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## Heating Cars

The order in relation to heating regulations, issued by the New York Public Service Commission, First District, appears to be more reasonable than some similar requirements by other public bodies. While the period of six months during which the commission prescribes a temperature of 40 to 65 deg. Fahr. indicates that occasional rather than prevailing weather will dictate the heating of cars at many times in the fall and spring of the year, the latitude in the degree of heat ordered is such that the temperature of the outside air frequently will be high enough at long periods to assure compliance without artificial heat with the language and intent of the ruling of the commission. It seems unnecessary for the companies to meet the cost of displaying the order of the commission in each car, but the possible use of thermometers, involving expense that might have been included in a rigorous ruling, is not prescribed, so that the principal expenditures will be for the apparatus and power or other means of heating needed, because the order includes both electric and horse cars. Chicago companies have been put to inconvenience as well as needless expense by the constant theft of thermometers carried in their cars. Since the heating of cars for the comfort of passengers is an additional element in the cost of transportation, it is right that public authorities with jurisdiction over such matters should refrain from including any expenses that are not necessary.

## Changing the Standard Code of Interurban Rules

In another column of this issue we print a letter from J. N. Shannahan, chairman of the committee on interurban rules of the American Street & Interurban Railway Transportation & Traffic Association, protesting against the action of the Railroad Commission of Ohio in proposing to adopt a number of important changes in the standard code of interurban rules as submitted at the Denver convention. We heartily agree with Mr. Shannahan that radical changes in the standard code should not be made by the authorities of any State except for overpowering reasons, and then only after conference with the committee of the American Association. When the present standard rules were adopted the association and committee realized that some slight modifications might be necessary in a few instances to adapt the code to peculiar local operating conditions, but fundamental changes in practice were not contemplated. The committee gave the widest publicity to the proposed wording of its rules before the final form was adopted, and welcomed criticisms and suggestions during that time. While there were some close divisions in the convention at Denver when voting separately on the adoption of a few of the rules, the code as a whole was approved by an al-

most unanimous vote of those present. This endorsement carries great weight, and changes such as have been proposed for the Ohio roads must be backed up by very strong arguments in their favor in order to justify what practically amounts to repudiation of the association's earnest efforts. The adoption of the proposed revised code in Ohio would establish an unfortunate precedent.

## Modernizing the Power System of the Medium-Size Railway

Throughout this country there are scores of power stations which are operated either with old d.c. belted dynamos or the pioneer designs of a.c. generators. Necessarily the progress in generating machinery has made these antiquated types uneconomical, even where the apparatus is well preserved. Yet the owners of some of these obsolete plants often appear to take more pride in the age of their equipment than in its efficiency. There may be a certain degree of pleasure in patting some faithful old "Kodak" or bipolar on the back, but there should be a great deal more in getting a reasonable kilowatt-hour cost from a generating set which embodies the hundred and one improvements of the last decade. After all, it would not be a bad plan for the proprietors of old-time stations to get some figures on the cost of up-to-date machinery and see whether the reductions in the coal pile and labor accounts would not result in a high return on the investment.

Two recent instances will make plain what remarkable improvements are possible through the adoption of modern machinery and the revision of distributing lines in connection therewith. The first company operated about 50 miles of track and had three small d.c. stations. This scheme was replaced by one turbo-generator station and an 11,000-volt transmission to two outside substations at a cost of $750,000. The result of installing the more efficient generating system and cutting down the line losses through substation distribution was a reduction of the cost of a d.c. kilowatt-hour from 2.2 cents to 0.61 cent. The earning on this investment is now exceeding 33 per cent. The second company operated about 40 miles of track in city and suburban territory. In this case the old machinery was replaced by the latest type of reciprocating engines, with such success that the $100,000 invested for these changes is earning a dividend of 25 per cent. It is worth noting that on both of these lines part of the saving was due not only to the installation of high-tension distribution throughout, but to better care of the return circuit.

## Rail Standards Abroad

Both the British and German tramways companies have progressed rapidly during the last few years in the standardization of rail sections. The situation has been simplified in these countries because practically all of the city railway companies in each use grooved rails. But, of course, there is a very great difference in traffic in the different cities and this has necessarily required a large variety of sections and weights of rails. In both countries consequently a single general type of grooved rail has been adopted and this general form has been designed to be rolled in different weights of rails.

In England the work of standardizing rail sections has been part of a general scheme of engineering standards which was initiated by the Institution of Civil Engineers. Some nine years ago this organization recognized the economic waste of a lack of standards and appointed a committee to see what could be done. The co-operation of other technical organizations, such as the Mechanical Engineers, the Naval Architects, the Iron and Steel Institute and the Electrical Engineers, was solicited and later 12 sectional and 28 subcommittees were formed. These committees contained representatives from the Board of Trade, the War Office, prominent railway companies, large manufacturers and others interested.

The scope of the work accomplished by these committees was very broad, but so far as electric railway companies were concerned, centered in the question of rail sections. The variety of these in general use in Great Britain five years ago was probably larger than in this country, because of the greater tendency toward individual or separate operation of roads on account of municipal ownership. In consequence municipal engineers often had little difficulty in persuading tramway committees that a slight change in rail sections would be desirable, sometimes for the operation of cars, sometimes from the standpoint of the public. In spite of this handicap, however, the committee in charge of the standardization of rail sections was able to reduce the number of sections for which there was any real demand in tramway service from more than 70 to 5, varying from 90 to 110 lb. in weight. The work, however, did not terminate with the selection of these sections. To be of real value to the industry a campaign of education had to be conducted and it is very satisfactory to learn from a paper recently presented before the Institution of Civil Engineers that 80 per cent of the tramway rails now rolled in Great Britain are of these standard sections.

The experience in Great Britain has largely been duplicated in Germany, where four standard sections, varying in weight for straight track from 85 lb. to 122 lb. per yd., have been adopted. This work was undertaken by the German Street & Interurban Railway Association, which, under its constitution, has authority to make contracts in the name of the association with the rail mills for apparatus and equipment to be used by its members. It was consequently able to enter into arrangements with the mills by which rails of standard section can be purchased at a lower price per ton than other rails of the same weight.

The subject of standardization is as acute in this country as abroad, possibly more so because there are many conditions here which favor standardization. The roads are much larger and more numerous and there is a community of interest between different companies which does not exist to the same extent in Europe. The economic gain should be even larger and the foundation upon which the end sought can be obtained has been laid by the standardization committees of the association. But as yet there has been comparatively little progress in the second and more important part of the work of standardization, the adoption of standards. No company can be forced by other companies or by the association to fall in line in this matter, but there can be compulsion from within. Every company which adopts the association standards, either in whole or in part, aids in gaining the object sought. It would be of interest to know what roads use the association standards.

## Rapid Transit Delayed in New York

According to executive proclamation, the residents of New York had many blessings for which they should have returned thanks on Nov. 25, but in that category very few, we believe, will include the present condition of the rapid transit situation. Up to within recently some of the more optimistic, among whom we include ourselves, were in hopes that some basis of agreement would be reached between the Interborough Rapid Transit Company and the Public Service Commission, so that construction could be begun upon the long-delayed rapid transit line on the east and west sides of New York and upon the third tracks on the Second and Third Avenue elevated railroads. But on the morning of Nov. 25 the immediate realization of these hopes was proved futile by the publication of the reply of the Public Service Commission to the proposal of President Shonts. The Interborough Company had agreed, under certain conditions, to build a subway on Seventh Avenue south from Times Square to the Battery, one on Madison Avenue north from Thirtieth Street to 160th Street, to extend its Westchester Avenue line to Pelham Bay Park, to complete a third track on the Second, Third and Ninth Avenue elevated lines, and to build an extension of its Eighth Avenue elevated line to 194th Street. It is generally admitted that these extensions would greatly relieve the present congestion on the existing subway and elevated lines. The subways could not be opened for from five to seven years, but the third tracks on the elevated lines could be completed very much more quickly and would constitute an improvement which we have long advocated, because express trains on these routes would compete in running time with the present subway between the Bronx and lower New York, and so would greatly relieve the existing congestion.

The chief objections raised by the commission to the granting of this permission are: (1) That in addition the company did not propose also to extend its lines in Brooklyn. (2) That under the guise of extensions permission would be granted to construct what is virtually a new system, to the detriment of other possible builders. (3) That the terms of payment to the city are inadequate.

The position of the commission on these matters is expressed in a very long communication, which is abstracted in our news columns this week. We realize that the commission is fighting for the best terms obtainable, and the company is undoubtedly doing the same, so far as it is concerned. But in the meantime the interests of the city are suffering greatly from lack of adequate transportation, and we believe that the actual loss of residents from inability to travel conveniently and quickly, and of the city itself from consequent lack of business efficiency and loss of increased real estate assessments which would follow such extensions, when added together, would far exceed annually the slight difference in terms of recompense which are now the center of contention between the commission and the company. It is true that most of the new work proposed by the company is in the congested portion of the city, which is sometimes characterized as the "fat" or the short-haul traffic territory, and that the extensions in the undeveloped regions of the city are comparatively small, but any improvement in the traffic facilities in the center of the city will necessarily be immediately reflected in the long-haul business, because it is in the region between 125th Street and downtown that most of the delays occur. The rapidity with which trains can be moved through this portion of the system and the traffic which can be carried there set the limit for the service which can be afforded the outer districts. The latter therefore gain with the improvements made to facilitate travel in the congested districts of the city.

## Notes on Substation Design

In building substations for such railway and other high-tension plants as require them, there has been in the last few years a very considerable change in the ordinary practice, a change on the whole in the direction of better and more substantial construction in details, perhaps in the direction of large unnecessary expense. The old substation, as built 10 or 15 years ago, was commonly a mere housing for the converting apparatus, oftentimes of primitive character and nearly always of low cost. With the development in size of units and the elaboration in auxiliary apparatus that has now come to pass, the substation is taken much more seriously and is frequently a structure of more than ordinary excellence architecturally and representing an instrument which, so far as apparatus is concerned, is very much greater than would have been deemed permissible in earlier days.

Railway substations have frequently to be located in the comparatively densely populated parts of the city and hence some degree of structural propriety is important and the matter of possible noise to the detriment of one's neighbors must be looked out for; hence the practice in some recent substations of lighting entirely from the roof, leaving solid walls between the street and the noise of the converters. Beyond this with the growing use of higher voltages and multiplication of feeders, the substation switchboard, once of rudimentary simplicity, has grown to be an element of very serious cost, and requires, perhaps, more care than all the rest of the equipment. In a totally different direction there has been striking progress in the use of portable substations, on wheels so to speak, able to support any part of the large network. Now the substation on wheels has proved prodigiously useful and from its very limitations of dimension must be relatively simple. There is no room in such a portable substation for high-tension busbars laid in individual cement passages, nor for remote control switches carried in brick-work cells and serving high-tension lines, brought into the car through passages 6 ft. apart, insulated and fortified in the latest manner of the constructing engineer.

Durability and freedom from danger of accident are very important matters in substation design, and the question of noise too is one which should receive attention much more frequently than it does. Nevertheless, it is a question in our minds whether the same designing skill that produces a simple, effective and compact portable substation cannot also be brought to bear upon the design of a simple, efficient and compact permanent substation. As we have several times intimated of late, the modern station, be it a generating station or substation, has run to switch-

board in a way that is nothing less than sensational. It is an exceedingly good thing to provide ample switching facilities and a safe place for busbars, but it is open to very grave doubt whether the habits which have recently been acquired by some constructing engineers are not disastrously expensive to their clients, considering the actual good that is gained. It is a fact that so far as high-tension plants are concerned foreign practice is in the direction of simplicity, while American practice, save in the far West, has gone to every conceivable length in the matter of re-protecting over and over again safety precautions which are in themselves quite adequate. A few American plants are striking exceptions to this rule and we have yet to see any evidence that these are actually less safe or less practicable in every-day working than some plants in which the engineer and manufacturer have combined to accumulate a quantity of intricate and costly precautions, which have not always proved effective in averting disaster.

In one of the most striking individual and successful high-tension transmission plants in this country the fundamental conception seems to be for a generator and its transformers. In other words, a generating apparatus for the line is to be considered a unit to be connected and handled in the simplest possible way. Over against this one may set the switchboard structures, which are designed to work every possible computation and combination of all apparatus within the station, irrespective of first cost or of the difficulty of protecting the protecting device. Now between these two plans of design, that which records and treats the generating apparatus for a 100,000-volt line as a suitable unit and that which records the generating apparatus as an intricate series of machines and their accessories, all of which are to be independently protected and interchangeably connected to all possible units, it seems there must be a middle course which will lead, on the one hand to more conservative treatment than in the first case, and on the other hand to a very great reduction, both of expense and of danger of ultimate failure. Failure in this instance is not due to breaking down of the fundamental plant of the equipment, but failure due to casual insufficiency in some one of a train of devices interpolated between the really necessary parts of the equipment. A plant can be put down and out just as successfully by the failure of a cable connecting the seventh and eighth subordinate accessory safety devices as it can by a burning out in the generator itself, and the history of the art shows that the danger of the former accident is quite as great as the latter.

Substantial, durable construction is a good asset everywhere and always, and we are far from wishing a return of the old days when the substation was little more than a shanty put together anyhow. Upon the other hand, we would like to see a steady movement in the direction of that simplicity which makes a plant easy to handle in its daily use and frees it from a good many subordinate causes of danger. By all means let us have well-built and reliable switches, just as we wish efficient and reliable generators and converters, but let the connections and accessories be studied with a view to simplicity and individual reliability.

## London Rapid Transit Facilities

In view of the present condition of rapid transit affairs in New York City, a great deal of interest attaches to the methods in which very similar problems have been worked out in other cities, especially in those three which are closest in size to New York: Berlin, Paris and London. The London situation has just been made the subject of an extended study by G. Kemmann, the author of an article on the Berlin rapid transit system in our issue of July 3, and his essay on London transportation is just available in pamphlet form. It is an excellent summary of a most important condition and is a commentary upon the unfortunate results which have followed a competitive and haphazard development of rapid transit routes.

The basis of Mr. Kemmann's article is the 1906 report of the Royal Commission on London traffic and a supplementary report, covering the subject to the end of the year 1907, which was prepared by Sir H. Herbert Jekyll for the Board of Trade. In his 62-page summary of this voluminous material, Mr. Kemmann first treats the territorial divisions of London as they affect transit conditions. Greater London is composed of 142 local governments in an area of about 680 sq. miles. The population of this district was 7,217,939 in 1907. According to estimate, it will rise to 7,537,194 by 1910, the latter figure corresponding to an increase of 14.09 per cent in a decade. Furthermore, Mr. Harper, city statistician of London, and the Royal Commission, respectively, have estimated that in 1931 the population will be 9,250,000 and 11,000,000. It seems almost incredible that there could be too many transit means for such an enormous mass of people, yet owing to the way in which the roads have been developed this condition actually has arisen in at least some portions of this territory, while others are very deficient in rapid transit facilities. In London, as in American cities, the growth of traffic is more rapid than the increase of population because the same man who walked to his work when he lived in town must ride when he becomes a suburbanite. The suburban trend in London is clearly shown by the fact that, while the population of the inner portion administered by the County Council has increased only 6.37 per cent in 10 years, the outer portion has increased fully 22.64 per cent for the same period.

The superabundance of transportation means in London cannot be ascribed to poor riding, for in 1907 the annual number of rides per capita, including cabs, etc., was 494 in the County of London, which then had a population of 4,750,000. For Greater London, with a population of 7,217,939, the corresponding figure was 312, and for the tube railways, street railways and omnibus lines was 177. An interesting parallel is afforded by Berlin and its contiguous built-up suburbs covering an area practically the same as that of London County. In the Berlin district, there were only 312 rides annually per capita in 1907 when the population was 3,100,000. It is difficult to compare these figures with those of New York, because of the lack of statistics of suburban travel, but the rides per capita in New York, on the surface, elevated and subway lines in 1907 were 397. The New York figures include transfers, but no allowance for the small amount of cab and auto-bus

riding. Mr. Kemmann believes that, although the London transit routes could be extended in some directions, enough suburban territory is now served to banish all fears that the city will cease growing.

In the second part of the report, it is pointed out that until very recently, little had been done to carry out the recommendations of the Royal Commission as to street widening. The few changes made in the older streets of London have been enormously expensive. Hence, Sir H. Herbert Jekyll recommends that it would be well to work out a uniform street plan for the suburbs, at least before such changes become too costly. The archaic condition of the London streets, of course, favors trackless vehicles, but in replacing their horse-drawn prototypes, the new vehicles have greatly extended the field of their predecessors. The bus has been less successful in South London, which is well supplied with tramways and it is bound to suffer in other parts of London when the public grows to appreciate the value of the trans-Thames connections made recently by the London County Council Tramways. The electrification of the street railways will be completed within the next four years and experience shows that the electrified lines will increase their business and largely at the expense of other transportation means.

The third section of the report discusses the fields which should be served by the various classes of transportation. While most of the traffic in the business districts of the city is carried by the buses, the rapid transit lines are securing a part of this patronage and can gain more if a fast and frequent schedule should be maintained and the accessibility of important points well advertised. The three tube lines of the London Underground Electric Railways have in this way attracted an unexpectedly large business. The excellent suburban service offered by the steam lines entering London is apparent from the fact that the 36-mile run between two individual stations, Southend and Fenchurch Street, is made in 50 minutes by express trains which carry over 4000 commuters daily. In general, even the laboring classes are willing to live at distances 18 to 19 miles from the heart of the city. A count made by Sir Herbert Jekyll in October, 1907, from Charing Cross as a center, showed that about 83 per cent of the travel comes from points less than 10 miles away, 8½ per cent from points between 10 and 12½ miles away and 8½ per cent from points farther distant. It is significant that in recent years the steam lines have lost a portion of their suburban traffic because of the fast service and shorter headway given by competing tubes and also by the cheap bus service. It is not believed that electrification would help many of the steam suburban roads because most of the traffic comes only during a few hours of the day.

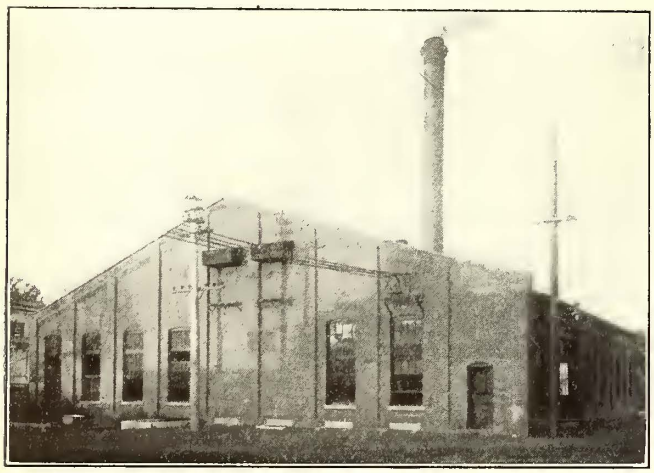
In the fourth division of the report Mr. Kemmann treats of the sphere of influence exerted by each class of transportation. While the Royal Commission believed that the buses and street railways would find their field to be short-haul traffic, they have actually proved strong competitors of the rapid transit lines up to a distance of 7 miles, and even up to 10 miles, because of the lower bus and tramway fares. Only two instances are presented of the tramways acting as feeders in the sense desired by the commission, namely, the single ticket service between the Metropolitan Electric Tramways at Highgate and Finsbury Park with the Piccadilly and Hampstead tubes of the London Underground Electric Railways.

Considering the financial aspect of the transit situation, it was found that the bus companies were losing money to such an extent that the three largest companies were combined in August, 1908, to eliminate wasteful competition, reduce administration costs and centralize maintenance. The future of the auto-bus is still doubtful, and it is questionable whether the bus business will ever be profitable once the government begins to impose upon it the kind of burdens now borne by the railways companies. According to Mr. Kemmann, the financial success of the tramways has not been particularly encouraging, but his accompanying tables show that only three lines, aggregating but 8 miles in length, had deficits, whereas the London County Council Tramway, operating about 120 miles of track, earned 6 per cent on the investment. None of the underground railway companies paid more than 4 per cent on its common stock, and several paid nothing. According to Mr. Kemman, there seemed to be little hope for improvement on the oldest lines on account of their high fixed charges, but recently a vigorous campaign of advertising the facilities for suburban and pleasure travel has greatly stimulated traffic.

As a result of their studies, both the Royal Commission and the Board of Trade concluded that Parliament should create a strong central body for the control of traffic affairs, with powers even greater than those of the New York Public Service Commissions. Such a body could prevent the construction of needless lines and eliminate destructive competition by permitting the consolidation of existing lines under certain conditions. Sir Herbert Jekyll believes that such a commission should also prevent the granting of ruinously low fares. He says that it does not follow that low fares always benefit the public, as the effect is to raise rentals in the favored territory. The Royal Commission states that a reasonable minimum fare would be 2 pence (4 cents) for rapid transit lines, with certain increases for the outer zones. The commission does not favor the operation of unprofitable trains, and feels that a certain amount of standing must be permitted in rush hours. It mentions the London Underground Electric Railways, which now operate four underground lines, as an example of the good results that can be accomplished by consolidation. Mr. Kemmann concludes that if there is to be any further growth of transit facilities in and around London, the only way to attract private capital will be to simplify the cumberous and expensive methods now necessary to secure franchises; to encourage the construction of the shallow instead of deep underground lines so as to reduce the operating expenses and time of transit; to relieve the companies of paying exorbitant prices for easements and property damages; and to reduce taxation. It is also suggested that new undertakings be assisted by the communities to be benefited through the purchase of low interest bonds issued by the companies, by the payment of subsidies or by the grant of land for stations and terminals. The railway companies might also be permitted to purchase land along the right-of-way or near their stations and gain in its advance in value.

## POWER IMPROVEMENTS OF THE NEW JERSEY & PENNSYLVANIA TRACTION COMPANY

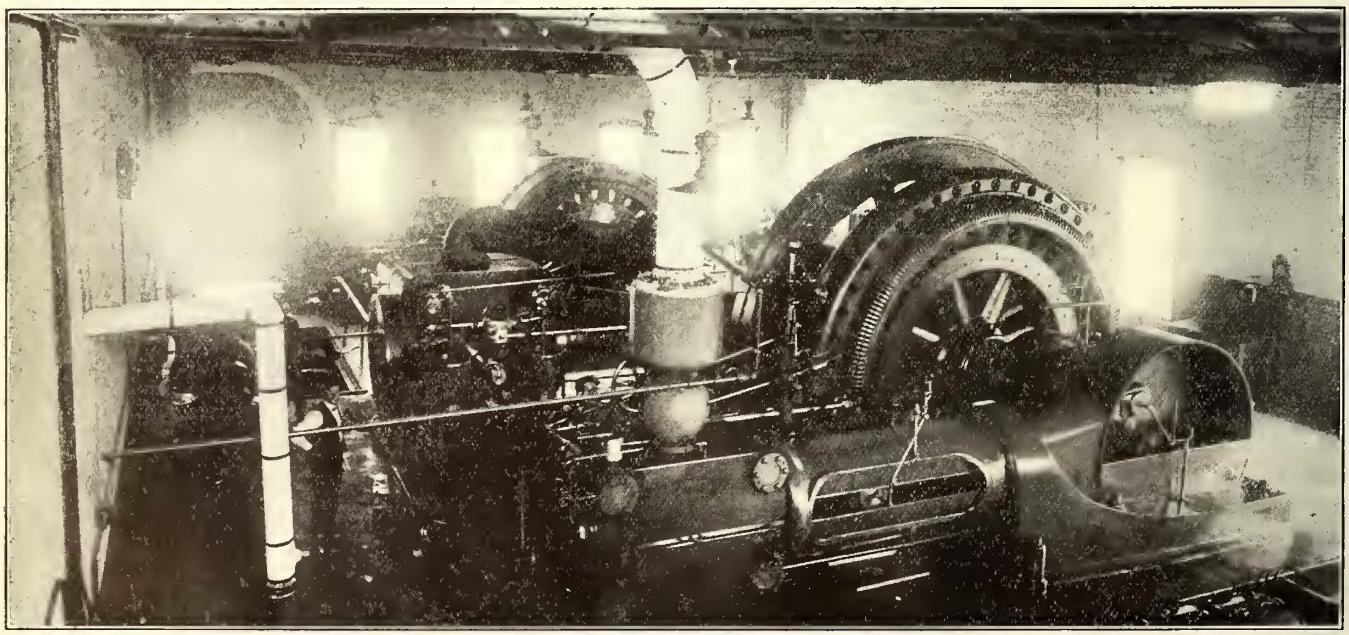
The power situation of the New Jersey & Pennsylvania Traction Company before its recent reorganization was like that of many another medium-size railway merger which finds that it has inherited from its predecessors a motley generating and transmission equipment dating from the earlier days of the art. Hence, when the combined roads entered other hands, it did not take long for the new management to conclude that it would be a profitable scheme to concentrate the power-generating apparatus and revise the transmission lines as well. The company operates a 40-mile city and interurban system, part of the trackage being on the New Jersey side and part on the Pennsylvania side of the Delaware River. The layout of the routes was shown on the map published in the article on the traffic features of this company in the issue of Nov. 20.



New Jersey & Pennsylvania Traction Company—Power Station at Yardley

The first portion of what is now the New Jersey & Pennsylvania Traction Company's system was built in 1901 between Trenton and Princeton with a power station near the former town. This plant consisted of single-cylinder engines belted to d.c. generators When the line to New Hope and Lambertville was constructed in 1905, a separate a.c. station was built at Yardley. The latter plant, however, was not large enough for both lines, as it contained only one 750-hp Belmont Corliss engine direct-connected to a 24-amp, 13,200-volt, 25-cycle, three-phase generator. The direct current for this second road was furnished by a 300-kw rotary in the Yardley station and a similar rotary at Brownsburg.

After careful study of all the factors involved, the company determined about two years ago to enlarge the a.c. plant at Yardley; give up the old d.c. plant at Trenton and replace it by a substation at Lawrenceville, about half-way between Trenton and Princeton; build a 7-mile 13,200-volt transmission line on a private right-of-way cut-off due east from Yardley to the proposed Lawrenceville substation; remove the substation at Brownsburg and rearrange the feeder circuits in accordance with the new distribution system. The changes as outlined required an expenditure of $100,000, but the investment has proved a most profitable one, as the power cost has been lowered fully $25,000 a year. For example, in August, 1908, before the improvements were completed, the cost for electrical energy was $4,105.88; in August, 1909, five months after the completed rebuilding of the Yardley station, the same item was $1,968.15—a difference of $2,137.73 for one month. In consequence of the power improvements as a whole, the operating expenses for September, 1909, were only 52 per cent. Another striking comparison is afforded by the daily coal consumption, which has been reduced from 41 tons to 12 tons a day for practically the same car-mileage. Incidentally, the rebuilt power plant is capable of an output some 45 per cent greater than the two old plants combined, due, in part, to the more efficient operation of the machinery and the lessened line losses. In fact, the company is now prepared to sell a portion of its power output.



New Jersey & Pennsylvania Traction Company—Interior of the Yardley Power Station

### THE YARDLEY POWER STATION

The a.c. station at Yardley was retained in view of its central location from a transmission standpoint, both for the present lines and the future extension to Willow Grove, via Newtown, on the west. The structure, which is of brick, with a tile roof, is conveniently located along the canal of the Lehigh Coal Navigation Company. Coal is de-

livered by barges throughout the year, except from December to April, when navigation is closed. There is enough storage room, however, to tide over the winter months. The present method of handling coal from the canal barges to the boiler room by means of a derrick and scoop bucket is to be eliminated by the construction of an automatic railway and a concrete coal bin. Every pound of coal is carefully weighed when delivered, for, although the station is not a large one, as much attention is given to details as if it were of 10,000-kw capacity or more. Even in a plant of this size important economies in the coal pile have been achieved by spurring the night and day shifts on to compete for the best results; and it will be noted later that in such matters as lubrication and switchboard and high-tension connections the Yardley station is up to the latest power-plant practice.

The steam generating equipment at Yardley before the building was enlarged consisted of three 250-hp B. & W. boilers, to which were added afterward two 280-hp units of the same type, taken from the dismantled Trenton power house. However, only two of these boilers, delivering steam at 140 lb. pressure, are required for normal operation. Their efficiency is maintained by cleaning out the fire boxes, flues, combustion chambers and other parts once a month, without fail. The two boilers normally in operation use per day of 20½ hours, an average of 24,000 lb. of coal, which costs $3 per ton delivered.

The principal engine-room apparatus in the original plant comprised the following: One 750-hp Belmont-Corliss engine, with 28-in. x 36-in. cylinder, direct-connected to a General Electric A. T. B. generator, giving 13,200 volts, 24 amp, 25 cycles at 125 r.p.m.; one T. C. 300-kw rotary converter; three 110-kw type "H" transformers; one type "O. T." reactance and one 15-kw, 125-volt marine engine exciter set.

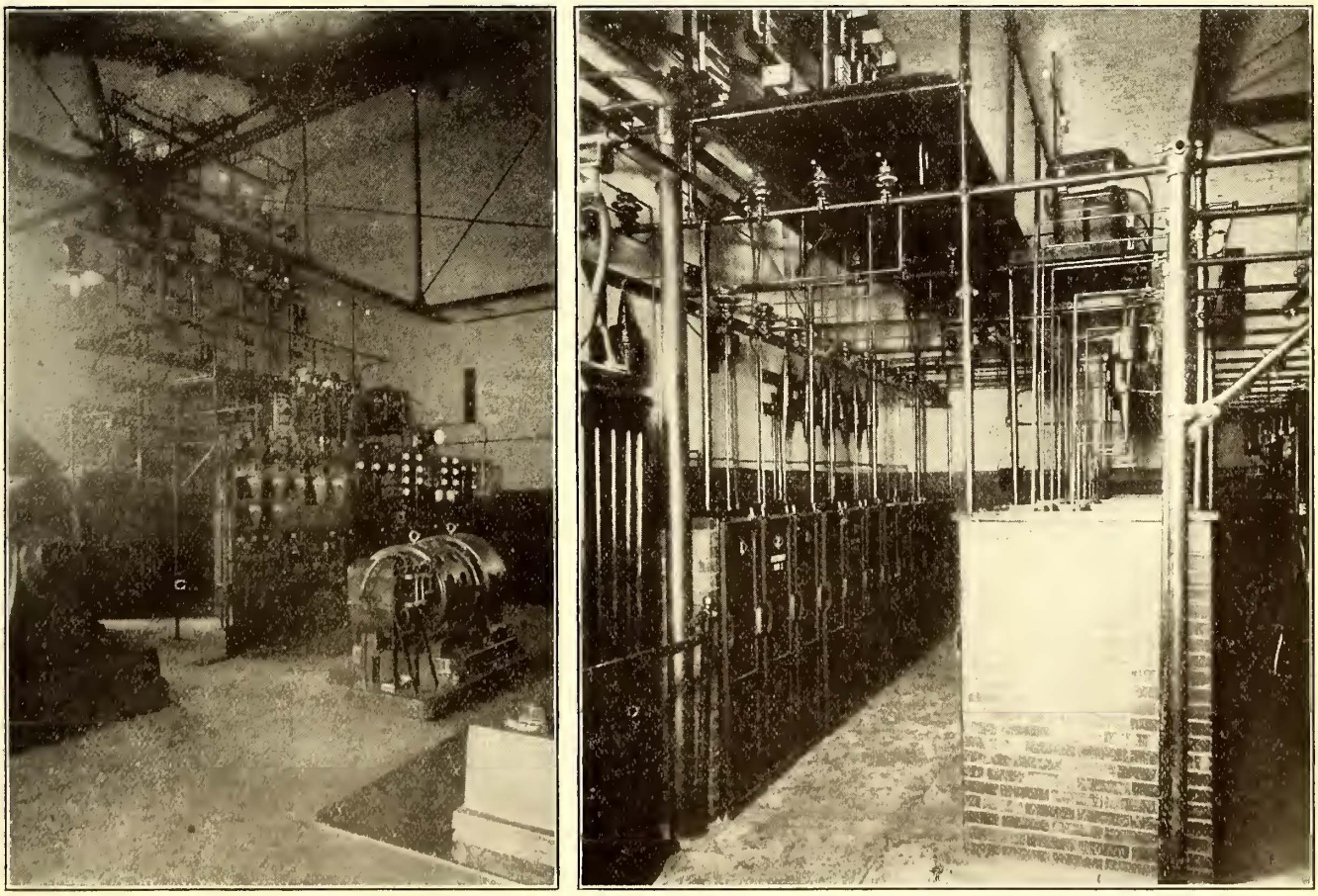
In 1908 the company purchased from the Allis-Chalmers Company a direct-connected set consisting of a horizontal compound engine running at 94 r.p.m. and a 13,200-volt, 35-amp generator; also a 54-hp exciter set made up of a 720 r.p.m., 350-volt, three-phase motor and a 120-volt generator. The General Electric Company supplied the following: One type "H" 500-kw, six-phase rotary converter with speed-limit device; three type "H" 185-kw transformers; switchboard equipment, including a Tirrill regulator; two sets of multi-gap lightning arresters with hour-glass choke coils, and one 35-kw, 120-volt, 3600 r.p.m. Curtis turbo-generator set, which is used for lighting and starting only. The marine engine unit previously mentioned is available as a substitute for the turbo-generator, as the old reciprocating set for which it serves as an exciter is now required only as reserve.

The station was also supplied with Cope boiler feed-water regulators, Cochrane oil separators and feed-water heaters and Worthington surface condenser and pumps.

### LUBRICATION FEATURES

The efficient and economical lubrication of the power-house machinery is provided by an automatic engine oiling system, which includes two Burt unit type filter tanks in the basement and a Worthington pump, which sends the filtered oil back to two receivers of 100 gal. total capacity, located in the upper part of the engine room. The replenishment of this system requires only one quart of engine oil a day.

The daily supply of cylinder oil averages about 12 quarts.



**New Jersey & Pennsylvania Traction Company—Switchboard and Copper Tube Oil-Switch Connections in the Yardley Power Station**

This oil, with its entrained water, is reclaimed by means of Cochrane separators, and then flows, together with the oil from the engine drip pans, etc., to a basement sewer pipe drain, which is about 3 ft. high and 2 ft. in diameter. The oil which rises to the top of this drain is skimmed off every 24 hours, while the water flows away through a 6-in. sewer pipe at the side. Afterward, the skimmed oil is passed through a cloth filter and then is used to supply all the lubrication needed for the company's rolling stock. There is also installed for the reclamation of oily waste the Oil & Waste Saving Machine Company's turbo-cleaner.

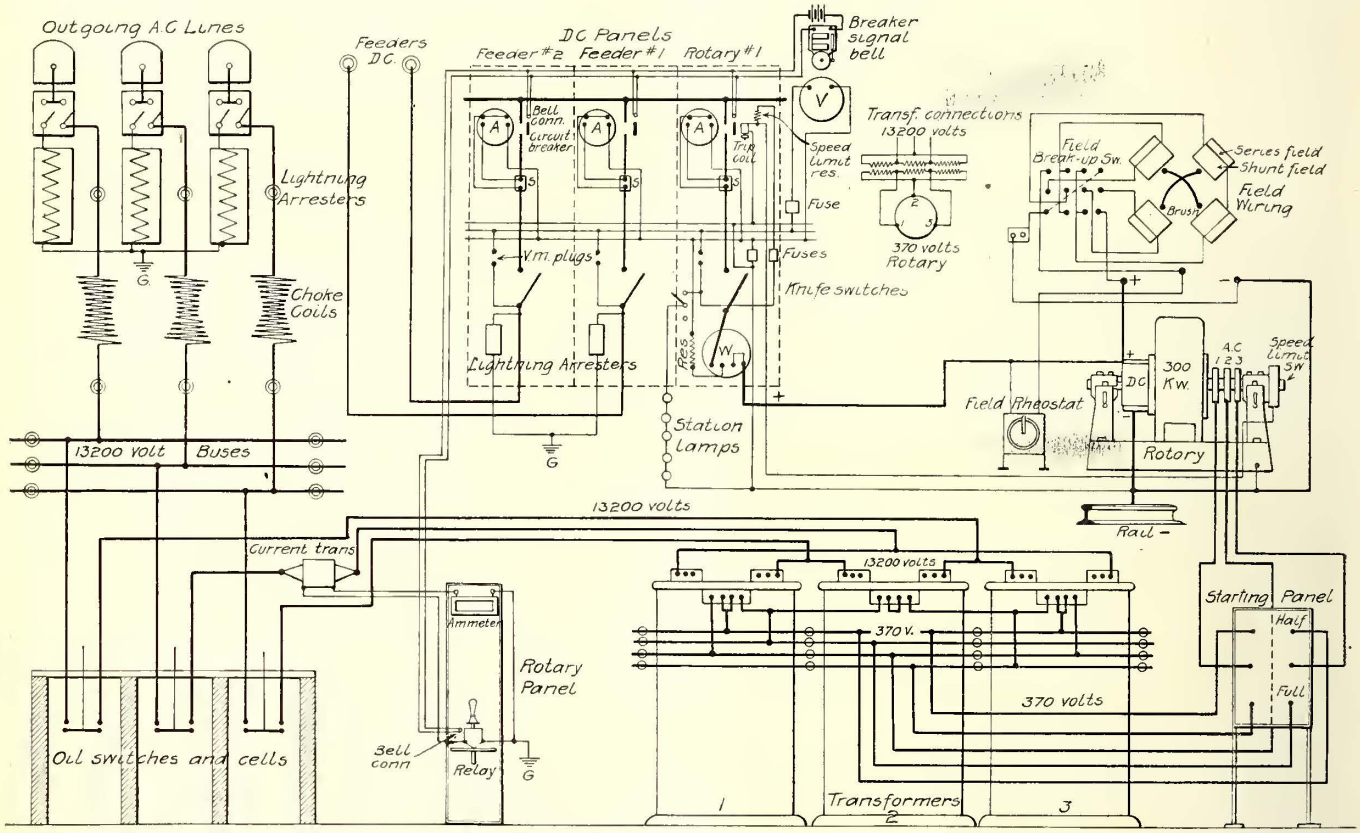
### SOME ELECTRICAL FEATURES

To avoid the short-circuiting troubles that arise from the deposition of metal or carbon dust in undesirable places, all the electrical machines of this company are cleaned daily with compressed air, hollow outlets being provided under each unit for that purpose. In the power station a 7-hp compressor is used, while the rotary converter at Lawrenceville is cared for by a Christensen type AA compressor. The air pressure is limited to 75 lb. to avoid blowing the carbon dust into the leaf mica.

A most unusual feature for a station of such small capacity is the use of ⅜-in. copper tubing with elbows and tees for the high-tension busbars and oil switch connections. Aside from the fact that this tubing cost about one-third less than insulated wire for the same purpose, it is far superior to the latter material in stability and appearance. Insulated wires naturally tend to sag and become soiled after a time, whereas the tubing can be kept highly polished by the occasional application of an emery cloth. This copper tubing was quickly and easily installed in the following manner: After the threads were cut the threaded ends were dipped into the solder pot and tinned, the elbows and tees being subjected to the same process. When the pipes were set up in place the connections were heated with a torch to soften the solder, and thus permit the screwing together of the tubing. Before the piping had cooled off thoroughly the fittings were wiped with burlap to remove all traces of the surplus solder.

A great deal of care has been given to identify all electrical connections, so that even a new man would have little trouble in following out the circuits. The doors of the brick oil-switch compartments are numbered in accordance with the machines served by them, and all the transformer taps and switching circuits are marked right up to the brush-holders of the rotary converters. Similarly, the ammeter shunts and current transformers are numbered in accordance with their respective switchboard instruments.

