, the commission reserving right to make such substitute order as special conditions require.

**Bristol & Plainville Tramway, Bristol, Conn.**—Richter & Company, Hartford, Conn., are reported to have secured control of the Bristol & Plainville Tramway through the purchase of the 819 shares of the outstanding capital stock of the company held by the New York, New Haven & Hartford Railroad through one of its subsidiaries. The authorized capital stock of the Bristol & Plainville Tramway is \$1,000,000, of which \$375,000 is outstanding. The company paid dividends of 7 per cent in 1910 and 8 per cent in 1911 and 1912. The book value of the stock of the company held by the New York, New Haven & Hartford Railroad was given recently as \$127,428.

**California Railway & Power Company, San Francisco, Cal.**—A circular is being sent to the holders of the prior preference stock of the California Railway & Power Company advising that the company proposes to redeem 1000 shares, as provided by the certificate of incorporation. The certificates to be redeemed will be decided by lot at the offices of the Bankers' Trust Company, New York, on Jan. 2. Stockholders of record of Dec. 31 will be permitted to participate.

**Eighth Avenue Railroad, New York, N. Y.**—On the application of the Eighth Avenue Railroad the Public Service Commission for the First District of New York has authorized the issuance by that company of \$750,000 in certificates of indebtedness to refund similar certificates in the same amount, issued in 1884 and due Feb. 1, 1914. The new certificates are to be limited to five years instead of twenty years, as requested by the company, and are to be issued only to the holders of the outstanding certificates they are intended to retire.

**Empire United Railways, Inc., Syracuse, N. Y.**—The Public Service Commission of the Second District of New York has authorized the Empire United Railways, Inc., to execute a trust deed to secure an issue of approximately \$20,000,000 par value of 5 per cent bonds. Of the \$20,000,000 permission is given to issue under the new mortgage bonds to the par value of \$9,617,000, the major portion of the proceeds of which will be used to retire obligations of the



Rochester, Syracuse & Eastern Railway, the Syracuse, Lake Shore & Northern Railroad and the Auburn & Northern Electric Railroad. Bonds to the par value of \$5,000,000 are to be reserved to refund, exchange, purchase or otherwise retire \$5,000,000 par value, first mortgage, 5 per cent forty-year bonds of the Rochester, Syracuse & Eastern Railway; \$2,500,000, par value, will be reserved to refund or otherwise retire an equal amount of bonds of the Syracuse, Lake Shore & Northern Railroad, and \$280,000, par value, will be used to retire \$250,000 of the Auburn & Northern Electric Railroad. In addition to these reservations, other proceeds of the new issue will be used for the retirement of other outstanding obligations of the companies constituting the Empire United Railways, including the 6 per cent three-year notes of the Rochester, Syracuse & Eastern Railway. The new \$20,000,000 mortgage will be known as a first and refunding mortgage and is arranged to provide funds in the future for the purpose of carrying on extension and construction work.

**Ephrata & Lebanon Street Railway, Ephrata, Pa.**—H. P. Taylor & Company, Pittsburgh, Pa., have purchased \$200,000 of first mortgage 5 per cent bonds of the Ephrata & Lebanon Street Railway due in 1942 covering at \$10,000 per mile the line connecting the cities of Ephrata and Lebanon and fourteen intermediate towns.

**Erie (Pa.) Southern Railway.**—The Erie Southern Railway, successor to the bankrupt Erie, Cambridge, Union & Corry Traction Company, has filed notice of the authorization of a funded debt of \$2,000,000.

**Federal Light & Traction Company, New York, N. Y.**—A meeting of the stockholders of the Federal Light & Traction Company has been called for Dec. 12, 1913, to vote on the following propositions: (1) The execution of a trust agreement with the Columbia-Knickerbocker Trust Company, New York, N. Y., as trustee, to be dated Dec. 1, 1913, under which may be issued ten-year gold notes of not exceeding the aggregate of \$10,000,000, dated Dec. 1, 1913, to bear such rate of interest not exceeding 7 per cent per annum, and to be redeemable on thirty days at such amount not exceeding 105, as may be fixed by the board from time to time and designated in such notes when issued. (2) To approve the offering to the stockholders for subscription at par and interest of \$725,000 of such notes. (3) To approve the execution of an agreement with a syndicate for the sale to the syndicate at par and accrued interest of all of such \$725,000 as shall not be subscribed and paid for by the stockholders and to pay to said syndicate a compensation for said agreement. (4) To approve the issuance with such \$725,000 of notes to be presently issued and sold of option warrants for common stock of equal par amount entitling the holders to obtain such stock at par at any time prior to Dec. 1, 1923; payment for such stock to be made in cash, or in lieu of such payment, by surrender of notes issued under said trust agreement dated Dec. 1, 1913, that have been outstanding not less than two years and have not been called for previous redemption.

**Fresno, Hanford & Summit Lake Interurban Railway, Fresno, Cal.**—The directors of the Fresno, Hanford & Summit Lake Interurban Railway have decided to issue at this time \$71,000, par value, of 7 per cent preferred stock under the recent order of the Railroad Commission authorizing the company to issue \$225,000 of preferred stock.

**Hillsboro (Ill.) Railway.**—The Sangamon Valley Railroad and the Hillsboro Railway have been absorbed by the Southern Illinois Light & Power Company.

**Jefferson City Bridge & Transit Company, Jefferson City, Mo.**—The McKinley interests through the Western Railways & Light Company have purchased the property of the Jefferson City Bridge & Transit Company, consisting of a bridge across the Missouri River valued at more than \$250,000 and 6 miles of street railway operating in the state capital and vicinity. It is said that the McKinley interests propose to extend the Jefferson City line to Columbia and Mexico, Mo. Plans for these extensions, made by the Jefferson City Bridge & Transit Company before the purchase, were approved by the Public Service Commission. Several franchises along this new proposed line have been obtained. The Jefferson City Bridge & Transit Company has applied to the Public Service Commission of Missouri

for permission to issue \$1,500,000 of bonds to provide funds for extensions and improvements.

**Manchester Traction, Light & Power Company, Manchester, N. H.**—The stockholders of the Manchester Traction, Light & Power Company have voted to purchase the \$600,000 of stock of the Nashua Light, Heat & Power Company.

**Mexico Tramways, Mexico City, Mex.**—The stockholders of the Mexico Tramways have authorized an increase in the capital stock of the company from \$20,000,000 to \$30,000,000 and supplementary letters patent have been issued at Ottawa, Ont. It is proposed to devote \$6,000,000 of the additional stock to the conversion of 6 per cent three-year notes and reserve the remaining \$4,000,000 for future needs.

**New York (N. Y.) Railways.**—Permission was recently granted to the New York Railways to purchase certain traction securities of a face value of \$4,500,000 for a sum not to exceed \$1,805. These securities, nearly all practically worthless, were once in the possession of the Metropolitan Street Railway, and on May 19 were sold at public auction by William L. Turner, the special master in the traction cases. They eventually passed into the ownership of William W. Ladd, receiver for the New York City Railway. To avoid any risk of their ownership giving opportunity to any one to cause trouble to the New York Railways it sought approval of its purchasing them.

**Norwich & Westerly Traction Company, Norwich, Conn.**—A meeting of the stockholders of the Groton & Stonington Street Railroad has been called to pass upon the proposal of the Norwich & Westerly Traction Company to lease the property for ten years and assume the payment of fixed charges and a rental of \$36,000 a year.

**Piedmont & Northern Railway, Charlotte, N. C.**—The stockholders of the Piedmont & Northern Railway will vote on Dec. 20 on the question of increasing the capital stock of the company from \$5,000,000 to \$15,000,000 as part of a plan to merge with the company the Piedmont Traction Company and the Greenville, Spartanburg & Anderson Railway.

**Regina (Sask.) Municipal Railway.**—According to a new statement of income, profit and loss recently issued by the Regina Municipal Railway for the eight months ended Aug. 30, 1913, the gross income of the company amounted to \$115,192 and the expenditures for the period \$102,615, leaving a surplus from operation of \$13,276. Interest on the monthly capital credit balances from Jan. 1 to Aug. 31 to the amount of \$4,936 gave a total income of \$18,213, from which capital charges of \$50,086 were deducted, leaving a deficit of \$31,872.

**Third Avenue Railway, New York, N. Y.**—According to a decision recently handed down by the United States Supreme Court, receivers of insolvent corporations are not required to pay the corporation tax imposed by the Paine-Aldrich law. This decision was in the case of the Third Avenue Railway and the Metropolitan Street Railway as noted in the *ELECTRIC RAILWAY JOURNAL* of Oct. 25, 1913. The contention of the companies that they were not "doing business" within the meaning of the law was sustained.

**United Gas & Electric Corporation, New York, N. Y.**—It has been decided to increase the number of directors of the United Gas & Electric Corporation from fifteen to twenty-five, and a meeting of the stockholders of the company has been called for Dec. 17. The new directors will be George W. Bacon, New York; John Q. Gannon, New Orleans; W. P. G. Harding, Birmingham; A. H. Wiggin, New York; A. J. Hemphill, New York; F. M. Kirby, Wilkes-Barre; Frank A. Sayles, Pawtucket; R. Lancaster Williams, Baltimore; Frank V. Hayne, New Orleans, and S. Z. Mitchell, New York.

**United Railroads San Francisco, Cal.**—Ladenburg, Thalmann & Company, New York, N. Y., and E. H. Rollins & Sons, Boston, Mass., have contracted with the United Railroads of San Francisco for an extension of the Market Street Cable Company first mortgage 6 per cent bonds for a period of two years, or until Dec. 15, 1915.

