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A CONVENTION AFLOAT

The next meeting of the Central Electric Railway Association, which is to be held June 25 to 27 inclusive, will offer a marked novelty in convention gatherings as all of the sessions will be held on a boat. The geographical position of the association and the season of the year combine to make this departure especially attractive. The beauties of the Great Lakes and the high-class accommodations of the great passenger steamers which ply upon them are known and appreciated by every traveler, while the substitution of a breeze-swept deck for a warm and often stuffy hotel parlor calls for no apology. From a pleasure standpoint, the delegates and their families are assured of comfortable quarters, pleasing changes of lake and river scenery and that increased good-fellowship peculiar to a condition where all present form a little world in themselves. From a business standpoint, it is certain that more will be accomplished in less time because every delegate will be within call of the chairman. Last but not least, the entire boating expense will be so moderate as to be practically no more than if the meeting were held at the point of departure. Necessarily, great trouble has been incurred by undertaking to charter so commodious a steamer for exclusive use. It is to be hoped, therefore, that the attendance will be commensurate with the progressive spirit which has been shown by the Central Electric Railway Association.

THE ERIE SINGLE-PHASE ELECTRIFICATION

When part of the Rochester division of the Erie Railroad was electrified some years ago there was considerable interest in the installation on account of its novelty. The railroad company installed the equipment presumably as an experiment to give actual data in case electrification on a larger scale should be considered later. During the six years since electric operation began there has been uninterrupted satisfaction with the performance of all parts

of the equipment. The traffic has doubled and has presumably been profitable. An exceedingly important factor in the economy is the low cost of maintenance. A supervisor and four men attend to all parts of the motive power work, including light car repairs and some extensions. That this small force can handle the work is evidence of the durability of the catenary construction and the single-phase motors. Unfortunately the increase in the number of trains under electric operation required a disproportionate increase in the expense for signal service, but in spite of this the low total cost per car mile makes the installation a thoroughly satisfactory example of electrification.

STEAM RAILROAD ELECTRIFICATION IN AMERICA

The résumé of progress in electrification in this country published elsewhere in this issue displays the rather striking fact that the electrified lines actually in operation or projected are not confined to any particular region. Quite as much is being done in the mountains of the West and on the Pacific Coast as in the level alluvial country of the Atlantic seaboard. The latter section naturally offers great advantages for the use of electricity owing to the very general density of traffic and, in fact, might easily be considered as the only place where the load factor could be maintained at a sufficiently high point to warrant the outlay for overhead construction and electrical equipment. Yet the projects of the Chicago, Milwaukee & Puget Sound and of the Denver & Rio Grande, together with the possible new line of the Great Northern, show that dense traffic, as the term is usually understood, is not a necessity. Nevertheless, one principal reason for electrification applies in all cases, and that is to reduce track congestion or the number of train hours per mile of track. Other reasons apply in each case. Thus, at New York City the underlying purpose was to provide adequate and suitable terminal facilities; on the New Haven the end sought was economies with extremely dense, mixed traffic; on the Norfolk & Western it is a matter of handling enormous coal trains; in the Rocky Mountains cheap power is available; in one Great Northern electrification a long tunnel was the cause, while on the projected line for Dakota and Montana the almost prohibitive difficulties of poor coal and bad water can be eliminated completely. Summed up, it would almost seem as if any operating difficulty could be overcome by electrification.

THE CHOICE OF ELECTRIC SYSTEMS

A great deal was said several years ago about the battle of the systems. At that time the advocates of direct current, the single-phase system and the three-phase system used to insist upon the merits of each for universal use. The same differences of opinion exist to-day, and one or two additional systems have developed, but there is general

recognition that each has undeniable advantages for certain classes of work and certain conditions and that there is no serious objection to the use of two or more of them even upon the same railroad. For those who have not closely followed all of the recent developments of the direct-current and single-phase systems, the description by Dr. Louis Bell of the different types of single-phase motors, his comments upon the use of rectifiers on locomotives and the article in this issue on the first large 2400-volt locomotive to be built in this country will prove of interest. As the last candidate for favor, the mercury-arc rectifier will attract special attention, as it permits the advantages of high-voltage distribution with the well-known merits in design and construction of the direct-current motor. Whether these advantages are associated with serious disadvantages remains to be seen after more extensive tests have been made with the combination. Some at least are apparent, such as the increase in weight necessitated by the use of a rectifier as well as a transformer on the locomotive and the probability that a special type of direct-current motor may have to be used, owing to the fluctuations of voltage in the rectified current corresponding to the alternations on the line. On the other hand, if the use of the rectifier should prove practicable on the locomotive it might be even more useful in the substation. All in all, the improvements made in electrical apparatus during the last two years have undoubtedly extended the field of its application to traction purposes.

STRIKE DAMAGES CLAIMED AT BUFFALO We are glad to note that the International Railway has brought claim against the city of Buffalo for damages caused through failure of the authorities to protect the property of the railway company during the recent strike. The entire propriety of claims of this kind was set forth in a recent issue of this paper, and we believe that if such claims were brought in other cities where corporations or individuals suffer loss through dereliction of duty on the part of the authorities there would be more respect for law and order in this country. We admit that where the city can prove that it did its best to protect property or where the authorities took all of the precautions to enforce the law which reasonably could be expected of them, the responsibility of the city for damage might be lessened. But that was not the case in Buffalo because the company notified the authorities prior to the actual damage that various threats and attempts to destroy its property had been made and demanded protection. There is no reason either in law or morals why a city should be held less responsible for performing its obvious duties than a private corporation or individual, and we should have better government if a few cases of this kind were followed up vigorously. In this connection we remember that a good many years ago a certain town in New England was lax in regard to paying the interest on its funded debt. One of the bondholders secured a writ from the court which authorized him to levy on any property found in the town belonging to any citizen of it, and accompanied by a constable he drove off with the equipage of one of the leading residents. The incident was sufficient to awaken the community to a realization of its obligations, and whether the act could be defended at law

or not there was no more talk about repudiation. Similar aggressive tactics in the case of strike damages would be an eye-opener to many citizens and municipal authorities who now think more of politics than of justice.

DEVELOPMENTS IN POWER GENERATION

The reports of the N. E. L. A. committees on prime movers and on electrical apparatus constitute a remarkably complete résumé of the developments in apparatus for the generation of electrical power in central stations. Neither committee has hesitated to go on record with its opinions, and for that reason the reports are perhaps of more interest than a merely academic description of new devices.

The committee's implied approval of the use of steam turbines for driving auxiliary apparatus is logical enough as it follows out the modern idea of obtaining simplicity in the smaller items of the equipment even at the expense of economy, especially when the total amount of steam used under any circumstances is small. To a large extent this follows the same principle which has brought into use so many centrifugal feed pumps. This type of pump may have the inherent disadvantages of inability to prime itself and low efficiency except at or near its rated load, yet it cannot be denied that the advantage which it offers in its simplicity and in the absence of wearing parts constitutes a strong argument in its favor. The small steam turbine is shown by the curves in the committee's report to be, at least in units larger than 200 kw, almost as economical as the small non-condensing engine, and it is quite possible that the elimination of reciprocating motion and complication of moving parts in the small turbine will offset any small increase in steam consumption.

The statement on troubles with turbine blades and nozzles showed about half of the cases reported to be free from blade trouble of any kind. Strange to say, the matter of erosion did not appear at all. It is true that this early difficulty does not seem to be very much in evidence at present. Yet with the impulse type of turbine having a very high steam velocity through the blades, erosion, especially with wet steam, must and does occur to a certain extent, although its influence on the repair bill of a comparatively new turbine may be somewhat limited. The report of one company that its turbine blades became clogged with mud and scale is interesting, but it certainly does not show very satisfactory boiler conditions. It is hardly possible for dry steam to carry mud or scale, and superheated steam certainly does not. The incident is another argument for the use of moderate superheats, although in a plant where enough water is carried over to clog up the turbine blades with mud it is quite likely that the interposition of a superheater between the boiler and the prime mover would only result in burnt tubes.

That part of the report dealing with the boiler room offers some very important suggestions which may well be applied to almost any plant. The investigation of the adequacy of openings for admitting air into the boiler rooms led to the startling but perfectly correct statement that if in a boiler room containing 10,000 hp of boilers the air was compelled to enter through a 7-ft. x 7-ft. doorway the velocity of the blast would reach 50 m.p.h. Of course,

this is a very forcible way of expressing the committee's meaning. Under such conditions if the opening was restricted to 49 sq. ft. no hurricane would blow through it, for the draft necessary to produce such a velocity is nearly equivalent to 2 in. of water column, more than the ordinary chimney could produce. Instead, the relative draft at the furnace would be cut down very materially, and the surplus would be expended in setting up a much reduced velocity through the small doorway. With the diminished draft it is easily possible that the boilers could not be made to give even half of their rated capacity. The matter is one of great importance and well worthy of investigation in every boiler room. In fact, there is no doubt that in many plants where lack of draft is a continual complaint during the winter months much of the trouble is due to restricted openings for letting air into the boiler room.

The perennial question of feed regulators is again brought up by the committee on prime movers, which takes the rather unusual ground of approving them. In another part of the report the committee advocates the use of the flow meter in preference to the CO₂ recorder. The reasons are somewhat obscure, for the CO₂ recorder is solely a device affecting economy by indicating the presence of excess air, and within reasonable limits the existence of a considerable amount of excess air has comparatively little effect, provided the draft is ample, upon the boiler output, the only thing measured by the flow meter. Another interesting opinion of the committee is that on account of the recent large increase in the productive oil fields of the world oil will soon regain its former position as one of the steam-producing fuels.

The statement that the use of direct-coupled exciters is on the increase will undoubtedly come as a surprise to many engineers, as it has been the prevalent opinion that the direct-connected machine, while used to some extent in Europe, was not suitable to American practice or to American ideas. As the committee on electrical apparatus says, mounting the exciter upon the turbine shaft simplifies the installation, but this increases the length of the complete machine. In consequence the direct-connected exciter involves a larger building, ties up each exciter to the operation of its own turbine and splits up the exciter installation into small units. In addition, it handicaps the exciter operation by the fact that when the turbine speed goes down through overload the excitation voltage falls with it, so that, altogether, the disadvantages are a distinctly high price to pay for a possibly small gain in simplicity.

The description of the motor converter, a device consisting of an induction motor and a rotary converter rigidly connected mechanically and with the rotor winding and armature winding connected in parallel, is interesting. The efficiency of the new machine is reported to be within 1 per cent of that of the rotary converter together with its transformer, and its efficiency is from 2½ per cent to 8 per cent better than that of the motor generator, depending upon the percentage of rated load. Ease of starting, synchronizing and regulating are qualities which the motor converter appears to have to an equal or greater degree than either the rotary or the motor generator, and in addition it has a very distinct advantage over the rotary in not reversing its polarity under extraordinary fluctuations.

RESPONSIBILITY FOR CONVENTION SUCCESSES

May and June are pre-eminently the months of conventions, and it may be worth while to point out at this time some of the ways in which the maximum benefit may be obtained from these gatherings. Some meetings of this kind reach nearly 100 per cent of their possible efficiency, others, from one cause or another, are less productive, but the matter is so important that we believe an effort should be made all along the line to get the most possible out of conventions. Otherwise, there is a serious loss of energy and time which could just as well be saved.

The two elements which make up a technical convention are the papers and the discussion which follows them. The responsibility for the papers and choice of speakers rests almost entirely upon the association as represented by its executive committee and secretary. The responsibility for making the discussion of value is almost entirely that of the individual members. Each has a duty in the matter, and if either shirks the result reacts upon the success of the meeting. Our observation has been that the individual members are much less apt to do their full part than the executive committee or secretary.

In large organizations, where the papers are printed in advance, each member should familiarize himself with their contents so that he may come to the convention prepared to discuss them. At the last meeting of the Southwestern Gas & Electrical Association this point was emphasized by the secretary, who sent a notice to each member with the advance copies of the papers. This notice asked the member to give the papers "careful reading and study before you come to the convention so that you may be prepared to ask questions and bring up points for further elucidation and discussion at the convention." If a good program has been arranged, good speakers secured and advance papers sent out early, where that plan is followed, there is very little more that the secretary or the executive committee can do. Then the responsibility falls on the individual members.

At the meeting there is often a disinclination on the part of representatives of the small companies to participate in the discussion, partly because of their less experience and partly perhaps because they think themselves not so competent to discuss matters under consideration as the representatives of larger companies. The facts are that their experience is often of more value to most of the members in attendance than that of representatives of the larger companies. The latter necessarily consider the subject from the viewpoint of a large road, and this may be quite different from that of the smaller roads. The members in attendance are usually by a large majority from the smaller roads, and the information which a delegate from another small road can give is therefore of the greatest help to them. Even a question asking for information on a certain point often brings out matter of value. Practice in speaking at a meeting is something which can easily be cultivated, and the more one does it the easier it becomes, so that when a person takes part in the technical discussion he may not only feel that he is benefiting himself but also that he is helping to secure the maximum amount of efficiency from the meeting.

THE ELECTRIFIED STEAM RAILROAD

On Jan. 25, 1907, Lewis B. Stillwell and Henry St. Clair Putnam presented before the American Institute of Electrical Engineers a paper entitled "On the Substitution of the Electric Motor for the Steam Locomotive." This classic study boldly generalized the problem of electrification for the United States as a whole and even ventured to estimate in millions of dollars the financial benefits that would follow a universal change from steam to electricity. The paper was remarkable not only for its imposing array of data but also for the confidence of the authors that electricity would be cheaper than steam for other conditions than those peculiar to the suburban zones of large cities. Unfortunately, the arguments of Messrs. Stillwell and Putnam did not create among steam railroad men the great interest that they deserved, one reason being perhaps that the discussion on the paper was confined to electrical engineers, who at that time seemed to be concerned with the systems rather than with the savings of electrification. At last, after five years of waiting, it is possible to announce that the electrification on economical grounds of continental lines, both mountain and plain, will soon be a reality. Electrification has now gone beyond the stage of gratifying passengers to that of furnishing better and cheaper facilities for handling the more profitable freight business. The great single-track railways west of the Mississippi will electrify either because they must increase the capacity of the road at some critical section like the continental divide or because a world of cheap water-power is at their disposal in place of low-grade fuels.

Coincident with this expansion of the field of electrification has come the adoption of high-tension direct current. Equipment for 2400 volts is under construction for one line and is being seriously considered for others, while 5000-volt d.c. machinery has already "been designed, built and tested with gratifying results," according to the statement made by Mr. Armstrong at the May 20 meeting of the American Institute of Electrical Engineers. It is also worth mention that this high-tension d.c. apparatus is being selected strictly on its merits for long-distance work without regard to the possibility of alternate operation on high-tension and low-tension circuits as worked out for 1200-volt and 1500-volt d.c. interurban railways. With this addition, the distribution systems in use on American electrified steam railroads will comprise direct-current potentials at 500 volts to 2400 volts, three-phase at 10,000 volts and single-phase at 3300 volts and 11,000 volts. The summary published elsewhere in this issue shows that the steam railroads have electrified to date approximately 919 miles for low-tension d.c. and 186 miles for high-tension d.c., 534.4 miles for single-phase and 6 miles for three-phase operation. The total of, say, 1650 miles plus the 1200 miles which has been approved for construction is a little more than 1 per cent of the steam railroad mileage of the United States. These figures are encouraging to the electrical engineer in opening to him an almost limitless field for endeavor, but even if electrification does proceed in an ever faster ratio, it is evident that for many years to come the steam locomotive is not very likely to go a-begging for work.

THE COMMERCIAL STAGE OF THE DOUBLE DECK

The advance of the double-deck car beyond the experimental stage is indicated by the purchase of five new cars of this type by the Pittsburgh Railways. These cars, as described in last week's issue, are of marked peculiarity only in the fact that they are equipped with widely separate exit and entrance doors, a feature which undoubtedly lowers the time of passenger interchange but which can do no more toward maintaining schedule speed than is effected by reducing the total time during which the car is actually stopped. The period during which a car is at rest, in ordinary city service, may be said, as a very rough approximation, to amount on an average to about 10 per cent of the running time. If this time, therefore, should be cut in half, it would increase the schedule speed only 5 per cent, a very material consideration under ordinary circumstances, but not necessarily enough to offset the possible loss of time due to the increased number of stops per mile which is certain to accompany the great increase in seating capacity.

The traffic conditions in Pittsburgh are unusual in degree if not in character, the great majority of the rush-hour passengers being loaded at night, or unloaded in the morning, in a remarkably restricted business district. From this section many lines radiate to the various residential sections of the city, in some cases being almost suburban in character with comparatively few stops for the first mile of route, although the grades are extraordinarily severe. In fact, there is good evidence for the belief that the new cars can be operated successfully upon half of the lines in the city, because on many of them 70 per cent to 80 per cent of the passengers are collected at five or six loading points in the downtown district.

On tripper runs to handle shop crowds and for ball games or other special services where excessive crowds board at one point the success of the double-deck principle from an operating standpoint has been thoroughly demonstrated by the experimental car of last year, so that there is no question that the new cars will remain in use regardless of the results which develop on regular runs. Their cost, which amounts to less than 20 per cent in excess of that of standard single-deck cars, will manifestly be no bar to their availability for occasional service.

As the total of six double-deck cars in Pittsburgh will by no means be enough to handle alone the traffic on any one of the city lines, they will not be able to reduce track congestion to any appreciable degree, and they will in consequence be handicapped for the present to that extent in their operation on regular runs. As an offset to this condition, however, the ingenious scheme of placing a second conductor on each car during its run through the congested business district will be carried out by the management if necessary. The extra man would thus help the regular conductor collect fares at the five or six loading points and would then drop off, to go through the same procedure with another car. As all cars are looped through the downtown section, the extra man would be picked up by an incoming car without having to make an extended journey from one car to another.

The extent to which these new cars will prove available is, of course, still to be settled by experiment. Yet, from the experience with the original double-deck car, it is believed that at least fifty cars of the type can be advantageously used in Pittsburgh. Certainly as an operating unit the double deck affords many advantages over the train, not only in track space occupied, platform expense, first cost and maintenance but also in loading time, as the great distance between the two entrances of the train is undoubtedly a handicap. The weak point of the double-deck principle appears to lie in the stairway. This has given no trouble as yet, but whether a great increase in the number of interior accidents will take place when the novelty has worn off and passengers become careless still remains a very serious question.

OBSOLESCENCE AND DEPRECIATION FOR LOCOMOTIVES

One of the important considerations in the estimates of possible savings of a projected electrification is the allowance which should be made both for the second-hand value of the old locomotive equipment and for the rate of depreciation of the new. In one of the recent A. I. E. E. papers on the possibilities of saving by the substitution of electric power for steam, the steam locomotive was credited with a scrap value of 20 per cent on its original cost and a useful life of twenty-seven years, while to the electric equipment was assigned a scrap value of 30 per cent at the end of thirty-five years of service.

The figures appear exceedingly high not only in the case of the steam locomotive but also for the more modern machine. A steam locomotive sells to-day for approximately 10 cents a pound, assuming that the design involves no unusual features of extreme costliness and that the standards of the locomotive builder are followed to a reasonable extent. A scrap value of 20 per cent would necessitate selling a combination of wrought and cast steel scrap with a negligible amount of brass thrown in for a price of 2 cents a pound, or \$40 a ton. As a matter of fact, the seller would be lucky to get \$16 a ton for it, even in a time of good prices, which of course could by no means be assured at the time of sale. Eight per cent would indeed be a liberal allowance for the scrap value of a steam locomotive.

With the electric locomotive the pound price of the completely worn-out machine would, of course, be higher on account of the larger percentage of copper entering into the total weight. No figures are obtainable upon such prices, for obvious reasons, yet if it amounted to 50 per cent more than the scrap price of the old metal making up the steam locomotive it would still fall short of a figure which would offset the higher pound price of the electric locomotive when new.

The sales of old locomotives for scrap are, of course, few and far between. They can by periodical overhauls be kept in running condition for an almost indefinite period, and strange to say there appears to be an irresistible desire on the part of railroad companies to keep engines in some kind of service so long as their wheels can be made to turn. Yet such a procedure does not necessarily mean that

the locomotive is worth any more than its scrap value, for obsolescence of equipment cannot be avoided any more successfully than death or taxes. To-day we see engines built in the early nineties used for various odd jobs, double-heading over minor grades, drilling in small yards or pulling occasional light trains on branches whose sparse traffic could better and more economically be handled by trolley or storage battery cars.

During the past decade the major cause of obsolescence has been lack of size. The enormous increase in train loads has called for larger and larger locomotives, and that this growth of the locomotive is still under way is shown by the most recent Mallet engines. Yet the next ten years may see a complete change in the steam locomotive development, and economy of operation may easily be placed above capacity or tractive effort. The Mallet types, again, are an indication of this tendency, for, in addition to their compound cylinders, the feed-heating devices and superheaters with which numbers of them have been equipped—"jimcracks" to the conservative mechanical man, but still very material means for saving coal—have even staved off in many cases the inevitable necessity for extra firemen in addition to effecting really appreciable reductions in the fuel bills.

If this sign is a correct indication, and lack of economy becomes the cause of obsolescence rather than lack of tractive effort, it is safe to say that old engines will be scrapped very much more promptly after outliving their usefulness than they have been in the past. The wastes of operating obsolete equipment will be too tangible, too manifest, even to escape the eye of the average railroad president. In consequence, the life of a locomotive may be expected to become a period very much more definite, and probably very much shorter, than it is to-day. Yet to-day it would be idle to prophesy what this term of life should be. The next twenty years will certainly involve very radical changes, in all likelihood sufficient to render obsolete every steam locomotive of the present day. Ten years' time could hardly do this, but if improvements in economical operation were made, equivalent to the growth in capacities which took place between the years of 1894 and 1904, the improved types would save enough to pay easily the interest charges on their first cost, as well as the increased depreciation charges involved by the shortened life of the old equipment.

The same argument applies, of course, with more force to the electric locomotive, although it is impossible to predict now the direction in which improvements will be made. For anything subject to such rapid progress as equipment for electric traction the assumption of a life of thirty-five years is impossible. Twenty might be accepted, but fifteen would be safer. This, however, can be said, that the margin for improvements in the present electric locomotives, which have an efficiency now around 90 per cent, are small compared with the steam locomotive which is working at the lower end of the efficiency scale; nor does there seem in the direction in which invention in the design of electric locomotives is trending the probability of any radical changes in design which would have a corresponding effect on the true value of the existing types.

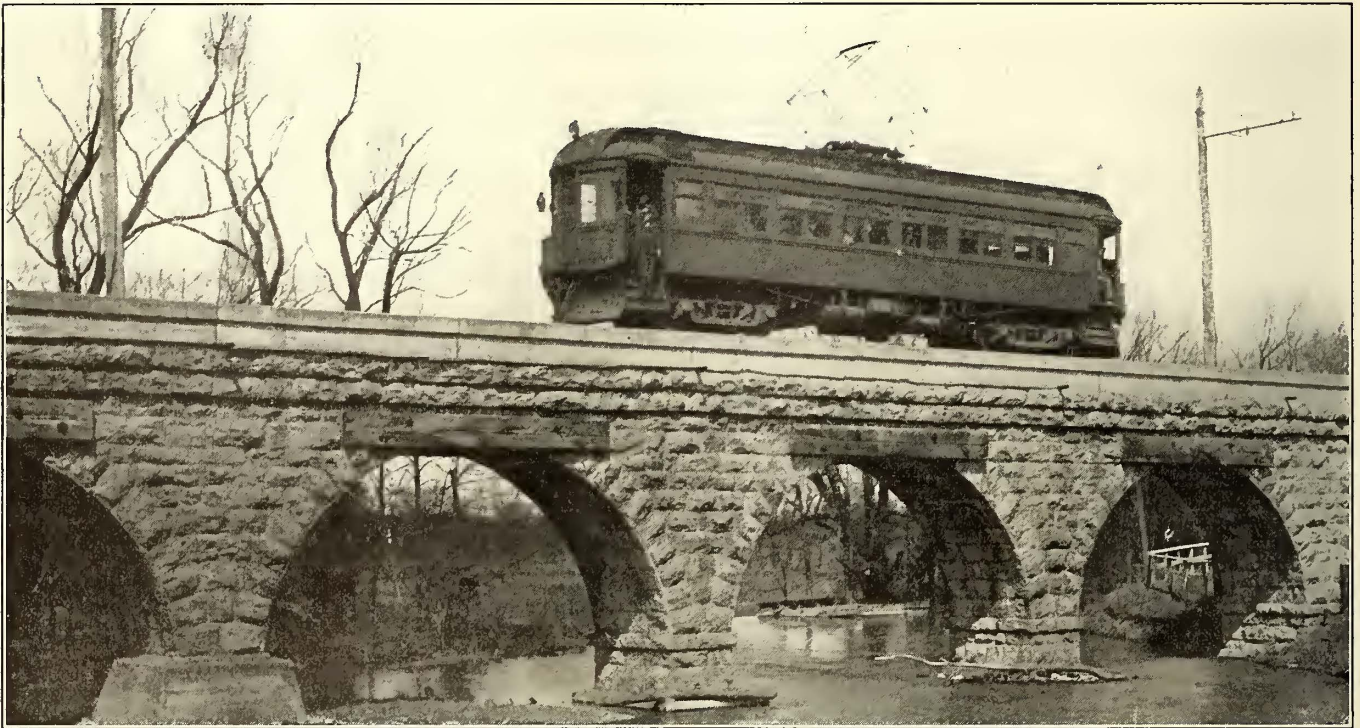
Maintenance on the Electrified Section of the Erie Railroad

The First Steam Railroad Electrification with Single-Phase Current Was Made Near Rochester, N., Y., Six Years Ago—An Outline of the Present Condition of the Installation Is Presented

The electric division of the Erie Railroad has now been in operation for six years, a length of time sufficient to demonstrate its durability and popularity. In the issue of the *ELECTRIC RAILWAY JOURNAL* for June 19, 1909, some notes on the progress up to that date were given, and these showed that even then the main elements of weakness had been eliminated. During the past four years a few additional improvements have been made and others are projected, but on the whole the working of the system has been eminently satisfactory. In fact, so smooth and uneventful, from the public's standpoint, has been the operation of the road that it is difficult to realize now how much courage was necessary for the selection of a motor which was at the time of installation hardly out of the experi-

½ mile north of Avon, which is not quite midway between the terminals. The cars are operated singly and in trains at frequent intervals, the schedule giving seven round trips daily between Rochester and Mount Morris and one and one-half additional trips between Mount Morris and Avon, a car being returned empty to Avon each day. A schedule speed of about 28 m.p.h. is maintained, stops being made at way stations located 3 to 4 miles apart.

The original equipment of rolling stock consisted of six motor cars, each 53 ft. 4 in. long over bumpers and 8 ft. 9 in. wide over sheathing. Four of the cars have two passenger compartments, the others two passenger and one baggage compartment. The bodies are mounted upon heavy M.C.B. trucks with 6½-in. axles. On each car are four



Erie Electrification—Five-Arch Bridge on the Line Near Ashantee

mental stage. The popular appreciation of the service is shown by the fact that the present traffic is twice what it was in the days of steam operation.

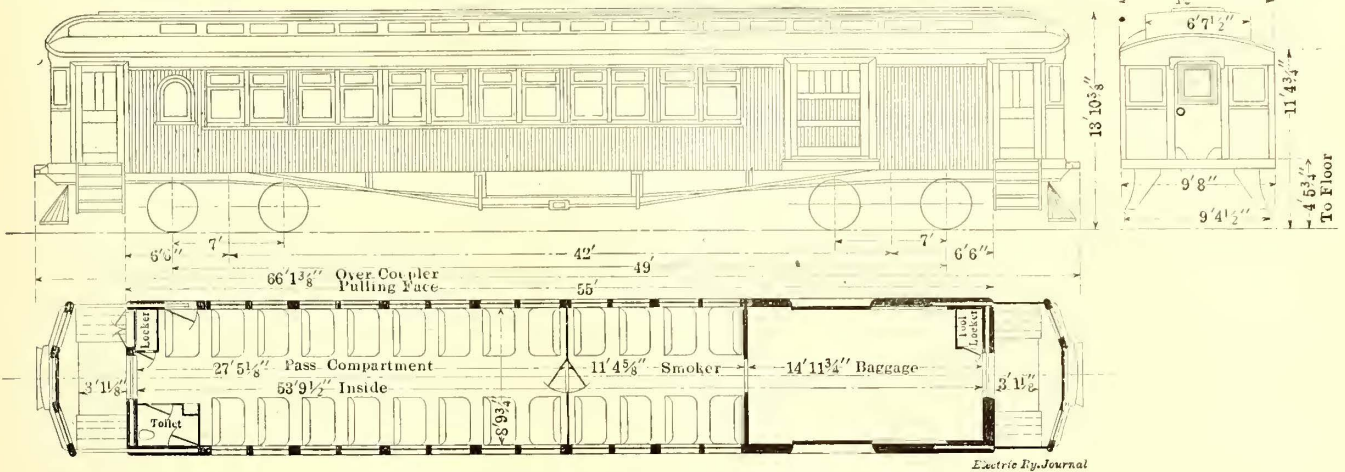
Electric service was begun on this road on June 18, 1907, and the road was taken over from the contractors three months later. The electrified section is part of the Rochester division and extends in a southwesterly direction from Rochester to Mount Morris, a total distance of 34 miles. It is equipped with catenary overhead construction with a trolley voltage of 11,000 and was the first section of a steam railway in this country on which single-phase current was employed. Niagara Falls power in the form of three-phase, 60,000-volt, twenty-five-cycle current is received at the substation at Avon, 19 miles from Rochester, and is there reduced in two V-connected transformers to 11,000 volts. One transformer secondary feeds a section in the Rochester side of the substation, and the other feeds the Mount Morris section, the division into sections, however, being made

100-hp, single-phase Westinghouse series motors geared to the axles in the ratio of 63 to 20. These motors have nose suspension. They are controlled by the Westinghouse electro-pneumatic control with unit switches. The voltage is reduced from that of the line, 11,000, to that required for the motors in a 200-kw transformer provided with three primary and eight secondary taps, giving a wide range of operating voltage. The normal voltage of the motors is 300. The emf used for lighting, heating, etc., is 110 volts.

Electrical energy is purchased from the Niagara, Lockport & Ontario Power Company under the standard contract of that company. The Erie Railroad Company agrees to purchase a certain "firm" power which is paid for whether the load reaches this value or not. If the demand exceeds the firm value an additional charge is made. This is based upon the monthly average of the highest daily peaks which last for one minute or more and is paid each month. The monthly average of the peaks is, however,

never considered as less than the firm power, and if it exceeds the firm power beyond a certain percentage the firm power which must be paid for whether used or not is automatically increased by an amount sufficient to maintain this percentage. The rate varies with the amount of firm power and with the load factor. In this case the load factor is about 25 per cent and the average cost of energy is

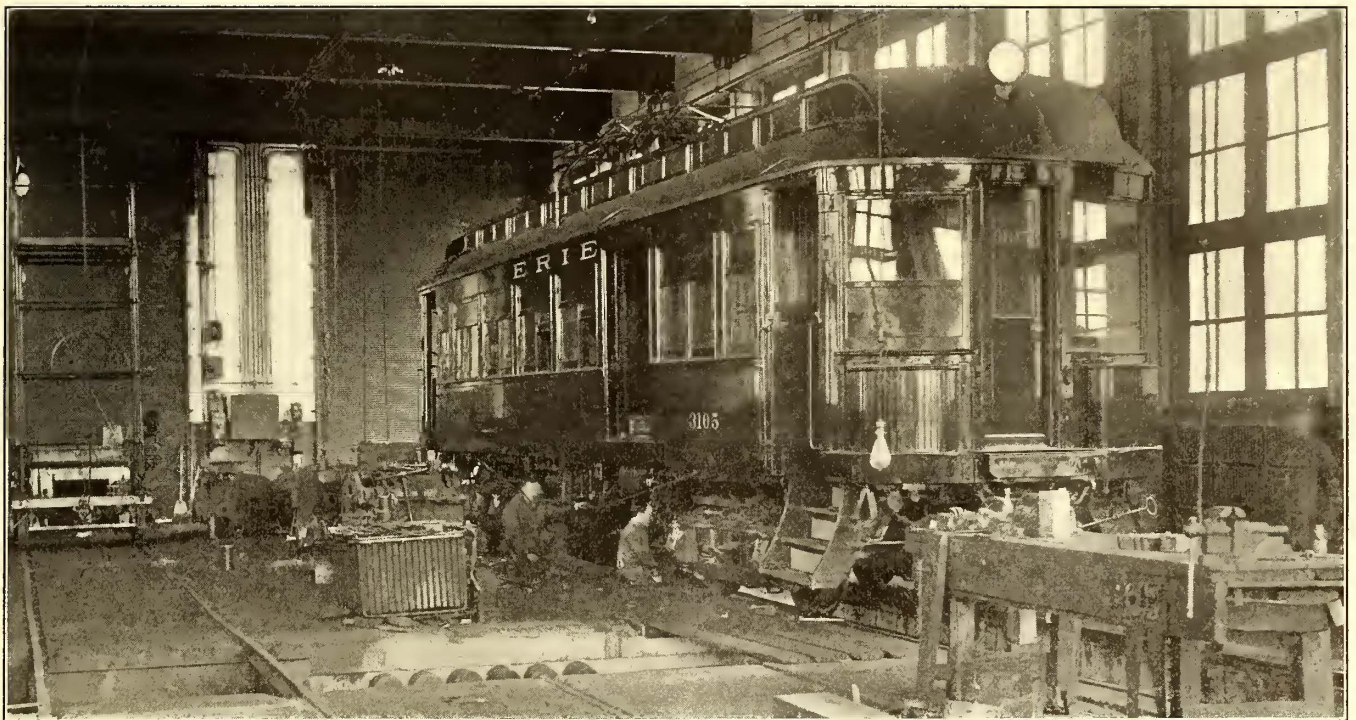
In the shop is also kept, in readiness for use, a gasoline-engine-driven line car equipped with a telescope tower built up of iron pipe after the design of R. C. Thurston, supervisor-in-charge. The line-car engine is of 12 hp, with double, opposed cylinders, and it is geared to the axle to produce a speed of 15 m.p.h. The tower consists of two parts, the frame and the platform. The latter is supported



Erie Electrification—New Standard Combination Car

slightly over 1 cent per kw-hr. delivered at the substation. All work of the electrified section including car repairs and line maintenance is under the charge of the supervisor of electric service, who is assisted by two electricians, one line inspector and one line and signal repair man, a total of four men. Attached to the Avon substation is a well-lighted repair shop with two tracks which accommodate

on pipes in the four corners which slide in larger pipes forming the corners of the frame. The platform is raised by means of a winch and is held in place by pins placed in holes drilled through the corner pipes of the frame. The platform may be raised to a height of 18 ft. from the rail. This car has saved much expense in labor and material, as it is always ready for use and can reach the scene of line



Erie Electrification—Interior of Repair Shop at Avon

four cars, one track being equipped with a full-length pit. The shop has facilities for making repairs, although heavy work, such as wheel turning, gear replacements and the like, is done at the Buffalo shops of the Erie Railroad. This also applies to painting. At least one man is always present in the building to replace circuit-breakers and to inspect the operation of the recording instruments. The opening of a breaker is indicated by the ringing of a bell in the shop.

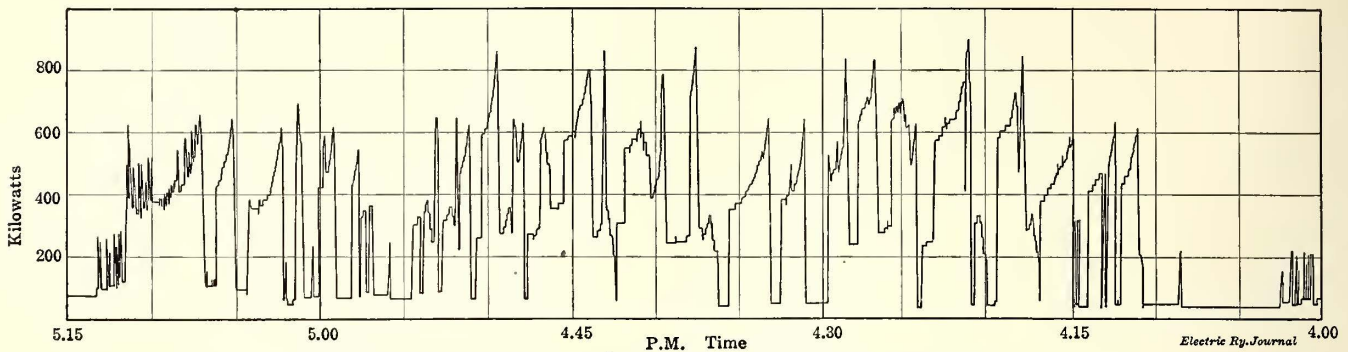
trouble in a short time. With this equipment and the small force of four men the supervisor is able not only to maintain the road in excellent operating condition but also to make improvements without extra cost for labor. Train delays from electrical causes seldom occur. In December, 1912, the delays amounted to one for every 4600 motor car miles, or one for every 5800 total car miles including trailers. The total train delays in December

from all causes amounted to ninety-eight minutes, or one minute delay per 231 motor car miles or per 295 total car miles.

Train delays are recorded on a large chart on which are vertical columns for the various possible causes of delay and horizontal columns for the days of the month. Delays are reported by the train crews at the office of the superintendent of the Rochester division of the road and each day

car miles. In December, 1912, the respective mileages were 28,920, 22,775 and 6145.

As the electrical section is a small part of the Erie system, it is somewhat difficult to estimate exactly what the electrical operation actually costs since the proportion of overhead charge is uncertain. However, the cost per car mile is not excessive considering the fact that the capacities of the cars are greater than those of average interurban cars. The



Erie Electrification—Typical Load Curve During Rush Hour

the supervisor of electric service is notified of them on a printed form.

The electrical causes of the delays are as follows:

ERIE RAILROAD COMPANY
Number of Delays and Detentions in Minutes from Electrical Causes in 1912

	11,000-Volt	Motor Circuit	Control Circuit	Main Motors	Trolley
January.....	1—68 min.	1—18 min.	1—30 min.		
February.....	1—10 min.		1—15 min.		
March.....	2—68 min.				
April.....	1—28 min.	2—120 min.	1—60 min.		
May.....	1—29 min.				5—166 min.
June.....		1—10 min.	1—15 min.		2—30 min.
July.....	1—30 min.	1—27 min.			2—51 min.
August.....	1—20 min.		2—25 min.		2—32 min.
September.....	3—76 min.		1—15 min.	1 min.	1—35 min.
October.....	3—72 min.	2—50 min.			1—35 min.
November.....					2—125 min.
December.....		2—26 min.			
Motor miles.....					251,189
Trail miles.....					72,169
Total.....					323,358

Under the head of material in this table are included costs of electric energy, lubricants and other supplies for road locomotives, cleaning cars, heating and lighting cars, supplies for electric cars, repairs to trolley line, power plant supplies and expenses, repairs to electrical buildings and sundry expenses of the supervisor of electric service. To this amount are credited labor and materials charged to work not directly connected with the department of electric service.

Under labor items are the salary of the supervisor, the wages of the four mechanics carried on the Avon shop roll, the wages of motormen, conductors and trainmen, of car cleaners and of engine house men employed on work for the electric service. In addition, a heavy expense for labor is necessitated by the rules of the Interstate Commerce Commission regarding block signal and dispatching requirements. The change from steam to electric service increased the number of trains and imposed a considerable additional burden for this reason. There are charged to electric service operation, therefore, the wages of the additional signal operators and the increase in pay of other operators made necessary by electric service. This increase includes wages of block signal operators, dispatchers, agents, division clerks, timekeepers, etc.

The usual daily mileage is about 654, although the average is somewhat greater than this owing to occasional very heavy days. The largest mileage recorded recently was 1400 for motor cars and trailers. On July 4, 1912, there were 1306 miles run, made up of 887 motor and 419 trailer

costs during the past year are given in the accompanying table. These include a large expense for electrical material for the cars due to the armature changes mentioned hereafter. The figures are based on the total car mileage including trailer operation.

ERIE RAILROAD, ROCHESTER DIVISION
Cost of Electric Service in 1912

	Approximate Cost in Cents per Car Mile
Supervision and inspection	1.80
Train crews	4.26
Electrical energy	4.47
Expenses of signal operation, stations, etc., incident to electrical operation	3.57
All other expenses of operation and maintenance.....	4.90
Total	19.00

The most important changes in the equipment of the road have been the addition of two new cars, the rebuilding of the armatures of the motors and the application of steady strains on all brackets. During the coming spring the over-

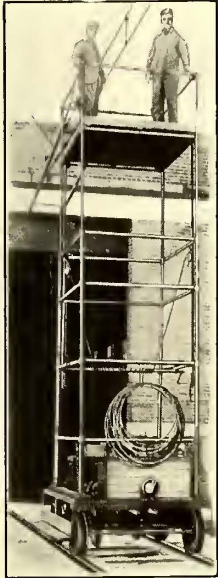


Erie Electrification—Standard Car at Avon Station

head construction will be improved by the addition of a steel contact wire.

The new cars are 15 ft. longer than the original ones. They have steel underframes with built-up girder center

sills and trussed side sills. The sides and roof are of wood. The total weight is 117,000 lb., or 850 lb. per seated passenger. The deep center sills necessitate a different arrangement of apparatus under the car body, the transformer being placed on one side of the center sill and the remainder of the auxiliary equipment on the other side. A larger size of transformer is used and provisions have been made for installing ventilating fans for the motors, but the fans will not be put in at present. The motors on the new cars are of the Westinghouse 132-F type. These differ from the 132-A type motors used on the other cars in that the compensating winding is short-circuited on itself instead of being connected in series with the main winding.



Line Car

The original motor armatures contained German silver resistance strips between the windings and the commutator bars. The connections at the commutator originally gave some trouble but all armatures have now been rewound using resistance strips of monel metal with the result that a very satisfactory durability is secured. Monel metal contains 68 per cent nickel, 2 per cent iron and 30 per cent copper. Its specific resistance is twenty-five times that of copper. To have this work done the armatures were sent back to the factory a few at a time so that the remodeling was accomplished without in any way interfering with the service.