The switchboard, which is composed of 17 black marble panels, carries a full complement of d.c. and a.c. instruments, including line wattmeters, a synchroscope and a Tirrill regulator. Two of the panels carry two d.c. feeders each with but one circuit-breaker per panel, in accordance with the General Electric Company's C. S. F. design. The




**New Jersey & Pennsylvania Traction Company—Simplified Wiring Diagram of the Lawrenceville Substation**

A most interesting characteristic of the board, however, is at the back. Instead of having a lot of long wires dangling at the rear, the connections from the instruments are led into conduits which are carried up from the floor to such a height that no dirt will enter the openings when the floor is swept. There has been no trouble behind this switchboard ever since its installation.

With regard to the lightning arresters, it may be mentioned that the company found it necessary to change the gap spacing. Naturally, these arresters were adjusted at the factory in accordance with a theoretical earth, but there is, of course, considerable variation in the grounding qualities of various soils, so what is a proper discharge gap in one locality does not give good results elsewhere. The 13,200-volt arresters of the New Jersey & Pennsylvania Traction Company have a discharge gap of ⅜ in.

### LAWRENCEVILLE SUBSTATION

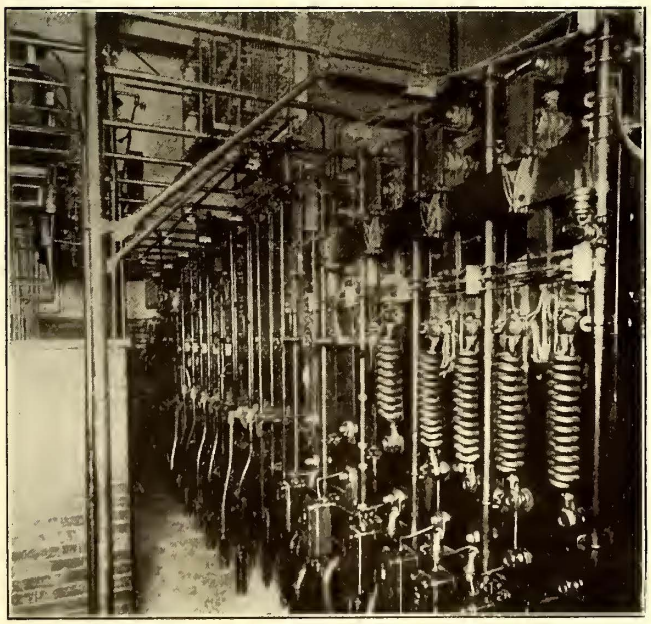
The Lawrenceville substation, which is shown in one of

the accompanying illustrations, is a two-story brick structure, containing a waiting room on the lower floor and the attendants' living quarters on the upper floor. The principal apparatus in the substation comprises three 110-kw type "H" transformers and a 300-kw, 750 r.p.m. General Electric rotary converter. Both the field rheostat and the speed-limit resistance of the rotary have been carefully insulated, and there has never been any trouble from lightning. The old 300-kw rotary from the abandoned substation at Brownsburg is available for a reserve at Lawrenceville. The accompanying wiring diagram of the substation wiring was prepared by the chief engineer of the company as an aid for attendants who cannot readily master the more complicated and symbolic diagrams furnished by the makers of electrical apparatus.

DISTRIBUTION SYSTEM, ETC.

The changes in the location of the direct-current distributing centers naturally resulted in considerable alterations in the feeder layouts. By placing a substation at Lawrenceville, which is practically half-way between Trenton and Princeton, it was not necessary to continue the use of three 500,000 circ. mil feeders between the last-named towns. One of the feeders was removed and installed for 8 miles between Yardley and Brownsburg to compensate for the removal of the Brownsburg substation. Another feeder was retained as a positive in its original position, and the third was also allowed to remain, except that it was converted to a negative feeder.

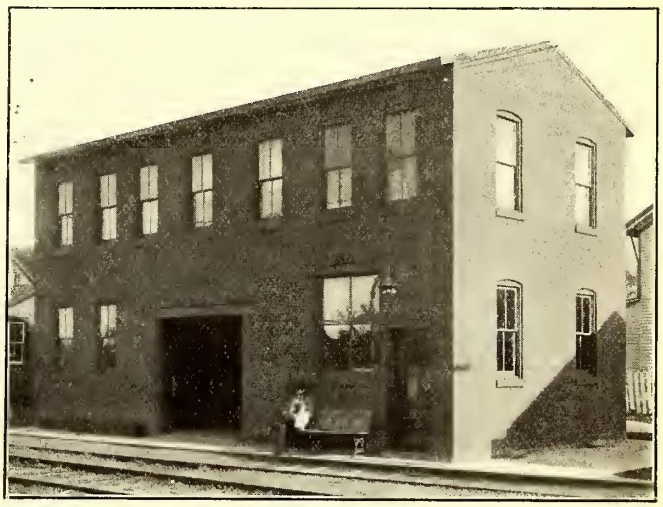
Shortly before the power improvements had been begun the management had started to rebond the Trenton-Princeton line. However, in view of the other changes it was



**New Jersey & Pennsylvania Traction Company—High-Tension Tubing Connections and Conduits Behind the Power Plant Switchboard**

found that further expense for this purpose could be avoided if the spare feeder were used to help out the return circuit. In accordance with this idea, the old feeder was tied in to the rails every 10 poles (1000 ft. on tangents and 800 ft. on curves) all the way to the Yardley station. The practical result of this unusual application of spare copper was to reduce the running time to Princeton by four minutes, or fully 10 per cent, besides producing a conspicuous improvement in the voltage throughout the line.

The complete feeder system on the Lambertville-Yardley-New Hope line consists of the former Yardley-Brownsburg 500,000 circ. mil feeder previously mentioned and a No. 0000 feeder throughout; the Yardley-Newtown section has a 500,000 circ. mil feeder half-way and a 300,000 circ. mil feeder on the balance of the route; from Yardley to a point just outside of Trenton there is a 500,000 circ. mil feeder and then as far as the site of the old Trenton power house a feeder of 1,000,000 circ. mil aluminum, pur-



**New Jersey & Pennsylvania Traction Company—Lawrenceville Substation, with Waiting-Room and Living Quarters**

chased by the original owners of the line. With few exceptions, the standard trolley wire is of No. 0000 gage.

The important power improvements described in the preceding paragraphs have been made under the direction of C. M. Bates, president of the company, and E. G. Daniels, chief engineer, formerly of the General Electric Company.

## EQUIPMENT OF THE SHORE LINE ELECTRIC RAILWAY

The Shore Line Electric Railway, which is under construction from New Haven, Conn., to Ivoryton, through Saybrook and Guilford, a distance of approximately 52 miles, will be the first line to be put in operation east of the Allegheny Mountains using 1200-volt direct current. The power station, which is located on the Connecticut River, near Saybrook, is nearly completed. It will contain two 1500-kw, 25-cycle, 11,000-volt, three-phase Curtis steam turbo-generators. Provisions have been made for installing two additional units of the same size in the future. Power will be transmitted as three-phase current to two substations, one located in the car house at Saybrook and the other located at Guilford. Each of these substations will contain three 200-kw 600-1200-volt rotary converters. Two machines will be operated in series to supply current to the trolley at 1200 volts. The third unit will be used as a spare.

A considerable part of the route has been graded by the Aetna Construction Company which is building the line. It is expected that the first section will be opened for operation early in 1910. The company has ordered 12 cars from the Jewett Car Company, Newark, Ohio. These cars will be mounted on Baldwin trucks and will have side entrances. Each will be equipped with four GE-217, 600-1200-volt railway motors of 50 hp each and with Sprague-General Electric type M control. The motor and control equipment is arranged to operate on 500-volt and 1200-volt current.

The cars of the Short Line Electric Railway will enter New Haven over the tracks of the Connecticut Company.

## ADVERTISING FOR TRAFFIC BY THE LONDON UNDERGROUND RAILWAYS

One of the first things to impress the stranger in London is the great variety of striking advertisements and guides prepared by the Underground Electric Railways Company to direct attention to the advantages of subway transportation to places of business and social importance in and near the city. Even the station sites are advertised because the ticket offices, stairways and elevator shafts are located in buildings or arcades. To assist in finding these stations easily, small guide signs are placed on buildings within a block or two in each direction, while the station itself is indicated by a great sign over the entrance bearing the catchword "Underground" and a variety of striking posters and maps. At night the station hallways are visible at a considerable distance, the word "Underground" then appearing on a large vertical or horizontal electric sign over the sidewalk. These signs are especially prominent in contrast with their surroundings owing to the fact that few London stores illuminate their windows after business hours.

### MAP AND GUIDE ADVERTISING

A permanent feature at every station is a large map of the Metropolitan district on which are shown, by differently colored lines, the territories served by and the transfer sta-


London Traffic Advertising—The Famous Policeman Poster

tions of every underground railway in the city. Above one of these maps is a silhouette of the London skyline including the upper portions of such famous structures as Westminster Abbey, Parliament, St. Paul's and Tower Bridge. The lettering at the bottom of this poster bears the slogan: Underground to Anywhere—Quickest Way—Cheapest Fare. The map described has been distributed by millions in almost every conceivable size and form. In fact, it has become so well known in London as to have attained the honor of being cartooned in *Punch*, England's famous comic weekly. The cartoon shows a Londoner and his country cousin gazing at an exceedingly complicated map, while the city man cries out with admiration: "Perfectly simple, you see!"

A fac-simile of the large poster map recently has been printed on linen backing for pocket use. This map also indicates the connections with suburban lines at the terminals. A great many maps have been printed on a paper folder in connection with data on the principal places of interest, including the hotels, restaurants, hospitals and cemeteries. Another map folder of like size and appearance carries on the back a list of first and last trains, local journey times, the distances to the steam railroad terminals from the nearest subway stations, rules governing the transportation of passengers, etc. The same folder refers to the reduction obtained through purchasing tickets in strips of six. It may be noted here that every ticket shows the fare to be paid between the leaving and destination points indicated and usually the name of the interchange station when a transfer is necessary. The passenger has his ticket punched before reaching the departure platform and gives it up when he leaves the arrival platform. This system, which, of course, applies only with zone fares, eliminates all cheating and it has the further merit of preventing strangers from getting out into the street in case they should alight at the wrong station.

The map has also been employed as part of the accompanying comic poster, entitled "No Need to Ask a P'liceman," on which a London "bobby" with a jerk of this thumb indicates to a rustic couple that they will find all the information they want on the poster on the station building. The sentiment expressed by this design is typical of the company's determination to give intending patrons every opportunity to make their journeys with the greatest possible certitude. Every ticket agent is provided with a map showing all the streets, parks and important buildings in the vicinity of his station to enable him to give precise information to inquirers. Fac-similes of these sectional maps, together with a street index, have been printed in book form


London Traffic Advertising—Express Train at Platform

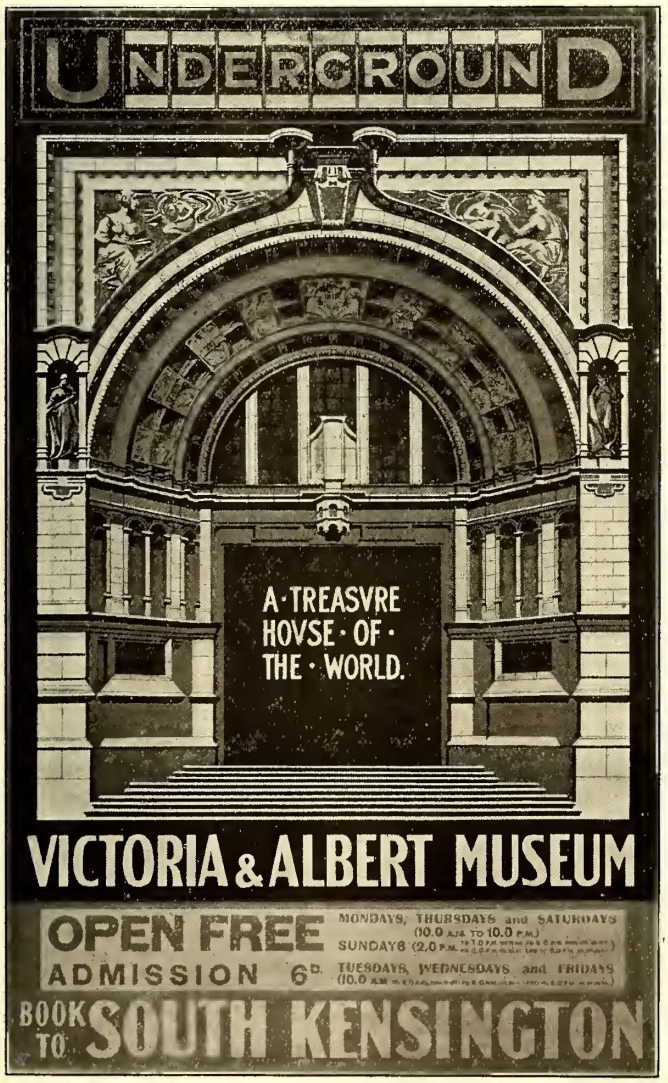
and are sold for the nominal price of two pence. For one penny the passenger can obtain a 54-page guide which gives a list of all places of sight-seeing interest, the theaters and principal clubs, schedules of first and last trains, the subway stations nearest the steam railroad terminals, the subway transfer points and a large map including the connections with suburban lines. Sunday traveling by religious Londoners is stimulated by the distribution of weekly folders which contain a list of the principal churches, the names of the ministers, the hours of service, etc. Of course, this publication contains a strong hint on how to reach the places of worship via the underground railways.

### POSTERS

A good deal of holiday and Sunday travel has been worked up also by advertising the attractions of the public museums. Another poster among those reproduced refers to the Victoria and Albert museum and shows how effectively the artistic and practical features of a traffic advertisement can be combined. This poster not only gives an excellent conception of the beauty of the structure, but also of the time and cost involved in visiting this institution.

One of the most novel posters prepared by the company is a map of the theater district on which all the theaters are shown in red, the principal hotels, restaurants and public buildings in green, and the tube line in white. This design

has proved very effective in promoting the use of the subways for travel to and from London's pleasure section. The theater advertising is strongly reinforced by splendid train service for the crowds going and returning. For example, the late train schedules are so arranged that at Piccadilly Circus, where the Piccadilly and Bakerloo lines intersect, the last trains in each of the four directions meet at 1 a. m. Hence there is no danger that passengers on the last train of one line will be unable to transfer to the other. As the vicinity of the Piccadilly Circus station is quite a rendezvous for Continental visitors, the company has provided a uniformed linguist at that place. This interpreter is particularly valuable at the times when exhibitions are being held in London. The arrow poster reproduced shows some

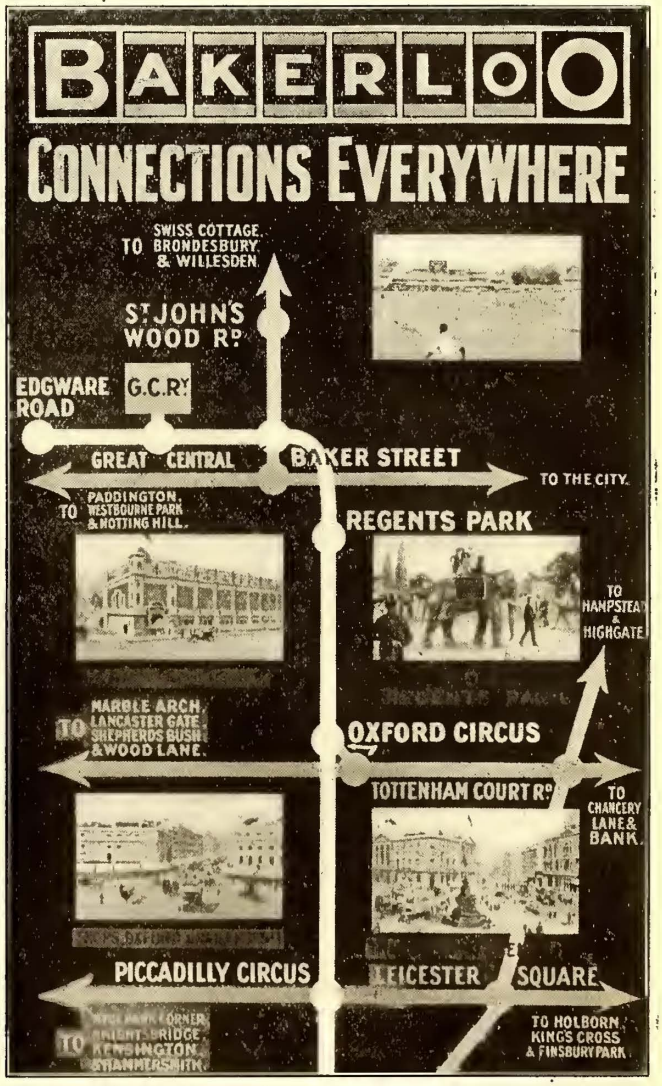



**London Traffic Advertising—Art and Utility Combined in a Museum Poster**

of the important connections that can be made and some of the places reached by the Bakerloo tube. While this is headed by the name of the particular line instead of "Underground" the general style is maintained by using boxed letters as on the other sheets.

Many fine posters have been prepared of London's beautiful suburbs which have been made more accessible by the underground railways. It is only practicable to reproduce a few of the designs, however. As they must be printed in black and white, it is impossible to convey an adequate idea of their artistic coloring. Many of the scenes, such as Hampstead Heath and Richmond Park proved so popular that they were lithographed in reduced size on coated paper for home decoration. The posters on the country and seashore resorts are reinforced by descriptive folders which are illustrated with excellent half-tones. On the occasions of great fairs or other extensive exhibitions, special posters are prepared to call attention to them. In the case of Earl's Court, London's Coney Island, the company sells at attractive reductions round-trip tickets, which include admission to the grounds.

Many small posters have been gotten out for display in the cars. One of these is a theater map with reference numbers; a second advertises the advantages of the suburbs of Osterley and Hounslow, and a third refers to Golder's Green, a rapidly growing suburb which was practically created through the opening of the Hampstead tube. On



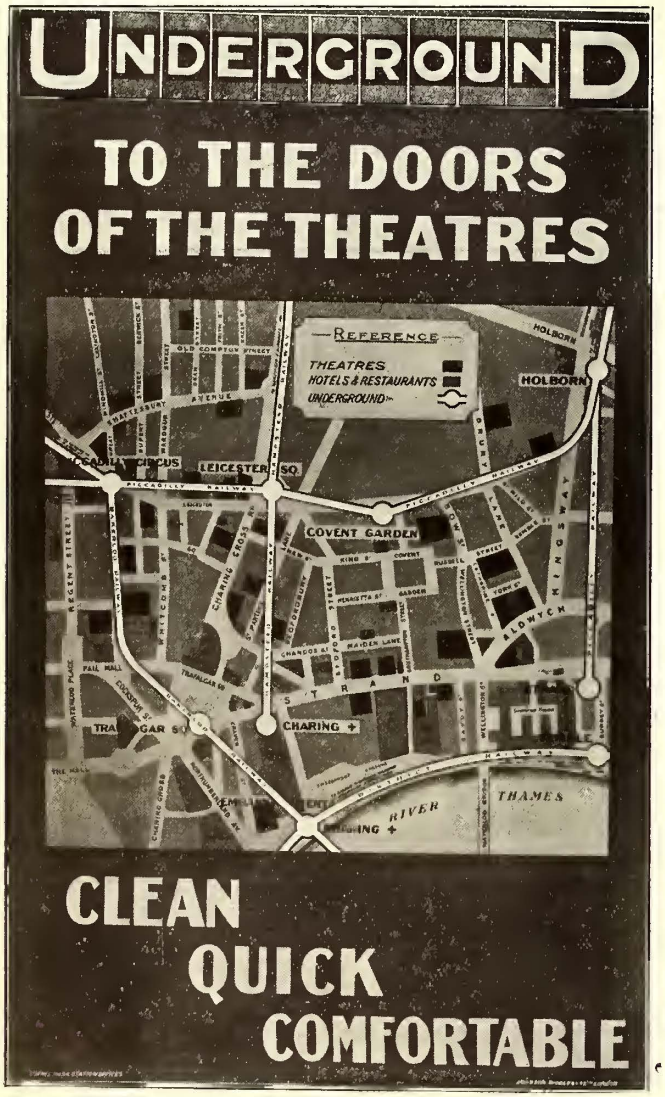

**London Traffic Advertising—A Poster Showing Some of the Prominent Places on the Bakerloo Route**

Monday, Aug. 30, 1909, the company instituted an express or non-stop service to Golder's Green whereby a run of 4½ miles is made in only 11 minutes. At Golder's Green also the company has built a large shed where patrons coming in from the country can store their bicycles all day free of charge. It will be seen from this that the attractive advertising of the company is insured successful results by backing it up with fast train service and special accommodations.

### STATION AND CAR DIRECTIONS

The desire of the railway company to keep its passengers on the right road is also shown in the station and car notices. Thus the subway elevators have an indicator which

lights up whenever the corresponding car is 10 ft. from the landing and remains so until the load has been discharged and a new load taken on. Hence, the passenger can place himself at once before the shaft of the car which will be available next. In many of the stations the elevators do not open directly to the railroad platforms and illuminated direction signs therefore have been installed in the passages which lead to them. Passengers desiring to alight at a given place have no difficulty in finding the station name as the latter is presented 10 to 12 times in 6-in. white letters on a blue ground backed by a red disk. They are placed high and low alternately without any distractive advertising nearby. At one end of the platforms the names of all the stations on the given line are printed on enameled tablets




London Traffic Advertising—Poster Which Proves the Accessibility of the Amusement District via the Underground Lines

and the terminal direction of the incoming trains appears on the wall opposite the platform.

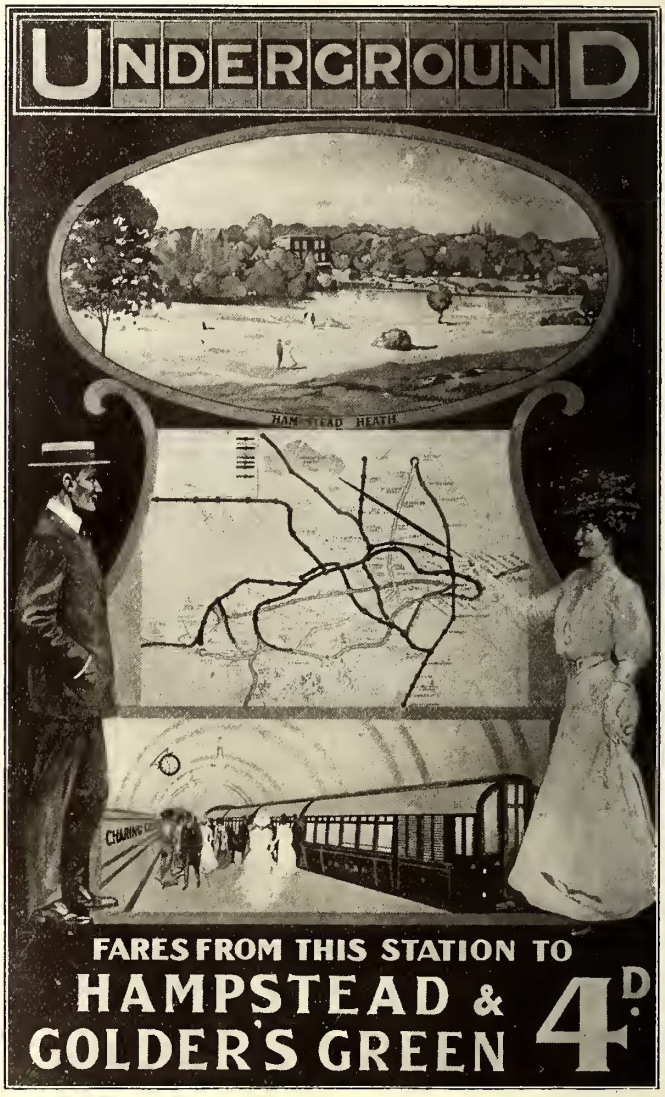
The tube cars carry illuminated maps in the clerestory. These maps show the local stations on the route in green and the interchange stations in red. A rather novel card observed in the Piccadilly cars consists of a double barbed-arrow with the lettering of the station names so arranged that the passenger can immediately determine the direction in which he is travelling and read the names of the following stations in order.

### RESULTS OF PUBLICITY CAMPAIGN

The active efforts which the Underground Electric Railways Company has made to advertise its service has been responsible for a greater growth in traffic than the normal increase which might otherwise have been expected from year to year. The results, from a traffic standpoint, on the three tube lines controlled by this company will be noted from the table on this page.

TRAFFIC STATISTICS ON THREE LONDON TUBES.

| | Bakerloo Ry. | | Piccadilly Ry. | | Hampstead Ry. | |
|---|---|---|---|---|---|---|
| | Total No. of Passengers. | Gross Receipts. | Total No. of Passengers. | Gross Receipts. | Total No. of Passengers. | Gross Receipts. |
| Half-year: 16 weeks to | | | | | | |
| June, 1906.. | 3,006,276 | £23,490 | ..... | £ ..... | ..... | £ ..... |
| Dec., 1906.. | 6,799,895 | 44,580 | ..... | ..... | ..... | ..... |
| June, 1907.. | 9,936,995 | 63,451 | 11,953,759 | 106,570 | ..... | ..... |
| Dec., 1907.. | 10,662,876 | 69,249 | 13,914,779 | 119,271 | 9,881,357 | 74,328 |
| June, 1908.. | 12,940,801 | 83,528 | 17,446,477 | 147,763 | 12,132,639 | 88,883 |
| Dec., 1908.. | 13,337,126 | 86,355 | 16,990,501 | 143,234 | 13,015,363 | 94,066 |

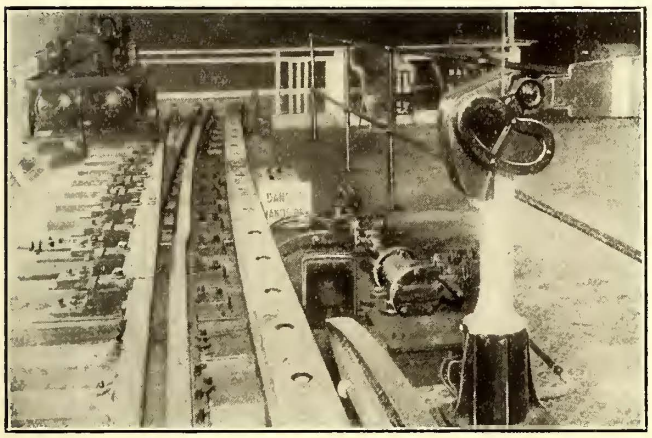



London Traffic Advertising—Map of the Underground Lines Incorporated in a Poster on Hampstead Heath, which is a Favorite Pleasure Ground

It is apparent from the experiences in London that a well-planned advertising campaign combined with good service can do much to develop the suburban business, increase the pleasure travel to outside resorts and even make the local public pay more attention than is customary to local museums and other places of public interest. Acknowledgment is due to Albert H. Stanley, general manager, and Frank Pick, publicity agent of the company, for the interesting examples of advertising matter illustrated or otherwise referred to in this article. The advertising material which has been prepared for the winter publicity campaign will be described in an early number.

## EXHIBIT OF BOSTON ELEVATED RAILWAY COMPANY AT ELECTRICAL SHOW

At the first annual electrical show, held in Boston from Nov. 15 to 25, the Boston Elevated Railway Company installed several working exhibits of operating interest, illustrating the care taken on the elevated system to avoid accidents. Popular interest centered on a model of the elevated structure which was completely equipped for service, including track, third rail and signal system, with a model electric locomotive built as nearly as possible to duplicate the company's shifting locomotive, No. 0514, at its Sullivan Square yards.

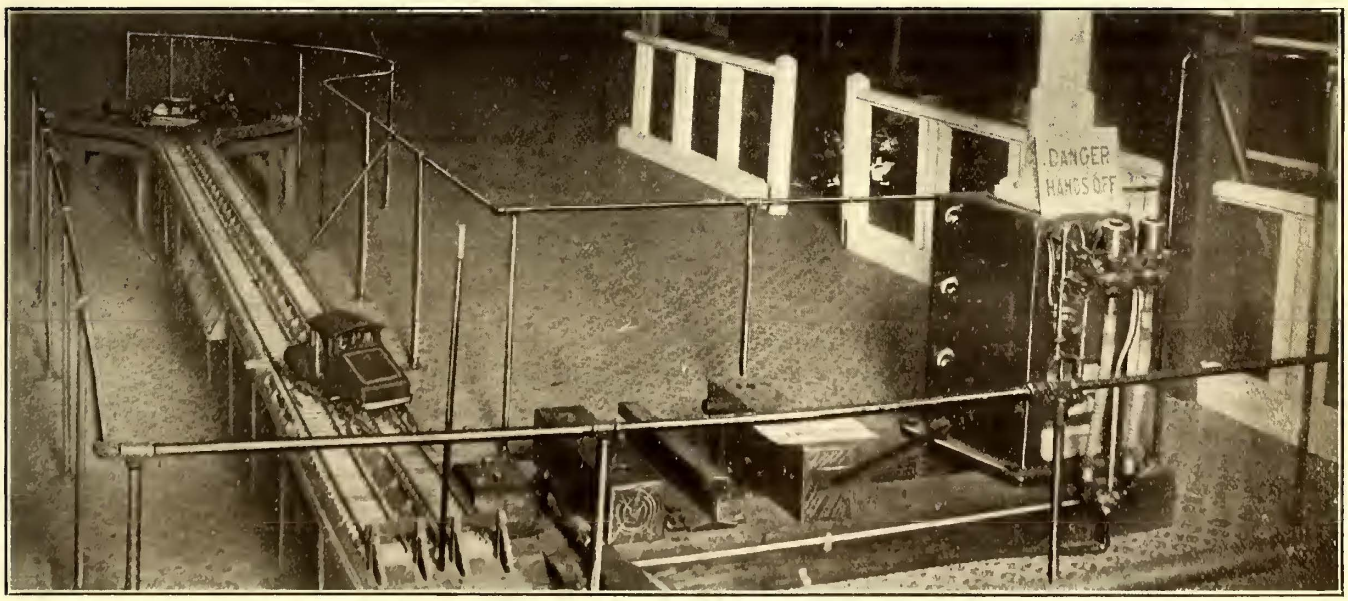


Boston Elevated Exhibit—Manganese Steel Switch and Dwarf Signal

The track was equipped with malleable iron service and third rails laid to a 2½-in. gage and located about 1 ft. above the floor level. About 40 ft. of track were installed in the form of a double line of rails with a loop at one end and a crossover with spring switch at the other. The track was laid on shellacked ties ⅜ in. x ⅜ in. x 4 in. in dimensions, spaced 1¼ in. apart on centers. Every fifth tie laid was longer than the others to carry the third-rail support as in actual service. The current was supplied to the track and third rail at 220 volts, with a lamp resistance in series with the load to protect the locomotive motor. The outside rail was divided into insulated sections as in regular practice, and a 15-volt signal service connected. A complete block with two Union Switch & Signal Company's electro-pneumatic automatic track circuit signals was installed, the signals being full-sized, operating on 80 lb. of air, with mechanism complete and exposed to examination when in operation. The automatic train-stop attachment used on all signals on the Boston Elevated system was also shown. The electric locomotive was built in 39 hours by the company. Its equipment includes a single motor geared to four 1¼-in. malleable-iron wheels, copper third-rail shoes, and model cab and housing. The locomotive is 14 in. overall and weighs 11 lb. It was designed to operate at a maximum speed of 7 1-3 m.p.h., and averaged from 8 to 10 miles running per day during the show.


Boston Elevated Exhibit—One of the Illuminated Floats Used to Advertise the Electrical Show

The company also exhibited a two-motor truck and controller, with air-brake equipment mounted on a skeleton car frame, so that the public might obtain a closer idea of the method of driving a street car. Two GE-86 motors were installed, and the wheels were raised from the floor to permit the motors to be operated on 220-volt current in the exhibition space. Another exhibit consisted of a full-




Boston Elevated Exhibit—Model of Elevated Track and Signal System

sized manganese steel switch about 30 ft. long operated by compressed air with electro-magnetic control and including full-sized dwarf signal, guard rail, ties, timbers and bolts. Short third-rail lengths were also shown. The exhibit was completed by a cable rack showing every size of wire used on the system from bell conductors to 2,000,000 circ. mil feeders, and photographs and drawings of the company's signal towers, trainmen's school, power plants and car-cleaning devices. The exhibit was prepared by W. C. Smith, inspector of signals; H. M. Steward, roadmaster, and about 40 assistants in about one week.

CAR FLOATS USED TO ADVERTISE ELECTRICAL SHOW

The company arranged with the management of the electrical show to operate three floats nightly on its surface lines during the exhibition week. One float represented a diamond in its general scheme of decoration, the second an emerald and the third a chrysalite. Each float was built upon a single truck and equipped with a W. P. 50 motor and K-10 controller, operation being from one end only. About 940 colored incandescent lamps were used in the decoration of the floats, including sign lights advertising the show and its location. The floats were prepared at the Charlestown Neck car house and were started each night from the Bunker Hill car house, running from 7 p. m. until 10 p. m. In general the floats were operated from Bunker Hill through the city past the Mechanics Building, where the show was held, to a point in the Back Bay, where divergent routes to the suburbs were taken. One motorman and one conductor accompanied each float, and the three floats covered practically the 550 miles in six days.

## HEARING ON COMPLETE VESTIBULES IN NEW YORK

The hearing before the Public Service Commission of the First District of New York on the complaint to compel the electric railways operating in Brooklyn and Queens Boroughs to equip their cars with a full vestibule was continued on Nov. 23, 1909. A. W. Williams represented the Brooklyn Rapid Transit Company as counsel; C. L. Addison, the Ocean Electric Railway; J. J. Kuhn, the Coney Island & Brooklyn Railroad and the Bush Terminal Company, and Arthur G. Peacock, the New York & Queens County Railway, New York & Long Island Traction Company and the Long Island Electric Railway. E. M. Bassett represented the commission, with G. H. Backus as counsel.

The attorney for the complainants had at the previous hearing promised to present witnesses who could testify to having operated cars in the metropolitan district so as to show the disadvantage of the present type of vestibule. He had been unable to do this, however, and it was decided to proceed with the case and to give the railway companies an opportunity to present witnesses.

William B. Gove, superintendent of equipment of the Brooklyn Rapid Transit Company, was called as the first witness. Mr. Gove said that the present vestibules in use on the cars of the Brooklyn Rapid Transit Company had been designed under his supervision, to comply with the act of the Legislature compelling cars to be partly vestibuled, and that they had all been installed within the time limit set by the act requiring them at a cost of $295,000. He did not think the design for the complete vestibule furnished by the complainants had been drawn by one familiar with the requirements. Moreover, it would be applicable to only about 452 cars. The cost of $27 or $28 for such a vestibule meant, in his opinion, only the actual cost of materials. Another thing, the stock specified was not suitable for car construction. Neither the paint nor the proposed window setting was adequate.

In accordance with the request of the commission, Mr. Gove had a plan prepared for a proposed folding vestibule applicable to cars of the Brooklyn Rapid Transit Company. He said that to equip 452 convertible cars with these doors would cost $196.65 per car, or $88,885, and to equip 1044 closed semi-convertible cars would cost $201.16 per car, or $230,149.92. Such vestibules would impair the efficiency of the cars for handling traffic by reducing the width of the opening and limiting the loading and unloading. It might even be necessary to relocate some of the equipment, and while it was thought that only the light switch would be interfered with, service requirements alone would determine this. These vestibules would also interfere materially should it be decided later to adopt some prepayment plan. Mr. Gove explained that his company has a very careful system of checking estimates of the cost of construction with the actual cost, and that they usually compared favorably, although in most cases the actual cost exceeded the estimated cost. His estimate of the cost of the vestibules was a very careful one, and he did not think the actual cost would be less than the estimated cost.

Mr. Huff, for the Coney Island & Brooklyn Railroad, said that he had had estimates prepared for equipping the cars of that company with full vestibules; that the estimate was about $200 per car, but that in the absence of counsel for the company he would prefer not to introduce the figures.

Mr. Williams, on behalf of the railroads, moved to have the commission dismiss the complaint on the ground that public necessity does not demand the vestibules; that there is no evidence that the employees desire a change, or that their health is endangered, and that the cost of reconstructing the vestibules is prohibitive. In refusing to dismiss the complaint, Commissioner Bassett said:

The commission desires when its attention has been called to a matter of this sort and a proceeding has been begun, to exhaust, so far as possible, the subject so that the same question will at least be decided for a time, or while circumstances remain the same. That is as much for the interest of one party as it is for the other. I will direct the counsel for the commission to have the transportation bureau during the next two or three months examine into the questions presented by actual observations of local conditions and appear at the hearing to which we will adjourn ready to make a report and be cross-examined on the subject. The commission will then take under consideration all that the complainant has produced and what the companies have produced and also what may be produced by further actual observation and experience during these months, part of which will run at least well into the winter and then the commission will be much better qualified, I think, to express a true opinion on this question than otherwise.

The hearing was adjourned until Feb. 10, 1910.

One of the most important interurban electric railways in France has recently been completed, and is officially to be put in operation on Dec. 4. This line extends from Lille to Roubaix and Tourcoing, and is known as the Electrique Lille-Roubaix-Tourcoing. The northeastern section of France in which it is located is one of the most densely populated industrial sections in Europe outside the large cities, and the new line will join Lille, the chief city of this industrial section, with two important manufacturing centers. An outline of some of the features of the concession was given on page 21 of the Street Railway Journal of Jan. 3, 1903.

# HINTS ON INSPECTION AND MAINTENANCE OF CAR EQUIPMENT

BY H. A. LEONHAUSER, ASSISTANT SUPERINTENDENT OF SHOPS, UNITED RAILWAYS & ELECTRIC COMPANY, OF BALTIMORE, MD.

The car maintenance department of a street railway company should always be on the alert for apparatus that has reached the danger point, for if the policy is to let a car run "just a little longer," the company is sure to be involved in endless delays and expense for damages arising from the failure of equipment. It is important, also, if maintenance work is to be done thoroughly, that the best class of men should be attracted to the repair department, and the foreman in charge should keep an accurate record of each man's work. When the men learn that their advancement depends upon their skill, rather than on seniority, they are sure to take a deeper interest in their work. An accurate record of inspection and repairs is also of material benefit to the claim department, for if it can be proved that a car was carefully inspected and was in safe condition before it left the shops or car house it may relieve the company from liability in an accident damage suit.

Any proper system of inspection must be founded on a systematic mileage basis. There should be a reliable inspector assigned to the terminus of each line every day to examine all cars in the morning, or both in the morning and in the afternoon before the evening trippers are put out. Besides inspecting the equipment in general, as shown in his daily reports to the foreman, the inspector should also "take up" brakes and make any small repairs that are necessary from time to time. If it is impossible for the inspector to place a car in perfect condition at the end of the line or in the inspection depot, a shop sign should be attached to the brake handle immediately as a notice to the dispatcher. No matter how urgent the call for this car may be, the dispatcher should not be permitted to order it out on the road until it has been thoroughly repaired.

### MISCELLANEOUS CARS

The inspection of miscellaneous cars is just as important as the inspection of those used for passenger service, but the average shop man, unless cautioned frequently, will show a tendency to slight them. Miscellaneous cars include those used by the maintenance of way department, such as sprinklers, sweepers, flat, dump and line cars. These cars are usually roughly handled and often overloaded, and the electrical equipment is exposed to snow, slush or mud. Whenever possible, shields should be installed on such cars to protect the electrical apparatus. The entire equipment should be inspected every week, besides receiving a casual daily inspection. Overhead line cars also are often abused, especially when responding to emergency calls. They should be inspected every day. Particular attention should be given to the suspension, protection and capacity of the resistances on line cars, owing to the fact that in stringing wire the resistance notches of the controller are used continuously. This condition, of course, leads to heating of the resistances and to the burning of the bottom of the car. Furthermore, linemen often will install upon the inside of these cars some temporary wiring which may be very unsafe.