**Washington Railway & Electric Company, Washington, D. C.**—The Washington Railway & Electric Company has leased the Washington, Spa Spring & Gretna Railroad, which runs from Fifteenth and H Streets, N. E., Washington, to Berwyn, Md.



**Dividends Declared**

Brooklyn (N. Y.) Rapid Transit Company, quarterly, 1½ per cent.  
 California Railway & Power Company, San Francisco, Cal., quarterly, 1¾ per cent, prior preferred.  
 Massachusetts Electric Companies, Boston, Mass., \$2, preferred.  
 Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, \$3.  
 West Penn Traction & Water Power Company, Philadelphia, Pa., quarterly, 1½ per cent, preferred.

**ELECTRIC RAILWAY MONTHLY EARNINGS**

ATLANTIC SHORE RAILWAY, SANFORD, MAINE						
Period		Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m.,	Oct.,	'13 \$25,420	\$25,002	\$417	\$654	\$8237
1"	"	'12 29,275	23,286	3,988	464	73,524
BATON ROUGE (LA.) ELECTRIC COMPANY						
1m.,	Sept.,	'13 \$14,254	\$9,847	\$4,407	\$2,127	\$2,280
1"	"	'12 11,432	7,237	4,195	1,733	2,462
12"	"	'13 156,427	96,083	60,343	23,647	36,696
12"	"	'12 140,942	84,727	56,215	20,763	35,452
BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.						
1m.,	Sept.,	'13 \$12,091	\$8,340	\$3,751	\$1,069	\$2,682
1"	"	'12 11,711	7,648	4,063	1,025	3,038
12"	"	'13 125,222	96,400	28,822	13,049	15,773
12"	"	'12 120,007	89,783	30,224	12,508	17,716
CAPE BRETON ELECTRIC COMPANY, SYDNEY, N.S.						
1m.,	Sept.,	'13 \$32,516	\$16,956	\$15,560	\$6,082	\$9,478
1"	"	'12 34,364	15,777	18,587	5,703	12,884
12"	"	'13 373,223	203,762	169,461	71,449	98,012
12"	"	'12 354,152	193,379	160,773	68,080	92,693
COLUMBUS (GA.) ELECTRIC COMPANY						
1m.,	Sept.,	'13 \$50,685	\$22,186	\$28,499	\$24,601	\$3,898
1"	"	'12 51,584	22,539	29,045	18,952	10,093
12"	"	'13 638,691	293,129	345,562	255,029	90,533
12"	"	'12 601,043	268,762	332,281	224,430	107,851
DALLAS (TEX.) ELECTRIC CORPORATION						
1m.,	Sept.,	'13 \$180,067	\$102,892	\$77,174	\$25,393	\$51,781
1"	"	'12 147,473	86,553	60,921	24,666	36,255
12"	"	'13 2,105,076	1,218,562	886,515	297,016	589,499
12"	"	'12 1,762,242	1,101,550	660,691	275,430	385,261
EL PASO (TEX.) ELECTRIC COMPANY						
1m.,	Sept.,	'13 \$73,747	\$39,096	\$34,652	\$4,233	\$30,418
1"	"	'12 70,434	36,521	33,914	3,907	30,006
12"	"	'13 880,335	470,067	410,268	48,989	361,279
12"	"	'12 764,240	419,078	345,162	77,020	268,142
FEDERAL LIGHT & TRACTION COMPANY, NEW YORK, N. Y.						
1m.,	Oct.,	'13 \$194,206	\$120,441	\$73,765	.....	.....
1"	"	'12 184,087	104,124	79,963	.....	.....
10"	"	'13 1,909,848	1,126,545	783,303	.....	.....
10"	"	'12 1,745,741	1,015,099	730,642	.....	.....
GALVESTON-HOUSTON ELECTRIC COMPANY, HOUSTON, TEX.						
1m.,	Sept.,	'13 \$200,183	\$110,589	\$89,594	\$34,965	\$54,629
1"	"	'12 184,899	101,802	83,098	33,722	49,376
12"	"	'13 2,304,396	1,317,426	986,970	413,775	573,195
12"	"	'12 1,889,494	1,118,956	770,538	362,346	408,192
HOUGHTON COUNTY (MICH.) TRACTION COMPANY						
1m.,	Sept.,	'13 \$22,596	\$13,863	\$8,733	\$5,626	\$3,107
1"	"	'12 28,411	13,719	14,692	5,677	9,015
12"	"	'13 303,387	179,788	123,699	67,829	55,870
12"	"	'12 303,187	175,254	127,932	65,820	62,112
JACKSONVILLE (FLA.) TRACTION COMPANY						
1m.,	Sept.,	'13 \$55,357	\$34,496	\$20,861	\$12,976	\$7,885
1"	"	'12 49,956	32,609	17,346	10,084	7,261
12"	"	'13 612,697	405,337	207,360	136,093	71,267
12"	"	'12 593,838	378,977	214,862	115,036	99,826
NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEXAS						
1m.,	Sept.,	'13 \$172,014	\$96,021	\$75,994	\$24,166	\$51,828
1"	"	'12 160,275	80,829	79,446	25,024	54,422
12"	"	'13 2,089,776	1,131,746	958,030	288,911	669,119
12"	"	'12 1,693,982	909,485	784,497	254,793	529,704
PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.						
1m.,	Sept.,	'13 \$24,844	\$15,890	\$8,954	\$7,583	\$1,371
1"	"	'12 23,499	14,859	8,640	7,201	1,439
12"	"	'13 292,020	194,090	97,929	89,115	8,814
12"	"	'12 280,531	185,692	94,839	65,819	9,020
PENSACOLA (FLA.) ELECTRIC COMPANY						
1m.,	Sept.,	'13 \$23,307	\$14,392	\$8,915	\$7,175	\$1,740
1"	"	'12 23,815	14,731	9,084	6,377	2,706
12"	"	'13 284,528	181,649	102,879	78,617	24,263
12"	"	'12 286,598	177,718	108,880	73,821	35,057
PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.						
1m.,	Sept.,	'13 \$717,282	\$405,054	\$312,228	\$174,374	\$137,854
1"	"	'12 684,221	385,560	298,661	168,046	130,615
12"	"	'13 8,477,120	4,929,977	3,547,142	2,051,344	1,495,798

\*Includes taxes.  
 †Deficit.

**Traffic and Transportation**

**Safety Committee Meetings in Seattle**

The prominent position taken by the Puget Sound Traction, Light & Power Company in the matter of safety committees and the paper on the working of the safety committee of this company read before the Atlantic City convention by George Carson, claim agent, make the practice in Seattle of special interest. The following is briefly an account of the meeting held on Nov. 12: Those present were the members of the central and division safety committees and also all of the members of the claim department, making a total of eighty-nine men. Mr. Carson presided and first spoke of the appreciation of the management of the good work done by the trainmen during the past year. This appreciation was evidenced by a recent raise in wages. The speaker then explained the history of the organization of the safety committees on the road and presented the following statistics of accidents during September and October:

	September	October
Collisions between cars.....	5	4
Collisions with automobiles.....	73	70
Collisions with wagons.....	43	55
Collisions with pedestrians.....	17	28
Derailments.....	2	0
Defective car or apparatus.....	10	9
Boarding or leaving moving cars with gates.....	11	16
Boarding or leaving stationary cars with gates....	45	47
Boarding or leaving moving cars without gates....	33	25
Boarding or leaving stationary cars without gates..	4	5
Accidents on cars from motion of cars.....	33	26
Accidents not caused by motion of cars.....	17	2
Ejectments, disputes, disturbances.....	43	31
Miscellaneous.....	24	31

He then called attention to the increase numerically in accidents to automobiles and said that this condition was prevalent throughout the country on account of the growing number of these machines. He also presented comparative tables showing the number of safety reports turned in from the different carhouses and the number of defects remedied thereby.

A general discussion followed in which Mr. Richardson, assistant superintendent of railways, pointed out that the increase in wages to the men represented the proportion to the men of the saving that the claim department had been able to make during the past year. Several suggestions in regard to reducing accidents were made by the men, calling attention to reckless driving of automobiles in certain parts of the city. It was voted that the general safety committee should take this matter up with the local automobile association as well as with the police department.

**New Transfer System Proposed for Brooklyn**

At a hearing before the Public Service Commission for the First District of New York on Dec. 1, 1913, A. M. Williams, counsel for the Brooklyn Rapid Transit Company, and William Siebert, superintendent of surface lines, made a proposal to the commission that the company be allowed to issue transfers at each and every intersecting point on its lines. This plan came as a counter-proposal to the recommendation offered by experts of the commission that the company be ordered through two of the operating lines, the Nassau Electric Railroad and the Brooklyn Heights Railroad, to exchange transfers at several local points in the borough of Brooklyn.

Mr. Williams stated that the company was not concerned with the statutory right of the commission to order new transfer points but desired to take up the question only from the view of substantial justice to the public and no harm to the company. On this basis the proposed addition of several transfer points was inadvisable, for the present system, installed in 1910, has proved somewhat inelastic, owing to the steady increase in transfer points. To the 520 original points eighty-eight have been added during the past two years, and each one has necessitated a readjustment of the entire transfer system.