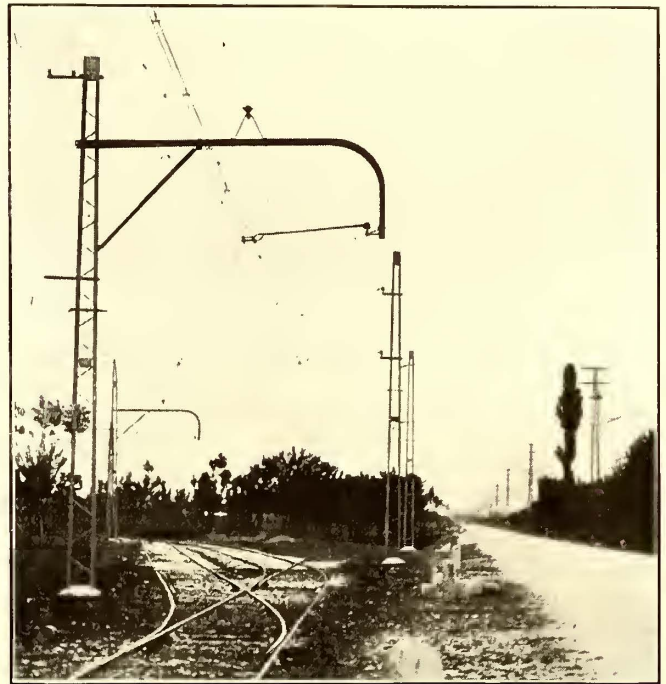
The use of steel contact wire has been found desirable not because the old hard-drawn wire has not worn well but because there is a hammering of each support by the pantograph. This is similar to the trouble experienced by the New Haven Railroad, although, as the service is much lighter than on that system, the effect has not been so noticeable. A No. 000 grooved, mild Siemens-Martin steel wire will be used. Its conductivity is 13 per cent that of copper. Its elongation is 3½ per cent and its ultimate strength and elastic limit are 75,000 lb. and 50,000 lb. per sq. in. respectively. The contact wire will be suspended below the conductor wire by means of single bolt hangers. These hangers are similar to those used by the New Haven Railroad except that a bolt with spring washer is used in place of flat-head machine screws. The supervisor estimates that, working when power is off each night, it will require fifty days to install the new wire. This will be done with the regular force and without in any way interrupting service.

In an address before the convention of the National Association of Manufacturers, May 21, at the Hotel Pontchartrain, Detroit, Mich., Gilbert H. Montague, of the New York bar, assailed the Oldfield bill and other efforts at patent reform as endangering the present satisfactory and useful system on which the industrial prosperity of the country is foundationed. Mr. Montague insisted that the Sherman law, properly administered, will cover all the points in the Oldfield bill and declared that any tendency to restrict invention must undermine American supremacy in the industrial arts. At the present time, he pointed out, the 35,000 United States patents being issued annually constitute more than one-third of those granted by all the countries of the civilized world. Forty years ago, said the speaker, an effort was made to amend the United States patent system so that anyone by paying a fixed royalty to the patentee might carry on the manufacture of an invention, but the perils of such a policy were even then considered too great.

will in the future be replaced by electric locomotives of an approved design.

AN ITALIAN 1300-VOLT D. C. RAILWAY

The electrified Verona-Caldiero Railway is a 1300-volt direct-current line in Northern Italy. For part of its length it parallels for a short distance the main steam line between Venice and Milan. It is of standard-gage construction, consisting of 13.64 miles of single-track with turnouts about 2.5 miles apart. About one-half the mileage, that between



Verona-Caldiero 1300-Volt D. C. Railway—Construction on Right-of-Way

Verona and Caldiero, is on the highway, but private right-of-way is used from Caldiero to San Bonifacio. The maximum operating speeds of the electric passenger cars or trains, therefore, vary from 24.8 m.p.h. to 31 m.p.h., according to the way conditions. The freight service is still being handled by means of steam locomotives, but these



Verona-Caldiero 1300-Volt D. C. Railway—Construction on City Streets

The overhead construction is of the Siemens-Schuckert double-catenary type in open country and of double-span type in the towns. In both instances, however, two trolley wires are used, and these are of figure-eight profile of 80 sq. mm (approximately No. 000 B. & S.) cross-section.

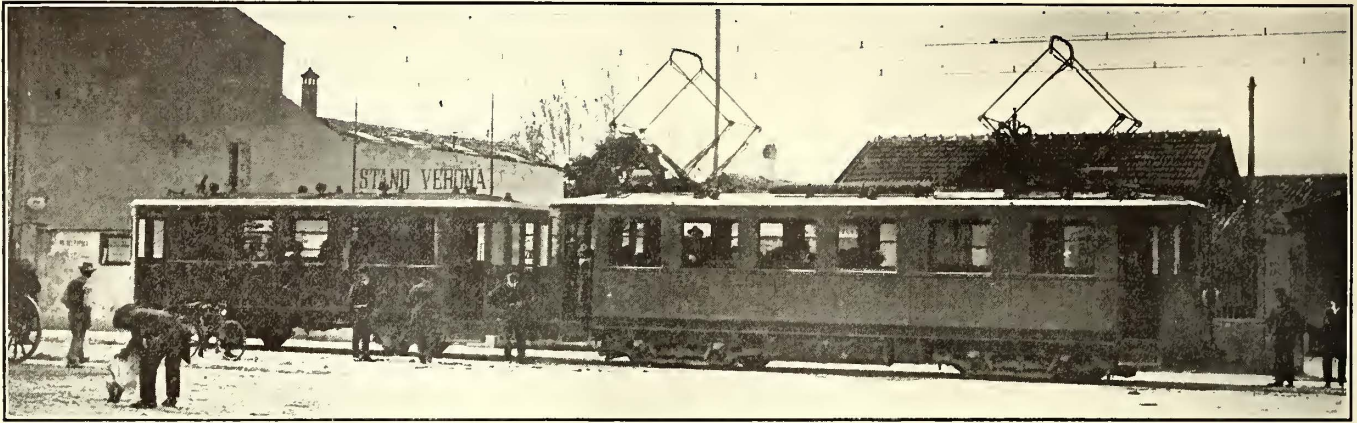
The over-

This double trolley was preferred to a single wire of larger area for several reasons; namely, the erection was easier, if one wire broke the other would still be available, and the wear of trolley wires and collector bows was decreased because a bow tension of 6.6 lb. to 8.8 lb. could be used instead of 13.2 lb. to 17.6 lb.

The actual cost of assemblage and erection for the two wires was no greater than for one. The multiple

regulation of the line are installed. All insulators are interchangeable.

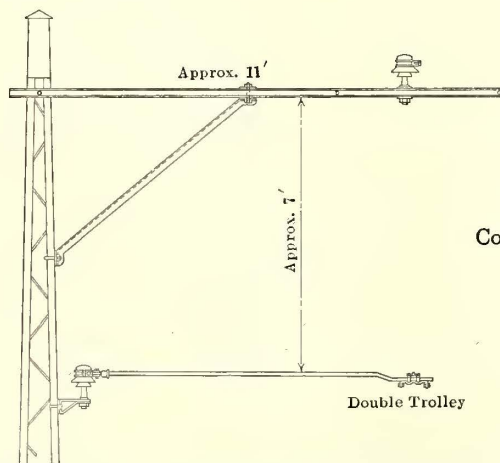
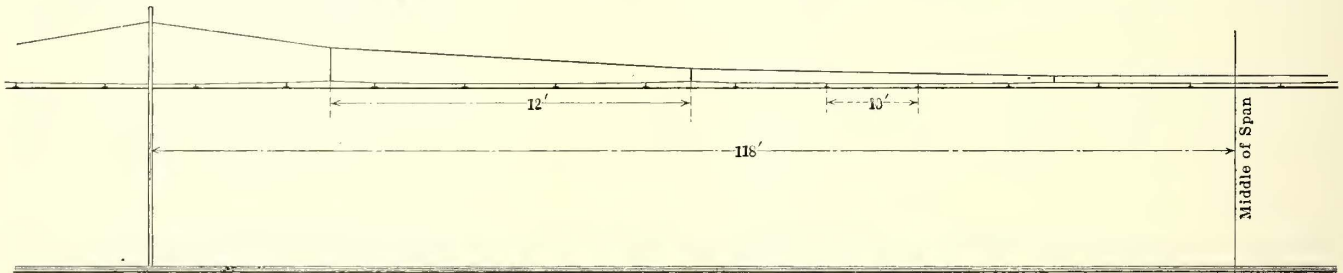
The cars are also operated at 1300 volts in passing through towns. The line construction in this case consists of the double-span catenary illustrated, the span wires being attached to rosettes in buildings on opposite sides of the street and insulated from the walls by means of two spool insulators. The average clearance of the trolley wire



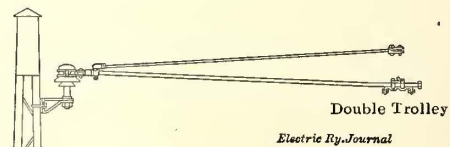
Verona-Caldiero 1300-Volt D. C. Railway—Motor Car and Trailer

catenary suspension is carried from latticed poles spaced 236 ft. through the medium of two brackets, the upper one of which consists of two channels about 3.2 in. high, placed back to back, and the lower of piping. This suspension consists of a seven-strand catenary of 50 sq. mm (approximately No. 0 B. & S.) cross-section, an auxiliary steel

throughout is 19 ft. 8 in. above the top of the rails. Three sets of horn-type lightning arresters are used for protection of the circuits. The line is operated with purchased hydroelectric power, which is transformed to 1350 volts d.c. by means of two 300-kw motor-generator sets installed in Verona. There are no substations of any kind on the line.



Construction for Outside Curve



Verona-Caldiero 1300-Volt D. C. Railway—Multiple Catenary Construction for Tangents and Curves on Right-of-Way and on Highways

catenary of 6-mm diameter (approximately No. 3 B. & S.), hangers between main and auxiliary catenary 39 ft. apart, the two trolley wires already named and sliding clamps hung at intervals of 10 ft. between the auxiliary catenary and the contact wires. The main catenary is continuous while the auxiliary is anchored about every 0.9 mile at the poles, where the weights used in the automatic tension

The rolling stock consists of new double-truck motor cars, each carrying two pairs of 650-volt motors, each pair being permanently connected in series.

The Palermo (Italy) Tramway has been granted a concession to construct an electric tramway in Palermo, from Pallavicino to Mondello.

Single-Phase Railway Motors

Principles of Some Common Types of Single-Phase Traction Motors and a Comparison of Rectifier Systems

BY LOUIS BELL, PH.D.

At a certain stage in the development of any art it is worth while to look over what has been done with the idea of getting a general view of the situation rather than studying petty details. The present discussion is for this purpose—to show the general principles which have been adopted in building single-phase motors for traction and the general results that may reasonably be expected.

To begin with, any electric motor consists of three essential parts, a fixed magnetic field, a rotatable magnetic field and means for preserving these two fields in the same relative direction, so that the stress between them shall be continuous instead of ending with the first angular displacement. In traction motors the fixed field is commonly provided by the ordinary field magnet. The rotatable field is that which is established by the current which traverses the armature, and the means for holding the two fields thus established in position to secure continuous rotation is, in the single-phase motors used for traction, some description of commutator. This is reducing the matter to its simplest terms. Further, in any motor, direct current or alternating, the torque between field and armature is proportional to the field magnet strength multiplied by the total strength of the magnetic field established by the current flowing through the armature conductors. It is this torque when arranged for continuous rotation that determines the output, whether uniform or pulsatory, of the motor. The direction of the rotation of the initial torque and the subsequent rotation is determined by the relative signs of the two magnetic fields set up. If of different sign, the torque is equivalent to attraction; if of the same sign, it is repulsion, as in the case of any magnetic poles. In the case of d.c. motors the field strength and the armature strength are nearly constant and depend on the uniform values of the currents through field magnet and armature. In a.c. motors the torque at any moment is approximately proportional to the instantaneous values of these fields, and the total output, other things being equal, is proportional to the summation of the various instantaneous values that occur throughout a complete cycle. In the former case the torque is constant, in the latter it is pulsatory to a greater or less degree.

Further, in the d.c. motor, the current flowing is determined, in effect, only by the applied electromotive forces and the resistance of the field and armature windings. In the a.c. motor it is, as in every case of alternating circuits, determined by the reactance as well. In the ordinary series d.c. motor the current is determined by the resistance of field and armature, but in such a motor the simultaneous reversal of direction of current in both armature and field does not affect the direction of the resulting torque, because both fields change signs together; hence a.c. applied to such a motor will give torque in a uniform direction, and this is the basis of one important group of a.c. motors for traction. But the reactance of an ordinary d.c. motor imposes a serious limitation on the current that can pass through it, and since, as in any other motor, the useful energy is determined by the motor electromotive force, it is necessary to make this large compared with the resistances of the armature and field. To do this it is necessary to increase the number and velocity of the armature wires and also to keep down the reactances. The first condition calls for a motor having a relatively simple field winding and a very powerful high-speed armature, while the second condition is favored by low frequency and general careful

design to reduce reactance. Furthermore, in every a.c. machine parasitic currents in the structure must be kept as low as possible, so that a series motor to run on a.c. should have the field magnet laminated as well as the armature.

The type then of the series a.c. motor is that shown diagrammatically in Fig. 1, with a relatively weak field and a very powerful armature connected in series, the whole magnetic structure being laminated. In point of fact, such a motor will run, but not very well. One important reason is that in every motor a relatively weak field and a relatively very powerful armature do not work well together, since the armature field tends to produce immense distortion of the field-magnet field, so that the torque-producing conditions change violently with change of load. Another difficulty is that if the conditions for commutation are good at one load the distortion will render them bad at other loads, besides which, with a rapidly alternating current supply, there are certain to be abnormally heavy currents in the coils short-circuited under the brushes which tend to produce serious heating and sparking. To obtain a motor which will work well on a.c. it is therefore necessary to provide means of preventing ab-

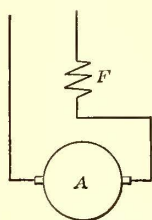


Fig. 1—Straight Series Motor

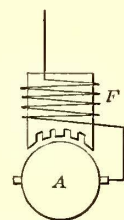


Fig. 2—Finzi Motor

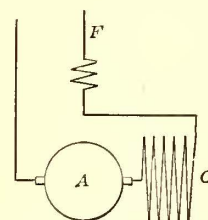


Fig. 3—Compensated Series Motor

normal field distortion and for holding down the current in the short-circuited coils.

Perhaps the simplest means of doing this, quite laying aside for a moment the historical development of this type of motor, are those provided in the Finzi construction successfully tried out in Italy more than a decade since. This is shown diagrammatically in Fig. 2. The method adopted for checking field distortion due to the armature was to slit the pole piece at right angles to the laminations so as to present a magnetic circuit of high reluctance to the cross-magnetization due to the armature. In addition, Finzi used somewhat high resistance in the commutator leads to keep down the short-circuit current, a device long familiar in d.c. apparatus. In small sizes at least this construction did passably well, and the performance of the early Finzi motors was highly creditable and was one of the things which went far to encourage further work in the line of single-phase railway motors. For large and powerful machines, however, and particularly those in which the output must be forced, these devices were not wholly sufficient, and the next logical step was the compensated series motor now very largely used.

In this machine, shown in Fig. 3, one finds the field *F* and the armature *A* as usual, but in addition a coil *C* in series with both and cross-magnetizing the armature so as to check the distortion, lessen the heavy armature reactance which produces it and hold the conditions of commutation fairly constant. High-resistance commutator leads

are also generally used in this construction. Such motors have played a very important part in the development of a single-phase system, and thanks to the compensation, run with very little sparking even under violent changes of load, have an admirable speed-torque characteristic and perform, as everyone knows, excellently on direct current, so that with suitable controlling apparatus they can be used indifferently on a.c. and d.c. service.

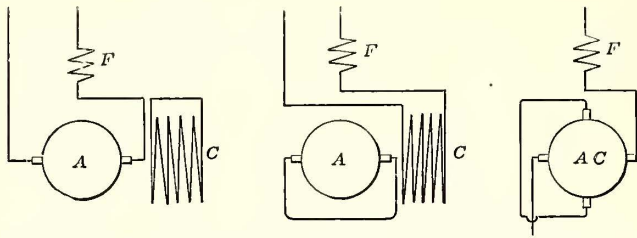


Fig. 4—Eickemeyer Motor

Fig. 5—Thomson Repulsion Motor

Fig. 6—Latour and Winter-Eichberg Motor

Now, in any alternating motor it is obviously possible to supply current to the field, to the armature or to both by induction as in a static transformer or induction motor. So long as the currents in the two fundamental elements are suitably timed with respect to each other so as to give the necessary torque conditions, it is a matter of little consequence whether they are led into the coils through brushes or induced in the coils as in the secondary of a transformer. Hence the motor of Fig. 4, one of the very earliest forms of compensated series motor devised by the late Rudolph Eickemeyer, whose masterly ingenuity left its mark on the early stages of electric railway development. In this motor the field and armature are in series as before, but the compensating coil *C*, wound in suitable direction to cross-magnetize the armature, is short-circuited upon itself and acts as a secondary of a transformer. This particular motor has not had an important application in practice but is extremely interesting as a forerunner of later developments.

Next in logical sequence of development, although very early in date, comes Fig. 5, the repulsion motor of Prof. Elihu Thomson. In this the field *F* and the compensating coil *C* are in series, but the armature is short-circuited upon itself through the brushes and the armature currents are produced by induction. The original motor of this type had the field coil and compensating coil united and disposed obliquely with respect to the brushes. The two components of the resulting magnetization with respect to the armature served the same purpose as the two coils in quadrature, shown in Fig. 5. In this case the working currents are induced in the armature, setting up a magnetization which reacts with the field *C*, which serves the double purpose of inducing armature current and steadying the working magnetization. From this repulsion motor, so called from the fact that in its fundamental form the closed circuit in the armature formed by the short-circuited brushes was thrust away from the magnet field, have been derived some of the most interesting and valuable types of single-phase traction motors. Indeed, the plain compensated repulsion motor of Fig. 5 is capable of doing very good work in this line, although the arrangement is commonly used only in starting.

Fig. 6 represents diagrammatically the circuits of the motors devised by Latour and by Winter and Eichberg. In these a composite magnetization is set up in the armature, the field and armature being in series as in Fig. 1, but the compensating field being provided by the armature winding itself in virtue of a second pair of brushes short-circuited upon each other and set 90 deg. from the series brushes.

It will be seen that all these arrangements carry out the

same fundamental idea of weak field and powerful armature, of low reactance which is kept down and the distortion and commutation conditions controlled by the cross-magnetizing field of a compensating coil. This coil is in series with both field and armature of Fig. 3, short-circuited in Fig. 4, in series with the field alone and reacting with an armature in which the current is induced in Fig. 5, and produced by part of the armature winding itself in Fig. 6.

Fig. 7, the Déri motor, somewhat resembles Fig. 6 but has its brushes short-circuited in pairs, of which at least one is movable, and one pair may be conceived to furnish the proper armature field and the second pair the compensating field.

Finally, there is the so-called series repulsion motor of Mr. Alexanderson, which has come with various modifications into large use. It is perhaps best described as a series motor in which the compensating coil is independently excited, the current being induced in the two elements of the winding as in the secondaries of two transformers or the branches of an auto-transformer. It belongs unmistakably to the series type of motor, but the independence of the compensating coil not found in the other designs here noted gives a certain freedom in design which is found to be advantageous from a practical standpoint.

Fig. 8 has its connections left open and represents the running condition of the motor, which starts with *F* and *C* in series and an auxiliary short-circuit around *A*, reducing the motor to a repulsion form equivalent to Fig. 5. In all these motors the compensating winding magnetizes the armature virtually in quadrature with the field, and the coil *C* is frequently actually wound so as to surround the armature at right angles to the main field flux. Those forms which work with an armature regularly short-circuited may often be most conveniently treated as induction motors with elliptical rotary fields, a view which is not here developed in order more closely to show the fundamental relationships between all these forms. Practically all motors can be considered from the rotary field standpoint if it is desirable for clearness of view, and, on the other hand, practically all motors can be considered from the standpoint of two independent magnetizations affecting the armature. There is nothing mutually exclusive in the two viewpoints, and the one here taken brings out some of the relations which exist in practical railway motors more simply than the other.

There are divers modifications of the same fundamental ideas, such as modifications introduced between the starting and running of the same machine, for which the connections are sometimes materially different, as has just been noted. Special commutating pole fields have also

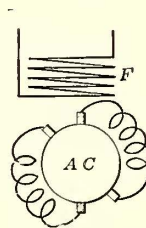


Fig. 7—Déri Motor with Two Pairs of Short-Circuited Brushes

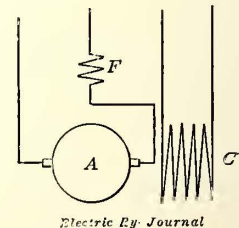


Fig. 8—Series Repulsion Motor

been introduced, as if auxiliary coils were to be wound on part of the field magnet of Fig. 2. But essentially all the single-phase commutator motors are laid out along the lines here set forth of a beautifully laminated magnet structure with a relatively weak field and very powerful armature, of which the field distortion with its resulting evils is controlled and the reactance held within bounds by a cross-magnetization, due either to separate compensating

coils or to the utilization of part of the armature winding for the same purpose.

High-resistance commutator leads are quite generally used to simplify some of the details of design, although they are not always necessary. All these motors work best at decidedly low frequency, which is important in reducing the reactance. Fifteen cycles or thereabout is the favorite frequency, although in some instances a frequency as high as twenty-five is employed, as in the St. Polten-Mariazell line of the Austrian State Railways.

As regards the relative qualities of these various forms of commutator single-phase motors, the results obtained are due more to fitness in design than to any radical differences between the principles involved. The motors of Figs. 3, 6 and 8 are probably more widely used than the others. They all start well, run well, commute well and result in motors of about the same general working characteristics, differing mainly only as they exemplify greater or less skill in the details of the design. Any motor is a series of compromises, and this is particularly true of the single-phase commutator type. The question of weight, output, efficiency and cost of such motors is a somewhat indeterminate one. As to the practical design, gains may be made in one of these features at the expense of one of the others.

Broadly the a.c. commutator motor may be expected to give less output with respect to its weight than a d.c. motor constructed with the same skill, merely because of the pulsatory character of the energy supply. High output can, however, be secured by sacrifice in other particulars, and the same is true of other features. It is merely a question of what particular characteristics one can best afford to sacrifice a little in order to produce a motor possessing the especial qualities which are desired as a matter of practical working.

The big salient fact which is here intended to be brought out is that in one or another of a few closely related forms an a.c. commutator motor can be built which is a thoroughly practical working machine for heavy electric traction. Such motors actually do start and run well, and the difficulties with commutation, at first greatly feared, have been for all practical purposes overcome. Powerful and successful locomotives of at least three of the types here shown are in actual use doing heavy work and giving good results, but a consideration of the differences in principle and practice as between one form and another may well be left for the manufacturers to fight out. The intention of this article is merely to indicate in the broadest general terms the various lines along which this interesting and valuable type of motor has been worked out. The actual and sometimes important details of design are, from the standpoint of the user, of much less consequence than the certainty of getting a powerful and reliable traction motor for large work.

THE RECTIFIER IN ELECTRIC RAILWAY PRACTICE

One of the most important modifications of the single-phase system in heavy traction work lies in the use of a.c. distribution, even clear up to the locomotives, with d.c. motors fed from some form of converter, either static or rotary, which will enable the advantages of the two systems to be united. This phase of the matter has been considerably discussed recently, but there seem to be regarding it as many shades of opinion as with respect to the relative merits of d.c. and a.c. motors. The general scheme runs back to the proposition for using the well-known Ward-Leonard system of control with a.c. distribution and high tension on the working conductors and a motor generator set with reducing transformers on the locomotive. At least one powerful machine of this kind was built and tried, we believe successfully, abroad. There stood, however, against this system the necessarily considerable weight of the converting apparatus. In principle it should, however, give most beautiful control, coupled with very low distribu-

tion losses and substantially no attention necessary outside the locomotive other than would be involved in the ordinary patrol of the line. Practically all heavy railway work is now carried on by an a.c. distribution up to the working conductor, and the main question to the front is whether it pays to extend the a.c. distribution clear up to the moving units.

Besides the Ward-Leonard system it has been proposed to use ordinary d.c. motors with a cascade converter, or with a permutator, or still more recently with the static mercury rectifier. The cascade converter is, of course, materially lighter than the motor generator; the permutator is still lighter, while the mercury rectifier should give even a much greater reduction in weight. The permutator locomotive has actually been tried on a large scale on the Midi line in France, and other experimental locomotives of various allied types have been built, including recently some experiments with the static rectifier.

To compare the systems briefly, the first three require, in addition to the rotary converting apparatus, static transformers of the full output of the locomotive as well, while the fourth, the mercury rectifier, is subject to the inconvenience that in order to get high efficiency the output voltage must be rather high and on the other hand cannot be conveniently made high enough to get along without a static transformer on the locomotive if the evident advantages of the high voltage on the working conductor are to be retained. It is this fact, perhaps, which has led some engineers to the view that if the static rectifier is to be used it might better be installed in stationary substations as on the locomotive, since the motor voltage must be somewhat abnormally high. From this view one would simply have the present familiar system with high-voltage motors adapted for perhaps 2000 volts or 2400 volts on the working conductor and static rectifiers instead of synchronous converters in the substations. This would lead to some reduction of cost in substation apparatus but would leave the distribution problem about where it now is. The only system which can be of great importance in simplifying the electrification of long lines for heavy service is one which carries high voltage clear up to the locomotive. For this service any of the four devices already mentioned is available besides the ordinary plan of using a.c. motors and dropping the rectifier matter altogether.

On the score of simplicity and high output per pound of weight the permutator and the mercury rectifier appear to be especially promising, with the permutator having the advantage as respects the voltage at the motors themselves. Just what the performance of ordinary motors would be when operated from the static rectifier current remains to be seen. The appearances would rather indicate that such a current would require a motor of somewhat special design, trending in the direction of the straight a.c. motor. From the standpoint of output it seems altogether likely that a commutating a.c. motor fed by a static transformer from a high-voltage working conductor would be at least the equal of any of the systems using rectified current. The static rectifier itself may prove to be a useful substitute for the synchronous converter in ordinary substation work. As respects the other systems, it remains to be proved whether from a practical working standpoint they have any substantial advantage over the use of straight a.c. motors. A few years ago the a.c. motor was in so dubious a state that current transformed to d.c. on the locomotive seemed a very desirable end. To-day it is at least an open question whether the game was worth the candle.

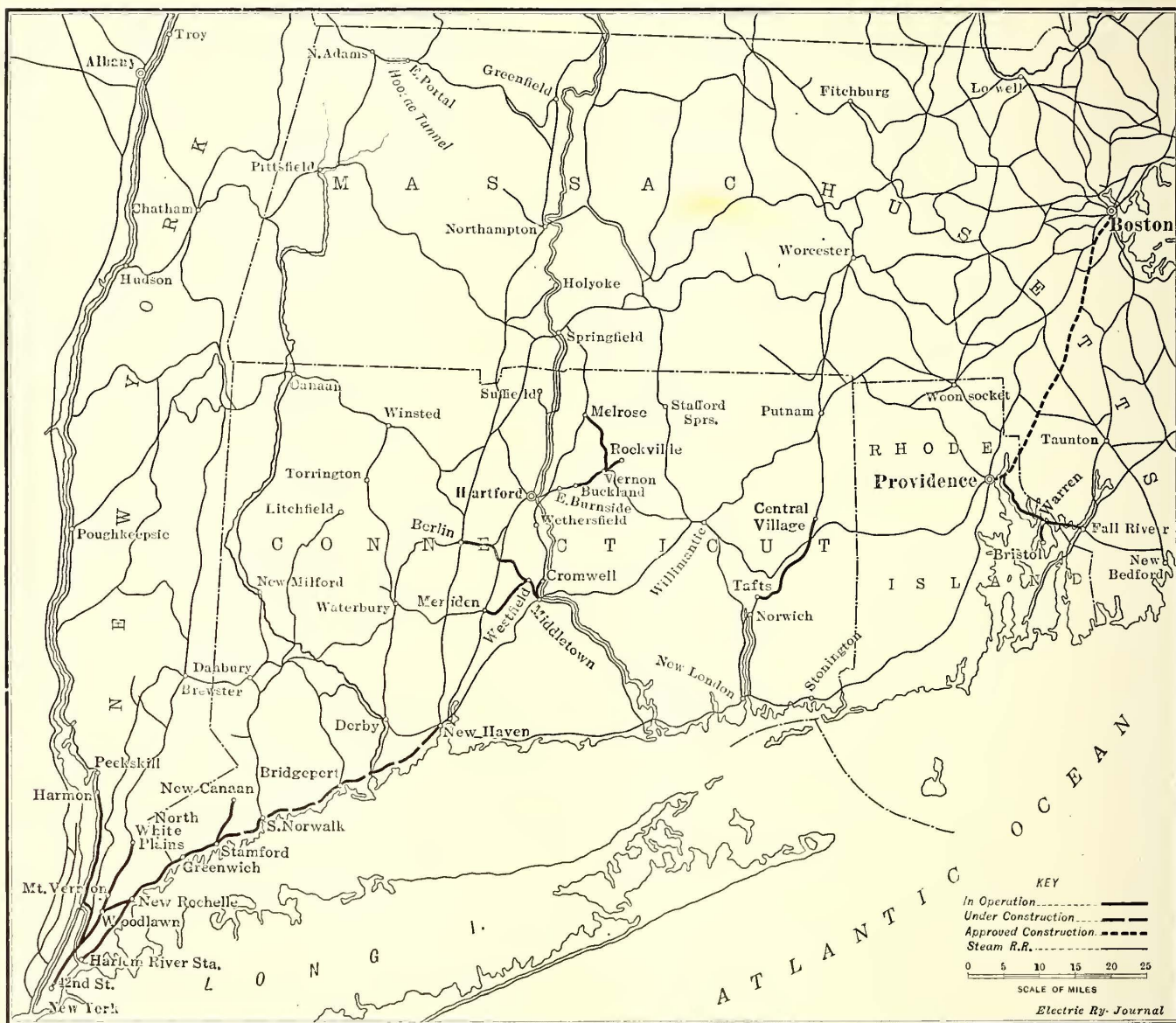
It is expected that Glenwood Park, near New Albany, Ind., owned by the Louisville & Northern Railway & Lighting Company, will be the scene of the celebration on Oct. 12-16, 1913, which will commemorate the one hundredth anniversary of the victory of Commodore Perry over the British on the Great Lakes.

Electrification Progress in the United States

This Article Reviews the Progress in Steam Railroad Electrification from the Earlier Tunnel and Terminal Work to the Long Distance and Mountain Railway Projects Now in Hand

Steam railroad electrification, in one sense, is almost as old as the electric railway itself, for among the first lines to be electrified were the dummy roads in the suburbs of the larger cities and the shorter steam railroad branches which had become part of urban traction systems. However, as all of these installations were independent of trunk-line service they will be omitted in the following review. An earlier table and bibliography of all classes of steam

records of the original equipment were presented by J. E. Muhlfeld, general superintendent of motive power Baltimore & Ohio Railroad, on Feb. 16, 1906, before the New York Railroad Club and published in the STREET RAILWAY JOURNAL for Feb. 24, 1906. Two electric locomotives, as described in the ELECTRIC RAILWAY JOURNAL for Nov. 26, 1910, were added in the latter year to the original four machines named by Mr. Muhlfeld.



American Electrifications—Lines of the New York Central, New Haven and Boston & Maine Railroads

railroad electrifications will be found on page 539 of the STREET RAILWAY JOURNAL for Oct. 12, 1907.

BALTIMORE & OHIO RAILROAD

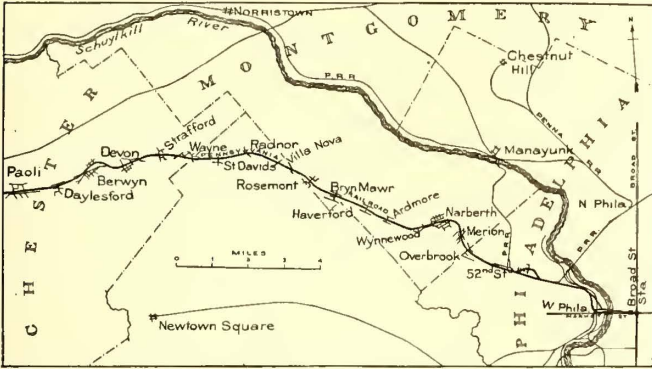
It is an interesting coincidence that the Baltimore & Ohio Railroad which in 1828 placed in service the first American-built steam locomotive on its initial 3 miles out of Baltimore should also have been the pioneer user of heavy electric locomotives. Its Belt Line tunnel at Baltimore, comprising 7.4 miles of single track, was electrified on the third-rail system in 1895 to eliminate ferriage and give this railroad direct entrance to Baltimore. Performance

NEW YORK, NEW HAVEN & HARTFORD RAILROAD

The New York, New Haven & Hartford Railroad, which holds the lead in length of electrified track, entered the electrification field in 1895, when it equipped with electric power for d.c. overhead operation a total of 16.8 miles of single track between Nantasket Beach and Pemberton, Mass., on a peninsula about 10 miles southeast of Boston, as described in the STREET RAILWAY JOURNAL for July, 1895. This line is operated with electricity now only in summer.

The company's first heavy interurban electrification, and

the first undertaken by any trunk line in the United States, was the equipment in 1902 of the Providence-Warren-Bristol-Fall River branch with the 550-volt d.c. simple overhead system. This Rhode Island line was described in the STREET RAILWAY JOURNAL for March 1, 1902, and its location and route are also shown in the accompanying general map of the New Haven company's electrifications.



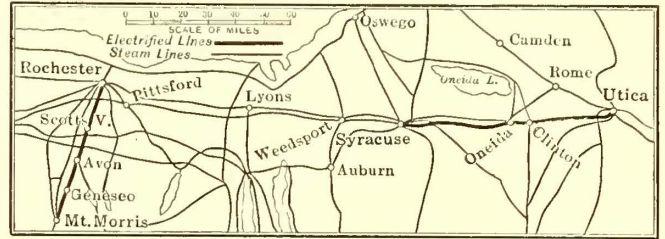
American Electrifications—Approved Paoli Suburban Line, Pennsylvania Railroad, Out of Philadelphia

It is 38.5 miles in length, measured as single track, and consists of a double track from Providence to Warren, a single track from Warren to Bristol and Fall River respectively, sidings at Providence, etc. The service is of standard interurban character and includes the handling of baggage. Electrification of this line made it possible to give a faster schedule despite an increase in the number of stops made by local trains.

During 1907 the New Haven company added to its branch electrifications the Middletown-Berlin-Meriden and Hartford-Vernon-Melrose lines in Connecticut. The Middletown-Berlin section, 10.4 miles long, and the Middletown-Meriden section, 7.2 miles long, are of 600-volt d.c. plain overhead construction. They were electrified to give more profitable feeders for the trunk lines and to build up

deflected to the steam railroad right-of-way from Buckland, Manchester and Talcottville to Vernon Junction, a distance of about 16.8 miles single track. At Vernon Junction the line swings to the north and passes to Rockville and Melrose over single-track branches totaling 14.7 miles of single track. The electrification of these lines made it possible to bring passengers into the business section of Hartford and to improve the headway through the operation of single cars. This line, which is of the d.c. catenary type, was described in the issue of the STREET RAILWAY JOURNAL for Dec. 7, 1907.

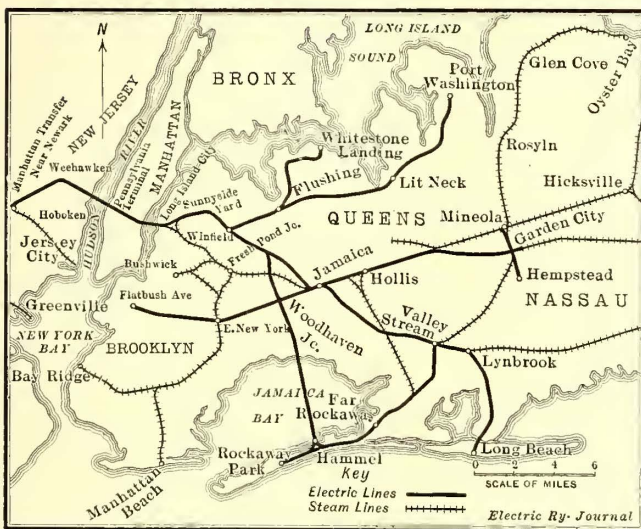
In addition to these d.c. electrifications, the New Haven



American Electrifications—Erie and West Shore Railroads, Central New York

company's tracks between Middletown and Cromwell, Taft and Central Village, etc., carry trolley cars of its subsidiary, the Connecticut Company, besides the regular steam service.

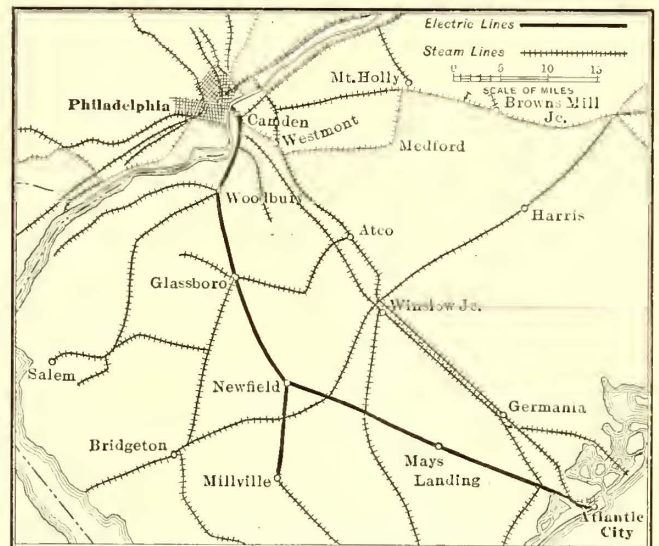
The 11,000-volt, single-phase, twenty-five-cycle main-line electrification of the New York, New Haven & Hartford Railroad is too well known to require any description, numerous articles on this subject having been published in the STREET RAILWAY JOURNAL and the ELECTRIC RAILWAY JOURNAL since 1905. A general review of the locomotive development on this system was published in the issue of Feb. 17, 1912. The section now in operation comprises 21.5 miles of route, or 109.3 miles of single track, between Woodlawn at the New York City line and Stamford, and the Harlem River branch as shown has just been completed



American Electrifications—Long Island Railroad and Pennsylvania Terminals

the towns served by providing connections with the local street cars. A description of the Middletown electrification was printed in the STREET RAILWAY JOURNAL for Sept. 21, 1907.

The Vernon and Melrose lines follow the tracks of the Hartford street railway system of the Connecticut Company for 2.5 miles to East Burnside, where the cars are



American Electrifications—West Jersey and Seashore Division, Pennsylvania Railroad

with 63.4 miles of main line and 78 miles of yard track, a total of 141.4 miles of single track. The main line electrification for the 41 miles between Stamford and New Haven now nearing completion will comprise 170 miles of main-line track and 40 miles of yards and sidings, or 210 miles in all. Furthermore, the board of directors has approved the electrification of the four-track main line

between Providence and Boston, a distance of approximately 50 miles. This work will call for 196 miles of main-line track and 20 miles of yards and sidings, a total of 216 miles. The figures for the Providence-Boston electrification are subject to change as the plans are not yet matured, but the single-phase mileages of the Harlem River and Stamford-New Haven divisions are approximately correct. The total single-phase electrification of this character with the completion of the Providence-Boston line will be about 700 miles of single track.

This company also operates a single-phase cross-country line of light catenary type between Stamford and New Canaan, comprising 7.7 miles of single track. This road carries electric passenger cars and steam freight, the latter being handled at night.