### SPRINKLERS

Sprinklers should be carefully inspected daily, owing to their excessive weight, the splashing of water, the loosening of bolts, and the fact that the waste water will wash off all lubrication, even the oil in the journal boxes.

### SWEEPERS

A sweeper is the most important piece of apparatus owned by a street railway, and therefore should be in perfect order at all times. All parts of the electrical equipment should be placed inside the body except motor-leads and the ground connection for lighting circuit. The cables should be cleated to the rafters, and the resistances and other auxiliary equipment kept clear of the floor, and the side doors so as not to interfere with the removal of the broom motor in case of trouble. Any wear in the sprocket links and rivets, as well as any slack in the chain, should be taken up promptly; center bands should be on all brooms, and all bands should be kept tight. All bearings should be kept well greased, or oiled, and an extra trolley pole, controller fingers, lamps, carbons, links, rivets, trolley rope, jacks, jumpers, and other tools and parts placed on the sweeper for use in case of emergency.

### TROLLEYS

A trolley pole about 12 ft. 6 in. long, weighting 22½ lb., with a 24-in. reinforcement, and made of hoop steel, will be found very elastic. This type of pole after a severe deflection will spring back to its normal shape, and only in rare instances will break off.

### INSPECTION OF TROLLEYS

The inspector should see that the pole is straight, is well clamped in the socket, is not rusty, and that the wheel and bushing are in condition to run at least two days longer. The wheel must be properly washered and the contact springs in good order. The stem of the harp should be tight on the pole, and none of the rivets loose or worn. See that the spindle is not badly worn. The cotters should be examined to make sure that they are in good condition, of the proper diameter and length, and properly opened. All wearing parts of the base need occasional oiling, but the inspector should keep the hoods and roof of cars clean, and not allow oil and grease to accumulate, particularly around the trolley base.

### LIGHTS

Lamps, sockets, electroliers and switches, including headlights and wiring, should be carefully gone over each inspection day. Nothing is more unsightly than a socket dangling from an electrolier. Each circuit should be fused with an enclosed fuse of proper carrying capacity.

### CIRCUIT BREAKERS

As a circuit breaker is really abused more than a controller, and as it was designed to protect the equipment, the cover should be removed each inspection day, and after putting all parts in good order, the scale or adjusting spring should be examined to make sure that it has not been tampered with, and the breaker tested to insure that it will trip freely. The set screws should bear firmly on the trolley wire leads. If the breaker is of the type known as No. 11,303-B the inspector should see that the ends of the trolley wire leads do not touch each other. Guard against this by placing a piece of 1/16-in. fiber between the contacts, for if the ends of the trolley wire leads touch, the breaker is useless. In short, a circuit breaker is none too reliable even when it is in perfect order. The writer's opinion is that circuit breakers are not efficient for heavy two-motor or four-motor equipments, and that up to the present time the heavy equipments have not been supplied with a proper protecting device. This applies more par-

ticularly to cities where the cars run up steep grades. The breaker must be set to carry the heaviest car with the heaviest load with a greasy rail, or with snow on the rails up the steepest grades; sometimes the car is called upon to push another heavily loaded car, yet it is called a protective device. Is it any wonder that armatures and fields are burned up and controllers blown out?

A separate fuse box with a fuse of proper capacity and a simple breaker for each motor has been considered by the writer, but trouble with this arrangement would probably arise if a pair of motors was cut out. The fuses of the two remaining motors would not have sufficient capacity to carry the load thrown on the two motors, and the motorman would resort to using pieces of iron wire for fuses. The next thing that would happen would be a controller burnt out. If four small capacity circuit breakers were installed, one for each motor, the motorman would probably not be aware of the fact that one breaker had opened and that the car was running with only three motors, unless some kind of an annunciator was mounted on the platform. Protecting the motors is one phase of the problem; protecting the trolley circuit is another; and designing a strong, spacious and simple controller is still another. If circuit breakers must be used, the manufacturers should design and build an apparatus that will always open at a current value for which it is set. It should not be possible to find on an inspector's report a record of a breaker opening at 950 amp, when it should have opened at 400 or 450 amp. Breakers should be tested at least once a month, using a water rheostat and ammeter.

### HOOD SWITCHES

Hood switches should be inspected carefully each regular inspection day and they should also be tried daily by the terminal inspectors. The old G.E. type of hood switch has an iron lever which rusts very easily, making it work stiff. This often deceives the motorman, with the result that contact springs burn off. The car must then be pushed to the terminal unless a repair man comes to the rescue.

### CONTROLLERS

See that the handle is not badly worn, keep the water collars tight and the bearings well lubricated. Set the controller fingers with proper tension, see that they have full and perfect bearing on the contact plates, and that the arc is broken at the proper number of points, and not at one, as is very often the case. The ground connection should be tight, and in good order, and the controller bolted tight to both the knee-iron and dash. After an arc divider is burnt about one-third through do not destroy it, but fill the cavity with oil putty. Keep contact plates on the main cylinder properly lubricated; the contacts on the reverse cylinder should not be lubricated but should be kept bright and clean, and all reverse fingers maintained with a good tension. If the springs are weak, remove them promptly. Keep the connecting board and all parts clean, and see that the insulation upon all cables is in good condition, and that the screws in the binding posts are tight and locked with the lock-nuts. Inspect the magnet or blow-out coil carefully and keep the thumb-screws on the case well lubricated so that they will work freely.

Controller "explosions" can be caused by weak springs on the reverse fingers; cables not properly sweated, or loose in the clips that fasten them to the reverse fingers; cables loose in the binding posts; cut-out switches not having full, proper and firm bearing in contacts; arc dividers burnt clear through; carbonization, causing short-circuits; breaking arc at one point instead of four; ground connection loose or burnt off; magnet grounded; ground wires burned off either at motors or cables; reversing; dropping back the controller handle from parallel to series position; cutting out the current with brake on; weak fields; grounded brush-holder; brush-holder springs breaking off; tight carbons; weak springs; circuit breakers sticking or set too high; feeding controller too fast especially on slippery rail; bad bonding; high voltage; passing under breakers with current on or cutting down from parallel to series while passing under breakers, especially if the voltage is low on one side and high on the other; imperfect ground connections after reaching the motor frame due to the axle being dry and gummy or the pedestal and journal boxes rusty and loose. In short, in order to get good results from a controller, all connections should be bright and tight from the trolley wire to the rail.

The paint or shellac pot, although it helps to make the controller look pretty, amounts to little in keeping a controller in first-class operating condition. For years the capacity of every part of the electrical equipment of cars was increased except that of the controllers. The platform controller is not now a complete success for heavy equipments. Auxiliary contractors have been thrown in the circuit to break the arc outside the controller, but in some cases have proved a failure. If the controller cylinder is thrown off quickly, the arc is broken in the controller, and not by the contactors. If the controller cylinder is thrown off slowly, however, the contactors will do the work for which they are intended.

### CABLES

See that all cables are eleated clear of iron parts, bolts, rods, etc., as if they are kept clear there will be no danger of grounding. If they are exposed to water or oil, and cannot be placed to one side, put up a guard or shield made of galvanized iron to protect them. A fire-proof trough and conduit properly installed is recommended for new equipment. Conduit, however, should be put in such a manner that it may be easily replaced in case of collision or other damage to the car body.

### RESISTANCES

Resistance grids should be tested to see that panels are not grounded to the frames and that the panels and the terminals are tight. Copper washers should be used between the panels instead of plates and screws. Grids should be protected from water splashing on them by guards or shields. They should also be suspended a safe distance from the floor and away from all wood-work. Any wood-work near the resistances should be protected with sheet iron and asbestos or transite board. Great care should be taken, especially on double-truck cars, in case a car jumps the track, or in rounding sharp curves, that the brake rods do not come in contact with the resistances, as this will burn the rods and chains and may cause a serious accident. Grids should be tightened up at least twice a year.

### MOTORS

A street railway motor is a much-abused piece of machinery. The brush-holder to begin with is often looked upon merely as a chunk of brass and a spring or two with a slot to receive a carbon. Thousands of dollars worth of electrical apparatus has been thrown into the scrap-heap, lines have been tied up, controllers blown out, fuses blown and armatures and fields burned out time and again, simply because the brush-holders, or the support known as the wooden yoke, were at fault. Every yoke should be placed in a templet or jig to see that it is perfect before leaving the shop. The wood for the yoke should be thoroughly sea-

soned, and all castings, after being riveted to the yoke, should be finished by a competent machinist. He should begin to mill the center casting first, then strike the center of this casting, and from this point locate, mill and face the end casting in order to have the brush-holder set square and at the proper angle. The drilling and tapping of the holes of the center casting if not worked from the center will throw a brush-holder out of neutral, and will cause a variety of motor troubles. A proper templet or jig is absolutely necessary in order to make each and every yoke perfect.

Troubles to be looked for in inspecting brush-holders are bent or twisted holders, baked carbon dust, too much play for the carbon brushes, unequal pressures of the springs which should exert about 6½ lb. per square inch of brush contact, sluggish action of the springs, plungers twisted, rubbing or binding. The tension should be right when the carbon brush is nearly worn out as well as when the brush is first put in. When applying new brush-holders place them on a perfect templet or jig and see whether they fit exactly. Slight variations from a perfect fit mean no end of trouble. See that the shunts are in good order. The best way of making sure of perfect action of the brushes and holders is to examine the carbons from time to time. If they are worn so that one edge is as high as the other, are hollow in the center corresponding to the radius of the commutator and are also worn square across, the brush-holders as well as the yoke are perfect. On the other hand, if the brushes are worn bevel, no matter how slight or worn on the bias, the yoke or brush-holder requires attention. Until this defect is rectified armature and field troubles, flash-overs, blowing up of controllers, etc., will continue. The brush-holders and insulators should be kept clean. Painting the insulators with a good oil-repelling varnish is recommended. The plastering of motor cases with asbestos or other material is wrong. Remove the cause and there will be no flash-overs. In order to get good results, and not wear the brushes and commutator too rapidly, the following brush tensions will be found satisfactory: Westinghouse No. 3 motors, 4½ lb. per spring; GE No. 1000 motors, 5 lb. per spring; GE No. 80 motors, 5 lb. per spring; GE No. 90 motors, 5½ lb. to 6 lb. per spring; Westinghouse No. 12-A motors, 4½ lb. per spring; Westinghouse No. 49 motors, 5 lb. per spring; Westinghouse No. 56 motors, 6½ lb. per spring; Westinghouse No. 101-B motors, 5 lb. per spring; Westinghouse No. 101-D motors, 5½ lb. to 6 lb. per spring. All brush-holders should have springs that can be easily adjusted without removing the holder. An arrangement similar to the brush-holder of a Westinghouse No. 49 motor is recommended.

### COMMUTATORS

Flat and rough commutators should be removed and turned promptly. The writer favors grooving commutators, although it is not necessary on motors up to 60 hp, providing the brushes have the proper carrying capacity, are just hard enough to trim down the mica, the commutator is made of the proper material and is properly bored out and turned. Commutators should be made of hard-drawn copper and the softest grade of Canadian amber mica. Every segment of mica should be milled to gage so that each bar will be the proper distance apart, in order to give the proper commutation. The bars should be bored out perfectly in order that they may be screwed up tight, as loose or high bars quickly cause trouble. Slots should be tinned. The grooving of any rough or bad commutator is recommended. This point is discussed at length farther on.

### CARBON BRUSHES

Brushes as a general rule are placed in the holders, the lid clamped down on the motors, the trap doors placed in position, and the car put out on the road to run until it breaks down. Who knows what is taking place inside of the motors? The only way in which a master mechanic can determine which type or grade of carbon brush is best suited for the service on each particular line is to get the pole pieces in proper position, see that the fields test properly and are tight, see that all connections are tight, test the armatures, fields and brush-holders for drop, try the yoke and brush-holders on a templet or jig, then make a thorough service test of the motors of each line separately. A cheap carbon brush in some instances will give almost as good results as a high-priced brush, but it should be borne in mind that the conditions must be studied very carefully and checked up occasionally. Where it is necessary to use high-priced brushes to get results, do not hesitate about buying them, but watch the men who handle them, and make them return brush for brush, noting whether they are sufficiently and properly worn and whether they are cutting the commutators. Cutting can be detected readily by the presence of very fine copper duct on the brush, providing carbon dust is not allowed to accumulate in the brush-holders. "Doped" brushes should never be used, and a soft brush that grinds away rapidly is a nuisance, as in a very short time all parts of the motor will be covered with carbon dust, which will cause trouble.

Select a brush with a safe carrying capacity, that will cut down the mica and not cut the copper and one that with proper tension will show a wear of ⅛ in. after having made about 2500 miles. The time the car is coasting and the time current is passing through the motors should be noted as coasting trims down the mica, and the results are entirely different with the same motors, weight of car, etc., on a fairly level road from the results on a hilly road. Fast feeding and forcing current through the motors is disastrous to brushes as nothing will break them quicker. The plungers of the brush-holders should be lowered carefully on the brushes. If allowed to strike the brushes with force, the carbons will break. Sluggish springs, inferior shunts, worn brush-holders, improper tension and worn armature bearings should also receive careful consideration. If the master mechanic has not the time to make a careful study of his conditions, the brush manufacturer can be relied upon usually to supply a satisfactory grade as the results of his long experience with conditions probably very similar to those involved.

It is a good plan to have the brush inspector mark with a piece of crayon the car number and the motor number on brushes that he removes from time to time and have him place them on the master mechanic's desk. The master mechanic will then know at all times whether brush-holder yokes and brush-holders are right or wrong, what results the brushes are giving and whether the commutators are being cut or damaged. It is also well to note in some cases the date the brushes were placed in service and when removed in order to get the mileage. The tension of the springs must be noted in making mileage tests and also whether the brush is getting a full contact against the brush-holder. Partial contact of the brushes in the holders may be caused by attempts to remove baked carbon dust. A repairman will rub a brush on the floor of the car, or on top of the motor, or will sandpaper it, while another man may use a file on the brush-holders. The manufacturer may have driven a broach through the brush-holder, thus springing

the slot in the center, while at the ends of the slot the carbon will fit snugly. Brushes frequently have only about one-fourth of the proper bearing surface on the brush-holders. Use the micrometer on brushes occasionally, and it will be seen that the brush manufacturers are also sometimes at fault. Brushes of the same size will vary from 0.00 in. to 0.005 in. in thickness. Brushes should never be changed from one brush-holder to the other, nor from one side to the other in the same brush-holder, nor should they be reversed after they have once been placed in service. Before removing a brush mark it in some manner so that it can be put back in the same position.

### ARMATURES

In making armature coils insulate them well and dip them in a good insulating varnish. Above all things, do not destroy the flexibility of the varnish by adding benzine or gasoline as a thinner. Place a steam coil of solid pipe, having no joints, in the bottom of the varnish tank, and heat the varnish to the proper temperature, using a hydrometer, and a thermometer in order to obtain the proper gravity and temperature. Bake the coils only a few hours, and let them air-dry. Too much baking after final dipping is wrong. Before the first dipping all coils should be placed in the oven for at least one hour, in order to remove all moisture, and then plunged hot in the melted varnish.

In winding an armature, before placing the first coil in the core use a piece of steel that will fit the slot of the armature core neatly and have the center of the point strike the center of the corresponding slot in the commutator. This is a very important aid to proper winding of the armature, as throwing the lead from the coil either one bar to the right or one bar to the left will seriously affect the commutation when running.

For banding armatures up to and including those for 60-hp motors the writer has found that No. 17 B. & S. gage steel banding wire 0.046 in. in diameter, with a tensile strength averaging 233 lb., an elastic limit of about the same amount, and showing no perceptible elongation by calipers in a 6-in. length, will give excellent results. No band wires should be used on the sloping surface between the core and the commutator.

The laminations forming the core of an armature should be built on a spider, the same as a commutator. This prevents any movement relative to each other. The spider also reinforces the shaft, and permits a shorter distance between bearings, preventing trouble with uneven wear of pinion and gear, due to the shaft springing under heavy load. The shaft should be designed to press out of the spider without disturbing the windings or the commutator.

For soldering the coil leads into the commutator use pure tin. For closing spaces between commutator bars or patching burned bars, litharge and glycerine mixed to the same consistency as putty, well worked into the space and then dried thoroughly in an oven has given excellent results. A mixture of stratena cement and talcum powder is also very good for this purpose. Spaces, however, must be sawed or scraped out thoroughly before applying this dope. Always see that the sleeve or quill of the commutator is tight on the shaft, as the burning and breaking off of leads are due in a great many instances to sleeves or quills being loose. At times loose sleeves are very hard to detect. Laminations loose on the shaft will produce the same result. Many defective armature shafts can be detected before winding by applying the same oil and hammer test as is used on axles.

### BEARINGS

Bearing shells should be made of semi-steel and only the best grade of babbitt used, particularly for armature bearings. The fewer number of times an armature has to be removed from the motor for any cause the longer will be its life. If it has not failed before being removed, the puncture test which is generally applied before it is replaced will often break it down. The bearings, therefore, should be carefully made and lubricated. Every large street railway company should mix its own babbitt metal, using only the best tin, copper and antimony. The mixing and pouring should not be entrusted to an inexperienced man. Bearings should be poured almost to size, and then broached. The broaching has a tendency to compress the babbitt and also give it a bright and perfectly smooth surface. If the bearing is broached the babbitt still maintains a chilled surface, whereas if it is bored the chilled surface is removed.

Bearing housings are recommended, all bearings to be of the same diameter and pressed and keyed in the housings. Large openings should be provided in the side of the housings for the application of waste packing to the journal. A separate compartment should also be provided for free oil in large quantities, so that the supply of oil can be maintained by examining the depth in the well. An arrangement of this kind allows the lower portion of the waste to be continually submerged in the oil, thereby insuring uniform saturation of the waste at all times. The oil delivered to the journals is fed through capillary attraction, which at the same time filters the oil, preventing grit and dirt being carried into the bearings. The openings in the housings and bearings for the application of waste should be on the side opposite to that which is exerting pressure, due to the action between the pinion and gear, in order to prevent the oil being wiped off the journal under the effect of this pressure against the babbitt. The housings should be held firmly to the upper frames with two 1¼-in. cap screws, and tightly clamped by both the top and bottom frames, which are in turn held by four 1¼-in. turned machine bolts with crowned nuts and 3/16-in. cotter pins. These bolts should fit neatly in the holes in both the top and bottom motor frames, in order to prevent shifting of the frames and wear. The lugs of the frames at the points where the bolts pass through should be of ample strength and large enough to permit the use of a socket wrench to remove the nuts. The bearings should be made in one piece, not split, and should also be designed so as not to permit excessive oil being fed to the journals. Some commutator troubles are due to excessive oiling.

### OILING

Oiling should be done on a mileage basis. The mileage per oiling will range from 550 miles to 3400 miles, according to the type of motor. The latter figure represents the armature bearings of a Westinghouse No. 101-B motor. The oil wells of the armature bearings are filled to a depth of 4 in. at each oiling. The axle bearings are oiled upon a 1700-mile basis, using ¾ gill per bearing. The reason for oiling the axle bearings on a shorter basis is that the axle bearing cap is not equipped with an oil receptacle. It must be borne in mind, however, that the waste must be kept up to the journals at all times.

Good results have been obtained in Baltimore with grease lubrication. The armature bearing caps of a GE-80 motor were packed with a wool waste and grease combination known as AA-4 Solidified Oil. This motor has made 10,000 miles in 70 days, or an average of 143 miles per day. During this time the motor was inspected three times, and at the last inspection the waste and solidified oil were removed and found to be in first-class condition. This preparation, while it is grease, can be placed on a parity with a heavy lubricating oil. The writer believes that it will only be

necessary to inspect motors lubricated in this way at intervals of 10,000 miles.

An interesting experiment has been tried with a Westinghouse No. 49 motor. Holes were drilled and tapped into the sides of the oil wells and ½-in. pipes placed in them, similar to the pipe and ell used for oiling the crankcase of a Westinghouse D-1-EG compressor. The bearing caps on the upper side of the bearings were packed with perfectly dry woolen waste. The lower wells were then filled with oil through the pipes, after the regular feeder had been soaked in oil for 48 hours, and the feeder spring set to the proper tension. The motor was placed in service and used about a half-gill of oil per bearing after having made 2500 miles in 23 days, or an average of 109 miles per day. The writer is satisfied that it will be possible eventually to fix the oiling period with this arrangement at 3000 miles, or about once a month. This experiment has shown that it is absolutely unnecessary to lubricate from the upper bearing cap.

### MOTOR FRAMES

Motor frames should be made of cast steel, should have a milled seat and a 1-in. lip for the suspension bar, and should be secured with four machine bolts not less than 1⅛ in. in diameter, with 3/16-in. cotter pins close to the nuts. Ample ventilation and inspection holes should be provided. Motors should be given all the ventilation possible, even though it is necessary to redesign the lid over the commutator. Manufacturers of motors should be required to bevel the sides and ends on the inside of the bottom frame, and also to drill two 1-in. holes at either end of the frame, so that any oil, or especially water after a storm, will drain off. This is very important.

### FIELD COILS

Field coils should be made of strap or ribbon copper covered with asbestos. The asbestos should not be less than 0.028 in. thick, and should be dried out and thoroughly impregnated. Under no circumstances should paper or cardboard be used at the corners, as no impregnating process can drive the compound through paper or cardboard when it is placed between the windings. After the fields have been properly impregnated they should then be well insulated with webbing, oiled linen and insulating tape, and then given several coats of good oil repellant paint. They should be repainted at each overhauling. In mounting they should be laid on an oiled canvas cushion, and a heavy flat spring placed between the cushion and motor frame, so that the coils will be held tightly at all times. The screws of the field terminals should have a brass nut to lock them. Carbon dust that has accumulated around the terminals should be thoroughly scraped away and the terminals repainted with a good oil repellant paint. This will eliminate burning and grounding of fields at the terminals. All field leads should be kept clear of the field frame and armature.

### GROOVING COMMUTATORS

While grooving of commutators is not absolutely necessary on motors of less than 50 hp, the writer has found it to be very economical for motors of any size. The mica should not only be grooved out about 3/64 in., but care must be taken that no small pieces of mica or copper are left between the bars; the slots must be picked or scraped out thoroughly with a sharp blade. An old hacksaw blade pointed and shaped with a small hook at the end will do. The commutator should then be polished with fine sandpaper and the grooves carefully blown out with compressed air. If the proper brushes and brush-holder spring tension are used then there will be no more trouble from flat or rough commutators, no more high mica, and the motors will be kept clean and almost free of carbon dust. This means clean yokes and clean brush-holders, and much less miscellaneous motor trouble. The commutation will be good, and the life of a commutator will be prolonged at least eight to ten fold. A number of old, rough and almost worn-out commutators of various types that formerly were turned almost every two weeks were grooved and placed in service seven months ago. They are still giving splendid service and show no sign of wear, while the brushes are still in good condition, after making 18,000 miles. Several GE-90 armatures that were grooved seven months ago and have made 19,000 miles show absolutely no wear, and the brushes have not been renewed.

### TRUCKS AND WHEELS

All trucks should be perfectly square, and all parts of both the body and truck bolsters should be of ample strength and machine fitted. Pedestal wear plates should be provided and properly secured. Transom bars should be very heavy and both bars should be tied together. If possible, they should be provided with wear plates, which should be well secured and easy to renew. The brakes should be inside hung. The axles should be perfectly straight, and the circumference of the wheels upon the same axle should be exactly the same. If this is done, and the weight is carried directly on the center bearing, with the car body balanced perfectly, there will be less turning of wheels and sharp flanges. The journal boxes should be large, and the opening in the front of the boxes kept as low as possible in order to permit insertion of the centers of a wheel grinder into the axle centers, and to allow for the packing of waste, removal of bearings, etc. The boxes should also be designed so that an inspector will know when enough oil has been poured in. The cap should be held down by a spring.

One of the most important features in the design of trucks is the suspension of the brake rigging. The rigging should be suspended from a frame, which in turn rests directly upon the journal boxes. This keeps the shoes in the same position, whether the car is light or loaded. In order to standardize, the distance from top of rail to center of brake beam should be specified when ordering new trucks. Having the brake shoes suspended from a fixed point produces even wear of the shoes, and results in a large saving in maintenance, because the shoes do not have to be reversed to wear them out. Chattering and other noises are also eliminated. Brakes should pull toward the center of the axle, and release by gravity, and not by springs. A steel-back interchangeable shoe supported by a strong malleable iron head will be found safe and very economical.

The use of crowned nuts with a substantial cotter key passed between the crowns is recommended where bolts do not have to be removed often, and at all points where absolute safety is required. Case-hardened pins of ample diameter with stout cotter pins will be found both economical and safe. The truck and body center plates should have a very large bearing surface, and should be so designed that they can be readily oiled without jacking up the body.

### HAND BRAKES

The Ackley brake is quick and powerful, and has given good satisfaction. On account of its simple construction the maintenance is reduced to a minimum.

### TEAM WORK

In conclusion, if the purchasing department and the transportation department will co-operate fully with the mechanical department, a very large saving in maintenance costs can be effected.

## PROPOSALS FOR A CENTRAL INSPECTION BUREAU FOR ELECTRICAL RISKS

The organization of the Central Electric & Lighting Bureau, as mentioned in the issue of this paper for Nov. 13, has called renewed attention to the subject of the fire insurance of electric railway and lighting properties, and some interest has been expressed as to the attitude which the new bureau will assume toward the American Railway Insurance Company and the Electric Insurance Company. These companies were organized in Cleveland some four years ago to write risks on railway and lighting properties, and are sometimes grouped with the mutual companies. They are mutual only in the sense that they were organized and controlled largely by gentlemen connected with electric railway and lighting interests. Among the directors are Horace E. Andrews, C. Loomis Allen, G. L. Esterbrook, Henry A. Everett, H. J. Davies, C. G. Goodrich, J. C. Hutchins and R. E. Sheldon.

The subject of a central rating bureau is not a new one, and was mentioned in the report of the committee on insurance of the American Street & Interurban Railway Association read at Denver in one of the executive sessions. This report, with permission, is published below:

REPORT OF THE COMMITTEE ON INSURANCE READ AT DENVER MEETING OF THE AMERICAN ASSOCIATION

The principal subjects considered by your insurance committee in the past year have been:

(1) The proposed organization or establishment by the old-line or stock insurance companies of a central inspection bureau or department, and

(2) The advisability of the employment by the association of an insurance expert to represent it upon this bureau, or to appear before the bureau in behalf of association members in controversies or conferences between them and it.

The purpose of this plan is to secure a greater uniformity than now prevails in rates of insurance on traction properties, and a nearer approach to standards in car house construction and in devices and methods for the prevention and extinguishment of fires. This work is exactly in line with the recommendations made by this committee in its annual reports, and with the present practice of the most progressive street and interurban railway companies.

The average cost of insurance has been reduced in consequence of the committee's efforts, but many inequalities in rates exist. In some cases, properties of a single company, situated in different towns or counties, and of like construction and exposure, are assessed at varying rates. If members whose properties are inequitably or unequally rated will write to the insurance committee, their letters will aid in bringing about the establishment of this national department.

Your committee has not held a meeting within the association year, and therefore has taken no formal action upon this or any other subject. Three of the members of the committee met in Cincinnati in June, and attempts were made to get a later meeting in New York City, but without success. Learning that the old-line insurance companies were to meet in convention at Frontenac, N. Y., in September, to consider this, among many matters, and knowing that the American Railway Insurance Company had been invited to confer with committees of the old-line companies with a view to making an agreement to co-operate in the insurance of the immense properties owned by the traction companies, the chairman of your insurance committee, believing that a conference between the leading insurance men of the country and your committee would result in benefit to the members of the association, called a meeting of the committee at the same time and place, and invited the two governing boards of the insurance association, representatives of the American Railway Insurance Company, and several others, to attend and participate in the meeting. Unfortunately, five of the six members of your committee were unable to be present. The chairman, however, went to Frontenac, and met the insurance men, whose committees gave him an entire afternoon. Another conference is to be held later, provided you continue the insurance committee or appoint a special committee for the purpose.

The meeting was attended by C. G. Smith, New York, secretary and treasurer, German-American Insurance Company; E. G. Richards, New York, resident manager of the North British & Mercantile Insurance Company; Frank Lock, New York, United States manager of the Atlas Assurance Company; J. H. Lenahan, Chicago, manager of the Phenix Insurance Company of Brooklyn; George W. Law, Chicago, one of the managers of the Royal Insurance Company of Liverpool; A. G. Dugan, Chicago, assistant manager of the Hartford Insurance Company; W. E. Sage, Chicago, manager of the German-American Insurance Company; E. B. Hatch, Chicago, secretary of the Western Union, an association of about 70 leading insurance companies; H. E. Andrews, Cleveland, president of the American Railway Insurance Company, and Henry N. Staats, Cleveland, vice-president of the last-named company. These gentlemen are among the ablest and most influential men engaged in managing the insurance business.

The properties of the electric railway companies are desirable risks, and their value is great enough to justify the particular attention that these insurers propose to give them. The capitalization of the street and interurban railway companies of the United States exceeds four billion dollars. The value of their buildings, power plants, rolling stock and other property subject to destruction or damage by fire is probably from 15 to 25 per cent of this amount.

The risks are constantly improving. Since the appointment of your committee four years ago, more than $1,250,000 has been expended for automatic sprinkler equipments in car houses. Large amounts have also been spent for other means of preventing, retarding and extinguishing fires. New structures are generally as nearly fireproof as they can be made. Greater care is required by the companies of their employees than was required four years ago. Traction officials and directors are giving more attention to insurance.

These facts were stated to the insurance men as indicative of a disposition on the part of street railway companies to improve their buildings so as to entitle them to lower rates of insurance, and as reasons why street railway properties should receive special consideration by insurers, and should be rated and inspected by men familiar with them and their particular hazards and protections—by experts viewing the entire field, rather than by local rating agencies and inspectors more familiar with particular localities than with particular classes of property, although the central bureau will undoubtedly avail itself of the knowledge, experience and assistance of the local agents and inspectors.

The results of the discussion, by the insurance men among themselves and with your representative, will probably be a still more careful study and consideration of traction properties, their conditions and surroundings, by men specially qualified to determine the rates and forms to which they are entitled, and to advise the insured as to the best methods of construction and maintenance, and the most effective means of preventing destruction or damage by fire. The chairman of your committee asked that the association be given direct representation upon the bureau. This may not be practicable. The American Railway Insurance Company, organized in the interest of the traction companies, to write insurance at cost, will probably be represented, however. In either case, your insurance committee should be continued, and the committee suggests that you consider the advisability of employing also an insurance expert to aid it, and to represent the association, or any member company that may call for his services, in any negotiation or dispute with insurers, as well as to advise members on the subjects of insurance and the better protection of their property against loss by fire—a suggestion adopted, with good results, by the National Electric Light Association some years ago.

Respectfully submitted,

H. J. Davies, Chairman,
G. W. Brine,
G. L. Estabrook,
A. H. Ford,
P. G. Gossler,
Charles O. Kruger,
Insurance Committee.

More clearly to outline his proposed plan, Henry J. Davies, chairman of the insurance committee of the American Association, has recently sent to the executive committees of the American Street & Interurban Railway Association, the National Electric Light Association, the Associated Edison Illuminating Companies and the Central Electric Railway Association a copy of the tentative plan mentioned in the report, with a statement in regard to it prepared by H. N. Staats, vice-president and general manager of the American Railway Insurance Company and the Electric Insurance Company. In the Central Electric Railway Association the matter has been referred to a committee consisting of F. D. Carpenter, chairman, H. A. Nicholl and C. D. Emmons, who will report at the meeting of the association on Jan. 28, 1910. No action has yet been taken by the other associations. The report and tentative outline are given below:

REPORT FROM H. N. STAATS ON INSURANCE MATTERS

Complying with your request for a progress report relative to our negotiations for co-operation with the old-line stock insurance companies, on Feb. 25, 1909, I received an invitation to attend a meeting of the governing committee of the Western Union. The committee represents about 70 of the old-line stock fire insurance companies. Plans were discussed for co-operation with the American Railway Insurance Company and a meeting was arranged by the Western committee for March 11, in New York City, to confer with the governing committee of the Eastern Union. Unfortunately, Fred S. James, chairman of the traction committee, and myself were confined to our homes by sickness on March 11, and, therefore, the meeting was not held.

On Aug. 16, 1909, another meeting of the Western governing committee was held at their office in Chicago, at which the writer was present. Plans were outlined for the consideration of the Eastern and Western Unions and the meeting adjourned.

On Tuesday, Sept. 14, 1909, a meeting of the governing committee of the Eastern and Western Union was held at Frontenac, N. Y., and it was decided at that meeting that committees would be appointed to consider a plan for further co-operation. (See report of the insurance committee of the American Street & Interurban Railway Association enclosed herewith.) This report was read by Secretary Swenson in executive session, unanimously approved, and referred to the incoming executive committee with power to act.

On Oct. 2, 1909, the governing committee of the Western Union held a meeting at their offices in Chicago, at which the writer was present. This meeting resulted in outlining a plan of co-operation. (See copy of proposed plan herewith.)

On Oct. 7, 1909, this plan was submitted to the executive committee of the American Street & Interurban Railway Association at a meeting held in the Brown Palace Hotel, Denver, for their approval. I am in receipt of a communication from Hon. James F. Shaw, president of the association, advising that this plan will receive due consideration, and prompt action will be taken at an early day.

On Oct. 9, 1909, a meeting of the governing committee of the Western Union was called. Chairman Fred S. James, manager of the National Fire Insurance Company; A. G. Dugan, associate manager of the Hartford Insurance Company; E. B. Hatch, secretary of the Western Union, and the writer were present. The writer made a report to the committee of the action taken at the Denver convention of the American Street & Interurban Railway Association.

On Oct. 12, 1909, a meeting was held at the Belmont Hotel, New York, by the governing committees of the Eastern and Western Unions, at which the writer was present. The enclosed plan was given careful consideration, and steps were taken for the appointment of committees for the purpose of bringing about co-operation. The following members of the governing committees were present: Members of the governing committee of the Western Union, Fred S. James of Chicago, charman of traction committee and manager of the National Insurance Company of Hartford; J. G. W. Coffran, associate manager of the Hartford Insurance Company of Chicago; J. H. Lenehan, of Chicago, manager of the Phenix Insurance Company of Brooklyn. Members of governing committee of Eastern Union, R. M. Bissell, vice-president of the Hartford Insurance Company of Hartford; E. H. A. Correa, vice-president of the Home Insurance Company of New York; C. G. Smith, secretary and treasurer of the German-American Insurance Company of New York; Edward Milligan, vice-president of the Phœnix Insurance Company of Hartford; also Whitney Palache, of San Francisco, of the firm of Palache & Hewitt, general agents of the Hartford Insurance Company.

The enclosed plan of co-operation has been submitted for the approval of the executive committees of the National Electric Light Association, the Associated Edison Illuminating Companies and the Central Electric Railway Association for concurrence.

TENTATIVE PLAN OF CO-OPERATION SUBMITTED FOR A CENTRAL INSPECTION AND SURVEY BUREAU FOR THE PROPERTIES OF ELECTRIC RAILWAY AND LIGHTING COMPANIES

(1) The central bureau to be located in Cleveland, Ohio (this city being located midway between New York and Chicago, matters of business can be facilitated by the central committees).

(2) We recommend co-operation with the regular insurance agents as long as they can best promote the interests of the assured.

(3) We recommend eliminating the insurance broker. His services are unnecessary and add to the cost of the insurance.

(4) The old-line insurance companies to co-operate with the American Railway Insurance Company and the Electric Insurance Company.

(5) The American Railway Insurance Company to be the medium for negotiating business for electric railway properties. The Electric Insurance Company to be the medium for negotiating business of electric light and power properties.

(6) All railway and lighting insurance to be distributed by the central bureau.

(7) The Central Inspection & Survey Bureau to be used for the purpose its name indicates. All plans, specifications, inspections and reinspections to be under the supervision of this bureau.

(8) The old-line stock insurance companies, in conjunction with the American Railway Insurance Company and the Electric Insurance Company, to contribute to the maintenance of the central bureau, their contributions to be based on the gross premiums paid them by electric railway and lighting properties.

Co-operation

(9) Under this plan, the American Street & Interurban Railway Association, the Central Electric Railway Association, the National Electric Light Association and the Association of Edison Illuminating Companies can co-operate with the old-line stock insurance companies. Each association to employ one of its members as an insurance expert through whom all complaints shall be made, said expert to confer direct with the board of arbitration.

Board of Arbitration

(10) Two members of the Eastern Union and two members of the Western Union of the old-line stock insurance companies, with H. N. Staats, will constitute the board of arbitration.

(11) The percentage of insurance to be assumed by the American Railway Insurance Company and the Electric Insurance Company shall be 25 per cent of the total amount of these two classes of properties, 10 per cent of this amount to be assumed by said companies on or about Jan. 1, 1910, and the balance, 15 per cent, to be assumed by said companies on or about Jan. 1, 1911.

Insurance at Actual Cost

(12) The American Railway Insurance Company and the Electric Insurance Company will conduct their business at actual cost. No commissions will be paid or received.

We approve the plan as above outlined and will urge the hearty co-operation of every member company of this association and will also influence to the best of our abilities other electric associations and companies who are not members of the above-named associations.

## WARNING SCHOOL CHILDREN AGAINST ACCIDENTS

For the last two years E. F. Schneider, secretary and purchasing agent of the Cleveland, Southwestern & Columbus Railway Company, of Cleveland, has been conducting a campaign of educating the employees of the company and the public in ways of avoiding accidents. First, he called the trainmen together and told them that the company ought to operate its system without casualties, and that if they would run the cars as they should he would be responsible for educating the public. Then followed a series of meetings, at which Mr. Schneider or some other official of the company would discuss different topics, while the men were encouraged to offer suggestions. The men took a great interest in the movement, and the results soon became apparent. Other meetings were held of the station agents, car house men, section men and others, who were told of the influence which they could exercise in the way of reducing accidents.

The company then decided to conduct the campaign of education among the school children. In this work Mr. Schneider was greatly assisted by C. E. McKisson, his assistant. Permission was secured from superintendents, principals and teachers of the public schools along the line of the company to address the pupils on the subject. In these speeches emphasis was laid upon the danger of crossing the track when a car was in sight no matter how far away; about playing near the tracks; about the importance of waiting until a car comes to a full stop before boarding or leaving it; about the correct way of boarding and alighting from a car, and about the dangers of touching any loose wire there might be along the line. About 175 addresses of this kind have been given during the past few years. No plan has yet been adopted by Mr. Schneider as to the best method of reaching adults, but several have been considered, such as illustrated lectures and moving pictures.

## INTERBOROUGH EXHAUST STEAM TURBINE PRACTICE DISCUSSED AT BOSTON

At the regular monthly meeting of the American Society of Mechanical Engineers, New England section, held at Boston on Nov. 17, H. G. Stott, superintendent of motive power, Interborough Rapid Transit Company, New York, gave some of the results which have been secured at the Fifty-ninth Street power station of the company in the use of exhaust steam turbine equipment. Mr. Stott said that the first separator installed was found to be unsatisfactory and that the secret of success is to build a large receiver with horizontal baffles to protect the water as it is being trapped out and removed by the pump. With the turbine the separation of the oil from the steam is thoroughly successful. The fuel economy from the introduction of a 5000-kw exhaust turbine has been improved about 23 per cent. Including labor and maintenance, the net operating economy of the unit is improved about 30 per cent. The cooling surface of the condensers is used about 87 per cent more effectively than before. There is now a heat transference of 750 b.t.u. per square foot of condenser surface. The unit shows a consumption of about 1.5 lb. coal per kw-hour, including auxiliaries or an estimated steam consumption of under 9 lb. of steam per horsepower-hour. The plant capacity per unit has been increased 125 per cent. Particulars of this equipment were published in the Electric Railway Journal for Aug. 14, 1909.

