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Reconstruction of the Metropolitan Street Railway

The changes that have been made in the property of the Metropolitan Street Railway of New York during the two and a half years of receivership through which the lines have passed furnish an interesting part of the history of transportation on Manhattan Island. Monopoly of the surface railway facilities on the Island was one of the strongest distinguishing characteristics of the system which was abolished. Where one company previously operated all the surface lines, there are now five separate operating systems and another company which has discontinued operation. By the policy of segregation of various lines, the Metropolitan system has been changed radically. The causes underlying the segregation of various properties are explained in another part of this issue. Other aspects of the work of reconstruction of the present system, showing the results of the introduction of new and more economical methods, will be described in a series of articles to be published in subsequent issues.

The Dollar Bill Club of Yonkers

It is said that when railroads were first built in China the natives manifested such great hostility to the new method of transportation that they tore up the rails, demolished the locomotives and did everything which they could to block the introduction of improvements. We are accustomed to regard such evidences of unreasonable antipathy as characteristic exclusively of the benighted heathen, but the same process or lack of process of reasoning has been manifested by those inhabitants of Yonkers who endeavored to stop the use of prepayment cars in that city. Undoubtedly if a large number of the residents of Yonkers prefer the old style of car, an effective way of blocking the use of the prepayment car is for many of them to present one dollar bills to the conductor and require change of him. This may be within their legal rights, but it seems strange that a type of car which possesses such undeniable advantages from the viewpoint of the passenger should be regarded with such disfavor. There are undoubtedly advantages to the company in the operation of prepayment cars but in the most important of them, its safety, the public benefits in as equal if not greater degree.

Lectures to Shop Foremen

It is quite the fashion nowadays for the larger electric railways to have a shop foremen's organization for the comparison and discussion of practices and records. Some of these bodies have profitably broadened their scope by inviting the representatives of manufacturers to address them on special topics. Many of these lectures are of great value to both the maker and the user of the equipment, for each is made better acquainted with the reasons for the other party's point of view. While this practice is no longer novel, it cannot be said that the

lecturer always understands just what kind of a discourse will do the most good. The practical men who attend these meetings are not particularly interested in hearing the praises of a certain make of apparatus. On the contrary, they want to learn only how they can minimize, if not entirely eradicate, the defects of the equipment in their charge. Consequently, the lecturer should not hesitate to devote himself to a frank consideration of the troubles which the audience calls to his attention, whether before or during the meeting. A recent talk on wheels, which aroused considerable interest among the auditors, was based entirely on questions which had been propounded long enough before the meeting to permit a comprehensive reply. This method is much better than reading a diffusive, general paper for an hour and then starting a more or less desultory discussion. When the lecture is to deal with some new apparatus about which the audience has little knowledge, it is a good plan to send as a lecturer a man who has practical knowledge of operating matters as well as of the details of manufacture. The designer is too apt to dwell on some favorite detail at wearisome length, whereas the man who has handled the apparatus under actual service conditions will be better prepared to answer the questions of both shop and transportation men. The suggestion can pertinently be made here of another direction in which the value of a shop organization can often be increased. It frequently happens that at one shop of a large system some new equipment is in use or some new methods have proved successful. The beneficial results of an experiment by one foreman will be multiplied if his confrères have the opportunity of examining his practice directly for themselves.

Railroad Club Report on Trunk Line Electrification

For a number of years the annual "Electrical Night" has been a feature of the New York Railroad Club's program of monthly meetings. Several of these past occasions have served largely as an opportunity for engineers representing electrical manufacturing interests to place before railroad officials a summary of the systems and apparatus they were offering, to solve this or that railroad electrification problem, sometimes with the element of commercial rivalry so much in evidence that the campaign of education defeated its own purpose by giving the impression that electrical men could not agree among themselves on the best system to recommend to the railroads. The meeting of March 18, however, was in several ways a striking change from previous meetings in its development of the subject. Instead of the contrary and confusing statements of interested partisans, the interpretation of the topic was taken up by a committee of the club itself, consisting of one superintendent of motive power, five representatives of the construction or electrical departments of several leading steam railroad companies and two independent consulting electrical engineers. This plan insured a treatment of the subject from the standpoint of the professional railroad man.

In the text of the report, electrical engineers familiar with the subject will not find much that is new. It sums up the past history and present development of steam railroad electrification and discusses at length and quite fairly the characteristic features, the reasons for considering electrification, its cost, and its advantages and disadvantages. The only new feature of the report is the fact that it is practically the first carefully prepared statement of the details of the problem with full recognition of

their relative importance from a committee of railroad men, who are to be complimented on the thoroughness with which they covered the field. In fact, as one of the speakers remarked, it is indeed worthy of note that a committee so constituted could find six advantages and only two disadvantages in the final summing up on trunk line electrification.

Throughout the report, the committee avoided a comparison of "systems," but did not do so entirely in the fifth conclusion, which was to the effect that "the electrification for passenger terminal and suburban service is now more or less settled as to method, but for freight and trunk line service, it is in the experimental stage." It was upon this conclusion that the principal part of the dissent of the evening was expressed, as the natural inference from the first part of it is that the committee believe future terminal work should continue to be done on past lines, that is, with direct current, but this can hardly be the case because, in subdivision "b" of the conclusion, the third-rail is condemned as being unsuitable for complicated switch work. The second part of the main statement, namely, that trunk line electrification is in an experimental stage, was combated by Mr. Murray on the strength of the performance of the New Haven system. He based his views on his practical and operative experience with a real trunk line equipped with electric power and registered his opinion without hesitation that the single-phase system was the most economical for trunk line purposes, including freight and passenger traffic, terminal and suburban operation.

Of course, any attempt to summarize a broad situation must be expressed in terms so general in their character as to be capable of different interpretations. It is easy to understand how the expression "trunk line" might convey different meanings to different persons. We agree with Mr. Murray, however, that the New Haven system should now be considered as having passed the experimental stage, especially as the decision has been reached by the company to equip both the Harlem division and the extension to New Haven along practically the present lines.

In this connection it is interesting to consider the history of steam railroad electrification, as cited by the committee. Beginning with 1895, the report mentions nine examples of this work (counting the Pennsylvania Terminal and the Long Island Railroad as one system) and omits a tenth instance—the Denver & Interurban 11,000-volt, single-phase installation, which is a division of the Colorado & Southern Railroad. Of these 10 examples, six are alternating current, and four direct current. All of the direct-current lines were installed in 1906, or prior to that date, with the exception of the Pennsylvania, which might not be considered an exception, as it is tied both electrically and from a traffic standpoint with the Long Island. On the other hand, all of the alternating-current lines have been installed subsequent to 1906. Even as a coincidence this is interesting.

Finally, the report of the committee should be accepted as possessing all of the advantages and subject to all of the limitations of the report of any committee. As Mr. McClellan explained, it represents the maximum which all of the members could agree upon, but that individual members undoubtedly would have gone very much further. Viewed in the light of what a similar committee about two or three years ago would have stated, the opinions given in it are extremely encouraging and between its lines it is not difficult to read a forecast of the

coming alliance between steam railroad men and electrical engineers to develop the heavy traction work of the future.

The Long Island and West Jersey

The discussion of the report of the committee of the New York Railroad Club outside of that relating to the fifth conclusion contained many notable features. One of the most important was the announcement by George Gibbs, chief engineer of the Pennsylvania Tunnel & Terminal Company, that the Long Island Railroad electrification, which went into service five years ago, was operating at sufficiently low cost below steam operation to pay fixed charges and a handsome surplus besides. This network of about 120 miles of track was the first large steam railroad division to be changed from steam to electric power, and the public acknowledgment that it is now fulfilling its economic mission, fixed charges and all, is most important at this juncture. Coming from one who has had longer experience and more responsibility than any other railroad engineer in this country, both in deciding on and carrying out designs, and in judging of results in steam railroad electrification, this statement is a signal offset to some of the published decisions not to electrify, made during the past few years by such roads as the Boston & Maine, Boston & Albany and the Illinois Central. Mr. Gibbs' reference to the impossibility of working the Flatbush Terminal up to its full capacity by steam power (entirely apart from the tunnel situation there involved) should be convincing to any railroad with a congested city terminal, if at this late date any more argument on that point is necessary.

The less favorable results obtained on the West Jersey & Seashore installation emphasize the economical distinction between a cross-country express service only moderately frequent and service of a local or suburban character. Another factor in the West Jersey situation undoubtedly is that although a third of the road's traffic is through business between Philadelphia and Atlantic City, the road is considerably longer both in time and distance than either of the other two routes between those cities. This condition suggests the inquiry: To what extent would the results have been different if the shortest instead of the longest line between Philadelphia and Atlantic City had been electrified? Another query is equally pertinent: Suppose it would have been feasible at the time that the West Jersey & Seashore was electrified to have installed a single phase installation of this magnitude, would not the operating expenses have shown an even greater decrease over the cost of steam operation than is now shown by the direct current equipment?

Some comment was also made on the lack of instances of the application of electric power to freight transportation on trunk lines. It is true that comparatively little attention has yet been given to this subject but Mr. Stillwell summed this situation up ably when he declared that the same methods of reasoning which have brought electric passenger service to its present high degree of development are applicable in settling the question of the most economical power to apply to freight transportation. It is not reasonable to suppose that there are any very deep mysteries in this matter which cannot be comprehended by the electrical engineer, who is accustomed to careful analysis and whose success in making deductions from known facts has been so well exemplified in the results shown by the existing electrifications of passenger service on steam railroads.

Non-College Men in Railway Work

Considerable attention has been given during the past two years, both at association meetings and by individual companies, to the enrollment of technical graduates among the employees of electric railway systems. Courses for post-graduate education in the work of the different departments of the railway companies have been devised, all leading up to prospective positions of responsibility in the operating department, assuming, of course, that the apprentice has the ability and the aptitude requisite for the work. The subject has been discussed from many points of view, but there is one phase which should receive consideration. This relates to the effect which the establishment of courses of this kind is likely to have upon the great majority of employees of the company who have not enjoyed the privilege of any other education than that taught in the school of experience. We do not refer to any question of assumed intellectual superiority of the college men on account of their scholastic training. If any of them should be imbued with a feeling of this kind when he enters the service, the chances are that it would be thoroughly dispelled during an apprenticeship course of two years or more on an electric road. If it is not, the man is unsuited for the business and would undoubtedly be dropped by the management, or at least he would not be promoted. The serious problems in electric railway work are pre-eminently those calling for executive ability, the power of application and common-sense, and it is only when the college graduate possesses these qualities in as great a degree as the man who has not been to college, that the other qualities and the knowledge gained during his college course will be of value in railway work.

The danger to be guarded against with courses of this kind is dissatisfaction among the other employees unless the management indicates clearly that promotion is equally open to all. The prizes in the electric railway work, as those in other industries, are comparatively few in number, but they are enough to insure the loyalty of the men in the ranks as long as there is a feeling that advancement will be based solely on merit. If a company should pursue the plan of giving undue preference to college-bred men when appointing new foremen or division superintendents or in filling other places of responsibility, the discipline of a railway organization might become seriously affected. Such a policy as this, however, we feel confident, is entirely foreign to the program recommended by the committee on education and is equally absent from the minds of the managements which have established courses of this kind. The years spent by a man at college should not count any more than if he had been engaged on the property for an equal length of time. On the other hand, they should be given some credit and this, as we understand it, is the underlying purpose of the apprenticeship courses.

It is also perfectly proper to assume that the introduction into any force of employees of a few broadly trained, ambitious young men should be an incentive to the other employees to equal or surpass in performance the newcomers, and also to secure a better education by night study. The railway employee who has not had the advantage of a college training, but has studied the theoretical principles which underly electric railway operation by taking a night school or correspondence course, while giving faithful service to the company in the daytime, is the type of man who deserves encouragement. "A fair field and few favors" should be the motto of every manager who is confronted with this delicate problem.

MULTIPLE UNIT TRAINS ON THE NEW HAVEN RAILROAD

On Feb. 28 the New York, New Haven & Hartford Railroad put into operation the first regular multiple unit train service between Port Chester and New York. The present equipment consists of four motor cars and six trailer cars. The car bodies were supplied by the Standard Steel Car Company, and are 70 ft. long. Each has a seating capacity of 76 people. No wood is used in the construction of these cars. The floor is of cement and the metal walls are finished to imitate mahogany. The trucks were furnished by the Standard Motor Truck Company and were described in the *ELECTRIC RAILWAY JOURNAL* for Dec. 12, 1908.

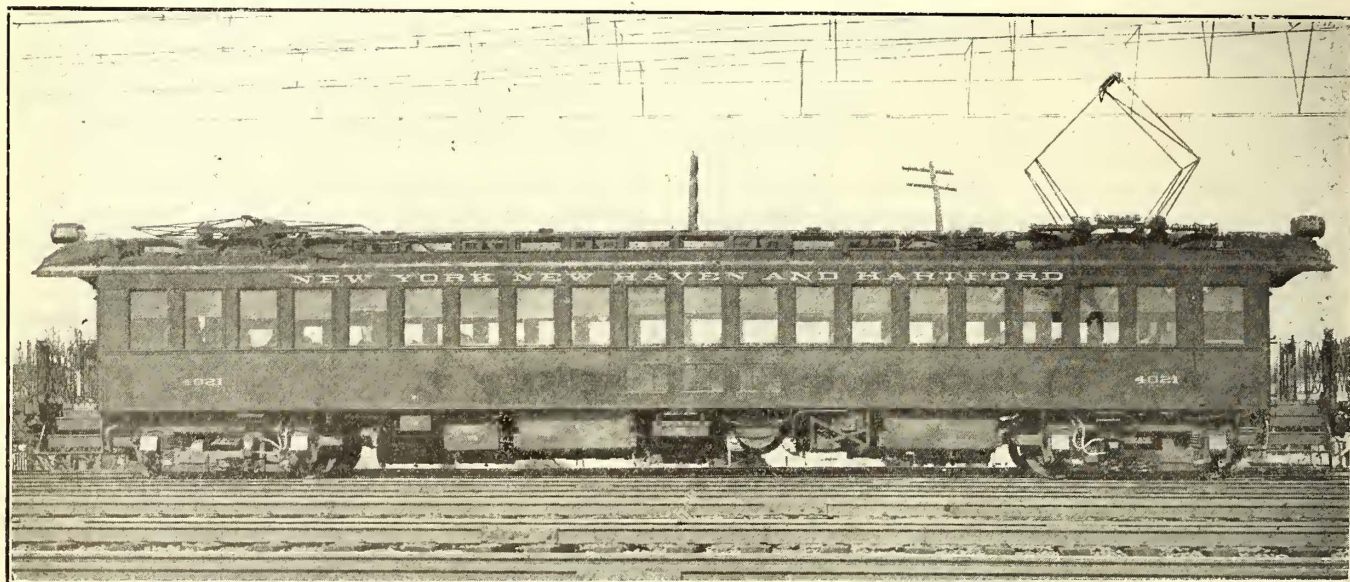
Each motor car weighs 173,400 lb. complete, and is intended to haul two trailers, each of which weighs 99,000 lb. All cars are provided with quick-acting automatic air brakes. The cars operate on 11,000 volts alternating current overhead and 600 volts direct current third-rail.