On May 27, 1911, the Boston & Maine Railroad placed in service the Hoosac Tunnel, which had been electrified for 11,000 volts, twenty-five cycles, single-phase, in conformity with the practice of the New York, New Haven &

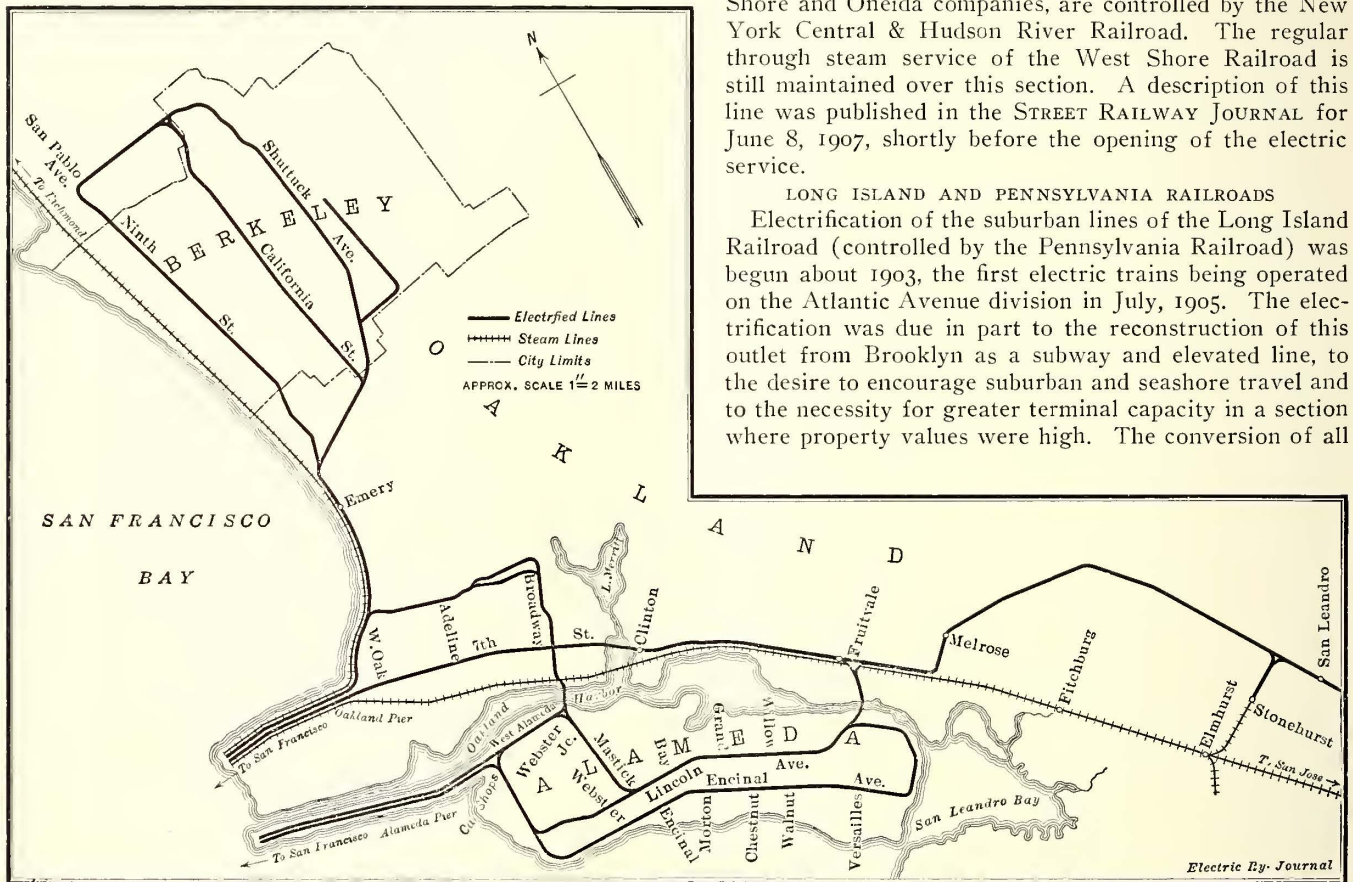
now being jointly considered by the railway company and a committee of the Board of Estimate and Apportionment of New York. The latest data on the operations of the electric zone of the New York Central company will be found on pages 586 and 587 of the ELECTRIC RAILWAY JOURNAL for March 29, 1913.

The electrification of the Detroit River tunnel, 19.2 miles of single track, was completed in October, 1910, by the Michigan Central Railroad, a subsidiary of the New York Central & Hudson River Railroad. This is a 650-volt direct-current third-rail line, as described in the ELECTRIC RAILWAY JOURNAL for Jan. 14 and 21, 1911.

The Oneida Railway is a 600-volt direct-current third-rail line, comprising 44 miles of route or 118 miles of single track. It is an electrification of the main line of the West Shore Railroad between Utica and Syracuse, New York. The passenger cars operated by the Oneida Railway over this section also arc run over the tracks of the Utica and Syracuse street railway systems, which, like the West Shore and Oneida companies, are controlled by the New York Central & Hudson River Railroad. The regular through steam service of the West Shore Railroad is still maintained over this section. A description of this line was published in the STREET RAILWAY JOURNAL for June 8, 1907, shortly before the opening of the electric service.

LONG ISLAND AND PENNSYLVANIA RAILROADS

Electrification of the suburban lines of the Long Island Railroad (controlled by the Pennsylvania Railroad) was begun about 1903, the first electric trains being operated on the Atlantic Avenue division in July, 1905. The electrification was due in part to the reconstruction of this outlet from Brooklyn as a subway and elevated line, to the desire to encourage suburban and seashore travel and to the necessity for greater terminal capacity in a section where property values were high. The conversion of all



American Electrifications—Southern Pacific Railway's Suburban Lines at Berkeley, Oakland and Alameda, Cal.

Hartford Railroad. This line, comprising 22 miles of track, was described in the ELECTRIC RAILWAY JOURNAL for July 1, 1911.

NEW YORK CENTRAL & HUDSON RIVER RAILROAD

As is well known, the New York Central and New Haven electrifications were accelerated by the compulsory conversion of the joint viaduct and tunnel entrance to the Grand Central Station via Park Avenue, New York. Unlike the a.c.-d.c. electrification of the New Haven company, the New York Central equipment is direct-current, third-rail throughout. The latter electrification comprises two lines out of New York City, the Harlem division to North White Plains, 24.4 miles northeast, and the Hudson (main-line) division to Harmon, 34 miles north of New York, a total of 234.4 miles of single track. The New York Central & Hudson River Railroad has no immediate plans for additional main-line work, but a plan to electrify its freight entrance along the Hudson River in New York City is

parts of the suburban system for third-rail, 600-volt operation has not yet been completed, but the electric lines, as indicated on the map, now total 1868 miles of single track. Articles on this electrification appeared in the STREET RAILWAY JOURNAL for Nov. 4, 1905, April 7 and June 9, 1906, and in the ELECTRIC RAILWAY JOURNAL for March 26, 1910, and June 10 and 17, 1911.

During 1910 the Pennsylvania Railroad completed its New York terminal, comprising 98.4 miles of d.c. third-rail construction from Manhattan Transfer station opposite Newark to Long Island City, via a new route to Bergen Hill and through tunnels under the Hudson River, Manhattan Island and East River. The principal articles on this installation appeared in the ELECTRIC RAILWAY JOURNAL for June 3 and June 10, 1910, and an article on the maintenance of these locomotives in the issue of March 15, 1913. It may be added that by arrangement made in 1911 with the Hudson & Manhattan Railroad cars of the

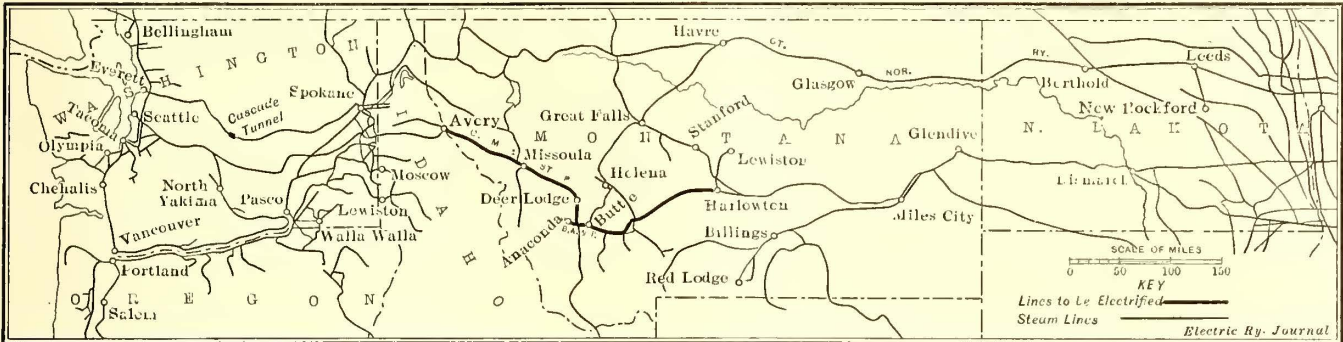
latter company are operated electrically over the right-of-way of the Pennsylvania Railroad between Newark and Jersey City.

The West Jersey & Seashore division of the Pennsylvania Railroad between Camden (opposite Philadelphia) and Atlantic City comprises 150.3 miles of 700-volt d.c. third-rail construction. This electrification was due chiefly to the desire to encourage seashore travel on high-speed

ELECTRIC RAILWAY JOURNAL for Oct. 21 and 28, 1911, and Oct. 5, 1912. The last article describes the electric locomotives, which are to be used chiefly for freight service.

GRAND TRUNK RAILWAY

The electrification of the Grand Trunk Railway, as carried out in 1908 under the name of the St. Clair Tunnel Company, comprises 4 miles of tunnel track at Port Huron, Mich., operated at 3300 volts, twenty-five cycles, single-



American Electrifications—Map of Electrified Lines in the Northwest, Showing Route of Chicago, Milwaukee & Puget Sound Railway

trains. The electric service was opened Sept. 18, 1906. Articles describing this line or presenting operating data were published in the following issues: Nov. 10, 1906; Oct. 12, 1907; March 26, 1910; July 1, 1911.

Another map shows the route of the approved Philadelphia-Paoli electrification, a distance of 20 miles. As noted on page 515 of the ELECTRIC RAILWAY JOURNAL for March 15, 1913, this line is to form the beginning on a general electrification of the Pennsylvania's lines in and about Philadelphia. The length of the electrification, measured as single track, will be approximately 90 miles, according to the number of sidings converted.

ERIE RAILROAD

In June, 1907, the Erie Railroad completed the electrification of its Mount Morris division between Rochester, Avon, Geneseo and Mount Morris, N. Y., a route distance of 34 miles, equivalent to 40 miles of single track. This line, which is of interurban passenger character, is operated at 11,000 volts, twenty-five cycles, single-phase, with Niagara power. Two articles on this line appeared in the STREET RAILWAY JOURNAL for Oct. 12, 1907. Operating results

phase. This work was described in the ELECTRIC RAILWAY JOURNAL for Nov. 4, 1908.

GREAT NORTHERN RAILROAD

The electrification of the Great Northern Railway's Cascade tunnel, between Leavenworth and Skykomish, about 100 miles east of Seattle, was completed in July, 1909, for three-phase, twenty-five cycle, 10,000-volt operation. This is the only three-phase line in the United States. It has 6 miles of single track, including the approaches. The distance between Leavenworth and Skykomish, the proposed completed three-phase electrification, is 57 miles. The line was electrified to eliminate smoke troubles and increase the

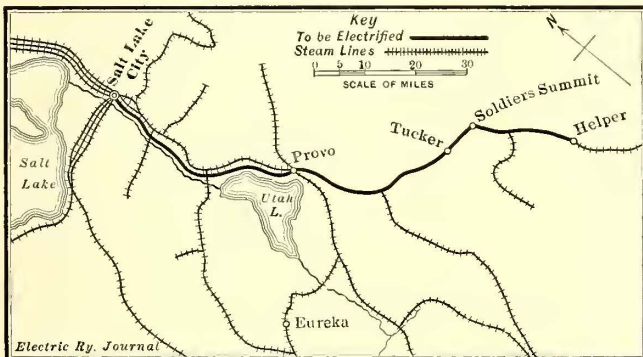
ELECTRIFIED STEAM RAILROADS IN THE UNITED STATES IN OPERATION OR UNDER CONSTRUCTION

Railway	Miles of Single Track	System of Electrification	Total Mileage
Baltimore & Ohio	7.4	Low voltage d.c.	...
N. Y., N. H. & H. and B. & M.	104.4	Low voltage d.c.	...
New York Central lines	371.6	Low voltage d.c.	...
Pennsylvania system	435.5	Low voltage d.c.	...
Total of low voltage direct current			918.9
Butte, Anaconda & Pacific	90.0	High voltage d.c.	...
Southern Pacific	96.0	High voltage d.c.	...
Total of high voltage direct current			186.0
Grand Trunk	4.0	Single-phase	...
Erie	40.0	Single-phase	...
N. Y., N. H. & H.	490.4	Single-phase	...
Total of single-phase			534.4
Great Northern	6.0	Three-phase	...
Total of three-phase			6.0
Grand total			1645.3

LINES APPROVED FOR ELECTRIFICATION.

Pennsylvania	90*	Not decided	...
Norfolk & Western	75	Not decided	...
Denver, Rio Grande & Western	114	Not decided	...
Chicago, Milwaukee & Puget Sound	440	Not decided	...
Great Northern	530	Not decided	...
Grand total			1249

* Paoli electrification, mileage approximate.



American Electrifications—Denver & Rio Grande Company's Line in Utah

were presented in the ELECTRIC RAILWAY JOURNAL for June 19, 1909, and the most recent data will be found elsewhere in the current issue.

SOUTHERN PACIFIC RAILROAD

During 1911 the Southern Pacific Railroad converted 96 miles of suburban steam track in and about Oakland, Alameda and Berkeley, Cal., to overhead 1200-volt d.c. overhead operation. Descriptions of this work appeared in the

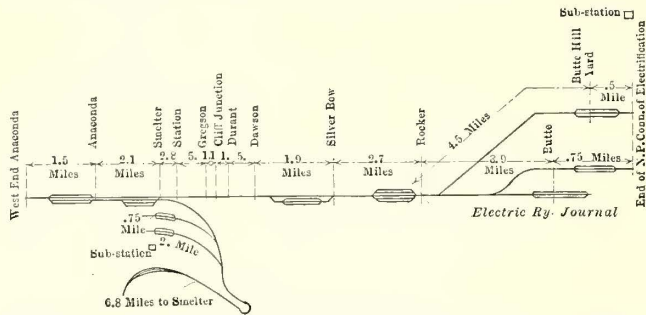
capacity. A description of this installation was published in the ELECTRIC RAILWAY JOURNAL for Nov. 20, 1909.

This company is also said to be considering the electrification of a 530-mile line between New Rockford, N. D., and Lewistown, Mont., for which roadbed and other construction contracts have been awarded. In this case electrification is said to be favored owing to the poor coal and water conditions for locomotives. A discussion of this subject was published on pages 117 and 118 of the ELECTRIC RAILWAY JOURNAL for Jan. 18, 1913.

CHICAGO, MILWAUKEE & PUGET SOUND RAILWAY

The Chicago, Milwaukee & Puget Sound Railway has already contracted for hydroelectric power to operate its line from Harlowton, Mont., to Avery, Idaho, a distance of 440 miles. It is probable that a 2400-volt d.c. system will

be used. Avery is 2495 ft., Harlowton 4163 ft. and the intermediate town of Deer Lodge 4520 ft. above sea level. The distance between Avery and Deer Lodge, the proposed initial electrification, is 211.5 miles and between Avery and Harlowton 439.3 miles, all single track. Articles on this mountain project were published in the *ELECTRIC RAILWAY JOURNAL* for Jan. 11, 1913, and Feb. 15, 1913.



American Electrifications—Diagrammatic Map of Butte, Anaconda & Pacific

DENVER, RIO GRANDE & WESTERN RAILWAY

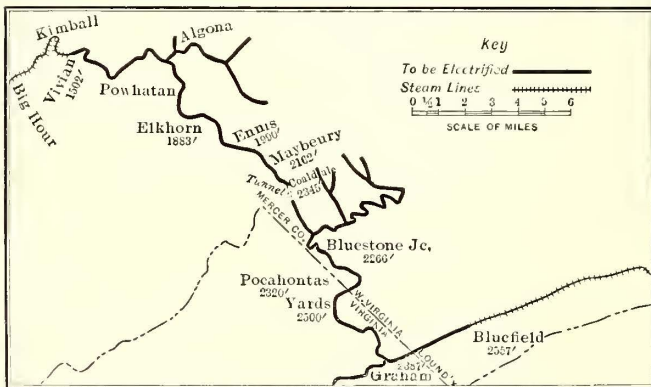
The Denver, Rio Grande & Western Railway has decided to electrify one 114-mile mountain division. The distance from Helper to Soldier Summit, which is to be the initial electrification, is 29 miles and from Helper to Salt Lake City, 114 miles. Helper is 5840 ft., Soldier Summit 7454 ft. and Salt Lake City 4224 ft. above sea level. Preliminary articles on this electrification appeared in the *ELECTRIC RAILWAY JOURNAL* for Nov. 23 and Nov. 30, 1912.

BUTTE, ANACONDA & PACIFIC RAILROAD

The Butte, Anaconda & Pacific Railroad is an ore-carrying mountain line comprising 114 miles of single track, 90 miles of which are being electrified for 2400-volt d.c. operation. Articles on this installation have appeared in the *ELECTRIC RAILWAY JOURNAL* for Feb. 10 and Aug. 31, 1912, and on page 20, Jan. 4, 1913. A description of the locomotives appears in this issue.

NORFOLK & WESTERN RAILWAY

The latest mountain electrification is that of the Norfolk & Western Railway for the heavy coal-carrying line between Vivian and Bluefield, W. Va., comprising 30 miles of route or 75 miles of single track. The operating conditions on this line were described in the *ELECTRIC RAILWAY JOURNAL* for May 3, 1913, and the general course of the line and topographical conditions are shown in the accompany-



American Electrifications—Norfolk & Western Railway

ing map. The system of electrification has not yet been selected.

Plans have been prepared for a proposed narrow-gage electric railway in Switzerland between Arzier and St. Cergue and to La Cure and Morez. The line would be about 25 miles long, about 8 miles of which would be in French territory.

LOCOMOTIVES FOR THE BUTTE, ANACONDA & PACIFIC

The electrification of the Butte, Anaconda & Pacific Railway is of exceptional interest because it is the first in this country where direct-current locomotives operating on as high a potential as 2400 volts will be employed. Construction work necessary to effect the change from steam to electric equipment is now practically completed, and the road is at present being operated to some extent by electric power.

The section of line that has been electrified lies between Butte and Anaconda, Mont. It comprises 30 miles of main-line single track and numerous sidings, yards and smelter tracks, aggregating a total of about 90 miles on a single-track basis. The haulage of copper ore from the Butte mines to the smelters at Anaconda, which is the principal traffic, together with all mine supplies, lumber, etc., moving in both directions, amounts to practically 5,000,000 tons of freight per year. The freight trains, weighing 3400 tons and made up of fifty loaded ore cars, will be handled against a ruling grade of 0.3 per cent by locomotives consisting of two of the units illustrated. Single units will be used for making up trains in the yards and for spotting cars.

The initial equipment consists of seventeen units, fifteen for freight and two for passenger service. Each unit weighs approximately 80 tons. The two units forming the freight locomotive in each case will be coupled together and operated in multiple, and combination locomotives will haul the 3400-ton train at a maximum speed of 15 m.p.h. against the ruling grade and at 21 m.p.h. on level tangent track.

The passenger locomotives are the same design as the freight locomotives, except that they are geared for a maximum speed of 45 miles per hour on level tangent track. A schedule of eight passenger trains per day, four each way, is maintained, the average train being composed of a locomotive and three standard passenger coaches. All the locomotive equipment, as well as the substation apparatus and overhead line material, was designed and built by the General Electric Company. One of the locomotives will be exhibited at the Master Mechanics' and Master Car Builders' conventions at Atlantic City.

The general design is of the articulated double-truck type, all weight being on the drivers. The cab, containing an engineer's compartment in each end and a central compartment for the control apparatus, is carried by the two truck frames on center pins. It is of the box type, extending the entire length of the locomotive, and is provided with end and side doors. Friction draft gear mounted on the outer end frame of each truck transmits the hauling and buffing stresses directly through the truck frame, diverting these strains from the center pins and underframe.

The trucks are built of heavy steel castings. The side frames are of a truss pattern with heavy top and bottom members and pedestal tie bars. They are connected by end frames and a cast-steel center transom. The entire weight is carried on semi-elliptic springs suitably equalized. On each axle is mounted a motor of the twin-gear type.

The cab underframe consists of two 12-in. longitudinal steel channels on either side of the center and two 6-in. x 6-in. steel angles along the outer edge. The central channels are inclosed and form a distributing air duct for forced ventilation. Air is conducted through the center pins, which are hollow, into the truck transoms and thence to the motors. The engineer's compartment, at either end of the cab, contains the operator's seat, controller, air-brake valves, bell and whistle ropes, ammeter, air gages, sanders and other control apparatus that should be within immediate reach of the engineer.

In the central section is grouped the control apparatus. The contactors, reverser and rheostats are mounted in two banks running lengthwise of the compartment and are arranged with ample space between them to afford con-

venient access for cleaning, inspection and repair. All parts and circuits carrying 2400 volts are thoroughly protected from accidental contact. A dynamotor is employed to furnish 600 volts for the operation of the contactors, lights and air compressor.

The principal data and dimensions applying to the locomotives are the following:

Length inside of knuckles.....	37 ft. 4 in.
Height with trolley down.....	15 ft. 6 in.
Width over all.....	10 ft. 0 in.
Total wheelbase.....	26 ft. 0 in.
Rigid wheelbase.....	8 ft. 8 in.
Total weight.....	160,000 lb.
Wheels, diameter.....	46 in.
Tractive effort at 30 per cent coefficient.....	48,000 lb.
Tractive effort at one hour rating.....	30,000 lb.
Tractive effort at continuous rating.....	25,000 lb.

The motors are of the GE-229-A commutating-pole type, wound for 1200 volts and insulated for 2400 volts. A forged pinion is mounted on each end of the armature shaft and meshes into a corresponding gear mounted on the wheel hub, providing a gear reduction of 4.84 on the freight locomotives and 3.2 on the passenger locomotives. The motor is designed especially for locomotive service, is inclosed and provided with forced ventilation. Air is circulated over the armature and field coils and over and through the com-

mutator, through longitudinal holes in the armature core, and thence exhausted through openings in the bearing head. The continuous capacity of each motor is 190 amp on 1200 volts under forced ventilation, and the input is 225 amp on 1200 volts for the one-hour rating. For the double unit the continuous rating is equivalent to an output of 2100 hp.

The operating equipment on the locomotives includes the Sprague-General Electric Type M multiple-unit control, and it is designed to operate the four motors in series and series-parallel. The pairs of motors with their respective resistances are all connected in series on the first point of the controller. The resistance is varied through nine points on the controller and finally short-circuited on the tenth or running point. The pairs of motors are then operated similarly in series-parallel and all resistance is cut out on the nineteenth point, which is the full-speed running point. This provides a control with ten steps in series and nine steps in series-parallel.

The transition between series and series-parallel is effected without opening the motor circuit, and there is no appreciable reduction in tractive effort during the change, the smooth transition between control points permitting acceleration close to the slipping point of the wheels. A switch having manually operated handles for cutting out either pair of motors is provided so that the locomotive can

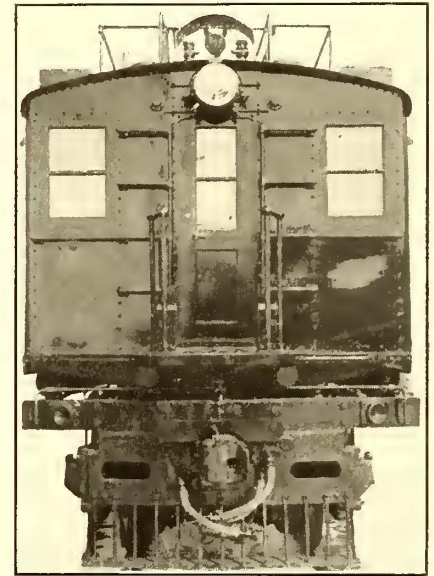
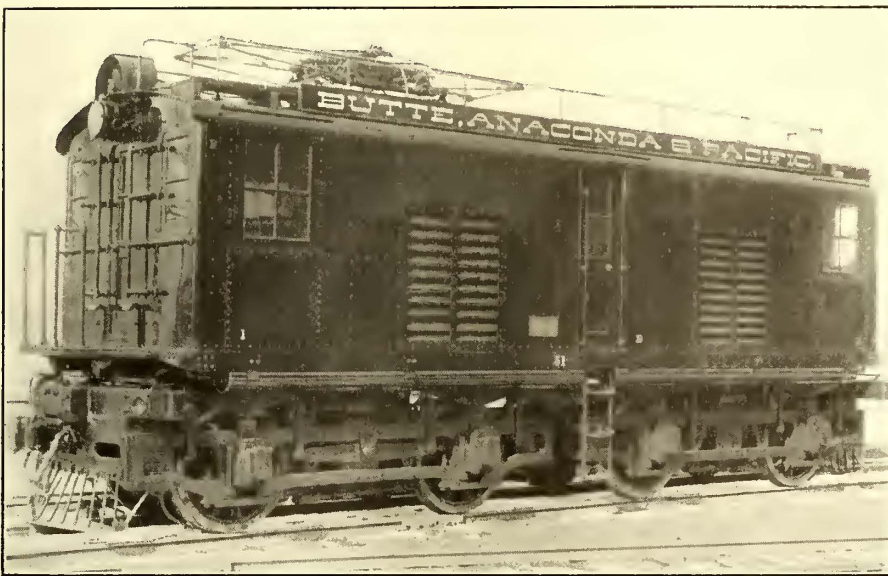
if necessary be operated with one pair of motors in the usual way. The contactors are actuated by the 600-volt circuit obtained from the dynamotor and are of a design similar to that employed in the standard Type M control.

The main switch is provided with a powerful blow-out so that heavy currents can be opened. The three smaller switches, one for each of the two heaters and one for the dynamotor circuits, are designed specially for 2400 volts. The blades are controlled by levers attached to the grounded part of the locomotive frame and insulated from the live parts of the switch by rods of treated wood.

There are two fuses for the motor circuits and one main fuse for the trolley circuit, all of the copper-ribbon type and fitted with hinged covers to facilitate fuse renewals.

An ammeter is located at each engineer's position and indicates the current in the circuit of one pair of motors. The ammeter and air gages are illuminated by a gage light connected in the headlight circuit, so that the headlight switch turns on simultaneously the headlight and gage light at the same end of the locomotive.

The main motor rheostats are formed of cast-iron grids assembled in a frame and insulated by mica. Twenty resistance units are provided for each passenger locomotive



Butte, Anaconda & Pacific Equipment—Side and End Views of 2400-Volt Freight Locomotive

and twenty-six for each freight unit locomotive, the units being mounted in an inclosed compartment above the banks of contactors.

Current is collected by overhead trolleys of the pantograph type. They are pneumatically operated and can be put into service from either engineer's compartment by a hand-operated valve. Each passenger locomotive is equipped with two collectors and each freight unit with one collector. A 2400-volt insulated bus line connected direct to the pantograph is run along the center on the roof of the cab, and the bus lines are connected by couplers between the two units of the freight locomotive, so that current may be obtained from both collectors or from a single collector as desired. The collectors and bus lines are adequately guarded by railings.

The locomotives are equipped with arc headlights and the interior illumination of the cab is provided by ten incandescent lamps arranged in two circuits, one lamp being placed in each engineer's cab and the others in the central compartment. In each lamp circuit is a portable lamp with an extension cord. One lamp switch is located in each engineer's cab, so that one lamp circuit can be controlled from each end of the locomotive. A 600-volt bus line is provided on the passenger locomotives for lighting and a 2400-volt bus line for heating the passenger coaches.

Papers at the N. E. L. A. Convention

Abstracts Are Published of a Number of the Papers Read and Reports Presented at the Convention of the National Electric Light Association in Chicago on June 3-6

The annual convention of the National Electric Light Association was held at the El Medinah Temple in Chicago this week. The meeting began with a general session on Tuesday in the main auditorium. The association then divided into its different sections and there were technical, commercial, accounting, hydroelectric and public policy sessions. Abstracts of a number of the papers and reports of committees presented at the meeting follow.

PRIME MOVERS

The committee on prime movers submitted a 100-page report covering the development of water, steam and gas units during the past year. It was stated that there has been no striking development in any of the various forms of prime movers applicable to central-station use. However, much thought has been given to improving the efficiency of waterwheels and steam turbines, and an earnest effort has been made to develop an internally fired heavy-oil engine.

Optimistic letters from the General Electric Company and the Westinghouse Machine Company published in full in the report indicated that the trend of rotative speed in steam turbines was upward and that the several minor changes that had been made in design had helped to improve the efficiency. Steam turbines for driving station auxiliaries were reported to be bidding fair to supersede all other competitive apparatus. In connection with high-pressure turbines the committee called attention to the statement of Dr. S. Z. Ferranti, who had said that he expected to be able to produce a high-superheat turbine capable of operating on less than 6 lb. of steam per brake-hp-hr. It was the suggestion of the committee that a condenser should be designed to get the steam to and not through the cooling surface. The use of baffles was regarded unfavorably as they established an undesirable back pressure in the condenser.

The question of adequate opening for admitting air for draft to boiler houses led to calculations with rather startling results. It was stated that if in an assumed boiler room containing twenty 500-hp boilers the air for the draft was compelled to enter through a 7-ft. by 7-ft. doorway the velocity of the blast would reach 50 miles an hour. These figures were presented as an argument for adequate draft opening both in winter and summer. The value of apparatus for determining flue gas composition seemed subject to a wide divergence of opinion. It was the opinion of the committee that a steam-flow meter could perform essentially all of the functions claimed for the CO₂ meter. Because of the high calorific value of petroleum oil and its great adaptability to boiler work it was almost the ideal fuel and the comparatively recent discovery of oil fields in Mexico was looked upon as an important factor in placing it again among fuels.

The committee in presenting for discussion the term "myriawatt" in an effort to get rid of the term boiler-horse-power suggested that the question of adoption of such a unit be put into the hands of the national engineering societies.

In the report on gas power it was stated that the market for gas and oil engines had been unusually quiet in the past twelve months and this was attributed to the great trend toward the centralization of generating stations. Owing to the relatively large investment and maintenance cost even the smaller units had suffered a loss in the prestige accorded them by the industries a few years ago. There were approximately 300 installations of medium and heavy-duty oil engines, aggregating 75,000 hp, in operation

in the United States, indicating that the oil engine had assumed a definite part in the production of power in this country. Although no gas turbine had yet been developed, engineers engaged in the development of the internal-combustion engine had long realized the advantage of substituting rotary movement for reciprocating motion. So far the practical difficulties had not been surmounted. Much useful knowledge, however, had been obtained by able experimenters.

ELECTRICAL APPARATUS

The committee on electrical apparatus reported upon the progress made and the tendency of developments of electrical apparatus for use in central-station service. It was stated that more attention than ever before was being given to details that would insure satisfactory operation. With the continuation of the tendency of manufacturers toward units of greater rating, higher relative speeds were being adopted, thereby necessitating the use of improved types of insulating materials suitable for withstanding high temperatures and severe mechanical strains.

The past year had been marked by progress in the design of turbo-generators and it was reported that several companies had placed orders for 25,000-kw units. Manufacturers now indicated their ability to build large high-potential generators without employing auto-transformers. Reactors were being introduced for protection against high-frequency disturbances, for voltage regulation and synchronizing power, and for limiting current rushes into a short-circuit. With the latter class their use with such apparatus as generators and transformers, for insertion on busbars of substations and in feeders was becoming more widespread.

With regard to the higher speeds of rotative apparatus instances were cited in which 5000-kw units operated at 3600 r.p.m., 19,000-kw units at 1875 r.p.m. and 20,000-kw units at 1500 r.p.m., and it was apparent that the final limit had not yet been reached. The adoption of commutating poles had assisted materially in making it possible to develop high-speed direct-current apparatus, and twenty-five-cycle converters of recent design were now operated at approximately twice the number of revolutions of the old non-commutating-pole designs, although peripheral speeds had not increased in the same proportion. There seemed to be a tendency at present to equip generators with directly coupled exciters. Chief among the advantages of this idea were simplicity, economy and elimination of wiring and switching connection. In spite of the fact that the rotary converters of recent date showed greater speeds and increased outputs due to inauguration of commutating poles, the committee believed that proposals to change over existing rotary converters should generally be discouraged. In summing up the situation the committee recommended the use of sixty-cycle machines for railway service. The use of synchronous converters for securing better regulation on transmission lines and for correcting the power factor on distribution systems was commented upon, and although in the former case installations have met with much success, it was the opinion of the committee that other methods should be employed for power factor correction. The data concerning the application and operation of types of brushes on commutating apparatus which were presented were said to be authoritative and accurate. The hard-carbon brush, treated hard-carbon brush, graphite brush and copper graphite brush were discussed at some length and were mentioned in connection with the class of operation to which they are best suited.

DISTRIBUTION PROBLEMS

The report of the committee on distributing lines, of which P. M. Downing, of the Pacific Gas & Electric Company, San Francisco, was chairman, dealt particularly with Western and Pacific Coast conditions, where during recent years there have been big changes in the methods of transmitting and distributing electrical energy. Principal among those noted was the increase in transmission voltages from 200 to 300 per cent or more. Distribution voltages have also been raised to a third or a half of the values formerly used. Star connection of transformers was favored up to 15,000 volts, although many companies prefer the delta connection. The type of line construction was thought to have stayed fairly constant during recent years, although improvements in insulators have been rapid. Pin-type insulators were considered better for low voltages and suspension type on voltages of 60,000 or over and for special climatic conditions. It was stated that there are portions of the Pacific Coast where salt fogs and dust storms combine to form conducting films on the surfaces of insulators. For such cases the suspension type of insulator was recommended; these must be wiped clean at certain intervals. Economic considerations in the extension of lines and fixing of development rates were mentioned in closing.

POLES AND POLE PRESERVATION

A paper by Russel A. Griffin, of the Western Electric Company, Chicago, briefly discussed the subject of wood decay, concluding with brief descriptions of the various methods now in vogue for preserving timber in order to insure maximum life at minimum investment. In the opinion of the author coal-tar creosote is the best timber preservative.

SWITCHBOARD INSTRUMENTS

In an interesting paper entitled "Switchboard Instruments," Paul MacGahan, of the Westinghouse Electric & Manufacturing Company, stated that errors in switchboard instruments may be divided into three classes, namely, electrical, mechanical and observational. Because the mechanical defects affect the life of the instruments and increase with time they are, generally speaking, of more importance than the electrical errors. The leading American meters are satisfactory with regard to temperature, self-heating, and phase-angle errors, but the errors resulting from external magnetic fields, residual magnetism and the wave form of rectified direct current are too large to be neglected. The mechanical sources of error are excessive weight of moving element, insufficient ruggedness of moving element, insufficient controlling force and insufficient insulation. It is suggested that to obviate the trouble occurring with direct-current instruments due to stray magnetic fields in the vicinity of busbars, the instrument of this type should be mounted so that the direction of the busbar field is at right angles to the permanent magnet, as a demagnetizing field passing through permanent magnets at right angles to the direction of the permanent magnetic flux has little or no effect upon the magnet. This method has been found more successful than that of employing iron shields for instruments, especially where short-circuits produce excessive current in the busbar. In the new alternating-current protective relays the inverse-time-element characteristics are obtained by the action of a permanent magnet upon a disk. These relays are made in the following types: (1) current or overload, inverse-time-element, operating instantaneously at heavy overloads; (2) current or overload, inverse-time-element, operating non-instantaneously at heavy overloads, the minimum time-element for any overload being adjustable; (3) overload and reverse relays, inverse-time-element, tripping on heavy loads in the normal direction or light loads in the reverse direction, provided the voltage or the power factor does not fall to a low value; (4) reverse-power, selective-type relays, operating on reverse power but having a selective wattmeter element in the same case so connected as

to keep the trip circuit open whenever energy flows in the normal direction. It is an axiom that relays located at the substation terminals of transmission lines should be arranged so that tripping can never take place because of energy flowing into the substation. Following this law, the reverse relays described solve the problem of reverse-power protection, even in cases where voltage and power factor drop to low value during short-circuits. They are particularly useful at the incoming ends of transmission lines.

HIGH-TENSION UNDERGROUND CABLES

The committee on underground construction, of which W. L. Abbott, of Chicago, was chairman, confined its annual report to the subject of high-tension transmission cables. The periodical high-potential break-down testing of such cables was condemned as they were thought in general to increase the liability to subsequent break-downs and often not to disclose existing points of weakness. The majority of the companies report that such tests are not applied. Considerable space was given to the discussion of carrying capacity of cables. This was stated to be limited by the temperature of the insulation, and it was held that the life of the cable varied in inverse ratio with this temperature. Hence the three factors to be considered in determining the safe current load of a cable are temperature of inclosed conductor, temperature of surrounding air and objects, and heat generated in the insulation itself due to current leakage through the dielectric. The committee recommended that a very decided increase be made in the rating during the winter and also that the current rating be varied inversely with the voltage on account of the heating of the insulation due to leakage of current. The committee also suggested that use might be made of a graded paper insulation formed by saturating successive sections with oils so chosen as to give specific inductive capacities varying in the proper proportions. Such a step, it was explained, would allow of a smaller diameter of cable with the same factor of safety, or of a higher voltage, the diameter and factor of safety remaining the same. With the increasing size of rotary converters and with the resulting increase in the size of the conductor, in order that a line may have sufficient capacity for one converting unit, some companies have reached the maximum size of three-conductor cables (with round conductors) that can be installed in a duct nominally 3 in. in diameter. To secure a cable with larger copper cross-section or thicker insulation, or both, cables have been developed with conductors of clover-leaf or sector form. Some attention was given in the paper to the discussion of methods for protection of cables in manholes and to trouble reporting. In closing, the author suggested standard form specifications for paper-insulated high-tension cable and for rubber-insulated, lead-covered cable for pressures in excess of 2000 volts.

LIGHTNING ARRESTERS

According to Prof. E. E. F. Creighton, of the General Electric Company, the multi-gap arrester still holds a predominant position in distribution work at or about 2300 volts, because of its lesser cost and because it can be made insensitive to arcing grounds and at the same time sufficiently sensitive to protect transformers. To get a high degree of protection for lighting transformers an arrester should be placed at each one, since if it is located only a few poles distant it will be ineffective against the concentrated and localized potentials due to lightning. With aluminum arresters, a charging resistor represents a good investment. It can be placed in series with the arrester without preventing the latter from taking its full charging potential. This solves the problem of limiting the charging current to a reasonably small value, even though the films are badly dissolved. Another measure found advisable, in order to prevent arcing across the horn-gaps while charging, is the use of spring clips. Previous to January,

1912, an organic electrolyte was used in which a fungus growth was apt to appear accompanied by the formation of vinegar which had a deleterious effect on the film. Since that date the operation of this type of arrester has been greatly improved by the use of an inorganic electrolyte. Speaking of the grounding of apparatus, Professor Creighton stated that ordinary pipes driven into earth well salted will give as good a ground connection as can be obtained. Most of the resistance of an earth connection lies in the immediate neighborhood of the pipe. Moisture is necessary to reduce the resistance, and the salt supplies this conducting moisture.

WIRE FOR OVERHEAD DISTRIBUTION CIRCUITS

T. K. Stevenson, of the Duplex Metals Company, described a copper-clad steel wire for certain classes of overhead distribution circuits. This wire is made by dipping a steel billet into a bath of supermolten copper where it actually absorbs a certain amount of copper. When the billet is withdrawn its surface is wet down with a copper-iron alloy. Later a coating of copper is cast around it, the copper welding to the copper-iron alloy. By this process there is no surface contact between the pure copper and pure steel, the former grading into the latter through a series of copper-steel alloys. Three varieties of this reinforced wire are made, having conductivities of 30, 40 and 47 per cent that of pure copper. Wire of this kind finds its field of usefulness in those cases where fair electrical conductivity has to be combined with great mechanical strength and resistance to corrosion.

TRANSMISSION-LINE CONSTRUCTION

A paper by R. D. Coombs, of New York, gave an outline of the author's views relating to lines designed for operation at 2300 volts or more and discussed the structural features of tower and pole lines. In the author's opinion many of the lines being erected are using poles that are too high. It is far better, he thinks, to trim a few scraggly trees and lower the telephone and low-tension wires than to try to acquire the proper clearance with 60-ft. or 70-ft. poles. Co-operation between existing companies with a view to securing joint ownership of pole line should be encouraged. Although the loading on lines sometimes exceeds that assumed in the specifications of the joint committee, yet these specifications for loading are thought to be sufficiently rigid. The transmission lines do not need to be absolutely immune from failure. If the factor of safety will eliminate nearly all the failure due to ordinary manipulation and provide for a reasonable variation in the assumed load and for such deterioration as may be assumed in the material, it has served its purpose. Any decrease in such a factor would be dangerous, but an increase would be extravagant. Owing to the varying conditions of different soils the depth to which foundations for towers must be placed cannot be determined accurately and readily by a mathematical formula. As it is impracticable to make advance tests of soil conditions for a long transmission line, it is necessary either to have two standards or to design a single foundation which will provide safety for ordinary variations in the soil. Results obtained from test towers on rigid foundations are sometimes deceptive as a horizontal movement at the ground line may induce stresses not foreseen by the designer. The relative merits of galvanizing and painting can be discussed only as a local issue, since the weather and atmospheric conditions determine largely which should be used. The practice of installing a ground wire or sky wire in a shoddy fashion above high-potential lines is to be severely condemned. The use of a small U-bolt or hook bolt which bites into the ground wire and causes failure should be especially discouraged, as the failure of the ground wire is certain to cause failure of the circuit beneath it. Between the limits of 5000 volts and 20,000 volts wooden cross-arms will find favor, but for the higher potentials metal arms are probably preferable. In the transition which transmission struc-

tures are undergoing from wood to metal the excellent record of wooden poles in line work should not be overlooked. It is the author's opinion that the wide-base tower and the semi-flexible pole when properly designed provide the maximum security against service interruption. The greater strength possible in such structures allows the use of larger spans with a subsequent reduction in the number of insulators and hence in the number of insulator failures. In conclusion, the author appended informally his views on desirable detail requirements, in order to promote discussion upon proper line construction for potentials in excess of 6600 volts.

SUSPENSION INSULATOR DESIGN

According to A. O. Austin, of the Ohio Brass Company, the factor of safety in suspension insulators is abnormally small. Even a very slight increase in this safety factor means, he said, an appreciable gain in reliability. The ordinary insulator under load was compared by the author to a steel spring working near its elastic limit on a fluctuating load. He also showed that there is a very close relation between the electrical and the mechanical stresses in an insulator of this type. The factors spoken of as exercising an influence in the puncturing of insulators were the suddenness, frequency and amplitude of the surge or disturbance, the physical proportions of the insulator, the dielectric strength of its material, and the mechanical strain upon it. Some attention was given to the proper design methods to care for these factors. Testing was advocated as an effective way to eliminate weak insulators, and it was suggested that the tests be carried to the point where "spilling over" occurs. A diagram was shown of a suggested apparatus for subjecting the insulators to very sudden stresses. The effect of time lag on puncture was shown, and a report was given of an investigation made of the distribution of the stress in a series of insulators of the suspension type. Some attention was also paid to the subject of protective air gaps.