## RAILWAY DEPRECIATION ACCOUNTS*

BY WILLIAM J. MEYERS, STATISTICIAN, NEW YORK PUBLIC SERVICE COMMISSION, SECOND DISTRICT

In every business or undertaking involving any outlay preliminary to the rendition of services or other benefits, moneys or credits are required to be advanced. Such advances must come from prospective recipients of the services or benefits, or from others. In the case of the latter we clearly enough have investors whose interests have to be separately accounted for; in the case of the former, unless the advances are severally to be speedily repaid by means of the services or benefits to be rendered, practical convenience will require that a separate account be kept of advances thus received, and that they be distinguished in the accounts from the receipts later derived from the recipients of services and other benefits in payment for such benefits. Such separate account of advances is the credit side of the capital account.

On the other hand, the disbursement of the advances mentioned will secure a group of things which are necessary for the proper performance of the work of the undertaking, and which will ordinarily have an appreciable degree of permanence. Such being the case, it would be improper to charge the cost of them against the later receipts acquired through rendition of benefits faster than they are consumed. There thus becomes necessary a suspense account to which to charge such disbursements, and such suspense account is the debit side of the capital account.

The undertaking, being now on its feet, so to speak, and ready to begin fulfilling its purposes, begins to have receipts which are not advances, but are payments for benefits rendered. If the rendition of such benefits does not necessitate any consumption or deterioration or waste of the preliminary stock acquired by means of the advances before mentioned, and does not require any further outlay, either for materials or for labor, the receipt is pure profit. In ordinary cases, however, the rendition of the benefit not only necessitates a direct outlay for labor and materials, but also involves the partial consumption or deterioration or waste of the preliminary stock, so that before the profit involved in the transaction can be determined it is necessary to charge against the gross receipt for the benefit rendered, not only the outlay directly necessitated for labor and material consumed, but also a proper part of the preliminary outlay.

With regard to the outlays or disbursements for materials and labor and other services directly and currently consumed in the work of the business or undertaking, there is practical unanimity of opinion that they should be charged directly to the revenue, or income, account through the subaccount of operating expenses.

With regard to the preliminary outlays, the resultants of which are consumed only in part in the operations of the business during a specific limited period, say a year, the question is more difficult. It is usually difficult, and in some cases impracticable, to make any *accurate* determination of the proper proportion of such outlays to be charged over against the revenue account, and the temptation to omit such charging over and to overstate the profits of the business is frequently strong, particularly in the case of undertakings whose revenues are scant or whose managers desire to deceive themselves or their principals and to bask in a fictitious prosperity.

Other managers who have recognized and appreciated the necessity of accounting for capital consumed, but have thought that the cost of any tolerably accurate ascertainment of the extent of partial consumption is greater than the benefit to be had through the more exact accounting, have been content to let the capital wear and waste to the point where it begins to be inefficient, and then have made the necessary repairs and replacements, and have charged the cost thereof as a part of operating expenses.

### CHARGING REPAIRS AND REPLACEMENTS AS MADE

It will be observed that the method of charging cost of repairs and replacements directly to operating expenses at

*Abstract of a paper read before the National Association of Railway Commissioners, Washington, D. C., Nov. 16, 1909.

the time the repairs and replacements are made defers the charge until the time when wear and tear of plant has reached such a point that it begins to be inefficient. Up to this time there has thus been a considerable consumption of capital that has not been charged to profit and loss. The accounts, therefore, overstate the actual profits by the amount of this undercharge. When repairs begin to be necessary they have to be executed piecemeal. It is impracticable to stop the operation of the plant and restore it to its pristine condition, and even if it were practicable it would be uneconomical, because unnecessary. The plant may be in efficient operating condition and yet be considerably short of its original condition.

About two years ago, in an important tax case, the chief engineer of one of the principal coal carrying railway companies testified that even though the railway and equipment with which he had to do were kept up to the point of highest efficiency, the structural value, i.e., the original cost, less deterioration to present condition, would not exceed about 85 or 86 per cent of original cost, cost of land being included. On the land there was, of course, no deterioration. If the structures and equipment were alone considered, the structural value was about 65 per cent of original cost, indicating that about one-third of the life of the structures and equipment would be consumed before it became economical to make repairs. The reported cost of road and equipment of the railways of the United States, as of June 30, 1907, is stated by the division of statistics and accounts of the Interstate Commerce Commission to be about $13,030,000,000. The reported book surplus as of the same date was a trifle less than $750,000,000, i.e., less than 6 per cent of the reported cost of road and equipment. If the conclusions of the above-mentioned chief engineer with regard to the railway with which he was connected were applicable to the railways of the entire country, they would indicate that if the depreciation of road and equipment to structural value were accounted for it would wipe out the book surplus and show on the other side of the account a deficit still larger. If the rest of the accounts could be accepted as correct, this would seem to indicate that the business has been conducted at a loss or that excessive appropriations for dividends and other like disbursements have been charged against income.

If the business of the carriers were purely competitive, if it had no monopolistic features, if it were not subject to public regulation of rates and practices, the accuracy or inaccuracy of the profit and loss account would concern only the stockholders, and so long as they were willing to have part of their investments paid back to them under the name of dividends it would, perhaps, be sufficient to shrug one's shoulders and remark that, "where ignorance is bliss 'tis folly to be wise." Perhaps things may take a turn and the managers may restore the balance through making improvements and charging the cost of them to operating expenses. Why insist on exact accounting between friends?

But the railway business is not purely private and competitive, it is largely monopolistic and it is subject to public regulation, both with regard to rates and practices; in all probability it will in the near future be still more completely subject to such regulation. If such regulation is to be just and fair to all the interests involved, it is essential that the revenues be charged with the full cost of maintenance and that they be ample to allow for adequate return of profit upon the actual investment reasonably and prudently made. It is also essential that if the revenues be greater than this and the excess revenues be disbursed in effecting improvements of the property the source of such improvements shall be declared. It certainly is absurd to permit a common carrier to tax a community for the use of what the community contributed to the preliminary stock or plant used in conducting the business; it seems equally absurd to permit it to tax the community upon the later contributions made by the community in excess of cost of maintenance and operation and a fair return to private investors on their actual investment reasonably and prudently made.

### IMPORTANCE OF FORMAL DEPRECIATION ACCOUNT

As a constituent of the operating expense account a depreciation account can hardly be looked upon as other than an adjustment account, inserted for the purpose of reaching a truer statement of net earnings or profits. Where the enterprise has reached what may be called its permanent going condition, assuming for the moment that there is such a condition, and operating expenses are charged with the cost of repairs and replacements when they are made, if such repairs and replacements flowed in an even current and the plant were maintained to a uniform condition, it is obvious that the current consumption of capital would be fully cared for and that no depreciation or adjustment charge in the operating expense account would be necessary. There would be no give and take to adjust.

It needs, however, only a slight consideration of the facts to show that the current of repairs and replacements does not flow with absolute uniformity from day to day or from month to month. The operating plant is not homogeneous, but is made up of a variety of units of diverse size and importance. With the exception of minor running repairs, when the locomotive is repaired it has to be temporarily withdrawn from operation, put in shop and overhauled; such overhauling frequently discloses defects in addition to those for which it is sent to the shop, and it is most economical to put the machine in thorough repair. Such repairs may involve minor replacements of important parts. So with other repairs, as of bridges and other important structures; they are in most cases necessarily piecemeal and therefore can not flow evenly. Certain repairs of way can be much more economically made at some seasons of the year than at others. Repairs are necessarily more or less intermittent. This is still more true of replacements. The disbursements for them bear no very close relation to the revenues in earning which the wear and tear took place. In order to get the expense properly assigned against the earnings some adjustment is necessary with respect to the actual disbursements for repairs and replacements.

The foregoing assumes that repairs and replacements are made as fast as needed to keep the property in efficient operating condition. It is sometimes good policy, however, in the light of practical working conditions to defer repairs and replacements to a later date.

It may be objected that depreciation, being necessarily an estimate until the time when the property involved is exhausted or otherwise withdrawn from the plant, the accounting for it is likewise subject to manipulation, and the burden is upon the proponents of depreciation accounts to show that they are less liable to manipulation than are the operating expense accounts under the old methods.

Because of the provisions of the statute under which the Public Service Commission of the Second District of New York acts, the depreciation accounts adopted for the use of steam railway companies are identical with those prescribed by the Interstate Commerce Commission. Owing to the prominent position occupied by the last-named commission in the regulation of steam railway common carriers, the discussion of the depreciation accounts prescribed for the use of steam railway carriers may fitly be left in the hands of that commission and the carriers concerned; the remainder of this paper will be devoted to a brief discussion of the accounts prescribed by the Public Service Commission for the Second District of the State of New York.

It has seemed advisable to the Public Service Commission to pass replacements through the capital account in order that that account may represent the capital in service and may be cleared of capital exhausted and retired, or withdrawn through sale, etc. Our depreciation accounts are therefore adjustment accounts designed to cover the difference between current consumption of capital and the charges for repairs when and as made. The depreciation charges are thus influenced by the repair charges, and, assuming that they have been in force from the installation of the capital, they have to be sufficient to provide, by the time such capital is withdrawn or retired, a reserve against which to charge the cost (less salvage) of such capital withdrawn or retired, such cost being at the same time credited to, or written off from, the debit side of the capital account. It may happen, therefore, that during a period of great and extensive repairs the depreciation account will show a credit to operating expenses, indicating

that such repairs have more than maintained the property.

It is not expected that the rules governing depreciation charges will have established the kingdom of heaven so far as operating expense accounts are concerned or even that they will put depreciation accounts upon so firm a basis that they will need no further attention. To keep the depreciation account within bounds it will be necessary from time to time to view the property and inventory and appraise it in detail. The provision of depreciation accounts does not relieve in any wise from the necessity of distinguishing between maintenance and investment; on the other hand, such provision does not add to the difficulty of making such distinction. Boards of directors who profess to be fearful of their inability to make proper estimates of depreciation overlook the fact that under the old order of things whenever they passed upon the question of whether a certain charge should be made to capital or to revenue they necessarily were estimating whether depreciation had been fully provided for. It is to be feared that in passing on such questions they are sometimes unconsciously influenced by their anxiety regarding the possibility of payment of dividends, and that when money is plentiful they lean toward operating expenses and when it is scarce they lean toward capital charges. Their real fear seems to be in some cases that if they lay down a rule in advance regarding depreciation charges they may be in the position of the man who was called on to move before he had opportunity to see which way the cat was going to jump. To determine the line between capital and revenue disbursements by a consideration of the amount of cash on hand or in sight is a proceeding which no matter how frequently resorted to in practice must always remain unjustifiable.

CONSIDERATION OF DEPRECIATION BY COMPANIES AFFECTED

The depreciation accounts prescribed by the Public Servive Commission have not yet been long enough in force to make it proper to express an opinion with regard to the way in which they are practically and actually working. It is safe to say, however, that as a consequence of the action of the commission in this regard more thought and careful consideration has been given to this question during the past 18 months by the companies within its jurisdiction than was ever before given to it by those companies. Most of the larger companies are accepting the situation gracefully and in settling upon the rules for the determination of their charges are giving a careful consideration to their past experience, to the standard of maintenance exacted by their respective communities and to the physical conditions under which they operate. Doubtless most of them also have an eye on the money market and are carefully calculating what effect a more or less complete confession of their actual situation will have on the suspicions of bankers and investors. It will take several years of study and comparison of conditions before anything like a normal rule can be reached by which to determine the adequacy or inadequacy of charges for depreciation, and it will probably always be true that no single arithmetical rule or ratio can ever be reached that will be applicable in all cases. The question of standard of maintenance will always be one incapable of exact numerical expression. The community that requires its passenger cars to be revarnished and reupholstered every three months must necessarily submit to higher maintenance charges than one that is willing to let such matters run until the material of the cars begins to disintegrate. Despite the incompleteness and the unfinished condition of the structure at the present time, we feel that much has already been accomplished, and that thus far no defects in its plan have been developed and none need be feared.

It is confidently expected that substantial benefits will result from the establishment of formal depreciation accounts, and that among such benefits will be found the following:

Violent manipulation of monthly statements of earnings and expenses will be made much more difficult if not impossible. A corporation that should every month or two change its rule for estimating its depreciation charges would soon be laughed out of court.

The provision of normal depreciation accounts will pointedly call attention to the question of depreciation and secure for it a more careful and adequate consideration than it has heretofore received from investors. It will lead to comparison of different properties and a much more thorough study of the completeness with which they are maintained.

The provision of such accounts will also have a tendency to educate the consuming public and lead it to understand that depreciation is an element in operating expenses that cannot be overlooked; that the revenues of the carriers must be sufficient to cover this as well as the current outlays for labor and materials, and that any reduction of rates, whether through force of law or of unrestrained competition, below the point where the revenues are ample to cover, not only current expenses, but also depreciation and a fair return upon the actual investment reasonably and prudently made, must in the end be harmful to the entire community.

## MEETING OF RAILWAY COMMISSIONERS

The twenty-first annual convention of the National Association of Railway Commissioners was held in Washington, D. C., on Nov. 16 to 19, inclusive

The report of the committee on construction and operating expenses of electric railways was presented by William Kilpatrick, secretary of the Railroad and Warehouse Commission of Illinois, and is as follows:

Owing to certain conditions, which will be briefly outlined, your committee submits the following report of progress, with a few recommendations, for adoption by the convention.

The members of the convention are doubtless well aware that there was prepared about a year ago a system of accounts which was adopted by the Interstate Commerce Commission, and by the two Public Service Commissions of the State of New York, with certain modifications. The system adopted by the Wisconsin Railroad Commission is similar to a considerable degree. A number of private corporations, operating electric railways which are not under the jurisdiction of the Interstate Commerce Commission or the commissions of New York and Wisconsin, have also put into effect, voluntarily, this uniform system.

Your committee has considered the advisability of recommending to this convention the approval of a uniform system. There seemed to be a general feeling, however, that as the systems adopted by the Interstate Commerce Commission and the commissions of New York and Wisconsin have been in operation only a comparatively short time, less than a year, and as their adaptability to actual conditions can only be determined by practical experience, it would be unwise at this time to recommend any specific system of accounts. By the time the next convention is held, however, the Interstate Commerce Commission and the commissions of some of the States, as well as many corporations, will have had an opportunity to see to what extent the system is workable, and it will then be possible to determine with certainty whether a uniform system is practicable, and whether, in general outline, the system that is being tried will serve as a basis for general adoption.

Your committee does not recommend at this time, therefore, the adoption or approval of any system, but does recommend that any State which is intending to adopt any system of accounts, in whole or in part, should adopt a plan which harmonizes or is in substantial agreement with the system in force under the jurisdiction of the Interstate Commerce Commission and in the State of New York and Wisconsin. Doubtless changes will need to be made in these systems, but these can easily be made, provided the fundamental features of the system in actual operation are not departed from to any great degree.

Your committee appreciates that, even though a single system may ultimately be adopted by all of the States, it will be necessary to provide some means by which questions of interpretation may be decided similarly by the various State commissions. It is impossible, as experience has shown, to cover every point which may arise in a system of accounts, even though the instructions and definitions are carefully prepared and in great detail. In actual operation, questions are bound to arise which are

susceptible of various answers, and it has even been found that the fundamental principle involved is not so clear or so important, but that different persons or different commissions might, with equal propriety, answer the questions differently. In many cases it is not so important that the answer should be of a certain character as that the same question should be answered in the same way by the various commissions; otherwise a term, an account, or a heading may indicate one group of facts in one State and another group of facts in another State, thus rendering impossible any proper comparison of statistics of results. As the principal object of uniform accounting is to enable such comparisons to be made, the primary purpose of uniformity would not be attained unless there is a substantial agreement as to the interpretation of the various rules, definitions and instructions which are a part of an adequate system of uniform accounting.

Although your committee has given some consideration to the method whereby this result may be brought about, we are not prepared at this time to recommend a plan. Indeed a plan is not necessary until a uniform system has been recommended for approval. We do believe, however, that this is one of the important matters which should be taken up in connection with the recommendations to be made at the next convention, and that the committee having this matter in charge should give it very careful and serious consideration.

Apparently there was referred to this committee only a part of a uniform system of accounts, namely, construction and operating expenses. Your committee believes that better results can be obtained if the scope of the committee's work for the coming year is somewhat enlarged so as to include all accounts and statistics for electric railways. There is at present a committee upon railroad statistics. It is our opinion that there should be, similarly, a committee upon the accounts and statistics of electric railways, for any committee which undertakes to prepare a report upon construction and operating expenses can, without great difficulty, prepare a report upon the remaining portion of the field, without which no system of accounts would be complete; but, before any intelligent action can be taken upon construction and operating expenses, one must know what the other features of the accounting system are to be and whether the system as a whole is logical and whether each part is in harmony with every other part.

We appreciate that naturally any system of accounts and statistics for electric railways must have a close relationship with those for steam railroads, and in order that each committee may be advised as to what is being done by the other, we recommend that the chairman of the committee upon railroad statistics for the coming year be made a member of the committee upon accounts and statistics of electric railways. We also recommend that the committee upon this subject for the coming year be composed of a representative from the Interstate Commerce Commission, the Public Service Commission for the First District of New York, the Public Service Commission for the Second District of New York, the Wisconsin Railroad Commission, the Massachusetts Railroad Commission, the American Street & Interurban Railway Accountants' Association, and such other commissions as are likely to adopt or are giving consideration to uniform accounting for electric railways.

Milo R. Maltbie, Chairman; Wm. F. Ham, Wm. Kilpatrick, Halford Erickson, F. M. Cockrell.

The report was ordered to be received and printed and its recommendations adopted.

The Allgemeine Elektricitäts Gesellschaft, the largest European manufacturer of electrical apparatus, has just published its report for the year ending June 30, 1909. The net earnings of the company were 16,384,572 marks ($4,096,142), of which $3,250,000 was paid as a 13 per cent dividend on the securities, $162,500 allowed for presents to employees and welfare work, and another $162,500 set aside for employees' pensions.

## HEARING ON VALUATION OF CONEY ISLAND & BROOKLYN RAILROAD

The hearing of the case involving valuation of the Coney Island & Brooklyn Railroad was resumed by the New York Public Service Commission, First District, on Nov. 22. Commissioner Bassett presided, and Frank R. Ford, of Ford, Bacon & Davis, was recalled as a witness.

Resuming the direct examination, William M. Dykman, of counsel for the company, asked Mr. Ford what effect the increase in fare from 5 to 10 cents had had on fixed charges.

Mr. Ford replied that there had been an actual reduction of 12 cars in the maximum number of cars operated, and he thought that one-half of this reduction was attributable to the decreased riding to Coney Island; that is, the reduction of six in the peak load of cars was due to decreased Coney Island traffic, and of the other six to decreased riding in the city, due to other causes.

The release of those cars would mean a release of about $10,000 per car capital, covering the investment in the car itself and in the equivalent power house, car house and shop facilities, and also in the feeder system, giving a capitalization released of $60,000; if 12 per cent was allowed for fixed charges of interest, depreciation, taxes and insurance, it would mean $7,200 annual saving applicable to equipment and other facilities, which could be used for other business. By the release of this capital the facilities which it represented were made available for extensions or additional business.

CONEY ISLAND ISLAND & BROOKLYN RAILROAD—ANALYSIS OF INCOME ACCOUNT PER PASSENGER MILE OF MANHATTAN TO CONEY ISLAND BUSINESS, SUBMITTED BY MR. FORD.

| | Cents if fare is 10 cents. | Cents if fare is 5 cents. |
|---|---|---|
| ON BASIS OF 4-MILE AVERAGE RIDE. | | |
| Gross receipts, 11.278 miles | 0.89 | 0.44 |
| Operating expenses | 0.68 | 0.68 |
| Interest and taxes | 0.22 | 0.22 |
| Expenses, Interest and Taxes | 0.90 | 0.90 |
| Balance for capital stock and reserves (deficit) | 0.01 | 0.46 |
| ON BASIS OF 3-MILE AVERAGE RIDE. | | |
| Gross receipts, 11.278 miles | 0.89 | 0.44 |
| Operating expenses | 0.91 | 0.91 |
| Interest and taxes | 0.29 | 0.29 |
| Expenses, Interest and Taxes | 1.20 | 1.20 |
| Balance for capital stock and reserves (deficit) | 0.31 | 0.76 |

NOTE.—Above operating expenses, interest and taxes are based on actual operation for year ended Aug. 31, 1909, carrying 35,958,023 passengers.

Mr. Ford submitted the accompanying table, showing the income account per passenger mile of the business from Manhattan Borough to Coney Island, based on an average ride of 3 miles and 4 miles, respectively, per passenger. This is based on the proof that the average ride in Brooklyn is between these limits, as shown in the former fare case. [See ELECTRIC RAILWAY JOURNAL of May 30, 1908, page 888.—EDS.] It will be noted that for either length of ride the result at 10 cents fare shows a deficit of 0.01 cent and 0.31 cent per passenger mile, respectively, for capital stock and reserves, and much larger losses of 0.46 cent and 0.76 cent at the 5-cent rate of fare.

A statement was submitted by the witness showing expenditures of $39,549.66 by the company from Feb. 1, the date of the physical valuation, to Aug. 31, 1909, for additions and betterments which, in his judgment, should be capitalized.

The values placed upon the physical property of the company by Bion J. Arnold had been examined by Mr. Ford. The reasons that deterred him from going further with

the examination were that he was told that the examination and valuation would have to be made within 30 days, and he thought that time insufficient to make a careful estimate with a force of moderate size. The company did not feel justified in spending the amount of money necessary to collect a large force of experts to prepare such an estimate properly. Mr. Ford, as a director of the company, said that it did not have the money to employ the force that would be required. The experts of the commission gave Mr. Ford and his staff every facility for comparison of figures, and so far as the time allowed, he thought the examination was made carefully. His criticism was that a valuation of that character could be made better over a long period of time with a moderate number of men than in a short period with a large number of men. He thought that some of the values determined by the experts of the commission were not correct, but in the main the estimate was made fairly.

A statement of the extraordinary maintenance and renewal charges from Feb. 1 to Aug. 31, 1909, aggregating $69,619.46, was presented by the witness.

Taking the opinion of the commission in previous cases affecting the company. [See Electric Railway Journal of July 10, 1909, page 75.—Eds.] Mr. Ford said that the amount actually expended for maintenance, including depreciation, was 3.8 cents per car-mile, compared with 5 cents, estimated by the commission. In the year ended Aug. 31, 1909, operation of power plants and operation of cars, estimated in the opinion at 8.97 cents, actually cost 9.4 cents. General expenses, estimated by the commission at 3.13 cents, actually were 4.1 cents, so that the total operating expenses, estimated by the commission at 17.10 cents, actually were 17.3 cents. Taxes, estimated at 0.90 cent, actually were 1 cent, so that operating expenses and taxes, estimated at 18 cents, actually were 18.3 cents, and if the maintenance, including depreciation, should be properly charged at 5 cents, that would add 1.2 cents to the 18.3 cents, making a total for actual operation of 19.5 cents. The total revenue from operation in the year, estimated by the commission at $1,550,000, was really $1,485,116. Total operating expenses and taxes, estimated by the commission at $1,220,000, were, if taken at 19.5 cents per car-mile times 6,111,630 car-miles actually operated, $1,191,645. This leaves a net revenue of $293,471, compared with that estimated by the commission at $330,000. The actual result was $364,973, representing the amount of interest actually paid by the company, $251,417, added to the corrected balance for reserves, contingencies and capital stock of $113,556. The figure of $364,973 is reached by applying the actual charge of 3.8 cents per car-mile for maintenance and depreciation, instead of 5 cents, as suggested by the commission.

George M. Kirchmer, claim agent of the Coney Island & Brooklyn Railroad, testified that the total amount of claims outstanding in litigation against the company was $2,031,302. From 1901 to the present time the company had paid an average of about 10 per cent of claims in litigation for the settlement of judgments. That did not include the expenses of the claim department in the settlement of cases that were not litigated, but it did include counsel fees and the expenses of investigators and claim agents in settling cases in litigation.

About 4400 claims not litigated, less than three years old, were outstanding against the company. The average payment for claims that were not litigated was about $95. There were 26 extraordinary damage claims pending against the company, aggregating $290,000, resulting from an accident that occurred at Manhattan Crossing in August, 1907, when a collision occurred between a car of the Company and a dirt train of the Long Island Railroad.

The hearing was then postponed to Dec. 2.

## A RAPID TRANSIT POLICY FOR GREATER NEW YORK*

BY MILO R. MALTBIE, MEMBER OF THE PUBLIC SERVICE COMMISSION, FIRST DISTRICT

As soon as the Public Service Commission was organized we began to redraft the rapid transit law. A bill that was somewhat crude and imperfect in certain respects was presented to the Legislature. The Legislature passed it, but not until several changes had been made that were very objectionable. Governor Hughes wisely vetoed the bill, and the matter went over until this year.

Between the two sessions, the statute was again carefully gone over, and the details of the proposed amendments revised and perfected, and several new features introduced. The bill was presented to the last Legislature, met with practically no opposition and was signed by the Governor, no amendments opposed by the commission this time having been made. The law needs still further amendments, and details must be perfected; but as it now stands, it represents a practically harmonious policy which is probably more modern and progressive than any heretofore formulated in law. It is believed to combine adequate protection of public interests and yet to allow reasonably free range to private initiative.

Probably the most important change in the law was the introduction of the indeterminate principle for franchises and operating leases. In all future franchises or operating contracts under this plan, the city will have the right to terminate the grant or contract at any time after 10 years and to take over whatever the company may have provided in the way of road or equipment upon paying an amount to be provided for in the contract, which shall not exceed the investment made by the company plus 15 per cent, and which amount shall decrease from year to year as the grant continues, until finally all the property in the street shall revert to the city free and clear without payment upon some date fixed in the grant. The date at which such reversion shall take place is to be fixed at the earliest time within which the investment made by the company in the road can be amortized out of earnings. In no case is any payment to be made to the company for the franchise or for the termination of the lease or the contract. If any rapid transit line is thus taken over, the city may operate the line itself or lease it to another company or transfer it directly from the old company to the new company.

The important points to be noted are the short minimum period (not more than 10 years), the limitation of the amount to be paid at any time (cost plus 15 per cent), the decreasing amount as time runs on, the fact that equipment will be paid for according to its then value, and the fact that the more profitable roads will revert to the city in a shorter time than the less profitable ones. The principal reason for differentiating equipment from roadway is that the former would doubtless be allowed to deteriorate as the date approaches at which the city is to receive it free. But if the payment is to be based upon its then value, it is likely that the equipment will be maintained in good condition.

The second important principle of the new law is the sharing of profits above a certain fixed minimum between the operating company and the city. The plan provides for the deduction from income of all operating expenses, taxes, payments to reserve and amortization funds and a return upon the investment not to exceed in any case 6 per cent. The remainder is to be divided equally between the company and the city.

Special attention should be called to the use which may be made of the profits thus accruing to the city. It has been customary to turn over to the general city treasury all such receipts from public utilities. As a result the users of such services as water, gas, electricity and transporta-

*Abstract of a paper read before the National Municipal League, Cincinnati, Ohio, on Nov. 18.

tion have paid an indirect tax, a sort of tax upon consumption. The commission considered that all receipts from the traveling public over and above cost should be used to improve, extend or multiply transportation facilities.

The commission's plan provides, therefore, that all funds received from such sources or from the rental of any rapid transit property or rights shall be used first to pay interest and sinking fund charges upon municipal bonds issued to build or equip rapid transit lines, and that the remainder shall go into "the rapid transit fund" to be used only for the construction, equipment or operation of rapid transit lines; it is not to be used to decrease taxation. In case the city's share of the profits shall be sufficient to warrant a reduction in fares, it may be utilized for this purpose.

In view of the imperative need of more rapid transit and of the various safeguards thrown about the grant, the commission believed that the public was ready to entrust to it the power to grant a franchise to a private company. The proposed amendments to the law provided for the restoration of that power, and it met with practically no opposition.

The most novel feature of the whole scheme is the construction of lines from funds raised by assessment of cost in part or in whole, upon the property benefited. It has been stated that the increase in land values in northern Manhattan and the Bronx, due to the construction of the present subway, would not only have built the entire line, but would have equipped it, provided rolling stock, built power-houses and paid every other capital expense, and left a margin.

If the construction of development rapid transit lines by special assessment is to be adopted in a few cases, it ought to be followed as uniformly as the facts will permit. Otherwise all localities will not be treated with equal justice.

Construction by special assessment also provides a method whereby all sections of the city may be provided with rapid transit upon a fair basis. Without it certain localities are given rapid transit at the expense of others. Take, for example, the present subway. Now the residents of northern Manhattan and the Bronx, who ride the entire length of the island, are carried at a loss normally. But this loss is more than offset by the profit made from carrying those who ride only a short distance in lower Manhattan. Eliminating the Brooklyn traffic, which is nearly if not quite self-supporting, this means that all of the profitable business in the heart of Manhattan is used for the benefit of two narrow areas. The property owners in these districts have seen their land increase enormously in value without an expenditure of one dollar upon their part. They have been given rapid transit for a 5-cent fare from the Bronx to lower Manhattan and Brooklyn. But because there is not a sufficient amount of short-distance riding in Manhattan to carry long lines in Brooklyn and the Bronx, Brooklyn has been deprived and the Bronx has been blessed abundantly.

It was felt that the provision in the State constitution limiting the city debt ought not to be allowed to continue to prevent the construction from public funds of lines which are self-supporting. Debts incurred for such purposes are not burdens upon the taxpayers, and there is no reason why the city should not be allowed to acquire revenue-producing property. Further, unless the city has the financial ability to build and equip its own lines, it is not in position to make a fair bargain with private companies. The city would be forced to accept what corporations may offer or do without the needed relief from present intolerable conditions. The city ought not to be limited to such alternatives. This view has just been endorsed by the people of the State at the last election, and the amendment will become effective when the Legislature passes an act creating the machinery for determining when an enterprise is self-sustaining.

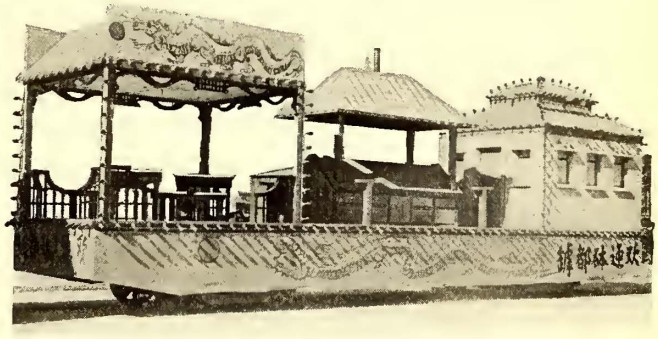
A few other provisions of the rapid transit law may be summarized without discussion. Previously to the enactment by the Legislature of our proposed amendments, the commission could not lease a rapid transit line for less than interest upon the bonds issued by the city for construction and equipment and a sinking fund payment of less than 1 per cent. If no one would pay such a rental, the commission had to operate the line. Now, there is no minimum rental; it may be much less than interest if it is thought necessary or desirable. The privilege of municipal operation remains as another alternative.

In the case of additional tracks on elevated roads and of extensions constructed by a company with its own funds, it was recognized that certain modifications must be made because of the peculiar conditions. In these cases, the system of profit sharing might not work, as it might not be possible to differentiate the receipts from the additional tracks or extensions from the receipts on the old lines. Consequently, the commission may fix a different compensation for a period not to exceed 25 years, and it is to be readjusted every 20 years thereafter. For similar reasons, the duration of the franchise may not exceed that for the existing line, so that all may terminate together.

No contract, franchise or grant may be let until bids have been invited by public advertisement, except in the few cases where only one party would bid if bids were invited. Everything has been done to increase the opportunity for competition where competition is possible. No important action may be taken hastily.

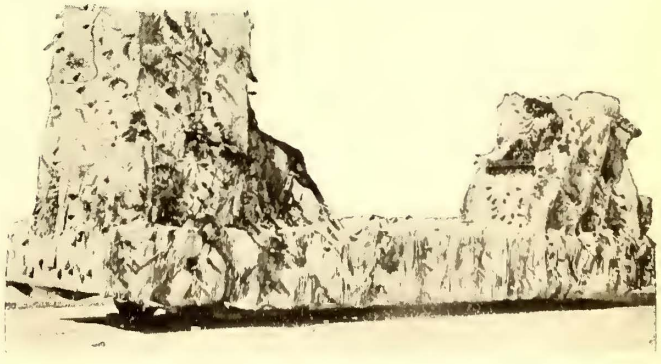
## ILLUMINATED CARS IN SAN FRANCISCO

Through the courtesy of B. P. Legaré, engineer of maintenance of way and construction, the United Railways of San Francisco, this paper is enabled to present views of five



San Francisco Floats—Chinatown

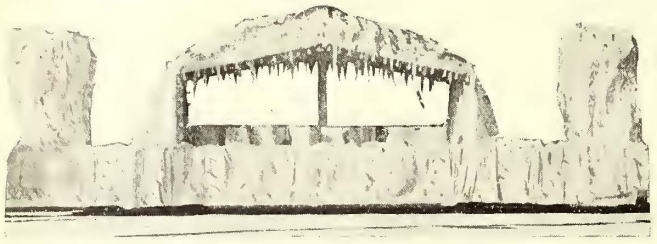
of the seven illuminated floats designed by the Portola committee and used in one of the night parades in the Portola festival held in San Francisco the last week in October. As stated in this paper, the festival celebrated the discovery of the Bay of San Francisco by Portola, an early Spanish discoverer, and also the rehabilitation of the city after the great fire of 1906.



San Francisco Floats—Yosemite

A number of daylight and evening parades were held during the continuance of the festival, but one of the most striking was that on the last evening, Oct. 23. In this parade there were seven elaborate floats on flat cars contributed by the United Railroads Company, representing, re-

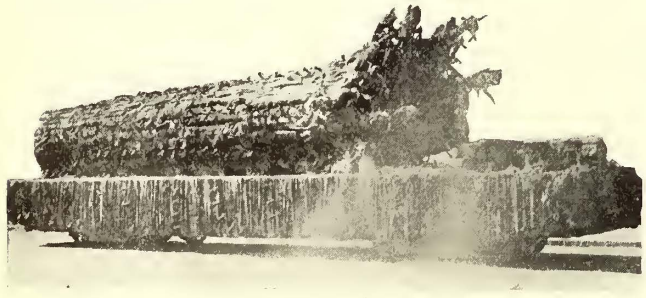
spectively, the "Fallen Monarch," "Chinatown," "Yosemite," "North Pole," "Shasta," "Old Mission Days" and "Miss San Francisco." The four first mentioned are illustrated. Each was mounted on a flat car carried on two double trucks, with the trolley pole concealed so as not to



San Francisco Floats—North Pole

be conspicuous. Each float was studded with between 500 and 1500 incandescent lights and carried a number of people in costumes appropriate to the subject illustrated. Thus the "Fallen Monarch," which represented one of the large California trees, was surrounded by a number of woodsmen. Eskimos were shown on the float representing the North Pole, and Oriental residents of San Francisco rode on the Chinatown float, and so on through the list. In addition, a band was carried on each float.

A very attractive feature of the floats representing the Yosemite and Shasta was a waterfall, which was supplied



San Francisco Floats—Fallen Monarch

with water from a 1000-gal. tank carried on the car. A 5-hp motor furnished the necessary power and the effect, surrounded as the cascade was with many incandescent lights, proved most effective.

The members of the Pacific Coast party of the Massachusetts Street Railway Association had an opportunity while in San Francisco, on Oct. 22, to see the floats in the car house of the company, where they were being decorated, but were unable to see them illuminated at night.

## LIGHTING IN THE NEW YORK SUBWAY

Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, New York, N. Y., at a hearing before the Public Service Commission of the First District of New York, on Nov. 29, said that the wish of the company was to serve the public, and that whatever the commission deemed necessary for the health and comfort of the traveling public would be used. The company had taken out the 16-cp lamps four years ago because it believed the 10-cp ones afforded sufficient light for comfortable reading in the cars and stations. The unfrosted 10-cp lamps, he said, were more powerful than the frosted higher candle-power lamps. The variations in the voltage, Mr. Hedley explained, were due to the loads carried when starting the trains. He knew of no way of obviating such a condition. The hearing was adjourned until Dec. 3.

## CONFERENCE ON RULES FOR OHIO INTERURBAN LINES

The Ohio Railroad Commission and the committee of Ohio interurban railway managers held another conference in Columbus, Ohio, on Nov. 29, at which the proposed changes in the standard code of rules to be adopted for use by the interurban roads in the State were given further consideration. A number of modifications of the changes first suggested were discussed, and the whole question was referred to Commissioner Sullivan and F. A. Davis, chairman of the committee of interurban managers, for final action.

As reported on page 1029 of the Electric Railway Journal for Nov. 13, a previous conference was held in Columbus on Oct. 28, at which a number of radical changes in the standard code of interurban rules as presented at the Denver convention were tentatively adopted. The most important of these were:

A change in rule 103, making the signal to back the car when standing still three strokes of the gong instead of four.

The proposed change in rule 110 was to provide that one or more red lights be displayed on the rear of every train at night and one or more red flags on the rear of every train of more than one car during the day. Rule 110 in the standard code provides that when a train is clear of the main track, green lights must be displayed to the front, side and rear.

Rules 111, 112 and 113 it was proposed to modify by requiring both flags and lamps to be displayed at night on the front end of the trains as marker signals instead of lamps only as prescribed in the standard code.

The committee recommended modifying rule 128 so that there would be no exchange of signals at a siding unless the siding is used for a scheduled or train order meeting point.

Rule 203 it was proposed to modify by the insertion of the words "which are of the same or superior class" after the words "all trains due." The last two paragraphs of this rule relating to train registers and calling the dispatcher it was proposed to eliminate entirely.

It was also proposed to eliminate entirely rule 203-a, which is an explanation of the term "protected by flag" as used in rule 203.

The committee recommended the substitution of a two-minute time interval under rule 210 in place of the 3000-ft. space interval between trains, as required in the code.

The elimination of rules 212 and 213 from the code was recommended, and it was also suggested that each road formulate rules covering the operation of trains in case of failure of telephone lines which would meet their own special requirements of safety.

It was proposed to make motormen jointly responsible with conductors for leaving switches in proper position, as required in rule 223.

The committee recommended that a form of train order should be adopted which would comply as nearly as possible with steam road practice.

When the committee of managers and the Railroad Commission have finally determined upon a satisfactory code, the commission intends to issue an order requiring that all interurban roads in the State which have no book of rules on file with the commission be required to prepare a rule book based on the revised code as finally adopted. A copy of this rule book must be filed with the commission within six months from the date of issuing the order.