The electrical equipment of each car consists of four Westinghouse 6-pole, 150-hp single phase series motors, which are geared to spring-supported quills, as described in the previous

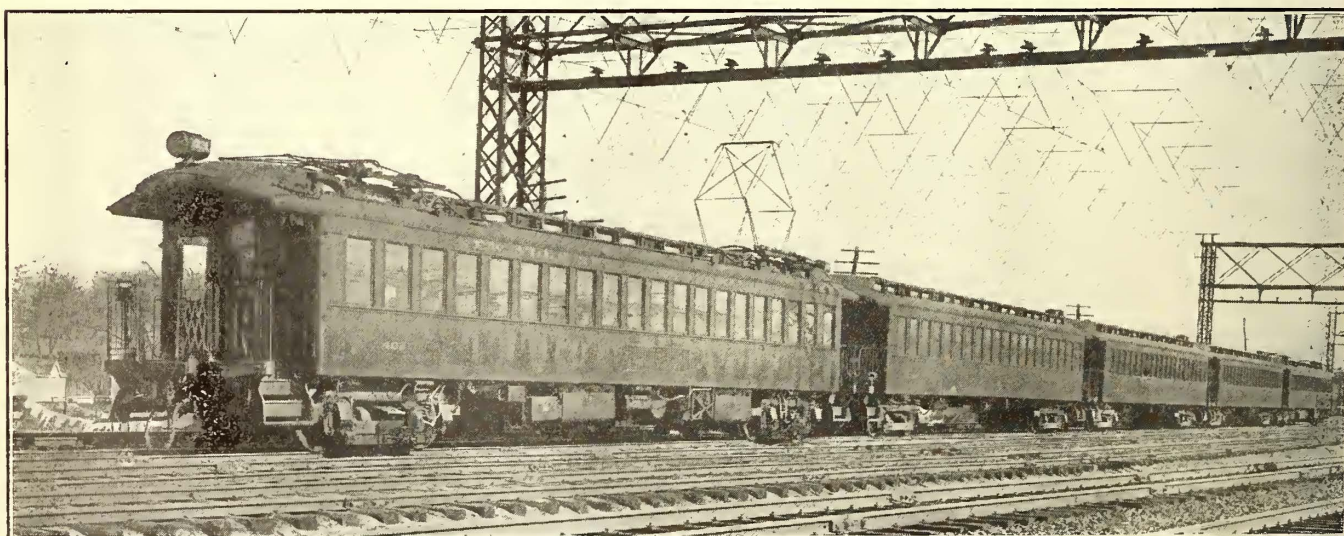
in series and two in parallel when operating 600 volts direct current. On alternating current they are permanently connected two in series and two in parallel. The multiple unit system is used and a complete motorman's equipment is placed



New Haven Multiple Unit Car—Interior View



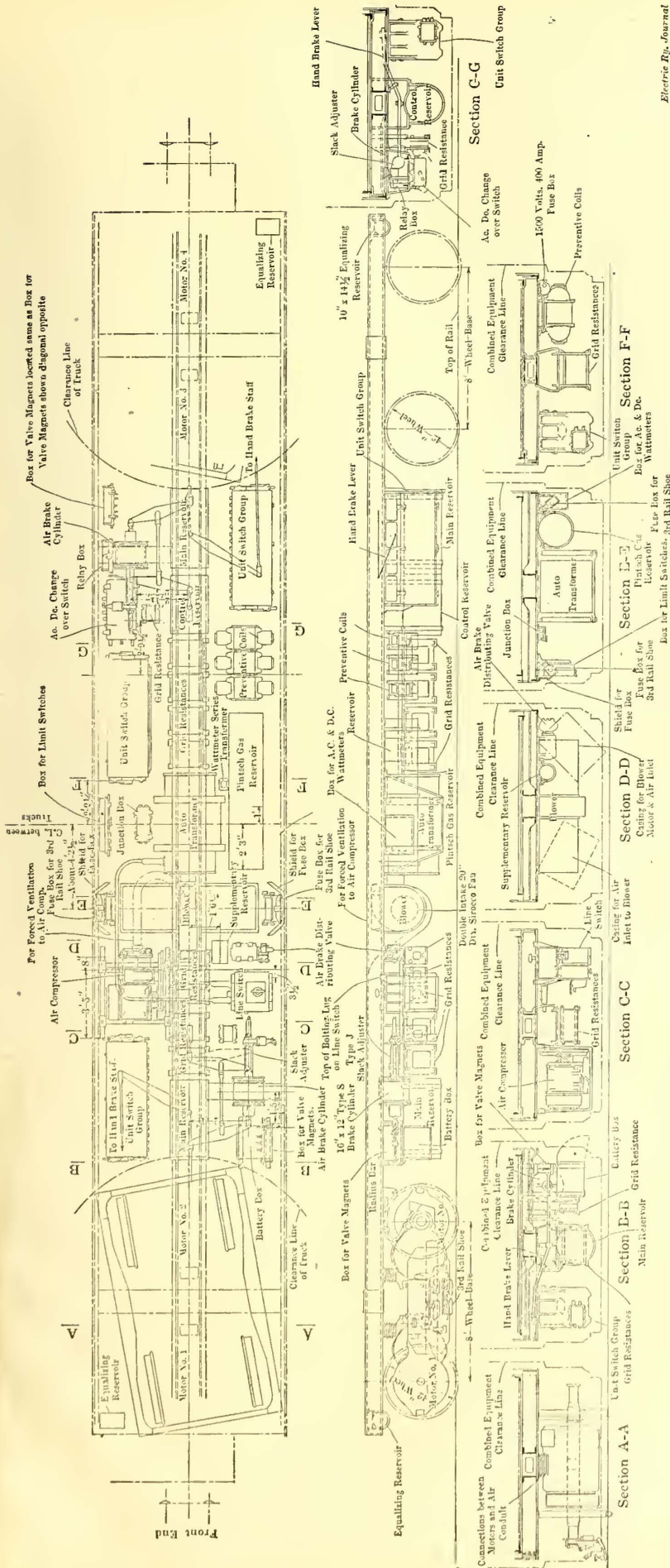
New Haven Multiple Unit Car—Side View



New Haven Multiple Unit Car—Side View of Five-Car Train

article mentioned. The quills are connected to the driving wheels in the same way as are the quills on the New Haven gearless locomotive. The motors are connected four in series, or two

in both ends of every car, trailers as well as motor cars, so that the train can be operated with trailer cars in front if so desired.



New Haven Multiple Unit Car—Plan, Side Elevation and Sections of Car Flooring and Trucks

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A step-down air-blast transformer is placed under the floor at the middle of each motor car. The air for cooling the transformers and motors and for operating the brakes, whistles, pantograph and third-rail shoes is supplied by a motor-driven compressor, which is capable of delivering 35 cu. ft. of free air per minute. The air intakes are located in the side of the car, as shown in the side view of the car.

The overhead current collector is of the pneumatically operated pantograph type, similar in construction to those used on the New Haven locomotives. This collector has been thoroughly tried out, and seems to be well adapted to railroad work, where the height of the contact wire varies over a large range. The upward pressure ranges from 15 to 20 lb., and with the steel contact wire, which has now been in service long enough to demonstrate its value, this high pressure does not produce the excessive wear that occurred when a copper contact wire was used. When running, the forward pantograph is usually down, and the rear one up. In this way, in case of any accident to the collector which might drag it off the car, the forward one is still intact, whereas were the forward collector to be torn off it would probably take the rear one with it.

In passing from the alternating current section to the direct current third-rail system, or vice versa, the necessary change of connections is accomplished by an automatic air-operated change-over switch.

These cars have been under test on the New Haven Railroad for the last few months, and the results have been very satisfactory. A motor car with two trailer cars, having a total weight of 371,400 lb., accelerating up to 25 m.p.h., had an average acceleration of 0.5 mile per hour per second.

REPORT OF MUNICIPAL TRAMWAYS TRUST, OF ADELAIDE, SOUTH AUSTRALIA

The report of the Municipal Tramways Trust of Adelaide, South Australia, for the six months ended July 31, 1909, shows a total revenue of £72,669, including £71,645 traffic receipts, of which £33,863 was earned by the electric railway and £37,782 by the horse system. W. G. T. Goodman, chief engineer and general manager, reports that the total expenditure was £63,193, including £23,577 in connection with the electric service and £39,616 in connection with the horse service. Mr. Goodman states:

"The total working expenses of the electric traction system aggregate 10.82d. per mile. I would point out, however, that this includes all management and supervision charges, which, as the system increases, will be distributed over a greater number of car-miles; it also includes the very great and varied expenditure incurred in the inauguration of the electric traction system.

"The loss in connection with the working of the horse-car system amounts to 1611, which is due to high cost of operating isolated terminal lines by horse traction."

DEVELOPMENT OF THE NEW METROPOLITAN STREET RAILWAY

An account of the methods by which the Metropolitan Street Railway of New York has been reconstructed is of especial interest for two reasons: First, the unusual division of the property into five separate operating systems; second, the comprehensive plan upon which the development of the lines retained by the receivers has been conducted. Insolvency of the New York City Railway Company, lessee of the Metropolitan Company, was announced on Sept. 24, 1907. The receivership was extended to the Metropolitan Company on Oct. 1, 1907. Prior to that time, strong public sentiment had been aroused against the property as a result of the investigation and subsequent disclosures before the New York Public Service Commission, First District.

All conditions appeared adverse to the operating organization in the closing months of 1907. That physical rehabilitation and operating reconstruction were essential was evident. Pending the financial reorganization, which was foreseen to be remote because of the complexity of the problems, steps were taken to effect a complete physical and operating reorganization. Acting under the general direction of the receivers, Oren Root, the general manager, and the staff of department officials began the work of creating a new property. The new structure was developed notwithstanding the public hostility, newspaper adverse criticism and the orders of the Public Service Commission affecting service. The management proceeded to develop, so far as could be determined with all the handicaps that had to be encountered, a basis for a successful and workable system.

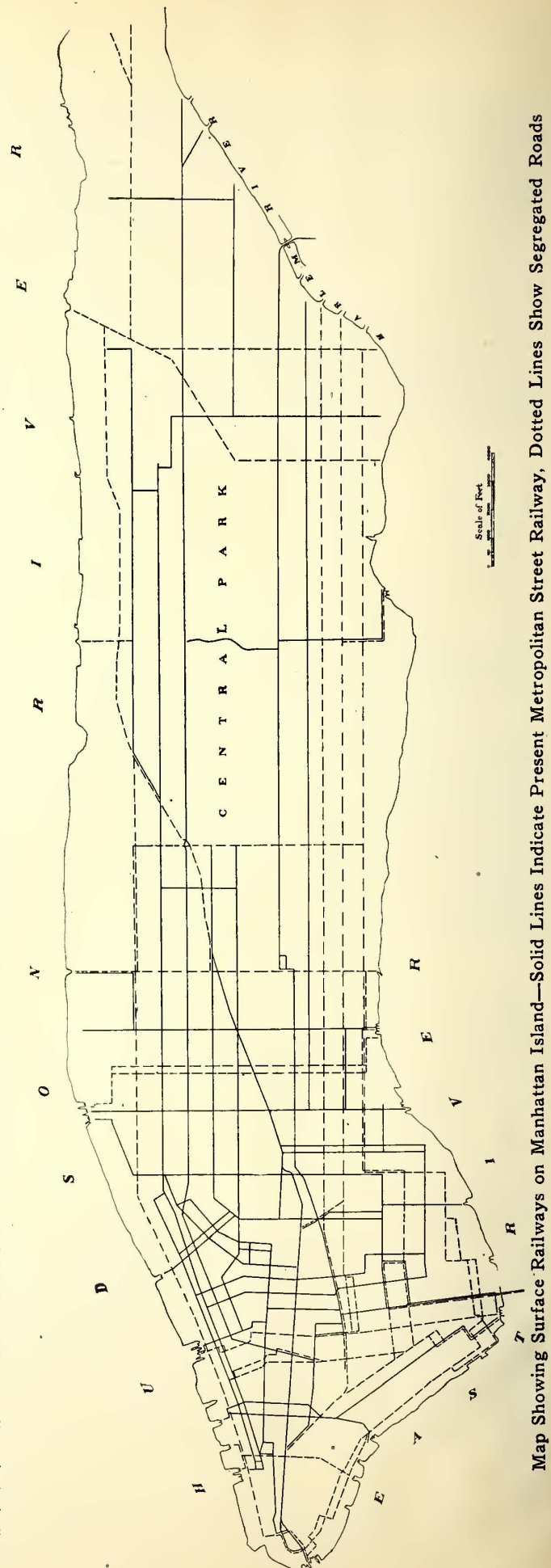
The principal effect of the changes that have been made is found in the improved condition of the property. So far as the ultimate financial effect is concerned, it is clear that the solution is still incomplete. A valuation of the property of the present Metropolitan Street Railway indicates that the revenues remaining after deduction of the operating expenses are insufficient to yield a fair return on the value of the physical property. The percentage of return is much smaller if allowance is made in a valuation for the expense of development arising from supersession of the horse and cable systems which preceded the introduction of electricity as a motive power.

Since the appointment of receivers for the Metropolitan Street Railway Company, a new system, more compact than the old and with fewer financial and transfer obligations, has been demonstrated to be a necessity. The disintegration of the street railway monopoly in the largest city of the country has been accomplished by the complete segregation of various important lines until to-day the Metropolitan lines comprise only about 55 per cent of the mileage of the old system. With the exception of lines which cross the Williamsburgh bridge and terminate at the Brooklyn end of that structure and of a line which crosses the Harlem River and terminates at Mott Haven, the property is confined now to Manhattan Island.

Accompanying the segregation of lines comprising substantially 45 per cent of the mileage of the old system, a step which has solved part of the problems affecting the property, other changes have been made. The scope and important nature of these changes, affecting all the departments concerned with the maintenance and operation of the property, will be described in subsequent articles in the *ELECTRIC RAILWAY JOURNAL*. Application of scientific methods in the solution of the problems of maintenance and operation has effected both a material saving and a substantial increase in efficiency.

CONDITIONS ON MANHATTAN ISLAND

The fact that most of the problems which confront electric railways at the present time exist on Manhattan Island in greater degree than in other cities is due to inherent conditions. Among these may be mentioned the compulsory operation by underground conduit system, the great and increasing congestion due to vehicular and other traffic, the expense of employment arising from the high cost of living in New York and the competition of the most successful rapid



Map Showing Surface Railroads on Manhattan Island—Solid Lines Indicate Present Metropolitan Street Railway, Dotted Lines Show Segregated Roads

transit railways in the world, those of the Interborough Rapid Transit Company.

For some time prior to the appointment of the receivers the operation of the Metropolitan Street Railway had been beset with increasing difficulties due to the heavy financial requirements of the system and the unparalleled and unbusinesslike development of the transfer system as a result of legal requirements. There was also a recognition of the fact that the system was too large and complicated to be operated economically at a 5-cent fare with universal transfer privileges. The Metropolitan Street Railway serves the greatest density of population of any property of this character in the world and has an advantageous short haul traffic as a result of the remarkable development of various centers of business and population on Manhattan Island. The probability of profitable operation was supposed generally, however, to be greater than investigations conducted in the last two years and a half showed were justified. As it was found to be wholly impossible to operate profitably the Metropolitan system as it existed at the time of their appointment, the receivers defaulted the interest on the outstanding \$29,104,000 Metropolitan Street Railway bonds and the dividends on the \$52,000,000 of capital stock. The somewhat spectacular work of segregation of the various properties was then commenced. The problem which lay before the management was that of conserving and up-building, so far as possible, the Metropolitan Street Railway system so as to develop a compact property which could be established on a basis that would permit a reasonable earning power and return of the lines to their security holders.