CIRCUIT-BREAKERS AND LIGHTNING ARRESTERS

J. N. Mahoney, of the Westinghouse Electric & Manufacturing Company, said that three factors were of controlling importance in the construction of oil circuit-breakers: (1) They must be insulated for the voltage at which they are rated; (2) they must have sufficient carrying capacity for their rated current, and (3) they must have sufficient circuit-breaking capacity to meet the conditions at the point where they are applied and to suit the character of the service. Extensive treatment of the last requirement was given embracing the various classes of oil circuit-breakers. The same points were also considered in regard to carbon-break circuit-breakers. Details of the electrolytic type of lightning arresters were given at length, and the author favored the use of this class of arrester whenever the value of the apparatus to be protected would warrant it. Recent investigations of the effects of daily charging were explained to have resulted in producing a great improvement in operating characteristics. These arresters are at present available for use with voltages up to 165,000, the highest thus far adopted commercially.

UNITS AND TERMINOLOGY OF POWER MEASUREMENTS

Several of the power measurement units in use in this country and abroad were noted in the report of the committee on measurements, of which Dr. A. E. Kennelly, Harvard University, was chairman. The committee favored the adoption of the myriawatt, about which there has been considerable debate during the past year. The advantage pre-eminently associated with such a step was held to be that of a unified system of measuring both the input and the output of steam engine-generator sets, making the important item of efficiency more readily apparent. The use of the term "kelvin," to displace the established kilowatt-hour, was opposed on the ground of ambiguity and because Lord Kelvin's name is being proposed for an important electrostatic unit.

ELECTRIC RAILWAY LOADS FOR CENTRAL STATIONS

Because of its notably good load factor and power factor and of its effect in improving the diversity factor, the electric railway load, both urban and interurban, was pointed out in a paper by E. P. Dillon, of the Westinghouse Electric & Manufacturing Company, to be a particularly good one for the central stations to obtain. The facts that it represents a large block of energy sold to one customer, that it is generally a growing load, and that the customer is one of known credit, were stated to be additional advantages in favor of this load. A number of instances were cited, mainly in the larger cities, where the railway systems are operated by central station energy. It was shown that, important as this demand is, its requirements are overshadowed by those of the lighting and motor loads, so that, although twenty-five cycles is a very desirable frequency for traction purposes, the sixty-cycle frequency required for lighting and ordinary motor loads is nearly standard. A simple and interesting chart was given, showing that the railway peak occurs at all seasons from about 5:30 to 6 p. m., while the lighting and motor peaks occur between 4 p. m., at the end of December, and 7:30 p. m., at the end of June, depending on the length of day at the various seasons. Leaving out of consideration, then, those days that are dark through stormy or cloudy conditions, there are only two periods of less than a month each per year—that is, at the end of March and at the end of September—when the railway and lighting peaks are likely to occur at the same time. Finally, it was stated that a very considerable advantage gained by the combination of the lighting motor-service power and the railway loads consists in the ability to use larger generating equipment, with its increased efficiency.

ACCOUNTING FOR DEPRECIATION

Frank A. Birch, of the Philadelphia Electric Company, explained that since local conditions, the earning capacity of the plant and, in some cases, the supervision exercised by public service commissions must be taken into consideration, it was difficult to present a treatise of wide application on the subject of accounting for depreciation. Certain things, however, could be done. The accounts should show the cost to the company of all properties. This should include the separate cost of each generating station, substation, line and all units of construction. The accounts of overhead and underground construction should be kept in such manner as will show at all times the complete cost of any particular line or portion thereof, so that upon retirement or replacement the amount to be charged to the depreciation reserve account may be readily determined. Accounts of a general nature should not be maintained in the general ledger unless subsidiary books are also kept which will show in detail the properties and lines included in such general accounts with individual costs of each. By charging against depreciation reserve account the cost of entire plants, lines and poles, or the cost of any item of construction retired, and charging directly into the property accounts the cost of plants or lines reconstructed, the accounting end of the proposition is kept clear and plain. The author considered depreciation in connection with the construction of a new plant or the installation of new equipment, and reviewed briefly the operations that are involved under the work-order system.

PREPAID AND ACCRUED ACCOUNTS

A paper by Franklyn Heydecke, of the Public Service Electric Company, Newark, N. J., contained a brief explanation of the methods employed in scientific cost accounting for keeping various classes of prepaid and accrued accounts. The particular accounts which the author indicated as requiring this treatment were taxes, rentals and income on investment, and he showed clearly that without such methods the actual condition of the business could not be correctly given in the usual monthly statements. He indicated furthermore that these special accounting methods

act as a safeguard against unexpected financial embarrassment since they are essentially neither more or less than an equitable distribution of a lump expense or income over the period in which it is incurred or earned.

MECHANICAL AIDS TO OFFICE ROUTINE WORK

H. B. Lohmeyer, of the Consolidated Gas, Electric Light & Power Company, Baltimore, Md., presented a paper in which were described the more important machines at present available for saving time and labor in carrying on office routine work. Some of these machines have become so common as to rank with the telephone as necessities. Of this class are the typewriter, adding and listing machines and the slide rule. Among the less commonly used devices are the tabulating machine, the duplicating devices of various kinds, mail opener, addressing machine, counting machine and automatic cashier. Mr. Lohmeyer discussed each of these special devices and gave an outline of its development and of its field of usefulness in modern office procedure.

HANDLING FREIGHT BILLS

A. S. Scott, of the Public Service Company of Northern Illinois, described the method for handling of railroad freight bills employed by his company and by the Illinois Northern Utilities Company. Receipted original freight bills on delivery to local superintendents are paid immediately by drafts made payable to the railroad company, and these bills attached to the duplicates of the drafts are sent to the purchasing or fuel department for approval and from there to the auditor. The system is arranged so that the company is protected from loss through cashing of irregular drafts, and the railroad companies readily agreed to entertain claims for incorrect charges after the items had been paid. The plan results essentially in placing railroad freight on a "c. o. d." basis. Among the advantages claimed for it are the elimination of a great deal of unnecessary clerical work with a corresponding reduction of expense, the securing of more prompt payments, and the avoidance of considerable friction between local superintendents and the railroad agents.

HANDLING OF BOND COUPONS

W. J. Kehl, of the Virginia Railway & Power Company, Richmond, Va., discussed the accounting methods involved in keeping track of coupon payments and of matured coupons unpaid. He said that the preservation of canceled coupons, awaiting the maturity of the bond and final payment of both principal and interest, had become a very annoying problem through the increase in extent and size of bond issues, and suggested that canceled coupons be periodically burned and a certificate of cremation issued to cover the transaction and represent that block of coupons in the final accounting.

ACCOUNTING SCHOOL FOR EMPLOYEES

In a paper by A. L. Holme a summary was given of the steps taken by the New York Edison Company to inaugurate a school on accounting theory and practice among the employees of its accounting department. The course was given on Wednesday evenings from 8 to 10 o'clock during the past winter season, and attendance was optional. There were nine lectures by an instructor from the New York University School of Commerce, Accounts and Finance; three written examinations were held, and six talks were given by company officials on the following topics: "Accounting Methods of the Company," "Relation of Accounting to the Company's Executives," "Work of the Contract and Inspection Departments," "Meters," "Purchasing and Supply Accounting" and "Customers' Accounts." The lectures were upon the following subjects: "Bookkeeping," "Assets and Liabilities," "Assets," "Investments," "Current Assets," "Patents, Copyrights and Trade-Marks," "Funds," "Capital Liabilities" and "Interpretation of Balance Sheets." While it is hard to measure the exact results of an innovation of this character, particularly in its early stages, Mr. Holme considered it successful.

Purchased Power in New York State

Extracts from the Reports Furnished by the Railway Companies of the State of New York to the Public Service Commission of the Second District—The Prices Paid for Power by the Different Companies Are Given

The electric railways in the State of New York are in an unusually fortunate position as regards the purchase of power owing to the existence of numerous water-power sites of large capacity. Notable among these are, of course, the installations at Niagara Falls. The Niagara Falls Power Company, which draws water from the American side of the falls, distributes power for electric railways through the Cataract Conduit & Power Company, the latter company acting as a selling and distributing agent only. On the Canadian side of the river the Ontario Power Company develops power and sells it through the Niagara, Lockport & Ontario Power Company. Both of these distributing companies furnish power within the State of New York at extremely low prices.

Next in importance to these mammoth enterprises is the Adirondack Electric Power Corporation, which is a consolidation of the Hudson River Electric Power Company, the Hudson Water Power Company, the Hudson River Power Transmission Company, the Hudson River Electric Company, the Empire State & Power Company, the Saratoga Gas & Electric Company, the Ballston Spa Light & Power Company and the Madison County Gas & Power Company. This company operates mainly in the eastern portion of New York State, obtaining large amounts of power from the rivers which flow in a southerly direction through the State to the Atlantic Ocean. While its power is not generated so cheaply as at the stations on Niagara Falls, the company has followed the policy of building up its business by selling at very low rates; and, as is shown by the number of companies purchasing power from this corporation or its subsidiaries, its prices are attractive.

The Niagara power companies have developed their sales of power along unusual lines. In general their contracts take such a form that current which is furnished on the basis of 100 per cent load factor is extraordinarily cheap. The price of \$16 per hp per annum, which appears in some of the contracts, works out at 100 per cent load factor to the almost nominal price of 0.245 cent per kw-hr. Both companies, however, heavily penalize any variations from an absolutely steady load, although the price for additional power beyond the basic payment would be considered low in almost any other part of the country. In consequence it is the custom for the railways which use Niagara power to take energy from the producer at 100 per cent load factor, or as near to that as can be obtained in practice. Most of them have steam plants floating on the line to take care of peaks.

A good example of this custom is found on the Rochester Railway & Light Company, which supplies power to the New York State Railways. This company purchases Niagara Falls power, but has in reserve its own hydroelectric stations located on the Genesee River. A system of reservoirs along the ravine through which the river flows near Rochester, and in which the power stations of the railway company are located, permits storage of water so that, during the periods when peaks come on, these reservoirs are emptied through the power station flumes. In addition to this the company keeps a steam plant floating on the line to assist the hydraulic stations, whenever necessary, through the rush hours.

The contracts of the Niagara power companies generally include the term "firm power." This term applies to the quantity of power which the purchaser agrees to buy, and the purchaser pays for it whether it is used or not. In consequence this power is used at 100 per cent load factor. Additional firm power, or a normal increase in the demand, is also furnished at 100 per cent load factor. The price of

additional firm power does not necessarily agree with that charged for original firm power for the reason that, opposing the tendency toward a decreased price on account of the increased quantity, there may be necessity for considerable additional expense on the part of the power company in providing for the increased demand, such, for instance, as new cables, poles or connections. Additional kilowatt-hours in these contracts are sold on a straight kilowatt-hour rate basis, and they do not take into consideration the matter of load factor. While this charge is often less than 1 cent per kw-hr., it appears extremely high when compared with the 0.245 cent per kw-hr. often used as a basic price for firm power, and in localities fortunate enough to be served by the Niagara companies there is a strong endeavor to avoid such payments.

The following extracts of power contracts in New York State are those which were reported to be in existence for the year ended June 30, 1912:

Adirondack Lakes Traction Company has a contract with Fonda, Johnstown & Gloversville Railroad for power, not measured, at \$15 a day.

Albany Southern Railroad purchased 4,593,211 kw-hr. from its own electrical department at 0.67 cent per kw-hr.

Babylon Railroad has a contract, dated Sept. 19, 1910, with the Babylon Electric Light Company to furnish electric energy from July 15, 1910, to the fifteenth of each succeeding month. The consideration is \$450 for 15,000 kw-hr., 2.5 cents per kw-hr. for each kilowatt-hour in excess of 15,000 and less than 25,000, and 2 cents per kw-hr. for each kilowatt-hour in excess of 25,000, unless the total consumption shall be less than 12,857 kw-hr., when the rate is 3½ cents for each kilowatt-hour during any one month. During the year ended June 30, 1912, 163,660 kw-hr. were supplied at 2.9 cents per kw-hr. Power is being furnished at \$450 per month during the summer season and at \$375 per month during the winter season.

Buffalo & Depew Railway has a contract with the Niagara, Lockport & Ontario Power Company dated Jan. 3, 1910. It expires March 1, 1930, and the consideration is \$16 per hp per annum and 0.55 cent per kw-hr. During the year ended June 30, 1912, 380,000 kw-hr. were supplied at 0.549 cent per kw-hr. In addition to the kilowatt-hours power was purchased as follows: 1366 hp at \$16 per hp-year, or \$1,821, plus \$261 for excess peaks.

Buffalo & Lake Erie Traction Company purchased during the year ended June 30, 1912, 8,954,987 kw-hr. from the Niagara, Lockport & Ontario Power Company at 0.702 cent per kw-hr., and also 1,465,740 kw-hr. from the International Railway at 1.131 cents per kw-hr.

Buffalo & Williamsville Electric Railway has a contract with the Genesee Light & Power Company, Batavia, N. Y., under which the first power was delivered Aug. 2, 1909. The contract expires five years from that date, the consideration being 3.75 cents per car mile with a minimum monthly rental of \$250 based upon a minimum demand of not exceeding 100 kw. The company also has a contract with the Niagara, Lockport & Ontario Power Company dated March 18, 1910, and expiring ten years from May 1, 1910. The consideration for each electric horse-power delivered is \$16 per year as the service charge and, in addition, 0.55 cent for each kilowatt-hour used when the firm power is less than 300 hp, 0.5 cent for each kilowatt-hour used when the firm power is 300 hp or more but less than 500 hp, 0.47 cent for each kilowatt-hour used when the firm power is 500 hp or more but less than 750 hp, and 0.44 cent for each kilowatt-hour used when the firm power is more

than 1000 hp. The service charge is based on the average of the highest daily one-minute peaks.

Buffalo, Lockport & Rochester Railway Company has a contract with the Niagara, Lockport & Ontario Power Company dated May 8, 1907, amended Dec. 24, 1908, and expiring Sept. 1, 1932. The rate varies, the amount paid in the year ended June 30, 1912, being \$37,701.05.

Catskill Traction Company has no formal agreement, but power is bought of the Schoharie Light & Power Company. The total number of kilowatt-hours supplied during the year was 261,400, the total gross price being \$4,621.28, at an average net price per kilowatt-hour of 1.75 cents.

Corning & Painted Post Street Railway has no contracts or agreements. Power amounting to 413,589 kw-hr. and costing \$8,271.79 was purchased during the year from the Corning Gas & Electric Company. The power is measured at the plant of Corning Gas & Electric Company, Corning, N. Y.

Eastern New York Railroad Company purchased during the year ended June 30, 1912, 202,675 kw-hr. from the Adirondack Electric Power Corporation at a price of 1.5 cents per kw-hr. measured on the a.c. side.

Elmira, Corning & Waverly Railway purchased during the year ended June 30, 1912, from the Elmira Water, Light & Railroad Company 1,576,514 kw-hr. at a price of 1.5 cents per kw-hr.

Fishkill Electric Railway Company purchased 358,904 kw-hr. from the Southern Dutchess Gas & Electric Company at a price of 3.5 cents per kw-hr.

Great South Bay Ferry Company entered into an agreement on April 24, 1909, with the New York & Long Island Traction Company, duly signed by the proper officers of each company, whereby the New York & Long Island Traction Company agreed to furnish electric power for 6 cents per kw-hr. No provision was made for the cancellation of this agreement except by the mutual agreement of the signatory parties. A total of 8104 kw-hr. was purchased under the agreement.

Hornell Traction Company paid the Hornell Electric Company in the year ended June 30, 1912, for power for city cars at a rate of \$2.35 per car per day, and for the Canisteo cars at the rate of \$3.65 per car per day.

Hudson River & Eastern Traction Company in the year ended June 30, 1912, was supplied with 302,880 kw-hr. by the Northern Westchester Lighting Company, the rate being 2.5 cents per kw-hr.

Huntington Railroad Company has no contracts or agreements, but purchased from the Long Island Railroad Company 783,996 kw-hr. at 1.02 cents per kw-hr., amounting to \$8,008.89, during the year.

International Railway Company has a contract with the Niagara Falls Power Company dated Jan. 1, 1908, and expiring Dec. 31, 1917, for power at a price of \$18 per electric hp per annum for firm power and 1.5 cents per kw-hr. for excess energy. The company also has a contract with the Tonawanda Power Company, dated Jan. 1, 1906, and expiring Dec. 31, 1920, at a price of \$18 per electric hp per annum for firm power and 1 cent per kw-hr. for optional power; a contract with the Cataract Power & Conduit Company, dated July 1, 1899, and expiring July 1, 1931, for \$25 per electric hp per annum for firm power and 1 cent per kw-hr. for excess power. There is also a contract with the Buffalo & Lake Erie Traction Company, dated Nov. 15, 1909, expiring Nov. 15, 1914, in which the consideration is \$1.1275 per kw per month for firm power and \$1.123 per kw per month for additional firm power. For excess power a charge is made which when the excess power does not exceed 40,000 kw-hr. is 0.786 cent per kw-hr. For excess power exceeding 40,000 kw-hr. and not exceeding 80,000 kw-hr. the charge is 0.786 cent per kw-hr. for the first 40,000 kw-hr. and 0.742 cent per kw-hr. for additional kilowatt-hours. For excess power exceeding 80,000 kw-hr. the charge is 0.74 cent for the first 80,000

kw-hr. and at the rate of 0.72 cent for all additional kilowatt-hours. During the year ended June 30, 1912, the company purchased the following power: from the Cataract Power & Conduit Company, 81,748,383 kw-hr. at an average price of 0.507 cent per kw-hr.; from the Tonawanda Power Company, 13,906,176 kw-hr. at 0.383 cent per kw-hr.; from the Niagara Falls Power Company, 5,030,100 kw-hr. at 0.560 cent per kw-hr.

Ithaca Street Railway Company, through its receiver, pays the Remington Salt Company for such quantities of electricity as it may require at a rate of 1 cent per kw-hr. for alternating current at the switchboard of the generating station. In addition to this the railway company pays one-half of the labor cost in the engine room of the power station, amounting to \$167 per month. The receivers of the New York, Auburn & Lansing Railroad pay to the receivers of the Ithaca Street Railway for use of tracks and power: on New York, Auburn & Lansing passenger cars, for each revenue passenger between Ithaca and Renwick in either direction, 2.5 cents; for each freight car, either motor or unequipped, 5 cents per car mile; for rental of cars, 3 cents per mile, and for power supplied to cars on New York, Auburn & Lansing tracks, 3 cents per motor car mile. The receivers of the Ithaca Street Railway pay to the receivers of the New York, Auburn & Lansing Railroad for use of substation and equipment the sum of \$1,617 per year.

Lima-Honeoye Light & Railroad Company purchased from the Livingston Niagara Power Company 172,172 kw-hr. at 3.14 cents per kw-hr.

Nassau County Railway Company has no contracts or agreements, but purchased from the Long Island Railroad Company 121,975 kw-hr. at 1.44 cents per kw-hr., amounting to a total of \$1,761.19.

New York & Stamford Railway Company paid the New York, New Haven & Hartford Railroad Company for 155,740 kw-hr. at a rate of 1.25 cents per kw-hr.

New York Central & Hudson River Railroad Company paid the Rochester, Syracuse & Eastern Railroad Company for power, at a rate of 2 cents per kw-hr., \$1,119.50 for 55,975 kw-hr.

New York State Railways bought of the Rochester Railway & Light Company 45,442,298 kw-hr. at 1.0942 cents per kw-hr., amounting to \$497,222.50.

Northport Traction Company has no contracts or agreements, but purchased of the Long Island Railroad 63,546 kw-hr. at a rate of 5.52 cents per kw-hr., amounting to \$3,509.61.

Oneida Lake Terminal Company has a contract with the Syracuse & South Bay Electric Railroad Company for the purchase of power. Upon verbal application the latter company during the year furnished the Oneida Lake Terminal Power Company power for lighting purposes at 3 cents per kw-hr., the total amount supplied being 5162 kw-hr., for which the Syracuse & South Bay Company was paid \$154.86.

Orange County Traction Company purchased from the Central Hudson Gas & Electric Company 254,370 kw-hr., costing \$4,425.12 at a rate of 1.78 cents per kw-hr. The company also purchased from the Wallkill Power Company 674,158 kw-hr., costing \$8,425.85 at a rate of 1.25 cents per kw-hr.

Otsego & Herkimer Railroad Company purchased of the Hartwick Power Company 3,909,979 kw-hr. at a rate of 1.67 cents per kw-hr., amounting to \$65,435.05.

Plattsburgh Traction Company purchased power from the Plattsburgh Gas & Electric Company at 1.5 cents per car mile operated, the kilowatt-hours not being measured. The cost this year was \$2,256.04.

Port Jervis Traction Company purchased of the Port Jervis Light & Power Company 295,720 kw-hr., costing \$5,335.82 at a rate of 1.8 cents per kw-hr. Other lighting and power amounting to 1768 kw-hr. cost \$220.82.

Poughkeepsie City & Wappingers Falls Electric Railway Company bought of the Central Hudson Gas & Electric Company 1,673,870 kw-hr., costing \$24,318.84 at a rate of 1.5 cents per kw-hr.

Putnam & Westchester Traction Company purchased of the Peekskill Lighting & Railroad Company 156,342 kw-hr., costing \$3,908.55 at a rate of 2.5 cents per kw-hr. This was direct current measured and delivered at the electric station of the Peekskill Lighting & Railroad Company.

Rochester & Manitou Railroad Company has no contracts or agreements, but bought of the Rochester Railway & Lighting Company 163,038 kw-hr. at a rate of 2.15 cents per kw-hr., amounting to \$3,500.39.

Shore Line Electric Railroad Company bought of the Westchester Electric Railroad Company, from and to the carhouse on the latter company's track, 11,303 kw-hr., costing \$206.79 at a rate of 1.8295 cents per kw-hr.

Suffolk Traction Company bought of the Patchogue Electric Light Company 48,360 kw-hr., costing \$1,924.20 at a rate of 4 cents per kw-hr.

Syracuse & Suburban Railroad purchased from the Syracuse Rapid Transit Railway Company 343,610 kw-hr. at 1 cent per kw-hr., amounting to \$3,436.10, and also purchased from the Syracuse Lighting Company 181,175 kw-hr. at a rate of 1.87 cents per kw-hr., amounting to \$3,470.03.

Syracuse & South Bay Electric Railroad Company had a contract with the Niagara, Lockport & Ontario Power Company which expired Nov. 1, 1911. Power, however, has been furnished since this date through the Syracuse, Lake Shore & Northern Railroad Company. The rate varies. For the year ended June 30, 1912, 915,044 kw-hr. was furnished the company, for which it paid \$9,337.05.

Syracuse, Lake Shore & Northern Railroad Company has a contract with the Oswego River Power Transmission Company for the purchase of power dated Nov. 24, 1906, which expires Feb. 1, 1917. The rate varies, 3,679,021 kw-hr. being furnished, for which the company paid \$32,176.27. There is also a contract for the purchase of power from the Rochester, Syracuse & Eastern Railroad Company, dated Jan. 24, 1910, as amended Nov. 28, 1910, and Dec. 8, 1911, which expired Dec. 31, 1912. The price is not specified, but power is paid for at same rates as those of the contract between the Oswego River & Power Transmission Company and the Syracuse, Lake Shore & Northern Railroad Company. During the year 544,636 kw-hr. was furnished, for which the latter company paid \$244.74.

Syracuse Rapid Transit Railway Company purchased from the Niagara, Lockport & Ontario Power Company 26,325,500 kw-hr. at a rate of 0.5665 cent per kw-hr., amounting to \$149,138.15. The company also purchased power from the following companies: Oneida Railway Company, 3600 kw-hr. at a rate of 1 cent per kw-hr., amounting to \$36; Syracuse Lighting Company, 368,540 kw-hr. at a rate of 1.25 cents per kw-hr., amounting to \$4,606.75; Syracuse & Suburban Railroad Company, 382,560 kw-hr. at a rate of 1 cent per kw-hr., amounting to \$3,825.60; Electric Railway Terminal, 12,135 kw-hr. at a rate of 1 cent per kw-hr., amounting to \$121.35. Direct current amounting to 4570 kw-hr. was purchased at a rate of 1 cent per kw-hr., amounting to \$45.70.

Troy & New England Railway Company has no agreements or contracts, but purchased from the United Traction Company direct-current amounting to 245,756 kw-hr. and costing \$1,228.78, at a rate of 0.5 cent per kw-hr.

Utica & Mohawk Valley Railway Company purchased from the Oneida Railway Company 4,708,500 kw-hr. at a rate of 0.86467 cent per kw-hr., amounting to \$40,713.20. The company also purchased power from the following companies: Adirondack Electric Power Corporation, 100,810 kw-hr. at a rate of 0.93387 cent per kw-hr., amounting to \$941.44; Adirondack Electric Power Corporation, \$2,571,150 kw-hr. at a rate of 1 cent per kw-hr., amounting to \$25,711.50; Oneida Railway Company, 5793 kw-hr. at a

rate of 1 cent per kw-hr., amounting to \$57.93, and from the receivers of the Hudson River Electric Power Company 142,315 kw-hr. at a rate of 0.87 cent per kw-hr., amounting to \$1,242.68.

Waverly, Sayre & Athens Traction Company purchased 1,142,278 kw-hr. at an average price of 1.48 cents per kw-hr., amounting to \$16,905.72. The company pays a minimum fixed charge of \$708.34 per month and in addition to this pays 0.7 cents per kw-hr. for all power used.

Westchester Electric Railroad Company purchased during the year ended June 30, 1912, 8,890,200 kw-hr., costing \$111,127.50. Power was furnished to Union Railway Company cars amounting to 1,486,926 kw-hr. at 1.8295 cents per kw-hr. Power was furnished by Union Railway Company to the Westchester Electric Railroad's cars amounting to 1,665,632 kw-hr. at 1.8295 cents per kw-hr. Arrangements with the receivers of the Union Railway Company had been made, but not reduced to writing, for the interchange of power at the rate of 1.8295 cents per kw-hr. for direct current, and also for the use of cars, although no compensation has been agreed upon for the use of cars. Arrangements have been made with the John Johnston road for the sale of power at 1.25 cents per kw-hr., direct current, and to furnish the John Johnston road with cars as required. This agreement was not reduced to writing. Arrangements had also been made with the receiver of the Third Avenue Railroad Company for a supply of electric power to the company at 1.25 cents per kw-hr., alternating current, and for the use of cars. This had not been reduced to writing and no compensation had been agreed upon for the use of cars.

Westchester Street Railroad Company purchased for the year ended June 30, 1912, 3,369,510 kw-hr., costing \$55,274.45, the average rate being 1.64 cents per kw-hr.

Yonkers Railroad Company had an agreement with the Third Avenue Railroad Company to buy power from the latter at the rate of 1.25 cents per kw-hr., alternating current, and also has an agreement with the Yonkers Electric Light & Power Company permitting the latter to use the Yonkers Railroad Company's poles at the rate of \$300 per annum. Power purchased for the year ended June 30, 1912, amounted to 10,381,000 kw-hr. and cost the total sum of \$129,762.50.

APPLICATIONS FOR SPACE AT ATLANTIC CITY CONVENTION

H. G. McConaughy, secretary of the American Electric Railway Manufacturers' Association, has issued a circular in regard to space at the October convention of the American Electric Railway Association. Copies are being mailed to the manufacturers who are members of the association. The blank contains spaces in which the number of square feet of space required at the convention, the names of the representatives who will be present, and other data can be entered. The charge to be made for space this year is 40 cents per square foot.

All applications for space received on or before June 15 will be considered on that date and will have equal preference as to location. Applications received after June 15 will be considered chronologically. The circular issued also contains a diagram of Young's Million Dollar Pier, upon which the exhibit will be held, and the promise is made that no exhibit will have to be out in the open as heretofore. The circular also says that the Greek Temple, in which the meetings are held, has been enlarged and that another meeting hall has been erected for the engineers beyond the Greek Temple.

All companies intending to exhibit are urged to send their application for space promptly and thus assist in making this convention the largest and best in the history of the association.

Convention of Southwestern Electrical & Gas Association at Galveston

The Attendance Numbered More than 500—A Report of the Proceedings So Far as They Related to Electric Railway Topics Is Presented

The ninth annual convention of the Southwestern Electrical & Gas Association was held at the Hotel Galvez, Galveston, Tex., May 21 to 24 inclusive. More than 500 members were in attendance, and each paper was received with interest and discussed at length. The first session opened with 150 members in attendance and President F. M. Lege presiding. Following an address of welcome by Senator J. H. Kauffman, Galveston, and a response by W. B. Head, Dallas, the secretary read the minutes of the preceding convention, and President Lege read his annual address. The president recommended certain changes in by-laws affecting the election of officers. These suggestions were referred to a committee for its recommendation.

TRACK CONSTRUCTION

The first paper presented was that by W. M. Archibald, superintendent of way Houston Electric Company, entitled "A New Type of Concrete Track Construction." An abstract of this paper was published last week. A number of members questioned the advisability of expending money for track construction providing for rail renewals, when the life of the rail was about that of the steel tie. It was the consensus of opinion, however, that a solid concrete foundation gave best results under the unstable soil condition prevailing in Texas cities. It also was believed that best results were being obtained when a concrete bed was used for paving blocks instead of the usual sand cushion. The former tended to waterproof the paving surface, which was very desirable whether wood block or paving brick was used. Two years' experience with the mortar bed for paving surface in Houston has demonstrated its practicability. The question was raised as to the best way of renewing paving, especially when the mortar-bed type of construction was employed. In reply Mr. Archibald stated that a sand parting was provided in his proposed construction for that purpose. He said further that he believed better results would be obtained from the 7-in. depth in the combination brick and concrete paving surface than with a 4-in. depth where brick or wood block was employed. R. B. Stichter, general manager Texas Traction Company, questioned the advisability of trusting to the concrete as a bearing when it came in direct contact with the rail. He believed that vibration would pulverize the concrete base, making a renewal of the whole necessary when rail renewal was required.

VALUE OF TRAFFIC CHARTS

Continuing the prepared program, P. L. King, auditor San Antonio Traction Company, read his paper on "The Use of Traffic Charts in Rush Service." This paper was also abstracted in the issue of last week. In the discussion of this paper it was generally agreed that the traffic check was the only way to determine actual conditions, and it was merely a question of the cost of preparing a daily chart. Mr. King stated that one man prepared the daily rush-hour charts for all lines and in addition made a complete traffic chart of one line each day. This man's training was not special, as he had served as a conductor before taking up the traffic chart work.

E. F. Moore, general manager Dallas Electric Light & Power Company, stated that he had charts made from time to time but that they were different from Mr. King's in that they showed exact loads carried and the headway on each line. The method described in the paper included a

tabulation of the total number of passengers carried per car on each line, and this would have no bearing on the car seating capacity. In explanation, Mr. King said that there was very little short haul in San Antonio, and this would make the charts show practically the true maximum load per car.

CAR DESIGN AND CONSTRUCTION

The Wednesday afternoon session of the association was largely taken up in discussing the points brought out in C. O. Birney's paper, "Old and New Ideas in Car Designing and Building." This paper was published in abstract last week. Mr. Birney's wide experience in this particular field as superintendent of car construction with the Stone & Webster Engineering Corporation gave the members an opportunity to obtain competent advice on this subject. The advisability of maintaining in first-class operating condition both air brakes and hand brakes on cars was discussed first. It was generally agreed that the present design of hand brakes made it almost impossible to keep them in good condition for emergency stops at all times. This was especially true on double-end cars where dirt will accumulate around the base of the brake staff. A hand brake was considered desirable when air fails and it is necessary to move a car to the shops, but its failure to operate efficiently made it almost useless in cases of this kind. Mr. Moore remarked that he believed the expense of maintaining a hand brake in good operating condition was not justified when the value received was considered. In six months his company had had two air-brake failures, which was too small a number to warrant the extra expense of placing hand brakes on his cars. H. S. Potter, general superintendent El Paso Electric Railway, stated that he did not believe it advisable to eliminate hand brakes from cars on lines where there were heavy grades. The hand brake served to protect electrical equipment in case of air-brake failure but had no value in an emergency stop. It was best to reverse the controller when the air failed.

R. B. Stichter, Dallas, emphasized the importance of standardization in car body construction, both for city and interurban service. It would be more satisfactory to the builders and reduce the cost to the purchaser. He said he believed that the car body should be designed with an all-steel underframe and side girders up to the windows. He also stated that he did not believe that a center entrance for interurban cars was to be desired but thought it probably would prove satisfactory for city service.

In discussing the inclosed vestibule it was shown that boarding and alighting accidents were reduced from 70 per cent to 100 per cent. W. L. Wood, general manager Texarkana Gas & Electric Company, said that after two years' experience with the inclosed platform he felt sure that the principle was right. New forms of accidents had developed, but the cost of settling the claims was very small. David Daly, general manager Houston Electric Company, stated that while he believed the principle was right, his public would not permit the closing of vestibules. They especially objected to wooden doors, and in all probability he would of necessity have to adopt a wire-mesh door. In closing, Mr. Birney stated that he would recommend the inclosed vestibule but would like to be able to standardize on the door-operating mechanism. Local conditions might affect design in some cases, but, generally

speaking, the doors should be in pairs, operative either together or separately.

Mr. Daly then presented an address on "Street Railway Planning for Growing Cities."

STREET RAILWAY PLANNING FOR GROWING CITIES

Mr. Daly said that the question of street railway planning was important in Texas owing to the rapid growth of the cities there. In a city of from 15,000 to 30,000 population the electric railway system consisted usually of several short stub-end lines or perhaps belt lines, but when the city reached a population of from 35,000 to 150,000, belt lines were out of place. Moreover, with a rapidly growing city, the real estate agents would demand extensions, and if these extensions were not constructed the company would be condemned for lack of enterprise and there would be agitation for either a municipal railway or a competitive road. The latter had been constructed in a number of cities and always resulted in considerable unnecessary duplication of track and more expensive operation, all at the cost of the community. Again, the competitive railway system was usually built from the standpoint of the sale of lots and not with the best interests of the city in mind. The result generally was that such a line was very crooked. The practice of real estate agents, when agitating for an extension, was to take the railway manager in an automobile rapidly through the district which they wished served and endeavor to give him the impression of a tremendous amount of progress in that neighborhood. The speaker's own company, in Houston, believed that it was worth while to make a careful study of the possibilities of electric railway extensions before they were built and by the initial expenditure of some \$1,500 and the annual expense of from \$500 to \$600 to obtain the exact facts. It had prepared a chart of the city, laid off in squares and containing a record of every house built. When a demand for an extension in a certain section was made, the company knew exactly the number of houses and inhabitants there, and could estimate closely the gross earnings to be obtained from such a line. With these data the company could say to the real estate agents, if the traffic would not justify the construction of the line entirely at the expense of the company, that it would meet them part way and would build a "bonus" line. This plan had worked out very successfully in Houston. Three or four bonus lines had been built; the real estate agents had been pleased and the company had kept its system up with and beyond the growth of the city.

Continuing, Mr. Daly said that another question somewhat allied to the one discussed was the length of haul practicable for a nickel. This question was bound to arise when long extensions were being considered. In Houston the estimate had been made arbitrarily that the company could not afford to haul passengers more than 5 miles from the center of the city for a nickel and give universal transfers. In pursuance of this policy the company was prepared to construct, with any reasonable encouragement from the real estate owners, extensions within the 5-mile circle.

The chart of the city already referred to had the advantage that it permitted predictions on the growth of the system during the next few years and a systematic planning of the railway along the predicted lines. Thus it provided a comprehensive scheme of development.

LIGHT AND POWER SESSION

Beginning with the Thursday morning session of the association, all papers and discussions were concerning subjects of especial interest to light and power companies. The first paper to be read was that by E. E. Nelson, electrical engineer Northern Texas Traction Company, on "Erection and Protection of High-Tension Lines." Protection of linemen working on high-voltage lines was first considered. In reply to an inquiry, H. Jatonick, new-business engineer Texas Power & Light Company, Dallas,

stated that men working on his company's 60,000-volt transmission lines were first required to ground the dead lines by means of chains. Replying to another question, he said that no special effort was made to ground the steel towers carrying this line. The tower legs were buried 6 ft. in the ground and set on concrete footings. The structure itself was a good conductor, being galvanized iron cold-riveted.

A question was asked as to advisability of stepping down the voltage in high-tension lines within cities and increasing the size of the copper conductors. Mr. Nelson replied that objection to high-voltage lines in city streets was more a question of mind than one of fact. They would not kill a person any more quickly than the arc-light circuits and probably were safer, as partial leaks in high-voltage lines will clear themselves.

W. L. Wood, Texarkana, emphasized the importance of the points brought out in the paper concerning switchboard wiring. The small operators should pay especial attention to this, particularly as regards the separation of various lines on the board. Crowded and improperly laid-out switchboards have been the direct cause of the destruction of entire plants. He said faulty design was often due to the small operator's lack of competent engineers. In further support of Mr. Wood's suggestion Dr. A. C. Scott, Scott Engineering Company, Dallas, said that too much stress could not be laid on proper switchboard design. Conditions exist in many small plants that are very bad, but since no accident had occurred no alterations have been made. As additional instruments and switchboard apparatus are required with the growth of the property, they have been added to the old panels, thus complicating the wiring and adding hazards to the board. Many boards are too close to the wall, making it practically impossible for a man to work behind them. A distance of 5 ft. to 6 ft., in his opinion, was too close. It would be better to build an addition to the station than crowd the board.

Dr. Scott then took up the question of ground wires in high-tension circuits. He said these wires could be placed too close or too far away from the transmission lines to accomplish the desired results. Further, he said it was a serious problem to protect against lightning discharges, which were notoriously freakish. The exact value of a ground line was unknown and proper insulation was most important. He said he would like to see something more done with glass insulators. Glass was more homogeneous than porcelain, which depends almost wholly on the glaze as an insulating medium.

Oil-switch maintenance was next discussed, and Mr. Nelson advised that oil switches should be taken apart at least once a year. The oil should be strained through cheesecloth if it is perfectly pure, and every part of the switch should be inspected and thoroughly cleaned. In some instances it might be necessary to clean an oil switch after a single opening; this was especially important after a heavy short-circuit.

Proceeding with the program following the transmission-line discussion, A. L. Chase, superintendent Clarendon Light & Power Company, read a paper on "Oil Engines for Light and Power Plants in Small Towns and Cities." In the discussion which followed it was stated that the operating cost and depreciation per kilowatt with oil engines was quite low. Mr. Chase stated that unless an accident occurred the cost of maintaining an oil engine was considerably less than that required with a steam engine. Dr. Scott stated that the period of obsolescence was about the same as with other machines, 3 per cent being applied. As to the operators, no more intelligence was required to run an oil engine than a steam engine. It was merely a question of proper training.

In the Friday morning session Dr. A. C. Scott, Scott Engineering Company, read a paper upon "The Purification of Feed Water for Steam Boilers." This paper was pub-

lished last week. The discussion developed the opinion that there was little value in intermittent treatment of boiler-fed water but that good results might be obtained by continuous treatment where scale-forming salts are bad.

WORK OF THE SECRETARY'S OFFICE

Secretary H. S. Cooper's report of work accomplished by the new permanent secretary's office indicated that all companies were being benefited and that the undertaking and expense had been well worth while.

OTHER EVENTS ON FRIDAY

Friday afternoon was taken up with a boat-ride excursion to Galveston jetties and Bettison's Pier, where a fish supper was served by the supply men who are members of the association. Friday night was set aside for the Jovian parade, full rejuvenation supper and speeches, and a class of ninety new members was initiated at the Scottish Rite Cathedral. Fred Johnson, Wagner Electric & Manufacturing Company, St. Louis, acted as toastmaster, and the speakers of the evening included F. E. Watts, reigning Jupiter, New York; W. B. Head, Dallas, and Sam A. Hobson, Chicago.

BUSINESS SESSION

At the general session Saturday morning the business of the association was transacted. It included reports of various standing committees and of the secretary and treasurer and the nomination and election of officers for the ensuing year.

The following resolution, among others, was passed unanimously by the association:

"Resolved, That the thanks of the association be tendered to the ELECTRIC RAILWAY JOURNAL for its courtesy in sending a special representative to report the proceedings of the association, for the prominence given to the association's affairs in the JOURNAL and for the uniform courtesy shown to this association and its officers during the past year."

The newly elected officers for 1914 are as follows: President, G. H. Clifford, vice-president and general manager Northern Texas Electric Company; first vice-president, D. G. Fisher, assistant general manager Texas Traction Company, Dallas; second vice-president, W. L. Wood, Jr., general manager Texarkana Gas & Electric Company; third vice-president, C. W. Kellogg, general manager Beaumont & El Paso Railway Companies; treasurer, J. D. Walker, auditor Dallas Electric Light & Power Company; secretary, H. S. Cooper, Dallas.

The executive committee is composed of the following: C. H. Clifford, Fort Worth; D. G. Fisher, Dallas; W. L. Wood, Texarkana; C. W. Kellogg, El Paso; F. M. Lege, Galveston; H. S. Cooper, Dallas; David Daly, Houston; F. J. Storm, Amarillo; F. B. Slater, Dallas, and W. B. Tuttle, San Antonio.

ENTERTAINMENT

The entertainment features of the Southwestern Electrical & Gas Association included surf bathing, free tickets being provided, a band concert and parade of United States troops at Fort Crockett, an open-air concert and dance at the Garten Verein, a German club, luncheon for the ladies at the Oleander Country Club, with special car transportation furnished by the Galveston-Houston Electric Company, a boat ride in Galveston harbor and an auction bridge party for the ladies.

The provincial council at Parma, Italy, has approved a scheme, which will have the effect of developing the electric tramway system of that city and its suburbs considerably. The lines in the city now in the hands of the National Italian Railway & Tramway Company and the lines to Zibello, Busseto, Soragna, Borgho San Domino, Rocca, Bianca Mano, Noceto, Medesano, Langhirano, Traversetelo and Montechio, upon all of which steam cars are now run, will be taken over and worked electrically, although the freight service will still be operated by steam.