Mr. Siebert testified that he had made a check of earnings and transfers under the present system, and that the number of passengers carried had increased from 41,388,708 in August, 1912, to 42,670,222 in August, 1913, or 3.3 per cent.



and from 37,734,398 in September, 1912, to 39,307,956 in September, 1913, or 4.2 per cent. On the other hand, the number of transfers had increased from 13,173,417 in August, 1912, to 14,055,921 in August, 1913, or 6.7 per cent, and from 12,461,221 in September, 1912, to 13,278,024 in September, 1913, or 6.6 per cent. Furthermore, the cost per passenger had increased 1.2 per cent and 3 per cent in August, 1913, and September, 1913, over the corresponding months of the previous year, while the earnings per passenger decreased 1 per cent and 1.1 per cent during the same months. The number of surface trips increased 2.6 per cent and 2.9 per cent and the surface mileage 2.3 per cent and 2.8 per cent during August, 1913, and September, 1913, as compared with the results obtained for these months the year before.

Mr. Siebert suggested that the increasing cost of the present system would best be obviated by abolishing it altogether and by establishing free transfers on a cash basis at all intersecting lines of the Brooklyn Rapid Transit Company. An analysis of the present system shows that from 50 per cent to 51 per cent of the passengers request a first transfer on a cash fare, and 3 per cent a second transfer. Mr. Siebert said that by the establishment of any necessary feeder lines and the use of a continuation ticket, and if necessary the re-routing of some lines, this figure of 3 per cent for second transfers would be greatly reduced if not eliminated entirely. The new system would enable a passenger to travel from any part of the city to any other on the payment of one cash fare and a transfer, would give a shorter and more direct routing in many cases, and would establish a permanent system that would not have to be altered at all upon the construction of a new line. One hundred and fifty points at which transfers are not now given would be included in the new plan. Provision would have to be made, of course, against the possibility of a passenger "doubling back."

One of the experts of the commission stated that such a plan could, he believed, be worked out with very few exceptions, and Commissioner Williams assigned two inspectors to examine the entire plan to ascertain whether any hardships would result from the proposed transfer idea. It is expected that the entire reorganization plan of the transfer system will be ready for the postponed hearing in four weeks.

**What the Interurban Road Does**

The Eastern Texas Traction Company, Dallas, Tex., has published a map, 4½ in. wide by 3¼ in. high, showing the route of its line between Dallas and Bonham. On the back of the map, which is printed on a drab card, appears the following in regard to the value of interurban roads written by Ralph Wade, industrial agent of the company:

"Interurban lines, like good roads and paved streets, make habitation along them most desirable; they enhance the value of farm lands, facilitate transportation and add untold wealth to the producers and consumers of the country; they economize time, give labor a lift and make millions in money; they save wear and tear and worry and waste; they beautify the country and bring it in touch with the city; they aid the social and religious and educational and industrial progress of the people; they make better homes and happier firesides; they are the avenues of trade and the agencies of speedy communication; they give a stimulus to the growing tide of trade and develop commercial advancement and prosperity; they mean the economical transportation of marketable products—the maximum burden at the minimum cost; they convert plantations into farm gardens and make the waste places to 'blossom as the rose'; they are ligaments that bind the country together in thrift and industry and intelligence and patriotism; they open fields of opportunities to thrift and energy and quicken the activity and enterprise of the people; they promote social intercourse, prevent intellectual stagnation and increase the happiness and prosperity of our producing masses; they contribute to the greatness of the city and the glory of the country; give employment to our idle workmen, distribute the necessities of life—the products of the fields and the forests and the factories—encourage energy and husbandry, inculcate a love for our native land, and make mankind better and happier."

**Express Cars and Skip-Stops Discontinued in Denver**

J. A. Beeler, vice-president and general manager of the Denver (Col.) City Tramway, has issued the following statement in regard to the plan of the company to discontinue the operation of express cars and skip-stops: "The City Council has repealed the express and skip-stop ordinances and re-enacted an ordinance permitting express service with certain restrictions.

"Our experience has demonstrated, so far as Colfax Avenue is concerned, that these restrictions preclude the possibility of maintaining the express service between local cars making stops at every block.

"This repeal does not become effective until thirty days after its passage. However, as it is apparently the unanimous desire of the Council, and also a considerable minority of our Colfax patrons, the company will immediately comply by discontinuing the express and skip-stop service on Colfax Avenue, including the Aurora and Fairmount lines.

"We regret that action was taken before completion of the postcard canvass of the families within the district served by these lines, for the reason that the returns from this canvass to date indicate that two out of every three favor the express and skip-stop methods, as the following tabulation of preference of patrons indicates:

For .....	3644
Against .....	2088
Not heard from to date .....	3924
Total .....	9656

"The canvass developed an almost universal sentiment in favor of trailers. On account of the short distance between blocks—there being sixteen blocks to the mile on East Colfax Avenue—the mechanical difficulties incidental to trailer operation are serious. However, it is our desire to please, and we will make every effort possible to continue the trailer operations during periods of heavy traffic."

**"Shop Early" Campaign in Kansas City.**—The Metropolitan Street Railway, Kansas City, Mo., is co-operating with the Kansas City Consumers' League with the end in view of having residents of that city do their Christmas shopping early. "The company requests its patrons to join the nation-wide movement to make Christmas a happy one by shopping early in the season," reads a placard placed in each of the Metropolitan's cars.

**Increase in Wages in Omaha.**—Under the increase in the wages of the motormen and conductors of the Omaha & Council Bluffs Street Railway, Omaha, Neb., referred to previously in the ELECTRIC RAILWAY JOURNAL, the men will get 24 cents an hour each year for the first four years, making the wages 28 cents at five years; from the fifth to the ninth year there is no further advance, but at the ninth year the men will get the maximum pay of 29 cents an hour.

**Effective Shelters for Patrons.**—The methods employed by the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., in caring for residents along its route have been commented on favorably. Without spending a great amount of money, the company has attained efficient protection for its patrons. One type of station is particularly effective. It is built in the shape of a cross, storm partitions forming the angles. Seats are built against the storm walls on each side. The chief advantage of this method is that persons are able to avoid the wind, regardless of the quarter from which it is coming.

**Prizes for Coaster-Meter Records in Richmond.**—The board of directors of the Virginia Railway & Power Company, Richmond, Va., during the past year ordered the cars of the company to be equipped with coaster-meters and offered a series of monthly prizes to motormen showing the best results. The board of directors have also authorized the operating officers to furnish free uniforms twice each year to all crews which do not have accidents costing the company in excess of \$10 for the previous six months. This policy has resulted in increased care in operation and in encouragement to older and more careful men.

**Change of Title from Claim Agent to Safety Agent.**—The title of James Harmon, claim agent of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, New Albany, Ind.,



has been changed to safety agent. The change was made at the request of Mr. Harmon. In explaining the reason for the adoption of the new designation, Mr. Harmon said that in dealing with the public it was his desire, as well as that of the companies, to show that the main effort is to make it safe to ride on the electric railways and not to suggest the necessity for handling claims growing out of accidents.

**Accident in New York.**—Two north-bound trains on the Third Avenue elevated line of the Interborough Rapid Transit Company, New York, N. Y., one coming up from South Ferry and the other from City Hall, collided from the rear at the Chatham Square station on Nov. 28. Five persons were injured. On the same day four persons were slightly injured by a collision between two surface cars on the Manhattan end of the Brooklyn Bridge. A Flatbush Avenue car, one of the new type of side-door steel cars, rammed the rear of a wooden car of the Myrtle Avenue line, demolishing the rear vestibule, smashing the end of the car and most of the windows.

**Lower Fares Accepted by Georgia Company.**—The Georgia Railway & Power Company has formally notified the State Railroad Commission that it has accepted the schedule of passenger fares on the new Stone Mountain line fixed by the commission. The acceptance was accompanied by a protest, for the company declared the fare too low. The commission notified the railway that the rates are experimental and that if the railway shows after a fair trial that the rate is too low the matter may be reopened. The rate from Atlanta to Stone Mountain as fixed by the commission is 25 cents, to Decatur 5 cents, and each zone between 5 cents.

**Quarterly Safety Meetings at New Albany.**—The regular quarterly meeting of employees of the Louisville & Northern Railway & Lighting Company and the Louisville & Southern Indiana Traction Company, New Albany, Ind., for the purpose of discussing safety measures, was held in New Albany on Dec. 1. Two addresses were made at the meeting, one by James Harmon, safety agent, and the other by Walter Foreman, trainmaster for the companies. After the addresses, which dealt with practical measures for eliminating accident hazards, the trainmen present took up the discussion, making suggestions and illustrating the points made in the talks by experiences of their own.

**New Tariff Issued by Central Electric Traffic Association.**—The Central Electric Traffic Association, through its secretary, has issued a joint and local passenger tariff giving joint and local rates, rules and regulations governing the transportation of a corpse. The requirements set forth in this new tariff govern transportation between all stations on the lines of the member companies located in Illinois, Indiana, Kentucky, Michigan and Ohio. In addition to supplying the joint and local rates, rules and regulations of the companies, the tariff also includes the rules of the state boards of health governing the transportation of the dead in baggage cars or baggage compartments in passenger coaches.

**Safety Measures Discussed by Union Traction Company Employees.**—The semi-annual banquet of the safety committee of the Union Traction Company of Indiana was held at Anderson recently. Methods of preventing accidents were the chief topic of discussion. In opening the addresses H. A. Nicholl, general manager and chairman of the general safety board, reviewed the work of the organization and the accidents of the past year. He pointed out certain places where means might be employed to prevent injury to passengers, and commended the excellent record for the six months just ended. Dr. J. B. Fattic, the company's physician, related incidents of his tour through Europe, Egypt and the Holy Land and told of methods of transportation which he observed in the foreign countries.