The policy of segregation, involving the creation of four operating systems in addition to that formed by the Metropolitan lines which were retained, attracted more attention than it would otherwise have received because it reversed the popular conception of coporations and the tendency of business in this country, both of which have been toward the acceptance and formation of monopolies as natural and inevitable.

Before a decision could be made as to which lines should be retained and which should be segregated, it was necessary to make a detailed investigation of the complicated and intercorporate relationships of the Metropolitan main and underlying lines and subsidiary properties. A number of lines which, in themselves, are unprofitable burdens upon the rest of the system, had to be retained for the reason that they were direct parts of the Metropolitan Street Railway. Various horse-power lines are of this character. Where it was possible to segregate other lines because of the existence of leases in which provisions were made for return of the properties in case of default, an investigation of the value of the leases to the existing and the future Metropolitan Street Railway was made. In this investigation, the subject was considered in all its aspects, including the rental or interest charges involved, the probable saving as a result of the elimination of transfers and the part which certain lines might take in the new Metropolitan property which will follow the re-organization. The problem of segregation had to be considered, therefore, both from the financial and the physical standpoints in order that the courses which should yield the best results might be determined.

SEGREGATION OF PROPERTIES

As the first step in the segregation, it was decided to separate the Third Avenue Railroad. The lease of this property by the Metropolitan Street Railway was manifestly unprofitable on account of the heavy fixed charges. This company and its important constituent properties comprised the largest single interest which it was possible to segregate from the Metropolitan system. The investigation of the results of operation under the lease of the Third Avenue Railroad was undertaken shortly after the appointment of the receivers. This included a legal, engineering and accounting study of the relation of the properties. As the investigation demonstrated clearly the unprofitableness of the lease, the property of the Third Avenue Railroad Company was surrendered on Jan. 12, 1908, to a separate receiver, F. W. Whitridge, in accordance with the

instructions of Judge Lacombe of the United States Circuit Court for the Southern District of New York. While this was the most important property that could be segregated, because it involved valuable north and south lines and crosstown lines that commanded central points and accommodated traffic of great density, it was demonstrated that whatever the Third Avenue system might accomplish as an independent property, its usefulness to the Metropolitan system, in view of the heavy fixed charges and the necessity imposed under the law of continuing the exchange of transfers, was at an end.

Segregation of other properties followed more slowly. A careful study was made of all existing leases and agreements with surface properties and as a result of the extended investigation, four other properties were segregated during the calendar year 1908. The first of these was the property of the Fulton Street Railroad Company. The Metropolitan receivers ceased to operate this line on June 1, 1908, and defaulted on the interest of 4 per cent per annum which had been guaranteed on the \$500,000 of first mortgage bonds. This line had been operated under a contract. A separate receiver, Gilbert H. Montague, was appointed. He has not operated the line. The Fulton Street line was operated by the Metropolitan company, from the East River to the North River on streets in the southern business section of Manhattan Island. Horse cars were operated during the day for many years, although very little traffic was secured.

The next distinct property to be segregated was that of the Central Park, North & East River Railroad Company for which

RENTALS, ETC., ON WHICH DEFAULT HAS BEEN MADE BY RECEIVERS OF METROPOLITAN STREET RAILWAY COMPANY.

		Rate per cent.	Annual interest.
Metropolitan Street Railway Company:			
General and collateral trust mortgage bonds.	\$12,500,000	5	\$625,000
Four per cent refunding mortgage bonds...	16,604,000	4	664,160
Dividend rental on capital stock.....	52,000,000	7	3,640,000
Metropolitan Crosstown Railway Company, first mortgage bonds.....	600,000	5	30,000
Third Avenue Railroad Company:			
First mortgage bonds.....	5,000,000	5	250,000
First consolidated mortgage bonds.....	37,560,000	4	1,502,400
Dividend rental on capital stock.....	15,995,800	6	959,748
Central Crosstown Railroad Company:			
Dividend rental on capital stock.....	600,000	15	90,000
Three-year notes.....	2,250,000	5.	112,500
Fulton Street Railroad Company:			
First mortgage bonds.....	500,000	4	20,000
Central Park, North & East River Railroad Company:			
Dividend rental on capital stock.....	1,800,000	9	162,000
Twenty-eighth & Twenty-ninth Streets Crosstown Railroad Company:			
First mortgage bonds.....	1,500,000	5	75,000
Second Avenue Railroad Company:			
General consolidated mortgage bonds.....	1,280,000	5	64,000
First consolidated mortgage bonds.....	5,631,000	5	281,550
Dividend rental on capital stock.....	1,862,000	9	167,580
Debenture bonds.....	89,000	5	4,450
Totals.....	\$155,771,800		\$8,648,388

a separate receiver, George W. Linch, was appointed on Aug. 5, 1908. The property of this company had been operated under a lease by the Metropolitan Railway. This company operates the Fifty-ninth Street line extending across Manhattan Island, which is equipped electrically, and also the so-called belt lines which are operated by horse power and reach the ferries and shipping districts located on the East River and the North River from Fifty-ninth Street to South Ferry.

On Sept. 30, 1908, operation of the property of the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad Company, which had been conducted under a contract, was terminated. Joseph B. Mayer was appointed receiver. This company operates horse cars between the West Twenty-third Street Ferry and the East Thirty-fourth Street Ferry. Its route is via substantially, Twenty-eighth and Twenty-ninth Streets across the Island and for its other trackage it is dependent on joint track arrangements with other companies. The company has recently placed in service one storage battery car.

The receivers ceased operating the property of the Second

Avenue Railroad Company after Nov. 12, 1908, and George W. Linch was appointed receiver. This company operates lines on Second and Third Avenues. The property had been leased by the Metropolitan Street Railway.

Default was also made on the dividend rental and interest on notes of the Central Crosstown Railroad Company, but an agreement was made whereby operation is continued by the Metropolitan system, which meets the interest on the other outstanding securities.

PROTECTION FOR INVESTED FUNDS

A statement of the rentals on which default was made by the Metropolitan receivers is contained in an accompanying table. The total amount of stocks and bonds involved is \$155,771,800 and the annual interest thereon is \$8,648,388.

Apart from the reasons outlined above for the segregation of these properties, another controlling reason was the fact that the Metropolitan Street Railway Company had invested comparatively little money in the five properties mentioned. With the exception of a relatively small amount which was borrowed from the Metropolitan Street Railway Company, the Third Avenue Railroad Company had developed its property from funds raised by issues of its own securities. As both the Fulton Street and the Twenty-eighth and Twenty-ninth Street lines were operated by horse power, and their traffic constituted relatively a small part of the total travel on the Island, little money had been expended on these properties except to meet the current expenses of operation of the cars and the requirements of ordinary maintenance. The portion of the Central Park North & East River Railroad property which had been electrified was relatively small, comprising only the Fifty-ninth Street crosstown line, and the investment of the Metropolitan Company, therefore, was considered to be of less importance than the probable financial advantage that would result from segregation of the property and the discontinuance of the rental. The Second Avenue Railroad, although a property of small traffic as compared with the heavy lines of the Metropolitan and the Third Avenue systems, had not required the expenditure of much money on behalf of the Metropolitan system. This line had been electrified before the lease to the Metropolitan Street Railway became effective.

FRANCHISE CONSIDERATIONS

Another question for consideration was that of the franchises held by the companies which it was desired to segregate. No franchise that seemed to be of relatively great or of sufficient future importance to the Metropolitan system to justify the adoption and retention of these leases and contracts was concerned. The operation of all of the lines of the five companies was plainly unprofitable as constituent parts of the Metropolitan system and their retention would mean a financial sacrifice. As separate properties the operating segregated lines have opportunities to develop an independent business.

Close investigation in the light of present and probable future conditions has been made in order to disclose, if possible, the existence of any further leases or operating contracts which could be abrogated in the endeavor to make the Metropolitan Street Railway a complete operating successful system. Where the margin of profit or loss shown by analysis has been small and some question has arisen as to the wisest ultimate course to follow, some lines have been retained. It was supposed that these lines could be operated with curtailed service with sufficient financial advantage to justify their inclusion in the reconstructed system. Orders of the public regulating body requiring increases in service on some of these lines have increased the doubt as to the advantage of retaining these lines.

One of the most important of the lines of lessor companies that have been retained in the system up to the present time is that of the city line of the New York & Harlem Railroad Company, generally known as the Fourth & Madison Avenue line. The Metropolitan Street Railway Company has invested almost \$4,000,000 in this line and this large amount would be

lost to the Metropolitan Company if it should surrender the lease.

Franchise conditions of some of the lessor companies have necessarily entered into the consideration of this aspect of the question, as, for instance, with the Broadway & Seventh Avenue Railroad Company. This company operates a line extending on Broadway from South Ferry to Forty-Fourth Street and thence on Seventh Avenue to Fifty-ninth Street. This route affords much less traffic than some of the other lines but it furnishes a link in the Broadway & Columbus Avenue line, which is one of the most important surface routes in New York City.

Another consideration that was borne in mind was the fact that such lines as might be segregated could be purchased by competitive systems or used as the basis for new competitive systems. For instance, the Third Avenue Railroad, which is now under an independent and aggressive management, might purchase control of the line of the Eighth Avenue Railroad Company, if that should be segregated. Acquisition of the Eighth Avenue line would give the Third Avenue Railroad Company a north and south route extending the entire length of Manhattan Island.

Although sufficient time has now elapsed to permit fair judgment in the light of the steps taken regarding the wisdom of segregation of the five properties mentioned and the failure to separate other properties, it is plain from the fact that other measures have not followed that nothing has occurred to cause a modification of views concerning the various properties involved. Representatives of the committee of bondholders of the Metropolitan Street Railway in proceedings instituted before Judge Lacombe by the Eighth Avenue Railroad Company, the Ninth Avenue Railroad Company, and the New York & Harlem Railroad Company respectively, to regain possession of their respective properties, have evidently approved of the action of the receivers in deciding to continue the lease of the properties of the three companies.

OPERATING SEGREGATION NOT COMPLETE

The foregoing information relates mainly to the financial segregation of the lines. Financial segregation, however, does not mean complete operating segregation. Although a separate receiver for the Third Avenue Railroad was appointed on Jan. 12, 1908, it was not until April 11 of the same year that transfers were discontinued between the Metropolitan Street Railway and the principal lines of the Third Avenue Railroad, except at points where joint trackage arrangements compel, under the law, the grant of transfer privileges. Later, however, transfers were discontinued with the segregated lines at all points but those at which the statute enforces the issue of transfers, by reason of the joint use of 1000 ft. or more of track.

The most important use of joint facilities by the surface lines, affecting materially the economy of operation, is involved in continuation of the unit system in the production and distribution of power. Financial segregation of the lines has not required any new power house construction such as would have been inevitable if complete segregation of all relations between the systems had been effected. Acquisition of property by the individual systems would have necessitated large investments because of the high values of real estate on Manhattan Island; and separate power houses and sub-stations would have made the costs of power much greater than under the unit system which has been continued.

One power station owned by the Metropolitan Street Railway is located at Ninety-sixth Street and First Avenue and the other, owned by the Third Avenue Railroad, is at 216th Street and the Harlem River. The Metropolitan Company operates six sub-stations and the Third Avenue Company three on Manhattan Island. Two sub-stations receive alternating current from the Kingsbridge power station at 216th Street and the Harlem River and the others are fed from the Ninety-sixth Street station. Irrespective of the ownership of lines Manhattan Island is divided into sections to facilitate the economical distribution of power.

Several cars are rented by the Metropolitan system to segregated lines, but no arrangements for joint equipment or for the interchange of equipment exist.

EFFECTS OF SEGREGATION

The most significant effect of segregation of the various lines from the Metropolitan system is evident in the increase in the average rate of fare received. An accompanying statement compares some of the results of operation for the fiscal year ended June 30, 1907, and the calendar year 1909. These periods were taken because they represented complete years preceding and following the principal changes made in the property. Although the improvement shown in the average fare per passenger, namely, from 3.29 cents to 3.40 cents, indicates a saving which is material when applied to the heavy traffic of the Metropolitan system, the lower figure fails to

METROPOLITAN STREET RAILWAY

	Year ended Dec. 31, 1909.	Year ended June 30, 1907.
Gross earnings.....	*\$12,766,000	*\$18,789,000
Miles electric track.....	121	205
Miles horse track.....	35	87
Total miles track, excluding car.....	156	292
Gross earnings per mile of track.....	\$81,833	\$64,346
Revenue passengers.....	255,320,000	376,550,000
Transfer passengers.....	120,080,000	194,765,000
Total passengers.....	375,400,000	571,315,000
Percentage of revenue passenger taking transfers.....	47	52
Revenue passengers per mile of track.....	1,636,700	1,289,600
Transfer passengers per mile of track.....	769,700	667,000
Total revenue and transfer passengers per mile of track.....	2,406,400	1,956,600
Average fare per total passenger, cents.....	†3.40	†3.29

* Excluding revenue from bridge local traffic, mail and express.
† The much greater discrepancy between the average rate of fare in 1909 and that which was shown immediately prior to the receivership is explained in the text of this article.

reveal the state of affairs which existed just prior to the withdrawal of transfers with the principal lines of the Third Avenue road. The average fare per passenger of 3.29 cents in the year ended June 30, 1907, declined in the six months ended Dec. 31, 1907, to 3.16 cents and in the 70 days preceding April 11, 1908, when transfers were discontinued with the main part of the Third Avenue system, the average was 3.09 cents per passenger. From this figure to 3.40 cents the gain is 0.31 cent or 10.3 per cent.

From an average of 1,289,300 revenue passengers per mile of track in the 1907 fiscal year the number has increased on the Metropolitan system until in the calendar year 1909 the average was 1,636,700. This indicates an average increase of 347,100 or 26.9 per cent. During the same interval the number of transfer passengers per mile of track increased from 667,000 to 769,700, a total of 102,700. This is equivalent to 15.4 per cent, or more than one-half as much as the percentage of increase in revenue passengers per mile of track.

INSIGNIA CONTEST AT OKLAHOMA CITY

The Oklahoma (Okla.) Railway has just adopted a new monogram, reproduced herewith, which was chosen from over 700 designs submitted in contest. It will be used on all stationery, advertising folders and publicity literature issued by the company. In order to encourage interest, the Oklahoma Railway, in announcing the trade-mark contest, published advertisements in the daily papers offering a cash prize of \$10 and the use of a chartered car over the company's lines to the person submitting the most satisfactory design. The contest was carried out by H. C. Martin, the company's passenger and freight agent.



The Congress of Ecuador, S. A., has before it a bill providing for the construction of an electric railway between Quito and Ibarra, a distance of about 106 miles.

PITTSBURGH ORDINANCES VETOED

Mayor Magee, of Pittsburgh, has vetoed three ordinances passed by the City Council in relation to the street railway situation. One of the measures provided for "a seat for every passenger from whom a fare is demanded," another proposed to fine the company if the cars were overcrowded 50 per cent above seating capacity, and the third prescribed universal transfers. The veto message indicated that Mayor Magee considered that action should be postponed pending the completion of the report of Bion J. Arnold, who is making an investigation of the situation. Mayor Magee said, in part:

"I always regret when matters arising in municipal legislation are in such form or are incorrect in principle that I cannot join with you in enacting them into law, and particularly when the matters have been unanimously agreed upon by you, but when bills presented to you for your consideration are so drawn as to bear upon their face defects so gross as to raise a doubt in the mind whether or not they were offered with the intention to effect a serious purpose, I cannot give them my official sanction.