## GERMAN STREET RAILWAY STATISTICS

Recent statistics published in the *Zeitschrift fur Kleinbahn* show that on March 31, 1908, the number of street railways in existence or in course of construction in Prussia was 165 and in the other German States 72. The total for Germany was therefore 237, with 3850.5 km (2389 miles) aggregate track length. Of these there were in operation:

| | | |
|---|---|---|
| In Prussia | 162 roads with a length of | 2652.5 km (1645 miles) |
| In other German States | 72 roads with a length of | 1128.5 km (705 miles) |
| Total in Germany | 234 roads with a length of | 3781 km (2345 miles) |

The increase in the number of roads over the previous year is four, two in Prussia and two in other German States. The motive power on street railways was as follows:

| | In Prussia. | In other German States. |
|---|---|---|
| Steam locomotives | 13 roads, or 7.9 per cent | ..... |
| Electric motors | 129 roads, or 78.2 per cent | 60 roads, or 83.3 per cent |
| Horses | 15 roads, or 9.1 per cent | 7 roads, or 9.7 per cent |
| Steam locomotives and electric motors | 1 road, or 0.6 per cent | 1 road, or 1.4 per cent |
| Electric motors and horses | 3 roads, or 1.8 per cent | ..... |
| Cables | 4 roads, or 2.4 per cent | 4 roads, or 5.6 per cent |

The roads using horse-power are for the most part small lines.

The rolling stock in Germany consisted in 1907 of 81 steam locomotives, 57 electric locomotives, 9,908 electric motor cars, 17,263 passenger cars (including motor cars and trailers), 69 package cars, 937 freight cars, 17 mail cars, and 1124 "special cars." The largest number of cars is owned by the Grosse Berliner Strassenbahn, which has 2544 cars, with capacity for 85,573 passengers. Hamburg is next, with 1269 cars with capacity for 36,693 passengers.

Most of the roads are owned by companies, although municipal ownership is slowly advancing. The figures show that 95 roads in Prussia (the same number as in 1906) and 42 roads in the other German States (against 43 in 1906) were owned by companies, while 61 roads in Prussia (against 57 in 1906) and 24 in other States (against 23 in 1906) were owned by municipalities or counties. Eight German roads are owned by private persons, and 3 roads are owned by the State of Saxony.

The gage is 1.435 m. (4 ft. 8½ in.) on 61 roads, 1 m. (3 1-2 ft.) on 148 roads, and less than 1 m. on 28 roads.

The capitalization in all German street railways was 904,630,453 marks (about $226,000,000), or 239,319 marks per kilometer (about $96,000 per mile) of track. In 1907 22 roads did not earn their operating expenses. The interest earned on the capital invested in 145 Prussian street railways, found by subtracting from receipts the operating expenses, including ordinary depreciation, but not interest and amortization on the funded and unfunded debt, was nothing in 18 roads, up to 1 per cent in 6 roads, up to 2 per cent in 14 roads, up to 3 per cent in 9 roads, up to 4 per cent in 14 roads, up to 5 per cent in 23 roads, from 5 to 10 per cent in 54 roads, and above 10 per cent in 7 roads.

The following figures on the length of track and the number of passengers per capita are interesting: For every 10,000 inhabitants there are 5.23 km (3.27 miles) of track in Hanover-Linden, 2.60 km (1.62 miles) in Dresden, 2.56 km (1.60 miles) in Essen-Ruhr, 2.30 km (1.44 miles) in Leipzig, and so on up to 1.22 km (0.76 mile) in Berlin. The rides per inhabitant were 197 in Cologne, 192 in Frankfort, 187 in Leipzig, 177 in Dresden, 171 in Hamburg-Altona, 166 in Berlin, 159 in Dusseldorf, etc. The average receipts per passenger varied between 7.9 pfennig (1.97 cent) in Breslau and 11.1 (2.77 cent) in Essen-Ruhr.

The total track length of all street and interurban or light railways in Germany was 12,277 km (7612 miles) in 1907, an increase of 3.7 per cent over the previous year. The capital invested in these roads was marks 1,510,354,116 (about $377,588,529) or marks 115,952 (about $28,988) per kilometer. A radical distinction is made in Germany between street railways (strassenbahnen) and interurban or light railways (kleinbahnen), and they are organized under different laws. While 63.6 per cent of all German street railways carry nothing but passengers, this is the case with only 1.9 per cent of the light railways, a number of which carry freight only. There is also a difference in motive power, 78.2 per cent of all street railways being operated electrically, while 91.2 per cent of the interurban light railways are operated by steam.

## A TURBO-ELECTRIC LOCOMOTIVE

On Oct. 28 Hugh Reid, chief managing director of the North Bristol Locomotive Company, Glasgow, Scotland, delivered an address before the Glasgow University Engineering Society on the Reid-Ramsay turbo-electric locomotive now being built by his company. In describing the new locomotive he said that steam is generated in a locomotive boiler, which has a superheater, and the coal and water supplies are carried in the side bunkers and side water tanks at both sides of the boiler. The steam is led to a 3000-r.p.m. impulse turbine, to which is directly coupled a d.c. generator. The dynamo supplies current at from 200 to 600 volts to four series-wound traction motors, the armatures of which are built on the four driving axles of the locomotive. The exhaust steam from the turbine passes into an ejector condenser, and is, together with the circulating condensing water, delivered eventually to the hot well. As the steam turbine, unlike the reciprocating steam engine, requires no internal lubrication, the water of condensation is free from oil, and consequently is returned from the hot well direct to the boiler by a feed pump. This condensing water is circulated by centrifugal pumps driven by auxiliary steam turbines placed alongside the main turbine and dynamo. The cycle of the condensing water is from tanks through the first pump, then through the condenser, where it becomes heated in condensing the exhaust steam, then to the hot well. From the hot well it passes through the second pump to the cooler, situated in front of the locomotive, where the full benefit of the blast of air caused by the movement of the locomotive, aided by a fan, is utilized for cooling the hot circulating water.

The condensation of the exhaust steam deprives the locomotive boiler of the usual exhaust blast which induces the draft through the firebox and boiler tubes. In the experimental locomotive the induced draft is replaced by forced draft provided by a small turbine-driven fan. The fan is placed within the cooler, so that it will deliver hot air to the boiler fire, and at the same time assist the current of air through the cooler. The small switchboard and the instruments required, and the controller for the four motors are all placed on the motorman's platform within easy reach.

The main and auxiliary machinery of this experimental locomotive is mounted upon a strong underframe, which is carried upon two trucks, each of which carries two motors. As the engine is intended for express passenger main line work, it is hoped to obtain comparisons from its actual working with the performances of the reciprocating steam locomotives, especially as regards the relative consumption of fuel and water, the efficiency of transforming the energy of steam into drawbar pull, and also the relative rapidity of acceleration under the old and new systems.

# COMMUNICATIONS

## PROPOSED INTERURBAN RULES IN OHIO

Washington, Baltimore & Annapolis Electric Railway Company

Baltimore, Md., Nov. 27, 1909.

To the Editors:

It is with great regret that I note the action of the committee of the Ohio interurban operators appointed by the Ohio Railroad Commission to prepare a code of operating rules for use in that State.

If it be admitted, as I think it must be by every one, that it is desirable to formulate a code of rules which can be adopted as a standard for use on all interurban roads, not only in Ohio, but throughout this country, then the action of this committee in making changes of so radical a nature in the code adopted at Denver seems unwise.

After the adoption of the American Railway Association code by that association, it was made the basis of the rule book of practically every steam railroad in this country. The deviations from the standard code were of minor importance, and, so far as my knowledge of the matter goes, no changes of a radical nature were made by any of the companies.

The changes suggested by the Ohio committee were not offered at Denver, and no general discussion upon them has been had. I am perfectly convinced that the American Street & Interurban Railway Association desired to offer as its standard a code which is the best possible for general adoption. If it could be demonstrated that the changes made by the Ohio committee are wise, there is no doubt of the willingness of the American Association to incorporate them in its code. In view of this fact, would it not be wise for the Ohio State Railroad Commission to grant a hearing to the committee on interurban rules of the American Association, in order that the rules as drawn may be made perfectly clear to them? The Ohio Commission, of course, may resent a suggestion of this nature, but I cannot help feeling that they would be perfectly willing to consider any suggestions offered by such a committee before taking final action upon the subject.

J. N. Shannahan,

Chairman, Standing Committee on Interurban Rules, American Street & Interurban Railway Association.

## ELECTRIC RAILWAY STATISTICS

Detroit, Mich., Nov. 5, 1909.

To the Editors:

I have been much interested in the statistical part of your big convention edition and especially so in the summary at the end of the last article, in which you give the miles of track of street railways for five years, as well as the number of cars, and capital invested. Curiosity led me to reduce these figures to a per mile and per car basis, and I herewith hand you a copy of the figures. I understand that the tables show the capitalization of the electric railway companies independent of whether they are engaged exclusively in the railway business or also supply other public utilities, such as electric lighting, gas, water, etc., so that the statistics given below for capital per mile of track do not show the capital engaged in railway undertakings per mile of track in different sections of the country. This is undoubtedly one reason why the figures for the Southern States are so large, because many of the New York companies in the South also carry on an electric lighting business and some conduct other public utilities. Another reason for the apparently high capitalization figures of the Southern States is undoubtedly the fact that there are comparatively few suburban and very few interurban roads among them.

CAPITAL PER MILE OF TRACK.

| | 1908. | 1907. | 1906. | 1905. | 1904. |
|---|---|---|---|---|---|
| New England States | $61,316 | $64,516 | $66,208 | $55,017 | $55,266 |
| Eastern States | 163,662 | 154,622 | 155,945 | 148,563 | 150,666 |
| Central States | 98,428 | 91,148 | 83,555 | 89,420 | 96,853 |
| Southern States | 128,773 | 124,739 | 108,425 | 111,595 | 111,503 |
| Western States | 90,043 | 84,857 | 80,044 | 80,200 | 86,995 |

CARS PER MILE OF TRACK.

| | 1908. | 1907. | 1906. | 1905. | 1904. |
|---|---|---|---|---|---|
| New England States | 2.82 | 2.96 | 2.98 | 2.73 | 2.68 |
| Eastern States | 2.98 | 3.17 | 3.27 | 3.36 | 3.29 |
| Central States | 1.66 | 1.62 | 1.71 | 1.97 | 2.18 |
| Southern States | 1.91 | 1.91 | 1.84 | 1.90 | 1.95 |
| Western States | 1.63 | 1.60 | 1.54 | 1.41 | 1.62 |

Referring now to the table showing cars per mile of track, the New England States seem to be the only division in which the number of cars per mile of track has been increased over the early standard. The Southern and Western divisions are the only others maintaining their equipment up to the same standard as shown in 1904.

Using the census of 1900 as a basis and comparing the population per mile of track for the year 1904, New England still has the call, as will be seen by the following table:

POPULATION STATISTICS.

| | Miles of track for each 10,000 population. | Population per mile of track. |
|---|---|---|
| New England States | 8.23 | 1,210 |
| Eastern States | 5.95 | 1,680 |
| Central States | 6.81 | 1,470 |
| Southern States | .655 | 15,300 |
| Western States | 2.55 | 3,930 |

It is safe to assume that the capitalization in New England furnishes but a small amount of profit for the promoter, and for this reason one would expect to find a very slow growth of facilities in that part of the country, yet the increase both in trackage and cars compares very well with that of the other divisions.

PERCENTAGES OF INCREASE IN CARS AND MILES OF TRACK IN LAST FIVE YEARS.

| | Miles of track. | Cars. |
|---|---|---|
| New England States | 17. per cent | 23.8 per cent |
| Eastern States | 29.7 per cent | 17.5 per cent |
| Central States | 35.5 per cent | 2.6 per cent |
| Southern States | 28. per cent | 25.1 per cent |
| Western States | 58. per cent | 57.8 per cent |

New England, where short cars are still quite generally used, shows a very considerable increase of rolling stock, while showing the smallest increase in track mileage. The Central States, where long cars are more popular, shows a very small increase of cars and a large increase in mileage, and the Southern and Western States show an even growth of both.

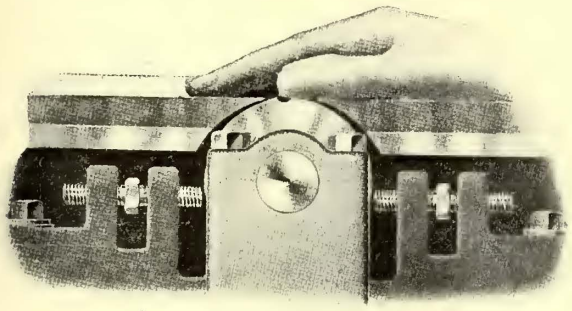
A Correspondent.

## NEW SAFETY CUTTER HEAD

Any improvement in a machine which will increase the safety of the operator is surely of value, providing, of course, that the efficiency of the machine is not lessened by the change. In a woodworking shop the hand planer is probably the most dangerous of any machine tool, and the statement has been made that more fingers have been lost in hand planers than by any other single type of tool. A new cutter head for hand planers and jointers, which assures maximum safety to the operator by reason of its permitting the tables to be set very close together, has lately been introduced in the woodworking machine tools manufactured by the J. A. Fay & Egan Company, Cincinnati, Ohio. In the old-style cutter head with the square block and knives bolted to its sides, the square shape of the block

would neither permit the tables to be set close together nor did the head itself fill the opening between the tables. Thus with the slightest slip on the part of the operator his fingers might be drawn in between the tables and badly mutilated if not lost.

The new safety circular cutter head closely fills the opening between the tables so that the most severe accident that could possibly happen would be the scraping of a finger or



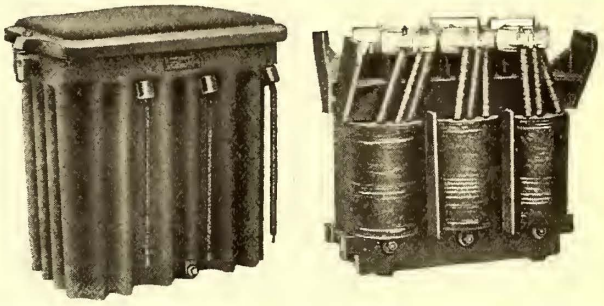
Safety Cutter Head

thumb. The new head is made from a solid piece of crucible steel, which is first roughed on a lathe to the desired circumference and then ground accurately to size. Afterward seats for the two knives are milled into the steel body. High-duty tungsten steel knives are used on this cutter head and are held in the milled slots by special blocking, which is wedged against them by sets of cup-head clamp screws. The design is such that the cutting edges of the knives protrude but slightly from the circumference of the cylindrical-shaped head and thus permit the tables to be set very close to the cutter. An illustration is presented which shows an end view of one of the new safety cutter heads which can be applied to machines not made by the manufacturer of this head and is applicable, not only to hand planers, but to surfacers, planers and matchers.

## SMALL THREE-PHASE TRANSFORMERS

Recent marked inprovements have been made in Westinghouse type "C" three-phase transformers for small light and power service. It is stated that in these transformers the losses are reduced below those of any ordinary equivalent combination for transforming three-phase power, while experience in design and modern factory methods have produced a highly serviceable apparatus that can be sold for less than the equivalent single-phase transformer group. These transformers are made in sizes ranging from 5 kw to 75 kw capacity, and are said to give very high efficiency at all loads, as well as close regulation when operating on currents having low power factors. These properties, together with compactness and simplicity, make these transformers especially adaptable for supplying motor loads.

The accompanying illustrations show the appearance and construction of this apparatus. The cast-iron corrugated case employed is quite similar in design to that used in the Westinghouse type "S" transformer. The three high-tension leads enter from the front side of the transformer,



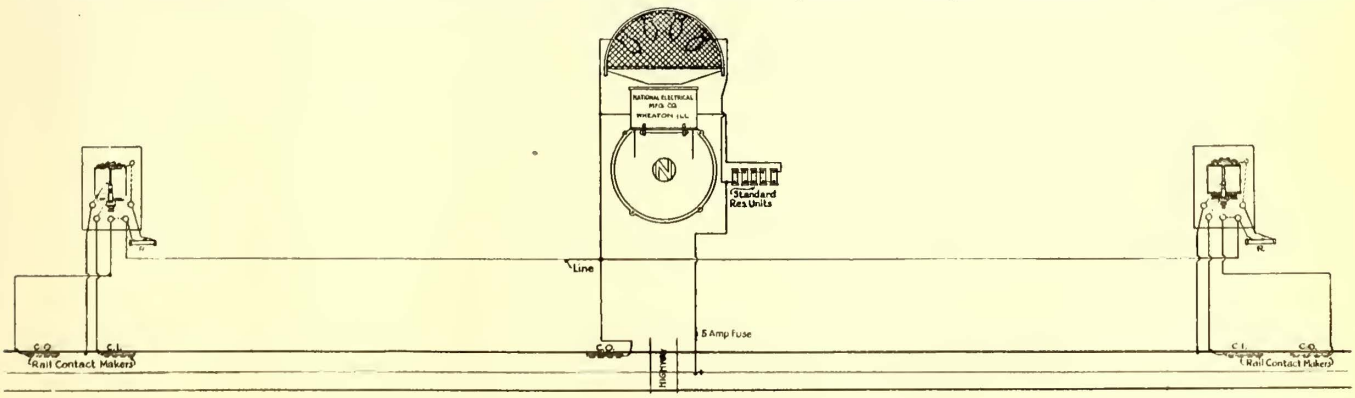
Coils and Casing of Small Three-Phase Transformer

the low-tension secondaries issuing from the pole side of the case. Provision has also been made for bringing out neutral leads, when desired, from both the high- and low-tension windings. Separate terminal blocks are provided for both the high- and low-tension leads of each of the three phases. Each low-tension winding comprises two coils which can be connected in parallel for 110 volts, or in series for 220 volts, the standard designs being for 2200 volts and the high-tension side.

## AN IMPROVED CROSSING SIGNAL

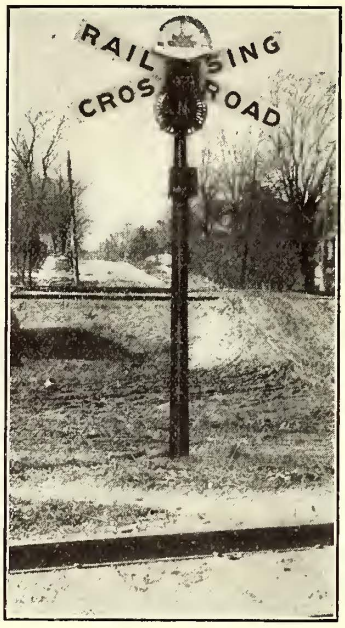
The National Electrical Manufacturing Company, Wheaton, Ill., has recently been formed to make a highway crossing signal, the strong feature of which is its positive action on lines with fluctuating voltages. The signal in its original form was invented about four years ago by Joseph Sauer, now president of the new company, but who was then employed by the Aurora, Elgin & Chicago Electric Railway Company. The signal was installed at one of the highway crossings of the railway mentioned where practical operation made it easy to determine any possible weaknesses.

The "National" crossing signal is a visual as well as an audible system of simple construction. Each installation consists of a 12-in. bell and a bank of incandescent lamps, mounted on a crossing signal post as shown in one of the accompanying illustrations; a contact maker and a relay which governs the making and breaking of the circuit. This apparatus has been applied equally well on single and




Wiring Diagram of Crossing Signal for Single Track

double-track roads, having either third-rail or trolley contact makers. When rail contact makers are installed, the circuit which works the signal is closed by the flange or the tread of the car wheel coming in contact with a spring-supported contact maker which is clamped to the base of the running rail.

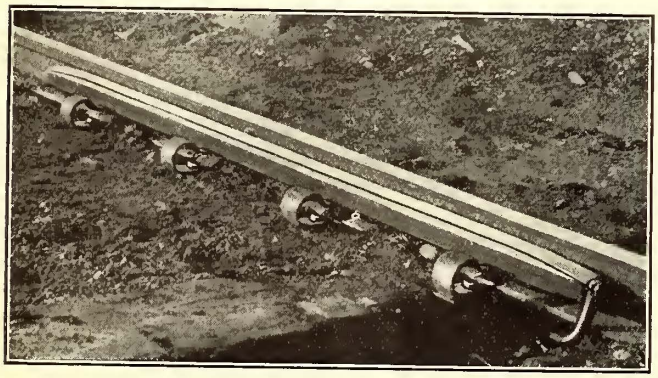



Crossing Signal

The bell on the crossing signal is of the continuous-current vibrating type and requires no delicate adjustment. The bell is efficient on circuits having a line pressure ranging from 500 volts to 800 volts. The usual arcing at the contact points is eliminated. The improved carbon holder provided allows the carbons to be changed quickly by the use of pliers, and is a decided improvement over other types.

The relay is non-arcing. It is wound and insulated for operation on from 500 volts to 800 volts. The circuit is made and broken between renewable hard-carbon blocks, flexibly mounted and so arranged as to have a very slight rubbing motion to insure perfect contact.

These signals are now in successful operation on such important electric railways as the Aurora, Elgin & Chicago, the Indiana Union Traction, Chicago & Milwaukee Electric, Ft. Wayne & Wabash Valley, Elgin & Belvedere, Louisville & Northern, and other electric railways. On each of these lines local conditions have been met, and in some cases serious fluctuations in the line voltages have been encountered and overcome.



Contact Maker

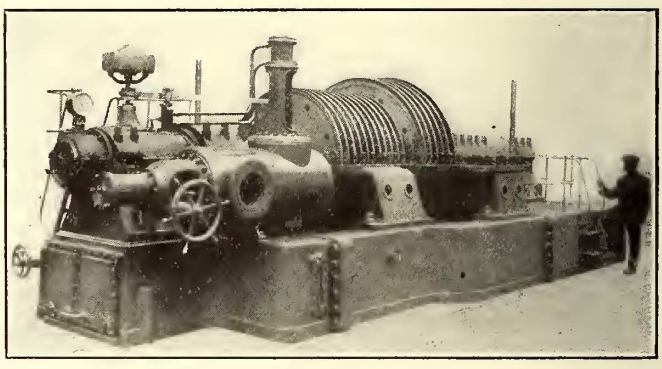
## NEW FARE RECORDERS IN CHICAGO

The Board of Supervising Engineers, Chicago Traction, has authorized the adoption of Dayton fare recorders for use on all surface cars in the city of Chicago and the railway companies have ordered 2500 of these devices from the Dayton Fare Recorder Company, Dayton, Ohio. The street railway systems in Detroit and Buffalo have also ordered 1500 recorders to equip their cars. This new type of recorder is designed to greatly reduce the clerical labor in accounting for fares received and to provide a perfect check on the conductors' trip sheet reports and on the car-house receivers' count of money and tickets. All classes of fares are rung up by the conductor, but each class of fare, 5-cent, 3-cent, ticket, transfer or pass, is registered separately and plainly indicated by a shutter in the recorder at the time it is rung up. At the end of each trip the trip-totalizer record is printed on a strip of paper within the recorder. This record shows the trip number, total cash received, number of each class of fares collected in separate columns, total number of passengers and the conductor's number. At the end of each conductor's assignment he withdraws from the recorder the equivalent of a complete day card on which is printed the record of each trip and also a summarized record of the total number of trips he has made on the car. This total record shows the division number, line number, total number of trips, total cash collected, total number of each class of fares collected, total passengers carried and the final register reading. Each conductor who is in charge of the car removes such a day-card record and hands it in to the receiver with his receipts. At the end of the day an inspector inserts a special key in the recorder and removes a printed totalized record of the entire day's receipts and register readings which must check with the totals of the several conductor's records previously removed.

The Dayton recorders are made in types suitable for both city and interurban railways and are equally well adapted to the conditions existing on large and small systems, with pay-as-you-enter, pay-within and regular types of cars.

## 6000-KW TURBO-ALTERNATOR

The Manchester (Eng.) Corporation has just installed in its power station a 6000-kw steam turbine set of the Zoelly pattern, built by James Howden & Company, Limited, Glasgow, and the largest of its kind in Europe. It is designed on the multi-stage impulse principle, and comprises a cast-iron cylindrical casing divided along the horizontal center line and containing fixed guide wheels. These are in halves and arranged so that their upper portions can be easily removed along with the upper portion of the casing. The expansion of the steam takes place entirely in the guide blades fixed in the stationary diaphragms, no expansion taking place in the rotating vanes, so that the steam pressures on the entrance and exit sides of the wheels are about the same. This reduces end thrust and necessitates no special means of balancing. The rotors are made of forged Siemens-Martin steel, machined and polished all over. The blades are of 5 per cent nickel steel. Distance pieces, shaped by milling cutters, are placed be-

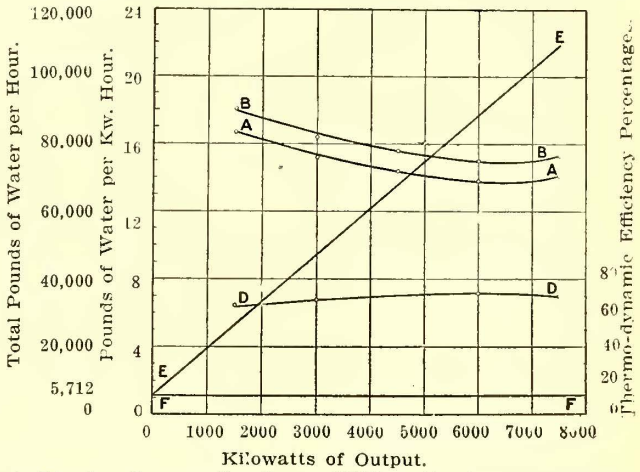


Turbine with Casing Removed

tween each pair of blades, and the whole is secured by a ring piece secured to the main wheel by rivets. The wheels are accurately balanced, and the radial clearance at the tips of the blades is 5 mm. (.2 in.) The shaft is bored throughout its length, and where it passes through the turbine casing is fitted with stuffing boxes and packings which are readily accessible for examination and adjustment when required.

The bearings are independent of the turbine casing, and are thus unaffected by the high temperature due to the steam. They are lubricated with oil under pressure, supplied from a rotary pump driven from the governor shaft. The bed-plate is of box section, provided with flanges and bolt holes for coupling to the generator bed-plate. The governor end of the bed-plate forms an oil reservoir and settling tank, a series of tubes with cold water circulation being provided inside the tank to keep the oil at a suitable temperature. The thrust block is fixed in the main bearing block at the low-pressure end, and consists of a number of collars turned on the turbine shaft working in white metal-lined grooves in the bush of the main bearing. A centrifugal governor driven by spiral gearing from the turbine shaft actuates a controlling valve, which in turn regulates a supply of oil under pressure to a piston, the latter being in direct communication with the throttle valve. The governor itself is thus relieved of the stress due to actuating the heavy throttle valve. The pressure of oil is supplied by a positive-action, valveless pump contained in the same chamber as the pump which furnishes the lubricant for the bearings. For the governor gear the oil pressure is 80 lb. per sq. in. By these means the variation of the speed of the rotor between full and no loads is approximately 1 per cent, and under no circumstances of load variation is there any tendency to hunt.

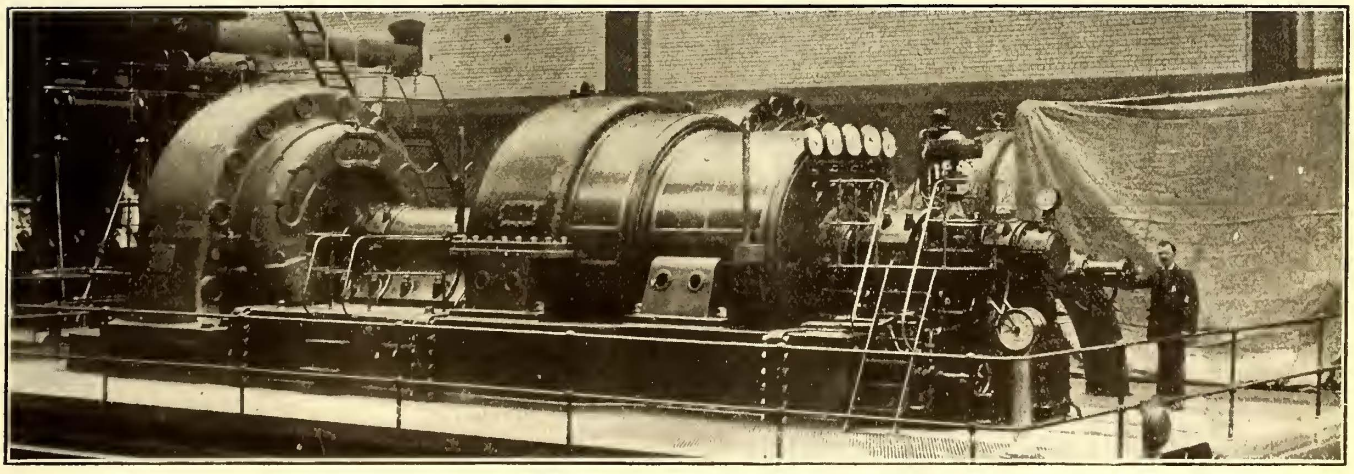
The machine drives a Siemens three-phase, 50-cycle alternator with six poles, the mean potential being 6500 volts. The turbine and generator are connected by a geared flexible coupling. The alternator is ventilated by a fan, which draws air by means of a duct through a special filtering arrangement situated in a chamber outside. Twenty-




A. Howden Consumption Curve, 28" Vac. Total Temp. of Steam, 523° F.
B. " " " 27" Vac. " "
483° F.
D. Howden Thermo-dynamic Efficiency Curve.
E. " Total Water Consumption.
F. " No Load Consumption.

**Curves of Steam Consumption**

one thousand cubic feet of air per minute are delivered at a pressure of 2½ in. of water to the rotor, returning through the stator frame to another duct, which carries it out of the building. The condensing plant has been supplied by Richardson, Westgarth & Company, Ltd., and consists of a Contraflo condenser with a surface of 10,500 sq. ft. There is one set of electrically driven three-throw Edwards air pumps. The water has a static head of 30 ft., and is drawn, and not forced, through the condenser, the pump being attached to the discharge pipe.



**General View of 6000-Kw Turbine as Installed in the Manchester Power Station**

A speed-regulating gear is fitted to the throttle valve, which is actuated either by hand or by the small electric motor shown in the general view of the machine. The speed of the machine is 1000 r.p.m. A supplementary governor is provided, which shuts down the supply of steam should the speed rise to 10 per cent above the normal. This governor acts by means of a trip gear, and enables the main stop valve to be instantly closed by a powerful spring, the impact of the valve on its seating being cushioned by an air piston. A noteworthy feature in the running so far has been the very slight leakage of air into the turbine casing through the glands, thus facilitating the maintenance of a high vacuum even when using high temperature of circulating water.

The following results were obtained in the station tests made by S. L. Pearce, chief engineer of the Manchester Corporation:

| Load. kw | Duration of test. hrs. | Water per kilowatt-hour | Mean efficiency. per cent. |
|---|---|---|---|
| 7500 | 3 | 14.916 | 70.0 |
| 6000 | 6 | 14.598 | 71.5 |
| 4500 | 3 | 15.04 | 69.4 |
| 3000 | 3 | 15.927 | 67.8 |
| 1500 | 3 | 17.57 | 64.5 |

The rise in temperature after a six-hours' full-load test at 6000 kw was 72 deg. F. in both stator and rotor.

## LONDON LETTER

(*From Our Regular Correspondent.*)

Until a year ago, all trains leaving the high level station of the North British Railway, Glasgow, had to be pulled through a tunnel from Queen Street Station to Cowlairs, as the grade between these points is 1 in 45. The North British Railway between Glasgow and Edinburgh was constructed before it was known that locomotives could operate on a grade, so that from Cowlairs to Edinburgh (Princes Street) the track is level. At the time of construction it seemed best to send all trains from Cowlairs to Glasgow over the grade and through the tunnel, braking them by heavy vans, and using the cable to assist the trains out of Glasgow. This system was costly and slow, and a year ago experiments were made with heavy locomotives, without the aid of the cable. With the sanction of the Board of Trade, the company has decided to abandon the cable system and use only the locomotives. It is interesting to note that the stationary engine at Cowlairs which worked the cable was in continuous use from Feb. 19, 1842, until a year ago, and from my own personal knowledge, which dates back many years, I am confident that many parts of the engine, so excellent was its original construction, had never even been renewed. Like all engines of its time, the one installed at Cowlairs was constructed on the old walking-beam principle.

The Bradford Tramways Committee is considering the question of providing a new and up-to-date house for the accommodation of its cars. At present there are nine depots in Bradford, most of them in outlying districts, with a total capacity of 275 cars. Mr. Spencer's idea is to provide a depot near the center of the city for all the cars. A suitable site has been procured for this purpose, and Mr. Spencer contends that a saving of nearly 57,000 car miles per annum of dead mileage could be effected if his plan, which would involve an expenditure of about £22,500, is carried out.

It is more than 15 years since the Glasgow Corporation took over the tramways and operated them municipally. At that time there were 670 drivers and conductors in the employ of the department, whereas there are now 2570 conductors and motormen. At a recent ceremony in the quadrangle of the Municipal Building nearly 200 members of the tramway department were presented with medals in recognition of their having completed 15 years' service. The recipients were congratulated by the convenor of the tramways committee, who assured them that by their conduct and service they reflected credit, not only on themselves and their department, but on the whole city.

At the half-yearly meeting of the Underground Electric Railways, of London, which operates the Metropolitan District Railway, the Bakerloo tube, the Piccadilly tube and the Hampstead and Highgate tube, Sir Edgar Speyer, chairman of the company, said that he was glad to be able to record material progress. As is well known, the financial condition of the company was affected for a time by the large amount of capital necessary to electrify the District Railway and to construct the various tubes. All of the lines now show satisfactory increases in traffic, and Mr. Stanley, the general manager, was commended for his extremely efficient management and for the very favorable results which he has achieved. The company has now moved from Hamilton House to new offices erected by the Metropolitan District Railway at its St. James' Park Station, where the officers of the three tube companies and the District Railway are also located. It is proposed to apply to Parliament for powers to consolidate the three tube railways as one company with a capital of about £16,000,000.

It has been decided by the City Corporation of London to build a new bridge over the Thames in accordance with plans submitted by the Bridge House Estates Committee. The structure will be erected between St. Paul's Cathedral, in the heart of London, and Southwark, on the south shore of the Thames, at a cost of £1,646,983. In addition, Southwark Bridge, which is in the vicinity of the proposed structure, will be reconstructed at a cost of £261,000. As already stated in this column, the new bridge will be constructed to accommodate tramways, and will afford another connection between the southern and northern portion of London where most required. The approaches to the new bridge will be commenced further back from the river bank than those of the existing bridges, with the exception, perhaps, of Waterloo Bridge, and as the bridge will span some of the east and west arteries confusion of cross traffic will be obviated. The structure will be called St. Paul's Bridge, and will have its northern approach from the junction of St. Paul's Churchyard and Cannon Street, crossing Queen Victoria Street and Upper Thames Street on a viaduct, and crossing other streets south of the Thames in the same way. It will finish at the junction of Southwark Street and Southwark Bridge Road. Though not yet sanctioned, part of the proposal is for the tramway lines after crossing the bridge, to continue in a subway under Cannon Street, the northern side of St. Paul's Churchyard, St. Martin's-le-Grand and Aldersgate Street, crossing to the surface in Goswell Road. The bridge and approaches, when completed, ought to be of invaluable assistance in solving the problem of transportation in London.

We reported about a year ago that the Manchester Corporation placed an order with James Howden & Company, Glasgow, for a 6000-kw steam turbine of the Zoelly type to be installed in the Stuart Street station. This turbine, which is the largest in England or on the Continent, under tests conducted recently, the contractors have earned a possible bonus as the steam consumption at full load, with 188-lb. pressure, 140 deg. Fahr. superheat, and 28 in. vacuum, was 13.9 lb. per kw-hour. At 25 per cent overload, 7500 kw, equivalent to 11,000 ihp, the steam consumption was 14.2 lb., obtained without the use of a bypass. It is claimed that these figures are unsurpassed.

At a recent meeting of the London County Council, various tramway schemes were passed for construction next year, which will involve an outlay of more than £400,000. This is in addition to work already authorized. Some of the work will be done in the southern portions of London, but most of it will be in the northern portions. One of the new tramways will be constructed in Maida Vale, which has hitherto been without tramway accommodations. This line will be equipped with the overhead system. The most important of the other systems will be built in the vicinity of Highgate Road and Seven Sisters Road. All of the work in the northeastern portion of the city will be on the conduit system. In view of the objection of the Astronomer Royal to the line on account of the possible disturbance of the Observatory instruments, it has been decided to equip the tramway from Woolwich to Eltham with the double overhead trolley, which it is contended will prevent the trouble feared by the Royal Observatory officials by supplying an overhead return.

As the magnitude of the tramways in London increases, the intricate nature of the business becomes more evident, and a special committee has now been appointed by the London County Council for the allocation of the cost of street widening, always a difficult problem. Many of the borough councils object to bearing any of the expense of street widening, claiming that the whole cost ought to be allocated to the tramways. The policy of conciliation boards has also now been definitely adopted by the Council to obviate any disputes between the management and the employees. The congestion of the tramways in London is also becoming very serious, and when it is considered that during the last year more than 400,000,000 passengers were carried, it is evident that at certain points the congestion is extreme. It is estimated that at the Elephant and Castle crossings nearly 6000 cars pass daily, six different roads radiating from this point. The solution of the problem will probably be found in the abolition of "dead ends" and the construction of more connecting links and loops.

The Dunfermline & District Tramway has posted notices that application will be made for permission to run tramways in Dunfermline, Inverkeithing, and Lochgelly and Dunfermline, Carnock Tarryburn, Inverkeithing, Auchterderron, Ballingry, and Kinglasse. When in operation the new line will, taken in conjunction with the line already laid, link up Rosyth with almost every community in the west of Fife.

The City Council of Sheffield has rejected the proposal that passengers should be allowed to take dogs on the tramcars. Sir Wm. Clegg, in bringing the matter forward, said that dogs were not to be allowed to ride on the car seats. The Council asked a large number of corporations what was their custom, and had received 57 replies. Of them 44 towns allowed dogs on the cars, 25 of that 44 allowed them on the top-decks only, 16 allowed them on the cars under special conditions, 10 towns allowed them on as passengers at special rates, and only 13 out of the 57 did not allow dogs on the car under any consideration whatever. So far as he knew, no complaints were made in the 44 towns of any inconvenience to passengers.

The London, Brighton & South Coast Railway proposed to commence the new electric service over the South London line between Victoria and London Bridge, via Peckham Rye, on Dec. 1. The new line is 9 miles long. At Victoria Station seven lines are equipped with overhead construction, giving access to five platforms, and there will be the same arrangement at London Bridge. The full journey will occupy 25 minutes, and it is intended to run a 10-minute service.

A. C. S.

# News of Electric Railways

## Meeting of Street Railway Association of the State of New York

J. H. Pardee, secretary of the Street Railway Association of the State of New York, has issued the following notice regarding the quarterly meeting of the association to be held at Albany, N. Y., on Dec. 7 and 8, as briefly announced in the ELECTRIC RAILWAY JOURNAL of Nov. 20, 1909, page 1078:

"The tenth quarterly meeting of the association will be held at Albany, N. Y., on the evening of Tuesday, Dec. 7, and Wednesday, Dec. 8, 1909.

"The Tuesday evening session will be an informal dinner at the Hotel Hampton, at 8 o'clock. After the dinner, the subject 'Relation of State Highways and Interurban Railways' will be discussed, and J. K. Choate, of the Otsego & Herkimer Railroad, will open the discussion.

"The Wednesday session will be convened at the Fort Orange Club at 10 a. m., when the remainder of the program will be taken up.

"Arrangements have been made with the Hotel Hampton for accommodations for those who apply directly to the hotel management prior to the date of the meeting.

"All questions and subjects will be open for general discussion, and all are invited to participate, particularly the legal representatives of the various member companies."