**Increase in Wages in Seattle.**—About 800 motormen and conductors in the employ of the Puget Sound Traction, Light & Power Company were affected by the increase in wages recently announced by Manager A. L. Kempster, to take effect on Dec. 1. The wage increase, which totals about \$30,000 annually, was made "as a recognition of the loyal co-operation of the trainmen of the company as evi-

denced by the material reduction in accidents and the expense connected therewith during the past two years." The announcement also expressed to the trainmen the company's "sincere appreciation of their loyalty and attention to duty, and compliments them on the reputation they have won among the citizens of the community for their unflinching courtesy and accommodating disposition in handling the patronage of our system."

**Third Avenue Railway Insurance Plan Soon to Begin.**—The Third Avenue Railway, New York, N. Y., is to put into operation on Jan. 1, 1914, the group insurance plan for its men as outlined in the *ELECTRIC RAILWAY JOURNAL* of Aug. 23, 1913. About 2000 of the company's men have taken out \$1,000 life and accident policies under the plan. The men pay \$7 of the \$11 yearly premium, the company paying \$4. This company assistance is extended only to the members of the Third Avenue Railway Employees' Association. The company will continue to pay the premiums on policies of employees who become incapacitated. The contract with the Travelers' Insurance Company, Hartford, Conn., is for five years, and the company advances about \$25,000, for which it is reimbursed by the payments from the men.

**Monthly Tickets to Be Recommended for Massachusetts Road.**—A conference was held at the office of the Public Service Commission of Massachusetts in Boston recently on the petition of the daily travelers on the Dartmouth and Westport division of the Union Street Railway, New Bedford, Mass., asking for the issuance of commutation tickets at a reduced fare between Fall River and New Bedford. The petitioners contended that they were entitled to monthly tickets, good for sixty rides. The company had refused to grant these, "because inconsistent with the whole system of street railway fares." After the arguments of both sides had been fully presented, Chairman MacLeod for the commissioners stated that the board would recommend that the company issue to daily travelers a book of tickets for fifty rides, or twenty-five round trips, to be sold for \$8, making the cost of a round trip 32 cents.

**United Railroads to Insure Employees.**—Following a conference between representatives of the retail trade committee of the Chamber of Commerce of San Francisco and Jesse W. Lilienthal, president of the United Railroads, San Francisco, Cal., it was announced that the plan to establish co-operative stores for the benefit of the employees of the company would not be considered further. By Jan. 1, however, Mr. Lilienthal hopes to inaugurate his proposed scheme of insuring every employee of the company. In case of the death of an employee from any cause the families of men who have been in the company's employ for three years will receive \$250, for four years \$500, for five years or over \$1,000. Ultimately Mr. Lilienthal hopes to be able to insure all of the men for \$1,000 each. This insurance is to be provided without cost to the men. If the employee leaves the company, the insurance will stop automatically.

**Restaurants in Carhouses at Richmond and Norfolk, Va.**—It has been found that one of the serious difficulties under which employees of the Virginia Railway & Power Company, Richmond, Va., and especially those engaged in operating the cars, have labored in the past has been their inability to obtain their meals at proper times and at reasonable prices. To meet this condition, the company has arranged during the past year for the establishment and operation of suitable restaurants at its carhouses at Norfolk and Richmond. Under this arrangement the company provides free of charge the building, light and heat, and contracts with experienced caterers to furnish good, wholesome food, subject to inspection by the company, at a scale of prices which represents the minimum cost to the employee. While these restaurants have been in operation only a short while, they have produced most satisfactory results.

**Twenty Conductors Arrested for Stealing at Joliet, Ill.**—After an investigation extending over more than a year, J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway, caused the arrest recently of twenty conductors charging them with conspiracy, grand larceny and embezzlement of fares aggregating several thousand dollars. Practically all of the conductors who were arrested have confessed their guilt, and it is understood that probably



fifteen more will be arrested on the same charges. H. A. Fishleigh, the railway's detective, received credit for obtaining the necessary incriminating evidence. Practically all the men arrested were employing the same method in stealing from the company. According to a general understanding they would exchange punched transfers and ring them up on the transfer register when cash fares were collected. In one instance one of the conductors collected \$1.30 in this manner on a single round trip requiring one hour.

**Relief Association Established in Richmond.**—A relief association has been established in Richmond, Petersburg and vicinity, the organization being standardized on the entire system of the Virginia Railway & Power Company, Richmond, Va. Under the constitution of this association as now organized all officers and employees of the company are expected to be members, and the company pays the initiation fee of \$1 for all members. The monthly dues of members are 50 cents each, and in case of death there is an assessment of 50 cents on each member, the company contributing the sum of \$250 in the event of death of a member. The benefit on account of accident or illness is limited to \$200 in any one year, and the death benefit to \$500. The beneficial effects of this organization have already become manifest, and the board of directors now has under consideration the question of extending the benefits to a modified or limited pension system for employees who have become incapacitated through old age.

**Washington Railway Relief Association Report.**—The report of the treasurer of the Washington Railway Relief Association, the membership of which is composed of employees of the Washington Railway & Electric Company, Washington, D. C., shows briefly for the year ended Sept. 30, 1913, as follows: Receipts from initiation fees and dues, \$14,754; disbursements, \$10,305; surplus, exclusive of miscellaneous income, \$4,448; miscellaneous income, \$7,815; withdrawals of members, \$5,006; surplus for year, \$7,257. The receipts of the association from initiation fees and dues for the thirteen years ended Sept. 30, 1913, were \$150,637; the disbursements for the same period were \$120,692, and the surplus, exclusive of miscellaneous income, was \$29,944. The miscellaneous income for the thirteen years was \$83,669; the withdrawals of members amounted to \$31,278, leaving the surplus as of Sept. 30, 1913, \$52,391. The report is concluded with a statement of the amount standing to the credit of members joining in each year from the beginning of the association. This money is payable to members when they leave the service of the company or to the widow, children or other beneficiary of the member upon the death of the latter.

**Application for Permission to Increase Fares.**—The United Railways, Portland, Ore., has filed an application with the State Railroad Commission for an increase in rates on its line from Portland to Wilkesboro. When the company obtained a franchise to lay its tracks on the Linnton Road from the Multnomah County Court in 1908, it was stipulated that the fare between Portland and Linnton should be not more than 5 cents. After the line was built the company attempted to charge 15 cents from the Portland station at Second and Stark Streets to Linnton. The Circuit Court held that it could not charge a fare of more than 10 cents from the station to Linnton. The company avers that the fare is unremunerative and that when the franchise was granted by the County Court no one had a knowledge of what rates would be reasonable. It says in the application that "the order of the court was made improvidently without proper regard to the public interests or a fair return for the service." The following schedule of rates is asked: Between station in Portland and shops, 5 cents; 10 cents from station to Stockdale and Willbridge, including stations between; 15 cents from Portland station to Webster and Linnton; 30 cents to Burlington instead of 25 cents as at present charged; 60 cents to North Plains and 70 cents to Wilkesboro.

**Proposed Increase in Suburban Fare at Ottawa.**—The Ottawa (Ont.) Electric Railway gave formal notice some time ago that on and after Dec. 1 an extra fare would be charged to all passengers riding from Holland Avenue, the western limits of the city, to Britannia and intermediate

points. As a result of an application filed with the Dominion Railway Board on behalf of the city by Mayor Ellis, asking the commission to investigate the tariffs of the company and its alleged unwillingness to make any further extensions in the city before the expiration of the franchise in 1923, an order has been issued restraining the company from putting the proposed increase in rates in effect before Jan. 1. In the meantime arguments for and against the application will be heard by the Railway Commission on a date to be fixed. The directors of the company contend that since the one fare from any part of Britannia to Ottawa, a distance of about 6 miles, has been in effect the receipts have not been sufficient to pay the fixed charges of \$50,000 on the \$750,000 invested in the line. When the line was opened in 1900 an extra fare was charged from the city limits. Five years ago the extra fare was abolished and a fare or transfer from any part of the city was honored on the line. The district through which the line runs has become fairly well settled during the last five years, but the increase in traffic which resulted has not been sufficient to meet even the fixed charges of the company.

**Jurisdiction of California Railroad Commission.**—In a recent decision rendered by the Railroad Commission of California the monthly commutation fare charged by the San Francisco-Oakland Terminal Railways between Oakland and Ashland was reduced from \$4.50 to \$3.75. The commission held that it was unreasonable to establish a blanket rate of \$3 for Ashland and San Leandro, 2.2 miles nearer Oakland, or of \$4.50 for Ashland and Hayward, 2.4 miles farther away from Oakland. A rate adjusted between these amounts was therefore adopted. One of the important questions in connection with this case was the right of the commission to decide it. The company claimed that it operated a street railroad upon the public streets of Oakland and San Leandro under local franchises and that neither Oakland nor San Leandro had surrendered to the commission its powers over public utilities. The commission granted that the incorporated cities and towns of the State had the power to establish the rate of fare to be charged by street railways for transportation over routes lying entirely within the city or town limits, but stated that no city or town had the power to establish the fare to be charged by a street railway between a point within the city limits and a point outside of the city limits. Since the towns and cities could not decide this point, the commission held that it came within the jurisdiction of the State Railroad Commission, for by the public utilities act of March 23, 1912, power was given to the commission to regulate the rates of any public utility, street railways included.