"With all due respect to your honorable bodies, I must express the opinion that neither spasmodic and hysterical public outcry nor the nostrums of a quack publicist can effect a cure to the most grievous and complex evil from which the people of this city, as well as most other American cities suffer. The condition of affairs brought about and gradually growing more acute during many years of legislative improvidence cannot be corrected in a day by an offhand, made-to-order remedy.

"Some time ago you authorized me to employ competent persons to study the subject and report a program of action. The investigation was begun and has been pursued unremittingly, and is now being concluded by the most eminent authority in this country. I consider it unwise and inopportune to pass ordinances of the nature mentioned for the reason that legislation of this kind prepared by unskilled draughtsmen not qualified to investigate causes and to reach logical conclusions on this intricate subject is certain not to be upheld by the courts and may, therefore, prejudice the cause of the people after the investigations I speak of shall have been concluded and proper bills prepared by competent authority.

"If these crude productions should ever be submitted to the courts for enforcement, an adverse decision might accidentally go beyond the mere form. The principles underlying them might suffer in the judicial mind, and in their consideration some expression of authority may be utterly against the very right of the city to enact ordinances upon this subject. I consider it my duty in this case, holding a commission from the people, to make no false steps, to guard against impulsive action, and to proceed most carefully upon the delicate ground which we are traversing. The enforcement of the rights of the public as a party to the controversy with the street railways companies is still in pioneer stages; whatever right we have can only be enforced with the aid of the courts of law. The street railway companies have buttressed themselves about with the aid of the best legal talent, have foreseen and anticipated every method of attack and are prepared to contest every step. There is every reason why bills of this character, if it is advisable at all to proceed along these lines, should be drawn with care from the legal point of view, and only after all the facts regarding the case are fully known, and that they should be put into force at the logical moment."

ASSOCIATION CIRCULARS

Secretary H. C. Donecker of the American Street & Inter-urban Railway Association has issued a circular to member companies enclosing copies of the amended railroad rate bill pending before Congress and of reports from the Committee on Interstate Commerce of the Senate, relating to the bill.

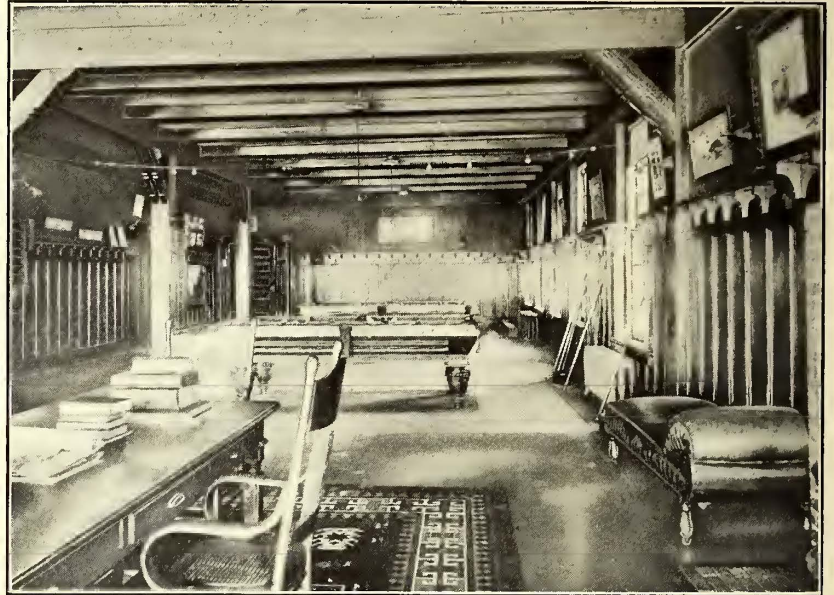
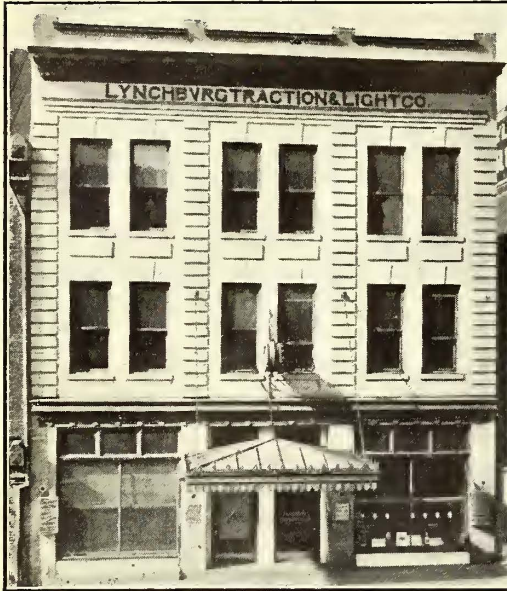
A list of active and associate members of the association has been published for distribution to all members of the association.

Secretary John W. Corning of the Engineering Association has issued an index of the rules of the National Electrical Code relating to car and car-house wiring.

EMPLOYEES' BENEFIT ASSOCIATION CLUB ROOMS IN LYNCHBURG, VA.

For the past eight years the employees of the Lynchburg (Virginia) Traction & Light Company have been conducting a sick and death benefit association which has been eminently successful.

and are limited to \$90 per annum. In case of death of a member, \$100 is paid to his heirs. The association has a physician who gives free medical attention to the members and their families. The physician is paid at the rate of 50 cents per month per member by the association. Bowling alleys are operated in the city and at the company's amusement park, the

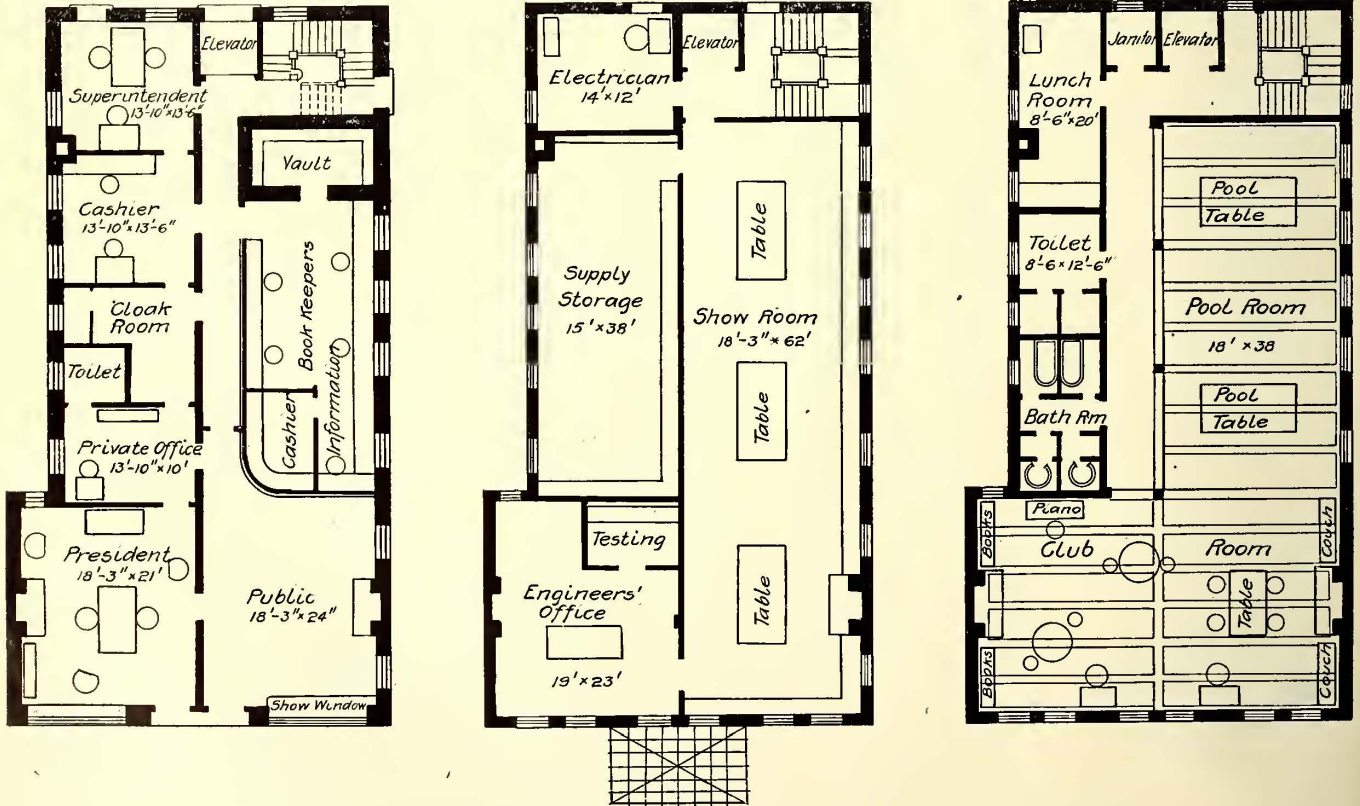


Lynchburg Traction & Light Company—Office and Club Building, with General View of Employees' Clubroom When Looking Toward the Rear

As shown by the treasurer's report at its last annual meeting, the benefits paid out since the date of organization have amounted to \$9,052.47, the amount of money deposited in the

proceeds of which are applied to the association. No assessment has ever been levied on its members.

The association holds monthly and annual meetings on the



Lynchburg Traction & Light Company—Floor Plans of the Office and Club Building

bank was \$1,434.57, and the assets exceeded the liabilities by \$5,216.09. Ninety per cent of the employees of the Traction Company are members of the association. Each pays monthly dues of \$1. Sick benefits are paid at the rate of \$1 a day

third floor of the company's magnificent private office building, which adjoins the car houses and shops. At the annual meeting and banquet prominent citizens are invited, and men of national reputation are frequently present as orators.

Although many companies have been liberal in providing recreation centers for their men, it is safe to say that few have equaled the beautiful quarters provided in Lynchburg. This is due chiefly to the efforts of R. D. Apperson, president of the company, who is a strong believer in the doctrine that cheerful surroundings make cheerful men. It will be seen from the accompanying illustrations that the Lynchburg club rooms are more like those of a high-class club than a railway men's retiring room. The walls of the room are handsomely wainscoted, and the ceilings finished in the exposed-beam style of the old English country homes, while large, handsome rugs complete the homelike effect of coziness. That the men appreciate the beauty of their surroundings is shown by the excellent condition of all the furniture after several years of use.

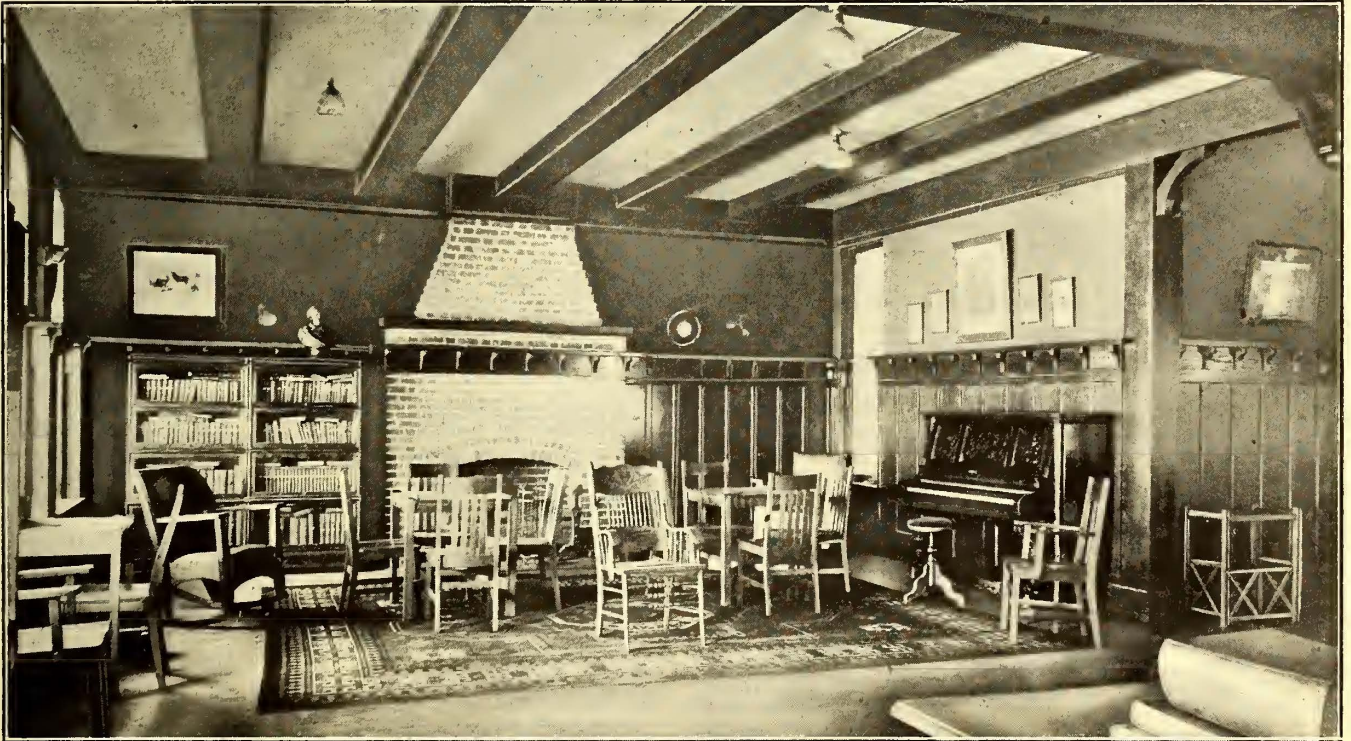
As is shown on the plan of the Lynchburg quarters, room is provided for shower baths, kitchen, library, etc. At present the association owns several hundred popular and technical books, a piano, pool and billiard tables and facilities for various games of cards, checkers and chess. The association furnishes

THROUGH ROUTES BETWEEN ELECTRIC AND STEAM LINES

Many communications have been received by the Committee on Interstate and Foreign Commerce of the House of Representatives in relation to the railroad rate bill now under consideration. They relate mostly to provisions affecting steam railroads, but in addition to those regarding electric lines which have been published in previous issues of the *ELECTRIC RAILWAY JOURNAL* the following, addressed to Congressman Palmer, of Pennsylvania, by Thomas A. H. Hay, president of the Northampton Traction Company, of Easton, Pa., was presented to the committee:

"I am very much obliged to you for your letter, in reference to the bill prepared by the Attorney-General, known as the railroad-rate bill. We street railway men have been at a disadvantage so long that the Government now should not give the steam roads a club to injure us.

"May I suggest an additional clause to go into the bill, that



Lynchburg Traction & Light Company—Library and Music Section of Employees' Clubroom

the library and furniture out of its own funds, but the room and the caretaker's services are given free by the company. The association is now preparing to add gymnasium features to the club rooms at an early date. A similar club room is provided for the employees of the Roanoke Railway & Electric Company, of which Mr. Apperson also is president.

The men of the association hold their organization in high esteem, regarding it as the best arrangement that has ever been made for the solution of the labor problem. The Lynchburg Employees Benefit Association has many commendable features, and it is felt that should these become more universal with employers and employees, both would derive great benefit from them through their tendency to eliminate many of the differences that exist between them.

When Mr. Apperson took charge of these properties eight years ago the wage rate for motormen and conductors was 12½ cents per hour. As Mr. Apperson believes in the policy that the employees should share in the prosperity of the company, he has voluntarily advanced the wages from time to time, until at present they are 21 cents per hour. This rate is one of the highest in the South. Mr. Apperson now has under consideration a system of pensioning the disabled employees, which he will put into immediate operation.

street railways having terminals in towns and cities and doing an interstate business should be compelled to permit the use of their terminals to non-competing lines just the same as steam roads are compelled to permit the cars of their competitors the right to use their tracks.