NEW FORMS OF MONTHLY REPORTS IN MILWAUKEE

New forms of monthly reports have been developed for the use of twelve subsidiary public utility companies of the North American Company. Copies of the forms have been received from C. N. Duffy, vice-president The Milwaukee Electric Railway & Light Company. The use of the forms is simplified by the designation of electric railway properties as "railway," of electric light and power properties as "electric," of steam-heating or hot-water-heating properties as "heating," and of gas properties as "gas."

The forms comprise the following: (1) financial and operating report, fourteen pages; (2) power report, nine pages; (3) gas works report, two pages; (4) electric service operating report by systems and divisions, two pages.

The forms have been arranged in accordance with the classification of accounts of The Milwaukee Electric Railway & Light Company and its associated and controlled companies. This classification is in conformity with the uniform classification of accounts prescribed by the Railroad Commission of Wisconsin, which, however, is amplified for the purposes of the companies.

The forms have several distinctive features. All are of uniform size, 10½ in. by 14 in.

The financial and operating report is designed to show results by comparative three-year periods for both month and period. The totals are shown at the top instead of at the bottom of the report. Both common and specific units are used. The income account shows the result of the different forms of business conducted by the company. The comparative balance sheet shows the increases and decreases. Capital expenditures are classified in detail in accordance with the classification of accounts prescribed by the commission for the different forms of business conducted. The maintenance and depreciation reserve expenditures are also classified in detail in accordance with the classification of accounts prescribed by the commission for the different kinds of business conducted. Data based on the income account show certain percentage income results, percentage basis of apportionment of operating expenses and sundry items, charges in operating expenses credited to sundry reserves and expenditures charged against sundry reserves, both percentages and amounts, all of which are shown combined and also divided according to the different kinds of business conducted. The statistical calculations showing the results of operation are largely in conformity with the specific units used, which are applied to the different forms of business.

The power report covers operating expenses and operating statistics of power plants (steam power generation separate from hydraulic power generation), substations, transformer stations and storage battery stations. The statistics include "individual and coincident demands," "electrical energy output and disposition" and "station capacity and customer demands," divided according to the different classes of electrical energy. Blank pages are provided for expansion if necessary or for adaptation to any particular plant or class of service. The totals in this report also are shown at the top instead of the bottom of the form and both common and specific units are used.

The gas works report shows operating expenses and operating statistics incident to the production of coal gas and water gas and the purchase of purchased gas. The totals and units accord with the arrangement in the power report.

The electric service operating report by systems and divisions covers operating revenues, operating expenses, net operating revenues and statistics. It is designed to show the results of operation of a system or division of an electric light and power system. The form is the same as two pages of the financial and operating report. The treatment of the totals and units is the same as in the power and the gas works reports.

Meeting of Keystone Railway Club

Several Papers of Interest to Street Railways Were Presented, Among Them Being a Comprehensive Discussion Upon Special Track Work for Electric Railways by Victor Angerer

The sixth meeting of the Keystone Railway Club was held at the Colonial Hotel, York, Pa., Monday and Tuesday, June 2 and 3. The Monday meeting for the transaction of preliminary business was called to order at 8:30 p. m., with President Gould in the chair. After the reading of the minutes, reports of committees and disposition of unfinished business, the members voted to hold the next meeting at Reading, Pa., on Monday evening, Sept. 8, and Tuesday, Sept. 9. A committee composed of the wives of Reading members will entertain the wives of the visiting members on Sept. 9.

SELECTION OF EMPLOYEES

After the opening of the session on Tuesday morning there was read a paper on the "Selection and Retention of Transportation Employees," by W. H. Hitchcock, general superintendent Trenton & Mercer County Traction Corporation, Trenton, N. J. He said that not only should rules for platform men be carefully prepared and rigidly enforced, but justness and fairness should also be exercised. The men's quarters should be clean, comfortable and cheerful, and where possible their wishes should be consulted and respected. Money spent for club rooms with good reading matter and simple amusements would be returned a hundredfold in attracting and keeping a set of loyal men. The least that should be required in selecting employees was a good reference from the last employer and a satisfactory account of the applicant's movements for the last five years. Mr. Hitchcock suggested the possibility of a period of probation of say three months. If the student showed proficiency after the first six days with an instructor, an inspector should ride with him say four times during the next fifteen days, and during this period the recruit should also undergo two examinations. In the three-month probation period following, he should be watched closely by the inspectors to prevent his falling into many of the ruts open to new men.

The retention of old employees was a most important matter, for often the man let out was better than the one who replaced him. Many companies had ironclad rules which automatically dropped men for certain offenses, but it was a question whether this practice could always be justified. It was poor policy to drop a man with six months' experience because of one mishap, which cost the company say \$200 or \$300, and then to hire three or four others who in turn ran the risk of similar or costlier accidents. It was better to call in the offender, show him what his slip had cost, tell him that he could not expect much more than one chance and, if necessary, suspend him for a time rather than to discharge him outright. It was a rare occurrence for a man worth anything at all to have more than one costly accident within a reasonable period. The expense merely of teaching a new man was about \$25, and this was followed by the likelihood of vehicle and other accidents before he became reliable. The speaker estimated that the average cost of the combined tuition and accident expenses of a new man was certainly \$50.

Mr. Hitchcock referred to a road where almost one-half of the men had been changed annually for several years with the result of weak discipline and a high damage account. Finally, it was decided to supersede the rule of might by that of reason. In three months there was a decided improvement because of the talks with individuals, and in eighteen months the general manager could openly compliment the line on its good showing in reduced equipment abuse and accidents. During the last year less than 12 per cent of the 200 men had been changed, and of these

only a small part were motormen. As for conductors, only 30 per cent of those cautioned for failing to register and account for fares collected had been detected a second time, and even better figures had since been secured. In general, excellent results had been obtained with this kind of discipline for offences other than drinking.

Mr. Hitchcock also advocated the employment of a liberal number of inspectors because many accident-breeding offences would not be committed if an inspector was present or likely to be on hand any moment. It would be better to devote some of the money now spent for the instruction of new men to the engagement of more inspectors. In any event, their wages would be less than the loss of traffic due to irregular service by crews who did not heed the schedule, and, furthermore, the public would have less reason for complaint.

In the discussion of the paper C. F. Crane, Pottsville, said that this year he had been obliged to break in only three new men instead of 180 by allowing the best extras of the previous season to keep their positions on the seniority list. J. E. Wayne, York, said that he had reduced the requirements for new men by permitting many extra summer employees to retain their badges for free riding during the winter months.

ELECTRIC RAILWAY TRACK WORK

A paper, accompanied by colored charts, on "Electric Railway Special Track Work" was then read by Victor Angerer, vice-president and general manager William Wharton, Jr., & Company. Mr. Angerer first defined the different kinds of track work for different classes of surface operation and deplored the unnecessarily large number of girder and guard-rail sections.

Theoretically, he said, for track laid to true gage, every combination of radius of curve and wheelbase of truck, with a given wheel flange, called for a specific width of groove to make the inside of the flange of the inside wheel bear against the guard and keep the flange of the outside wheel from grinding against the gage line of the outside rail and possibly mounting it. It would be manifestly impracticable to provide guard rails with such a variety of grooves or to change the grooves of the rolled rail. The usual minimum of 1 9/16 in. was wide enough to pass the A. E. R. A. standard flanges on a 6-ft. wheelbase down to about 45-ft. radius, and the maximum of 1 11/16 in. to about 35-ft. radius. On curves of larger radius the excess width should be compensated for by a corresponding widening of the gage. If the groove in the rolled rail was too narrow for given conditions, it must be widened by planing on the head side of the inside rail, to preserve the full thickness of the guard, and on the guard side of the outside rail, if a guard section was used, to preserve the full head. Unusual wheelbases of say 8 ft. or 9 ft. might require widening of the gage on some curves. The widening of gage was necessary only to bring the guard into play when the groove was too wide for some one combination of wheelbase and flange running over the work.

Referring to layouts for track carrying both interurban and city cars, Mr. Angerer said that it was probably true that the city regulations often prevented standardization on one kind of wheel, but cities should realize that when they expect the railway to bring interurban cars with larger flange wheels into the streets for the convenience of the people they should allow the use of the same wheel flange on city cars, and the track should be built to suit.

In T-rail curves the guard was formed of a rolled shaped guard, or a flat steel bar, bolted to the rail; but in Mr.

Angerer's opinion the double T-rail was the most substantial, and in the long run the most economical, particularly in standard T-rail track.

In special work and curves in high T-rail track a girder guard rail was often used. This was very desirable, as it was cheaper than the double T-rail and gave the solid guard in one piece with the running rail. The idea that a separate guard could be renewed when worn out did not usually work out in practice. When the guard was worn the running rail was usually worn to such an extent that it would soon have to come out also. The only drawback to this girder guard rail in high T-rail track was the compromise joint where the two had to join. The strains on a compromise joint, especially with lateral offset of plates, were quite different from the strain that tended to break the joint or loosen it. There was a remedy which should be more generally used. This was the use of so-called combination rails, namely, short sections of the rails to be jointed, say 3 ft. or more of each, welded together by a steel casting or any other method, or steel castings shaped to the desired sections on the ends, so that they could be connected to the rails in the track at both ends with plain joints. They cost somewhat more than the compromise joints, but they replaced that many feet of plain rail in the track, which helped to pay for them, and they certainly should soon save their extra cost in maintenance.

For special pieces, such as frogs and crossings, there was hardly an electric railway in the country to-day that, at present prevailing prices, could afford to buy anything less durable for tracks in paved streets than what was known as "hard-center" work. In the latter the pieces were formed of rails held together by a casting, into which they were partly fused or welded, or they were made a steel casting in their entirety. In either case a recess was left in the central part into which a hard metal plate was set and fastened in various ways. The metal "par excellence" for the centers and for track work in general was manganese steel, although some work was still made with chrome-steel or tool-steel centers.

Through the difficulty of machining manganese steel and because heating it to any marked degree destroyed its toughness and wearing quality, certain limits were placed upon the methods of applying and fastening manganese steel castings to track structures. The centers in hard-center work were fastened into the main body of the special work in various ways. (Here Mr. Angerer showed colored charts illustrating the methods named.) One method was to use a pendent lug and a key going through the lug and body, pulling the center down into the recess. Another was to use a combination of wedges applied to the edge of the center and between it and the wall of the body portion. Another method was to interpose a nut and brass set screw between horizontally extending lugs on the center and corresponding recesses in the body portion, and still another was the method of simply bolting down the center by vertical bolts running through both the body and the center plate. In all except the method last mentioned, zinc or spelter was poured in between the lower part and sides of the center and the body. In the bolted-down center zinc was also used in the same way in some work on the market, while in other work the under surface of the center and the top surface of the recess were finished by grinding and planing, and the two pieces were bolted together without the zinc lining.

Too much stress had been laid on the so-called renewability feature of special work. Anything mechanical that was easily detachable would, when put under repeated strains, be liable to detach itself. On the other hand, this renewability feature had been applied very little in practice, and a good portion of the renewals were made not on account of the wearing out of old centers but because something had gone wrong with the first center. Where centers were renewed on account of wear it was prac-

tically impossible to make a good job out of the surfaces, even by a very large amount of grinding of the adjoining parts, on account of the necessarily unequal wear on the two lines of rail. A good manganese steel center should outlast the adjoining portion of the body or rails, particularly the curved portions, which naturally existed in every piece of special work.

It was the wearing out of those portions of special pieces which had been made of ordinary rail outside of the manganese steel center that led to the introduction of solid manganese steel work in which the entire frog, crossing or other special piece was made in one manganese steel casting with the arms cast and ground to correspond to the general shape of the adjoining rail and joined to it with a regular joint plate. The main drawback was the greater cost, but it was no doubt economical for the railway company, provided the severity of the traffic warranted the greater initial outlay.

Some work had been made in which the main portion was cast solidly of manganese steel, similar in shape to the hard-center work, and a separate manganese steel plate set in at the points of the frogs and crossings. This might be warranted under certain conditions, but the difficulty of gaining advantage from the renewability of the center plates made its large introduction somewhat doubtful.

In the construction of frogs and crossings, of either the hard-center type or solid, the bottom of the grooves should be raised so that the wheel when crossing the intersecting groove would have a bearing of the flange on this raised floor or rather a simultaneous bearing on part of the tread and on the flange. This flange bearing was certainly necessary with narrow-tread wheels. If the wheel treads were wide enough to span the intersecting groove and still leave a good amount of bearing of the wheel tread on the running surface, and wide enough so that when crossing a groove at nearly right angles the blow would be distributed on a considerable area, the flange bearing would not be necessary. Though electric railway wheels were now made wider than years ago, the weight of the rolling stock had also increased and the wheels which could run on the present tracks were still not wide enough. There, again, the destructive effect of different sizes and different depths of wheel flanges running over the same track asserted itself. If the floor was raised only high enough to give bearing to the larger and deeper flanges of the wheels, all the wheels with shallower flanges would wear and batter down the points and other portions where they did not get a full tread bearing. If the floor was raised high enough to give a bearing to the shallower flange, then the deeper flange, not being assisted by any tread bearing, would soon cut into the floor.

The general remarks regarding the construction of frogs and crossings also applied to the mates that went with tongue switches. One piece in special track work in which a solid manganese casting for the body portion particularly recommended itself was the tongue switch. The important factor in the switch was the tongue bearing or pivot, which should be constructed to hold the heel of the tongue steady and to give the greatest possible resistance against the knocking down of the tongue at the heel end. It must have means of taking up the wear so as not to allow the tongue to get too loose, and still it must work loosely enough to permit throwing devices, like electric track switches, to move the tongue under all conditions.

To get the full life out of a tongue switch one must give it attention and take up the wear as it occurred. The tongue of the present day was generally reinforced by lateral flanges against the thrust of the weight of the cars. Tongue locks—that is to say, devices in which a spring held the tongue in one or the other position—should not be necessary in a properly constructed tongue switch and with the tongue bearings as snug and tight as they should be, but they were a safeguard against a tongue that was

too loose or one that had a tendency toward accidental throwing between trucks.

In standard T-rail for unpaved streets practically the same details of construction were followed in the various special pieces as in the girder rail and high T-rail work, except that the low T-rail gave a better opportunity for the use of solid manganese steel special pieces at no marked increase in cost over hard-center work. It was possible in this work to make the special work pieces of the same heights as the adjoining standard T-rail. Another class of hard-center work in connection with standard T-rail was known as insert work. In this construction the main portion of the special pieces was built up of rails and a small manganese steel casting, which corresponded in extent to the center plate of hard-center work, was bolted in between the rails. The cost of this, however, was not much less than that of the solid work, and the latter was, therefore, undoubtedly preferable in new work. Inserts found their best place in repair work where the lengths of the original pieces, probably of ordinary bolted construction, must be adhered to and where solid manganese steel pieces often became too expensive, because of the extra length. Little ordinary bolted work was now used in T-rail track on public highways, except in places where the traffic is very unimportant, and sometimes inside of carhouses.

In standard T-rail work on private rights-of-way where steam railroad practice could be followed the ordinary frogs and split switches should be used for the sake of economy. However, where traffic on such lines was heavy manganese steel frogs either solid or of the rail-bound type used on steam railroads and split switches with manganese steel points should be used. If the wheels on such roads had a narrow tread, provision must be made for flange bearings in frogs and crossings, distinguishing the work thereby from the regular style of steam railroad work. In the ordinary bolted frogs and in the fixed line of spring frogs, this was usually done by making the filler between the rails of steel, and carrying it up to the necessary height in the groove. Of course, in manganese steel frogs this simply meant making the groove shallow enough at the intersection and tapering it.

The crossings of electric railways over steam railroads formed a distinct class of special work, and owing to the great speed and weight of the steam trains the wear of such a crossing, either insert or solid, could not be compared with the performance of an ordinary crossing built of rails. A similar argument applied to the special track work of electric railways in general. In 1902 the average city passenger car weighed 33,000 lb. empty and 40,000 lb. loaded; in 1912 it weighed about 43,000 lb. empty and 58,000 lb. loaded, owing to increased passenger capacity. In 1902 the average interurban car weighed 40,000 lb. empty and 56,000 lb. loaded, against 68,000 lb. empty and 89,000 lb. loaded in 1912, an increase of from 30 per cent to 50 per cent. Comparisons without this consideration of increased weights and speeds often lead to the belief that the work is not so durable as it used to be.

A.C.-D.C. EQUIPMENT AT YORK

E. L. Greene, master mechanic York railways, then presented his paper entitled "A Description of the A.C.-D.C. Equipment in Use on the York Railway System." He did not discuss the relative merits of a.c. and d.c. equipment but confined himself to a description of the apparatus, an article on which was printed in the *STREET RAILWAY JOURNAL* for April 25, 1908. The cars operated between Hanover and York are 50 ft. long over all, weigh about 42 tons and carry four Westinghouse 135-A 75-hp motors, geared 60:17. The d.c. service is from York Center Square to the outskirts of that city, 2.8 miles, and the 6600-volt a.c. service from the city line to Hanover, 18.6 miles. The d.c. section is covered in thirteen minutes and the a.c. section in thirty-seven minutes, making a schedule speed of 25.6 m.p.h. The cars are equipped for multiple-unit operation

with non-automatic master controllers and pantograph current collectors. Mr. Greene said that although the control wiring was complicated, it rarely gave trouble. Every part of the cars had a thorough inspection and the motors and control were blown out once a week, in addition to a light inspection twice a week.

COMMUTATOR SLOTTING

In the absence of W. H. Rushton, master mechanic Altoona & Logan Valley Railway, his paper on "The Slotting of Street Railway Commutators" was read by R. P. H. Staub, General Electric Company. This covered the author's experiences in the treatment of commutators.

A great improvement in service and cost had been obtained by slotting the commutators of old 40-hp motors. During the year previous to slotting 287 armatures had been removed and the commutators turned for flat spots, but during the past year no flat spots requiring lathe work had developed. The motor temperatures had been appreciably lowered, particularly on the company's "hill cars," which have magnetic brakes. The saving was 60 per cent in brushes, 66 per cent in brush holders and 72 per cent in commutator renewals. When commutators are being slotted attention should also be given to brushes and brush holders. Some roads asserted that they slotted commutators in from fifteen to twenty minutes, but the speaker believed that this work could not be done satisfactorily in less than fifty to sixty minutes. Clean cutting and finishing would always pay. Mr. Rushton's slotter embraces a small motor with an extended shaft on which is mounted a 1 $\frac{3}{8}$ -in.-diameter milling saw of the thickness of the mica. The motor is placed on a vertically adjustable stand, and the stand and motor are fastened to the tool carriage of a lathe.

He recommended that brush holders should be inspected carefully and kept in alignment. The tension of the springs should always be checked. Brush holders with a spring adjustment device and shunts were preferable. A holder which was worn enough to allow a forward and backward movement of the brush should be replaced at once. As such movements were often caused by the brush wearing on the holder when the commutator had flat spots or was out of true, they could be practically eliminated by undercutting the mica. Worn brush holders also allowed the brushes to tilt or ride up, thus preventing their proper contact with the commutator bars. Correct brush tension depended upon track, service and brush conditions, but in no case should it exceed 5 lb. Most conditions would be satisfied by 4 $\frac{1}{2}$ lb. to 5 lb. per square inch of brush.

Carbon brushes had received much misplaced criticism. The treatments they received were legion. Some soaked them in gasoline to remove lubricant and others in cylinder oil or paraffin to introduce lubricant. Others had two sets of brushes for each motor and changed brushes each week for a fresh introduction of the cylinder oil and a rest. Such meddling was unnecessary as the brush manufacturers were making high-grade brushes to answer any conditions specified by the user. He favored a brush low in resistance and containing as little abrasive material as possible. Its mileage might not be high, but it would add years of life to the commutator. As a rule, brushes were kept in service too long. They should not be used when they get short or when they show wear against the brush holder. Their cost certainly was not enough of a factor in the total expense of maintenance to warrant the use of inferior grades.

QUESTION BOX

The last order of business was the question box. In reply to the question reading "How often should air compressors be removed from cars for a general overhauling?" A. F. Rexroth, Harrisburg, stated that it was not necessary to remove compressors more than once in six months. J. M. Connelley, Lancaster, said that he had gradually extended his overhauling period up to two years. Another delegate mentioned that the best time to renew springs,

clean the compressor thoroughly with gasoline, drain off the oil, etc., was in the fall as the compressors gathered most dirt during the summer months. W. J. Jeandron, New York, said it was not desirable to slot compressor commutators if there was any possibility of oil getting on the commutator to short-circuit the bars.

In answer to the question reading "What results and what mileage have been obtained with one-run steel and cast-steel wheels?" W. A. Heindle, Wilmington, said he was getting 70,000 to 80,000 miles of wear from Lobdell one-run cast-steel wheels. W. S. Edgar, Midvale Steel Company, Philadelphia, added that the Public Service Railway of New Jersey and several New York State companies were using rolled-steel, one-wear wheels in large numbers. As much as 150,000 miles of life had been obtained from wheels with a rim only $1\frac{9}{16}$ in. thick.

The meeting was then adjourned for luncheon and a trip to the great hydroelectric plant at York Haven was made.

MEETING OF ELECTROLYSIS COMMITTEE

The joint national committee on electrolysis, whose membership was published on page 934 of the issue of May 24, met at the Engineering Societies Building, New York, on May 27. As the American Gas Institute and the American Water Works Association did not have representatives present at the meeting, it was decided to effect only a temporary organization until the co-operation of those associations and possibly some other associations in the movement could be secured. Since this meeting took place, however, the Natural Gas Association has decided that it will appoint a committee to co-operate in this work.

There were present R. P. Stevens, A. S. Richey and Calvert Townley, representing the American Electric Railway Association; E. B. Katté, D. J. Brumley and W. I. Trench, representing the American Railway Engineering Association; H. S. Warren and F. L. Rhodes, representing the American Telephone & Telegraph Company; Philip Torchio, L. L. Elden and D. W. Roper, representing the National Electric Light Association, and B. J. Arnold and F. N. Waterman, representing the American Institute of Electrical Engineers. Ralph D. Mershon, president of the American Institute, was also present.

Mr. Mershon stated that as the president of the American Institute of Electrical Engineers he felt it his duty to call the meeting to order and turn it over to a chairman to be elected by the committee. He then set forth the object of the meeting and stated that the associations which had not yet appointed representatives had been conferred with by letter on March 12, and that the American Water Works Association had replied to the effect that it would not be possible for the association to take any action until its convention, which would be held on June 23. The Natural Gas Association of America had also replied stating that no action could be taken by that association until after its next convention. The American Gas Institute had not yet replied to Mr. Mershon's communication.

Mr. Torchio suggested that, inasmuch as all of the associations which had been invited had not yet appointed representatives, it might be inadvisable to take any definite action until after the representatives of these associations had been appointed. These associations are the American Gas Institute, the American Water Works Association and the Natural Gas Association of America. Mr. Torchio further suggested that a temporary chairman be appointed, pending the appointment of these representatives. This view prevailed, and Mr. Arnold was elected temporary chairman.

Mr. Townley was asked to give his views as to what work should be undertaken by the committee, and he set forth to some extent the field that, in his opinion, the committee's work should cover, which was that it should be mainly suggestive and constructive, and that the committee should recommend to the associations interested certain findings

which, when adopted, could be utilized by the associations in their work with each other in the handling of the general subject of electrolysis. There being a large representation of the committee present, it was deemed best to proceed with a general discussion of the subject, in order that time might not be lost, keeping in view, however, the fact that no definite action of any character would be taken until the other representatives could be present.

At the suggestion of Mr. Waterman, who stated that he had had some communication with the representatives of the American Gas Institute, it was thought best to appoint a committee to confer with the three associations which have not yet appointed representatives, with a view to obtaining their co-operation. Upon motion of Mr. Torchio, seconded by Mr. Katté, the temporary chairman was requested to act as such committee. Upon motion of Mr. Waterman, it was voted after some discussion to invite the National Bureau of Standards to appoint representatives on the committee.

A general discussion then followed as to the object, work and scope of the committee, in which several members took part. At the close of the discussion the following resolution was offered by Mr. Waterman, seconded by Professor Richey, and carried:

"Resolved, That the chairman be authorized to appoint a committee on scope, organization and plan of work, such committee to include representatives of each of the associations interested, and that no further attempt at work be made by the joint committee until the committee on scope, organization and plan of work can render a report to the joint committee, outlining the scope of its work and suggesting a plan of procedure."

The chairman appointed as members of this committee Calvert Townley, chairman, F. N. Waterman, E. B. Katté and H. S. Warren.

Mr. Katté stated on behalf of the American Railway Engineering Association, of which he is a representative, that the principal desire of that association, as regards electrolysis, is for education; that a sub-committee on electrolysis of that association has spent most of its time during the past year and a half in preparing an educational thesis, in very elementary language, which, when presented in the report of the committee at the last annual meeting, appeared to be just along the lines of information that some railway men were looking for, and that the sub-committee has been instructed to continue its work along the same lines. Hence the representatives of the American Railway Engineering Association would be glad to have information along educational lines to present to the association.

Mr. Waterman stated that he knew of a number of such reports as those mentioned by Mr. Katté having been prepared, and that perhaps a committee representing the joint electrolysis committee could be appointed to collect such reports and data as might be available and select therefrom a list of such matters as might be agreed upon as fundamental, which should form the basis of some sort of an educational document to be issued by the committee. That seemed to be the way in which the committee could be of most use.

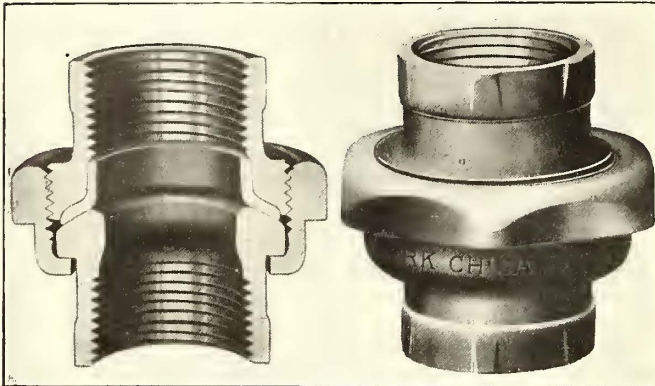
The question then arose as to whether the joint committee should suspend its work pending the appointment of the representatives of the associations which had not taken action, and it was decided that the committee would continue to hold meetings as occasion might require.

The chairman then named the members of the scope and organization committee and suggested that the committee prepare a skeleton outline of what it considered the joint committee should do, subject to the committee's approval.

The Ottawa (Ont.) Electric Railway has decided to change the color of the exterior of its cars from maroon to dark green. The twenty new cars to be put into use next month will be green, and the present cars will be repainted the new color as they go into the shops to be repaired.

COLD-DRAWN-STEEL UNION

A pipe union made of cold-drawn steel has recently been placed on the market by the Mark Manufacturing Company, Chicago, Ill. It consists of the usual three main parts, namely, male and female ends joined by a coupling nut. These parts, as well as the brass seat ring, are drawn cold from flat stock, thereby obtaining a fitting that is said to be



Cold-Drawn Union

seamless and free from sand holes, pin holes or similar structural defects. As the union is threaded to the Briggs standard for pipe threads, it carries the same taper as the pipe instead of being tapped straight through as most unions are. The union is made of the same material as wrought-steel pipe, and therefore re-tightening and leaks are eliminated because of the equal expansion and contraction of the union and pipe. Another novelty is the densified hardened steel seat which is formed by applying the die with such great pressure that the metal is hardened and a smooth, accurately shaped surface is given to the seat. When the coupling nut is screwed into place the densified seat and the opposing soft brass ring in the female end make a joint which is leak-proof even under extreme pressures. Both seat and ring are formed in dies without machining or grinding so that the fit of one face against the other is exact. After the threads are cut, the union is also sherardized to provide against corrosion, but this protection does not alter the sharpness and fit of the threads.

AUTOMATIC TROLLEY GUARD

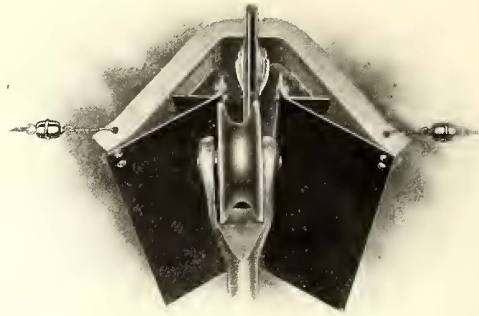
The automatic trolley guard illustrated on this page has recently been added to the line of equipment sold by the Electric Service Supplies Company, Philadelphia, Pa. This guard is placed over the trolley wire usually at cross-



Method of Suspending Trolley Guard

overs intersecting steam and electric lines to replace the pole automatically should it leave the wire at these dangerous locations. Even if the pole is held down because the rope is caught, it is only necessary to release the rope and the automatic guard will replace the pole immediately. This guard also finds effective use on railways operating through tunnels, under grade crossings, bridges, dark sheds or at any other point where it would be difficult to replace the pole on account of darkness or other hindrances.

The simple construction and application of this device appears from the illustration. The guard consists principally of two aluminum-coated steel sheets which are held in place by pressed-steel yokes or hangers. These hangers are adaptable to any standard type of trolley car. It has no projections or obstructions to hinder the trolley wheel. Furthermore, it allows a free vent for gases from passing locomotives and eliminates the possibility of choking up



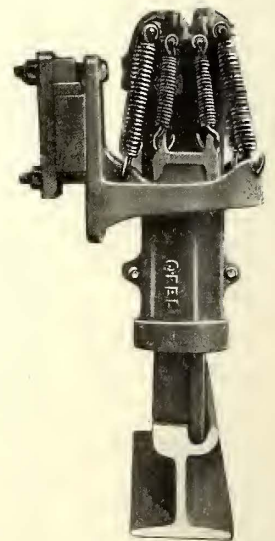
Trolley Guard in Operation

from any combination of ice, dirt or soot. The metals used in this guard are impervious to the action of the elements.

TWO-BLADED RAIL SCRAPER

In 1905 P. J. Pringle, now engineer and manager of the Ballarat (Australia) & Bendigo Tramways, designed a rail scraper with independent parts for cleaning the head and groove. Experience with the original design has led the manufacturer, the Consolidated Accessories Company, London, E. C., to add such improvements as screws to raise and lower the blades, one pair of springs to hold the blades down to the rail, a second pair of springs to absorb shocks and finally to use manganese steel for the groove blades.

A side view of this scraper, now known as the "Q-Fel," is presented in the accompanying illustration. The scraper has a bracket by means of which it is attached under the side of the car between the wheels with ample space for side movement. The vertical position of the scrapers should be adjusted so that the bottom of the sleeve, which is held in position by four main springs on two trunnions, is 4 in. from the top of the rail when the wheels are new. When necessary, a hard-wood packing block is inserted between the bracket and the frame to keep the groove blade vertical over the rail groove. The blades are brought into action and also adjusted for wear by turning two top handles anti-clockwise, and they are taken out of action by turning the same handles clockwise. Worn blades are removed by unhooking the reaction springs, swinging the cleaner to one side, using the top handles to withdraw the groove and tread blades and inserting new blades while the sleeve remains in oblique. The steel groove blades wear approximately 3/8 in. per 100 miles, equivalent to an effective life of 3000 miles. The life of the tread blades is about 9000 miles, the usual wear being about 1/8 in. per 100 miles. The blades are self-sharpening and therefore require no re-setting or removal until worn out.



Rail Scraper

ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES AND FRANCHISES

Connecticut.—Eminent Domain—Right to Exercise Power.

A street railway company may proceed to condemn land under Pub. Acts 1909, Chap. 101, and Gen. St. 1902, Secs. 3687, 3888, authorizing the condemnation of land necessary for altering and widening the right-of-way for a street railway company, though the company has, without authority, entered on the land sought to be condemned and has made excavations thereon and suits for damages therefor are pending. (*Stevens v. Connecticut Co.*, 84 Atlantic Rep., 361.)

New York.—Carriers—Transfers—Penalties.

An agreement between the city of Buffalo and street railway companies operating surface railroads under franchises which binds the companies to abolish transfer charges and requires them to charge a uniform fare for a continuous trip by the most direct route from any point on any of the street railroads owned by the companies to any other point thereon is at most a contract by which each company agrees to honor the transfers of the others without charge. It is not a contract for the use of their respective roads or routes, within railroad law (Laws 1905, Chap. 695), Sec. 78, providing that any railroad corporation may contract with any other railroad corporation for the use of their respective roads or routes, or any part thereof, and a company refusing to give a transfer is not liable to the penalty imposed by Public Service Commissions law (Consol. Laws 1910, Chap. 48), Sec. 49. (*Catalano v. Cross-town St. Ry. Co.*, 137 New York, Supplement 118.)

New York.—Taxation—Assessment—Pavement—Viaduct.

It was improper in assessing the property of a traction company to include as a part of its tangible property pavement laid by it solely for the benefit of pedestrians upon the highway, such pavement being the property of the municipality.

Where the assessment of a traction company's special franchise was presumptively correct, but a street pavement was improperly assessed as part of its tangible property, the assessment was invalid and could not be added to the value of the corporate franchise, though the pavement constituted a part of the cost of construction.

A viaduct necessary for the operation of a railroad, and in which the railroad company had a substantial property interest, was properly assessed against the company as part of its tangible property, though the public also had a right to use it. (*People ex rel. Buffalo & L. E. Traction Co. v. State Board of Tax Commissioners*, 136 New York, Sup. 474.)

Pennsylvania.—Steam and Electric Passenger Railways—Connecting Lines.

Where a corporation operates under leases a steam railway company and an electric street railway company, it will not be restrained, at the instance of a township, from constructing a connecting line between the two over a township road where it has gone no further than its lessor could have gone and where the railway existed before the township road. (*Willis et al., Board of Commissioners of Baldwin Tp., v. Pittsburgh Rys. Co.*, 82 Atlantic Rep., 1117.)

Pennsylvania.—Cleaning Streets—Action for Cost.

In an action against a street railroad for the cost of cleaning streets which should have been cleaned by defendant, where the companies underlying defendant obtained their right to the streets on the condition that they should keep them cleaned, and defendant assumed the duty and conditions relating to cleaning of streets imposed by the charters and franchises of the underlying companies, a verdict and judgment for plaintiff for the cost of cleaning the streets between the tracks and 1 ft. on either side thereof, in accordance with a general ordinance, instead of for the entire street from curb to curb, as required by some of the charters, should be sustained. (*City of Pittsburgh v. Pittsburgh Rys. Co.*, 83 Atlantic Rep., 273.)

Texas.—Condemnation Proceedings—Measure of Damages.

Where a railroad company wrongfully took possession of land and constructed its road without having paid or deposited the amount awarded by the commissioners, the measure of damages for the land taken was its market value

at the date of the trial, and not its lesser value at the date it was taken.

The fair cash market value of land condemned for a railroad right-of-way is not the market value of the strip taken when considered by itself, but is its value as a part of the tract of which it forms a part. (*Routh et al. v. Texas Traction Co.*, 148 Southwestern Rep., 1152.)

Washington.—Vacation of Street—Right to Question.

A street railway company which has a mere easement in a street cannot claim that there was a vacation of the street by operation of law because it was not opened within five years after the plat was filed, to defeat the right of the city to grade the street, upon which condition the company is bound by deed to remove its track to the center of the street. (*Seattle, R. & S. Ry. Co. v. City of Seattle*, 126 Pacific Rep., 531.)

LIABILITY FOR NEGLIGENCE

Alabama.—Collisions—Duty of Motorman—Duty of Travelers.

A motorman who sees a driver approaching on the regular roadway used by travelers with his horse under control need not stop his car until it becomes reasonably apparent that the traveler's horse will go on the track in front of the car. Where it is apparent that the driver sees the approaching car and is near enough to the traveled part of the street readily to turn off the track, the motorman may presume that he will get off the track until by his conduct he shows that it is his purpose not to do, or that he cannot do so. The motorman must then begin to stop the car to prevent injury. (*Birmingham Ry., Light & Power Co. v. Simpson*, 59 Southern Rep., 214.)

Alabama.—High-Voltage and Low-Voltage Wires on Same Pole.

Where an electric company maintained low-voltage and high-voltage wires on the same poles and a wire of high-voltage came in contact with a wire of low voltage and an employee working on the wire of low voltage was injured by an electric shock, the negligence in permitting the wires to come in contact was the cause of the accident. (*Birmingham Ry., Light & Power Co. v. Canfield*, 59 Southern Rep., 217.)

Georgia.—Municipal Corporations—Defects in Streets.

When the limits of the municipal corporation were extended so as to include a part of a highway which had previously been beyond the limits, such part of the highway then became one of the public streets of the city, and the municipality became liable for failure to keep it in proper repair, as it would be for failure to repair its other streets. But, whether or not the municipality was liable on account of any injury occurring there, this did not operate to release from liability one who unlawfully placed in the highway before it became a street a catch basin which caused a personal injury to a passer. (*Georgia Ry. & Electric Co. v. Tompkins*, 75 Southeastern Rep., 664.)

Indiana.—When Employees Are Passengers.

Where a carrier of passengers employs a person and assigns him a place of labor some distance from his home, giving him, in addition to his wages, tickets enabling him to ride to and from his work, such person, while riding on such tickets, is a passenger to whom the carrier owes the same duty as it is bound to exercise with reference to other passengers. (*Indiana Union Traction Co. v. Langley*, 98 Northwestern Rep., 728.)

Massachusetts.—Injuries from Sparks from a Third-Rail Shoe.

Plaintiff, while riding as a passenger on an open surface car beneath defendant's elevated structure, looked up as an elevated train passed overhead and was struck in the eye by a spark coming from the elevated road, probably from the contact shoe of the train. The elevated railroad was operated by proper authority in the proper manner, and there was nothing to indicate that defendant should have foreseen any particular danger or guarded against the same or that he had warning of its existence, nor was there any evidence that there was any practicable method of checking the emission of sparks from the trains or its electrical apparatus or preventing their falling into the street. Held, that plaintiff was not en-

titled to recover under the doctrine *res ipsa loquitur*. (Carney v. Boston Elevated Ry., 98 Northeastern Rep., 605.)

Missouri.—Explosion of Controller Box.

In an action against a street railroad company for injuries which a passenger received, owing to explosions in the controller box or other machinery, where it appeared that the motorman failed to throw off the electricity and permitted the car to run for several blocks after the explosions and flames began, there was a casual connection between the panic of the passengers caused by the flames and the negligence of the motorman in failing to stop the car. (Logan v. United Rys. Co. of St. Louis, 148 Southwestern Rep., 444.)

Missouri.—Collision with Hook-and-Ladder Truck—Care Required of Drivers.

In an action by a fireman who while riding on a hook-and-ladder truck was injured by a collision with a street car the motorman of which, although he could see that the driver of the truck was waiting on the tracks for the car to stop so that he could turn a sharp corner, did not stop the car, the petition pleaded an ordinance of the city giving the fire wagons right-of-way over all street cars. Held that, to rebut any inference of negligence on the part of the plaintiff for sitting on the truck until it was struck by the car, he might put in evidence the ordinance and the general custom of street car companies to obey the ordinance and stop their cars at the approach of fire wagons, the action not being based on the street car company's violation of the ordinance. (Taylor v. Metropolitan St. Ry. Co., 148 Southwestern Rep., 470.)

Montana.—Injuries to Passengers Expecting to Alight.

Where the motorman of a street car slowed up his car at a certain street, in accordance with a request of a passenger who, believing the car would come to an immediate stop, went upon the front steps and platform preparatory to alighting, the passenger may recover for injuries received from the failure of the car to stop and from its sudden and violent starting, which threw him off. (Knuckey v. Butte Electric Ry. Co. et al., 122 Pacific Rep., 280.)

New Jersey.—Coasting on Public Street—Collision.

Where one engaged in coasting on a public street was injured in a collision with a street car in consequence of the negligence of the motorman and not in consequence of any contributory negligence, he could recover from the street railroad company for the injuries received, though coasting is a public nuisance. (Lynch v. Public Service Corporation, 83 Atlantic Rep., 382.)

New York.—Injury Through Closing Doors—Overcrowding—Carrier's Liability.

A carrier of passengers is not liable for injury to one of them caused by his being crowded through a car doorway and his hand being caught by the door, if the carrier's employees used due care in closing the door. (Rubin v. Interborough Rapid Transit Co., 136 New York Sup., 60.)

New York.—Injuries to Persons on Trestle Used as Thoroughfare.

An engineer or motorman is required to keep a sharp lookout for pedestrians only at places where he has reason to expect they may be on the track, but where a trestle of a street railway company has been used by the public as a footpath so constantly and notoriously as to raise a presumption of knowledge on the part of the company its servants are bound to exercise the same vigilance in looking for travelers in that place as in places where the public have a right to go on the tracks. (Shelton v. Metropolitan St. Ry. Co., 151 Southwestern, 493.)

New York.—Injuries to Travelers—Passing Standing Car.

Plaintiff, a physician, was following a street car which stopped to take on a passenger. After looking ahead and observing no obstacles, he turned to the left in accordance with the law of the road to go round the car, when he saw another car approaching about 100 ft. away, without warning, and at a speed of more than 20 m. p. h. He endeavored to avoid collision, but was struck by the car and injured. Held, that since it was the duty of the street railway company when one car approached another which was standing on the street receiving and delivering passengers to

have the approaching car under control in order that no injury be done the public, and plaintiff was entitled to presume that defendant would observe such rule, he was not negligent as a matter of law in going on the track. (Bocovsky v. Buffalo & L. E. Traction Co., 137 New York Sup., 75.)

Pennsylvania.—Boarding Car from Wrong Side—Who Are Passengers.

In an action against a street railroad company for causing death where the decedent was killed while forcing his way into the car from the wrong side at an unusual and improper place he could not be regarded as a passenger, and the mere fact that he had succeeded in getting his feet upon the running board, and even upon the body of the car, was not sufficient to make him one. (Geiger v. Pittsburgh Rys. Co., 83 Atlantic Rep., 367.)

Pennsylvania.—Injuries to Passengers—Liability of Company Issuing Ticket.