**Conditions Affecting Traffic on Interurban Lines.**—An interesting statement regarding conditions affecting traffic on interurban lines was made recently by R. H. Wyatt, general freight and passenger agent of the Louisville & Interurban Railroad, Louisville, Ky. He said: "We find that our passenger business has not been up to expectations. I am inclined to attribute this to the growing use of the automobile. We have had motor cars with us for a number of years, but their use by people living in the country seems to be increasing and it is affecting the volume of passenger business adversely. On the other hand, a large number of motor trucks are now being used for hauling goods into country districts around Louisville, but apparently this has had little if any effect on our business, which has shown increase right along. We have been watching the development of the parcel post with interest, as it appeared to be possible that providing for this service, especially with the weight limit increased to 20 lb., might interfere with our freight traffic. However, I am glad to say that this has not been the case thus far, and that in our territory, at least, a new class of business has been developed by the parcel post." Mr. Wyatt commented upon the fact that the severe drought of the past summer all over Kentucky, including the district served by the interurban lines of his company, has made it necessary for farmers and live-stock owners to buy feed much earlier than usual. For this reason an unusually heavy traffic on feedstuff has been noticeable this fall, making business better than it might reasonably have been expected to be.



## Personal Mention

**Mr. John B. Rawlings** has succeeded Mr. W. B. Congdon as claim agent of the Warren-Bisbee Railway, Warren, Ariz.

**Mr. C. C. Custer** has been appointed electrical engineer of the Hot Springs (Ark.) Street Railway to succeed Mr. A. E. Main.

**Mr. R. J. Le Clert** has succeeded Mr. W. F. Fuller as superintendent of the Modesto & Empire Traction Company, Modesto, Cal.

**Mr. J. L. Mason** has succeeded Mr. A. C. Colby as master mechanic of the Birmingham, Ensley & Bessemer Railroad, Birmingham, Ala.

**Mr. W. F. Bull** has been appointed assistant secretary of the Southern Pacific Company, New York, N. Y., to succeed Mr. Joseph Hellon.

**Mr. A. Greet** has been appointed auditor of the Gadsden, Bellevue & Lookout Mountain Railway, Gadsden, Ala., to succeed Mr. R. J. Hughes.

**Mr. A. E. Carlton** has been elected vice-president of the Grand Junction & Grand River Valley Railway, Grand Junction, Col., to succeed Mr. C. M. McNeill.

**Mr. Timothy W. Riley** has been appointed chief inspector of the Springfield (Mass.) Street Railway. Mr. Riley's service with the company covers a period of about twenty-five years.

**Mr. C. N. Ryan**, who has been auditor of the Wilmington & Philadelphia Traction Company, Wilmington, Del., has been elected secretary and treasurer of the company to succeed Mr. W. T. Spring, resigned.

**Mr. C. E. Yost** has been appointed auditor of the Wilmington & Philadelphia Traction Company, Wilmington, Del., to succeed Mr. C. N. Ryan, who has been elected secretary and treasurer of the company.

**Mr. James McPherson** has been made superintendent, Mr. B. W. Perrin engineer in charge and Mr. W. H. Norton assistant superintendent of the electric lines of the Southern Pacific Company, the change being made by the company in order to maintain its steam and electric lines as separate properties.

**Mr. E. L. Putnam** has been appointed superintendent of the Springfield division of the Springfield (Mass.) Street Railway. Mr. Putnam has been employed by the Springfield Street Railway for about fifteen years. He began his connection with the company as a motorman. He had been starter for about four years.

**Mr. H. M. Flanders**, who has been roadmaster of the lines of the Springfield (Mass.) Street Railway, has been appointed engineer of maintenance of way of the Springfield Street Railway, the Worcester Consolidated Street Railway, the Milford, Attleboro & Woonsocket Railway and the Attleboro Branch Railroad. Mr. Flanders, who has served the Springfield Street Railway for five years, is a civil engineer by profession. He was educated at the Massachusetts Institute of Technology. Before he became an official of the Springfield Street Railway Mr. Flanders was engaged in similar work with street railways in Texas. He is a son of Mr. Dana Flanders, who for many years was general passenger agent of the Boston & Maine Railroad.

**Mr. E. C. Hurd** concluded his duties as chief engineer in charge of valuation for the Nebraska State Railway Commission on Dec. 1, but will continue with the commission in a consulting relation. Mr. Hurd was appointed chief engineer in charge of valuation of the commission on June 1, 1909, at which time the lawmakers of the State had delegated to the commission the important duty of making a state-wide physical appraisal of all railroads, express company's properties, telegraph and telephone lines. This work of appraisal Mr. Hurd has directed continuously up to the present. The entire initial appraisal of all these utilities has thus been accomplished, including the revaluation of the steam railroads. In view of the advanced condition of the work Mr. Hurd requested to be relieved of his regular employment. Engineering of a general type, though more particularly for railroads and public improvements, has engaged Mr. Hurd's attention for more than twenty years.

Mr. Hurd will enter private practice and will establish offices at Lincoln, Neb., and at Chicago, Ill.

**Mr. Charles C. Dietz** has resigned as assistant to the general manager of the United Traction Company, Albany, N. Y., to become assistant in the executive offices of the McGraw Publishing Company, Inc., publisher of the *ELECTRIC RAILWAY JOURNAL*. Mr. Dietz's first business experience was with the Rochester (N. Y.) Railway. He resigned as ticket and freight auditor of the Rochester Railway in 1906 to become secretary to Mr. T. J. Nicholl, general manager of the Hudson Valley Railway. In 1907 the property of the Hudson Valley Railway was purchased by the United Traction Company and Mr. Dietz was made secretary to Mr. Edgar S. Fassett, general manager of the latter company. On the resignation of Mr. Fassett from the United Traction Company in August, 1912, Mr. Dietz was appointed secretary to Mr. James F. Hamilton, Mr. Fassett's successor. Mr. Dietz was later promoted to the position of assistant to the general manager. He was elected secretary of the New York Electric Railway Association in 1912 and was elected secretary and treasurer of the association in 1913.

**Mr. Albert H. Stanley**, formerly general manager of the Public Service Railway, Newark, N. J., and now managing director of the London Underground Railway and other traction and omnibus interests in London, is visiting the United States in company with the following officers of the Midland Railway: Sir Guy Granet, general manager; Mr. F. Tatlow, assistant general manager, and Messrs. J. Sayers and J. Dalziel, electrical engineers. The party has planned to make an extensive tour of the United States for the purpose of studying all important steam railroad electrification and other operating practices preliminary to the proposed electrification of the Midland Railway in London and vicinity. This is the first time that these officers of the Midland Railway have visited America. All of the gentlemen named are making their headquarters at the Ritz-Carlton Hotel, New York. The length of their stay in the United States is indefinite, but they expect to be here until the new year at least. The plans of the Midland Railway are referred to at length elsewhere in this issue. Particulars of other British electrifications under way or in prospect were published in the *ELECTRIC RAILWAY JOURNAL* for May 3, 1913.

**Mr. Chester F. Gailor**, now way engineer of the Hartford division of the Connecticut Company, will enter the service of the United Railways & Electric Company, Baltimore, Md., on Dec. 15, 1913, as assistant chief engineer. Mr. Gailor was born in 1880 at Saratoga, N. Y., where he completed the high school course. He then attended the Lansingburg Engineering Academy, Lansingburg, N. Y., and upon graduation in June, 1897, became a rodman for the Hudson Valley Railway. At the end of two years he was advanced to engineer in charge of construction. In 1902 he left the company to become chief engineer of the Rutland Railway, Light & Power Company, Rutland,



C. F. Gailor

Vt., where he supervised the rebuilding of the horse car system and the construction of 31 miles of extensions. He also had charge of the erection of a large hydroelectric plant, including two reservoirs and 25 miles of transmission lines. In 1904 he had charge of an exploration party for the Grand Trunk Pacific Railway in Manitoba to Lake Nipigon. During the following year he did railway and transmission work for the Raleigh & Durham Passenger & Power Company, Raleigh, N. C., and the Augusta & Aiken Railway & Electric Company, Augusta, Ga. In 1906 he joined the Goldsmith Thermit Company, New York, N. Y., as assistant engineer. He became connected with the Connecticut Company in 1908.



# Construction News

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

An asterisk (\*) indicates a project not previously reported.

## RECENT INCORPORATIONS

**\*Helena (Ark.) Southwestern Railroad.**—Chartered in Arkansas to build an electric or steam railway southwest from West Helena, a distance of 20 miles. Capital stock, \$100,000. Directors: E. C. Nelson, Helena, and R. L. McClell, Chicago, Ill.

**\*Brooksville (Fla.) Interurban Railway.**—Application for a charter will soon be made by this company to build a 16-mile electric railway from Brooksville to Lake Stafford. Capital stock, \$100,000. Officers: H. D. Evans, Brooksville, president; P. H. Saunders, New Orleans, vice-president; W. A. Fulton, Brooksville, secretary, and Charles Monroe Price, Brooksville, treasurer.

**\*Interurban Transportation Company, St. Louis, Mo.**—Incorporated in Missouri with a capitalization of \$4,000. Incorporators: S. McPheeters, O. J. Miller and F. C. Sharp.

**\*Shefford, Bagot & Missisquoi Railway, Montreal, Que.**—Application for a charter has been made by this company to the Quebec Legislature to build an electric or steam railway through the counties of Missisquoi, Shefford and Bagot from a point on the Quebec and Vermont line in the parish of St. George to a point on the Intercolonial Railway between Bagot and St. Eugène. Capital stock, \$1,000,000.