"The Easton Transit Company, which owns all the entrances into Easton and Philipsburg, will not permit the use of its tracks by the Northampton Traction Company, the Easton & Washington Traction Company and the Philadelphia & Easton Railway Company, all of which are interurban and non-competing lines, to bring passengers into the center of Easton.

"The Easton Transit Company has the right to use these terminals by reason of taxation locally and the aegis of the interstate commerce laws, yet that same law cannot compel it to permit other trolley companies, non-competitive, to use the terminals except at whatever price it sets, which price is very prohibitive and proscriptive."

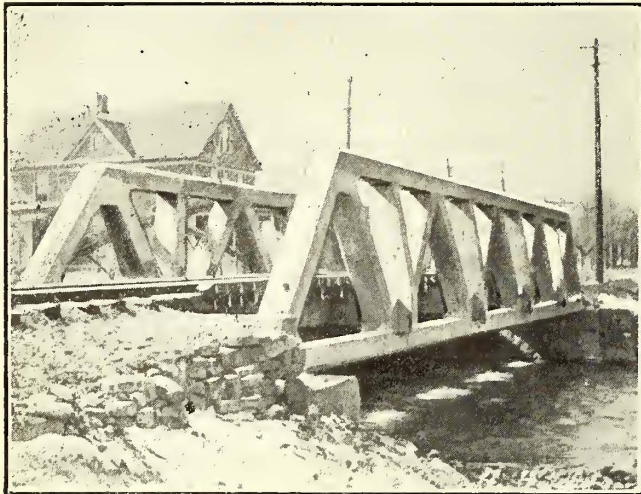
A 6000-volt single-phase line, 35 km long, has been completed connecting Padua, Italy, with Fusina. Ten motor cars and five trailers are in operation. The motor cars are each equipped with two 80-hp Winter-Eichberg motors. In the city of Padua the trolley voltage is reduced to 600.

REINFORCEMENT OF FULMER CREEK BRIDGE WITH STEEL AND CONCRETE

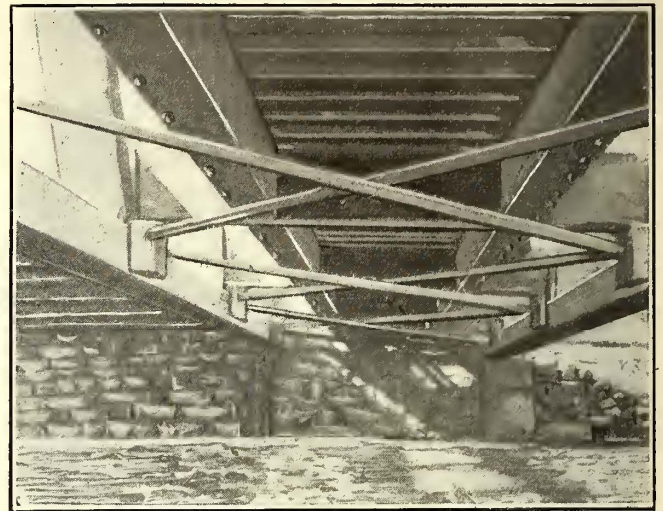
With the development of suburban electric railways into interurban lines and the replacement of light single track, slow-speed cars by heavy double track high-speed cars, the tendency has been to disregard the heavy duty placed upon the track and bridge structures so long as the schedule could be maintained. Appreciating the necessity for exact data of bridge capacities,

to make the bridge safe for loaded cars having 45 tons total weight. This reinforcement was not considered sufficient to make the bridge safe for the express cars weighing 45 tons and carrying 20 tons additional weight as now operated over it by both the Utica & Mohawk Valley Railway and the Ct-sego & Herkimer Railway.

A temporary wooden bent was placed under the center of the bridge for a time and during the fall of 1909 the struc-



Fulmer Creek Bridge



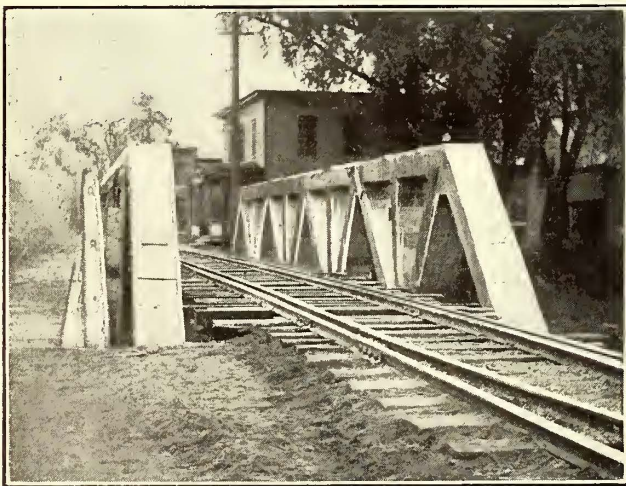
View of Floor System

the Utica & Mohawk Valley Railway Company has employed an experienced bridge engineer who makes a specialty of inspecting and reporting upon the condition of old bridges. Among the bridges upon which heavier equipment has gradually been imposed is the Fulmer Creek bridge at Mohawk, N. Y., on the division formerly known as the Herkimer, Mohawk, Ilion & Frankfort Railway.

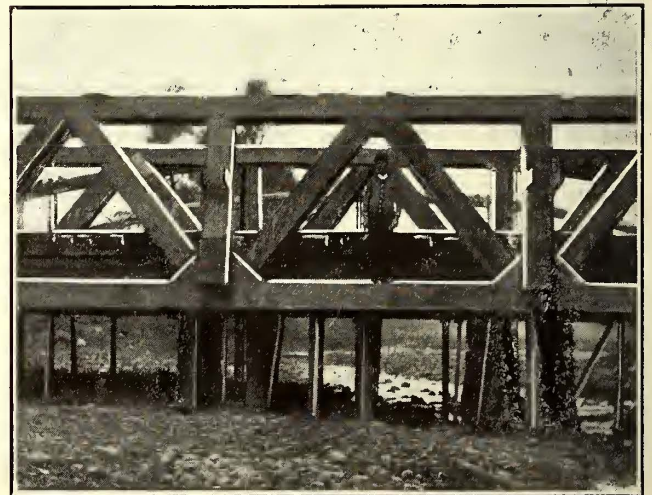
The old single track bridge, furnished by the Berlin Iron Bridge Company in 1895, was of the half through riveted truss type, length over all 70 ft. 10 in., consisting of five panels, 13 ft. center to center of trusses, 8 ft. 6 in. center to center of chords, angle 90 deg. The stringers are 12-in. 40-lb. I-

ture was reinforced with steel and concrete in a unique and satisfactory manner, according to plans and specifications prepared by Wilbur J. Watson, bridge engineer, of Cleveland, Ohio.

In order to maintain traffic and at the same time allow room for forms, the track and bridge ties were raised about 6 in. on temporary wooden stringers supported on timber bents bedded in the channel of the stream. The bottom chords were then reinforced with 1-in. round steel bars, four bars being placed in a vertical row between the channels of each panel with four additional bars placed in all except the shore panels, one additional bar being placed at each flange of the channels.



End View of Bridge, Showing Forms in Place After Concreting



Side View of Bridge, Showing Forms in Place After Concreting

beams and floor beams 15-in. 42-lb. I-beams; upper chord of truss, two 6-in. x 1/4-in. channels with one 12-in. x 1/4-in. plate; lower chord of truss, two 7-in. channels, 1/4 in., 5/16 in. and 3/8 in. thick. The diagonals are made of two 3-in x 3 x 3/8-in., two 3 1/2-in. x 2 1/2-in. x 5/16-in., two 2 1/2-in. x 2 1/2-in. x 1/4-in. and two 3-in. x 2 1/2-in. x 1/4-in. The bridge rested on stone masonry abutments and was designed for 32-ton cars. The lower chords and the diagonals were reinforced in 1908

The top chords were reinforced by two bars placed between the channels and four bars just below the bottom flanges of channels. The batter posts and diagonals were reinforced with four bars each and two bars were placed in each intermediate post. The bars in each of these cases were curved at the ends to extend into the recesses around the top and bottom chords and floor beams at the connections. Two bars were also placed on either side of the webs of all stringers and

cross beams, just above the lower flanges: Considerable skill was required to bend the bars and place them in position. The bars were all securely fastened in place with No. 10 steel wire. The chords of trusses, floor-beams and stringers were then wrapped with No. 16 standard 3-in. mesh expanded metal securely wired in place. All other members were wrapped spirally with No. 10 steel wire spaced 6 in. between coils. Forms of dressed yellow pine lumber were then built about the floor system and bottom chords and the concreting was carried from the bottom upward, the forms being built up along the posts and diagonals just ahead of the concrete so as to give all possible room for thorough tamping. It was necessary to cut holes through the cover plates of the top chords in order to insure complete filling of all parts of the chords and connections. The tamping was done through the holes with a stick of small diameter and continued until the concrete oozed out of adjoining holes.

The concrete was made of one part American Portland cement, two parts clean, sharp quartz sand and four parts crushed limestone of size to pass a 1/2-in. ring. As only a small quantity of concrete could be used at a time the mixing was done entirely by hand. It was found necessary to make it quite wet in order to fill all of the angles and pockets of the steel work at the connections.

The freezing weather came just as the concreting was finished and so the forms were left in place about two weeks. The faces were then brushed with a mixture of one part cement and one part sand and rubbed with a cement brick. The load was not placed upon the structure until a full month after the work was completed. In the mean time a full set of new bridge ties and guard timbers of long leaf yellow pine was prepared and treated with two coats of Avenarius Carbolinum applied hot with hand brushes.

Pieces of 3/4-in. wrought-iron gas pipe were set in the forms for the stringers to receive the 5/8-in. bolts used to fasten the ties in place. Two bolts with cast washers at both ends were used for each 8-in. x 10-in. x 9-ft. tie, and the ties were spaced 16 in. center to center.

On account of the original character of the work, it was considered best to select a reliable bridge contractor, familiar with concrete work, and pay him on a percentage basis for superintendence and labor. He was paid 15 per cent on all wages paid to men furnished by him. Time was kept and men were paid by the company. All materials were furnished by the company.

The approximate total cost was as follows:

Reinforcing steel.....	\$192.64
Lumber for forms.....	291.10
Concrete materials.....	171.52
Nails, wire, staging, etc.....	18.24
Engineering.....	77.90
Contractor's labor.....	732.43
Contractor's 15 per cent.....	109.86
Delivering materials.....	13.36
Company labor raising tracks, etc.....	30.00
Total.....	\$1,637.05

The bridge seats and pedestals were also rebuilt, the cost being included in the total given above. As the lumber from forms was saved for future use, a credit for half value or \$145.55 should be given, also a credit for 4000 ft. B.M. tie framing at \$9.20 paid to contractor, amounting to \$36.80, thus making the net cost of bridge reinforcement \$1,454.70. The engineer's estimate for a new steel bridge of the required capacity was \$2,500.

The cross-section areas of the various members after reinforcement were: Bottom and top chords, diagonals and batter posts 12-in. x 15-in.; intermediate posts tapering from 12-in. x 24-in. at top of floor beams to 12-in. x 15-in. at top chords; stringers 16-in. x 12-in.; cross beams 19-in. x 12-in. Vertical distances are given first.

The reinforcing bars were furnished by the Carnegie Steel Company, the expanded metal was purchased from the Corrugated Bar Company, of St. Louis. Measurements taken at center of bridge showed a deflection of less than 1/8-in. under heaviest cars operated over it immediately after placing it in service. The estimated safe load of the structure is 66 tons.

ELECTRIFICATION OF STEAM RAILROADS DISCUSSED BY NEW YORK RAILROAD CLUB

The committee appointed by the New York Railroad Club to examine into the subject of the electrification of steam railroads presented its report to the club on the evening of Friday, March 18. Those composing the committee were: W. J. Harahan, assistant to the president, Erie Railroad, chairman; L. C. Fritch, consulting engineer, Illinois Central Railroad, Chicago; H. M. Warren, electrical engineer, Delaware, Lackawanna & Western Railroad, Scranton, Pa.; H. H. Vaughan, assistant to the vice-president, Canadian Pacific Railway, Montreal, Can.; J. H. Davis, electrical engineer, Baltimore & Ohio Railroad, Baltimore, Md.; George W. Wildin, mechanical superintendent, New York, New Haven & Hartford Railroad, New Haven, Conn.; William McClellan, consulting engineer, New York; C. O. Mailloux, consulting engineer, New York, and E. B. Katte, chief engineer of electric traction, New York Central & Hudson River Railroad, New York. The report was presented by Mr. Harahan.

It first cited in chronological order a number of the most important events in the history of the electric railway. It then took up the "characteristic features of electrification" and referring to the subject of flexibility, stated among the advantages of electricity, that "locomotives or motor cars may be coupled in a variety of ways, and operated by means of the multiple-unit system, from one point in the train. Public streets and highways may be occupied, if necessary, and operation in tunnels ceases to be objectionable. Trains may be shorter and more frequent, or they may be of any size that business conditions dictate, consistent with mechanical considerations. A distribution of driving wheels throughout the whole train permits high acceleration, which in turn permits increased schedule speed without excessive increase in maximum speed.

"All of these features have a varying weight according to the circumstances of the particular problem at hand."

Referring to weather conditions, the report declared that electric service has been found to be but slightly affected by snow or other weather conditions, and that in cold weather the steam locomotive is at a disadvantage, but not an electric locomotive or motor car.

The committee believed that the electric locomotive would have much less idle time under the same conditions than steam locomotives and can be designed for practically continuous operation over any length of run. It has also a very much larger power capacity and is much more cleanly.

The principal reasons for considering electrification, in the opinion of the committee, are an increase of station and track facilities, an increase in gross earnings due to more frequent trains and legislative enactment. In referring to the increase in gross earnings, however, the report states that "the mere substitution of electricity for steam will not accomplish a very great increase in gross earnings, but by changes in schedule and stops, the service must be made more convenient and attractive to the desired patrons. Inattention to this feature is preventing some roads at present from realizing the full possible returns upon their electrification."

Upon legislative enactment requiring the substitution of electricity for steam the committee says:

"The operation of a steam railroad in the heart of a large city is of necessity attended by features not always ideal. On account of the cost of land, and other conditions, the amount of space for roadway is likely to be cramped, and closely pressed by city and private property. The emission of smoke and gases from the locomotives, especially if a subway or tunnel is involved, often leads the community to demand that the railroad abolish the objectionable features. This demand, in its essentials, may be reasonable enough, and if by calm and considerate discussion it can be shown that conditions are unnecessarily bad, the public has a right to expect the railroads to provide a reasonable remedy. Unfortunately, however, the discussion is sometimes fanned into a condition where hos-

tility and acrimony become the chief features. As a consequence, the public may make demands, the difficulty, expense and result of which it has no conception, and the railroad is compelled to refuse anything like the full extent of the demands because it knows it cannot afford to do otherwise.

"In this connection, the following are a few broad considerations which common sense and equity present:

"1. A railroad has a charter franchise or special privilege from the commonwealth, and, therefore, belongs to a class of activities which must especially consider the interest of the public.

"2. A railroad is also a business venture organized to make money, and those responsible to the stockholders must conduct its affairs so as to serve their best ultimate interest.