### PROGRAM

REPORT OF COMMITTEE ON CLASSIFICATION OF ACCOUNTS

Committee—A. L. Linn, Jr., W. H. Davies, H. M. Beardsley.

QUESTIONS FOR DISCUSSION

To be presented by H. A. Benedict, mechanical and electrical engineer of the United Traction Company, Albany, N. Y.:

"Repair shop and car house tests of electric equipment of cars."

"The prevention of electrolysis on an electric railway with overhead trolley and ground return."

"The best type of roadbed construction for electric railways on paved streets."

To be presented by W. J. Harvie, chief engineer of Utica & Mohawk Valley Railway:

"How closely are the recommendations of fire insurance inspectors followed?"

"Has slotting commutators eliminated most of the commutator and brush troubles?"

"What is being done toward the elimination of protective cradles at high-tension crossings?"

To be presented by Charles R. Barnes, railway expert of the Public Service Commission:

"Block Signaling on Electric Railways."

GENERAL DISCUSSION

To be opened by J. W. Hinkley, Jr.:

"Remuneration for Handling U. S. Mail."

To be opened by J. K. Choate:

"Relation of State Highways and Interurban Railways."

## Cleveland Traction Situation

William Barclay Parsons, New York, testified before Judge Tayler as referee on Nov. 22, 1909, that 40 per cent would be an adequate amount to set aside for overhead charges in reproducing a street railway. Mayor Johnson tried to induce Mr. Parsons to reduce his estimate by qualifications and Judge Tayler finally felt called upon to say that he understood the point which the witness had made without lengthy cross-examination. Mr. Parsons stated that 5 per cent bonds issued for the reproduction of the Cleveland Railway would not sell higher than 90 and that Mayor Johnson's plan of having the company carry out the reconstruction work would be much more expensive than if it was done under contract, a point upon which all the engineers have agreed.

On Nov. 23, 1909, Prof. M. E. Cooley, of the University of Michigan, testified at the request of the Cleveland Railway Company. His total valuation added several million dollars to the appraisal agreed upon by Messrs. Johnson and Goff in 1908. Mayor Johnson attacked the origin of some of the figures and said Professor Cooley could hardly be considered an impartial observer, as he had been employed by corporations elsewhere to work upon valuations. Judge Tayler said that every man who was qualified to speak in an investigation such as that under way had probably been employed by corporations and that such employment might affect his testimony, but he did not state to what degree such facts would be considered, if at all.

Following are the figures of Professor Cooley and Messrs. Goff and Johnson:

| | Cooley. | Goff-Johnson. |
|---|---|---|
| Track construction | $3,992,501 | $3,800,000 |
| Cars, trucks, motors | 2,634,563 | 2,634,563 |
| Land | 1,134,474 | 1,134,474 |
| Buildings, except power houses | 842,987 | 842,987 |
| Overhead construction | 1,123,474 | 1,007,958 |
| Return circuits | 95,713 | 95,409 |
| Power stations | 2,246,753 | 2,216,991 |
| Storage batteries | 287,910 | 289,863 |
| Shop machinery and tools | 69,442 | 63,130 |
| Horses, wagons, autos, etc | 83,279 | 62,200 |
| Miscellaneous rolling stock | 170,158 | 154,766 |
| General office | 35,000 | 20.650 |
| Interest in Salt Company | 34,406 | 34,406 |
| General contingencies, 5 per cent | 637,533 | 156,000 |
| | $13,388,193 | |
| Engineering | 701,441 | 48,000 |
| | $14,089,634 | |
| Insurance, 1 per cent | 182,375 | 47,000 |
| | $14,272,009 | |
| Organization and legal, 5 per cent | 920,992 | 135,000 |
| Pavement | 1,721,000 | 1,721,000 |
| | $16,914,001 | |
| Interest and taxes, 9 per cent | 1,938,289 | |
| Total cost construction and equipment | $18,852,290 | |
| Stores and supplies | 423,164 | 363,944 |
| Working capital | 264,653 | |
| Financing, 10 per cent | 2,416,265 | |
| | $21,956,372 | $15,069,821 |

This is a readjustment of the schedules used in the Goff-Johnson settlement, Professor Cooley when first on the stand having said that they were incomplete. He added some items and changed the values in others to accord with his investigations in Cleveland and his experience elsewhere. Nothing had been considered in this valuation for the property of the Forest City Railway or for good will. A schedule is being prepared for the railways and the values found will be added to this. With an allowance for good will, Professor Cooley's valuation will be greatly in excess of the Goff-Johnson aggregate. In the cross-examination Professor Cooley gave reasons for his figures and told how he arrived at results. He recited his experience in valuing other properties and brought out the difference between a valuation of steam and electric railway properties.

On the morning of Nov. 24 City Solicitor Baker urged Judge Tayler to consider the loss sustained in operating in that village in valuing the franchises and contracts. The judge said that the contract between the company and the village would be considered with the other contracts and obligations of the company.

Mayor Johnson testified in relation to the values placed on the Detroit properties when Mayor Pingree was considering the question of taking over the Detroit lines in the interest of the city. City Engineer Hoffman testified later as to the value of the tracks in Cleveland and explained why he would deduct $212,313 from the Goff-Johnson valuation. His statements were made a portion of the evidence placed before the arbitrator.

Frederick T. Barcroft, who directed the valuation of the Detroit system recently, was introduced as a witness by Mayor Johnson on Nov. 26. He stated that he had spent three days making an examination of the tracks of the Cleveland system. He had taken 40 sections of track on various lines, representing the best and the worst, and by applying the average value thus secured to the entire lines examined had arrived at an average value for the system. From deductions of this nature he stated that the average value of the track per mile is $7,850 in comparison with $12,000 made during the Goff-Johnson valuation proceedings. He stated, however, that the value was greater a year ago than at present. He placed the average life of track at from 15 to 16 years. Judge Tayler questioned the witness closely regarding the manner in which he arrived at his conclusions.

Mr. Barcroft said that the Detroit system was equipped with electricity in 1894 and 1895. Twenty-seven miles of new rails have been laid since 1903 and 60 miles of the system rehabilitated.

A brief meeting was held in the forenoon of Nov. 27. Judge Tayler said that there would be no meeting on Nov. 29. Both President Andrews and Mayor Johnson sug-

gested that Nov. 27 be spent in preparation, on information from Judge Tayler that the question of franchises would be considered during the week commencing on Nov. 29.

At a special meeting of the City Council of Cleveland on Nov. 27 to consider the ordinance introduced for the Cleveland Underground Rapid Transit Company, J. H. Hidy announced that he was present as the representative of certain Cleveland men to propose the construction of a subway upon more favorable terms than had yet been offered, and that his principals were ready to begin the construction of the tubes within 18 months. Mayor Johnson stated that it would be unwise to take a proposition from others into consideration at this late date, especially as the Council had granted a franchise to the original company and was considering a new one.

## Transit Affairs in New York

A letter from the Interborough Rapid Transit Company regarding proposed subway construction in New York and the third-tracking of some of the elevated lines of the company addressed to the Public Service Commission under date of Nov. 24, 1909, crossed in the mail a communication from the Public Service Commission to the Interborough Rapid Transit Company in which the commission rejected the program of the company previously submitted. The letter from the Interborough Rapid Transit Company to the commission refers to recent conferences between the officers of the company and the members of the commission at which rapid transit matters were considered. The communication of President T. P. Shonts of the company follows:

"The impression left upon my mind as a result of our conference on Nov. 19 is that we are in accord as to the physical features of the Interborough Rapid Transit Company's proposition for third-tracking the elevated lines, as well as the physical layout of the subway extensions except, possibly, the Pelham Bay Park extension out Westchester Avenue, which was included in our proposition in the belief that it was a line into new territory you were anxious to have occupied.

"This company's proposition of June 30, 1909, as amended Sept. 22, 1909, set forth the terms under which this company could finance and construct these lines. In view of your statement that it will probably cost double to build subways to-day, as compared with the conditions under which the present subway was built, and in view of the fact, which, I think, must also be admitted, that the cost of operation is at this time correspondingly higher than at the time of the opening of the present subway, the Interborough Rapid Transit Company's proposition to furnish its own money to build subways, and to operate them under the general terms of the contracts relating to the existing subway, should certainly be satisfactory to the city's interests, particularly in view of the fact that although at present the subway is giving more transportation of its kind than is given anywhere else in the world for 5 cents, it is proposed to double the amount of that transportation for the same fare.

"In so far as the third-tracking of the elevated lines is concerned, the Interborough Rapid Transit Company proposes the same terms as the old Rapid Transit Board offered the old Manhattan Elevated Railway 10 years ago; and when it is borne in mind that the same comparison as to costs in construction and operation as outlined above will apply to the elevated lines it would seem that these terms should also be satisfactory to the city.

"If I am correct in my understanding that we are practically agreed on physical lines, and correct in my further assumption that the terms should be satisfactory in view of the foregoing, do you not think that the time has come for you to take action on our proposition, as you have a right to do under the law as an extra under contract No. 1?"

The letter of the commission to the Interborough Rapid Transit Company, signed by W. R. Willcox, chairman of the commission, declares that the proposal of the Interborough Rapid Transit Company would prevent proper provision of traffic facilities for a large part of Brooklyn and that the company seeks terms too favorable with regard to construction, taxation and the third-tracking of the Second, Third and Ninth Avenue elevated railroads. The letter by the commission refers briefly to the original proposal of the company for new work and the subsequent modifications, and summarizes the proposed subway extensions as follows:

"Seventh Avenue Line—Extending from Times Square down Seventh Avenue, West Broadway and Greenwich Street to the Battery. This line would be a four-track subway from Times Square to Canal Street, two tracks extending to the Battery and two tracks via Canal Street, Manhattan Bridge and Flatbush Avenue extension to connect with your line in Brooklyn.

"Madison Avenue Line—Extending from Park Avenue and Thirtieth Street up Madison Avenue to connect with the present subway near 149th Street and with the Jerome Avenue elevated line near 160th Street.

"Westchester Avenue Line—To connect with your present line at Southern Boulevard and Westchester Avenue and to extend to Pelham Bay Park."

Reviewing the understanding of the commission in regard to the conditions which the Interborough Rapid Transit Company has sought to impose, Mr. Willcox said in part:

"You have stated that those lines must be built as 'extra work' under Contract 1, the original contract for the construction and operation of the present subway from City Hall north, except that you will obtain the money directly, instead of indirectly, by using the city's credit, the cost being amortized out of earnings as at present.

"You also insist that the city must provide the right of way and station sites, and assume all liability to abutting property owners, except such damage as may be negligently caused by you in construction work. This means that the city must defray the cost of all real estate taken for rights of way, stations, connections, etc. You further state that you must be allowed all the favorable construction privileges contained in the contract under which the present subway was built.

"As to the operating contract, you state that it shall be coterminate with your present contract (that it shall run for 45 years, or until 1954, with the privilege of renewal for 25 years more); that the city shall pay taxes upon the physical property and upon the franchises, if any are imposed, and that no rental shall be exacted by the city."

Seven reasons are then given by Mr. Willcox for rejecting the proposal of the company as the commission understands it. The reply is embodied in a letter containing 10 typewritten pages. A brief abstract of the reasons of the commission for rejecting the proposal follows:

"1. The fundamental objection to your proposition is that it does not deal with the rapid transit problem in a broad, metropolitan way. While you refuse to extend even 1 mile or 2 miles into the built-up portion of Brooklyn, requiring a haul of 3½ to 4½ miles to City Hall, Manhattan, you propose an extension in the Bronx over 4½ miles in length, the extreme terminus of which is 14¾ miles from the City Hall, Manhattan. It is manifest that if you can afford to build the Pelham Bay Park branch and carry passengers for a 5-cent fare from that point to the lower part of Manhattan you can afford to operate an extension in Brooklyn, running a much shorter distance east or south. It has not been suggested that your company should necessarily construct, equip and operate with your own money lines to distant points; but the commission does believe that you should be willing to make proper extensions in Brooklyn. An adequate system of transportation cannot be provided along such lines. Any plan which contemplates the utilization of a few thoroughfares in the lower part of Manhattan and of the short-haul traffic in the center of narrow Brooklyn and the lower part of Manhattan solely for the benefit of certain districts in the upper portion of Manhattan and in the Bronx is illogical, unmetropolitan and unjust to the whole city. For similar reasons the commission does not view with favor your offer to operate the Broadway-Lafayette Avenue loop without any obligation to extend further into Brooklyn.

"2. The law provides for the special treatment of extensions, but we do not believe that it was intended or that it would be right for this commission to nearly double the mileage of your lines as 'extra work' under Contract No. 1, and call these very important additions 'extensions,' when they really constitute a new system. Furthermore, public opinion has condemned the 75-year irrevocable, non-profit-sharing grant—Contract No. 1—as too unfavorable to the interests of the city. The Legislature has passed laws making the repetition of such grants impossible for independent lines. The Rapid Transit Commission did not follow them in Contract No. 2.

"3. Under Contract No. 1 you are required to pay interest and sinking fund upon the cost of construction, including land for subway purposes. Your present proposition is that the city shall pay for all land, easements and rights that are necessary, and allow you the use of such property without charge. Thus the city would have to pay annually by taxation the interest upon this cost.

"4. You also insist that such taxes as shall be levied upon your company in connection with the new lines shall be paid by the city. Thus, if the State of New York should change the system of taxation and levy a tax upon you and other common carriers, you would be exempt, according to the terms of your offer. We do not believe that the general

taxpayer should be burdened in this way, especially in view of the fact that the additional lines you desire will be very remunerative, especially the Seventh Avenue line, which will carry the larger portion of the traffic from the Pennsylvania Railroad station—a very profitable short-haul traffic.

"5. The commission considers that it would be unwise to give you a franchise under which there would be no sharing of profits with the city. The Rapid Transit act provides that in connection with new, independent lines the operators shall share profits with the city after the payment of all proper charges, including interest upon the cost. Your proposition contains no such provision.

"6. Viewed as operating lines, the proposed routes in Manhattan are largely satisfactory; but your refusal to build or operate route 18 in the Bronx, while at the same time proposing a branch connecting with your present line at Westchester Avenue and Southern Boulevard and extending to Pelham Bay Park, is open to criticism.

"7. We cannot believe that you are prepared to insist that you be allowed all of the construction privileges contained in the original subway contract. The methods there permissible aroused such widespread opposition that no contract since drawn has allowed such latitude, and this commission is not prepared to reverse recent policies and return to the methods practised 10 years ago. The welfare of the city will not permit it.

"Coming to the portion of your proposition relating to elevated tracks, we understand your proposition to include the following:

"Additional tracks upon the Second Avenue, Third Avenue and Ninth Avenue lines, with such crossovers, approaches and stations as may be necessary to operate the additional tracks as express lines.

"Extension of Eighth Avenue elevated road across McComb's Dam Bridge easterly to River Avenue and northerly by River and Jerome Avenues to 194th Street.

"You propose that a franchise be given you for these additional tracks and that the terms of such franchise shall not exceed the terms proposed by the Rapid Transit Commission early in 1898.

"You have indicated that you consider a payment equivalent to 2 per cent of the additional gross receipts which accrue after the additional tracks are added as the compensation which you are willing to pay. If this is your last word upon the subject we are ready to state that it is inadequate. Under the State law the minimum compensation required of street railways is 3 per cent of gross receipts for the first five years and 5 per cent thereafter. The third-tracking of the elevated roads is probably the most valuable right which the city can give to any company when compared with the expense involved, and we do not believe that your offer could be considered adequate when viewed in any light.

"In view of the entire dissimilarity between the engineering features of your recent proposal and the proposal of the Rapid Transit Commission in 1898, it is the opinion of the commission that the two are not comparable, and that the compensation provided for third-tracking alone is quite inadequate. We believe that more progress would be made if you would do as has been suggested, viz., present a new proposition based upon conditions as they exist to-day. As you insist that the proposition you had made in writing should be accepted or rejected as a whole, we have no alternative but to reject your proposal, and suggest that a new proposal be made or that you indicate your willingness to modify the terms proposed."

Unofficial reports are being returned of the vote on the four proposed amendments to the constitution of the State of New York at the election on Nov. 2. One amendment, known as the "debt limit amendment," is designed chiefly to extend the borrowing powers of the City of New York by permitting the city, under control to be prescribed by the Legislature, to exclude from the computation of the debt limit bonds issued exclusively for rapid transit and dock improvements so long as such bonds are self-sustaining and self-extinguishing. The tabulation of the rate so far prepared shows that less than 35 per cent of the electors in Manhattan and the Bronx expressed any opinion on the proposed changes in the law, and that 60 per cent of those who did record their opinions voted in favor of all the amendments. It is very evident that all were carried, although the official count will not be made public for several weeks.

An extension of the system of the Brooklyn Rapid Transit Company into Manhattan to connect Coney Island and the North River by means of the Manhattan Bridge and a subway under Canal Street has been tentatively proposed by the company to the Public Service Commission. The proposal is as yet indefinite. It includes the operation of cars over the Manhattan Bridge and under Manhattan, the building of an elevated line between Coney Island and Brighton Beach, the operation of cars under lease from the city through a new subway to be built between the Prospect Park station and Fourth Avenue and the laying of two additional tracks between Church Avenue and Prospect Park station.

The Public Service Commission has sent a letter to the New York Central & Hudson River Railroad notifying the company of the commission's belief that the Rapid Transit act as it is now amended is adequate to provide a solution of the removal of surface tracks from Eleventh Avenue. If the New York Central & Hudson River Railroad is disposed to act under the provision which enabled the Pennsylvania Railroad to receive a franchise to build its tunnels under the streets of Manhattan, and will make proper application to the Public Service Commission, the commission is convinced that the Eleventh Avenue situation can be cured. Officers of the New York Central & Hudson River Railroad have been quoted recently as saying that the company is ready to spend $60,000,000 in removing its tracks from the surface of the streets on the west side and only awaits additional legislation before going ahead with its plans. A bill passed by the last Legislature which had to do with the case in question was vetoed by the Governor as inadequate.

## Annual Report of Boston Transit Commission

The 15th annual report of the Boston Transit Commission, covering the fiscal year ending June 30, has been published by the board. The first part of the report consists of the usual résumé of the year's work of the commission, including appreciative comments upon the services of Howard A. Carson, lately chief engineer of the board; the opening of the Washington Street tunnel in November, 1908; legislative reference of Boston transportation matters to the Massachusetts Railroad Commission and the Boston Transit Commission sitting as a joint board; location of the Boston terminus of the Cambridge subway; construction of an additional subpassage at the Boylston Street subway station by the Boston Elevated Railway to prevent the making of round trips for a single fare; receipts and expenditures.

The net toll receipts of the East Boston tunnel at 1 cent per passenger for the year were $107,663.85, the additional cost of collection being $17,825.56, including wages, cost of exit tickets, cost of entrance tickets, power for lighting and heating, cost of accounting, proportion of indemnity insurance premiums on bonds of collectors, toll collectors and ticket sellers. The total cost since organization of the commission's work to June 30, 1909, was about $17,167,000, of which the Tremont Street subway required $4,125,068; Charlestown bridge, $1,570,197; East Boston tunnel, $3,225,437; Washington Street tunnel, $7,962,463.

The report of Chief Engineer Carson reviews the final work leading up to the opening of the Washington Street tunnel, improvements at Haymarket Square, interior finish of stations, methods of supporting the Boston City Hospital Relief Station, contracts for subway work, progress on the Beacon Hill tunnel work, pipe changes and leakage in the East Boston tunnel. Special effort was made in the work at Haymarket Square to determine whether the steel used in the Tremont Street subway about 14 years ago had deteriorated on account of rust. In the alteration of the station about 200 columns, 70 beams and 150 knee braces were removed, and portions of other steel members were uncovered. Practically all of this steel was found to be substantially free from rust, but rust was found on the bottom of some large base plates and columns. The coating was thin, but had local swellings, in some cases ¼ in. thick. It was thought to have been caused by a slight settling or shrinking away of some of the finer portions of the concrete under the plates, leaving the latter resting on the coarser portions. The smaller base plates were practically free from rust. In this reconstruction work the concrete was removed by drilling holes about 6 in. apart through it with air drills and breaking it out with hammers and wedges. The leakage in the East Boston tunnel has been reduced from 8 gal. per minute in 1907 to 6 gals. per minute in 1909.

## Long Island Railroad Electrification Work

Ralph Peters, president of the Long Island Railroad, has issued a very interesting statement regarding the work done by the company in electrifying its lines and preparing for tunnel service into New York.

By Dec. 31, 1909, the electrification of 40 miles of track, on which work was begun this year, will have been com-

pleted, and more than 140 miles of road will be ready for electric operation. Contracts have been placed for 130 new steel cars, the first of which are to be delivered by Jan. 1, 1910, and the last by May 1, 1910. The completion of these contracts will furnish the company with 400 steel passenger cars for operation between Manhattan and Brooklyn and the sections reached by the third-rail lines.

On June 1, 1910, the lines will be in full operation, and by that time work will be well advanced on the electrification and double tracking of the entire North Shore division of the road from Winfield Junction to Flushing, Whitestone, Malba and Whitestone Landing, and from Whitestone Junction to Port Washington. A site for a substation to supply power for this division has been secured at Winfield. Before the end of next summer the road will be carrying passengers from the entire North Shore territory direct to Manhattan.

It is estimated that the opening of improved transportation service through the Pennsylvania tubes will effect a saving in traveling time of about 25 minutes each way, as compared with the present trolley and ferry service. The estimated running time from Manhattan to Jamaica will be 18 minutes; to Flushing, 16 minutes; to Malba, 18 minutes, and to Fort Washington and Whitestone Landing, 32 and 22 minutes, respectively.

The most important of the projects nearing completion are the construction of two additional running tracks, the reduction of grades and the elimination of grade crossings between Winfield and Jamaica. With this new trackage there will be eight running tracks between the tunnel entrance and Whitfield and four to the Jamaica terminal. The Glendale cut-off, from Glendale to Woodhaven Junction, will furnish a double-track connection with the Far Rockaway and Rockaway Beach branches.

As far as possible the company will divert its freight trains from passenger tracks, and to this end one of the most important improvements has been practically completed by the construction of the Montauk freight cut-off between the North Shore freight yards at Long Island City and the Montauk division at Dutch Kills Creek. On Feb. 1, 1910, the company hopes to operate its first regular passenger trains from Manhattan and Brooklyn to Jamaica.

## Forest Hills Elevated Extension Opened in Boston

The Boston (Mass.) Elevated Railway opened the Forest Hills extension of its elevated system for traffic at 5:16 a. m. on Nov. 22, 1909. The line is a double-track third-rail route about 26 miles long, and extends southward from the Guild Street car house of the company through Egleston Square to Forest Hills, where surface car lines transfer passengers to and from West Roxbury and suburban points in somewhat the same manner that has prevailed at Dudley Street and Sullivan Square since the opening of the elevated train service in 1901. At Forest Hills, however, the surface cars are kept at the street level, and transfer is by stairways and an escalator between the upper and the lower levels.

The running time between Forest Hills and Dudley Street has been reduced about 9 minutes by the new line, and it is now possible for a passenger to travel from Forest Hills to Sullivan Square via the Washington Street tunnel in 25 minutes, compared with from 50 to 60 minutes before the elevated train service was inaugurated eight years ago. The distance is about 7.5 miles, and 18 minutes are saved in the round trip between the West Roxbury district and the center of the city, the running time from Milk Street station in the Washington Street tunnel to Forest Hills being 18 minutes, as against 27 minutes before the opening of the extension. The actual train running time between Forest Hills and the South station, via the Atlantic Avenue division of the elevated system, is now about 15 minutes, against about 25 minutes under the former arrangements. The company will undoubtedly secure a large amount of patronage which formerly went to the steam railroad lines running to the south of Boston.

The physical features of the new line have been described in the Electric Railway Journal. The most noteworthy characteristics are the use of reinforced concrete in the station platforms at Egleston Square and Forest Hills, and the extensive application of this material where the line crosses the Arborway, and also in the structure of the Forest Hills station itself. Provision has been made in the new line for the easier removal of ties compared with the difficulties of withdrawing and replacing them on the earlier elevated lines. Sheet copper has been extensively used in the architectural design of the stations, and a liberal window-glass surface provided at the Forest Hills terminus. A substation is now under construction near Egleston Square for supplying current to the trains. The line is signaled with automatic blocks, and in some cases home and distant signals are installed on the same post. Sharp curves and heavy grades are absent and high-speed running for upward of a mile at a time is possible. In the use of a single station between Dudley Street and Forest Hills, with surface car transfer facilities between the elevated and the street below, the company adheres to its plan of providing express train service between the center of the city and the outer distributing points, leaving the local travel to surface cars as at Sullivan Square and Dudley Street. By the opening of the new line Dudley Street has become in part a way station, although a liberal surface car service is still operated between that station and the intermediate suburban districts between it and Brookline and Dorchester.

## Two More Articles on the New York Subway

The two final articles in the series which have appeared in the *Evening Post* of New York, on the New York rapid transit situation, were published on Nov. 24 and Nov. 27. That on Nov. 24 was entitled "Five-Cent Fare Practicable." The first requisite for future rapid transit in New York, according to the author of the articles, is that the city should grow in a westerly direction rather than north and south. This can be done by constructing east and west transit lines, and they would develop considerable territory close to the City Hall not now fully utilized. A part of the cost of such a rapid transit line could be raised by assessment on the land to be benefited. Instances were cited of the increase of land value due to the construction of the present subway.

The final article declared that the city was not dependent upon either the Interborough Rapid Transit Company or the Brooklyn Rapid Transit Company for the construction of further subways. Among the possible builders of future subways the article mentioned the Bradley, Gaffney, Steers Company, which has already submitted a proposition to build and operate what is known as the Broadway-Lexington Avenue line; the New York, New Haven & Hartford Railroad which, at great expense, is now completing a six-track railway from New Rochelle to the Harlem River; the New York Central & Hudson River Railroad, with whom the city is discussing the construction of a modern rapid transit line on Eleventh Avenue; the Hudson & Manhattan Railroad and the Amsterdam Corporation, of which W. J. Wilgus is president. The latter company has proposed the construction of a belt line railroad on the east and west sides of the city.

## Committee on Subjects of Claim Agents' Association

E. C. Carpenter, president of the American Street & Interurban Railway Claim Agents' Association, has announced the appointment of the committee on subjects of that association to report at the January meeting of the executive committee. This committee is as follows:

H. V. Brown, claim agent, Public Service Railway Company, Newark, N. J.

C. B. Hardin, claim agent, United Railways Company of St. Louis, St. Louis, Mo.

M. P. Spillane, claim agent, Boston Elevated Railway Company, Boston, Mass.

## Association Meetings

Street Railway Association of the State of New York.—Albany, N. Y., Dec. 7 and 8.

Central Electric Accounting Conference.—Dayton, Ohio, Dec. 11.

Central Electric Railway Association.—Columbus, Ohio, Jan. 27, 1910.

**Conference on Electrification in Chicago.**—The transportation committee of the City Council of Chicago has invited the railroads operating into Chicago to send one representative each for a private conference on electrification.

**Appraisal of St. Louis Properties.**—The Public Service Commission of St. Louis has decided to make an appraisal of the property of the United Railways of that city, following a similar valuation of the property of the Union Electric Light & Power Company. The appraisal of the property of the Union Electric Light & Power Company has not yet been completed.

**Electrification of Columbus & Lake Michigan Railroad.**—The Ohio Electric Railway, Cincinnati, Ohio, which several years ago acquired the Columbus & Lake Michigan Railroad between Lima and Defiance and reballasted and reconstructed the roadbed, has begun the work of equipping the line for operation by electricity. It is proposed to handle all passenger traffic by electricity, but to continue

the steam locomotives in use for hauling freight for the present at least. It is expected that the work of equipping the line with electricity will be completed by Dec. 18, 1909.

**Accident to Winnipeg Plant.**—One of the penstocks at the Lac du Bonnet generating station of the Winnipeg (Man.) Electric Railway, 50 miles from Winnipeg, burst on Nov. 23 and the power house was flooded, with the result that power, lighting and street railway service in Winnipeg had to be suspended temporarily. The company placed its reserve steam plant in Winnipeg in operation, but the capacity of this station is only 8000 hp as compared with 20,000 hp received from Lac du Bonnet and it was only possible on several days partially to meet the requirements of the street railway and lighting service.

**Track Elevation Ordinance Passed in Chicago.**—The Council of Chicago has passed an ordinance which prohibits the Chicago & Oak Park Elevated Railway from running trains west of North Fifty-second Avenue until it raises its tracks from the surface. The ordinance becomes effective with the Mayor's signature and the police are ordered to forbid the trains to operate on the surface, through Austin and Oak Park. The ordinance provides a penalty of $25 a day for each car operated over the surface in Austin six months after the passage of the ordinance, unless the company has by that time submitted plans for elevation which meet the approval of the city. Clarence A. Knight, president of the company, intimated that an injunction would be asked prohibiting the enforcement of the ordinance.

**Complaint About Horse Railway Rails in New York City.**—The Public Service Commission of the First District of New York on Nov. 23, 1909, adopted a complaint order against the Dry Dock, East Broadway & Battery Railroad, directing it to answer in 10 days a complaint filed with the commission by business concerns of North Moore Street, New York, and vicinity, alleging that the tracks of the company in North Moore Street, between West Broadway and Washington Street, over which horse cars are operated, consist of old-fashioned strap rails so laid that wagons, trucks and other vehicles, when loaded, are unable to turn out of the tracks without delay and inconvenience and that the congestion resulting renders it impossible for fire apparatus to get through the streets at times. The petitioners ask that the company be directed to repair its tracks in North Moore Street by replacing the present rails with rails such as are used by other companies generally throughout the city.

**Canadian Company Arranges for Power from Municipality.**—Failure on the part of the Kingston, Portsmouth & Cataraqui Electric Railway and the City Council of Kingston, Ont., to agree upon the terms of a contract whereby the railway was to receive power from the municipal plant resulted in the company suspending operation on Nov. 23 and 24, 1909. The company wanted a 5-year contract at 1.20 cents per kw-hour, but the City Council would not consent to a contract for more than three years at this rate, claiming that it might be necessary to increase the capacity of its plant before the expiration of the 5-year contract on account of increased demands for power. On Nov. 25 an agreement was reached between the company and the representatives of the city whereby the company will be supplied with power for five years at the rate previously mentioned on condition that the company pay $500 interest and depreciation if new boilers should be required during the period of the contract. The Council was to ratify the agreement on Nov. 30, 1909.

**Report on Proposed Municipal Lines for Toronto.**—The report on the municipal subway proposed by H. C. Hocken, Controller of Toronto, has been submitted by J. W. Moyes, who was especially engaged to make the report. Mr. Moyes recommends the construction of 3¾ miles of underground lines and about 18 miles of surface lines at an estimated cost of $4,885,000. The route suggested for the underground lines is Front Street, from St. Lawrence Market to the site of the new Union Station; Yonge Street, from Front Street to St. Clair Avenue, and Bloor Street east from Yonge Street to the corner of Broadview and Danforth Avenues. The report states that construction of the lines would solve the radial railway problem by providing an entrance to the center of the city and St. Lawrence Market for the railways projected by the Toronto & York Radial Railway from Hamilton, the one from London and the one from Cobourg. The special committee of the City Council to which the report was referred has passed a resolution recommending that the City Council submit a referendum at the municipal elections on Jan. 1, 1910, as follows: "Are you in favor of the Legislature of Ontario giving Toronto the power to construct and operate a municipal system of subways and surface street railways if approved by the property owners?"

# Financial and Corporate

## New York Stock and Money Market

November 30, 1909.

Although there was considerable activity and a pointed effort toward recovery in the stock market to-day, the result was unsatisfactory. Ever since the announcement of the decision adverse to the Standard Oil Company Wall Street has been nervous and timid. The fear that the principles laid down in that decision would reach other industrial combinations and would prevent the proposed copper merger caused widespread liquidation and prices are many points lower.

Otherwise the conditions favor a strong market. The money market is not in a condition to force selling. Rates for money have not been advanced for a month and the situation of the foreign banks has been vastly improved. Local rates to-day were: Call, 4 to 5 per cent; 90 days, 4¾ to 5 per cent.

### Other Markets

Rumors concerning receivership proceedings have caused renewed weakness in Chicago Subway stock, and this is the principal feature of the market of that city. Under active selling to-day the price went as low as 4⅛ and buyers were hard to find. Other tractions were not in the market.

In Philadelphia there has been moderate activity in Rapid Transit, but the price has been inclined to sag. There has been little doing in other issues and prices have remained about stationary.

In the Boston market, Massachusetts Electric shares have been practically the only tractions that have been dealt in. The preferred has been the more active, and each issue has sustained fractional losses during the week. There have been a few sales of Boston Suburban during the week at 15.

United Railways bonds continue to sell in Baltimore at figures that are slightly higher. There are few transactions in traction stocks.

Quotations of various traction securities as compared with last week follow:

| | Nov. 22. | Nov. 30. |
|---|---|---|
| American Railways Company | a45½ | a45¼ |
| Aurora, Elgin & Chicago Railroad (common) | a50 | a49¾ |
| Aurora, Elgin & Chicago Railroad (preferred) | a92 | *92 |
| Boston Elevated Railway | 130 | a131 |
| Boston & Suburban Electric Companies | 15 | a18 |
| Boston & Suburban Electric Companies (preferred) | 77 | a76¾ |
| Boston & Worcester Electric Companies (common) | a12 | a12 |
| Boston & Worcester Electric Companies (preferred) | a52 | a50 |
| Brooklyn Rapid Transit Company | 77¾ | 77½ |
| Brooklyn Rapid Transit Company, 1st pref., conv. 4s | 86¼ | 85⅞ |
| Capital Traction Company, Washington | a135 | a133½ |
| Chicago City Railway | *190 | a190 |
| Chicago & Oak Park Elevated Railroad (common) | *2 | *2 |
| Chicago & Oak Park Elevated Railroad (preferred) | *10 | *10 |
| Chicago Railways, ptcptg., ctf. 1 | a101 | a100 |
| Chicago Railways, ptcptg., ctf. 2 | a32½ | a32¾ |
| Chicago Railways, ptcptg., ctf. 3 | a20 | a20 |
| Chicago Railways, ptcptg., ctf. 4s | *10 | *10 |
| Cleveland Railways | *84 | *84 |
| Consolidated Traction of New Jersey | a77½ | a77½ |
| Consolidated Traction of New Jersey, 5 per cent bonds | a107 | a107 |
| Detroit United Railway | *60¼ | *60¼ |
| General Electric Company | 162 | 159¼ |
| Georgia Railway & Electric Company (common) | a103 | 100 |
| Georgia Railway & Electric Company (preferred) | a88 | 87 |
| Interborough-Metropolitan Company (common) | 22½ | 22¾ |
| Interborough-Metropolitan Company (preferred) | 54¾ | 54¾ |
| Interborough-Metropolitan Company (4½s) | 82⅝ | 82⅞ |
| Kansas City Railway & Light Company (common) | a39 | a38½ |
| Kansas City Railway & Light Company (preferred) | *82 | *82 |
| Manhattan Railway | 140 | 139½ |
| Massachusetts Electric Companies (common) | a16½ | a16 |
| Massachusetts Electric Companies (preferred) | a80 | a78⅞ |
| Metropolitan West Side, Chicago (common) | a17 | a17 |
| Metropolitan West Side, Chicago (preferred) | a53 | a52½ |
| Metropolitan Street Railway | a25 | a24 |
| Milwaukee Electric Railway & Light (preferred) | *110 | *110 |
| North American Company | 79 | 78 |
| Northwestern Elevated Railroad (common) | a18 | a18 |
| Northwestern Elevated Railroad (preferred) | a68 | a68 |
| Philadelphia Company, Pittsburg (common) | a48¾ | a48¾ |
| Philadelphia Company, Pittsburg (preferred) | a44½ | a44½ |
| Philadelphia Rapid Transit Company | a26⅝ | 25⅞ |
| Philadelphia Traction Company | a89 | 89 |
| Public Service Corporation, 5 per cent col. notes | *100⅛ | *100⅛ |
| Public Service Corporation, ctfs. | a101 | a105 |
| Seattle Electric Company (common) | 117 | a117 |
| Seattle Electric Company (preferred) | 103½ | a104 |
| South Side Elevated Railroad (Chicago) | a56 | a53 |
| Toledo Railways & Light Company | *8 | *8 |
| Third Avenue Railroad, New York | 19½ | 18¾ |
| Twin City Rapid Transit, Minneapolis (common) | *109 | 109½ |
| Union Traction Company, Philadelphia | 52½ | 52¼ |
| United Rys. & Electric Company, Baltimore | a13½ | a14 |
| United Rys. Inv. Co. (common) | *42 | 40 |
| United Rys. Inv. Co. (preferred) | *72½ | *72½ |
| Washington Ry. & Electric Company (common) | a44 | a44 |
| Washington Ry. & Electric Company (preferred) | a91 | a91 |
| West End Street Railway, Boston (common) | 92½ | 93 |
| West End Street Railway, Boston (preferred) | 105 | 104¼ |
| Westinghouse Electric & Manufacturing Company | 85⅞ | 83 |
| Westinghouse Elec. & Mfg. Company (1st pref.) | *140 | *140 |

a Asked. * Last Sale.

## Chicago Railways Company's Earnings for October

The income statement of the Chicago (Ill.) Railways Company for September, 1909, compares with September, 1908, as follows:

| Income— | 1909. | 1908. |
|---|---|---|
| Passengers | $1,039,025 | $939,048 |
| Chartered cars | 304 | 346 |
| Mail | 2,892 | 2,629 |
| Advertising | 5,250 | 2,916 |
| Rent of land and buildings | 1,033 | 1,277 |
| Rent of equipment | 2,541 | 3,120 |
| Sale of power | 1,688 | 1,397 |
| Interest on deposits | 4,695 | 3,044 |
| Miscellaneous income | 8,624 | 6,788 |
| Gross | $1,066,056 | $960,567 |
| Expenses— | | |
| Maintenance of way and structures | $47,782 | $93,548 |
| Maintenance equipment | 65,009 | 83,577 |
| Renewals | 8,782 | 1,300 |
| Operation power plants | 117,023 | 73 858 |
| Operation card | 327,641 | 295,582 |
| General expenses | 116,710 | 110,904 |
| Expense acct. investment real estate | 4,268 | 3,477 |
| Taxes (estimated) | 30,982 | 176,558 |
| Total | $718,201 | $788,808 |
| Balance (actual) | $347,854 | $171,759 |
| Balance (based on 70 per cent operation) | 319 816 | 288,170 |
| Deduct interest, 5 per cent on valuation | 198,324 | 146,447 |
| Net income | $121,492 | $141,722 |
| City of Chicago, 55 per cent | 66,820 | 77,947 |
| Chicago Railways Co., 45 per cent | 54,671 | 63,775 |

The following table shows the monthly gross income of the company from February to October, 1908 and 1909:

| | 1909. | 1908. |
|---|---|---|
| February | $870,720 | $758,942 |
| March | 985,927 | 2,857,732 |
| April | 997,347 | 865,434 |
| May | 1,055,160 | 902,482 |
| June | 1,047,639 | 933,467 |
| July | 1,077,693 | 962 558 |
| August | 1,088,209 | 980,166 |
| September | 1,066,056 | 960,567 |
| October | 1,110,000 | 968,542 |
| Total | $9,298,751 | $8,189,890 |

## Annual Report of Christchurch Tramway Board

The annual report of the Christchurch (New Zealand) Tramway Board for the year ended March 31, 1909, shows that gross earnings from operation were £86,182, as compared with £81,296 in the previous year. Operating expenses were £50,397, as compared with £52,701, leaving net earnings from operation of £35,785 in the last year, as compared with £28,595 in 1907-08. After other adjustments and provision for interest and sinking fund requirements, the net income was £18,574, as compared with £11,958. The deductions from net income aggregated £12,279 in the last year and £11,312 in the previous year and consisted of appropriations for the depreciation reserve fund, renewals fund, fire reserve fund and public accident reserve fund. Of the surplus of £6,294 remaining last year, after provision for these funds, comparing with £645 in the preceding year, £500 was transferred to the employees' accident reserve fund and £5,794 was written off preliminary expenses.