**\*Nebraska Central Railway, Pierre, S. D.**—Application for a charter has been made by this company to build a 130-mile electric railway from Pierre, S. D., to Ainsworth, Neb., via Tripp and Lyman Counties in South Dakota and Brown and Keyapaha Counties in Nebraska. Power will be obtained from the Ainsworth Light & Power Company, Ainsworth. Incorporators: George W. Adams, Walnut, Ia.; F. W. Sellor, R. H. Osborn, M. V. Finney and Arthur McSweeney, Ainsworth; Charles Henneman, John Scheie and E. G. Kenaston, Springview; F. K. Strother, Omaha; V. B. Hill, Council Bluffs; John A. Holmes, Pierre.

## FRANCHISES

**Mill Valley, Cal.**—W. W. Hicks, Mill Valley, has asked the Council for a fifty-year franchise in Mill Valley. This is part of a plan to build a 10-mile electric railway between Sausalito and Mill Valley. [E. R. J., Nov. 15, '13.]

**Lewiston, Idaho.**—F. L. Sturm has received a franchise from the City Council in Lewiston which gives him the right to use the line of the Lewiston Terminal Company, the right to operate over that portion of the Lewiston-Clarkston bridge within the city limits of Lewiston, and the right to install overhead equipment. According to the terms of the franchise an electric line must be completed and in operation between Lewiston, Idaho, and Clarkston, Wash., within one year. [E. R. J., Aug. 23, '13.]

**Springfield, Mass.**—The Springfield Street Railway has asked the Council for a franchise for a double track and a relocation of its track on the Springfield highway.

**\*Akron, Ohio.**—James Shaw has asked the Council for a franchise for a municipal electric railway in Akron and authority to issue bonds in the sum of \$225,000.

**Fremont, Ohio.**—The Lake Shore Electric Railway has received an eleven-year extension of its franchise in Fremont and in return will rebuild its right-of-way on State Street and improve the street at a cost of \$50,000.

**Niagara Falls, Ont.**—The Niagara, St. Catharines & Toronto Railway, St. Catharines, has asked the Council for a fourteen-year extension of its franchise in Niagara Falls.

**Portland, Ore.**—The Portland & Oregon City Railway has received a franchise from the Council in Portland.

**Portland, Ore.**—George F. Hensner, Portland, has received a twenty-five-year franchise from the Council for a line from the Kenton district to the West Side business district in Portland. [E. R. J., Oct. 11, '13.]

**Hershey, Pa.**—The Hershey Transit Company has received a franchise from the Council for a line between Hershey and Elizabethtown.

**Centralia, Wash.**—The Washington-Oregon Corporation, Vancouver, has asked the Council for a franchise on Tower Avenue to Third Street in Centralia.

**Spokane, Wash.**—The City Council recently passed an ordinance repealing a franchise granted to the Moran Prairie Electric Railroad Construction Company on March 4, 1913, for the right to construct and operate an electric railway in Spokane.

## TRACK AND ROADWAY

**Birmingham Railway, Light & Power Company, Birmingham, Ala.**—Several extensions of its lines are being planned by this company. The Owenton-Ensley line will be extended to Wylam and an extension from Ensley to Fairfield will soon be built.

**British Columbia Electric Railway, Vancouver, B. C.**—The contract for the erection of an interlocking control tower electrically operated at the crossing of this railway and the Esquimalt & Nanaimo Railway on the Esquimalt Road was recently awarded to R. Shields, Vancouver. The city, the Esquimalt & Nanaimo Railway and the British Columbia Electric Railway are sharing the expense of erection.

**Fresno, Cal.**—Right-of-way has been secured and grading will be begun at once on the line to connect Fresno and Clovis. F. S. Granger, Clovis, is the promoter. [E. R. J., Nov. 22, '13.]

**Petaluma & Santa Rosa Railway, Petaluma, Cal.**—Plans are being considered by this company for an extension from Forestville to Healdsburg along the Russian River.

**San Bernardino, Cal.**—The City Commissioners announce that they will shortly call a bond election for the construction of an electric railway in the Northwestern section of San Bernardino. [E. R. J., Oct. 25, '13.]

**\*San Francisco, Cal.**—Plans involving the construction of an elevated railroad from the ferry and railway lines to outlying districts have been filed with the Supervisors by the Twin Peaks Tunnel Company Property Owners' Association. As the proposition includes the joint use by the city of the tracks of the electric line to be constructed by the Southern Pacific Railroad on its steam railroad right-of-way through the Mission and also of the Ocean Shore Railroad Company's tracks, the association suggested that the board create a commission to consider this scheme, the commission to consist of the engineers of the Southern Pacific Ocean Shore Railroad and United Railroads and the City Engineer.

**Geary Street Municipal Railway, San Francisco, Cal.**—The Supervisors have authorized the purchase of cars, rails and other equipment for the extension of this company's lines in San Francisco and for an estimated expenditure of \$10,000 for paving blocks to be laid alongside the rails.

**Tidewater & Southern Railroad, Stockton, Cal.**—Work will soon be begun by this company on an extension to Turlock.

**St. Petersburg, Fla.**—Plans are being made to build a 2-mile electric railway in St. Petersburg. It will be constructed by the holders of certain real estate and later it will probably be operated by the St. Petersburg & Gulf Railway. Thomas E. Lucas, St. Petersburg, is interested. [E. R. J., April 19, '13.]

**Idaho Falls (Idaho) Electric Railway.**—Work on this railway began Nov. 18, when the contract was signed by William Rogers for 42 miles of grading. Contracts have been let for the ties, poles and all bridge timbers, also for the rails. Franchises throughout the city and right-of-way through Bingham County have been secured. Bonds in the sum of \$1,500,000 have been underwritten by a Chicago firm. J. L. Milner, Idaho Falls, president. [E. R. J., Nov. 22, '13.]

**\*Wardner, Idaho.**—Citizens of Wardner plan to build an electric line between Wardner and Kellogg. No names are yet given of those interested.

**Central Illinois Interurban Railway, Bradford, Ill.**—Surveys have been completed by this company for its 40-mile line to connect Kewanee and Henry, via Osceola, Bradford and Whitefield. J. R. Fate, 413 Dechman Street, Peoria, president. [E. R. J., March 16, '13.]



**Centralia (Ill.) Traction Company.**—This company has completed its 2-mile line from Centralia to Warner and has surveys under way between Warner and Irvington, 4 miles. About 1¼ miles of grading is being done by the company from Warner to the new Illinois Central Railroad yards in Washington County.

**Mount Vernon Traction & Power Company, Mount Vernon, Ill.**—This company, the incorporation of which was referred to in the *ELECTRIC RAILWAY JOURNAL* Nov. 29 as the Mount Vernon Traction & Car Company, has changed its name to the Mount Vernon Traction & Power Company. It has placed orders for all the material and will soon begin the construction of its 4-mile line in Mount Vernon. It will obtain power from the Citizens' Light & Gas Company, Mount Vernon. Charles C. Baldwin, Mount Vernon, secretary. [E. R. J., Nov. 29, '13.]

**Illinois Traction System, Peoria, Ill.**—Plans are being considered by this company to build a line between Joseph, Mo., and Atchison and Topeka, Kan.

**Peoria, Canton & Galesburg Railway, Peoria, Ill.**—Surveys have been made and construction will be begun in the spring by this company on its 51-mile line between Peoria, Galesburg, Hanna City, Trivoli, Farmington, Maquon, Gibson and Knoxville. Horace Clark, Peoria, president. [E. R. J., Oct. 11, '13.]

**Evansville & Indianapolis Light, Power & Electric Railway, Evansville, Ind.**—This company, which plans to build a 158-mile railway between Evansville and Indianapolis, via Oakland City, Petersburg, Washington, Bloomfield, Worthington, Spencer and Martinsville, has surveyed the section of its line between Indianapolis and Bloomfield, 60 miles, and surveys are under way between Bloomfield and Evansville, 98 miles. Construction will be begun as soon as the organization of the company is completed. Arthur C. Stone, 113 Upper Fourth Street, Evansville, president. [E. R. J., May 24, '13.]

**Indianapolis, Chicago & Meridian Railway, Indianapolis, Ind.**—Some engineering work has been begun but no construction is yet under way on this line between Indianapolis, East Chicago, Sheridan, Monticello, Valparaiso, Gary and Hammond. E. J. Binford, Greenfield, is interested. [E. R. J., Aug. 31, '13.]

**Indianapolis & Delphi Traction Company, Indianapolis, Ind.**—Right-of-way has been obtained and construction will be begun as soon as financial backing has been secured on this line between Indianapolis, Delphi, Sheridan, Kempton and Russiaville. M. E. Bales, Westfield, president. [E. R. J., Sept. 6, '13.]

**Southwestern Traction Company, Indianapolis, Ind.**—This company states that construction will not be begun until the spring on its 87-mile railway to connect Indianapolis, Mars Hill, Joppa, Mooreville, Monrovia, Prairie City, Cherryvale and Terre Haute. Joseph A. Davidson, Indianapolis, secretary. [E. R. J., July 6, '13.]

**Keokuk & Columbus Junction Transit Company, Keokuk, Ia.**—This company, which plans to build a 90-mile line to connect Keokuk, Columbus Junction, West Point, Donnellson, Winfield, Lowell and New London, states that the organization and preliminary surveys have been completed and that it is uncertain when construction will be begun. T. A. Craig, 28 West Fifth Street, Keokuk, secretary. [E. R. J., June 14, '13.]