"3. A nuisance, for example, smoke, incident to the operation of a property, whether factory, railroad, store, or what not, may be deplored, but, all sources of such nuisances must be treated alike, and it should also be determined how far a removal of the nuisance might endanger the industry itself and cause its failure.

"4. It is only fair to assume that men who have worked in the public eye, at any particular business, for a number of years, are men of integrity and well informed as to their business. Action should be taken, therefore, by the community only when advised by well-informed persons, and after comprehensive consideration.

"5. There are not two sides to this problem. The interests of the railroads and those of the public are one.

The committee made an effort to secure operating data for publication for the existing electrified steam railroads, but this attempt met with little favorable response, because, almost without exception, the men who are responsible for the operation of these properties did not think the conditions were sufficiently settled to permit them to publish data that would be just to either steam or electric operation.

The report concludes as follows:

"To sum up, the following may be stated as the advantages and disadvantages of electrification:

ADVANTAGES

"1. Increasing the capacity of a given terminal by the elimination of switching movements, where multiple units are used, and increasing the scheduled speed of trains without increasing maximum speed by the higher acceleration possible with electric power; also increasing the capacity of the line and permitting shorter block signal spacing.

"2. Avoidance of smoke and steam nuisance, making unobjectionable tunnels, subways, and underground stations, and reclaiming the aerial space above track for offices, stores, warehouses, hotels, or other buildings; also a saving in deterioration of metallic structures because of the corrosive products of combustion in steam locomotives.

"3. Uniform power over grades and greater tractive power of electric locomotives of equal weight with steam locomotives including tender, making heavier trains possible over mountain divisions. Locomotives may be used in multiple without increasing the cost for enginemen.

"4. Economy of operation under conditions favorable to electric traction, such as frequent multiple-unit train service or cheap electric power as compared with the higher cost of locomotive coal.

"5. Electrical operation has proved itself reliable.

"6. Electric power is not a source of danger to the traveling or general public.

DISADVANTAGES

"1. A large investment for re-equipping the railroads with the new power which can only be justified by definite financial or economic results.

"2. Increased danger to employees or the railroad due to the presence of the third rail or the overhead conductor, especially in yards or terminals.

FEATURES TO BE CONSIDERED FOR FUTURE ELECTRIFICATION.

"The following features with reference to present conditions should be considered, having in view future electrification:

"1. The signal systems should be designed with a view of meeting the restrictions involved in electrification work.

"2. Bridges, yards and terminal platforms should be designed to conform to the clearances necessary for the installation of working conductors.

"3. Locomotives and cars should be designed to conform to electrification clearances.

"4. The lighting system of cars should be designed for economical use on electrified roads. This applies also to the heating systems.

"5. Steam, water, air and gas-pipes, in yards and at stations, should be laid out to avoid current collectors on future electric equipment and working conductors, also bonded to avoid electrolysis.

CONCLUSIONS

"1. No general information is available on the basis of which steam railroads, as a whole, would be justified in electrifying terminals or main lines, solely on the grounds of economy.

"2. Careful investigation is necessary to decide if electrification of terminals and suburban districts would be warranted in order to increase earnings.

"3. More attention should be given to the possibilities of electrification in connection with heavy grades, and at other places where an increase in facilities is needed.

"4. It is not likely that conclusive data on the economy of electrification will be available until electrification is extended over a complete steam locomotive stage.

"5. The electrification for passenger terminal and suburban service is now more or less settled as to method, but for freight and general trunk line service it is in the experimental stage.

"a. The types of locomotives for various service have not been determined, though progress is being made.

"b. The method of secondary distribution (working conductors), needs much development. The third rail is thoroughly reliable and efficient, but unsuitable for complicated switch work. In its present form it has only been used for voltage up to 1200.

"c. The overhead system for high voltage working conductors also needs much development. Few, if any, are satisfied with present designs, and many changes are proposed.

"6. The steam railroad men and electrical engineers should work together in as close harmony as is possible so as to produce results that will be as free from mistakes and experiments as is possible in any developing art.

"7. Each problem must be studied on its merits and a decision can only be made after careful study of the conditions pertaining to each situation.

"8. The electrification of large freight terminals has not as yet been attempted, nor satisfactorily worked out, therefore it is necessary to proceed with caution in this matter and the problem must be exhaustively studied and new developments made before it would be justifiable to make such an installation. The electrification of any large freight terminal would involve a number of roads, and cannot be undertaken independently, without the co-operation of all the railroads affected, on account of the relations existing among the various roads in the interchange of freight traffic."

DISCUSSION

Upon the conclusion of the reading of the report by Mr. Harahan, George Gibbs, chief engineer, Pennsylvania Railroad & Terminal Company, moved a vote of thanks to the committee. This resolution was seconded and unanimously adopted. A communication was read from the president of the club, W. G. Besler, regretting his absence; and one from C. L. Muralt, in which he stated that he did not agree with the committee's assertion that the three-phase motor cannot be operated on direct current. In his opinion, if a mixed system was considered desirable, the three-phase motor was just as applicable for the purpose as any other.

Mr. Gibbs opened the discussion with the statement that now the most important factor in relation to electrifying steam railroads is the question of cost. Two years ago, when he dis-

cussed this matter before the New York Railroad Club, he had had no figures to present but he had predicted that electric operation could not be considered as a commercial proposition unless the economy which it effected was sufficient to pay the interest on the added investment. Electrification would not be able to do this except where the traffic was very dense. In his experience, this statement still held good. He had had the opportunity of studying the operation of two important electrified systems, namely, the Long Island Railroad and the West Jersey & Seashore Railroad. He was now preparing a report for the International Railway Congress meeting to be held in Switzerland this summer before which he will present some operating figures for both of the properties named to cover two and possibly three years' service. The Long Island case deals with a system of 120 miles of electrified track consisting principally of local service with multiple unit trains over a complicated network. The operating results, all things considered, show a very large saving over the same car mileage or ton mileage by steam. The Long Island Railroad installation not only pays the interest on the extra investment but it yields a handsome surplus besides. The West Jersey & Seashore Railroad, however, presents a different situation. One might compare it to a trunk line of moderate length having freight and passenger service at rather frequent intervals the entire length and a heavy local service at one end of the line. This installation has also produced a saving but not enough to pay the interest on the investment. In this instance, electrical operation is combating the most economical type of steam operation, namely, long distance high-speed trains with few stops.

In the case of the Long Island work, the electrification greatly increased the capacity of the line, especially at the Brooklyn terminal which could not possibly be operated by steam up to its present capacity. The West Jersey electrification has proved popular but it is obvious that, in cross-country service, the advantages of electricity over steam are not so apparent as in local service. One point mentioned by Mr. Harahan was the question of system. The d.c. multiple unit system used on Long Island was giving entire satisfaction and very little trouble had been experienced beyond routine maintenance. However, there were other systems which might be used under other conditions. In some previous electrical discussions, the argument had drifted into a question of relative advantages of one system over another, some taking the position that one system was the best for all cases and thereby confusing the minds of the steam railroad men. This method of arguing was very unfortunate for those who wish to promote electric traction. Happily, that state of mind was being dispelled, but for the good of the profession it could not be entirely eradicated too soon.

L. B. Stillwell, consulting engineer, said that the report of the committee was well considered and a very fair statement of the art of electrification. A few years ago, it would hardly have been anticipated that in the year 1910 a committee of steam railroad men studying and reporting on this subject would have found six advantages for electricity and only two disadvantages. The fact that we have to-day no electric trunk line service operating freight as well as passengers is impressive but not discouraging. The same kind of reasoning and the same deductions from known facts that have led to the successful electrification of terminals and of electric zones where traffic is congested are applicable with the same certainty to the conditions governing freight and other transportation on trunk lines. The problem must be worked out by co-operation between the operating men and electrical engineers. There is no reason, however, why the man who begins the study of engineering problems as a specialist in electrification and moves on to the study of broad problems of railroad operation may not come to know and be able to analyze the problems of railway operation as well as the man who has the disadvantage of having his nose held continually to the grindstone of operation. The reports of steam railroads present no mysteries that cannot be traced, and can be understood quite as aptly by the outside man as by the inside man. There would be no progress in the art if some men were not

able and willing at times to stick to the deductions made from a careful reasoning of facts and analyses. The determination as to whether it would pay to electrify any given trunk line can be made with a very close approximation to the results which would be realized in practice three to five years later. The available data for such computations had been greatly increased in the past two years. It is a comparatively short step now to figure from the known to the comparatively unknown. For example, the grand average cost of fuel consumption for a locomotive mile in the United States is 11.2 cents. It is quite a simple problem to work out a figure for electrical operation to within 5 per cent. In the case of the New York, New Haven & Hartford Railroad, he had been informed that actual experience had shown a cost figure within 2 per cent of the estimate made by Mr. Putnam and himself from theory two years ago. One of the most important questions was that of developing standards of electric railway practice as rapidly as the progress of the art will permit. In adopting special methods of solution, we are laying up vexation, expense and criticism. The German method is different but we cannot adopt it here. Nevertheless, through the engineering associations, we ought to be able to approximate to the German idea of standardization more rapidly than we are now doing.

Two years ago, in the paper prepared by Mr. Putnam and himself for the American Institute of Electrical Engineers, he had suggested a standardization of at least three things, as follows: Location of third rail; location of overhead trolley; frequency on a.c. systems. The third rail is not yet standardized but some day it will have to be. Some special solutions have been made but one does not fit the other. Thus, the subway in New York has the third rail located 26 in. from the gage line and 4 in. above the top of the rail, whereas the corresponding dimensions on the Long Island Railroad are 27½ in. and 3½ in. The New York Central & Hudson River Railroad made an important step in inverting the current rail and locating it approximately 28¼ in. from the gage line, but even that dimension does not fit all conditions for on this road it is necessary to keep out certain kinds of rolling stock in the electric zone. On the West Shore Railroad's electrified division between Utica and Syracuse, it is about 32 in. from the gage line. Mr. Stillwell suggested that the New York Railroad club should co-operate with other railway bodies and endeavor to agree upon recommended standards for adoption by electrified steam railroads. Such standards may not be adopted in all cases owing to the influence, perhaps, of local conditions but still they will give something to which they can work forward. The position of the overhead trolley had been located by the New York, New Haven & Hartford Railroad and he hoped that other roads which would adopt the overhead construction would use the same clearance, if at all possible. The possibility of the interchange of rolling stock as affected by overhead conditions might some day be as important as the question of gage is now. Progress had been made with regard to the question of frequency. The Prussian State Railroads, for instance, had adopted as standard for single phase work a frequency of 15 cycles and a trolley potential of 10,000 volts. When Mr. Putnam and he suggested 15 cycles there was a great diversity of opinion, but he was glad to see that engineers of both the great companies making a.c. apparatus now advise that 15 cycles and 11,000 volts should be used on all long lines. A potential of 11,000 volts at the power house of course means anything between 10,000 volts and 11,000 volts on the trolley and so does not differ materially from the German standard. The reason for recommending a low frequency was that, as a.c. motors are now made, two 15-cycle machines will do the work of three machines at 25 cycles. As it is the railroad company which spends the money, its interest should be the controlling one because it is buying draw-bar pull and is entitled to the maximum for its money. One strong reason which existed for 25 cycles was that the manufacturing companies had the patterns for that frequency and therefore were disinclined to change.

As a matter of fact, however, they will have to build additional factories anyway when the steam railroad electrification field really has developed its possibilities. As to the statement in the report that the management of steam railroad companies, in general, should anticipate the construction of parallel electric lines, he thought that if there is a good economic reason for building a new line, there is a better reason for electrifying the old steam line. The established railroad has everything in its favor for lower costs and by electrifying will avoid the loss of business from competition.

W. S. Murray, electrical engineer of the New York, New Haven & Hartford Railroad, said that he was glad to have the opportunity of saying something about trunk line railroads. He had prepared some comments on the committee's report but before reading them, he would show some lantern slides of the very latest catenary construction installed by his company. He said that the new designs were cheaper and better than the original construction which as everybody knew had to be installed under great pressure of time. Mr. Murray then took up the committee's chapter on "Power Capacity" where it is stated that an electric locomotive can draw all the current necessary to produce a maximum tractive effort but that this feature is somewhat counterbalanced by the fact that the amount of power deliverable at a given point depends upon the carrying capacity of the distribution system. The speaker said that the mechanical conditions involved in the overhead suspension of conductor and contact wires in the high voltage system allow such large carrying capacity that there is every provision against any such contingency in the limitation of power transmitted. Notwithstanding that the copper in the single phase system of the New Haven installation is but a small per cent of the equivalent copper for the same line efficiency of a d.c. third rail system, there has never been a moment when the distributing system installed has not been able to furnish strong voltage over its complete line. There has never been a complaint that schedules could not be made on account of low voltage even when it has been necessary to keep in motion simultaneously trains totaling about 10,000 tons. Under peak conditions, the actual voltage drop of the system, based on voltmeter readings at Woodlawn tower, the farthest signal tower from the power station and 18 miles distant, showed a minimum potential of 9800 volts while the general operating voltage of the line was 11,000 volts. The average loss throughout the day for the line was less than 5 per cent.

Under the chapter headed "Collateral Advantages," the committee stated that schedule conditions usually will allow switching and perhaps some other portion of the traffic to be done at times of light load. Mr. Murray said that, while this is given as an advantage, the condition that it carries seemed to imply the opposite. The New Haven experience showed that on a commercial basis switching requires from 6 per cent to 10 per cent of the total power. Therefore, the power and transmission system as a whole should be able easily to handle, say an extra 10 per cent above the regular main line requirements at any time. It was interesting to note, however, that generally speaking, the power house equipment will not have to be increased for the transportation of freight, as this particular schedule can be handled at night as is now customary. This combination will give a much better load factor to the system. One of the greatest fields in which economy could be practiced, however, was the electrical handling of freight with longer and faster trains, thereby materially reducing the aggregate train miles. It should also be borne in mind that 100 per cent in steam engine units can be replaced by 60 per cent in electric engine units. Mr. Murray disagreed with the committee's statement under "Contingent Costs." He did not deny that there were not expenditures other than the direct cost of electrification, but perhaps the experience of the New Haven Company might cast some light on the subject. For example, the right of way of the company, except for a few pier rights which had to be purchased, was to-day just as it existed before the trains were electrically operated. There were few railroads whose right-of-way limits are not entirely sufficient to cover the erection of structures for carrying the trans-

mission system. Of course, the New Haven Company did not have to buy land for substations. It did not have to make any important changes in bridges and buildings, but on the contrary they have become more valuable. Overhead crossings have added nothing to the list of expenses. While it is true that the signal system was changed, the alterations increased the track capacity and reduced the original operating expense to such a degree that the money saved in operation practically has offset the investment charge. It is true that the telephone and telegraph have been affected by the single-phase service, but the correction of the troubles has not proved a serious expense. The company had not been subjected to claims from patrons on account of accidents due either to temporary or permanent construction. Electrification cannot be applied economically to trunk lines except where the density of traffic is great enough to bring a return for the capital outlay. He agreed with the committee that the amortization of equipment such as locomotives and cars is taken care of by their being placed in other service. Coal, wood, and water stations are too insignificant for consideration. On the whole, it seemed to Mr. Murray that one should be cautious in making an array of costs if the complementary credits were not given at the same time.