Where a street railway issues tickets in its own name having the words thereon "Good for one 5-cent fare," and supplies such tickets to two other independent railway companies, the tickets to be good as fare on any of the three railways, a person buying a ticket from the conductor of one of the other independent street railways and injured while riding on such road in a collision may sue the company issuing the tickets to recover for his injuries, though the issuing company received no benefit from the sale of the ticket. (Mullen v. Chester Traction Co., 84 Atlantic Rep., 429.)

Washington.—Injuries to Persons on Track.

A person lying on a street car track on a rainy night was struck by a car. The street railway company was not responsible for his presence on the track. There was no evidence of how long he had been on the track prior to the accident, and he might have moved on the track just before the car struck him. The car was not operated at a dangerous speed, and the fender was a suitable one. Held, not to show actionable negligence of the company, though the headlight of the car was obscured, so that the gripman could not see as far as he would have seen had it been in a proper condition. (Gilcher v. Seattle Electric Co., 124 Pacific Rep., 218.)

Washington.—Duty to Provide Gates—Passenger Alighting from Wrong Side of Car.

Where a city ordinance required street railway companies to equip their cars with gates or guards on the side of the platform next to the opposite track to prevent passengers from entering or alighting from that side, it was the duty of a carrier operating a double-track street railroad not only to provide gates but to see that they were kept closed. Hence, where a passenger on a crowded car attempted to alight on the side next to the adjoining track through open gates and was struck and injured by a car passing in the opposite direction, the facts indicated actionable negligence. (Elliott v. Seattle R. & S. Ry. Co., 122 Pacific Rep., 614.)

MISCELLANEOUS

Illinois.—Interference Between Employees.

Every employee has a right to protection in his employment from the wrongful and malicious interference of another. But an employee cannot complain because another servant causes his discharge by refusing to continue in employment if he is any longer retained. A servant having the right, in the absence of contract, to quit the service for any reason or without reason, and the wrong in such case in causing another's discharge being *damnum absque injuria*. (Kemp et al. v. Division No. 241, Amalgamated Ass'n of Street and Electric Ry. Employees of America et al., 99 Northeastern Rep., 389.)

Kentucky.—Assaults and Ejectments.

A carrier is liable for an assault upon a passenger by its servant, whether the assault was because of personal malice or in the supposed interest of the carrier, and is liable if its servant assaults the passenger, though the passenger provokes the servant by insulting language, or if the servant, having been assaulted by the passenger, uses force greatly in excess of that necessary to repel or eject him from the conveyance. (White v. South Covington & C. St. Ry. Co., 150 Southwestern Rep. 837.)

LONDON LETTER

(From Our Regular Correspondent.)

As a result of the refusal of the local councils to allow the overhead system to be adopted on the South Hackney-West India Docks route of the London County Council Tramways a trial is being made with some old cars equipped with the Stevens petrol-electric system. Each car is equipped with a petrol engine, a dynamo and the necessary motors, which are connected to the axles. The trial trips prove that a speed of 12 m. p. h. can be maintained, and that 8 to 10 miles can be run on a gallon of petrol. If successful, this method will be used by the London County Council on lines where the Borough Councils will not allow the installation of overhead wires and traffic does not justify the expense involved in installing the underground system. The London County Council has been hampered for years by the power of veto possessed by the Borough Councils against the use of the overhead system, although in many places the cost of installation of the underground system has been prohibitive.

The highways committee of the London County Council reports that it will be necessary to spend £67,500 on rails for maintenance purposes, and the new plant for the Greenwich generating station, together with other improvements, will cost £150,000. The Council has accepted the tender of the British Westinghouse Electric & Manufacturing Company for two 8000-kw turbo-generators for the Greenwich power station. These generators will have a guaranteed steam consumption of 12.44 lb. per kw, and the contract price is £50,532, subject to a bonus of £500 for every 0.1-lb. reduction in the consumption. The new machines, which will generate alternating current at 6600 volts and 25 cycles, will replace two of the four 3500-kw reciprocating engines and generators originally installed in the power house. It is expected that the new machines will be in working order by March, 1914. It is proposed eventually to install two similar turbo-generators in place of the remaining reciprocating plant. The output of the Greenwich power station is not sufficient for the present tramway requirements, and while these new turbo-generators are being built additional power will have to be secured temporarily from one of the London electric supply corporations.

At the recent discussion on the annual expenditure of the London County Council it was shown that the tramway problem grows more complicated each year and that the estimates of revenue are upset by the growing motor omnibus competition. While the results of last year's working are not up to expectations, the revised estimates show that the working expenses and the interest on debt have been met and that £388,000 out of surplus earnings is available for the repayment of capital. The total debt outstanding on the tramways is about £9,916,000 and the debt charges amount to £738,000, or the equivalent of nearly a 4d. rate.

The Metropolitan Electric Tramways, which operates largely in the northern suburbs of London, held its annual meeting recently. The chairman stated that in order to maintain the same income the sum of £24,000 had to be spent on a fleet of motor omnibuses owned by the London & Suburban Traction Company, the idea being that if vehicles of this class are to be operated on the company's route, then the company had better control the competing service. Many combined tramway and omnibus undertakings will probably be developed in the United Kingdom during the next few years. This company has also successfully promoted a bill empowering it to provide a system of railless traction on some of its outlying districts. The proposal had the support of the County Councils of Middlesex and Essex and of the District Councils of Tottenham and Walthamstow. From Wood Green to Finsbury Park the system will not be used for the transportation of passengers but simply to move the cars to and from the Wood Green depot. This bill is a substitute for a bill promoted successfully by the company in 1906 for the construction of an ordinary tramway, the cost of which was found prohibitive.

The Board of Trade has officially inspected a Cedes Stoll system of trackless trams at Keighley, on a line which has been installed between the Ingrow terminus of the Keighley Corporation Tramways and the village of Cross Roads.

The principal difference between the Cedes Stoll car and those running in Leeds and Bradford is that in the latter the motors are hung beneath the chassis and driven by chain whereas the Cedes car wheels contain the armatures of the motors and there is no revolving axle.

The Manchester Corporation tramways and electricity committees have come to the following terms for the supply of electrical energy for tramway purposes:

(1) Charge to be made by the electricity committee to the tramways committee for all current supplied for traction, also for lighting and power at car sheds and car works, 1d. per unit. This charge is based upon price of coal at 11s. per ton. In the event of increase or decrease in price of coal there shall be an increase or decrease in the charge for current at the rate of .02d. per unit in respect of each shilling increase or decrease per ton in price of coal.

(2) This charge shall apply so long as current supplied for traction does not exceed 30,000,000 units per annum. If and when current supplied for traction exceeds this, then the supplies for all purposes (traction, lighting of car sheds and power at car works) over and above said 30,000,000 units shall be paid for at the prevailing rate which the electricity department charges to large industrial power users under similar conditions of supply.

(3) Arrangement to be in force for minimum of three years and terminable thereafter at end of any financial year on receipt of six months' notice from either side.

(4) In event of City Council altering the basis upon which the contributions from the profits of either or both of the two undertakings to the relief of rates is made, and thereby increasing the total amount of such contributions, either of the two committees to have the option of determining this agreement.

The select committee of the House of Lords has rejected the Hastings tramway bill, which would have authorized the substitution of overhead wires for the present surface contact system along the sea front. The bill was opposed by the Hastings Corporation and a number of frontagers, who gave evidence to the effect that the trams injured property on the front and that overhead wires would have an even worse effect. For the tramway company it was contended that the overhead system was the only practical system, and that the promoters were willing that the question of the system should be left to the Board of Trade.

The Northampton Town Council has decided to extend the limited parcels service in connection with its tramway undertaking. At present parcels are delivered on the line of route, but by the new arrangement a central receiving office is to be established to which all the parcels will be conveyed by the cars and later delivered by messengers at stated times.

The Glasgow Corporation tramways committee has adopted the report of a sub-committee recommending that two additional turbo-alternators be obtained for the Pinkston power station, one of 5000 kw and the other of 2000 kw, and that the general manager be instructed to prepare the necessary specification and form of tender and obtain offers for the erection of the alternators, and in the meantime to advertise one or more of the reciprocating engines at the Pinkston power station for sale.

A committee of the Town Council of Edinburgh, along with the city engineer, recently visited a number of English cities to inspect self-propelled tramway cars and obtain information concerning them. A number of extensions are proposed on various city and suburban routes. The most important is the line which is to be laid from the city to the new barracks at Redford. At present most of the Edinburgh and district lines are worked on the underground cable system. When horse traction was abolished it was not considered advisable to install the overhead system in Princess Street, but since then electric lines have been constructed by the Corporation of Leith, and from Edinburgh to Portobello, and it is recognized that the present cable lines cannot be extended. The Town Council must either construct overhead lines and require passengers to change cars wherever the trolley routes and the cable routes meet or organize a service of self-propelled cars which can run over any routes where there are rails. The deputation visited London, Coventry and Morecambe, where petrol-electric systems are in operation.

A. C. S.

News of Electric Railways

Electrification Ordinance Recommended in Chicago

At a meeting of the committee on railway terminals of the City Council of Chicago, Ill., on June 2, 1913, an ordinance requiring the abatement of smoke on or before July 1, 1915, by all railroads entering Chicago was recommended to the Council for passage. The vote of the committee was twelve to one.

Robert Redfield, attorney for the Pennsylvania Lines and other roads interested in the plans for new passenger terminals on the West Side near the location of the present Union Station, asked that action be delayed until the committee of the Chicago Association of Commerce can complete its report on the subject. He said that the report of the committee would be ready by Jan. 1, 1914. The committee, however, refused to grant any delay. It was influenced in this attitude largely by a report which Alderman Theodore K. Long presented as his main argument in favor of immediate action.

This report was rendered by a committee of the Association of Commerce to Homer A. Stillwell, president of that organization, on July 8, 1910. It was substantially a recommendation for immediate electrification of the terminals. This report has not been made public heretofore. The members of the committee who rendered it were as follows: John M. Ewen, Bion J. Arnold, A. Bement, Paul P. Bird, W. F. M. Goss, W. B. Jackson and Charles E. Merriam. The committee reported that it found electrification of terminals to be both practicable and feasible and it recommended that immediate measures for its accomplishment under proper and reasonable plans be adopted. The committee also recommended that until electrification had been accomplished anthracite coal and coke be used as locomotive fuel.

Alderman Long also presented the minutes of an executive session held by leaders of the Chicago Association of Commerce on Sept. 22, 1910, at which the report of their early committee was discussed. In addition to the officials of the association, representatives of a number of prominent railroads were present. The president of one railroad was quoted as having stated in his discussion of the subject that electrification was a commercial problem, and if it cost \$100,000,000 or \$400,000,000 to electrify the terminals in Chicago the question was whether the commerce of Chicago would bear that burden.

The resolution of the Council committee will go before the City Council for consideration.

Claim Filed Against City of Buffalo for Strike Damage

The International Railway, Buffalo, N. Y., through its president, E. G. Connette, has filed a claim for \$18,400 against the city of Buffalo for damage to the property of the company sustained during the recent strike of its employees. The company estimates that it suffered a loss of \$102,108 in earnings and \$6,292 in injury to its property through the failure of the city to afford the company proper protection. The company has tabulated in its claim the losses in earnings which it estimates it sustained from April 6 to April 13 inclusive, the highest amount for any one day being \$17,197 for April 9. The damage sustained to the physical property is set forth in detail, the cost for labor and materials being given where the element of cost for labor was significant. The claim against the city is addressed to "The Honorable Common Council of the City of Buffalo, City Clerk, Corporation Counsel and Chief Fiscal Officers of Said City." After reciting that it operates in Buffalo under franchises granted by the city and that it is a large taxpayer, the company in its claim says in part:

"On April 6, 1913, claimant became informed of various threats and attempts to destroy and injure its property within said city by mobs, riots and unlawful assemblages upon the streets of said city and elsewhere, and claimant did immediately upon acquiring such knowledge notify the Mayor of the city of Buffalo of such threats and attempts to destroy and injure its property by such mobs, riots and

unlawful assemblages, and did thereupon, both in writing and orally, demand of the Mayor of said city and of its police department and of others in authority to protect the property of claimant, and did further notify the Mayor of said city that claimant would hold the city of Buffalo responsible for any damages sustained by claimant by reason of such mobs and riots. That, commencing early on the morning of April 6, 1913, the cars, equipment and other property of claimant were attacked by mobs and by unlawful assemblages of people, and riots ensued and continued to and until April 12, 1913, and that by reason thereof claimant's property as more particularly set forth was damaged and injured by such mobs and riots and unlawful assemblages, and by reason of the fact that the city of Buffalo did not protect claimant's property from damage and claimant's employees from bodily harm and because of the violence practised by said mob upon claimant's property and claimant's employees, claimant was unable to carry on and operate its street cars and by reason thereof was deprived of earnings from its business of operating street cars and thereby suffered a large property loss as more specifically set forth. That by reason of the premises this claimant has been damaged and hereby makes claim and demands against the city of Buffalo in the sum of \$108,400."

Decision of Supreme Court in Fort Street Case, Detroit

Mayor Marx of Detroit, Mich., had reached no decision up to April 30, 1913, as to the next step to be taken with respect to the street railway situation, now that the United States Supreme Court has ruled that the Detroit United Railway has no right on Fort Street and may be ordered off at any time by the City Council. The company is willing to obey the mandates of the city, but the manufacturing interests object to any move that would affect the street railway service. For the city to compel the company to discontinue service on Fort Street would cause a reaction against the administration in the section served and endanger the chances of the present officials for reelection. Mayor Marx has been advised by business men to negotiate with the company for lower fare, but he declares that the administration is for municipal ownership.

After reviewing the history of the Fort Street case and setting forth the contentions of both sides Justice Day of the Supreme Court at Washington said:

"Certain federal questions made out require consideration upon this application to dismiss or affirm. The first of these is that the attempt to terminate the rights of the railway and to require the removal of its tracks and property from the streets of the city impairs the obligation of a valid existing contract for the continued use of the streets until 1921. This contention is based on the ordinance of May 2, 1906, which by the title purports to be one in relation to the rates of fare on the Fort Street line of the railway and which provides, after reciting the purpose of the ordinance, as we have mentioned above, and the intention that the grants from the township of Springwells may be modified in accordance with the ordinance, the terms and conditions of the township grant not to be otherwise affected by the agreement.

"The argument is that, as this ordinance obligates the railway for a full term of the township grants to do what does not expire until Dec. 14, 1921, to sell tickets and transport passengers over its line including the portion covered by the now expired grants, the last-named grants of the railway were thereby extended to expire at the same time with the township grants, because only by such construction can the obligation of the railway to furnish transportation for the full term of the township grants be complied with, and that this was a contract.

"The principles upon which the grants of this character are to be construed have been frequently declared in decisions of this court."

Justice Day then referred to a decision in the Cleveland Electric Railway case, in which it is stated:

"The rules of construction which have been adopted by the court in cases of public grants of this nature by authority of cities are of long standing. It has been held that such grants should be in plain language, that they should be certain and definite in their nature and contain no ambiguity in their terms.

"The legislative mind must be distinctly impressed with the unequivocal form of expression contained in the grant in order that the privileges may be intelligently granted or purposely withheld. It is a matter of common knowledge that grants of this character are usually offered by those interested in them and submitted to legislatures with a view to obtain from such bodies the most liberal grants or privileges that they are willing to give. This is one among many other reasons why they are so strictly construed."

Continuing, Justice Day said:

"Applying these principles, it is impossible to hold that the effect of this ordinance was to extend the franchises, which by their terms had definite and fixed duration. Such effect is nowhere suggested in the preamble of the ordinance and does not necessarily inhere in the thing sought to be accomplished. Legislation concerning prior grants was not brought to the attention of the Council, so that privileges enlarging them could be intelligently acted upon or clearly given or explicitly withheld. A fair construction of the ordinance requires such service at the rates fixed only while the railroad had a lawful right to use a street by grant from the city. Certainly it was not contemplated that the city should require such service after the grant had expired by its own limitation.

"We are of the opinion that where a street railway is authorized to operate in the streets of a city for a definite and fixed time and has enjoyed the full term granted it may upon failure to renew the grant be required within a reasonable time to remove its tracks and other property from the streets. In this case the Supreme Court of Michigan held that if the city by the resolution of its Common Council should require the removal of the company's property from the streets, the removal should be effected by the railway within ninety days after notice or resolution, unless it should receive a longer time or the time given should be extended by resolution.

"In thus providing for the removal of the property of the railway from the streets of the city we are unable to see that any contractual obligation was impaired, or that the property of the railway was taken without due process of law, and these are the contentions as to federal questions argued in this connection."

The utilities committee of the Charter Commission has asked Corporation Counsel Lawson for an opinion on the municipal ownership section which has been framed. This section, as it stands, will allow the street railway commission to demand a 2 per cent increase in the bonding limit of the city every two years, in addition to the 2 per cent increase in the general bonding limit. Commissioner Burton claims this is illegal, under the Verdier home rule law, and that it can never be put to a vote of the people. Other members assert that it is putting too much authority into the hands of the street railway commission and that it could go to any extremes in the issue of bonds, with the railway property as security. Still others say that if the commission does not have power to demand the issue of bonds when needed, the purpose of the municipal ownership section will be defeated.

Mayor Marx has announced the appointment of William D. Mahon, president of the Amalgamated Association of Street & Electric Railway Employees, as the third member of the street railway commission. Joseph S. Stringham, one of the men already named, has informed the Mayor that it will be impossible for him to serve in that capacity. The commission will probably be asked for advice in regard to the settlement of the differences between the city and the Detroit United Railway. Representatives of both the city and the company were reported to be working in executive session on plans for settlement on May 27.

On the following day Mr. Brooks said that the company was ready to consider any fair plan of settlement that might be proposed.

In pursuance of the order of the Wayne Circuit Court, the City Council on May 27 rescinded its action in appropriating \$250,000 to be used for transportation purposes. This money was to be used in financing either a cross-town street railway or a bus line on Junction Avenue.

Attorney Hinton E. Spalding has filed notice of an appeal to the Supreme Court of Michigan from the decision of the Wayne Circuit Court declaring the Verdier home rule act constitutional.

Franchise Negotiations in Kansas City Resumed

The franchise negotiations in Kansas City, Mo., between Mayor Jost, representing the city, and the receivers of the Metropolitan Street Railway have been resumed. At a recent executive session two proposals were submitted by the receivers and a counter proposal was made by the Mayor. At the close of the session it was decided by both sides to the conference to issue a statement in regard to the progress made at the meeting. A summary of the first proposal made by the representatives of the company at the conference follows:

Capital value shall be fixed at \$30,000,000, to which shall be added as new capital all capital expenditures since May 31, 1912, and all which may be hereafter made. The sum total shall from time to time be regarded as capital value upon which there shall be a return, cumulative, equaling 6 per cent per annum, payable semi-annually. The net surplus shall be divided 75 per cent to the city and 25 per cent to the company. The part going to the city shall, at its option, go to amortizing or paying off the capital value, so that when it is paid down to one-half of the then capital the city shall own the property, subject to an indebtedness for the other half, and when the city thus acquires the property the 25 per cent of the company shall cease. The excess of 8 per cent on gross earnings above taxation, at the option of the city, shall go into the city treasury, as at present, or be set aside as a primary amortization fund. The city shall have the right to test in the fourth and fifth years of the contract a reduction of fares to six tickets for a quarter to see whether the return is sufficient to carry out the spirit of the contract, and the 75 per cent of the surplus going to the city for the first three and subsequent years shall stand as security to the company against the loss, if any, by that test.

After this had been discussed the representatives of the company made a proposal in part as follows:

Capital value shall be fixed at \$35,000,000, to which shall be added as new capital all expenditures therefor since May 31, 1912, and all which may be hereafter made. The sum total shall be regarded as the capital value. Upon the \$35,000,000 there shall be a return, cumulative, of 5 per cent per annum, payable semi-annually. Upon the new capital there shall be a return, cumulative, of 7 per cent per annum, payable semi-annually. All the surplus over and above interest, as aforesaid, shall be applied to amortization, the 7 per cent money to be first amortized. When one-half of the total capital shall have been amortized the city shall own the plant, subject to the indebtedness for the other half. The present 5-cent fare shall never be so reduced as to impair the return aforesaid and the value to the company of said amortization. Under both plans it is agreed:

(a) The city may at any time purchase, at capital value, but if the purchase is made under the first plan before one-half of the capital is amortized, then there shall be added the fair value of the right of participation; (b) an agreed plan shall be adopted for adequate and satisfactory representation by the public in the management of the property.

The counter suggestions of Mayor Jost have been summarized as follows:

The capital value to be \$30,000,000; 6 per cent on this sum and on new capital to be hereafter invested; interest cumulative; all earnings after paying interest charge and operating expenses to be applied to paying off capital until it has been reduced to a point where it is the equivalent of the physical value of the property. During this time fare to be 5 cents with transfers as now. After capital has been paid off and reduced to physical value the company to receive one-third of the surplus and the city the remainder of the surplus. All surplus going to the city to be applied to further paying off capital until such time as

the capital shall have been one-half paid off. The city shall thereupon become owner of the property and the rights of the present owners shall then and there terminate. At such time as the capital has been reduced to the physical value the city may reduce the fare, but the fare shall not be reduced to such an extent or in such a way as materially to impair the right of the company to participate in the surplus as aforesaid, measured by the earning power of a 5-cent fare.

Estimates Based on Proposed Merger of Chicago Surface Lines

The local transportation committee of the Board of Aldermen of Chicago has received a letter signed by all the members of the Board of Supervising Engineers, written in compliance with the request made by the committee on May 16 for figures showing the probable capital expenditures, gross receipts, operating expenses, net profits and rate of return of the Chicago Railways and the Chicago City Railway, provided these properties were operated as one property and under one management from Feb. 1, 1913, until the expiration of the present ordinances on Feb. 1, 1927. The letter reads in part as follows:

"In arriving at the figures submitted we have necessarily had to take into consideration the method of operating the cars of the different companies involved and the changing of the service in such a manner as to introduce the through routing of the cars to the greatest extent practicable, not only for the purpose of giving better service but also for the purpose of reducing operating expenses.

that pass by the same point during the same period without the car-loading exceeding an average of seventy passengers per car, and that such cars shall have a seating capacity of not less than forty passengers, although it is contended by some members of this board that, considering the size and type of car used in Chicago, eighty passengers per car is a fair measure of service under the above conditions.

"After careful analysis we have determined that with the measure of service most advantageous to the public, as above set forth, and with the economies that can be effected resulting from unified operation, the operating ratio can be approximately 65 per cent of the gross receipts and upon this basis the net profits have been determined."

Based upon the above premises the accompanying table shows the income account and its distribution for the combined properties of the surface street railways operated as one property for the period beginning Feb. 1, 1913, and ending Jan. 31, 1927.

Governor Sulzer's Veto of Power Bills

In the department "Legislation Affecting Electric Railways" in the issue of the ELECTRIC RAILWAY JOURNAL of May 31, 1913, page 980, brief mention was made of the vetoes filed by Governor Sulzer of New York in the case of the Murtaugh hydroelectric bill, designed to permit the utilization of the surplus waters of the canal for the development of water power by the State, and the Walters bill, which would have permitted quasi-public corporations to impound waters through the construction of dikes, watersheds, etc., and to market the water. The memoran-

Year	Capital, Yearly Additions	Capital at End of Year	Gross Receipts	Operating Expenses, 65 per Cent of Gross Receipts	Net Receipts	5 per Cent Interest on Capital	Net Profits	City's Share, 55 per Cent of Net	Companies' Share, 45 per Cent of Net	Per Cent Companies' Share to Capital	Per Cent Total Companies' Share to Capital and Additional
1912*	\$6,277,991	\$133,770,389	\$30,459,111	\$19,396,257	\$11,062,854	\$6,524,947	\$4,537,907	\$2,529,993	\$2,007,914	1.537	7.140
1913	\$9,370,000	\$143,140,000	\$32,016,000	\$20,810,000	\$11,206,000	\$6,922,700	\$4,283,300	\$2,355,800	\$1,927,500	1.392	7.275
1914	8,754,000	151,894,000	33,623,000	21,855,000	11,768,000	7,375,800	4,392,200	2,415,700	1,976,500	1.339	7.113
1915	7,843,000	159,737,000	35,280,000	22,932,000	12,348,000	7,790,800	4,557,200	2,506,500	2,050,700	1.316	6.972
1916	7,398,000	167,135,000	36,988,000	24,042,000	12,946,000	8,171,800	4,774,200	2,625,800	2,148,400	1.314	6.904
1917	4,987,000	172,122,000	38,745,000	25,184,000	13,561,000	8,481,400	5,079,600	2,793,800	2,285,800	1.347	6.730
1918	4,778,000	176,900,000	40,550,000	26,358,000	14,192,000	8,725,600	5,466,400	3,006,500	2,459,900	1.409	6.766
1919	4,545,000	181,445,000	42,403,000	27,562,000	14,841,000	8,958,600	5,882,400	3,235,300	2,647,100	1.477	6.808
1920	3,917,000	185,362,000	44,303,000	28,797,000	15,506,000	9,170,200	6,335,800	3,484,700	2,851,100	1.554	6.832
1921	3,955,000	189,317,000	46,248,000	30,061,000	16,187,000	9,367,000	6,820,000	3,751,000	3,069,000	1.638	6.913
1922	4,017,000	193,334,000	48,237,000	31,354,000	16,883,000	9,566,300	7,316,700	4,024,200	3,292,500	1.720	6.994
1923	4,055,000	197,389,000	50,268,000	32,674,000	17,594,000	9,768,100	7,825,900	4,304,200	3,521,700	1.802	7.073
1924	4,105,000	201,494,000	52,339,000	34,020,000	18,319,000	9,972,100	8,346,900	4,590,800	3,756,100	1.883	7.151
1925	4,155,000	205,649,000	54,448,000	35,391,000	19,057,000	10,178,600	8,878,400	4,883,100	3,995,300	1.962	7.228
1926	4,193,000	209,842,000	56,593,000	36,785,000	19,808,000	10,387,300	9,420,700	5,181,400	4,239,300	2.040	7.303
										Average	7.076

*Figures are actual for year 1912.

"Owing to the responsibility involved in our conclusions we have spent much time in estimating the probable increase in population and in growth of territory of the city of Chicago and their relation to the future gross earnings of the companies, and in making these calculations we have made a careful analysis of the past growth of many of the large cities of the world during the period occupied by them in growing to the present population of the city of Chicago, as well as thereafter, up to their present population.

"In determining the capital investment we have started with the present value of the properties, known as the purchase price in the 1907 ordinances, and have added annually the amounts which we deemed necessary properly to extend and equip the surface line systems, including both a north and south and an east and west surface car-line subway system through the business district.

"To determine the probable future operating expenses, it has been necessary to define a measure of service and use this measure of service in determining the necessary car service and consequently the number of cars required for the service. We have based our conclusions on the assumption that during the non-rush-hour periods, under normal conditions of operation, a seat will be provided for every passenger on the basis that there shall pass any given point on any route during each fifteen-minute period a number of seats equal to the number of passengers passing such point on the cars during the same period, and that during the rush-hour periods sufficient cars shall pass any given point within each thirty-minute period to carry all passengers

dum filed by the Governor in regard to the act to amend the conservation law by repealing one of the articles of that act and enacting a new article in relation to hydroelectric plants and making an appropriation therefor follows in part:

"This bill appropriates \$650,000 to make a beginning, and I am advised that it will sooner or later cost the taxpayers of the State millions and millions of dollars. It seems to me that if we are to begin utilizing the natural water powers of the State for the benefit of the people we should commence at that place in the State where we have the greatest water power and not where we have the least. In other words, we should develop water power which is of so great a volume that power and heat and light can be generated for the benefit of all the people and not for a few in a selected locality.

"Then, again, this measure is severely criticised as loosely drawn, defective in places and of doubtful constitutional provisions. I am satisfied that if the bill should become a law it would be the subject of long and expensive litigation. In addition the friends of the Barge Canal are opposed to the plan embodied in this bill on the ground that it will cripple the efficiency of the canal.

"In view of all that has been said for and against this measure, I purpose to withhold my approval and have concluded to appoint a commission of experts and disinterested citizens to investigate thoroughly not only the project under consideration, but the Long Sault water powers, the Niagara water powers, the Genesee water powers and others, with a view of determining what is the best thing

to do ultimately and finally for all concerned, and to report their conclusions, with appropriate bills, for the consideration of the next Legislature."

In his memorandum filed with the bill to amend the transportation law in relation to water storage corporations the Governor said in part:

"The basic principle underlying this measure is nothing less than the granting to private individuals of the vast, undeveloped and immensely valuable natural resources of our State, and it would mark the commencement of a policy that would inevitably end in the domination of the industrial life and the industrial liberty of our citizens by corporate control. So far as I know, the extraordinary powers conferred by this measure are without legislative precedent."

New Terminal for Dallas

The interurban terminal station which is to be erected by Stone & Webster, Boston, Mass., to accommodate its lines at Dallas, Tex., will cost approximately \$2,000,000. Plans for the building have been drawn and adopted and construction will be started in a few weeks. The building will cover a block and will be nine stories high with a basement. Twelve tracks will run into the trainshed. The site of the proposed station is in the heart of the downtown business district.

The combined building and trainsheds will extend 200 ft. on the Jackson and Wood Street sides and 270 ft. on the Browder Street side. The building will have an aggregate floor space of 155,000 sq. ft. The trainsheds will house thirty-five interurban trains at one time. All of the interurban lines now running into Dallas, those being built into Dallas and those which are to be built in the future are expected to use these terminals. When the various interurban railways now under way are in operation 500 interurban trains will probably pass through the station every day.

The exterior finish on the street fronts of the building will be of pressed brick and terra cotta. The floors of the corridors and public spaces will be laid with terrazzo, a variety of inlaid mosaic. The walls will be finished in hard plaster and the interior woodwork will be of mahogany. The building will be equipped with three high-speed passenger elevators and the latest vacuum cleaning devices. There will be telephone and call bell systems, a fire alarm system, electric fans for offices, a refrigerating plant and pumps for circulating ice water to all offices. Hot water will also be supplied. There will be ample vault space and an independent heating plant with the necessary auxiliaries will be installed. The basement will be used as a substation for distributing current to the interurban lines and for lighting and power purposes in the business district in connection with the new underground system which is being installed. A portion of the ground floor of the main building will be devoted to stores. All of the Dallas Stone & Webster companies, the Stone & Webster district offices and the Stone & Webster Engineering Corporation will have their headquarters in this building.

Carhouse of Tri-City Railway Destroyed by Fire

The carhouse of the Tri-City Railway, in Roek Island, Ill., was destroyed by fire on the morning of June 1, 1913. Lightning struck the front end of the building and penetrated its entire depth of about 300 ft. The fire spread so rapidly that before sufficient help could arrive to assist the night force ninety-four cars were in flames, and it was possible to save only four. Practically all the rolling stock used in the bridge service between Davenport and Rock Island and the cars operated on the Roek Island and Moline city lines were stored in the building, but by working in the shops continuously the day and night following the fire the company was soon able to restore practically normal service with its obsolete equipment.

The Tri-City Railway placed an order recently with the St. Louis Car Company for thirty new cars, but they will not be ready for delivery until Sept. 1. It has officially announced that an order will be placed at once for sixty new cars and that work on the new shops will be rushed to completion. The new shops will be about 200 ft. wide

by 300 ft. long, and must serve temporarily as a carhouse. J. G. Huntoon, general manager of the company, estimates the total loss from fire at \$300,000. Of this amount \$50,000 is chargeable to the building and \$250,000 to the ninety-four cars which were destroyed. Insurance on the building and contents amounted to \$225,000. The building which was destroyed was used as a storage barn and shop, while a two-story portion over the Fifth Avenue front served as trainmen's quarters and an office for the cashier. The proposed new shops were described in the *ELECTRIC RAILWAY JOURNAL* for Dec. 28, 1912.

Services of Traffic Expert Formally Ended.—The Supervisors of San Francisco, Cal., have adopted a resolution formally concluding the employment of Bion J. Arnold, Chicago, Ill., as traffic expert.

Motion for Inquiry Into Fare in Buffalo.—The committee on streets of the Aldermen of Buffalo, N. Y., has voted to file the resolution introduced in that body directing the Mayor to petition the Public Service Commission to conduct an inquiry into the fare charged by the International Railway in that city.

Beaumont Strike Declared Off.—The strike of the employees of the Beaumont (Tex.) Traction Company, which has been a thing of the past for some time so far as the company is concerned, has been declared off by the representatives of the former employees. The men went out on strike on Feb. 8, 1913.

Franchise Negotiations in Des Moines.—Mayor James R. Hanna of Des Moines, Ia., is reported to have stated that he hoped to be able to have a tentative ordinance for the extension of the franchise of the Des Moines City Railway ready for presentation to the officers of the company by June 15, 1913, for their consideration.

Prospects for Double-Tracking the Buffalo, Lockport & Rochester Railway Indefinite.—The matter of double-tracking any part of the Buffalo, Lockport & Rochester Railway, Syracuse, N. Y., is at present very indefinite. If the project does assume a definite form the company will in all probability do the work, which will merely consist of laying the track on the double grading which was completed when the road was originally constructed.

Plan to Take Over Abandoned Steam Branch.—The Northwestern Pennsylvania Railway is reported to have made an offer of \$150,000 to the Erie Railroad for its old main line track between Meadville and Cambridge Springs, which is to be abandoned by the Erie Railroad when it completes its new double-track line at low grade. If the deal goes through, the Northwestern Pennsylvania Railway will, it is said, abandon its present line to Cambridge, except a 4-mile spur to the Country Club, and will use the old Erie main line instead.

Decision in Bridge Railway Case.—The Appellate Division of the Supreme Court of New York has confirmed the recommendation of a commission that the Manhattan Bridge Three-Cent Line, New York, be permitted to lay tracks in the borough of Manhattan. The line now runs from Fulton Street and Flatbush Avenue, Brooklyn, over the Manhattan Bridge to the bridge plaza in Manhattan. The line will extend from the North River through Desbrosses Street by double track to Washington Street, thence by single track in Vesey Street to Greenwich Street, by double track in Vesey Street to Canal Street and through Canal Street to the Manhattan Bridge terminal.

Changes in Personnel of the Choctaw Railway & Lighting Company.—In a recent reorganization of the Choctaw Railway & Lighting Company, McAlester, Okla., the following changes in the organization were effected: B. R. Stephens resigned as general superintendent and moved his office to St. Louis, Mo., where he still acts as secretary, auditor and purchasing agent. Russell Palmer succeeded D. W. Dawley as treasurer of the company. B. E. Tabler, formerly the traffic manager, was appointed general superintendent. M. Plunkett, formerly master mechanic, succeeded N. E. Daniels, chief engineer power station, now having supervision over the maintenance of equipment and power station.

Motor Buses Proposed for Philadelphia.—The Philadelphia (Pa.) Rapid Transit Company has caused a bill to be introduced in the Legislature giving it authority to operate

motor buses in the city of Philadelphia. This is done in order that the company may be in a position to operate motor buses when considered necessary for the proper accommodation of the public. Nothing in this regard can be done, however, without having first secured consent of the city authorities. This bill does not confer an exclusive privilege on the Philadelphia Rapid Transit Company. Omnibus companies may still be incorporated as heretofore, and it remains for Councils to decide who shall operate omnibuses on any of the city streets.

Separate Management for Southern Pacific Electric Line.—It has been announced that the suburban electric lines of the Southern Pacific Company in Oakland, Alameda and Berkeley, Cal., are to be separated as an operating organization from the steam lines about the bay. Directly in charge of the electric organization will be a local manager to be appointed. Under him, W. H. Norton, at present assistant superintendent of the Western division, will supervise electric train operation. His headquarters will be at the Oakland pier. Paul Shoup, president of the Pacific Electric Railway, will remain the executive head of the transbay system, serving, it is said, however, largely in an advisory capacity. The steam lines will continue under the management of J. D. Brennan, superintendent of the Western division.

San Francisco Traffic Agreement Approved by Court.—The Supreme Court of California has approved the agreement between the United Railroads and the city on behalf of the Geary Street Municipal Railway for the joint use of lower Market Street. The tracks of the Geary Street municipal railway will now be connected with the tracks of the United Railroads on Market Street, and as soon as this work has been completed the cars of the Geary Street Municipal Railway will be operated to the ferry at the foot of Market Street. The way has also been cleared for the operation of the cars of the Sutter Street line to the ferry and for the abandonment of the horse cars. The action of the Supreme Court is in accordance with the result of the election on April 22, 1913, when the voters approved the agreement entered into between the city and the United Railroads.

Work of New England Railroad Conference.—Chairman Charles A. Prouty of the Interstate Commerce Commission met in the State House, Boston, Mass., recently with the representatives of all the other New England States than New Hampshire, who constitute the New England transportation conference appointed by the Governors. The temporary organization which was formed at the first meeting was made permanent, with Percival W. Clement, of Vermont, chairman, and Admiral Francis T. Bowles, of Massachusetts, secretary. The statement issued at the conclusion of the conference says that the members of the committee conferred in Washington with the Attorney General. The members then resolved to have certain committees appointed. These will be a general executive committee, a committee on the Boston & Maine Railroad, one on steamship affairs, one on electric railway affairs and one on legal affairs, in each case the committee to go into the present status, control and condition of the branch to be investigated.

Railway Report Adopted by Los Angeles Council.—The Council of Los Angeles, Cal., has adopted the report of its municipal railway committee, which has recommended certain changes in the methods of operation of the railways in Los Angeles and outlined a plan for a beginning in municipal ownership. The committee says in regard to municipal ownership: "The franchise for the Temple Street car line will soon expire, and we recommend that the city take over this line, accepting the offer of William Dunn to present the city with the track and overhead improvements. We recommend that this line, as soon as taken over by the city, be extended to Sunset Boulevard, along Sunset Boulevard to La Brea or Gardner Junction; thence north to Hollywood Boulevard and west on Hollywood Boulevard to the city limits. Sunset Boulevard is the only through east and west street between Hollywood Boulevard and Santa Monica Avenue, and the only route over which a car line could be operated to serve the extensive territory lying between the above-mentioned streets."

LEGISLATION AFFECTING ELECTRIC RAILWAYS

ILLINOIS

The amended public utilities bill will be reported out by the committee of the House, according to a statement made on May 30 by John M. Rapp, chairman of the House committee on public utilities. The proposed measure gives Chicago home rule and expressly enlarges the powers which cities of more than 20,000 population have heretofore held over public utilities. For the cities under 20,000 the power is to be vested in the state commission, but the citizens are to have the right to vote to exercise home rule with the same powers that are delegated to the larger cities. The bill called up in the Senate by Senator Francis Brady, Chicago, to permit the establishment of stage and omnibus routes was opposed by Senator Walter Clyde Jones on the ground that under its provisions companies would be able to establish trackless trolley lines and create a monopoly. Senator Samuel Ettelson, Chicago, supported the bill. He declared street railway service on the South Side of Chicago is inadequate. The bill was laid over.

The Senate has passed the bill requiring all corporations to pay their employees at least twice a month.

MASSACHUSETTS

The House has ordered to a third reading the bill to provide for the acquisition of the electric railways in western Massachusetts by the New York, New Haven & Hartford Railroad. One of the conditions of the bill is that the railroad shall expend at least \$5,000,000 in building new lines in that section of the State.

NEW YORK

The following is a summary of the progress through the Legislature of the Cronin measure relating to the employment of experienced motormen: The Cronin measure was known as Assembly bill printed No. 1897 and introductory No. 1678. A companion bill in the Senate was introduced by Mr. Sanner, known as printed No. 1403, introductory No. 1213. After the Assembly bill had been passed by the Assembly, it went to the Senate, where it became Recording No. 808, being substituted there for Sanner's bill, which was an exact copy of the Cronin bill. On April 16 the bill in the Senate (Cronin's measure) was referred to the railroads committee and was reported from that committee to the committee of the whole, or in other words third reading, or to the Senate as a body, on April 30, where it died, no further action being taken on it. The Cronin bill was published in full in the *ELECTRIC RAILWAY JOURNAL* of April 26, 1913.

Governor Sulzer has disapproved the act to extend the time of the Rochester, Corning & Elmira Traction Company, its successors or assigns, to begin the construction of its road, to expend thereon 10 per cent of its capital and to finish its road and to put it into operation.

OHIO

Governor James M. Cox has vetoed the Gregory bill which provided for the construction of the Bond Hill line of the Cincinnati Traction Company without the formality of securing the consents of the owners of abutting property. The Governor has signed the Snyder bill, which provides for the issue of bonds by a municipality for the construction of rapid transit loops under certain conditions which make the act applicable to Cincinnati only. This completes the legislation necessary to carry out the plans of Mayor Hunt for the proposed rapid transit changes in that city.

WISCONSIN

The Senate has deferred action on the Assembly bill relating to the distribution of the street railway tax. The bill was recommended for concurrence by the committee on corporations of the Senate, but has been re-referred to the committee on finance. The Conway bill to exempt mutual public utilities from the operation of the stock and bond law has been killed. Governor McGovern has approved the Assembly bill empowering municipalities to construct and acquire utilities. Very few new bills are being introduced in the Legislature and the work of the session is drawing to a close. A joint resolution has been passed by the Senate which provides for adjournment on June 12.

Financial and Corporate

Stock and Money Markets

June 3, 1913.

Price movements on the New York Stock Exchange in the last half of the forenoon were generally confined within narrow limits. In the afternoon weakness developed in the last hour and nearly all of the important railroad and industrial issues joined in the downward movement in the dealings at the close. Interborough-Metropolitan issues sold off under small sales. Rates in the money market to-day were: Call, $2\frac{1}{2}$ @3 per cent; sixty days, $3\frac{3}{4}$ @4 per cent; ninety days, 4 @ $4\frac{1}{4}$ per cent; four, five and six months, $4\frac{1}{2}$ @5 per cent.

Trading in Philadelphia to-day was broad and the volume of transactions increased. Pennsylvania and United States Steel were the features. The demand for bonds was fair. The Chicago market was narrow and dull to-day. The bulk of the bond transactions was in the railway issues.

The Boston market to-day was unusually broad, with the trading well distributed over the list. Boston Elevated was by far the most active railroad issue.