Herbert Pearce, chairman of the board, in discussing the subject of depreciation in his review of the operations of the year, said:

"The board's policy is to transfer to a renewal fund 1½ per cent of the loan moneys, which fund is invested for the time being in the board's own undertaking without interest, and to pay over a like amount as depreciation reserve fund to special commissioners, with instructions to invest in interest-bearing securities. In addition to the renewals fund mentioned, ordinary maintenance and repairs are charged to each year's revenue account.

"After the tramways have been in operation for 25 years, the position of the present lines will be approximately as follows:

| | |
|---|---|
| Owing to debenture holders | £437,000 |
| The sinking fund (½ per cent) assuming it has been invested at 4 per cent without breaks for the whole period, will have amounted to | 90.996 |
| Leaving a liability still to be provided for of | £346,004 |
| The depreciation reserve fund if invested continuously at 4 per cent. will have amounted to | £277,299 |

"Assuming for the sake of argument that the undertaking was then going to be wound up, this depreciation fund being in liquid form could be used to pay off debentures, which if done would reduce the total liability to £68,705.

"I hold that it is not the duty of the present ratepayers to hand over to the next generation the tramway undertaking absolutely free of debt. Our duty is complied with if we provide that the actual value of the undertaking, after allowing for the depreciation which must take place, is not less than the amount of liabilities at the time.

"Given, then, that the liability will in 25 years be £68,705, what will be the actual value of the undertaking?

"The solution of the question depends upon the 'life' of the various portions of the undertaking. It is at this point that so much difference of opinion exists.

"In England the 'life' of rails is estimated at from 10 to 20 years. On the Continent the experts' estimates for rails on straight lines with light traffic vary from 10 to 30 years. There are equally different opinions with regard to other items.

"Bearing in mind the fact that, in addition to repairs and maintenance being charged to each year's revenue account, a sum of £153,950 will have been available during the 25 years for renewals, I therefore think it is fair to assume, taking all matters into consideration, that the undertaking—costing initially £443,900—will be worth £68,000 in 25 years' time, assuming that no great revolution in passenger locomotion methods takes place in the interval."

## Annual Report of the Glasgow Corporation Tramways

The fifteenth annual report of the tramways committee of the Corporation of Glasgow, relating to the year ended May 31, 1909, shows that the gross revenue amounted to £892,750 and the working expenses, excluding depreciation, to £505,617, leaving a balance of £387,133. As compared with the previous year, the gross revenue decreased £17,567, which is attributed to the general depression in trade. Working expenses in the year ended May 31, 1908, were £509,894. Reduced to a car mileage basis, the working expenses showed a decrease of .06d. Less was expended on repairs and maintenance of permanent way and of electrical equipment of the line. The saving in this and other features of the expenses, however, was partly overcome by an increase of £17,856 in the rates and taxes, due to the fact that the tramway lines within the city were assessed for various purposes by the corporation on the full valuation instead of on one-fourth, as formerly.

The balance at the credit of the depreciation and permanent way renewals fund at the close of the last year was £1,383,289. The amount at the credit of this fund one year previous was £1,224,051, but from this amount there was deducted for expenditures throughout the year £36,560 and there was added from the revenue of the year the sum of £195,798 to meet depreciation and renewals.

The corporation operated 189.5 miles of single track. It expended during the year on the upkeep of the track, in ordinary repairs, the sum of £41,120. In addition, £90,261 was set aside from the year's revenue to meet the cost of renewal of track. This figure was calculated at the rate of £500 per mile of single track. The number of passengers carried was 221,744,569. as compared with 226,948,290 in the preceding year. The number of car-miles run last year was 20,802,797, and in the year ended May 31, 1908, 20,766,722. The number of car-hours was 2,795,942, as compared with 2,808,711. The proportion of total receipts required for working expenses was 56.6 per cent, as compared with 56 per cent in the preceding year.

## Annual Report of the Melbourne Tramway & Omnibus Company, Ltd.

The thirty-sixth report of the directors of the Melbourne Tramway & Omnibus Company, Ltd., shows the operations for the year ended June 30, 1909. The traffic receipts amounted to £578,231, an increase of £20,793. The total number of passengers carried was 68,194,052, an increase of 2,626,932.

The digest of proceedings at the annual meeting of the shareholders of the company on Aug. 10 contains an explanation of the report and balance sheet made by F. B. Clapp, chairman of the directors. The chairman said in part:

"The shareholders will be pleased to note the continued increase in the traffic receipts, which have been going up for several years, but lately at a decreasing ratio. the rate of increase this year being only 3.73 per cent, against 7.50 per cent last year and 8.25 per cent the year before; and this year would have been less still but for the visit of the American fleet to Melbourne in September last.

"The increase in revenue has been considerably offset by the increase in working expenses, totaling £18,923, but I am sure it will be apparent to every one that we cannot carry a steadily enlarging traffic and keep tracks, rolling stock and buildings in good order without more expense for labor, motive power and repairs."

**Farmington Street Railway, Hartford, Conn.**—A special meeting of the stockholders of the Farmington Street Railway has been called for Dec. 20, 1909, to vote on the proposal to sell the property of the company to the New York, New Haven & Hartford Railroad.

**Holmesburg, Tacony & Frankford Electric Railway.**—A second committee has been formed in the interests of the first mortgage bondholders of the Holmesburg, Tacony & Frankford Electric Railway, which defaulted on the interest on $400,000 bonds due Nov. 1, 1909. The committee is composed of Joseph McMorris, secretary of the Fidelity Trust Company, Philadelphia; L. A. Baltz, vice-president of the Pennsylvania Company for Insurances on Lives and Granting Annuities; Edwin L. Blabon, of Geo. C. Blabon & Company, and W. L. Haehnlen, of Charles Fearon & Company. The Fidelity Trust Company will be the depository for bonds. Jacob S. Disston is chairman of the first committee, mention of which was made in the ELECTRIC RAILWAY JOURNAL of Nov. 20, 1909, page 1081.

**Indianapolis, Crawfordsville & Western Traction Company, Indianapolis, Ind.**—The report of H. J. Milligan, receiver for the Indianapolis, Crawfordsville & Western Traction Company, for October, 1909, filed in the Federal Court, shows gross earnings of $14,897, operating expenses of $8,270 and the net earnings of $6,627. The net surplus for the month was $1,288 and the balance on hand on Nov. 1 was $18,917. Of the total earnings, $13,064 constituted passenger earnings and $1,285 the freight earnings.

**International Traction Company, Buffalo, N. Y.**—Morris Cohn, Jr., and Porter Norton have been elected directors of the International Traction Company to succeed Henry J. Pierce and Arthur Robinson.

**Johnstown (Pa.) Passenger Railway.**—Spencer Trask & Company, New York, N. Y., offer for sale, at a price to yield 5 per cent refunding mortgage 4 per cent gold bonds of the Johnstown Passenger Railway. The bonds are dated Dec. 1, 1901, and due Dec. 1, 1931, interest being payable June 1 and Dec. 1 of each year. They are redeemable at 105 and interest on six weeks' notice and are also tax exempt in Pennsylvania.

**Los Angeles-Pacific Company, Los Angeles, Cal.**—A meeting of the stockholders of the Los Angeles-Pacific Company has been called for Jan. 6, 1909, to vote on the question of issuing $20,000,000 of bonds, $10,000,000 of which approximately will be used to defray the expense of building a 4-mile subway from Fourth and Hill Streets to Western Avenue, Los Angeles, and the remainder to be used to retire outstanding bonds of the company.

**Massachusetts Electric Companies, Boston, Mass.**—The trustees of the Massachusetts Electric Companies declared a semi-annual dividend of 1¾ per cent. This is at the rate of 3½ per cent per annum, an increase of ½ per cent per annum above the rate previously in force. The dividend is payable Jan. 1, 1910.

**Milwaukee Electric Railway & Light Company, Milwaukee, Wis.**—The New York Stock Exchange has listed $6,347,000 of refunding and extension mortgage 4½ per cent bonds of the Milwaukee Electric Railway & Light Company, due in 1931.

**New York Central & Hudson River Railroad, New York, N. Y.**—The New York Central & Hudson River Railroad has been granted permission by the Public Service Commission, Second District, New York, to subscribe for 42081/3 shares of additional stock of the New York, New Haven & Hartford Railroad for $526,042. The company stated in its petition that it owns 11,248 shares of stock of the New York, New Haven & Hartford Railroad, and 206,300 par value of the 3½ per cent convertible debentures and $4,000 par value of the 6 per cent convertible debentures of that company. The New York Central & Hudson River Railroad has the right as a stockholder, under the resolution recently passed by the New York, New Haven & Hartford Railroad, to subscribe for increased stock of that company at $125 per share to the amount asked for in the petition. The New York Central & Hudson River Railroad stated that it was of the opinion that because of the relations between it and the New York, New Haven & Hartford Railroad, especially in view of the mutual interests which they have in the Grand Central Terminal, New York City, it is to the advantage of the New York Central that it should maintain a substantial interest in the stock of the New York, New Haven & Hartford Railroad, and that it should retain its present proportionate holding by availing itself of the right to subscribe for additional stock.

**West End Street Railway, Boston, Mass.**—At the annual meeting of the stockholders of the West End Street Railway recently the directors were all re-elected.

# Traffic and Transportation

## Order on Heating Cars in Greater New York

The Public Service Commission of the First District of New York has served upon all the street railways in Greater New York an order requiring the observance of certain heating regulations in cars operated between Oct. 15 and April 15. The form of the proposed order was published in the ELECTRIC RAILWAY JOURNAL of Oct. 30, 1909, page 955, together with a report of the first hearing on the order, and the reports of the subsequent hearings were published in the issues of the ELECTRIC RAILWAY JOURNAL of Nov. 13, 1909, page 1018, and Nov. 20, 1909, page 1082. Section 3 of the proposed order, requiring thermometers to be placed in cars, was opposed by all the companies as inexpedient, as was also the proposal to make the minimum temperature 45 deg. Fahr. The order adopted by the commission does not require the use of thermometers and fixes the minimum temperature at 40 deg. Fahr. It follows:

"ELECTRIC CARS

"1. All closed cars in service for the transportation of passengers between Oct. 15 and April 15 in each year shall be equipped with suitable apparatus for heating by electricity.

"2. Every company shall during the period above named, whenever the outside temperature is less than 40 deg. Fahr., maintain in all closed cars in service for the transportation of passengers a temperature of not less than 40 deg. nor more than 65 deg. above zero Fahr., unless the company is temporarily prevented from doing so by storm, accident or other controlling emergency for which it is not responsible and which is not due to any negligence on its part.

"HORSE CARS

"1. All closed cars in service for the transportation of passengers between Oct. 15 and April 15 in each year shall be equipped with suitable apparatus for heating.

"2. Every company during the period above named, whenever the outside temperature is less than 40 deg. Fahr., shall maintain in all closed cars in service for the transportation of passengers a temperature of not less than 40 deg. nor more than 65 deg. above zero Fahr., unless the company is temporarily prevented from doing so by storm, accident or other controlling emergency for which it is not responsible and which is not due to any negligence on its part. And it is further

"Ordered, that a copy of such regulations relating to electric cars with the added words 'By Order of the Public Service Commission for the First District' be displayed conspicuously in each of said closed electric cars, and that a copy of such regulations relating to horse cars with the like addition be displayed conspicuously in each of said horse cars, both of such notices to be in a form approved by the commission."

The Public Service Commission announced the receipt of letters on Nov. 30 from the Metropolitan Street Railway, Brooklyn Rapid Transit Company, Interborough Rapid Transit Company, New York City Railway, Long Island Electric Railway, New York & Long Island Traction Company and the New York & Queens County Railway, objecting to the requirement of the order that a notice be posted in their respective cars with regard to the heating regulations, and set Dec. 2, 1909, as a date for hearing the companies' objections.

## Through Routes and Joint Rates in Michigan

Negotiations are being conducted between the Michigan State Railroad Commission, the Detroit (Mich.) United Railway and the Michigan Central Railway to establish a heavy steam freight service over 25 miles of the Detroit United Railway between Oxford and Flint, Mich. Several large automobile and carriage factories are located at Flint, so that Flint is an attractive objective point for the Michigan Central Railway. At present the Pere Marquette Railroad and the Grand Trunk system are the only steam railroads which serve Flint. On the electric railway between Oxford and Flint the freight service has not included the handling of much through business in carload lots. This has required transfer and delivery by steam roads.

The residents of the towns on this section of the Detroit United Railway some time ago petitioned the Michigan Railroad Commission to provide them with freight service which would not require the transfer of shipments from electric to steam cars or vice versa. The petition stated that such transfer of freight to and from electric and steam cars imposed increased transportation and transfer charges upon shippers. The commission took up the complaint,

and the Detroit United Railway agreed to reconstruct certain parts of the electric railway so that steam locomotives and freight trains could be handled over the route, if the residents desiring the service arranged to secure the right of way necessary for straightening the line and otherwise preparing for steam railroad operation. This feature has been taken care of by the several towns affected, and the reconstruction work is so far completed that steam railroad trains may be handled before Jan. 1, 1910.

The Detroit United Railway in improving the line is building water tanks and a roundhouse for a new Brooks locomotive which will be attached to the freight train. The through rates have not yet been arranged and the traffic agreement between the Michigan Central Railroad and the Detroit United Railway, which will require the exchange of equipment, is still under consideration. The Detroit United Railway, through the Rapid Railway, with tracks between Chesterfield and Marine City, Mich., connecting with the Grand Trunk Railway system at Chesterfield, is operating a steam-drawn freight service over this line in accordance with through interchange rates agreed upon by the companies and a tariff approved by the Michigan State Railroad Commission and the Interstate Commerce Commission.

## Transfer Talks in Chicago

In the Electric Railway Journal of Nov. 27, 1909, page 1119, brief mention was made of the campaign of education started by the Chicago (Ill.) City Railway through the medium of transfer slips, with the idea of minimizing accidents and of putting a stop to the illegal use of transfers. The advice and warnings are printed on the backs of the transfers. The following are four examples of talks already addressed to the public on the transfers:

"Coroner Hoffman says: 'It is imperative that the traveling public conform to existing rules of traffic and transportation. No amount of legislation or of care on the part of the transportation companies can eliminate reckless deaths. This must be done by the people themselves. Fifty per cent of our fatal accidents last year were caused by people taking chances while crossing the street.'

"Before getting off this car: 1. Wait till the car actually stops. 2. Look to see there is a safe alighting place. 3. Look out for autos or other vehicles which might strike you in passing."

"Never step from behind a street car or other vehicle without being certain—absolutely certain—there is not a car or other vehicle passing in the other direction. Serious accidents happen frequently from this cause."

"The conductor is the only person who can legally issue a transfer. The person who paid a cash fare in the first place is the only person who can legally use a transfer. The city ordinances prohibit the misuse of transfers and provide a penalty therefor—a fine of not less than $5 and not more than $100."

**Meeting of the Central Electric Traffic Association.**—A meeting of the Central Electric Traffic Association was held at Fort Wayne, Ind., on Nov. 29, to complete the compilation of divisions of the through passenger rates shown in Joint Passenger Traffic No. 3. and correct any mistakes which may have been discovered in the tariff. It was thought that the session would last four of five days.

**Discrimination in Fares Alleged in Indiana.**—The Citizens' Industrial Club, of Shelbyville, Ind., charges that the Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., is discriminating against Shelbyville in the schedule recently put into effect which fixes the fare between Indianapolis and Acton, which is equidistant between Indianapolis and Shelbyville, at 10 cents less than the fare between Acton and Shelbyville. The club charges that this will turn the volume of trade to Indianapolis.

**Traffic Agreement Between New York Suburban Lines.**—Judge Lacombe of the United States Circuit Court, has granted the application of the receiver of the Union Railway, New York, for authority to enter into an agreement with the receiver of the Westchester Electric Railroad, by which cars of the two companies will be run over the same tracks from the Bronx to Mount Vernon. Passengers traveling from the northern end of the Bronx to Mount Vernon have previously been obliged to change cars at the boundary line and pay an additional fare. If the agreement is perfected, a continuous trip will be given for one fare.

**Injunction to Restrain Carrying of Freight in Montreal Refused.**—The action brought on behalf of the City of Montreal to secure an injunction to restrain the Montreal (Que.) Street Railway from operating freight cars in the city was dismissed by Judge Fortin on Nov. 23, 1909. The city had ordered the company to carry stone for it and the company built cars for that purpose, and the city paid for the services rendered by the company and collected a percentage of the freight earnings. Outlying municipalities contended that if the company was prevented from carrying freight it would cause them loss by preventing them from carrying out important improvement programs. The judge held that the city failed to prove that it suffered any damage by the carrying of freight.

**Service in Pittsburgh.**—Having concluded the hearings at Harrisburg, regarding street railway service in Pittsburgh, the State Railroad Commission adjourned to Pittsburgh where several days during the fore part of the week beginning Nov. 29, 1909, were spent in considering complaints. At the request of the commission, Mayor Magee of Pittsburgh filed a supplementary complaint setting forth more specifically data gathered by his agents concerning the manner in which the Pittsburgh Railways has operated its lines. The company has been sustained by the commission in its defense of the rate of fare charged between Pittsburgh and Carnegie, complaint having been made to the commission by the Borough of Carnegie that the fare was excessive. The commission held that the ordinance gave the company the right to charge even more than the prevailing rate of fare.

**Vest Pocket Time Table.**—The Winona Interurban Railway, Winona Lake, Ind., has issued a time table in vest pocket form which, when folded, has eight pages 2 in. x 3 in. in size. The name of the road and the catch phrase, "How to go and when," followed by a request that complaints be made at the general office in Warsaw, appear on the first page, followed by complete time tables for week day and Sunday trains on the four interior pages. The time of connecting steam railroad trains at the principal towns served is shown on two pages, which also announce that limited service between Warsaw and South Bend is operated in connection with the local cars of the Northern Indiana Railway and through freight service between Chicago and Warsaw twice daily via the Graham & Morton Transportation Company's lines from Chicago to St. Joseph and the Indiana Transportation Company's lines from Chicago to Michigan City, and from either of these ports to way points by the electric railway.

**Supreme Court Orders Modification of Transfer Case.**—The Appellate Division of the Supreme Court of New York has ordered the Public Service Commission of the First District of New York to strike out 250 pages of printed matter in its answer to the receivers of the Metropolitan Street Railway in connection with the case involved in the issuance of transfers between the Metropolitan Street Railway and the Fifty-ninth Street Railway. The receivers obtained a writ of certiorari to review the order of the commission establishing through routes and joint rates with the Metropolitan Street Railway and the Fifty-ninth Street line. This order of the Public Service Commission was made on Oct. 30, 1908, after a hearing before it, ordering the roads to exchange transfers for a single fare, and apportioning the proportion of the rate to be borne by the roads within the transfer zone so designated. On Nov. 11, 1908, the receivers of the Metropolitan Street Railway obtained the writ of certiorari to review the action. A motion of the Public Service Commission to quash the writ was denied by the Appellate Division. The Court of Appeals affirmed this decision.

**Clean Accident Record of Southern Michigan Railway.**—Through the courtesy of J. McM. Smith, vice-president and general manager of the Southern Michigan Railway, South Bend, Ind., the Electric Railway Journal is able to present the remarkable operating record made by that company during the last 16 months. The Southern Michigan Railway operates 12 interurban motor cars and two express cars on a well-built 35-mile line connecting South Bend, Ind., with St. Joseph, Mich. During the last 16 months more than 800,000 car-miles have been run and more than 1,280,000 passengers carried without an accident to a passenger and without an accident of any character for which the company could be held liable. Such minor accidents as have occurred during that period have resulted from trespass or from teams pulling across the track in front of the cars. No suits for damages have been brought against the company for more than a year and a half. This record may rightly be attributed to the thorough discipline of employees and to the careful operation of cars. No dispatching system is used on the Southern Michigan Railway. Every car is operated according to a fixed schedule and the routing and passing of cars are made with systematic regularity. Extra cars are invariably put on a "double-head" schedule. All crews are notified daily between what points the work train will operate and each work train must be on the nearest side-track at least five minutes before the schedule time of any car.

# Personal Mention

**Mr. J. F. Goodwin** has been appointed superintendent of the Sherbrooke (Que.) Street Railway to succeed Mr. P. J. Slattery, resigned.

**Mr. P. J. Slattery** has resigned as superintendent of the Sherbrooke (Que.) Street Railway and Mr. J. F. Goodwin has been appointed to succeed him.

**Mr. F. E. Pritchard,** who resigned recently as superintendent of the Rochester & Manitou Railroad, Charlotte, N. Y., has been appointed general manager of the Indiana County Street Railway, Indiana, Pa.

**Mr. W. J. Sheldon** has resigned as vice-president and a director of the Waynesboro & Monongahela Street Railway, Waynesboro, Pa., and will become connected with a railroad construction firm now being formed which will have offices in Waynesboro.

**Mr. C. H. Kretz** has recently been appointed general manager, purchasing agent and electrical engineer of the Beaumont (Tex.) Traction Company to succeed Mr. N. B. Rhoads. From 1898 until 1904 Mr. Kretz was assistant professor of mechanical engineering in charge of the mechanical engineering department in the Louisiana State University. During 1904 and 1905 he was president and manager of the Capital Light & Power Company, Baton Rouge, La., and from 1905 until recently he was manager of the Baton Rouge Electric & Gas Company.

**Mr. George H. Gall** has resigned as general passenger agent of the Washington, Baltimore & Annapolis Electric Railway, Washington, D. C., to act as the special representative at Washington of a number of railroads and interstate electric railways. Mr. Gall became connected with the Washington, Baltimore & Annapolis Electric Railway soon after the opening of the line about two years ago in the capacity of publicity manager. He was soon promoted to be general passenger agent and given full charge of passenger traffic, still retaining his duties pertaining to general publicity.

**Mr. F. R. Newman** has resigned as general superintendent and master mechanic of the York (Pa.) Railways to become connected with the Southern Cambria Electric Railway, Johnstown, Pa., as general manager. Mr. Newman has been connected with the York Railways for the last four and a half years. He entered electric railway work in 1895 as a conductor on the Lowell, Lawrence & Haverhill Street Railway and from 1896 until 1900 was connected with several electric railways in New England as motorman, conductor and inspector. From 1900 until 1902 he was assistant superintendent and master mechanic of the Citizens' Electric Street Railway, Newburyport, Mass. In 1902 Mr. Newman accepted the position of superintendent of the railway department of the San Juan Light & Transit Company, San Juan, Porto Rico, and remained at San Juan until 1905, when he accepted the appointment to the York Railways as general superintendent and master mechanic.

**Mr. P. A. Freeman,** who for the last 14 years has been chief engineer of the Halifax (N. S.) Electric Tramway, has been given the title of superintendent and master mechanic and has had his jurisdiction extended to the car house and all real estate of the company. Mr. Freeman was born in Newcastle-on-Tyne, and served an apprenticeship of six years with R. & W. Hanothrones. He left England for Boston in 1887 and entered the employ of the Hinkley Locomotive Works. The property of these works was taken over by the West End Street Railway, Boston, and Mr. Freeman subsequently became connected with the Boston Elevated Railway, the successor to the West End Street Railway, as foreman machinist during the erection of a temporary plant for the company in which high-speed engines were installed. Mr. Freeman was later appointed assistant chief engineer of the company and served in this capacity until September, 1895, when he accepted the position of chief engineer of the Halifax Electric Tramway, which was then installing electricity. Since then the Halifax Electric Tramway has taken over the Halifax Illuminating Company and the Halifax Gas Works.

**Mr. C. E. Lenhart** has resigned as master mechanic of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., effective on Dec. 1, 1909. Mr. Lenhart was born in Auburn, Pa., in 1867, and is the eldest son of a family of prominent steam railroad operating officials. He began railway work on the Philadelphia & Reading Railroad as a water boy under his father. He was promoted repeatedly, and after serving about three years in the machine, locomotive and car shops of the Philadelphia & Reading Railroad, he was transferred to the engineering department, where he advanced to transit man and assisted in mountain surveys in the anthracite coal regions which resulted in the building of several steam and electric railways. In November, 1888, Mr. Lenhart resigned from the Philadelphia & Reading Railroad to enter electric railway work as a conductor and motorman for the East Reading Electric Railway, Reading, Pa. He advanced rapidly through the shops and was subsequently made accountant and later assistant superintendent of this company. When the East Reading Electric Railway was acquired by the United Traction Company, Reading, Pa., Mr. Lenhart was appointed dispatcher of the East Reading division. Soon thereafter, however, he accepted the position of superintendent of the Buffalo, Gardenville & Ebeneyer Electric Railway, Gardenville, N. Y. He subsequently returned to Reading, however, as chief dispatcher for the United Traction Company, and on May 1, 1904, was appointed master mechanic of the company and continued in this capacity until May 1, 1906, when he was appointed master mechanic of the Buffalo & Lake Erie Traction Company, which had then been recently organized. As master mechanic of this company, the work of standardizing the equipment of the constituent companies devolved upon Mr. Lenhart, also the work of specifying the new equipment for through service between Buffalo and Erie. Mr. Lenhart is a member of several engineering societies and is an associate member of the American Street & Interurban Railway Engineering Association. He proposes to take a short vacation before re-entering electric railway work.

## OBITUARY

**Robert M. Van Arsdale,** proprieter of the *American Engineer and Railroad Journal,* died suddenly at his home in New York on Nov. 23, 1909, as the result of a stroke of apoplexy. Mr. Van Arsdale was a member of the American Trade Press Association.

**Albert V. Porter,** who for many years was consulting architect for the Metropolitan Street Railway, New York, N. Y., is dead. Mr. Porter was a fellow of the American Institute of Architects and drew the plans for most of the recent car houses of the Metropolitan Street Railway system.

**O. R. Fyler,** of the Railroad Commission of Connecticut, died at his home in Torrington on Nov. 22, 1909. Mr. Fyler was formerly chairman of the Republican State central committee. He was born in Torrington in 1840, served in the Civil War and has been prominent in public life since that time.

**Irvin Belford,** Clerk of the United States Circuit Court at Cleveland, Ohio, is dead. Mr. Belford served the court many years, and acted as special master in taking testimony on the claims against the Municipal Traction Company at Cleveland and classified them so that the court has been able to discharge all that were considered preferred and take up others which will be paid later.

**Isadore Newman,** of Isadore Newman & Sons, New York, N. Y., died in New Orleans, La., on Nov. 30, 1909, at the age of 72 years. Mr. Newman was a native of Germany. He came to America in 1860 and settled at Harrisonburg, La. In 1868 he removed to New Orleans and engaged in business as a banker and broker. He became interested in the Carrollton Railroad, New Orleans, and subsequently entered the lighting field. He afterward relinquished his interest in these properties and became interested financially in street railway properties in Nashville, Memphis, Birmingham, Little Rock and Knoxville, which are controlled by the American Cities Railway & Light Company, of which Mr. J. K. Newman, his son, is president. Mr. Newman was the principal owner of one of the largest department stores in New Orleans.

**John Caldwell,** treasurer of the Westinghouse Air Brake Company, was stricken with heart disease and died in his office in Pittsburgh on Nov. 23, 1909. Mr. Caldwell had been associated with Mr. George Westinghouse since the inception of the Westinghouse Air Brake Company, and was well known in financial circles. He was also one of the trustees of the Carnegie Institute from its foundation. He was born in the north of Ireland about 70 years ago, and went to Pittsburgh when 12 years old. For several years he followed mercantile pursuits, but with the organization of the Air Brake Company in 1869 he became bookkeeper of the company, a position he retained for 10 years. He was then elected treasurer, a position he held for the rest of his life. When the Westinghouse Electric & Manufacturing Company was organized Mr. Caldwell was made treasurer of that company; but he resigned in 1892 to give his entire time to the Air Brake Company. He was also elected treasurer of the Philadelphia Company when this company was organized, but resigned in 1899. At the outbreak of the civil war Mr. Caldwell enlisted as a private in Company E, 61st Pennsylvania Volunteers, and was mustered out as a second lieutenant at the close of the war.

# Construction News

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

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

## RECENT INCORPORATIONS

*Irwinton (Ga.) Railway.—Chartered to build an electric railway from McIntyre to Irwinton, 3¾ miles. Capital stock, $15,000. Incorporators: J. L. Byington, J. W. Lindsey, G. H. Carswell, I. B. Stinson and I. E. Burkett.

*Iowa City, Ottumwa & South-Eastern Electric Railway, Iowa City, Ia.—Incorporated in South Dakota for the purpose of building an electric railway from Iowa City to Ottumwa, in the same State, a distance of 80 miles. The new company has nominal headquarters at Pierre, S. D., with a business office in Iowa City. Capital stock, $2,500,000. Incorporators: S. J. Smith, Roscoe Wilson, Frank Farmer, Iowa City, and G. P. Peterson, Pierre, S. D.

*McKeesport Belt Line Street Railway, McKeesport, Pa.—Chartered to build a 2-mile street railway on the outskirts of McKeesport. Capital stock, $12,000. Directors: S. D. Foster, president; D. A. Foster, A. D. Foster and W. E. Hartman.

*Wilkes-Barre (Pa.) Railway.—Chartered to construct and operate street railways by electric and cable power. Capital stock, $10,000.

## FRANCHISES

Burnaby, B. C.—At the last meeting of the Burnaby Council, the solicitors of the British Columbia Electric Railway sent a letter asking that the company be allowed the option to build a tramway north of Burnaby Lake.

Bristol, Ind.—The Trustees have granted a franchise to the St. Joseph Valley Traction Company, Elkhart, to construct an electric railway through the town. H. E. Bucklen, president.

Covington, Ky.—The Cincinnati, Louisville, Lexington & Maysville Traction Company has applied to the City Council for a 100-year franchise over the streets necessary to secure an entrance through the town to the river. The application specifies that the company wants exemption from taxes for five years, and that it proposes to use the tracks of the Louisville & Nashville Railroad and the Chesapeake & Ohio Railroad for several miles just out of Covington. The company will erect a station at Covington and will have a purchasing depot near the river, where they will buy their coal. [E. R. J., Nov. 20, '09.]

Covington, Ky.—The Covington & Big Bone Railway has applied to the City Council for a franchise giving it the right to lay tracks in a number of streets for interurban service. The same company asks for the right to operate a trunk line over other streets which will give it an entrance for its line connecting Covington and Big Bone Springs, 22 miles. [E. R. J., Nov. 20, '09.]

Lincoln, Neb.—The Omaha, Lincoln & Beatrice Railway has applied to the City Council for a 99-year franchise over a number of city streets of Lincoln. The company has been using the local company's trackage from Twelfth to Eleventh on P, south on Eleventh to N, and east to Fourteenth Street. The Lincoln Traction Company has served notice that when the contract expires next August the company will be expected to find another way to a terminal.

Auburn, N. Y.—The City Council has granted a perpetual franchise to the Auburn & Syracuse Electric Railroad Company, Syracuse, which gives it the right to maintain and operate a double track east through Genesee Street from Hooper Avenue under the same time schedule as the rest of the streets.

Sherbrooke, Ont.—B. W. Hibbard, who represents a syndicate which is arranging to purchase the property of the Sherbrooke Street Railway and extend and improve the railway, has asked the Council for a new 60-year franchise, during the first 30 years of which no taxes would be exacted and for the remainder of which the company would pay the city a percentage of the profits. It was intimated that extensions would be built to Magog, Bromptonville and Windsor Mills and that 8 miles of railway could be constructed within the city limits. Mr. Hibbard is desirous of obtaining possession of the water power at Westbury, owned by the city, and it has been offered to him for $22,200, which includes $4,200 paid for plans.

Milwaukee, Wis.—The City Council has granted a franchise to the Milwaukee Electric Railway & Light Company to operate cars over the Sixteenth Street viaduct.

## TRACK AND ROADWAY

*Globe, Ariz.—Press reports state that J. B. Girand is interested in a proposition to establish an electric street railway in Globe and also a line from Globe to Miami.

British Columbia Electric Railway, Vancouver, B. C.—The New Westminster-Eburne line, recently completed by this company, was placed in operation on Nov. 15. At Eburne connection is made with the cars running to Vancouver.

Vallejo & Northern Railroad, Vallejo, Cal.—T. T. C. Gregory, president of this company, which is the successor to the Vallejo & Northern Railway, advises that construction of the line will be begun next year. It will extend from Sacramento to Woodland, Davis, Suisun, Vacaville, Fairfield, Dixon, Winters and Vallejo, at which point steamboat connection will be made for San Francisco. The line will be 110 miles in length. The overhead trolley will be installed on the city lines and it is the intention to use the third rail on the interurban lines. Capital stock, authorized, $2,500,000. Officers: T. T. C. Gregory, Fairfield, president and general manager; W. R. Madden, Fairfield, vice-president; Wm. Pierce, Suisun, secretary; E. D. Holly, Suisun, treasurer. [E. R. J., Nov. 6, '09.]

Greeley (Col.) Street Railway.—This company which is being to a great extent fathered by the Colorado & Southern Railway, has completed about 3 miles of double track in Greeley, having about 1 mile of double track still to lay. The line is disposed in a loop taking in the principal parts of Greeley and the intention is to run cars both ways. The track is standard gage, curves are long radius, rails and overhead construction are exceptionally heavy and the idea prevails that ultimately the proposed Colorado & Southern Railway interurban service from Denver to Greeley will have an inlet to Greeley over these tracks.

Washington, Spa Springs & Gretta Railroad, Washington, D. C.—Announcement is made that this company will soon be ready to take up the work of building the first section of the line which embraces the territory between Fifteenth and H Streets and the Baltimore Pike and Bladensburg Road, in Bladensburg. It is stated that the interests which have been working to finance the railway have been in communication with the firm of Henry A. Allen & Co., consulting engineers, First National Bank Building, Chicago, the prospective builders of the road. A tentative contract between the firm and the company stipulates that the cost of building the first section is not to exceed $107,000.

Bluffton, Geneva & Celina Traction Company, Bluffton, Ind.—The directors of this company have decided to install the overhead trolley system. The use of self-contained moror cars received serious consideration, but the directors at last concluded that this system is not feasible. The first passenger cars over the line between Bluffton and Vera Cruz were handled by a construction engine on Nov. 13. [E. R. J., March 6, '09.]

The Ft. Wayne & Springfield Railway, Decatur, Ind.—This company advises that it expects to build 28 miles of track during the coming year. W. H. Fledderjohann, general manager.

St. Joseph Valley Traction Company, Elkhart, Ind.—This company is pushing the construction of the first section of its railway between Elkhart and Bristol. Work on the construction of the line from Bristol to Middlebury will begin early in the spring and the entire line when completed will be 60 miles long. A contract has been entered into between this company and the Northern Indiana Traction Company, by which St. Joseph Valley Traction Company will have the use of the Northern Indiana Traction Company's tracks for a city entrance and the Northern Indiana Traction Company will have these tracks for city use.

Evansville (Ind.) Railways.—It is semi-officially announced that this company, operating traction lines from Evansville to Newburg and Rockport, Ind., will extend its lines across the Ohio River to Henderson and Owensboro, Ky. It is proposed to use the bridge of the Louisville & Nashville Railroad at Henderson.

Davenport & Manchester Interurban Railway, Davenport, Ia.—A special meeting of the stockholders of this company will be held at Monticello on Dec. 14 to vote on an amendment to increase the capital stock to $650,000. The company proposes to build an electric railway between Davenport and Manchester. [E. R. J., Oct. 23, '09.]

Iowa City (Ia.) Electric Company.—It is stated that this company has succeeded in financing its 4-mile street railway in Iowa City. Officers: S. A. Swisher, president; J. O. Schultze, vice-president and manager; D. A. Reese, secretary; Lovall Swisher, treasurer. [E. R. J., April 24, '09.]

***Oskaloosa, Ia.**—It is stated that Col. T. P. Spillman, Ottumwa, is interested in the construction of an electric railway between Ottumwa and Oskaloosa. It is said that the promoters have secured most of the right of way between Ottumwa and Eddyville, via Kirkville.

**Lexington (Ky.) Railway.**—This company has just built 12 miles of new interurban track between Lexington and Nicholasville and has also reconstructed in brick and concrete, 3 miles of city track. I. L. Oppenheimer, general superintendent.

**Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y.**—This company has decided to electrify that portion of the steam division lying between South Main Street, Gloversville, and the fair grounds crossing in Johnstown.

**Hornell-Bath Interurban Railway, Hornell, N. Y.**—This company has applied to the Public Service Commission of the Second District for authority to construct an electric railway between Hornell and Bath, a distance of 23 miles, passing through the towns of Hornellsville, Fremont, Howard, Avoca and Bath. The company, which is capitalized at $250,000, has also asked permission to issue its common stock to the amount of $250,000 and bonds to the amount of $550,000. Charles Adsit and John M. Finch, Hornell, are interested. [E. R. J., July 31, '09.]

***Asheville, N. C.**—It is stated that M. L. McCormick, St. Paul, Minn., is considering a plan to build an electric railway from Asheville to Waynesville.

**North Carolina Traction Company, Danbury, N. C.**—E. Hillman, president of this company, which is the successor to the Crescent Electric Railway, advises that contracts will be placed within 60 days for the construction of 80 miles of new line, including switches and side tracks. The company will build three bridges, one over the Dan River to be 100 ft. long and two double-track bridges each 80 ft. in length. [E. R. J., Nov. 27, '09 ]

**Ohio Electric Railway, Cincinnati, Ohio.**—This company has begun construction work on the ove head system on the old Columbus & Lake Michigan Railroad between Lima and Defiance. The company states that steam will be used for hauling freight, but as soon as the overhead work is installed hourly passenger service will be inaugurated. All the cars are to be operated by electricity. The Ohio Electric Railway purchased the Columbus and Lake Michigan Railroad more than two years ago and it has been operated as a steam road since that time.

***Fostoria, Ohio.**—Charles A. Bliss, Toledo, representing the Toledo Promoting & Developing Company, is said to be securing a preliminary right of way for an electric railway which the company is planning to build from Fostoria to Paulding and eventually to Defiance.

**Montreal (Que.) Street Railway.**—The Dominion Railway Commission has ordered the Montreal Street Railway to pay $15,000 towards the cost of the subway under the Canadian Pacific Railway at St. Lawrence Boulevard in St. Louis de Mile End, adjoining Montreal. The total cost is about $200,000.

**Oklahoma (Okla.) Railway.**—This company has awarded a contract to John Alley, Oklahoma City, for the grading and bridge work on its proposed extension between Capital Hill and Moore, a distance of 7 miles.

**Citizens' Traction Company, Oklahoma City, Okla.**—W. F. Harn advises that this company, which has recently been incorporated, is a consolidation of the Oklahoma Interurban Company and the line being constructed by the Oklahoma City Land & Development Company. About 7 miles are completed and in operation and an additional 4 miles are under construction. The line now in operation and that under construction is to be operated as a city and suburban system and also terminus of an interurban line between Oklahoma City and Shawnee. Power is being rented from the Oklahoma City Gas & Electric Company. Three cars are being operated over the completed section of the line. Capital stock, authorized and issued, $300,000. Bonds, authorized, $175,000. Officers: L. E. Patterson, president; W. F. Harn, P. O. Box 573, Oklahoma City; J. F. Winans, secretary and treasurer; Alfred Hare, general manager and purchasing agent; H. S. Hurst, general counsel. [E. R. J., Nov. 20, '09.]