Referring to the chapter on "Systems of Electrification," in the report, Mr. Murray said that as it considered the matter of trunk line electrification exclusively, it was well to understand just what was meant by a trunk line. He would define a trunk line as one connecting large cities which are separated by considerable distance. That portion of a trunk line which lies in the immediate vicinity and outlying districts of the terminal cities will carry a suburban traffic. The companies which are considering electrification of their trunk lines, have been brought to this point by the public desire, mandate of law or economical reasons. For the present, electrification of steam roads about or between small cities with light traffic, cannot be considered, except where tunnels or grades are concerned. Hence, as the problem of electrification is limited to the heavier type of traffic between large cities and to their suburbs, it follows that large power generation and large train unit service is the desideratum. In the small city interurban zone, d.c., third-rail electrification may be more economical than the a.c. system, but in his opinion the former cannot be applied to any trunk line, considered either in part or whole, connecting the larger cities of this country. The reason for his belief was that the fixed charges and attendant operating expense over the mileage necessary to cover the suburban radius of large cities, taken in connection with density of traffic common to these lines, are less for the single phase system.

So far as the inter-rural trunk line territory was concerned, it seemed to be the committee's concession that single-phase was the logical solution. Referring to the committee's statement that "The d.c. railway motor is better than the single phase railway motor of to-day, but for long-distance work the distribution system for single-phase system is simpler than the d.c. system," Mr. Murray said that he thought it would come closer to the situation if the word "cheaper" were substituted for both the words "better" and "simpler." He then read an extract from a recent article by Philip Dawson, the well-known English engineer, in which Mr. Dawson criticizes the American practice of using the a.c.-d.c. combination. He said that he agreed with Mr. Dawson that a single system such as used in Europe was better even though his own road was involved in the condemned arrangement. Mr. Dawson had written that the apparent intention of the American engineers was to make a very good d.c. motor capable of operating on alternating current. In Europe, not a single main line railway is operated over both a.c. and d.c. systems. With reference to the committee's statement that the difference in the estimated cost between the d.c. and high potential single phase systems, considering both first cost and cost of operation is so slight that the decision cannot be made on the cost basis alone, Mr. Murray said that while this statement might be correct for interurban railways, five years of engineering, construction and operating experi-

ence on a trunk line property, permitted him to present a firm but respectful disagreement. Mr. Murray did not think that the danger to employees from the overhead conductors was very great if due care was exercised. He thought there was no necessity for employees to be on the top of cars and the many accidents that had been due to their being there could be eliminated by enforcing a regulation to keep the men off the roof.

In conclusion, Mr. Murray said that his firm belief in the single phase system as the proper agent for freight and passenger trunk line operation including such a line's terminal and suburban traffic was based upon a conscientious effort to secure the facts within a situation that actually exists. It had been shown that the high voltage conductor out of reach is safer than the low voltage contact conductor within reach.

George M. Basford, assistant to the president, American Locomotive Company, said that the interest and value of the report was increased by the fact that the committee included railroad officials who have direct responsibility in connection with railway installations. The conclusion that each problem on electrification would have to be settled on its own merits was a truth which illuminated the entire situation. Electrification on the grounds of economy can be justified in but very few cases. A few years ago it seemed very economical to use it on mountain divisions, but the development of the Mallet compound locomotive had changed conditions, even in cases where water power is available. There is less heard now-a-days concerning the electrification of long distance main trunk lines. The possibilities of the steam locomotive have not yet been exhausted. Hitherto, the development of the steam machine has been toward plain, rugged types with little attention to securing refinements of economy. These refinements are now being taken up and will produce the desired reductions in expense for less than electrification. He questioned any statement that the limit of capacity had been reached in the steam locomotive. However, there will be other cases like that of the New York Central, and great freight terminals particularly will present difficult problems for study.

Mr. Gibbs discussed the question of standards brought up by Mr. Stillwell. He said that the American Railway Association had had in existence for over four years a committee on standard locations of third-rail and overhead conductors. He was a member of this committee which had made a report on standardizing these locations and he hoped that the railway members of the club would live up to the standards set. Mr. Stillwell replied that he knew of the existence of the committee, but did not know that a report had been made. As a member of the Erie Railroad Commission some years ago, he had found that a third-rail with enough clearance for all classes of rolling stock could not be installed without making very expensive changes in bridges and other structures. Referring to Mr. Basford's remark about the steam locomotive, Mr. Stillwell quoted a statement by E. H. McHenry, vice-president of the New York, New Haven & Hartford Railroad, to the effect that the electric locomotives on that railroad had run 19,000 miles per delay as against 6000 miles per delay by the "sturdy" steam locomotives.

C. O. Mailloux, consulting engineer, said that if any fault was to be found with the algebra or other mathematics of the electrical engineers, it has been due more to the ignorance of those who tried to interpret it than those who formulated it or with mathematics themselves. He did not deny that some electrical engineers could get mixed up in their analyses, but if anything is known about the real economics of electric and steam traction, we owe it very largely to the electrical engineer. In lecturing to students on electric railway engineering, he had been in the habit of prefacing his remarks by a dissertation on financial feasibility. He used in this connection a simple yet far-reaching formula in discussing the question of the almighty dollar, and one which showed that the electrical engineer has gone into things thoroughly without using any very misleading algebra. The following is the formula quoted by Mr. Mailloux:

$$\frac{R - E}{C} \times 100 = F$$

This formula simply means receipts (R) less expenditures (E) divided by cost (C) and multiplied by 100 will represent the financial ratio of feasibility (F). That equation was the one which showed clearly the important fact that it was not necessary to decrease the cost of operation in order to increase the financial returns of a road. It is the difference between the receipts and the expenditures which determines the financial condition. Each of the terms in practice can be subdivided; for instance: $R = R_1 + R_2 + R_3$, etc., in which R_1 is the receipts from passengers; R_2 the receipts from freight, etc. E can also be subdivided into E_1, E_2 , etc., and C can be divided in $C_1 + C_w +$ etc. The subscript w indicated the capital which was water.

William McClellan closed the discussion as a member of the committee. He said it was not his intention to defend the report. It represented what all the members could agree upon as one and not what the individuals thought. Some of the individuals, he knew, would have gone further. If this point had been understood by some of the speakers many criticisms would have been unnecessary. Had the committee been able to decide at the beginning that there was no practical system except the single phase system, the report would have been somewhat different; but, as this was not the case, all the committee could do in justice, without straddling and still speak as one, was to present a report embodying the maximum to which all members could agree and trust to the discussion to bring out individual opinions. Following the line of Mr. Stillwell's remarks, on the success of past work, Mr. McClellan said that, inasmuch as we have succeeded in terminal and heavy subway work and our predictions have been so nearly correct, we should be perfectly willing to stake our reputations that the same results will ensue if the same efforts are applied to the trunk lines problems. As to the question of contingent costs, he said that directors of a railroad could not help including certain items in the expenditure account, even if they were not caused directly by the electrical work. On some lines, it would be necessary to rebuild every bridge for the overhead wires and there are systems where it would not be easy to take care of the amortization of steam locomotives and rolling stock by using them elsewhere. To sum up the matter of systems, he said that there is no uncertainty about the system except when the conditions themselves are uncertain.

MEETING OF THE COMMITTEE ON TRANSFERS

A meeting of the committee on transfers and transfers information of the American Street & Interurban Railway Transportation and Traffic Association was held at the headquarters of the association, 29 West Thirty-ninth Street, New York, on March 21. Those present were: M. R. Boylan, chairman, general auditor, Public Service Railway Company, Newark, N. J.; F. T. Wood, assistant to general manager, Metropolitan Street Railway Company, New York; R. E. Lee, general superintendent, Cincinnati Traction Company; T. C. Cherry, superintendent, Utica & Mohawk Valley Railway Company.

The discussion developed a variety of practices among those present in regard to the type of transfers used. Thus in New York direction is indicated by color and the date and a. m. and p. m. designation by being printed on the ticket. No effort is made to mark the junction. The only punch mark is the time limit. The Cincinnati Traction Company has an a. m. and p. m. coupon, with the date printed in red letters on the face of the transfer, and shows the direction by a punch. The Public Service Railway Company uses the a. m. and p. m. coupon, while the Utica & Mohawk Valley Railway uses different colors for morning and afternoon transfers. Transfers are registered on the Public Service system and in Utica, but not in New York. In Cincinnati they are registered except on P. A. Y. E. cars. The committee decided to prepare a data sheet asking for samples of the different forms of transfer tickets used by member-companies and for other data on transfers.

OPERATING STATISTICS OF THE LONG ISLAND AND WEST JERSEY & SEASHORE RAILROAD

George Gibbs, chief engineer of electric traction, Long Island Railroad, and chief engineer of electric traction Pennsylvania Tunnel & Terminal Railroad, has prepared a very interesting report on electric traction to be presented at the 1910 meeting of the International Railway Congress. The report appears in full in the January issue of the *Bulletin* of the congress, issued in Brussels.

After giving a short account of the history of electric traction in America, Mr. Gibbs describes the systems and the character of equipment employed on different railroads in the United States. He then presents the following tables on the cost and other data of operation on the Long Island and West Jersey & Seashore Railroads. Mr. Gibbs comments on these tables are presented below:

"Table I gives a concise statement of the comparative physical characteristics of the electric installations on the two roads, from which a general idea of the magnitude of the operation may be gathered.

TABLE I.—STATISTICS

	Long Island Railroad.		West Jersey & Seashore Railroad.	
	1907	1908	1907-1908	
Route miles of track.....	37.6	43.9	74.6	
Miles of single track.....	90.0	98.69	152.5	
Miles of high-tension pole line....	41.0	42.0	69.59	
" " " circuit (3-phase)	70.24	80.03	417.54	
" " " (1-phase)	14.1	9.7	None.	
" of conduit	9.09	9.09	....
High-tension transmission voltage...	11,000	11,000	33,000	
Number of substations.....	6	6	8	
" of portable substations....	2	2	None.	
Capacity of substations.....	19,500	19,500	17,000	
" of portable substations....	2,000	2,000	None.	
" of power house.....	16,500	16,500	8,000	
Number of motor cars.....	130	132	80	
" of trailer cars.....	84	82	None.	
" of baggage and mail cars..	5	5	8	

"Table II gives the average number of cars in trains and the average weight per car. It will be noted that the average weight per car changes slightly in the two years, due to a change in the ratio of the motor to trailer cars.

TABLE II.—WEIGHT OF CARS AND MAKE-UP OF TRAINS

	Long Island Railroad.		West Jersey & Seashore Railroad.	
	1907.	1908.	1907.	1908.
Average car per train.....	3.70	3.94	2.95	3.45
Average tons per car (1 ton equals 2000 lb.)	37.8	36.5	47.9	47.4

"Table III gives comparative figures for electrical quantities and efficiencies and is of interest in showing the distribution of the various losses in electrical energy from the power house to the cars. The figures for power consumption per ton-mile and per car-mile represent fair averages for electric installations of the character in question and in a climate which requires a considerable consumption of energy in winter for heating the cars. Electric heating adds very largely to power consumption, as will be illustrated when it is stated that, in summer months, the watt-hours per ton-mile at substations on the West Jersey & Seashore Railroad were about 63, while in midwinter months this figure rose to 100; the larger part of this difference is due to the additional energy required to light and heat the cars in winter. It is interesting to note also that the efficiency of the electric system from the power station to the point where the current leaves the substation for feeding into the third-rail is from 70 per cent to 80 per cent, depending upon the loading during the various months; in the busy months the efficiency will at times run as high as 85 per cent. The losses from the substation to the cars in the direct-current feeder system cannot be accurately measured, but in the cases cited it is estimated to be between 5 per cent and 10 per cent. The figures given for 'current used for other purposes' illustrate the considerable and useful consumption of power for running shop motors, lighting stations and operating the signal system.

TABLE III.—ENERGY CONSUMPTION

	West Jersey Long Island & Seashore Railroad.		West Jersey Long Island & Seashore Railroad.	
	1907	1908	1907	1908
1. A. c. kw-hours received at substations	20,341,826	....	21,899,739	....
2. Efficiency of h. t. Transmission	96.2	....	97.7	....
3. D. c. kw-hours delivered from substations	16,138,965	14,585,900	18,138,515	16,088,300
4. D. c. kw-hours used for electric traction	13,466,995	13,530,659	16,201,962	14,780,145
5. D. c. kw-hours used for other purposes.	896,075	389,672	901,934	731,771
6. Kw-hours lost in conversion from a. c. to d. c.	4,202,861	5,882,510	3,761,224	5,997,020
7. Efficiency from power house to substation bus-bars	78.52%	72.15%	81.3%	73.8%
8. Total ton-miles, passenger	141,541,106	184,615,535	180,129,860	192,472,541
9. Car-miles, passenger.	3,808,479	3,855,580	4,945,719	4,044,025
10. Train-miles, passenger	1,021,102	1,305,663	1,251,877	1,172,894
11. Watt-hours per ton-mile at substations.	95.2	73.29	90.0	76.8
12. Watt-hours per ton-mile at power house	121.2	101.58	110.6	104.0
13. Kw-hours per car-mile at power house	4.51	4.86	4.028	4.95
14. Kw-hours per car-mile at substation..	3.54	3.51	3.276	3.66

"Table IV gives the cost of generating current at the power house and cost of the current when delivered at the cars. The former figures include all power-house operating and maintenance expenses, but no fixed charges, taxes or depreciation charges. The 'delivered cost' includes the operating and maintenance cost for transmission lines, third-rail, track bonding and substations and allowances for losses in transmission of the current and its conversion to direct current delivered at the car contact shoes. It should be noted, however, that the above figures do not include any maintenance expenses other than for electrical apparatus, and no portion of the general expenses of the railroad.

TABLE IV.—CURRENT AND MAINTENANCE COSTS

	Long Island Railroad.		West Jersey and Seashore Railroad.	
	1907	1908	1907	1908
Cost per kw-hour at power house	0.804 cent.	0.697 cent.	0.680 cent.	0.592 cent.
Cost per kw-hour at cars	1.705 cents.	1.461 cents.	1.302 cents.	1.151 cents.
Cost per car-mile for maintenance of electrical equipment on cars	0.71 cent.	0.76 cent.	....	....
Net output in kw-hrs. at power house...	....	31,517,200	....	22,887,800
Lb. of coal per kw-hour	....	3.29	....	3.36
Cost of coal per ton: 2000 lb. ....	....	2.512 dollars.	....	2.1814 dollars.
Number and capacity of units .....	....	Three: 5500 kw.	....	Four: 2000 kw.
Total kw. capacity of power house.....	....	16,500 kw.	....	8000 kw.

"Table V gives the monthly car-mileage and cost per car-mile; the total yearly mileage and the average car-mile cost, and average yearly cost per 1000 ton-miles moved. The cost per car-mile includes the following: The cost of power, maintenance of third-rail and track bonding, maintenance of car bodies and trucks, maintenance of way and equipment expenses, conducting transportation and traffic expenses, general expenses, wages of motormen and train crews; in fact, all operating expenses of the railroad. In comparing the costs per car-mile the difference in weight of cars, given in Table II, should be noted; it should furthermore be explained that in the case of the Long Island Railroad all trains may be termed 'local,' as the average length of the run on the so-called express service is only about 2½ miles, whereas on the West Jersey & Seashore Railroad about one-third of the total train-miles are made in cross-country express service with an average length of run of about 25 miles between stops, and the remaining service, termed 'local,' averages 2½ miles between stops, or about the same as express service on the Long Island Railroad. In other words, the Long Island installation may be considered purely local service in a densely populated district, whereas the West Jersey service approximates main-line railway conditions with long runs.