The market for stocks in Baltimore was extremely narrow and dull. The bond transactions totaled \$25,000, par value.

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

	May 28	June 3
American Brake Shoe & Foundry (common).....	93	90
American Brake Shoe & Foundry (preferred).....	130	129½
American Cities Company (common).....	37½	37¼
American Cities Company (preferred).....	70	69½
American Light & Traction Company (common).....	370	370
American Light & Traction Company (preferred).....	106	106
American Railways Company.....	38	39
Aurora, Elgin & Chicago Railroad (common).....	41½	41½
Aurora, Elgin & Chicago Railroad (preferred).....	84	84
Boston Elevated Railway.....	87	90
Boston Suburban Electric Companies (common).....	7½	7½
Boston Suburban Electric Companies (preferred).....	*66	*66
Boston & Worcester Electric Companies (common).....	8	a8
Boston & Worcester Electric Companies (preferred).....	43	43
Brooklyn Rapid Transit Company.....	91½	89½
Capital Traction Company, Washington.....	120	120
Chicago City Railway.....	*150	*150
Chicago Elevated Railways (common).....	*25	*25
Chicago Elevated Railways (preferred).....	*87	*87
Chicago Railways, pteptg., ctf. 1.....	92½	92
Chicago Railways, pteptg., ctf. 2.....	21¾	20
Chicago Railways, pteptg., ctf. 3.....	7	7
Chicago Railways, pteptg., ctf. 4.....	3	3
Cincinnati Street Railway.....	112	112
Cleveland Railway.....	103¾	103¾
Cleveland, Southwestern & Columbus Rv. (common).....	*5¼	*5¼
Cleveland, Southwestern & Columbus Ry. (preferred).....	*28¼	*28¼
Columbus Railway & Light Company.....	18	18
Columbus Railway (common).....	69½	69½
Columbus Railway (preferred).....	83	83
Denver & Northwestern Railway.....	109	109
Detroit United Railway.....	85	70
General Electric Company.....	139¾	139
Georgia Railway & Electric Company (common).....	116	117
Georgia Railway & Electric Company (preferred).....	84	84
Interborough Metropolitan Company (common).....	14¾	13¾
Interborough Metropolitan Company (preferred).....	50½	47½
International Traction Company (common).....	*40	*40
International Traction Company (preferred).....	*95	*95
Kansas City Railway & Light Company (common).....	9	9
Kansas City Railway & Light Company (preferred).....	*9	*9
Lake Shore Electric Railway (common).....	*91	*91
Lake Shore Electric Railway (1st preferred).....	*25	*25
Lake Shore Electric Railway (2d preferred).....	130	127
Manhattan Railway.....	14½	14
Massachusetts Electric Companies (common).....	72	72
Massachusetts Electric Companies (preferred).....	*100	*100
Milwaukee Electric Railway & Light Co. (preferred).....	*26½	26½
Norfolk Railway & Light Company.....	70	68¼
North American Company.....	80	80
Northern Ohio Light & Traction Company (common).....	105	105
Northern Ohio Light & Traction Company (preferred).....	44	41
Philadelphia Company, Pittsburgh (common).....	40½	40
Philadelphia Company, Pittsburgh (preferred).....	23¾	23½
Philadelphia Rapid Transit Company.....	*67½	*67½
Portland Railway, Light & Power Company.....	106	114
Public Service Corporation.....	16	30
Third Avenue Railway, New York.....	a12	a12
Toledo Railways & Light Company.....	103	103
Twin City Rapid Transit Co., Minneapolis (common).....	*7½	*7½
Union Traction Company of Indiana (common).....	82	*82
Union Traction Company of Indiana (1st preferred).....	32	*32
Union Traction Company of Indiana (2d preferred).....	26¾	26¾
United Rys. & Electric Company (Baltimore).....	22	21
United Rys. Inv. Company (common).....	43¾	42
United Rys. Inv. Company (preferred).....	53¾	50
Virginia Railway & Power Company (common).....	92	92
Virginia Railway & Power Company (preferred).....	89	89
Washington Ry. & Electric Company (common).....	89	89
Washington Ry. & Electric Company (preferred).....	72	71½
West End Street Railway, Boston (common).....	88	88
West End Street Railway, Boston (preferred).....	65½	60
Westinghouse Elec. & Mfg. Company.....	111	110
Westinghouse Elec. & Mfg. Company (1st preferred).....		

*Last sale. a Asked.

ANNUAL REPORTS

Philadelphia Company

The board of directors of the Philadelphia Company, Pittsburgh, Pa., has submitted a report of the operations of the company and its subsidiaries for the year ended March 31, 1913. The condensed income, profit and loss statement is as follows:

Gross earnings.....	\$7,052,276
Operating expenses.....	\$2,958,821
Taxes.....	192,379
Total operating expenses and taxes.....	3,151,200
Net earnings.....	\$3,901,076
Other income.....	2,354,651
Total income.....	\$6,255,728
Deductions from income.....	73,035
Net income.....	\$6,182,693
Fixed charges.....	1,565,740
Net income after deducting fixed charges.....	\$4,616,953
Improvements, betterments and extensions.....	1,198,811
Net income for the year.....	\$3,418,142
Profit and loss surplus, April 1, 1912.....	5,394,152
Additions to profit and loss.....	9,789,902
Total.....	\$18,602,196
Deductions from profit and loss.....	9,798,162
Balance—profit and loss.....	\$8,804,034
Dividends.....	3,036,433
Surplus March 31, 1913—per balance sheet.....	\$5,767,601

J. H. Reed, president of the company, said in part:

"The company has acquired and now owns, as representing its entire investment in electric light and power companies, all the outstanding capital stock of the Duquesne Light Company to the par value of \$20,884,200, a moderate dividend upon which would provide the interest upon the total funded debt of the Philadelphia Company. The Duquesne Light Company has declared and paid its initial dividend of 1¼ per cent on said \$20,884,200 for the quarter ended March 31, 1913, being at the rate of 7 per cent per annum. As a further result of the purchase by the Duquesne Light Company at the valuations determined by the appraisements made for it and the exchange of a portion of its stock for stocks of similar companies hitherto held directly by the company, the surplus of the Philadelphia Company was increased by \$5,595,429.

"The company availed itself of the above increase in surplus and of a recognition of part of the increase over book values of the shares of stock of certain of its natural gas companies, in which companies many improvements and extensions had therefore been charged to earnings, to adjust its accounts with and the finances of the Pittsburgh Railways, to which it had advanced from time to time since 1902, as well as having assisted it to borrow, large sums of money to enable it to meet the Pittsburgh Railways' extraordinary maintenance demands for improvements and extensions and to pay interest upon such borrowings. It is important to note that in doing this no increased book values were placed upon the oil and gas leases owned by the several companies or upon the plant and property owned directly by the Philadelphia Company. The principal transactions involved in said adjustment were the sale and delivery to the Pittsburgh Railways of certain shares of stock of certain street railway and electric traction companies included in the Pittsburgh Railways operating system and carried on the Philadelphia Company's books at \$8,265,000; also the turning over to the Railways company of the bills payable of that company and certain underlying street railways amounting in book value to \$10,649,052, for which the Philadelphia Company received \$10,000,000 par value of 6 per cent debentures of the Pittsburgh Railways, interest upon which is payable as and when earned and is non-cumulative.

"By this adjustment the Pittsburgh Railways was relieved from large indebtedness to its sole stockholder, the Philadelphia Company, and from the payment of a large sum of money annually as interest on such indebtedness. As the Philadelphia Company was and still is the owner of all the outstanding stock of the Pittsburgh Railways, the value of the stock of the Pittsburgh Railways was correspondingly enhanced by this arrangement. It is contem-

plated that any funds needed hereafter by the railways company for the improvement of its lines will be provided through the issuance of bonds of the Pittsburgh Railways, and that any increase of equipment will be provided either out of the proceeds of such bonds or the proceeds of some other satisfactory financial arrangement to be entered into by the Railways company.

"The Railways company has made a contract with the Duquesne Light Company for an adequate and reliable supply of all the power which it may need and this is relieved from the necessity of further financing to provide for its increasing power requirements."

J. G. White & Company, Inc.

J. G. White, president of J. G. White & Company, Inc., New York, N. Y., in the report to the stockholders of the company for the fiscal year ended Feb. 28, 1913, made under date of May 26, 1913, said in part:

"The balance sheet shows that the total debts of the company were \$231,473, or less than half the item of 'cash in bank and on hand,' which was \$474,178, this latter being exclusive of working capital, cash at branch offices and all other quick assets.

"The actual profits realized from the company's business during the fiscal year were \$846,907. Against these profits, however, in making up the balance sheet, the committee of directors which was appointed to value securities, co-operating with the officers of your company, agreed that the provisions which are shown on the opposite side of the profit and loss account were advisable, especially as they could all be met out of the year's profits, and still leave a substantial amount to be added to the company's surplus.

"The explanations in the profit and loss account regarding provisions are probably all so clear as not to need special comment.

"During the preceding year an issue of bonds had been placed with investors, largely through the efforts of your company and its affiliated companies. During last year the actual earnings of the properties covered by the bonds were quite disappointing. Your executive officers and directors agreed that there were exceptional circumstances connected with the situation, and that looking to a probable reorganization of the properties, the best interests of your company would ultimately be served by repurchasing all of these bonds from investors at cost plus accrued interest. In co-operation with the associates who had been interested in the business, this was done. To provide for writing down the bonds thus repurchased to low figures, and to provide against any other contingencies in connection with the business, the provision of \$300,000 was set aside and is believed to be more than ample for the purpose. The balance sheet indicated that after the above liberal provisions and payment of dividend on outstanding preferred stock, there was added to the surplus account the sum of \$176,647, or about 12 per cent on the outstanding common stock of your company not in the hands of trustee.

"The good will, business in hand, etc., now includes also all of the \$1,000,000 par value of the common stock of The J. G. White Engineering Corporation and all of the \$500,000 par value of the common stock of The J. G. White Management Corporation. These two companies have been provided with cash working capital, to the extent of \$500,000 for the former and \$350,000 for the latter, by the sale at par of equal amounts of the preferred stocks of the respective corporations."

Questions and Answers Under Uniform System of Accounts

Another series of tentative answers to questions raised in connection with the uniform system of accounts is published below. Agreement on these answers, like those published in the issue of May 17, 1913, has been reached by members of the committee on a standard classification of accounts of the American Electric Railway Accountants' Association and representatives of the Interstate Commerce Commission. As these answers have not yet received the formal approval of the commission, however, it should be

understood that the decisions do not represent its final conclusions and that they are subject to such revision as may be thought proper before final promulgation in the accounting bulletins of the commission.

Q. What account is chargeable with the cost of a traveling crane installed in a power plant?

A. Account No. 30, "Power Plant Equipment," in the classification of "Expenditures for Road and Equipment of Electric Railways."

Q. To what account should the cost of a passenger elevator in a power plant be charged?

A. Account No. 24, "Power Plant Buildings," in the classification of "Expenditures for Road and Equipment of Electric Railways."

Q. To what account should be charged the cost of filler blocks and guard rails used in connection with ordinary curves?

A. Account No. 7, "Rails, Rail Fastenings and Joints," in the classification of "Expenditures for Road and Equipment of Electric Railways." (See case No. 100 in Accounting Bulletin No. 7.)

Q. To what accounts should be charged the cost of moving and maintaining tracks, portable crossovers and other work necessary to maintain continuous operation during the progress of reconstruction work?

A. If the entire cost is properly chargeable to operating expenses, it should be included in the appropriate accounts under "Way and Structures." If the work involves improvements or betterments, the cost should be divided between the appropriate accounts in "Operating Expenses" and the appropriate accounts in "Road and Equipment" on an equitable basis.

Q. What account is chargeable with the cost of guard rails on bridges?

A. The cost of additional track rails laid to prevent cars from jumping the track should be charged to Road and Equipment Account No. 7, "Rails, Rail Fastenings and Joints." The cost of timbers or other devices placed at the sides of the bridge to prevent cars from leaving the structure if they jump the track should be charged to Account No. 15, "Bridges, Trestles and Culverts."

Q. To what account should the cost of excavation for underground construction be charged?

A. The cost of excavation for underground construction for a system operated by underground electric contact or cable should be charged to Road and Equipment Account No. 9, "Underground Construction." Excavation for conduits for feeders or return wire or cables should be charged to Account No. 20, "Underground Conduits."

Q. What account should be charged with the cost of right-of-way for surface or elevated tracks, conduits or overhead lines?

A. Road and Equipment Account No. 2, "Right-of-Way." Payments for rent of property leased for such purposes for short periods should be included in "Deductions from Income."

Q. To what account should the cost of land and of water rights acquired for reservoirs and pipe lines be charged?

A. Road and Equipment Account No. 3, "Other Land Used in Electric Railway Operations."

Q. What accounts should be charged with the cost of railway tracks and wagon roads built for exclusive service of water-power stations and wagon roads built to facilitate the patrolling of reservoirs, canals, etc.?

A. The cost of the tracks should be distributed among the various construction accounts in the same way as the cost of other tracks. The cost of the wagon roads serving the power stations should be charged to the account to which the cost of the power stations is charged. The cost of the wagon roads built to facilitate the patrolling of reservoirs, canals, etc., should be charged to Road and Equipment Account No. 23, "Dams, Canals and Pipe Lines."

Q. What account should be charged with the cost of cutting and trimming trees for transmission lines and of constructing roads for patrolmen of such lines?

A. Road and Equipment Account No. 21, "Transmission System."

Q. To what account should the cost of signs warning against third-rail conductors be charged?

A. Account No. 16, "Crossings, Fences, Cattle Guards

and Signs," in the classification of "Expenditures for Road and Equipment of Electric Railways."

Q. What account should be charged with the loss sustained by an electric railway company from the hold-up of a conductor or through default of a conductor?

A. Operating Expense Account No. 72, "Other Transportation Expenses."

Consolidation of Maryland Companies

In accordance with an agreement of consolidation dated April 7, 1913, the Hagerstown & Frederick Railway has been formed, the following being the constituent public utility corporations: Frederick & Hagerstown Power Company, Hagerstown Railway of Washington County, Md., Hagerstown & Myersville Railway, Hagerstown & Boonsboro Railway, Hagerstown & Northern Railroad, Myersville & Catoctin Railway of Frederick County, Md., Frederick Railroad and Frederick Gas & Electric Company.

By an order of the Public Service Commission of Maryland, dated May 8, 1913, the Hagerstown & Frederick Railway has been authorized to issue and sell first and refunding mortgage 5 per cent sinking fund gold coupon bonds in the amount of \$3,300,000, preferred 7 per cent cumulative stock redeemable at par, \$635,000, and \$2,000,000 of common stock. Of these amounts, \$1,515,000 par value of the bonds will be reserved by the trustee under the mortgage to cancel and redeem all the underlying bonds of the various constituent companies. The following issues of bonds underlie the consolidated issue, but will be exchanged for the new first and refunding mortgage bonds or be retired at maturity:

	Amount	Per Cent
Frederick & Hagerstown Power Company.....	\$300,000	6
Hagerstown Railway.....	200,000	6
Hagerstown & Myersville Railway.....	120,000	5
Hagerstown & Boonsboro Railway.....	110,000	5
Hagerstown & Northern Railroad.....	200,000	5
Myersville & Catoctin Railway.....	35,000	5
Frederick Railroad.....	190,000	5
Frederick & Middletown Railway.....	250,000	5
Monocacy Valley Railway.....	30,000	5
Frederick Gas & Electric Company.....	181,000	5
	<u>\$1,616,000</u>	

The remainder of the \$3,300,000 issue will be sold in the near future to care for the floating debt and to provide new rolling stock, extend the electric light and power system, and rehabilitate the properties.

The property of the company is all in Frederick and Washington Counties, Maryland, and consists of an interurban railway between Hagerstown and Frederick with various branches, an electrified steam railroad from Frederick to Thurmont, Md., together with gas, electric light and power franchises in Hagerstown. Additional railroad construction will be authorized in the near future, and an extension of the power and lighting system will be made.

At a meeting of the directors of the Hagerstown & Frederick Railway on May 23, 1913, the following officers were elected: Edward F. Peck, of the firm of Allen & Peck, Inc., Syracuse, N. Y., president; Emory L. Coblentz, Frederick, Md., vice-president; Henry Holzapfel, Jr., Hagerstown, Md., vice-president; Victor M. Cushwa, Hagerstown, Md., secretary; Thomas H. Haller, Frederick, Md., treasurer; C. A. Hoag, Syracuse, N. Y., assistant secretary and treasurer; Edward F. Peck, Henry L. Coblentz, Henry Holzapfel, Jr., Alexander Armstrong, Jr., Hagerstown, Md., and S. K. Colby, vice-president of Allen & Peck, Inc., Baltimore, Md., executive committee.

The general manager of the combined properties is Franz Von Schilling. W. J. Harvie has been appointed assistant to the president and engineer of construction.

At a previous meeting of the stockholders of the Hagerstown & Frederick Railway, the following directors were elected: Henry Holzapfel, Jr., M. P. Moller, Walter D. Wilson, Victor M. Cushwa, Alexander Armstrong, Jr., D. Ramacciotti and Clifford A. Hoag, all of Hagerstown, Md.; Harvey S. Bomberger, Boonsboro, Md.; Harry E. Clark, Philadelphia, Pa.; Emory L. Coblentz, G. Mantz Besant, George Birely, Thomas B. Johnson, John C. Mottor, Alexander Ramsburg, E. Charles Renn, Richard P. Ross, Calvin E. Schildknecht, George William Smith, Charles Wertheimer and Thomas H. Haller, all of Frederick, Md.; Cyrus F. Flook, Myersville, Md.; John N. Shannahan, Hampton,

Va.; William I. Tabor, Utica, N. Y.; Henry A. Abbe, New Britain, Conn.; Talmadge C. Cherry, Annapolis, Md.; James Piper and Frederic C. Todd, both of Baltimore County, Md.; William J. Harvie and C. Loomis Allen, both of Syracuse, N. Y.; Edward F. Peck, Schenectady, N. Y.; Saford K. Colby, Baltimore, Md.; Abraham Hemp, Jefferson, Md.

Allen & Peck, Inc., Syracuse, N. Y., have been appointed managers of the consolidated company. It will be within the scope of the managers to handle the re-financing of the property and upon its completion to develop the public utilities in this district along broad and liberal lines.

Preliminary Report by Receivers

Judge Reese G. Richards, Steubenville, and W. R. W. Griffin, East Liverpool, the latter general manager of the Tristate Railway & Electric Company, East Liverpool, Ohio, on May 27, 1913, submitted to Judge Day of the United States federal court at Cleveland, the initial report of the receivership of the company, covering the company's holdings in East Liverpool and Steubenville and the territory between. The report covers in detail the operations between March 19, 1913, the date of the appointment of the receivers, and May 1, 1913. Hereafter the receivers will be required to file a report on the first of every month, the April 1 account having been passed owing to the length of time necessary to place the operation under the receivership upon an initiatory working basis. The receivers asked for suggestions from the court in regard to the betterment of its operation. The receivers are also asking suggestions and advice by letter from stockholders, bondholders and creditors of the company. In making out the report to Judge Day, the interests coming under the receivership have been designated as the Tri-State Company, with the East Liverpool Traction & Light Company, a subdivision, termed the Liverpool Company, and the Steubenville & East Liverpool Railway & Light Company, called the Steubenville Company. This has been done in order to avoid confusion and a possible misunderstanding in the interpretation of the receivership reports. The receivership of the Tri-State line covers only that territory between the Pennsylvania state line and Steubenville, including Chester, W. Va., opposite East Liverpool, Ohio. Other divisions of the system are independent of the receivership.

Order by California Commission Affecting Evidences of Indebtedness

The following order, effective on June 1, 1913, has been issued by the Railroad Commission of California in regard to the matter of stock, bonds and other evidences of indebtedness issued by public utilities under the jurisdiction of the commission during the years 1911 and 1912:

"It is hereby ordered that all public utilities of every kind and character (including common carriers) operating within the State of California shall file with the Railroad Commission on or before the effective date of this order verified statements showing the following information:

"1. An itemized statement of new issues (not transfers) of stock certificates issued during the years 1911 and 1912, giving the number of the certificate, the number of shares of stock covered thereby, and the par value of said shares of stock and the date of issue of the certificate.

"2. The net cash realized from each certificate issued, or, if issued for a consideration other than cash, an itemized description of such consideration.

"3. The purposes to which the proceeds of said stock were devoted.

"4. An itemized statement of bonds issued during the years 1911 and 1912, giving the numbers of the bonds, the face value thereof, the date of issue and the type of the bond.

"5. The net cash realized from each bond, or, if issued for a consideration other than cash, an itemized statement of the consideration received.

"6. The purposes to which the proceeds from the issue of said bonds were devoted.

"7. Notes or other indebtedness issued between Jan. 1, 1912, and the date of the return on this order, giving the

face value of note, the date of issue of the note and its term.

"Attention is drawn to Section 52 (b) of the public utilities act, providing that notes for not more than twelve months may be issued for the first time without the consent of the commission, 'but no such note shall, in whole or in part, be refunded by any issues of stocks or stock certificates, or of bonds or notes of any term or character, or any other evidence of indebtedness, without the consent of the commission.'"

Bucks County Interurban Railway, Philadelphia, Pa.—The Bucks County Interurban Railway, a merger of the Trenton, New Hope & Lambertsville Street Railway, Morrisville & Trenton Street Railway, Newton & Yardley Railway and the Bucks County Electric Railway, as noted in the *ELECTRIC RAILWAY JOURNAL* of May 24, 1913, has issued or is about to issue all of its \$1,000,000 of capital stock. No bonds have been issued and no debts are outstanding, although there are \$1,000,000 of divisional bonds outstanding on the underlying merged companies. The entire capital stock of the merged companies will be owned by the group of men composing the officers and directors of the Bucks County Interurban Railway, except eighteen shares of Bucks County Electric Railway and forty shares of the Trenton, New Hope & Lambertsville Street Railway. The receivers of the New Jersey & Pennsylvania Traction Company, Trenton, N. J., were discharged under date of March 3, 1913, and the company retains the ownership of its lines in Trenton of the three underlying corporations comprising the Princeton division. The Trenton City Bridge Company is a separate corporation. The Bucks County Interurban Railway, the New Jersey & Pennsylvania Traction Company and the Trenton City Bridge Company are owned by the officers and members of the board of directors of the Bucks County Interurban Railway. The names of the officers and directors of the three companies follow: Sydney L. Wright, Philadelphia, Pa., president; Gaylord Thompson, Trenton, N. J., vice-president; W. Frederick Snyder and William Redwood Wright, Philadelphia, Pa.; John Barbey, Reading, Pa.; Frank Battles and W. Henry Snyder, Trenton, N. J. The secretary-treasurer is Walter T. Bilyeu.

Chicago City & Connecting Railways, Chicago, Ill.—The First Trust & Savings Bank, Chicago, Ill., has bought \$1,500,000 of Chicago City Railway first 5's, 1927, and \$500,000 of Calumet & South Chicago Railway 5's, 1927. Only \$800,000 of the new Chicago City Railway bonds and \$400,000 of the Calumet & South Chicago bonds, it is reported, will be issued at once, making the amounts outstanding \$28,000,000 and \$4,725,000 (or \$4,625,000) respectively. The two roads mentioned above are members of the Chicago City and Connecting Railways Collateral Trust, which was declared valid by the Illinois Supreme Court as reported in the *ELECTRIC RAILWAY JOURNAL*, May 17, 1913.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—A meeting of the stockholders of the Cincinnati, Dayton & Toledo Traction Company will be held on June 23 to consider the modification of the terms of its lease to the Ohio Electric Railway and to adjust the capitalization to conform to such changes as may be made. The Ohio Electric Railway states that the property has never paid a sufficient amount to cover its rental under the lease and that under these circumstances it cannot undertake to repair the flood damages, which will require an expenditure of about \$290,000. There are other debts and more than \$400,000 will be needed to make the connection with the proposed loop at Cincinnati. In addition to this some of the underlying bonds will soon be due. Under the lease the Ohio Electric Railway is paying 5 per cent on \$250,000 of preferred stock and 2 per cent on \$5,000,000 of common stock. This company proposes to surrender \$1,000,000 of the Cincinnati, Dayton & Toledo Traction Company's common stock and asks the holders of the other \$4,000,000 to accept one share of new stock for each two shares of the old, which would reduce the amount to \$2,000,000. The preferred stock would then be increased to \$1,250,000, and this would be issued to the Ohio Electric Railway from time to time to cover funds required for repairs, payment of bonds, etc. The Ohio Electric Railway would pay one-half of 1 per cent on the

common stock in July, 1915, and then increase this each year until 1922, when it would reach 5 per cent annually and continue at that figure thereafter.

Cleveland, Southwestern & Columbus Railway, Cleveland, Ohio.—The shareholders of the Cleveland, Southwestern & Columbus Railway, as well as the Ohio Public Service Commission, have approved the propositions to issue \$5,103,000 of an authorized issue of \$25,000,000 thirty-year 5 per cent bonds and \$1,500,000 of an authorized \$2,000,000 of first preferred 6 per cent cumulative stock. Details concerning these new issues were given in the *ELECTRIC RAILWAY JOURNAL* of May 31, 1913.

El Paso (Tex.) Electric Company.—A quarterly dividend of 2 per cent, or at the rate of 8 per cent a year, has been declared on the \$1,750,000 of common stock of the El Paso Electric Company, payable June 16 to holders of record of June 4. This is an increase, payments of 3½ per cent having been made semi-annually in September, 1912, and March, 1913.

New York (N. Y.) Railways.—Judge Goff of the State Supreme Court on May 27, 1913, dismissed the suit brought against the New York Railways by the accident creditors' protective committee of the old company for an injunction restraining the reorganized company from paying interest on the new bonds until the bonds have been issued to persons holding accident claims amounting to more than \$500,000 who did not file their claims before March 4, 1912, the time limit therefor.

Ottawa (Ont.) Electric Railway.—Thirty 4 per cent debenture bonds in the amount of \$30,000 issued under a mortgage dated June 29, 1897, are called by the Ottawa Electric Railway for payment at par and interest on July 5, at the office of the company in Ottawa.

Pelham Park & City Island Railway, Inc., New York, N. Y.—The Public Service Commission for the First District of New York has approved the plan of reorganization of the Pelham Park and the City Island Railroads as one company under the name of the Pelham Park & City Island Railway, Inc. It has also granted that company permission to issue its capital stock to the amount of \$117,000 to acquire the property of the two old companies and reconstruct the lines as a standard-gage electric railway. The order provides for a 5-cent fare over the whole line. This road runs from the Bartow, or City Island, station on the Harlem River branch of the New York, New Haven & Hartford Railroad to Belden's Point, City Island. The two old companies were owned by the Interborough Rapid Transit Company. Within the last few years one of these companies installed a monorail line from Bartow to City Island bridge, and this has been in operation for some time but has not given satisfaction. The companies did not earn enough to make the roads pay and last year the Interborough Rapid Transit Company foreclosed and had the property bought in by George Keegan. Mr. Keegan will transfer the property to the new company, whose stock will be issued to the Interborough company.

Richmond & Henrico Railway, Richmond, Va.—The Virginia Trust Company, Richmond, Va., was appointed receiver of the Richmond & Henrico Railway on June 3, 1913, by Judge Crump at Richmond, on application of the Union Trust Company, Toronto, Can., trustee for the holders of the bonds of the railway.

Taunton & Pawtucket Street Railway, Taunton, Mass.—The Federal Trust Company, Boston, Mass., trustee under the mortgage given by the Taunton & Pawtucket Street Railway to secure an issue of first mortgage bonds to the amount of \$200,000, has applied for the appointment of a receiver for the railway. The interest on the bonds is said to be in default since January, 1909.

Toledo Railways & Light Company, Toledo, Ohio.—At the meeting of directors of Toledo Railways & Light Company to elect officers to represent the control of the company by the Toledo Traction, Light & Power Company and Henry L. Doherty & Company, Henry L. Doherty was elected a director in place of Jay K. Secor and John H. Taylor was elected to succeed H. S. Swift, who has been secretary of the company. Frank R. Coates was elected president and will also take over the duties of general

manager, which have been performed by L. E. Beilstein. Rathbun Fuller was elected vice-president to succeed Frank Hafer, and C. E. Murray was elected secretary and assistant treasurer. W. P. Troth, New York, was appointed assistant secretary and assistant treasurer. S. D. Carr was elected treasurer.

Trenton, Bristol & Philadelphia Street Railway, Philadelphia, Pa.—The directors of the Trenton, Bristol & Philadelphia Street Railway have authorized an issue of \$750,000 of 5 per cent notes, \$406,000 of which will be issued in favor of George C. Blakstone, president of the Union Trust Company, Baltimore, Md., to take up the companies securities held by him. The balance will be held in the treasury.

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.
 El Paso (Tex.) Electric Company, 3 per cent, preferred; quarterly, 2 per cent, common.
 Louisville (Ky.) Traction Company, quarterly, 1 per cent, common.
 Massachusetts Electric Companies, Boston, Mass., 2 per cent, preferred.
 Puget Sound Traction, Light & Power Company, Seattle, Wash., quarterly, 1½ per cent, preferred; quarterly, 1 per cent, common.
 Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, \$3.
 West Penn Traction & Water Power Company, Pittsburgh, Pa., quarterly, 1½ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

BATON ROUGE (LA.) ELECTRIC COMPANY						
Period		Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., Mar., '13		\$12,312	*\$7,851	\$4,461	\$2,075	\$2,386
1 " " '12		10,880	*9,203	3,977	1,729	2,248
12 " " '13		150,896	*92,131	58,764	21,464	37,300
12 " " '12		126,159	*77,279	48,880	20,745	28,135
BROCKTON & PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.						
1m., Mar., '13		\$8,009	*\$6,982	\$1,028	\$1,099	†71
1 " " '12		7,514	*6,511	1,004	1,054	†50
12 " " '13		121,179	*92,438	28,741	12,674	16,067
12 " " '12		119,566	*90,830	28,735	12,745	15,990
CAPE BRETON ELECTRIC COMPANY, SYDNEY, N. S.						
1m., Mar., '13		\$174,809	*\$107,921	\$68,888	\$24,635	\$42,253
1 " " '12		143,057	*96,069	46,988	24,705	22,282
12 " " '13		1,922,450	*1,136,011	786,438	295,823	490,615
12 " " '12		1,655,597	*1,110,915	54,683	250,369	294,313
HOUGHTON (MICH.) COUNTY TRACTION COMPANY						
1m., Mar., '13		\$25,638	*\$6,041	\$9,597	\$5,995	\$3,902
1 " " '12		24,485	*14,352	10,133	5,227	4,906
12 " " '13		311,054	*175,991	135,063	68,688	66,375
12 " " '12		301,629	*178,653	122,976	62,720	60,256
GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.						
1m., Mar., '13		\$188,967	*\$113,005	\$75,962	\$36,944	\$39,018
1 " " '12		149,417	*93,494	55,922	33,387	22,535
12 " " '13		2,113,144	*1,227,379	885,765	407,812	477,953
12 " " '12		1,627,656	*1,012,973	614,682	274,096	340,586
JACKSONVILLE (FLA.) TRACTION COMPANY						
1m., Mar., '13		\$59,220	*\$36,446	\$22,774	\$10,957	\$11,817
1 " " '12		51,257	*32,231	19,026	9,590	9,436
12 " " '13		574,088	*386,888	187,202	123,473	63,729
12 " " '12		562,956	*350,754	212,203	106,307	105,896
NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.						
1m., Mar., '13		\$186,895	*\$103,677	\$83,218	\$24,958	\$58,260
1 " " '12		139,192	*75,067	64,125	20,846	43,279
12 " " '13		1,910,114	*1,009,910	900,205	277,978	622,227
12 " " '12		1,614,215	*886,628	727,587	251,525	476,062
PENSACOLA (FLA.) ELECTRIC COMPANY						
1m., Mar., '13		\$21,767	*\$14,990	\$6,778	\$6,394	\$384
1 " " '12		22,309	*14,371	7,638	6,377	1,261
12 " " '13		288,434	*177,875	110,558	76,400	24,158
12 " " '12		286,771	*180,092	106,679	65,430	41,249
PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.						
1m., Mar., '13		\$24,662	*\$15,836	\$8,826	\$7,327	\$1,499
1 " " '12		23,656	*17,366	6,291	7,140	†849
12 " " '13		290,957	*189,063	101,895	87,967	14,828
12 " " '12		273,542	*175,199	98,344	82,709	15,635
PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.						
1m., Mar., '13		\$701,941	*\$423,150	\$278,791	\$170,022	\$108,769
1 " " '12		691,518	412,026	279,492	163,332	116,160
12 " " '13		8,299,653	4,844,292	3,455,260	2,004,357	1,451,003
12 " " '12	

*Includes taxes. †Deficit.

Traffic and Transportation

Re-routing, Wages and Co-operative Buying Discussed by Philadelphia Rapid Transit Company

The Philadelphia (Pa.) Rapid Transit Company issued under date of May 28, 1913, Co-operative Bulletin No. 10, in which the company deals with the subjects of re-routing, wages and co-operative buying. The plans of the company for re-routing its lines were referred to at length in the ELECTRIC RAILWAY JOURNAL of May 17, page 910. The changes under the first step in the re-routing plan are described in detail in the bulletin just issued and the statement is made that the changes under the second step will be described in the next issue of the bulletin.

The company now has fifteen depots from which cars are operated. The co-operative committee consists of two men from each of these depots selected by vote of the motormen and the conductors at the depot which they are chosen to represent. Referring to the results secured by this co-operative committee in bettering the conditions of the men by means of the co-operative plan and the use of the 22 per cent fund, the company says:

"For the first time in the history of any street railway the rules for the information and guidance of motormen and conductors and the improving of working conditions have been passed upon by the representatives of the men and the operating officials of the company in joint council. Motormen and conductors now secure their day of rest. The number of days off per man now averages four and one-third per month, which about equals one day off duty to every six days of work.

"The co-operative committeemen pass upon all time-tables before they are made effective and themselves have the final word as to what hours shall constitute a day's work thereunder. In no other city do the men have this voice in the management. Extra men are guaranteed a minimum of \$12 per week of seven days, this being a larger sum than is guaranteed to extra men upon entering the service in any other city. Wages of motormen and conductors have been increased from the scale which was made effective in settlement of the 1910 strike and which was in force June 30, 1911—i. e., new men, 22 cents; after one year's service, 23 cents; after two years' service, 23 cents; after three years' service, 23 cents; after four years' service, 23 cents; after five years' service, 23 cents—to the present scale made effective May 1, 1913—i. e., new men, 23 cents; after one year's service, 24 cents; after two years' service, 25 cents; after three years' service, 26 cents; after four years' service, 27 cents; after five years' service, 28 cents.

"Comparison of the above scales shows an advance of 5 cents in the maximum wage during the past two years. This is a greater increase in the wages of motormen and conductors than has been accomplished in any other city during this period.

"It is now practically assured that a further advance of 1 cent per hour for all of the motormen and conductors can be made effective Sept. 1 next—i. e., new men, 24 cents; after one year's service, 25 cents; after two years' service, 26 cents; after three years' service, 27 cents; after four years' service, 28 cents; after five years' service, 29 cents.

"The co-operative committee is using its best efforts to make possible a further advance, as of Jan. 1, 1914, and now fully expects that the 22 per cent fund will permit of the following much to be desired scale—i. e., new men, 25 cents; after one year's service, 26 cents; after two years' service, 27 cents; after three years' service, 28 cents; after four years' service, 29 cents; after five years' service, 30 cents.

"Provided that nothing occurs in the meantime to prevent the realization of this scale on Jan. 1, there will have been accomplished during the two and one-half year period following the establishment of the 22 per cent fund an advance of 7 cents per hour, which will be 2 cents per hour more than was prophesied by Chairman Mitten, in the co-operative plan booklet of August, 1911, as being possible of attainment during the five-year period of the Stotesbury management.

"The results already accomplished under the co-operative plan by the aid of the co-operative committee, in comparison with that condition which existed during the two years preceding, offer the most conclusive proof of that which can be accomplished by the management and its men working together, as compared with the conditions resulting from organized opposition each to the other."

The report on co-operative buying which was presented by the trustees of the Co-operative Beneficial Association and adopted by the co-operative committee on May 27, 1913, is included in the bulletin. The board announced that the coupon books would be placed on sale on June 2, 1913. The buying plan has been inaugurated with more than sixty-five merchants on the lists of those whose contracts to accept the cash coupons have been approved by the board of trustees. The bulletin says in part in this connection:

"The list of representative merchants submitted shows the wide variety of the necessities and the luxuries of life which at the start can be purchased by the Co-operative Beneficial Association members at the saving made possible under this plan. These merchants are located throughout the various sections of the city convenient to large numbers of the members. Of the 10,000 employees of the company who are eligible, 7782 have already become members of this association. This number is increasing at the rate of more than fifteen members per day.

"Purchases exceeding \$4,000,000 a year are made by the families of these members. It now only remains for this membership to demonstrate its combined purchasing power by the greatest possible use of these cash coupons. This should insure that not only larger discounts may be obtained on new contracts, but that a still greater number of representative dealers in foodstuffs and merchandise throughout the city may rapidly be added to the list of those accepting these coupons—this with the result that the price at which the beneficial association can sell the coupon books to its members may be correspondingly reduced.

"Books of cash coupons will now be sold as follows:

Purchasing Value	Cost to Members	Savings, 8 Per Cent
\$2.50 book	\$2.30	\$0.20
5.00 book	4.60	0.40
10.00 book	9.20	0.80

"One of the regular receivers at each of the fifteen depots will act as agent of the beneficial association for the sale of these books of coupons to members. The books will also be on sale at the office of the Co-operative Beneficial Association, 820 Dauphin Street. During certain hours of the day, as may be found necessary, an agent of the association will be stationed at the Sixth Street shops for the convenience of members in purchasing books at this location. Employees of the electrical and other departments can purchase books at the most convenient carhouse or at the office of the association. Members may be properly identified at the time of purchasing a book, by displaying to the agent their association membership certificates. The cost of unused coupons will be returned to the purchaser, if he so desires, upon application at the office of the association."

Reduction in Fare Ordered on California Road.—A decision has been rendered by the Railroad Commission of California establishing a fare of 5 cents on the Peninsula Railway, San José, Cal., between Mayfield Junction and Palo Alto and Stanford University. The fare formerly was 10 cents.

Virginia Fare Case Heard.—A hearing was held recently before the Corporation Commission of Virginia on the application of the Norfolk Southern Railroad, Norfolk, Va., for permission to increase its passenger fares. The company claims that the electric division was operated at a considerable loss for the last three years. The commission has taken the matter under advisement.

Answer Filed to Fare Petition in Rhode Island.—The Rhode Island Company, Providence, R. I., has filed with the Public Service Commission of Rhode Island its answer to the petition for a reduction in the fare of the company over its Buttonwoods line to Durby's Corner and Dryden Heights from 10 cents to 5 cents. The company denies that the 10-cent fare is unjust or discriminatory.

Increase in Wages in Brooklyn.—The following announcement was made on June 6, 1913, by T. S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company: "Following similar action a year ago in making a general increase in wages of employees, the companies in the Brooklyn Rapid Transit System announced to-day another increase, effective on July 4, 1913, which will benefit about 6000 men in the transportation department. The increases vary according to length of service and record of efficiency, range from 4 per cent to 15 per cent."

Height of Steps Fixed Tentatively in Washington, D. C.—Following a conference in Washington, D. C., between the members of the Public Service Commission and the officers of the electric railways which operate in that city a rule was tentatively adopted by the commission which provides that on all cars placed in operation after July 1, 1913, no step immediately above the rail and no subsequent step is to exceed 14 in. in rise. Open cars will not be affected by the proposed order, but on closed cars already in service no step is to exceed 16 in. in rise after Sept. 1.

Increase in Wages in Dayton.—The City Railway and the Oakwood Street Railway, Dayton, Ohio, have announced an advance of approximately 8 per cent in the wages of their motormen and conductors. The men on both lines have been receiving 25 cents an hour for day duty and 24 cents for night duty. The new order, which went into effect on June 2, raises the wages 2 cents an hour, to 27 cents for day men and 26 cents for night men. Substitutes, who have been receiving 20 cents an hour, are raised 2 cents an hour, to 22 cents for the first year, and 24 cents an hour thereafter until they are installed in regular positions. Most of the men work from nine to nine and one-half hours a day.

New Elevated Station Ordered in New York.—The Interborough Rapid Transit Company, New York, N. Y., has been ordered by the Public Service Commission for the First District of New York to build a new station on the Ninth Avenue elevated railroad at Ninety-ninth Street and Columbus Avenue, Manhattan, and to have the same completed and ready for operation by Dec. 1, 1913. At present there is no station between Ninety-third Street and 104th Street, a distance of eleven blocks. The commission denied an application for a station at this point in 1909, mainly because the property owners affected had refused to give their consent. Since that time the consents of all property owners but one have been obtained, and upon the renewed request the commission ordered the establishment of the station.

Increase in Wages in Davenport.—An agreement has been reached with the employees of the Tri-City Railway, Davenport, Ia., whereby employees of all grades will receive an increase of 2 cents an hour under an agreement which will run four years. The contracts for the men on the Illinois & Iowa Railway and the Davenport and Muscatine lines are the same as on the Watertown and Silvis and Rock Island, Moline and Davenport city lines. It is understood that shopmen will be given an increase of about 10 per cent. Extra work for regular motormen and conductors is to be paid for at 7 cents an hour above the regular pay. Trainmen's badges are to be good for transportation on all lines covered by the agreement. All questions which may arise in regard to the interpretation of the terms of the agreement are to be submitted to a board of arbitration.