**Duquesne & Dravosburg Street Railway, Duquesne, Pa.**—This company advises that it has grading over half done to the Duquesne Borough line. Several cars of rails are on the ground. The entire route has been surveyed and begins at Duquesne, passing through Duquesne Annex, Mifflin Township, to Dravosburg, 3 miles. All contracts have been let excepting those for overhead material. Power will be purchased for the present. The principal contractors are R. D. Hunter & Company, Beaver, and J. W. Spering, Duquesne. Fred W. Scott, Duquesne, president; Douglass-McKnight, Pittsburgh, chief engineers. [E. R. J., Nov. 20, '09.]

**Slippery Rock & Grove City Street Railway, Grove City, Pa.**—S. L. McClure, general manager, advises that this company plans to begin work about the first of the year on the proposed 9-mile railway between Grove City and Slippery Rock. It is the plan to operate gasoline motor cars. Capital stock, authorized, $55,000. Application will be made at once to increase the capital to $250,000. H. B. Graves, Butler, chief engineer. [E. R. J., Oct. 16, '09.]

**Philadelphia & Suburban Elevated Railroad, Philadelphia, Pa.**—The State Charter Board will meet shortly to consider the amended application of this company which has withdrawn its application for a charter for an elevated line on Twelfth and Thirteenth Streets and substituted an application providing for both overhead and underground lines. The most important underground line is on Broad Street from Filbert to Cumberland. S. S. Neff, president. [E. R. J., Sept. 18, '09.]

***Phœnixville, Pa.**—Thomas E. O'Connell, of West Chester, Pa., is promoting an electric railway from Phœnixville to Strafford, 10 miles.

**Anderson (S. C.) Traction Company.**—It is stated that the new owners of this company have secured an option on the Union & Glenn Springs Railroad, which extends from Union to Price on the Seaboard Air Line, a distance of 19 miles, and from Union to Buffalo Mills, a distance of 3 miles. It is said to be the intention of the syndicate to build from Buffalo to Glenn Springs and from Union to Clinton and from Clinton to Laurens or to Greenwood or Abbeville to connect with the line from Anderson.

**Aberdeen (S. D.) Street Railway.**—This company advises that it will probably be ready to award contracts during this winter for the construction of its local street railway. Work is scheduled to begin early next spring. This line will be 4 miles in length. Four cars will be operated. No definite arrangements have yet been made regarding the source for obtaining power to operate the line. Officers: C. N. Herreid, president; A. L. Ward, vice-president; C. F. Easton, secretary; Charles A. Howard, treasurer, all of Aberdeen. [E. R. J., Nov. 20, '09.]

**Lake View Traction Company, Memphis, Tenn.**—This company has just awarded contracts for material for the construction of the first section of its extension from Memphis to Lakeview, 11 miles. The contract for the steel bridge work was let to the Joliet Bridge Company, Joliet, Ill. The Illinois Steel Company was awarded the contract for 1,320 tons of steel rails, including fastenings. The contract for cross ties has not been closed but will likely be awarded to John S. Foster, New Albany, Miss. Other divisions will be completed in the following order, it is announced: Memphis to Lakeview, Lakeview to Clarksdale, Miss ; Memphis to Colliervlle, and Memphis to Jackson, via Covington and Brownsville, Tenn.

**Corpus Christi Street & Interurban Railway, Corpus Christi, Tex.**—This company, which is building a 5 1/3 mile belt line in Corpus Christi, has completed 2 miles of track and has also half of the overhead work done. Power to operate the line will be rented from the People's Light Company, which is now enlarging its plant to accommodate the proposed street railway. The company expects to purchase six cars. Capital stock, authorized and issued, $100,000. Officers: Daniel Hewitt, Corpus Christi, president; Earl C. Heinly, Colorado City, Col., vice-president; V. S. Heinly, Corpus Christi, secretary and treasurer. [E. R. J., Nov. 20, '09.]

***East Texas Traction Company, Dallas, Tex.**—At a meeting recently held in Dallas a preliminary organization was perfected for the building of an interurban railway between Dallas and Terrell. Schuyler Marshall, Dallas, was elected president, and C. L. Wakefield, Dallas, secretary.

**Colonial Beach, Va.**—E. T. Benton, Jr., of Capers & Wright, Evans Building, Washington, D. C., writes that a franchise has been granted to Hon. John G. Capers for an electric railway from Colonial Beach to Quantico, a distance of 22 miles. A company will be incorporated in the near future to build this line. [E. R. J., Oct. 30, '09.]

**Whatcom County Railway & Light Company, Bellingham, Wash.**—A proposition has been submitted to the citizens of Bellingham by L. H. Bean, local manager of the Whatcom County Railway & Light Company, and R. T. Laffin, district manager of Puget Sound, in behalf of the Stone & Webster interests, assuring the construction of Bellingham-Skagit County Interurban Railway immediately by Stone & Webster, provided that the citizens of Whatcom and Skagit Counties raise $400,000 of the $1,500,000, the estimated cost

of the proposed railway. In consideration of the $400,000 raised preferred cumulative stock of the Whatcom Railway & Light Company will be issued. The railway will be about 30 miles in length and will connect Bellingham, Burlington, Mount Vernon and Sedro Woolley.

**Spokane & Inland Empire Railroad, Spokane, Wash.**—This company on Nov. 13 formally opened its new Opportunity-Vera branch, 11 miles long.

**Morgantown & Southern Railway, Morgantown, W. Va.**—This company advises that it will need material and equipment for the construction of 4 miles of track during 1910.

***Appleton, Wis.**—J. P. Barnes, vice-president of the Chicago & Wisconsin Valley Railway, Madison, has advanced a proposition to the Appleton and Outagamie County business interests for the construction of an interurban railway from Appleton northward through Hortonville, New London, Waupaca and to Hancock, Waushara County, where the proposed line will connect with the line of the Chicago & Wisconsin Valley Railway.

### SHOPS AND BUILDINGS

**Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind.**—It is stated that this company has decided to build its new car house and repair shops at Lafayette, the western terminus of the line. It is also the intention to improve and enlarge the car house at Huntingdon.

**Ohio Electric Railway, Cincinnati, Ohio.**—Plans which have been completed for this company by architects for the freight and passenger stations which are to be constructed at Columbus call for four buildings to be located in the plot of land bounded by Town, Rich and Third Streets. The main passenger station, to be located at the corner of Rich and Third Streets, will be two stories high, with a ground area 150 ft. x 87 ft. The large waiting rooms and train shed will take up a good part of the ground floor space. The foundations will be of such strength that the building may be increased to eight stories in height. The freight depot, north of the passenger station, will be 200 ft. x 45 ft., with a drive 32 ft. wide on the east side. On the opposite side of the tracks an express building, 200 ft. x 25 ft., will be erected, and south of it an extra freight depot, 187 ft. x 32 ft.

**Montreal (Que.) Street Railway.**—This company is about to begin the construction of its new shops north of St. Denis Street in the northern part of Montreal. The buildings will consist of a general electric repair shop 200 ft. x 200 ft.; car building shop, 200 ft. x 200 ft.; machine shop, 200 ft. x 200 ft.; blacksmith shop, 200 ft. x 200 ft.; paint shop, 200 ft. x 200 ft.; store shed, 100 ft. x 100 ft., and an oil room 75 ft. x 75 ft. The total cost is estimated at $1,000,000, and the buildings will be laid out so that they can be extended from time to time.

### POWER HOUSES AND SUBSTATIONS

**East St. Louis & Suburban Railway, East St. Louis, Ill.**—This company has just installed and placed in operation in its power station a 2500-kw turbine.

**Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind.**—Announcement is made that this company expects to erect a new power station at Lafayette and enlarge the old plant at Huntingdon.

**Indianapolis, New Castle & Toledo Electric Railway, New Castle, Ind.**—This company has begun work at Shirley on the first of three combination substations and passenger stations which are to be located at Shirley, Maxwell and one at a point 4 miles out of Indianapolis on the line toward New Castle. These buildings will be two stories high and will contain a waiting room, ticket office, freight room and a substation.

**Mason City & Clear Lake Railway, Mason City, Ia.**—This company expects to place during the next three weeks orders for a 500 or 600-kw, 2300-volt, 60-cycle, three-phase generator. Simple Corliss engine and a 500-kw, 600-volt rotary converter.

**New York & North Shore Traction Company, Mineola, N. Y.**—This company recently purchased a site for a power station at Bayside Meadows, and has placed an order with the Westinghouse Electric & Manufacturing Company for the following apparatus to be installed in the plant: two 1000-kw turbo-generators, two 25-kw turbine exciters, four 300-kw rotary converters, four 333-k.v.a, three-phase transformers, one nine-panel switchboard and a five-panel switchboard.

**Sandwich, Windsor & Amherstburg Railway, Windsor, Ont.**—This company advises that it expects to place contracts during the next two weeks for two 500-kw, three-phase, direct-connected alternators, and also two 750-hp engines. James Anderson, general manager.

# Manufactures & Supplies

### ROLLING STOCK

**Athens (Ga.) Electric Railway** will buy three or four convertible or semi-convertible cars in 1910.

**People's Gas & Electric Company, Burlington, Iowa,** will be in the market for five open cars during 1910.

**Alton, Jacksonville & Peoria Railway, Jerseyville, Ill.,** will buy four new 52-ft. interurban passenger cars early next year.

**Cape Girardeau-Jackson Interurban Railway, Cape Girardeau, Mo.,** expects to buy two sets of trucks and motors next year.

**Oklahoma Railway, Oklahoma City, Okla.,** has drawn specifications for 10 20-ft. closed cars, which will be ordered at once.

**Baltimore & Ohio Railroad, Baltimore, Md.,** recently purchased two 90-ton electric locomotives from the General Electric Company.

**Dixon, Rock Falls & Southwestern Electric Railway Company, Tampico, Ill.,** will order two passenger and one express cars next year.

**Peekskill Lighting & Railroad Company, Peekskill, N. Y.,** advises that it contemplates purchasing one sprinkler for next season.

**Seattle, Renton & Southern Railway, Seattle, Wash.,** expects to order six steel cars, one locomotive, and four double-truck flat cars during 1910.

**Wichita Railroad & Light Company, Wichita, Kan.,** expects to buy some Brill trucks, International registers, General Electric motors, and Chicago fenders next year.

**Oklahoma, Kansas & Missouri Interurban Railway, Miami, Okla.,** expects to purchase 30 box cars, 10 gondolas, 2 locomotives and 3 gasoline motor cars during the coming year.

**Charleston Consolidated Railway, Gas & Electric Company, Charleston, S. C.,** will close a contract for four single-truck and six double-truck passenger cars within the next eight weeks.

**Rockland, South Thomaston & St. George Railway, Rockland, Me.,** will buy one construction and two freight cars during 1910, also one fare register, controllers, and other equipment for new cars.

**Northern Ohio Traction Company, Akron, Ohio,** is about to add more cars to its line, and has placed an order with Allis-Chalmers Company for five double A-6 single-end straight-air brake equipments.

**Central Pennsylvania Traction Company, Harrisburg, Pa.,** mentioned in the Electric Railway Journal of Aug. 28, 1909, as being in the market for a sweeper, has ordered one from The J. G. Brill Company.

**Cedar Rapids & Iowa City Railway & Light Company, Cedar Rapids, Ia.,** has ordered a combined straight and automatic air brake equipment from Allis-Chalmers Company for use on a new electric locomotive.

**Pittsburgh Railways, Pittsburgh, Pa.,** has recently placed an order with Allis-Chalmers Company for 49 semi-automatic double-end air brake equipments, to be used on the new cars which the company is now having built.

**Joseph E. Bowen, Bank of Commerce, Norfolk, Va.,** is in the market for one combination passenger, baggage and mail car, equipped with electric trucks for standard-gage track and with 50-hp motors. The car is to have a seating capacity of 25.

**North Carolina Traction Company, Danbury, N. C.,** a road under construction, contemplates buying within 60 days motor cars for freight and passenger service entirely equipped, and also trailers to be run in conjunction with the motor cars.

**Beaumont (Tex.) Traction Company,** mentioned in the Electric Railway Journal of Oct. 30, 1909, as being in the market for three or four double-truck semi-convertible cars, advises they will purchase three cars of this type with 25-ft. bodies before the end of the year.

**Port Arthur (Ont.) Electric Street Railway,** mentioned in the Electric Railway Journal of Oct. 23, 1909, as contemplating the purchase of some new cars, it is learned, will order four more cars 42 ft. long for city service during 1910. They will be of the pay-as-you-enter type.

**Chicago & Joliet Electric Railway, Joliet, Ill.,** mentioned in the Electric Railway Journal of Nov. 6, 1909, as being in the market for two double-truck and two single-truck cars, will order at once two single-truck and four double-truck cars complete with trucks and equipment. The com-

pany will also purchase one set of double trucks for motor equipment.

**Pennsylvania & Ohio Railway, Ashtabula, Ohio,** ordered five quadruple equipments of No. 306 600-volt, direct-current interpole railway motors arranged for single-end control with one K-35-B controller from the Westinghouse Electric & Manufacturing Company. These equipments will be installed on the company's interurban cars which are now operating double-end equipment.

**Oregon Electric Railway, Portland, Ore.,** is in the market for early delivery of three observation trailer cars 62 ft. 6 in. long, including buffet, smoking room, toilet, lavatory, etc.; also three 59-ft. combination smoking and baggage cars and one 50-ton electric locomotive. All this material will be bought through W. S. Barstow & Company, New York. The company contemplates closing order within 10 days for four Rodger convertible ballast cars and one double-truck, 12-ton locomotive crane.

## TRADE NOTES

**Osceold Construction Company, Lincoln, Neb.,** recently organized with a capital of $300,000, will build, equip and develop electric railways.

**Buckeye Jack Manufacturing Company, Louisvile, Ohio,** expects to remove its business about the first of the year to Alliance, Ohio, where it has purchased a large factory.

**Transportation Equipment Company, New York, N. Y.,** has placed 30 of its new T. E. C. fare boxes in service on cars of the Metropolitan Street Railway in New York City.

**Allis-Chalmers Company, Milwaukee, Wis.,** has let a contract to the Worden-Allen Construction Company, of Milwaukee, for the erection of a new machine shop at its Washtenaw Avenue plant.

**Buda Foundry & Manufacturing Company, Chicago, Ill.,** announces that hereafter the company will be known as the Buda Company. There will be no change in the organization or policy of the company.

**Standard Paint Company, New York, N. Y.,** has appointed J. H. Thomas, general manager of sales, with headquarters at the company's main office. Mr. Thomas has been connected with the sales department for a number of years.

**T. H. Symington Company, Baltimore, Md.,** will hereafter make and sell in connection with its other specialties the draft gears formerly made by the Farlow Draft Gear Company, Baltimore, the property of which company it has purchased.

**Sherwin-Williams Company, Cleveland, Ohio,** has called a special meeting of its stockholders for Dec. 20, 1909, to vote on increasing its capital to such an amount as the stockholders may determine. The present capital consists of $4,000,000 common and $2,000,000 preferred stock.

**Simmen Automatic Railway Signal Company, Toronto, Ont.,** reports that in the operation of its signal and dispatching system on the Toronto & York Radial Railway during October a total of 73,410 signal indications were made, showing an efficiency of 99.995 per cent.

**National Brake & Electric Company, Milwaukee, Wis.,** has appointed Sydney F. Weston, district manager for the territory around New York to succeed Sidney I. Wailes, resigned. Mr. Weston was formerly department agent for the International Sprinkler Company, Philadelphia, with headquarters in New York.

**Electric Storage Battery Company, Philadelphia, Pa.,** announces a change in the management of its Southern sales office. H. H. Seaman, the former manager, having resigned, A. N. Bentley has been appointed to take charge of this office. Mr. Bentley has had a comprehensive storage battery experience as the engineer of the company's Cleveland office.

**Wellington G. Sickel,** formerly interested in the United & Globe Rubber Manufacturing Companies, has become associated with C. M. Hewitt and H. H. Hewitt, and will hereafter represent their interests in connection with the Hewitt Rubber Company, Magnus Metal Company, National Brake Shoe Company and Hewitt Supply Company, the New York offices of which are at 111 Broadway, and the main offices at 303 Railway Exchange Building, Chicago, Ill.

**Harry D. Bayne,** for many years manager of the Canadian branch of the Westinghouse Electric & Manufacturing Company, has acquired an interest in the General Electric Company of Sweden, and has opened an office for the transaction of the business of the company at Montreal. The Swedish Company has been doing business in Canada for some time, but in a somewhat limited way. Application will be made for incorporation in Canada, and under Mr. Bayne's management the business of the company will be vigorously pushed throughout the Dominion.

**Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.,** announces the following changes in personnel: S. L. Nicholson, industrial and power sales manager for the last five years, advanced to general sales manager; Charles Robbins, sales engineer for three years in the industrial and power sales department, advanced to the management of the same; G. Brewer Griffin, advanced after six years' service as assistant manager of the detail and supply sales department to the management of the same; Samuel A. Chase, resigned as New York special detail and supply salesman to become manager of the Chicago office of the White Investing Company.

## ADVERTISING LITERATURE

**J. G. Brill Company, Philadelphia, Pa.,** has issued a 24-page catalog, known as No. 184, in which Brill fare boxes are described and illustrated.

**Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.,** describes portable direct-current ammeters and voltmeters in Circular No. 1181.

**Automatic Lock Nut Company, Rockford, Ill.,** is distributing a card illustrating and describing its patent spiral spring steel automatic lock nut.

**Buckeye Electric Company, Cleveland, Ohio,** is distributing a folder in which its achievements in developing the incandescent lamp are set forth.

**Hayes Track Appliance Company, Geneva, N. Y.,** has issued Bulletin No. 58, dated November, 1909, in which various types of Hayes derails installed in the vicinity of Chicago are illustrated.

**Johns-Streeter Company, New York, N. Y.,** has issued a 4-page circular describing the Streeter flexible steel-back and steel-lug brake shoe of the M. C. B. standard type for steam and electric railways.

**American Ship Windlass Company, Providence, R. I.,** has issued a pamphlet entitled "Mechanical Control of Air and Coal," which describes construction and operation of the Taylor gravity underfeed stoker.

**Northwestern Expanded Metal Company, Chicago, Ill.,** has published a small pamphlet with the title "Overcoated Houses," which contains instructions for applying "Knoburn" expanded metal lath for stucco finish of buildings.

**Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y.,** has issued Pamphlets Nos. A2176, A4656, A5326, A5550 and A5569, in which the company's private exchange switchboards are described and illustrated.

**Beaver Dam Malleable Iron Company, Beaver Dam, Wis.,** has issued an 18-page publication in which attention is called to the increasing use of malleable iron as an economical material from which to make tie plates and third-rail brackets.

**United States Aluminium Company. Pittsburgh, Pa.,** has reprinted in pamphlet form an article by E. K. Davis which appeared in *Engineering News*, entitled "Bimetallic Condenser Tubes," which describes the properties of aluminium-copper tubes made by this company.

**Duplex Metals Company, New York, N. Y., in** a recently published folder demonstrates the economy of using a No. 0 copper-clad trolley wire in connection with a No. 1 copper feeder instead of a No. 0000 copper trolley wire having about the same conductivity.

**C. A. Wood Preserver Company, Austin, Tex.,** has reprinted a very interesting chart prepared by Benjamin Nickels in the form of a tree showing the more important compounds existing in and derived from coal tar by distillation. C. A. wood preserver is prepared from many of these compounds.

**Under Feed Stoker Company, Chicago, Ill.,** has published the report of the boiler tests made at the plant of the Union Gas & Electric Company, Cincinnati, Ohio, by W. H. Groverman, M. E., under the direction of John W. Hill & Sons, Cincinnati, Ohio, consulting engineers. The boilers in the equipment under test were fitted with Jones stokers.

**Electric Renovator Sales Company, Pittsburgh, Pa.,** has issued two publications, one entitled, "It Eats Dirt," and the other, "Would You Hang a Man on Circumstantial Evidence?" "It Eats Dirt" contains a description of the company's Invincible electric renovator and shows the application of the machine to the household, the shop and the office building. This publication is concluded with a long list of public buildings, offices, buildings, churches, theaters, residences, banks, schools, colleges, etc., which are using the Invincible cleaners. The publication, "Would You Hang a Man on Circumstantial Evidence?" contains letters from various users of Invincible cleaners, testifying to their efficiency.

# TABLE OF MONTHLY EARNINGS

Notice:—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement, "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. *Including Taxes. †Deficit.

| Company | Period | Gross Income | Operating Expenses | Gross Income Less Operating Expenses | Deductions From Income | Net Income |
|---|---|---|---|---|---|---|
| AKRON, O. Northern Ohio Tr. & Light Co. | 1m., Oct '09 | 184,815 | 100,800 | 84,015 | 44,114 | 39,907 |
| | 1 " " '08 | 157,532 | 90,258 | 67,274 | 43,779 | 23,496 |
| | 10 " " '09 | 1,818,987 | 988,530 | 830,457 | 437,456 | 393,000 |
| | 10 " " '08 | 1,578,085 | 912,300 | 665,785 | 438,521 | 227,263 |
| BELLINGHAM, WASH. Whatcom Co. Ry. & Lt. Co. | 1m., Sept. '09 | 34,836 | 18,957 | 15,879 | 8,069 | 7,809 |
| | 1 " " '08 | 28,381 | 17,363 | 11,018 | 8,945 | 2,072 |
| | 12 " " '09 | 397,272 | 223,798 | 173,474 | 101,026 | 72,448 |
| | 12 " " '08 | 359,087 | 205,581 | 153,506 | 95,293 | 58,213 |
| CHAMPAIGN, ILL. Illinois Tr. System. | 1m., Sept. '09 | 373,252 | *212,510 | 160,741 | 3,585 | 157,156 |
| | 1 " " '08 | 357,508 | *196,009 | 161,499 | ..... | 161,499 |
| | 9 " " '09 | 3,164,461 | *1,857,957 | 1,316,908 | 30,444 | 1,286,464 |
| | 9 " " '08 | 2,973,051 | *1,721,452 | 1,251,599 | ..... | 1,251,599 |
| CHARLESTON, S. C. Charleston Con. Ry., Gas & Elec. Co. | 1m., Oct. '09 | 63,764 | 44,613 | 19,150 | 13,917 | 5,233 |
| | 1 " " '08 | 60,655 | 41,693 | 18,961 | 13,817 | 5,145 |
| | 8 " " '09 | 515,189 | 329,908 | 185,280 | 111,333 | 73,947 |
| | 8 " " '08 | 505,751 | 327,664 | 178,087 | 110,358 | 67,728 |
| CHICAGO, ILL. Aurora, Elgin & Chicago Railroad. | 1m., Sept. '09 | 149,141 | 74,468 | 74,673 | 29,413 | 45,260 |
| | 1 " " '08 | 137,387 | 70,804 | 66,583 | 27,624 | 38,958 |
| | 3 " " '09 | 480,453 | 228,811 | 251,643 | 87,663 | 163,979 |
| | 3 " " '08 | 440,030 | 214,188 | 225,842 | 83,027 | 142,815 |
| Chicago Railways. | 1m., Sept. '09 | 1,066,050 | 718,201 | 347,855 | ..... | ..... |
| | 1 " " '08 | 960,568 | 788,808 | 171,760 | ..... | ..... |
| | 9 " " '09 | 9,134,608 | 5,978,927 | 3,155,681 | ..... | ..... |
| | 9 " " '08 | 8,034,622 | ..... | ..... | ..... | ..... |
| CLEVELAND, O. Cleveland, Painesville & Eastern R.R. | 1m., Oct. '09 | 29,467 | *15,880 | 13,587 | 8,793 | 4,794 |
| | 1 " " '08 | 25,223 | *15,728 | 9,495 | 7,977 | 1,518 |
| | 10 " " '09 | 271,673 | *136,461 | 135,212 | 84,398 | 50,814 |
| | 10 " " '08 | 250,452 | *142,304 | 108,148 | 80,371 | 27,776 |
| Cleveland, Southwestern & Columbus Ry. | 1m., Oct. '09 | 81,523 | 51,393 | 30,130 | 26,358 | 3,772 |
| | 1 " " '08 | 69,427 | 41,540 | 27,887 | 20,561 | 7,326 |
| | 10 " " '09 | 748,517 | 458,613 | 289,904 | 248,141 | 41,763 |
| | 10 " " '08 | 648,625 | 418,352 | 230,273 | 201,997 | 28,276 |
| Lake Shore El. Ry. | 1m., Oct. '09 | 94,255 | *49,754 | 44,501 | 35,453 | 9,047 |
| | 1 " " '08 | 87,678 | *47,418 | 40,260 | 34,290 | 5,970 |
| | 10 " " '09 | 929,310 | *489,445 | 439,871 | 344,547 | 95,325 |
| | 10 " " '08 | 874,888 | *486,915 | 387,972 | 322,010 | 65,963 |
| DALLAS, TEX. Dallas Electric Corporation. | 1m., Sept. '09 | 107,570 | 74,512 | 33,058 | 25,109 | 7,949 |
| | 1 " " '08 | 95,842 | 63,080 | 32,763 | 27,957 | 4,806 |
| | 12 " " '09 | 1,277,466 | 803,271 | 474,195 | 338,863 | 135,332 |
| | 12 " " '08 | 1,152,235 | 776,604 | 375,631 | 353,411 | 22,220 |
| DETROIT, MICH. Detroit United Railway. | 1m., Oct. '09 | 724,791 | 471,499 | 253,292 | *155,972 | 97,320 |
| | 1 " " '08 | 619,490 | *412,650 | 206,840 | 133,379 | 73,461 |
| | 10 " " '09 | 6,796,430 | 4,174,032 | 2,622,398 | *1,565,480 | 1,056,918 |
| | 10 " " '08 | 5,989,402 | *3,807,903 | 2,181,499 | 1,352,239 | 829,260 |
| EAST ST. LOUIS, ILL. East St. Louis & Suburban Co. | 1m., Sept. '09 | 176,402 | 87,324 | 89,077 | ..... | ..... |
| | 1 " " '08 | 170,027 | 87,161 | 82,866 | ..... | ..... |
| | 9 " " '09 | 1,481,078 | 818,000 | 663,072 | ..... | ..... |
| | 9 " " '08 | 1,487,855 | 781,239 | 706,617 | ..... | ..... |
| EL PASO, TEX. El Paso Elec. Co. | 1m., Sept. '09 | 50,501 | 29,874 | 20,627 | 8,185 | 12,442 |
| | 1 " " '08 | 43,828 | 33,338 | 10,490 | 7,133 | 3,357 |
| | 12 " " '09 | 574,578 | 366,077 | 208,501 | 94,377 | 114,123 |
| | 12 " " '08 | 530,215 | 375,030 | 155,185 | 82,817 | 72,368 |
| FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co. | 1m., Sept. '09 | 132,736 | 71,064 | 61,672 | ..... | ..... |
| | 1 " " '08 | 122,443 | 60,973 | 61,469 | ..... | ..... |
| | 9 " " '09 | 1,038,350 | 608,539 | 429,811 | ..... | ..... |
| | 9 " " '08 | 978,700 | 553,469 | 425,231 | ..... | ..... |
| FORT WORTH, TEX. Northern Texas Elec. Co. | 1m., Sept. '09 | 104,829 | 57,786 | 47,043 | 17,190 | 29,853 |
| | 1 " " '08 | 88,190 | 49,316 | 38,874 | 15,216 | 23,658 |
| | 12 " " '09 | 1,220,147 | 676,071 | 544,076 | 199,971 | 344,105 |
| | 12 " " '08 | 1,052,922 | 616,171 | 436,750 | 184,562 | 252,189 |
| GALVESTON, TEX. Galveston-Houston Elec. Co. | 1m., Sept. '09 | 100,837 | 56,363 | 44,474 | 22,824 | 21,650 |
| | 1 " " '08 | 91,790 | 46,620 | 45,170 | 20,121 | 25,050 |
| | 12 " " '09 | 1,190,398 | 692,020 | 498,378 | 257,198 | 241,180 |
| | 12 " " '08 | 1,060,003 | 620,378 | 439,624 | 241,240 | 198,385 |
| GRAND RAPIDS, MICH. Grand Rapids Railway. | 1m., Oct. '09 | 82,520 | 41,509 | 41,011 | 19,315 | 21,696 |
| | 1 " " '08 | 76,003 | 37,357 | 38,646 | 18,611 | 20,035 |
| | 10 " " '09 | 858,541 | 404,470 | 454,071 | 190,085 | 263,986 |
| | 10 " " '08 | 784,576 | 394,342 | 390,228 | 184,907 | 205,321 |
| HARRISBURG, PA. Central Penn. Trac. Co. | 1m., Oct. '09 | 62,773 | 44,555 | 18,218 | ..... | ..... |
| | 1 " " '08 | 58,096 | 44,303 | 13,793 | ..... | ..... |
| | 10 " " '09 | 627,520 | 463,194 | 164,326 | ..... | ..... |
| | 10 " " '08 | 591,214 | 466,902 | 124,312 | ..... | ..... |
| HOUGHTON, MICH. Houghton County Tr. Co. | 1m., Sept. '09 | 28,732 | 14,029 | 14,703 | 6,216 | 8,487 |
| | 1 " " '08 | 23,934 | 11,801 | 12,133 | 4,963 | 7,170 |
| | 12 " " '09 | 310,504 | 168,003 | 142,501 | 70,809 | 71,692 |
| | 12 " " '08 | 257,707 | 148,422 | 109,284 | 57,042 | 52,243 |
| JACKSONVILLE, FLA. Jacksonville Elec. Co. | 1m., Sept. '09 | 38,375 | 20,808 | 17,568 | 9,522 | 8,046 |
| | 1 " " '08 | 34,017 | 18,372 | 15,645 | 9,032 | 6,613 |
| | 12 " " '09 | 464,945 | 264,792 | 200,153 | 111,859 | 88,294 |
| | 12 " " '08 | 414,592 | 249,893 | 164,699 | 108,009 | 56,690 |

| Company | Period | Gross Income | Operating Expenses | Gross Income Less Operating Expenses | Deductions From Income | Net Income |
|---|---|---|---|---|---|---|
| MILWAUKEE, WIS. Milwaukee Elec. Ry. & Lt. Co. | 1m., Oct. '09 | 382,395 | 188,897 | 193,498 | 112 764 | 80,734 |
| | 1 " " '08 | 338,442 | 165,955 | 172,487 | 100,560 | 71,928 |
| | 10 " " '09 | 3,536,497 | 1,726,069 | 1,810,428 | 1,065,605 | 744,824 |
| | 10 " " '08 | 3,248,392 | 1,652,570 | 1,595,822 | 994,230 | 601,592 |
| Milwaukee Lt., Ht. & Trac. Co. | 1m., Oct. '09 | 122,801 | 32,977 | 89,825 | 65,386 | 24,440 |
| | 1 " " '08 | 112,675 | 30,560 | 82,115 | 58,858 | 23,258 |
| | 10 " " '09 | 1,235,009 | 324,901 | 910,108 | 646,236 | 263,872 |
| | 10 " " '08 | 1,180,739 | 311,018 | 869,721 | 597,154 | 272,568 |
| MINNEAPOLIS, MINN. Twin City Rapid Transit Co. | 1m., Sept. '09 | 645,197 | 270,035 | 375,162 | 140,251 | 234,911 |
| | 1 " " '08 | 583,876 | 276,589 | 307,288 | 138,667 | 168,621 |
| | 9 " " '09 | 5,176,420 | 2,432,567 | 2,743,852 | 1,248.510 | 1,495,342 |
| | 9 " " '08 | 4,765,802 | 2,372,025 | 2,373,777 | 1,145,122 | 248.655 |
| MONTREAL, CAN. Montreal St. Ry. | 1m., Oct. '09 | 354,007 | 174.735 | 179,272 | 31,079 | 148,193 |
| | 1 " " '08 | 328,608 | 165,424 | 163,184 | 30,180 | 133,004 |
| NASHVILLE, TENN. Nashville Railway & Light Co. | 1m., Oct. '09 | 148,992 | 89,193 | 59,799 | 33,023 | 26,776 |
| | 1 " " '08 | 141,815 | 82,888 | 58,927 | 32 829 | 26,098 |
| | 10 " " '09 | 1,415,675 | 836,322 | 579,353 | 328,306 | 251,047 |
| | 10 " " '08 | 1,309,348 | 786,279 | 523,069 | 319,620 | 203,449 |
| PADUCAH, KY. Paducah Traction & Light Co. | 1m., Sept. '09 | 19,096 | 10.895 | 8,201 | 6,613 | 1,588 |
| | 1 " " '08 | 18,694 | 10,488 | 8,206 | 6,750 | 1,456 |
| | 12 " " '09 | 223,390 | 130,742 | 92,648 | 81,791 | 10,856 |
| | 12 " " '08 | 230,882 | 138,305 | 92,577 | 83,474 | 9,103 |
| PENSACOLA, FLA. Pensacola Electric Co. | 1m., Sept '09 | 21,649 | 12.828 | 8,821 | 4,335 | 4,486 |
| | 1 " " '08 | 17,417 | 12,036 | 5,381 | 4,352 | 1,030 |
| | 12 " " '09 | 239,858 | 137,181 | 102,677 | 51,865 | 50,813 |
| | 12 " " '08 | 211,288 | 152,718 | 58,570 | 51,551 | 7,018 |
| PHILADELPHIA, PA. American Rys. Co. | 1m., Oct. '09 | 247,827 | ..... | ..... | ..... | ..... |
| | 1 " " '08 | 231,126 | ..... | ..... | ..... | ..... |
| | 4 " " '09 | 1,075,463 | ..... | ..... | ..... | ..... |
| | 4 " " '08 | 1,016,221 | ..... | ..... | ..... | ..... |
| PLYMOUTH, MASS. Brockton & Plymouth St. Ry. Co. | 1m., Sept. '09 | 12,833 | 9,359 | 3,474 | 1,641 | 1,833 |
| | 1 " " '08 | 12,603 | 6,678 | 5,925 | 1,833 | 4,092 |
| | 12 " " '09 | 129 964 | 90,935 | 39,029 | 22,771 | 16,258 |
| | 12 " " '08 | 120,716 | 90,003 | 30,713 | 27,101 | 3,612 |
| PORTLAND, ORE. Portland Ry., Lt. & Pwr. Co. | 1m., Oct. '09 | 426,707 | 188,721 | 237,986 | 126,873 | 111,113 |
| | 1 " " '08 | 372,398 | 182,111 | 190,287 | 113,462 | 76.825 |
| | 10 " " '09 | 3,974,354 | 1,839,919 | 2,134,405 | 1,238,208 | 896,197 |
| | 10 " " '08 | 3,594,501 | 1,779,232 | 1,815,269 | 1,151,897 | 663,372 |
| ST. JOSEPH, MO. St. Joseph Ry., Lt., Heat & Pwr. Co. | 1m., Oct. '09 | 82,363 | 43,167 | 39,196 | 21,521 | 17,675 |
| | 1 " " '08 | 78,512 | 39,503 | 39,009 | 20,760 | 18,249 |
| | 10 " " '09 | 805,170 | 417,697 | 387,473 | 213,601 | 173,872 |
| | 10 " " '08 | 750,743 | 382,281 | 368,462 | 205 302 | 163,160 |
| ST. LOUIS, MO. United Railways Co. of St. Louis. | 1m., Oct. '09 | 1,039,267 | 627,968 | 411,299 | 232,267 | 179,032 |
| | 1 " " '08 | 949,914 | 572,326 | 377,588 | 233,845 | 143,743 |
| | 10 " " '09 | 9,265,653 | 5,845,673 | 3,419,980 | 2,333.899 | 1,086,081 |
| | 10 " " '08 | 8,810,539 | 5,645,394 | 3,165,145 | 2,331,178 | 833,967 |
| SAN FRANCISCO, CAL. United Railroads of San Francisco. | 1m., Sept. '09 | 624,261 | 342,730 | 281,531 | ..... | ..... |
| | 1 " " '08 | 581,392 | 322,927 | 258,465 | ..... | ..... |
| | 9 " " '09 | 5,457,039 | 3,148,239 | 2,308,800 | ..... | ..... |
| | 9 " " '08 | 5,079,336 | 3,246,531 | 1,832.805 | ..... | ..... |
| SAVANNAH, GA. Savannah Elec. Co. | 1m., Sept. '09 | 49.523 | 32,031 | 17,493 | 17,445 | 48 |
| | 1 " " '08 | 48,404 | 27,662 | 20,742 | 17,554 | 3,188 |
| | 12 " " '09 | 611,840 | 391,412 | 220,428 | 209,138 | 11,289 |
| | 12 " " '08 | 591,798 | 397,202 | 194,596 | 205,922 | †11,327 |
| SEATTLE, WASH. Seattle Elec. Co. | 1m., Sept. '09 | 568,494 | 305,341 | 263,153 | 106,944 | 156,209 |
| | 1 " " '08 | 385,946 | 209,952 | 175,994 | 93,345 | 82,649 |
| | 12 " " '09 | 5,592,481 | 3,238,318 | 2,354,162 | 1,220,797 | 1,133,366 |
| | 12 " " '08 | 4,425,521 | 2,606,946 | 1,818,575 | 1,054,338 | 764,237 |
| SYDNEY, N. S. Cape Breton Elec. Co., Ltd. | 1m., Sept. '09 | 22,000 | 11,410 | 10,590 | 5,062 | 5,528 |
| | 1 " " '08 | 22,006 | 11,706 | 10,301 | 4,961 | 5,339 |
| | 12 " " '09 | 236.111 | 142,384 | 93,727 | 60.077 | 33,650 |
| | 12 " " '08 | 252,890 | 145,012 | 107,878 | 59,251 | 48,627 |
| TACOMA, WASH. Puget Sound Elec. Railway. | 1m., Sept. '09 | 179,956 | 107,605 | 72,351 | 48,552 | 23,799 |
| | 1 " " '08 | 143,121 | 90,243 | 52,878 | 43,372 | 9,506 |
| | 12 " " '09 | 1,822,449 | 1,208,142 | 614,307 | 553,272 | 61,035 |
| | 12 " " '08 | 1,625,846 | 1,021.649 | 604,197 | 510,955 | 93,242 |
| TAMPA, FLA. Tampa Elec. Co. | 1m., Sept. '09 | 47,108 | 27,253 | 19,855 | 4,615 | 15,240 |
| | 1 " " '08 | 43,356 | 26,705 | 16,652 | 4,538 | 12,114 |
| | 12 " " '09 | 582,847 | 352,488 | 230,360 | 55,939 | 174,420 |
| | 12 " " '08 | 543,185 | 365,614 | 177,570 | 28.530 | 149,040 |
| TOLEDO, O. Toledo Rys. & Lt. Co. | 1m., Sept. '09 | 218,095 | 121,779 | 96,316 | 75,483 | 20,833 |
| | 1 " " '08 | 222,953 | 111,900 | 111,053 | 71,977 | 39,076 |
| | 9 " " '09 | 1,983,633 | 1,134 049 | 849.584 | 652,202 | 197,382 |
| | 9 " " '08 | 1,867,894 | 1,019,823 | 848,071 | 635,743 | 212,328 |
| WASHINGTON, D.C. Wash., Baltimore & Annapolis Elec. Ry. | 1m., Sept. '09 | 58,789 | 33,160 | 25,629 | 29,079 | †3,450 |
| | 1 " " '08 | 55,938 | 31,899 | 24,039 | 25,169 | †1,130 |
| | 3 " " '09 | 172,505 | 99,818 | 72 687 | 88,134 | †15,447 |
| | 3 " " '08 | 151,545 | 100,667 | 50,878 | 75,270 | †24,392 |