**Davenport-Muscatine Railway, Muscatine, Ia.**—This company proposes to lay 70-lb. rails on the Mulberry Avenue extension from Sixth Street to Parham.

**Salina Street & Interurban Railway, Salina, Kan.**—Work will be begun at once by this company on the extension of its Walnut Street line in Salina.

**Arkansas Valley Interurban Railway, Wichita, Kan.**—Plans are being considered by this company to build an extension from Winfield to Wichita. Another extension will soon be built to Hutchinson and later to Salina and Abilene.

**Taylorsville, Louisville & Jeffersontown Railway, Taylorsville, Ky.**—This company, which plans to build a 20-mile line between Louisville, Jeffersontown and Taylorsville, has secured all of the right-of-way with the exception of the section between Middletown and Fisherville. Jeffersontown has already created a franchise for the opera-

tion of an electric railway through the town and will sell it, at a date to be advertised later, to the new company. I. F. Jewell, Taylorsville, president, and Rowland Cox, Louisville, chief engineer. [E. R. J., Jan. 4, '13.]

**Detroit, Almont & Northern Railway, Detroit, Mich.**—Grading has been begun by this company on its 9-mile line between Romeo and Almont. F. W. Brooks, 12 Woodward Avenue, Detroit, president. [E. R. J., Nov. 29, '13.]

**Duluth (Mich.) Street Railway.**—This company is asked to consider plans to extend its line to Itasca.

**St. Paul Southern Electric Railway, St. Paul, Minn.**—Grading is completed on this company's line between Inver Grove and Hastings.

**\*Chillicothe, Mo.**—H. L. Gilbert and David Miller, Kansas City, plan to build an electric railway from Chillicothe to Kansas City, 85 miles, via Hamilton and Kinston. Another plan is being considered to build a 50-mile electric railway from Chillicothe to Cainesville, Mo. Frederick Morch, Chillicothe, is interested.

**Red Lodge (Mont.) Electric Railway.**—Surveys have been completed and a route established for this 10-mile electric railway to connect Red Lodge, Washoe and Bear Creek. C. C. Bowlen is interested. [E. R. J., Nov. 22, '13.]

**Lincoln (Neb.) Traction Company.**—This company has just completed the work of welding 1000 rail joints upon its trackage system at a cost of approximately \$13,000. This work was done by the Littlefield, Frye & McGough Company, Chicago, Ill.

**St. John (N. B.) Street Railway.**—H. M. Hopper, general manager of this company, states that the line will be extended to Crouchville before July 1, 1914, and that the company is willing to extend to Little River as soon as the highway bridges are strengthened. These extensions are on the Courtenay Bay side of the city and in the vicinity of the extensive dry docks, wharves, etc., being built by the government.

**Sapulpa (Okla.) Interurban Railway.**—During the next few weeks this company plans to build a 1-mile extension in Sapulpa.

**Oregon Electric Railway, Portland, Ore.**—It is reported that plans are being considered by this company to extend its line from Eugene to Springfield and well up the McKenzie Valley in the near future.

**Pottstown & Phoenixville Railway, Philadelphia, Pa.**—This company has placed in operation its line between Sanatoga and Spring City.

**\*Valleyfield (Que.) Power Company.**—This company is applying for an extension of charter powers to enable it to build an electric railway from Valleyfield southwesterly through Beauharnois and Huntingdon Counties to the provincial boundary; another line from the same place south-easterly through Beauharnois, Chateaugay and Huntingdon Counties to the provincial boundary, and another line from the same place northwesterly across the St. Lawrence River and the counties of Soulanges and Vaudreuil to the Lake of Two Mountains.

**Abbeville, S. C.**—Plans are being made to apply soon for a charter to build an electric railway from Easley via Abbeville to Anderson, S. C., and thence to Augusta, Ga. Among those interested are James E. Leach and W. C. Smith, Easley; J. H. Anderson and S. J. Farmer, Anderson; S. J. Wakefield and A. M. Erwin, Antreville, and W. N. Graydon and C. C. Gambrell, McCormick. [E. R. J., Oct. 25, '13.]

**Jackson Railway & Light Company, Jackson, Tenn.**—Estimates and preliminary surveys are being made and construction will be begun in the spring by this company on its new West Jackson line.

**Houston (Tex.) Electric Company.**—Plans are being made by this company to build a 4-mile extension from Houston to Sunset Heights and Independence Heights, northwest of Houston. Application for a franchise and right-of-way will soon be made.

**Port Arthur (Tex.) Traction Company.**—This company is extending its line north on Proctor Street to connect with the line on the north city limits of Port Arthur.

**\*Clarkston, Wash.**—Citizens of Clarkston, headed by former Mayor R. M. Yount, M. Huylete, of the Clarkston State Bank, and others, are back of the movement which



has for its object the construction of 4 miles of electric railway between Clarkston and Vineland. A company will be organized and incorporated at once with a capitalization of not less than \$25,000.

**Milwaukee Electric Railway & Light Company, Milwaukee, Wis.**—This company is asked to consider plans to build an extension to connect Racine and Burlington.

#### SHOPS AND BUILDINGS

**British Columbia Electric Railway, Vancouver, B. C.**—This company has commissioned Westinghouse, Church, Kerr & Company, New York, to prepare new plans to build a two-story carhouse in Vancouver. The structure will be 128 ft. x 350 ft. and of reinforced concrete construction.

**Geary Street Municipal Railway, San Francisco, Cal.**—Plans are being made by this company to provide for the furnishing of machine shop equipment for its repair shops in San Francisco.

**Mesaba Electric Railway, Duluth, Minn.**—This company's carhouses and general offices in Virginia were completely destroyed by fire on Nov. 26. The loss will approximate \$125,000.

**Brooklyn Rapid Transit Company, Brooklyn, N. Y.**—Plans are being prepared by this company to build a new passenger station at Flatbush Avenue in Brooklyn.

**Portland, Eugene & Eastern Electric Railway, Portland, Ore.**—Plans are being made by this company to build soon new trainsheds, waiting room and ticket office on a site south of the Union Station in Portland. The buildings will be of fireproof construction.

**Charleston (W. Va.) Interurban Railway.**—This company plans to build a new concrete or brick station in Charleston within the next few months.

#### POWER HOUSES AND SUBSTATIONS

**Connecticut Company, New Haven, Conn.**—This company has placed an order with the Westinghouse Electric & Manufacturing Company for three 500-kva, 66,000-volt high-tension, 2300-volt low-tension, single-phase, 60-cycle, O.I.S.C. transformers and twelve 1000-kva, 66,000-volt high-tension, 2300-volt low-tension, single-phase, 60-cycle, O.I.W.C. transformers.

**Idaho Falls (Idaho) Electric Railway.**—This company plans to build soon a new power house in Idaho Falls. The cost is estimated to be about \$10,000.

**Illinois Traction Company, Peoria, Ill.**—Plans are being made by this company to build soon a new power house in Atchison. The cost is estimated to be about \$200,000.

**New Orleans Railway & Light Company, New Orleans, La.**—This company has placed an order with the Westinghouse Electric & Manufacturing Company for one 150-kw, 125-volt, 900 r.p.m., direct-current generator for use with turbine and reduction gear.

**New York (N. Y.) Railways.**—This company will add to its power house equipment a 242-kw synchronous rotary converter and a 315-kva and six 2000-kva transformers, which will be furnished by the General Electric Company.

**Halifax (N. S.) Electric Tramway Company.**—This company is installing additions to its railway generating plant and has awarded a contract to the Canadian General Electric Company for one 500-kw synchronous motor-generator set; also for the complete reconstruction of its direct-current switchboard.

**Cape Breton Electric Company, Sydney, N. S.**—This company is installing a 400-kw motor-generator set in its Sydney power house. The Canadian General Electric Company is supplying the equipment. A duplicate set is being installed in the reserve junction substation.

**Toledo Railways & Light Company, Toledo, Ohio.**—This company has ordered three 333-kva transformers from the General Electric Company.

**Chickasha (Okla.) Street Railway.**—This company expects to purchase one 100-hp synchronous motor with a capacity of 2300 volts to 2400 volts, 60-cycle, three-phase, 1200 r.p.m.

**Manitowoc & Northern Traction Company, Manitowoc, Wis.**—Plans are being made by this company to build soon a new 120-ft. concrete smokestack.

## Manufactures and Supplies

#### ROLLING STOCK

**Genesee Light & Power Company, Batavia, N. Y.**, is in the market for one near-side car.

**Birmingham Railway & Light Company, Birmingham, Ala.**, is building three cars in its own shops.

**Bay State Street Railway, Boston, Mass.**, has ordered seven express cars from the Laconia Car Company.

**Citizens' Traction Company, Oil City, Pa.**, has recently installed one snow plow, one line car, one sand car and one work car.

**Washington, Baltimore & Annapolis Electric Railroad, Annapolis, Md.**, is in the market for five all-steel double-truck interurban cars.

**Geary Street Municipal Railway, San Francisco, Cal.**, proposes to let contracts about Jan. 1, 1914, for cars to cost about \$700,000.

**Hattiesburg (Miss.) Traction Company** has purchased three car bodies from the Meridian Light & Railway Company, mounted on 21-E Brill trucks and with GE-81 two-motor equipments.

**Chicago (Ill.) Elevated Railways**, in view of increased traffic, has been authorized by its directors to purchase 120 cars instead of 100, as noted in the *ELECTRIC RAILWAY JOURNAL* of Nov. 22, 1913.