Transit Commissioner Taylor's Work in Philadelphia.—In announcing the appointment of A. Merritt Taylor as director of the new department of transit of the city of Philadelphia to be established in that city on July 1, 1913, Mayor Blankenburg said: "Mr. Taylor has outlined a complete rapid transit system for the entire city and compiled all relative facts and figures to support his conclusions. As transit commissioner, Mr. Taylor estimated that the report would be completed within eighteen months and that the cost of the work would be within \$150,000. He has actually completed the work in approximately twelve months, at a cost of less than \$125,000, notwithstanding his enforced absence for four months, from December to March, owing to a serious attack of typhoid fever." Reference to the appointment of Mr. Taylor by the Mayor was made in the ELECTRIC RAILWAY JOURNAL of May 31, 1913, page 987.

Personal Mention

Mr. G. W. Gwinn has been appointed assistant superintendent of the Fresno (Cal.) Traction Company to succeed Mr. G. R. Duncan.

Mr. Russell Palmer has been elected treasurer of the Choctaw Railway & Lighting Company, McAlester, Okla., to succeed Mr. D. W. Dawley.

Mr. W. B. Miser has been appointed general superintendent of the Jacksonville Railway & Light Company, Jacksonville, Ill., to succeed Mr. J. P. Doan, resigned.

Mr. E. W. Fowler has been appointed assistant to Mr. H. E. Chubbuck, vice-president executive of the Illinois Traction System and the Western Railways & Light Company.

Mr. J. F. Holman, formerly freight agent of the Ohio Electric Railway Company, Columbus, Ohio, has been appointed general freight agent of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.

Mr. John C. Eversman has been appointed general agent of the Illinois Traction System, with headquarters in Chicago, Ill., to succeed Mr. Fred A. Stowe, who has become one of the owners of the Peoria *Herald-Transcript*.

Mr. J. H. Miller, formerly city ticket agent of the Chicago, Burlington & Quincy Railroad at St. Joseph, Mo., has been appointed general passenger agent of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo.

Mr. John E. Wilkie, whose appointment as assistant to Mr. Henry A. Blair, chairman of the board of the Chicago (Ill.) Railways was noted in the *ELECTRIC RAILWAY JOURNAL* of May 24, 1913, was elected vice-president of the company on June 4.

Mr. A. W. Patten has been appointed assistant general manager with jurisdiction over the Kansas utilities of the Illinois Traction System and the Western Railways & Light Company, reporting to Mr. H. E. Chubbuck, vice-president executive.

Mr. B. R. Stephens has resigned as general superintendent of the Choctaw Railway & Lighting Company, McAlester, Okla., and has moved his office to St. Louis, Mo., where he will continue as secretary, auditor and purchasing agent of the company.

Mr. M. Plunkett, master mechanic of the Choctaw Railway & Lighting Company, McAlester, Okla., has had his jurisdiction extended over the maintenance of equipment and the power station, succeeding Mr. N. E. Daniels, chief engineer of the power station.

Mr. T. R. Woulfe, formerly of Fort Wayne, Ind., has been appointed power sales manager of the Cleveland, Southwestern & Columbus Railway to succeed Mr. J. P. Lewis, who resigned several months ago. Mr. Woulfe's headquarters will be at Elyria, Ohio.

Mr. A. H. Mann has resigned as general superintendent of the Jersey Central Traction Company and the Monmouth Electric Light, Heat & Power Company, Keyport, N. J. Mr. Mann was previously connected with the Michigan United Traction Company, Jackson, Mich.

Mr. Fred J. Maxwell, auditor of the Eastern Wisconsin Railway & Light Company, Fond du Lac, Wis., and of the Wisconsin Electric Railway, Oshkosh, Wis., who has been stationed in Fond du Lac, has been transferred to the executive offices of the companies in Milwaukee, Wis.

Mr. B. E. Tabler, formerly traffic manager of the Choctaw Railway & Lighting Company, McAlester, Okla., has been appointed general superintendent of the company to succeed Mr. B. R. Stephens, who continues with the company as secretary, auditor and purchasing agent with offices in St. Louis, Mo.

Mr. J. K. Moffitt, one of the trustees placed in charge of the United Properties Company, Oakland, Cal., has been elected a vice-president of the San Francisco-Oakland Terminal Railways to succeed Mr. W. A. Bissell, who has been elected president of the company. Mr. Bissell quite lately succeeded Mr. Dennis Searles as a vice-president of the company.

Mr. W. A. Bissell, one of the trustees placed in charge of the United Properties Company, Oakland, Cal., pending the preparation of some general plan of financing, has been elected president of the San Francisco-Oakland Terminal Railways to succeed Mr. E. A. Heron, resigned. Mr. Bissell was lately elected a vice-president of the company to succeed Mr. Dennis Searles.

Mr. T. H. Shaughnessy has resigned as master mechanic of the Essex County division of the Public Service Railway, Newark, N. J., to become assistant superintendent of equipment of the Chicago (Ill.) Railways. Mr. Shaughnessy was formerly general foreman of rolling stock of the New York (N. Y.) Railways and previous to that was district mechanical inspector of the Philadelphia (Pa.) Rapid Transit Company.

Mr. Edward F. Peck, of the firm of Allen & Peck, Inc., Syracuse, N. Y., has been elected president of the Hagerstown & Frederick Railway, the organization of which is noted elsewhere in this issue. Mr. Peck is also vice-president of the Newport News & Old Point Railway & Electric Company. A biography and a photograph of Mr. Peck were published in the *ELECTRIC RAILWAY JOURNAL* of Jan. 20, 1912, at the time Mr. Peck was elected president of Allen & Peck, Inc.

Prof. George F. Swain has been chosen chairman of the Boston Transit Commission to succeed George G. Crocker, who died recently. Professor Swain has been a member of the commission since 1894. He was born in San Francisco March 2, 1857. He received the degree of LL.D. from New York University in 1907. At the taking of the tenth United States Census in 1880-1884 he was the hydraulic expert. In 1887 he became the consulting engineer of the Boston Transit Commission and continued as such up to the time of his appointment to the commission.

Mr. Gaylord Thompson, who in April, 1913, became connected with the New Jersey & Pennsylvania Traction Company, Trenton, N. J., as vice-president and general manager, has been elected vice-president and general manager of the Bucks County Interurban Railway. This company, the New Jersey & Pennsylvania Traction Company and the Trenton City Bridge Company are all owned by the same interests. The Bucks County Interurban Railway is a merger of the Trenton, New Hope & Lambertsville Street Railway, the Newton & Yardley Railway and the Bucks County Electric Railway.

Mr. E. E. Soules has been appointed publicity manager of the Illinois Traction System, Peoria, Ill., to succeed Mr. Fred G. Buffe, who has become managing editor of the Peoria *Herald-Transcript*. Mr. Soules was formerly publicity agent of the Michigan United Traction Company. Previous to Feb. 1, 1911, when he became connected with the Michigan United Traction Company, then the Michigan United Railways, Mr. Soules was connected for about six years in reportorial and editorial capacities with newspapers in Peoria. He also did considerable publicity work for various parks and amusement enterprises.

Mr. E. A. Heron has resigned as president of the San Francisco-Oakland Terminal Railways, Oakland, Cal. Mr. Heron has been connected with railway work in and about Oakland since the organization of the Piedmont Cable Company in 1888. He has acted as president of the companies at Oakland through the series of consolidations which included the taking over of the initial enterprise by Mr. F. M. Smith and Mr. F. C. Havens in 1894 and the forming of the Oakland Transit Company, the purchase of the Alameda line, the Hayward line and the Telegraph & San Pablo lines from the Southern Pacific Company and the extension of these lines, as well as the operation of the Key Route ferry system.

Mr. Walter Silvus has been appointed superintendent of equipment of the Texas Traction Company and the Southern Traction Company, Dallas, Tex. Mr. Silvus began his railroad career with the Baltimore & Ohio Railroad in 1893. He remained with that company ten years and then accepted the position of shop foreman with the Chicago, Lake Shore & Eastern Railroad at Chicago. He resigned that position in January, 1904, to become general inspector of the Twin City Rapid Transit Company, Minneapolis, Minn., where he remained until the fall of 1909, when he

went with the Chicago & Milwaukee Electric Railroad as master mechanic. In August, 1910, he was appointed master mechanic of the Michigan United Railways, now the Michigan United Traction Company, with offices at Jackson, Mich.

Mr. George H. Clifford, the newly elected president of the Southwestern Electrical & Gas Association, is vice-president and general manager of the Northern Texas Traction Company, Fort

Worth, Tex., which operates the city lines in Fort Worth, 15 miles of city lines in Dallas and a 35-mile interurban line between the two cities. Mr. Clifford was born at Fort Worth in 1881. He was graduated from the public schools and attended Weatherford College. After he left school he worked as a stenographer for several companies until 1901, when he entered the service of the Northern Texas Traction Company as secretary to Mr. F. M. Haines, who was general manager of the company, owned by the Bishop & Sherwin syndicate, Cleveland, Ohio. In 1903 Mr. Clifford was made secretary and treasurer of the company, which position he held until 1905, when the property was purchased by Stone & Webster, Boston, Mass. After the change in ownership he was made general superintendent. In 1910 he was elected vice-president and general manager of the Northern Texas Traction Company and in addition he is general manager of the Fort Worth Southern Traction Company, which owns and operates a 32-mile interurban line between Fort Worth and Cleburne, Tex., and the Arlington Light & Power Company, which is engaged in the water, light and ice business at Arlington, Tex.

Mr. W. J. Harvie, formerly railway manager of the operating department of J. G. White & Company, Inc., New York, N. Y., has been appointed assistant to the president and engineer of construction of the Hagerstown & Frederick Railway, the organization of which is referred to elsewhere in this issue. Mr. Harvie was born in Buffalo, N. Y., and was educated in the public schools and the high school in that city. He was first employed in the operation offices of the Western Union Telegraph Company. He attended Syracuse University and was graduated from that institution with the degree of electrical engineer. Previous to the year of his graduation he entered electric railway work in the overhead department of the Syracuse Rapid Transit Company. During the latter part of 1900 he was employed on the Syracuse, Lake Shore & Northern Railway in various capacities in the car shops and power houses. He was appointed electrical engineer of the Syracuse & Suburban Railroad in 1901 in charge of the power plant, car equipment and overhead lines. In the fall of 1901 he became associated with the Andrews-Vanderbilt syndicate in charge of the construction work in Oneida on the Oneida Railway and also in charge of the overhead construction of the Little Falls extension of the Utica & Mohawk Valley Railway. In 1902 he was appointed electrical engineer of the Utica & Mohawk Valley Railway in charge of the power installation, one of the first 25,000-volt transmission lines with substations to be operated in the East. Later he was placed in charge of the mechanical department with charge over the car shops in Utica, Mohawk and Rome. During 1905 and 1906 and the early part of 1907 he supervised the installation of electricity on the West Shore Railroad between Utica and Syracuse. He was appointed chief engineer of the Syracuse Rapid Transit Company and the Oneida Railway in 1908 with supervision also over the Utica properties. In February, 1912, he was appointed railway manager of the operating department of J. G. White & Company, Inc. Mr. Harvie was president of the American Electrical Railway Engineering Association in 1911 and was acting president of the association for ten months of the preceding year.



G. H. Clifford

Construction News

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

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

RECENT INCORPORATIONS

***Wayne County Street Railway, Honesdale, Pa.**—Chartered in Pennsylvania to build an interurban railway between Honesdale and Hawley. Martin B. Allen, Honesdale, president. Edmund B. Hardenbergh is interested. [E. R. J., Dec. 14, '12.]

***Temple, Northwestern & Gulf Railway, Austin, Tex.**—Application for a charter has been made by this company in Texas to take over the property and assets of the present Temple & Northwestern Railway. Part of this railway has been constructed and it will now be extended from Temple to Dublin. Capital stock, \$100,000. Incorporators: John H. Thompson, James F. Sadler, Jr.; Jonathan Lane and William A. Vinson, all of Houston, and W. S. McGregor and J. H. McGregor, of Temple.

Minneapolis, Merrill & Marinette Railway, Merrill, Wis.—Application for a charter has been made by this company to build a 75-mile interurban railway between Merrill and Antigo and from Merrill to Prentice Junction. Capital stock, \$400,000.

FRANCHISES.

Medicine Hat, Alta.—The ratepayers of Medicine Hat have sanctioned a by-law giving an exclusive twenty-five-year franchise to the Montreal Engineering Company to operate an electric railway in Medicine Hat.

Fresno, Cal.—The Fresno Traction Company will ask the Supervisors for a franchise for its San Joaquin River extension.

Taylorville, Ill.—The Council has granted a fifty-year franchise to the Decatur, Sullivan & Mattoon Transit Company to construct and operate an interurban railway over certain streets in Taylorville.

Biddeford, Maine.—The Biddeford & Saco Railroad has asked for a franchise to double-track its line on Main Street from Laconia Street to the city building in Biddeford.

Lenox, Mass.—The Berkshire Street Railway has asked for a franchise in Lenox.

Springfield, Mass.—The Springfield Street Railway has received a franchise in Springfield.

Ithaca, N. Y.—The Ithaca-Cortland Traction Company, Ithaca, has received an extension of time to June 30, 1915, for the completion of its twenty-nine-mile electric railway to connect Ithaca and Cortland via Freeville, Forest Home, Dryden and McLean. Paul K. Clymar, Ithaca, N. Y., president. [E. R. J., Jan. 4, '13.]

Cincinnati, Ohio.—The Cincinnati Traction Company has received a franchise from the Council to extend the Avondale Street Railway route along Hunt Street in Cincinnati.

Portland, Ore.—The Errol Heights Railway has received a franchise from the Council over certain streets in Portland.

Salt Lake City, Utah.—The Salt Lake & Ogden Electric Railway has received a forty-two-year franchise from the Council over certain streets in Salt Lake City.

TRACK AND ROADWAY

Birmingham Railway, Light & Power Company, Birmingham, Ala.—This company plans to build an extension to Lewisburg.

Rome & Gadsden Railroad, Gadsden, Ala.—This company states that construction will be begun within the next few weeks on its 60-mile interurban railway between Rome, Cave Springs, Center, Forney Key, Rock Run and Gadsden. The power house and repair shops will be located at Rome and the company will operate twenty cars. Capital stock authorized, \$5,000 to \$5,000,000. Officers: J. B. Wadsworth, Gadsden, president; J. N. King, Rome, vice-president; Louis S. Daniel, Rome, secretary, superintendent and

general manager; G. P. Smith, Center, treasurer. [E. R. J., May 17, '13.]

Mobile & Baldwin County Railroad, Mobile, Ala.—Work has been begun by this company grading and laying rails on its 65-mile gas-electric railway between Mobile, Bay Minette, Blakely, Volanta, Fairhope, Yerkon, Magnolia, Foley, Elberta and Pensacola. Contracts will soon be awarded for the bridges and equipment. The company's repair shops will be located at Volanta. It will operate five passenger cars and a number of freight cars. Capital stock authorized, \$200,000. The headquarters of the company are in the Bank of Mobile Building, Mobile. Officers: W. B. Miller, Chicago, Ill., president; M. H. Miller, Mobile, Ala., vice-president, general manager and purchasing agent, and P. A. Parker, Mobile, chief engineer. [E. R. J., March 8, '13.]

British Columbia Electric Railway, New Westminster, B. C.—This company has awarded W. A. Gilley two contracts. The first contract is for the erection of a wharf at Port Moody. The work will require 200,000 ft. of lumber and the driving of over 300 piles. The construction calls for a double trestle 700 ft. long and capable of carrying two tracks. The Vancouver contract calls for a trestle viaduct on the south end of the Granville Street bridge at Vancouver. This will be used in connection with the new depot to be built for the patrons of the Lulu Island branch of the company and will require 1,000,000 ft. of lumber in construction.

Fresno (Cal.) Traction Company.—As soon as the right-of-way deeds can be cleared this company will begin the construction of a line from Muscatine to Biola.

Pacific Electric Railway, Los Angeles, Cal.—This company has awarded a contract to Grant Brothers for the grading of 22 miles of its line between San Bernardino and Uplands. Announcement has been made by this company that it will connect Long Beach and Redondo with an 18-mile electric railway skirting the ocean. Rights-of-way are now being secured.

San Diego (Cal.) Electric Railway.—This company announces that it will extend its Ocean Beach line from a point just beyond La Playa to the Fort Rosecrans Military Reservation.

Santa Barbara & Suburban Railway, Santa Barbara, Cal.—Plans are being considered by this company to build an extension out Fourth Avenue. The company is at present reconstructing the entire system formerly owned by the Santa Barbara Consolidated Railway, double-tracking State Street and purchasing new equipment.

Central California Traction Company, San Francisco, Cal.—It is reported that this company's line will be extended to Cosumne within the next few months. Ultimately this line will be extended to Jackson.

Southern Pacific Company, San Francisco, Cal.—This company will build an extension from Redwood to San José.

Waterbury & Milldale Tramway Company, Waterbury, Conn.—Surveys have been made and part of the construction capital secured by this company for its 8½-mile line from Waterbury to Milldale. Contracts for 4 miles of the line will be let soon. John H. Cassidy, Waterbury, Conn., secretary.

Georgia Railway & Electric Company, Atlanta, Ga.—This company has been asked to consider plans to build a 1½-mile extension to the Atlanta Steel Mills in Atlanta.

Central Illinois Interurban Railway, Peoria, Ill.—Surveys have been made and construction will be begun soon by this company on its 40-mile line to connect Kewanee, Osceola, Bradford and Henry. John R. Fate, 413 Dechman, Peoria.

Peoria, Canton & Galesburg Railroad, Peoria, Ill.—At a recent meeting of the board of directors the following officers were elected: W. T. Irwin, president; John W. McDowell, vice-president; and Clifford Ireland, secretary and treasurer, all of Peoria. [E. R. J., May 17, '13.]

Kankakee & Urbana Traction Company, Urbana, Ill.—Surveys have been completed by this company for a 10.6 mile extension between Rantoul and Paxton. The date for

awarding the contracts has not yet been decided upon. C. J. Hays, Urbana, chief engineer.

Fort Wayne & Northwestern Railroad, Fort Wayne, Ind.—Plans are being made by this company to build a new depot and freight station on Cedar Street and Twelfth Street in Auburn.

Tri-City Railway & Light Company, Davenport, Ia.—Mayor M. R. Carlson of Moline has advocated a new line for this company on Third Avenue to connect with the Seventh Street line now under construction and with the extension of the Fourth Avenue line.

Aroostook Valley Railroad, Presque Isle, Maine.—During the next eight weeks this company will finish its 7-mile line to Caribou.

Winnipeg (Man.) Electric Railway.—This company plans to build between 12 and 14 miles of new track during the season.

Holyoke (Mass.) Street Railway.—This company has been asked to consider plans to extend its Holyoke line to Enfield and possible to Ware.

Omaha, Lincoln & Beatrice Railway, Lincoln, Neb.—Plans are being made by this company for financing the proposed interurban line between Omaha and Lincoln.

United Traction Company, Albany, N. Y.—This company has been asked to consider plans for a new route for the proposed extension over New Scotland Avenue in Albany.

Binghamton (N. Y.) Railway.—Orders have been placed by this company for the material needed for improvements of its entire system in Binghamton. Plans are being made to double-track several of its lines.

Manhattan Bridge Three-Cent Line, New York, N. Y.—The Appellate Division of the Supreme Court has confirmed the recommendation of a commission that this company be permitted to lay tracks in Manhattan.

New York, N. Y.—The Public Service Commission, First District, has advertised for bids, to be opened June 24, for the construction of section No. 4 of the Broadway subway in Manhattan. Construction of this subway is now going on in lower Broadway as far north as Bleecker Street and section No. 4 will extend from that point to Fourteenth Street. This subway, when completed, will run up Broadway to Forty-second Street and thence through Seventh Avenue to Fifty-ninth Street and eastward through Fifty-ninth and Sixtieth Streets over the Queensboro Bridge. It will be operated by the New York Municipal Railway Corporation.

Richmond Light & Railroad Company, New York, N. Y.—The Public Service Commission has refused this company's request to modify the order for the double-tracking of the Castleton Avenue Street railway on Staten Island.

Niagara Gorge Railroad, Niagara Falls, N. Y.—This company plans to build soon a new passenger station at Youngstown.

New York State Railways, Rochester, N. Y.—The company has asked the Public Service Commission for permission to double-track its East Syracuse line in upper James Street in Syracuse. The Public Service Commission has granted permission to the company to construct extensions of its lines in West Dominick, East Dominick and Mill Streets at Rome. The city recently granted franchises for these extensions.

***Hiawasse Valley Railway, Andrews, N. C.**—Plans are being made by this company to begin surveys about June 10 on its 35-mile interurban railway between Andrews and Hayesville, N. C., and Hiawasse, Ga. A power plant will be built in Andrews on the Hiawasse River. Headquarters, Andrews. J. Q. Barker, Andrews, N. C., is interested.

Ottawa & Morrisburg Electric Railway, Ottawa, Ont.—This company has awarded the contract to the Reliance Construction Company, Chicago, for the entire construction of its line between Morrisburg and Ottawa.

Pittsburgh, Pa.—An electric line from the river district into Washington, Pa., is advocated by the Washington Board of Trade and the officials of Washington and Jefferson College. An effort was made some time ago by the West Penn Railways to build such a line, but objec-

tions by the college authorities led Gov. John K. Tener to refuse to grant the charter.

Montreal & Southern Counties Railway, Montreal, Que.—This company has accepted the by-law granting an extension on Youville Street in Montreal for terminals.

Charleston & Summerville Interurban Railway, Charleston, S. C.—Financial arrangements are being made for the completion of work on this 22-mile line. Surveys have been made between Charleston and Summerville, 22 miles, and grading has been completed for 15 miles. J. L. David, president. [E. R. J., Feb. 8, '13.]

Chattanooga Railway & Light Company, Chattanooga, Tenn.—This company has placed in operation its East Sixth Street line in Chattanooga.

Clarksville Railway & Light Company, Clarksville, Tenn.—Plans are being considered by this company to build an extension to Dunbar's Cave.

Middle Tennessee Traction Company, Franklin, Tenn.—Work has been begun by this company on its 72-mile line to connect Franklin, Shelbyville and Fayetteville with connections at Franklin with the Nashville Interurban Railway. The Interurban Construction Company has been organized to construct and equip this line. The company's repair shops will be located in Franklin and it will purchase power. Capital stock authorized, \$250,000. Capital stock issued, \$10,000. Bonds authorized, \$30,000 per mile. Officers, John A. Pitts, Nashville, president; L. W. Buford, Franklin, vice-president; C. R. Cockle, Nashville, secretary; O. D. Berroth, Franklin, treasurer; P. E. Cox, Franklin, general manager and purchasing agent, and C. B. Howard, chief engineer.

Johnson City & Elizabethton Railway, Johnson City, Tenn.—Grading will soon be begun by this company on its 13-mile electric railway between Johnson City, Milligan College, Oak Grove, Gap Creek and Elizabethton. J. G. Burchfield, Milligan, president. [E. R. J., June 15, '12.]

Memphis (Tenn.) Street Railway.—This company will extend its Lane Avenue line from Claybrook Street to Evergreen Street in Memphis in the near future.

Southern Traction Company, Dallas, Tex.—Plans are being made by this company for a 4-mile extension in Waco.

Wichita Falls (Tex.) Traction Company.—Plans are being made by this company for a 2-mile extension at Wichita Falls.

Pacific Power & Light Company, Astoria, Wash.—This company is asked to consider plans to extend its line from the present terminus at Forty-section Street eastward to a point near the Hammond Lumber Company's plant in Astoria.

***Spokane, Wash.**—An electric interurban line between Spokane and Wenatchee, the route following closely the tracks of the Great Northern Railroad, is being planned. Half a dozen important power sites on the Rock Island, Wenatchee and Columbia Rivers have been secured by A. B. Perrine, Salt Lake City.

Morgantown (W. Va.) Interurban Railway.—Surveys have been completed by this company on its 10-mile line between Morgantown and Point Marion, via Star City. It is not decided when construction will be begun. S. D. Brady, Morgantown, chief engineer. [E. R. J., May 24, '13.]

SHOPS AND BUILDINGS

San Diego (Cal.) Electric Railway.—During the next few weeks this company will award contracts to build a new carhouse with a capacity for 100 cars. Plans for the new structure have not yet been completed.

St. Petersburg & Gulf Railway, St. Petersburg, Fla.—Work will be begun at once by this company for the removal of its carhouses from the waterfront to Sixteenth Street and Central Avenue in St. Petersburg.

Illinois Traction Company System, Peoria, Ill.—Preliminary plans for this company's new seven-story building to be erected at Hamilton Street and Jefferson Street in Peoria have been filed by the architects, Hotchkiss & Harris.

Union Traction Company, of Indiana, Anderson, Ind.—It is announced that this company has purchased prop-

erty at Meridian Street and Twelfth Street in Anderson on which it plans to build a new terminal station in the near future.

Tri-City Railway & Light Company, Davenport, Ia.—This company's carhouses at Rock Island were destroyed by fire on June 1. More extended reference to the fire and loss sustained is made on page 1033 of this issue of the *ELECTRIC RAILWAY JOURNAL*.

Louisville (Ky.) Railway.—This company's new repair shops, located at Twenty-ninth Street and Garland Avenue in Louisville, are sufficiently near completion for the company to begin the purchase and installation of the mechanical equipment which will be needed. It has already contracted with the Henry Vogt Machine Company, Louisville, for the down-draft water-tube boilers which will furnish the power to the plant and other equipment will be bought later.

Toronto (Ont.) Railway.—This company plans to build a new carhouse on the south side of Queen Street near Connaught. The structure will be 100 ft. x 360 ft. The cost is estimated to be about \$3,600.

Barre & Montpelier Traction & Power Company, Montpelier, Vt.—This company is now building a 30-ft. addition to its carhouse to be used for a paint shop. The company will also build 80 ft. of new pit in its carhouse.

Wheeling (W. Va.) Traction Company.—Plans are being made by this company to enlarge its carhouses in Wheeling.

POWER HOUSES AND SUBSTATIONS.

Savannah (Ga.) Electric Company.—This company has placed in operation its new Riverside power plant at West Broad Street and River Street, in Savannah.

Aurora, Elgin & Chicago Railroad, Chicago, Ill.—This company has installed a new 7500-kw high pressure turbine recently at its power house at Batavia and is installing several new boilers.

Fort Wayne & Northwestern Railroad, Fort Wayne, Ind.—This company plans to build soon a new substation in Auburn.

Aroostook Valley Railroad, Presque Isle, Maine.—This company has completed its new substation in Caribou.

Worcester Consolidated Street Railway, Worcester, Mass.—This company's Worcester lines are now receiving power from the Connecticut River Transmission Company's substation at Millbury; 2000 kw has been added to the instalment already received for Worcester proper. In Worcester alone the company now has 4600 kw additional power. Outside of Worcester the company has added 600 kw at Berlin and 600 kw at Northboro.

Rochester Railway & Light Company, Rochester, N. Y.—A new power station will be built by this company on the river flats south of Platt Street bridge in Rochester. The structure will be 100 ft. x 40 ft. It will have two turbo-generators, one with a capacity of 2700 hp and the other with one of 5300 hp.

Pittsburgh (Pa.) Railways.—Plans have been prepared by this company for trebling the capacity of the plant on Brunots Island. The capacity will be increased from 25,000 kw to 85,000 kw. Bids are now being taken for the increased 60,000 kw. Twenty Stirling boilers of 822-hp capacity each have been ordered from the Babcock & Wilcox Company and the Westinghouse Electric & Manufacturing Company will supply four 15,000-kw turbo-generator sets. Condensers and pumps will be furnished by the Worthington Pump Company. The boilers are to be placed in four batteries of five boilers each. A 14-ft. x 180-ft. stack will be furnished for each battery. Estimates on the stoker equipment have already been taken.

Maritime Coal, Railway & Power Company, Ltd., Montreal, Que.—At the annual meeting of this company in Montreal the president reported that the negotiations for the sale of a considerable block of the company's securities had been successful and that it was contemplated to carry out during the ensuing year large extensions to the power plant at Chignecto, to cope with the increasing demand for electric power.

Manufactures and Supplies

ROLLING STOCK

Second Avenue Railroad, New York, N. Y., expects to change 175 of its cars to the pay-within type.

Third Avenue Railroad, New York, N. Y., contemplates changing 200 of its cars to the pay-within type.

Harrisburg (Pa.) Railways has ordered seven pay-as-you-enter cars from The J. G. Brill Company.

Morris County Traction Company, Morristown, N. J., is in the market for ten cars.

Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., is building five cars in its own shops.

United Railways & Electric Company, Baltimore, Md., is reported as expecting to purchase a large number of cars.

Wilmington & Philadelphia Traction Company, Wilmington, Del., expects to purchase from ten to twenty-five new cars.

Salt Lake & Ogden Railway, Salt Lake City, Utah, has ordered fifteen cars from the Niles Car & Manufacturing Company.

New York & Queens County Railway, New York, N. Y., is considering the change of 177 of its cars to the pay-within type.

Modesto (Cal.) Interurban Railway has ordered one storage battery passenger car from the Federal Storage Battery Car Company.

Charlottesville & Albemarle Railway, Charlottesville, Va., has ordered five near-side, one-man cars, from The J. G. Brill Company.

Puget Sound Electric Railway, Tacoma, Wash., is in the market for ten steel hopper cars of 80,000-lb. capacity and ten 80,000-lb. steel-side dump cars.

Emigration Canyon Railroad, Salt Lake City, Utah, has placed an order with the Niles Car & Manufacturing Company for two 47-ft. two-compartment cars.

Tri-City Railway, Davenport, Ia., is in the market for sixty cars to replace the cars that were burned in its car-house at Rock Island, Ill., on June 1, 1913.

Minneapolis & Northern Railway, Minneapolis, Minn., has ordered two 55-ft. gasoline motor cars and one 200-hp. freight locomotive from the McKean Motor Car Company.

West Jersey & Seashore Railroad, Camden, N. J., has ordered twenty-six 34-ft. center-entrance motor-car bodies, mounted on Brill 39-E trucks, from The J. G. Brill Company.

Chattanooga Railway & Light Company, Chattanooga, Tenn., is in the market for a number of cars to be used on its own line and some of the properties which it controls.

San Diego (Cal.) Electric Railway, noted in the *ELECTRIC RAILWAY JOURNAL* of May 10, 1913, as expecting to purchase several cars, states that thirty-five prepayment, center-entrance cars will be purchased.

Puget Sound Traction, Light & Power Company, Seattle, Wash., noted in the *ELECTRIC RAILWAY JOURNAL* of May 17, 1913, as having ordered ten double-truck single-end cars from the Cincinnati Car Company, has instead ordered twenty-five cars of this type.

Springfield (Mass.) Street Railway has awarded the contracts for one express car and four 35-ft. semi-convertible cars to the Wason Manufacturing Company. The company has also placed an order with the Osgood-Bradley Car Company for nine 28-ft. closed cars.

Shore Line Electric Railway, Saybrook, Conn., noted in the *ELECTRIC RAILWAY JOURNAL* of March 29, 1913, as having ordered eight semi-convertible cars from the Wason Manufacturing Company, has specified the following details for these cars:

Seating capacity.....44	Couplers..Brill channel iron
Weight (car body only), 20,000 lb.	Curtain fixtures...Cur. S. Co.
Length of body...30 ft. 8 in.	Curtain material..Pantasote
Length over vestibule, 40 ft. 1 in.	FendersPfgangst
	GongsDedenda
	Hand brakes.....Brill

Width over sills.7 ft. 11½ in.	HeatersConsol.
Width over all.....8 ft. 3 in.	Headlights ...Crouse-Hinds
Rail to trolley base.11 ft. 9 in.	Journal boxes.....Brill
Bodywood	Motors....West., 4 per car
Interior trim.....cherry	Sanders.....Brill Dumpit
Headliningbirch veneer	Sash fixtures.....Brill
Roofarch	Seats.....Brill Winner
Underframecomposite	Seating material....rattan
AxlesPenn. steel	Step treads.....oak
Bumpers, Hedley anti-climber	TrucksBrill
Car trimmings.....bronze	VarnishMurphy
Control1200-volt	Ventilators...Brill exhaust
	Wheels.....32 in. standard

Chicago & Joliet Electric Railway, Joliet, Ill., which recently ordered ten prepayment closed cars from the St. Louis Car Company, has specified the following details:

Seating capacity.....40	Curtain material..Pantasote
Bolster centers, length..20 ft.	Fenders or wheelguards, H. B.
Length of body.....21 ft.	GongsSt. Louis
Length over vestibule..40 ft.	Hand brakesSt. Louis
Width over sills..8 ft. 5½ in.	Heaters..Smith No. 2 hot air
Width over all....8 ft. 8 in.	Headlights ... Crouse-Hinds
Height, rail to sills, 2 ft. 10 in.	Motors, type, GE 80 and GE 67

Sill to trolley base, 8 ft. 6¾ in.	SandersOhio Brass
Body composite	Sash fixturesEdwards
Interior trimbronze	Seats, style.....St. Louis
Headlining Agasote	Seating material...wood-slat
Roof..... turtle-back type	Step treadsUniversal
Underframe composite	Trolley catchers or re- trievers Keystone
Bumpers, 4-rib Hedley anti-climbers	Trolley base.....U. S.
Car trimmings....St. Louis	Trucks, type.....Brill 39 E
Conduits and junction boxes, St. Louis	VentilatorsSt. Louis
CouplersSt. Louis	Buzzer system, Cons. Car Heating
Curtain fixtures..Cur. S. Co.	

TRADE NOTES

H. M. Byllesby & Company, Chicago, Ill., has appointed B. F. Wellington, Jr., assistant Pacific Coast manager.

Wendell & MacDuffie Company, New York, N. Y., has opened an office in the People's Gas Building, Chicago, Ill.

Pittsburgh Testing Laboratory, Pittsburgh, Pa., has appointed F. E. Walker representative in charge of its office and laboratories at Easton, Pa.

Graphite Lubricating Company, Bound Brook, N. J., is operating its enlarged plant day and night in order to supply the increasing demand for "Bound Brook" trolley wheel bushings.

H. A. Strauss Company, Chicago, Ill., has been awarded the contract for all the heavy concrete construction work on the new plant of the Baldwin Locomotive Works, located at East Chicago, Ind.

Cassava Products Company, Jamaica, British West Indies, has appointed Allan S. Barrows its vice-president and general manager. Mr. Barrows was formerly manager of the Chicago office of the Pantasote Company.

John A. Roebbling's Sons Company, Trenton, N. J., has purchased the seven-story building at 169-175 Hudson Street, New York, N. Y., and will eventually move its offices from 117 Liberty Street to the new location.

Fonger Fender Company, Chicago, Ill., manufacturer of the Fonger tip-tilting automatic fender, has recently incorporated and will issue \$50,000 capital stock. The proceeds of this issue will be used in increasing its plant capacity and promoting sales.

C. G. Young, New York, N. Y., has been engaged to make examinations and reports on certain important public utilities in Central America. H. A. Belden, one of the firm's engineers, who will make the local studies, sailed from New York on May 17, 1913.

M & G Truck & Engineering Company, London, Eng., has just completed a shipment of forty-two Warner trucks to the Kōbe (Japan) Electric Railway. This makes forty-two railroads on which the Warner axle is being used, ten of which are in the United States.

Pyrene Manufacturing Company, New York, N. Y., has received recent large orders for its fire extinguishers from the New York, New Haven & Hartford Railroad, Delaware, Lackawanna & Western Railroad and the Westinghouse Electric & Manufacturing Company.

Ohmer Fare Register Company, Dayton, Ohio, states that the general average of conductors operating Ohmer registers on the Denver (Col.) City Tramway Company for the month of April, 1913, was 97.72 per cent. John F. Ohmer claims that this is the highest register record ever attained.

Electric Service Supplies Company, Philadelphia, Pa., has received large orders for protected rail bonds from the Boston (Mass.) Elevated Railway, the International Railways, Buffalo, N. Y.; the Georgia Railway & Power Company, Atlanta, Ga., and the Long Island Railroad, New York, N. Y.

I. S. Van Loan Railway Equipment Company, New York, N. Y., has been incorporated with a capital stock of \$125,000 to deal in engines, machinery and general supplies. The incorporators are: A. C. Case, New York, N. Y.; D. Pierson, Jr., East Orange, N. J., and E. W. Samuel, Mount Carmel, Pa.

Roberts & Schaefer Company, Chicago, Ill., has placed Willis E. Holloway in charge of the marketing of the new Marcus combination screen and picking conveyor which the company has recently acquired. Mr. Holloway was formerly connected with the Jeffrey Manufacturing Company.

Western Electric Company, New York, N. Y., has appointed C. W. Murphy railway and mine sales specialist, with headquarters at Pittsburgh, Pa. Mr. Murphy has been formerly connected with the Tri-State Railway & Electric Company, East Liverpool, Ohio, and the Westinghouse, Church, Kerr Company.

Dossert & Company, New York, N. Y., report having received recent large orders for connectors from the Public Service Railway, Newark, N. J.; Sao Paulo Tramway, Light & Power Company, Sao Paulo, Brazil; Gulfport & Mississippi Coast Traction Company, Gulfport, Miss., and the American Car & Foundry Company.

General Bakelite Company, New York, N. Y., reports that as a result of negotiations between it and the Condensite Company of America the suits brought for alleged infringement of the Bakelite patents have been withdrawn and the Condensite Company has acknowledged the validity of the Bakelite patents and will pay royalty.

Thomas Railway Track Appliance Company, Kansas City, Kan., was incorporated on May 22, 1913, to make switch stands, switch frogs and other special appliances. The company has a capital stock of \$200,000. The incorporators are John W. Thomas, R. J. Barker, J. R. Hammill, W. G. Miller and G. G. Austin, all of Kansas City, Kan.

W. J. Jeandron, New York, N. Y., United States agent for "Le Carbone" brushes, who has been in Europe for the past six weeks, returned on May 26. Mr. Jeandron spent ten days at the factory of the Le Carbone Company arranging for a larger production of "Le Carbone" brushes to meet the increased demand in the United States.

Fairbanks, Morse & Company, Chicago, Ill., has appointed C. W. Pank general director of sales, with offices in Chicago, Ill. Mr. Pank was formerly manager of the St. Louis (Mo.) office of the company. L. Norvell, manager of the railway supplies department, has been made manager of the St. Louis office, succeeding Mr. Pank, and F. O. Roy has been made manager of the railway supplies department, succeeding Mr. Norvell.

Anglo-American Varnish Company, Newark, N. J., held a meeting of its board of directors at which B. A. Hege-man, Jr., was elected president, Charles C. Castle vice-president, and J. Franklin Ford chairman of the board of directors. The company was established in 1872 by the late William Marshall and under his management the property gained recognition as a reliable producer of high-class varnishes. The plant of the company has recently been enlarged in order to meet the requirements of an increased business.

Buda Company, Chicago, Ill., has established a headlight department for the manufacture and sale of the Buda-Ross

electric headlights. Mark A. Ross, who has been engaged for sixteen years in the manufacture and sale of electric headlights; Harry P. Bayley, for thirteen years sales agent in the headlight industry, and John Eberhart, who for sixteen years has been manufacturing headlights, have become associated with the company. Mr. Ross will have entire charge of the headlight department, with the above-mentioned men at the head of their respective departments.

James H. Denton has been appointed Eastern manager of the Railway Utility Company, Chicago, Ill., with offices in the Marbridge Building, New York, N. Y. Mr. Denton became connected with the Christensen Engineering Company in 1898 as sales engineer and remained with that company until 1906, after having served in various capacities, including that of chief engineer and general superintendent. Mr. Denton then became manager of the air-brake department of the Allis-Chalmers Company and in 1909 resigned from that company to enter the railway supply business for himself.

Robert W. Hunt & Company, Chicago, Ill., held a conference in Pittsburgh, Pa., on May 13 and 14 of its chief inspectors who have charge of the inspection of rails and fastenings at the various mills of the United States. At the meeting various matters were discussed relative to the inspection of rails, joints, bolts, spikes and tie plates, the idea being to bring the inspectors into closer contact, with a view of harmonizing and systematizing the work to the end that more consistent action and results should be attained. Samples of the various types inspected, specifications and report blanks were on exhibition, and the different points of all were thoroughly discussed.

ADVERTISING LITERATURE

Day & Zimmermann, Philadelphia, Pa., have issued a folder illustrating some of the recent work which they have done.

John A. Roebling's Sons Company, Trenton, N. J., has printed a small booklet, containing a list of Roebling products.

Electric Service Supplies Company, Philadelphia, Pa., has issued a small folder illustrating and describing the advantages of its automatic trolley guard.

Underfeed Stoker Company of America, Chicago, Ill., has issued the *Publicity Magazine* for May, 1913, illustrating and describing several new installations of Jones stokers.

Sprague Electric Works, New York, N. Y., have issued in very attractive form Catalog No. 439, which contains a complete list, with illustrations of all Sprague conduit products.

Warner International & Overseas Engineering Company, London, Eng., has issued folders containing standard specifications Nos. 231,212 and 241,212 and Warner patent non-parallel axle and double-truck alignments.

Railway & Traction Supply Company, Chicago, Ill., has issued a catalog illustrating its Wyoming vacuum track sanders, Wyoming vestibule curtain release and the Hercules steel bumping posts, with directions for installing them.

Chicago Pneumatic Tool Company, Chicago, Ill., has issued Bulletins Nos. 128, 132 and 133 dealing with "Miscellaneous Equipment for Pneumatic Drills," "Pneumatic Motors and Pneumatic Geared Hoists" and "Cylinder Air Hoists and Jacks," respectively.

General Electric Company, Schenectady, N. Y., has issued Bulletin No. A 4116, describing isolated and small-plant alternating-current switchboard panels, both generator and feeder, for three-phase, 25 to 60 cycle circuit. The bulletin is made up principally of dimension and connection diagrams and miscellaneous data referring to the various panels and equipments.

Unit Construction Company, St. Louis, Mo., has issued a thirty-two-page catalog entitled "The Unit Method of Construction for Reinforced Concrete Buildings." It discusses briefly the advantages of this method of construction and illustrates numerous structures which have been erected by the company, including the new carhouse for the Philadelphia (Pa.) Rapid Transit Company. The dimensions of this carhouse are 375 ft. x 611 ft., and it has a storage capacity for 366 cars.