**Hull (Que.) Electric Company**, noted in the *ELECTRIC RAILWAY JOURNAL* of Nov. 1, 1913, as being in the market for cars, has ordered four 43-ft. semi-convertible, single-end trailer car bodies from the Ottawa Car Manufacturing Company, Ltd.

**Albany Southern Railroad, Albany, N. Y.**, has placed in service a new 40-ton electric switching locomotive built by the General Electric Company. The locomotive is of standard construction, is provided with type M control, is geared for slow speed and is equipped with four GE-207, 165-hp commutating-pole motors wound for operation on 600 volts.

#### TRADE NOTES

**Canadian H. W. Johns-Manville Company, Ltd., Toronto, Ont.**, has removed its office to larger quarters at No. 19 Front Street, East.

**Gould Storage Battery Company, New York, N. Y.**, has located its Detroit office in the Boyer Building, 88 East Congress Street, Rooms 402-3.

**E. G. Long Company, New York, N. Y.**, has received an order from the Brisbane Tramways, Ltd., Brisbane, Queensland, Australia, for one Kidder roll feed, bed and platen press for printing tickets. This press has a capacity of 48,000 tickets per hour.

**Western Electric Company, New York, N. Y.**, has appointed A. E. Beling, formerly manager of its Pittsburgh house, as manager at Cleveland to succeed H. A. Speh, resigned. L. M. Dunn has been appointed manager at Pittsburgh, succeeding Mr. Beling. J. R. Ray has been appointed sales manager.

**Ottawa Car Manufacturing Company, Ltd., Ottawa, Ont.**, has appointed W. M. Arnold its assistant manager, succeeding W. K. Jeffrey, who was made general manager some months ago. Mr. Arnold in addition to his new duties will, however, still act as purchasing agent for the company, a position which he has held for the last eighteen months.

**Scholey & Company, Ltd., London, England**, have received from the British Westinghouse Company an order for special tool steel gears and pinions, manufactured by the Tool Steel Gear & Pinion Company, for the whole of the equipments required in the electrification of the suburban lines of the London & South Western Railway. This constitutes the largest single order ever placed in England for gears and pinions.

**General Electric Company, Schenectady, N. Y.**, has received orders for motor equipment from the Northwestern Pacific Railroad; Twin City Rapid Transit Company; Fitchburg & Locomotive Street Railway, Fitchburg, Mass., and the Bay State Street Railway, Boston, Mass. Orders for air-brake equipments and air compressors have been received from the Boston (Mass.) Elevated Railway, Public



Service Railway, Philadelphia, Pa., and Rockford & Interurban Railway, Rockford, Ill.

**New York Switch & Crossing Company, Hoboken, N. J.**, at a recent meeting of its directors, elected Howard R. Sherman president to fill the vacancy caused by the death of William C. Wood, announcement of which was made in the *ELECTRIC RAILWAY JOURNAL* of Oct. 11, 1913. Charles L. Wood, a nephew of the former president, was elected secretary and treasurer. Mr. Sherman is thoroughly familiar with the details of the business, having been connected with the company for the past seventeen years.

**Edgar S. Fassett**, formerly general manager United Traction Company, Albany, has been appointed general sales agent of the New York Switch & Crossing Company, Hoboken, N. J. Mr. Fassett will continue in charge of the railway department of the National Products Company, 43 Exchange Place, New York, a position which he has occupied since he has been in New York City. The National Products Company is the New York representative of the Blair Parke Coal Company and of the William C. Robinson Company, refiners of oil.

**Davis-Bournonville Company, Jersey City, N. J.**, gave on Dec. 4 before the members of the American Society of Mechanical Engineers a comprehensive and practical exhibition of the recent development in the oxy-acetylene and oxy-hydric processes of welding and cutting metals. The commercial method of producing oxygen, acetylene and hydrogen gases and the welding of cast-iron, steel, copper, brass and aluminum by hand were shown. Steel barrel welding with an automatic machine was demonstrated. Steel cutting was shown by various machine applications of the torch, including the oxygraph, which cuts steel from 1 in. to 4 in. thick to a drawing, the radiograph and railograph.

**T. H. Symington Company, Baltimore, Md.**, through C. E. Mitchell & Company, New York, is offering for sale \$300,000 of serial mortgage 6 per cent gold notes dated Dec. 1, 1913, payable as follows: Dec. 1, 1914, \$75,000; Dec. 1, 1915, \$100,000; Dec. 1, 1916, \$125,000. These bonds are callable at any interest date as a whole at 102 and accrued interest, and are tax exempt in New York State. The interest is payable without reduction for the federal income tax. These notes are a direct general mortgage obligation, the proceeds of which are to be used in part payment of an issue of \$350,000 two-year notes due Dec. 1, 1913. The company is a Maine corporation, owning a plant in Rochester, N. Y., and engaged in the manufacture of malleable iron equipment for railroad use, especially draft gears and journal boxes. There are outstanding \$1,500,000 preferred stock and \$1,000,000 common stock and the company has a bonded debt of \$900,000, which has been reduced as of Nov. 1 by \$153,000 through the operation of a sinking fund, leaving the actual bonded indebtedness as of that date \$747,000.

#### ADVERTISING LITERATURE

**California Corrugated Culvert Company, Los Angeles, Cal.**, is distributing a reprint from an article in the *Railway Age Gazette* of July 18, 1913, describing the characteristics and advantages of ingot iron.

**Cutter Company, Philadelphia, Pa.**, has issued a catalog entitled "Who's Who and What's What," commemorating the twenty-fifth year in which it has manufactured its I-T-E circuit-breaker and containing descriptions of the personnel of the company.

**Robert W. Hunt & Company, Chicago, Ill.**, engineers, have issued a sheet showing the specifications for open-hearth steel girder and high T-rails which were adopted as recommended practice by the American Electric Railway Engineering Association.

**Drew Electric & Manufacturing Company, Indianapolis, Ind.**, has issued a catalog entitled "Have You Got Electrolytic Cancer in Your System?" describing the application of its Samson glazed porcelain and bronze pipe insulator to the requirements of electric railways.

**Antox Paint Company, Indianapolis, Ind.**, has issued a folder describing its railway, structural steel, marine and industrial paints. An illustration shows the application of this paint to a large bridge on a line of the Terre Haute, Indianapolis & Eastern Traction Company.

**Pyrene Manufacturing Company, New York, N. Y.**, has issued a folder announcing the start of an extensive advertising campaign and containing colored front-cover reproductions of the various periodicals in which it is conducting this campaign, also reproductions of advertisements which have been used.

**Northern Engineering Works, Detroit, Mich.**, have issued a catalog illustrating their various classes of electric traveling cranes. Among the types illustrated are 50-ton four-motor type E, standard 30-ton type E, 35-ton a.c. type, and 15-ton and 10-ton types. These cranes are adapted to a wide range of locations, for low headroom and close clearance as well as for standard headroom and for special duties. Illustrations are shown of the cranes applied to steel tire, wire and bar mill service, and for lifting and conveying car bodies in shops and carhouses.

**Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.**, has issued a number of pamphlets covering railway line material. Catalog section DS 840 covers suspension, ears and splicers. Different types of trolley suspensions are illustrated and described and also various accessories, such as expansion bolts, insulators, clinch ears, trolley splicers, strain ears and wire chucks. Section DS 841 covers frogs, including the Detroit trolley frog, rigid and adjustable crossings, section insulators, switches and lightning arresters. Section DS 844 covers strain insulators of various types and for different kinds of service. Section DS 850 covers rail bonds and bonding tools. Tables are given showing the net weight in pounds per 100 bonds, and installation views of different types of bonds are shown. Rail-bonding tools, such as ratchet drills, facing tools, bonding punch and bond compressor, are described. An illustrated description of portable grinders, torches and clamps is also given.

**General Electric Company, Schenectady, N. Y.**, has issued Bulletin A4173, which describes the GE-201 ventilated commutating-pole railway motor, and also Bulletin A4171, devoted to a description of that company's ventilated railway motors. Both of these bulletins supersede the company's previous bulletins on the respective subjects. Bulletin No. A4178 describes its three-phase induction motor panels. These panels are for controlling induction motors of voltages of from 110 to 220 and for operation on 25-cycle to 60-cycle circuits. The panels described are single panels only and not intended to be assembled as part of a switchboard. The bulletin contains a long list of standard panels, among which can be found panels suited to practically all conditions of service of this kind. Bulletin A4151 describes engine-driven continuous-current generators of the commutating-pole type. These generators are manufactured in both two-wire and three-wire styles and are either shunt-wound or compound-wound, 115 to 125 volts or 230 to 250 volts. They range in capacity from 25 kw to 400 kw inclusive. Data on larger sizes wound for 250 volts only will be furnished on application.

#### NEW PUBLICATION

**Transformer Practice.** By William T. Taylor. Cloth, 278 pages. New York: McGraw-Hill Book Company. Price, \$2.50 net.

It is refreshing to read a book upon a highly technical matter, as this one is, which begins with an introduction covering the fundamentals of the subject. In this case the author has broken away from the tradition that a work intended for any use outside of the classroom should start with a leap into the middle of a subject about which the practical engineer has had no time to keep fully informed. Instead, he has presented in clear and concise form a short historical treatment of the matter, followed by a series of comments on the uses, the practical requirements and the basic theories of transformers in general. The book is a practical treatise on transformer selection, design, construction and operation and covers in addition such necessities for the understanding of the problems involved as vector diagrams and the principles of efficiency, regulation, methods of cooling and the like. The book is profusely illustrated with diagrams of connections and outline sketches of different forms of construction, useful tables of information being, of course, included.