TABLE V.—CAR-MILE COSTS

Month.	West Jersey & Seashore Railroad.		Long Island Railroad.		West Jersey & Seashore Railroad.		Long Island Railroad.	
	Car-miles.		Car-miles.		Cost per Cts. Cts.		Cost per Cts. Cts.	
	1907	1908	1907	1908	1907	1908	1907	1908
Jan. ...	294,672	281,723	235,828	201,128	27.50	29.29	28.16	26.97
Feb. ...	255,344	271,542	214,242	186,256	30.90	28.53	30.04	27.87
March...	270,286	291,959	241,024	224,919	23.90	26.57	28.05	24.77
April ...	244,431	331,224	281,509	271,224	24.30	21.34	24.05	23.94
May ...	267,317	323,584	347,211	382,195	21.50	19.97	21.39	20.90
June ...	292,767	344,523	349,133	478,793	22.50	18.92	22.32	18.00
July ...	435,860	451,149	392,514	628,511	15.30	16.17	15.73	13.53
Aug. ...	478,041	485,565	400,880	632,388	14.90	13.71	15.59	13.26
Sept. ...	411,359	369,204	299,798	509,213	15.85	17.17	19.87	14.79
Oct. ...	317,141	312,833	306,138	441,638	23.50	19.55	22.37	17.21
Nov. ...	292,349	282,322	245,748	345,640	21.40	20.42	25.93	22.29
Dec. ...	295,097	292,397	212,144	360,325	22.60	22.68	27.48	22.45
Total ..	3,854,664	4,044,025	3,526,227	4,662,230	21.30	20.46	22.45	17.80
Cost per 1000 ton-miles.....					\$4.406	\$4.307	\$5.94	\$4.86

"Table VI gives a list of the principal defects reported, and is of interest in showing which portions of train equipment require the largest amount of attention. The item for blown fuses appears excessively large, but it should be remembered that the purpose of these fuses is to guard against excessive current in the various critical portions of the equipment, and the fuses are purposely adjusted so as to be blown under exceptionally severe conditions; they are easily and quickly replaced by the train crews and cause little delay to service. The excessive number of fuses blown on the Long Island Railroad in 1908 was partly due to the use of stock fuses which were found somewhat too small for the increased requirements due to heavy loads and increased severity of service in that year. The considerable number of flash-overs of motors on the Long Island Railroad was also largely due to very severe local service. Breakage of contact shoes is almost entirely due to striking material left by trackmen in the path of the shoes, but occasionally shoes are broken in striking the approach blocks where the third-rail is interrupted at street crossings. It will be noted that there were a large number of defective trolley poles reported on the West Jersey & Seashore Railroad; this is due to the use of wheel trolleys and the ordinary type of cross-span overhead trolley wire; it illustrates, that while this type of construction was installed in the best manner, it is not suitable in practical service with trains of three or more cars operating at fairly high speed.

TABLE VI.—DEFECTS OF TRAIN EQUIPMENT

	1907		1908	
	Long Island Railroad.	West Jersey & Seashore Railroad.	Long Island Railroad.	West Jersey & Seashore Railroad.
Flash-overs	23	None.	42	1
Main fuses blown.....	50	...	60	...
Shoe fuses blown.....	1169	844	4812	1934
Trolley fuses blown.....	None.	358	None.	711
Bus fuses blown.....	158	51	182	169
Controller fuses blown.....	None.	138	None.	118
Heater and pump fuses blown	379	359	590	383
Total fuses blown.....	2023	1955	6028	3504
Hot motor axle bearings....	6	8	25	2
Hot journal bearings.....	6	44	34	28
Grounded armatures	9	6	27	6
Short circuited armatures...	1	In above.	9	In above.
Grounded fields	1	2	2	1
Commutators	5	None.	16	None.
Contact shoes replaced.....	500	925	672	564
Pump motor armatures.....	10	1	15	2
Control	86	180	139	99
Brake equipment	15	40	26	15
Short circuits (misc.)	5	...	9	...
Trolley poles	Not used.	981	Not used.	469

"Table VII classifies the principal detentions of all kinds due to electric equipment and gives the total train-minutes of delay due to same. It also gives the totals reduced to figures of 'car-miles per detention' and 'car-miles per minute of detention.' In compiling this table detentions due to collisions and derailments have been omitted, as having no direct bearing upon the behavior of electric equipment.

GENERAL REMARKS UPON TABLES

"The two roads have been in operation for a sufficiently long time to rather definitely establish the behavior of all appa-

ratus in practical service; there is no indication that in subsequent years of operation there will develop cause for extraordinary maintenance in any particular items due to the accumulative effect of service. It should be noted, however, that no account is taken of possible advances in the electric art, which might make the equipment obsolete; in other words, no 'depreciation' account has been kept. In a rapidly advancing art replacements on account of 'change of type' are quite possible contingencies, but much difference of opinion exists upon this whole subject in America and its pros and cons cannot be entered into in this general report.

"Of the total cost per car-mile one-third is due to cost of supplying power to the car, including maintenance of all parts of the electric system on the car, and of this figure about one-half is the cost of the power alone. In both roads, the load conditions at the power houses are not favorable, nor is the quantity of power turned out as large as it is expected to be in the near future, so that the item for cost of power at the car

TABLE VII.—DELAYS DUE TO ELECTRIC EQUIPMENT

	1907		1908	
	Long Island R. R.	West Jersey & Seashore R. R.	Long Island R. R.	West Jersey & Seashore R. R.
	N.o.	Train Minutes.	N.o.	Train Minutes.
Motors	13	197	21	404
Control equipment	21	286	180	2,209
Air brakes	8	84	40	247
Miscellaneous mechanical equip't..	7	74	80	1,073
Miscellaneous electrical equipment..	58	1,006	316	1,564
Failures of power due to third rail..	17	218	8	103
Failures of power due to trolley....	...	...	86	1,122
Failures of power due to s.-s. and Trans.	5	25	13	80
Track troubles	7	263	7	146
Snow and ice on third rail	8	161	72	1,751
Shoe fuses blown.....	...	...	...	107
Unclassified and unknown	15	179	120	844
Total.....	159	2,493	943	9,543
Car-miles (passenger and baggage)		3,526,227		3,855,580
Car-miles per detention		22,177		4,088
Car-miles per minute of detention..		1,414		404
				689
				692

should come down considerably as the magnitude of the operation increases. Other items also in the total cost per car-mile, namely, general expenses of various kinds and wages of motormen and train crews, are largely affected by density of traffic and have a downward tendency.

"The list of detentions looks quite formidable, but when analyzed the general result is found to be good. Motors, as before stated, have been brought to a high state of perfection and detentions caused by their failure on the road are rare and largely due to overloading. The temptation in electric service is constantly to overload, either quickening the schedule, increasing the number of stops or adding trailer cars; this is due to the fact that the apparent limit of capacity of railway motors is their ability to make schedule and it is often not remembered by the railway superintendent that this is far beyond the heating capacity of the motors.

"Where all cars in a train are motor-cars, overloading cannot be as readily accomplished as where trailers are hauled, especially if the motors have been designed to take care of a continuous-running condition with the minimum number of stops, as is generally the case.

The multiple-unit control system is a very complicated assemblage of delicate apparatus, but works surprisingly well and when properly maintained, it will be noted, gives very little trouble.

"Table VI is confined to the statement of delays and troubles on the train equipment, but in Table VII the troubles due to the other parts of the electric installation, namely, the third-rail, transmission lines, substations and power house, are included, and it is interesting to note the unavoidable delay caused by these features of an electric installation.

COST COMPARED WITH STEAM

"Considering the figures for the year 1908, it is seen that the Long Island road operated its electric mileage at a cost of 17.80 cents per car-mile; the steam-train mileage cost 27.95 cents, a difference in favor of electric traction of 10.15 cents per car-mile. On the West Jersey & Seashore Railroad the electric mileage cost 20.46 cents per car-mile as against 22.30 cents for the steam mileage, or a saving for the electric service of 1.94 cents per car-mile.

"The relative unfavorable showing on the West Jersey for electric saving is in part accounted for by the difference in character of the service on the two roads, as before explained, and by the fact that on the Long Island road the average length of train in steam service was about the same as in the electric and the stops frequent; it was, therefore, costly service. On the West Jersey the average cars per steam train was twice that of the electric and much of the service was long-distance express with few stops and of an exceptionally economical character.

OPERATING COSTS OF A. C.-D. C. VS. A. C.

"A comparison of this kind must at present writing be based on estimates and opinion, as no operating figures for the a.c. systems are obtainable. It is the opinion of the writer that the maintenance costs of the single-phase system, as at present developed, will be somewhat higher than for the a.c.-d.c., but not by an important amount; eventually the maintenance costs should be about the same for either system. The total operating cost figure, however, will probably be in favor of the single-phase system, because of the higher average efficiency of this system and the lower operating cost of substations. The importance of the savings possible for the single-phase will depend upon the character and extent of the traction scheme, becoming greater as the length of line increases and the density of traffic decreases. It is impossible, however, to generalize safely and each case should be considered upon its own merits.

"An estimate may be given for the particular case referred to under the 'first cost' heading, in which it was figured that about 13 per cent less energy at the power house would be required for the single-phase than for the a.c.-d.c. system. This together with the saving in substation operation, would show an operating saving of about 1 cent per car-mile, or, say, between 4 per cent and 5 per cent, of the total operating cost."

MEETING OF RAILWAY SIGNAL ASSOCIATION

The March meeting of the Railway Signal Association was held on March 14 at the Congress Hotel, Chicago. Vice-President C. E. Denney, of the Lake Shore & Michigan Southern Railway, presided. Among the subjects considered were the reports of standing committees on signal practice, details of signal masts and ladders, three-arm signals, mechanical interlocking, power interlocking, lightning protection, primary cells and the portable storage battery in automatic block signal service. The latter subject was presented in a paper by H. M. Beck, of the Electric Storage Battery Company. A paper on "The General Control and Transmission of A.C. Railway Signals" was presented by Frank R. Rhea and E. E. Kimball, both of the General Electric Company.

In the discussion of lightning arresters a paper on "Lightning Protection," by Otto Holstein, chief train dispatcher of the Central Railroad of Peru, was read. The author described a novel type of arrester which had given satisfactory service under very trying conditions. The principal parts of the arrester were made of cast iron and it was of what is known as the two-line type.

The author's description follows:

"The ground plate measures $7\frac{3}{4}$ in. x $65/16$ in. and stands on four legs cast with the plate. The whole upper surface of this plate is furrowed and sharply ridged. The line plates are likewise furrowed. The arrester, when assembled, has these sharp ridges at right angles, making every point of intersection (of which there are thousands) a spark-gap with an air space of but $1/32$ in. to break down, which imposes but a

negligible resistance to a static discharge of any intensity.

"The line plates and ground plate are separated by hard rubber or ebonite washers $1/32$ in. thick. The plates to which the line is connected can be lifted from the ground plate for inspection or for cleaning without interfering with the working of the wires.

"The only fault that can be found with these arresters is that they are rather heavy, the weight of the two-line type being about 15 lb. The records of this road show excellent performance for this type. There are records of some violent storms where office and ground leads have been fused by static electricity, but no instruments have been lost.

"The original manner of connecting the arresters was to connect them in series with the line and instruments and, inasmuch as they appear to have done their work so connected, it might seem best to let well enough alone, but I have put choke coils in series with the line plates of the arresters and the instruments with a view of still further retarding the passage of the high-frequency discharge, causing the charge to bank up and break down the resistance of the arrester sooner than it would otherwise, thereby offering greater protection to the instruments. Good ground leads have also been sought and both binding posts of the ground plate have been connected with separate grounds. A flat copper ribbon being used for the ground conductor, this form of conductor appears to embody qualities not possessed by round conductors."

MEETING OF THE CENTRAL ELECTRIC ACCOUNTING CONFERENCE

The twelfth meeting of the Central Electric Accounting Conference was held at the Hotel Anthony, Ft. Wayne, Ind., on March 12:

A paper on the subject, "The Auditor's Relation to the Operating Executive," was read by A. J. Lamb, chief clerk, Toledo Railways & Light Company. An abstract of this paper was published in last week's issue.

A discussion in regard to methods of passenger fare collection followed. W. B. Wright, auditor of the Indianapolis & Cincinnati Traction Company, and E. L. Kasemier, auditor of the Ohio Electric Railway, explained in detail the methods used by their companies, and submitted forms for inspection.

Before discussion of the question of affiliation with the Central Electric Railway Association, the president, W. H. Forse, Jr., announced that the conference would go into executive session, in order that there might be a free and full expression of opinion on this subject.

The next meeting of the conference will be held at Toledo, Ohio, on June 25.

It is probable that the meetings hereafter will consist of a morning and afternoon session, in order that more time may be given to the subjects under consideration.

The Public Service Commission, Second District, New York, report of passenger train delays for January, 1910, shows that during that month 59,583 trains were run in the State of New York. Of these, notwithstanding the severe weather conditions, 73 per cent were on time. The average delay of each late train was 39.9 minutes; average delay for each train run was 10.8 minutes. The principal causes of delay were waiting for trains on other divisions, 39.6 per cent; waiting for train connections with other railroads, 14.2 per cent; train work at stations, 9.6 per cent; storms, 6.1 per cent; engine failures, 5.5 per cent; and wrecks, 3.1 per cent.

The Anglo-Argentina Tramway Company, of Buenos Ayres, Argentine, has 1200 motor cars and 600 trailers in service and will soon receive in addition 125 motor cars and 80 trailers. During the first 10 months of 1909 the company's cars carried 231,000,000 passengers as compared with 208,000,000 passengers during the corresponding period of 1908.

AIR BRAKE INSTRUCTION IN BROOKLYN

As previously announced in these columns the Brooklyn Rapid Transit System recently adopted the Westinghouse AML and ATL graduated release, quick-recharge brake for all passenger elevated and service cars. As a part of its program to educate the motormen in the most efficient handling of this improved equipment, the company has remodeled its instruction car as described in the *ELECTRIC RAILWAY JOURNAL* of Feb. 5, 1910, and has prepared an air-brake catechism especially suited for Brooklyn train-operating conditions. For a fitting preliminary, arrangements were also made to have Walter V. Turner, mechanical engineer of the Westinghouse Traction Brake Company, deliver to the elevated motormen a simple lecture on the principles and constructional features of different types of air-brakes. Mr. Turner delivered his lecture twice on Tuesday, March 8, at 11 a. m. and 9 p. m., so that all the men would have an opportunity to be present. The lecture was given in the auditorium of the employees' club building at East New York.

The lecturer was introduced by W. G. Gove, superintendent of equipment, Brooklyn Rapid Transit System. Mr. Gove said that the principal reason which had governed the company in adopting the new brake was the necessity for obtaining one which would give maximum braking power at any and all times, irrespective of the frequency of application, together with extreme flexibility, thereby insuring the maintenance of schedules, with the constantly decreasing headway necessary in the Brooklyn elevated service. The change first was contemplated about two years ago; many careful tests were made in December, 1908, and the contract was awarded shortly thereafter. Installation of the new equipments could not begin until the autumn of 1909, but now some 600 passenger cars are equipped and the balance will be ready on Decoration Day. A week after this the work on the service cars will be started for completion by June 10. Mr. Gove in referring to the brake itself added that it covered a design which, with a single application and graduated release, will give the quickest and smoothest stop possible, and because of having a low air pressure in the brake cylinders when the train comes to a stop, permits of a rapid acceleration of the train without the brake-dragging characteristic of the older designs. In conclusion he said that one great advantage of the new brake was the ability to obtain in an emergency application within but 3 lb. of the train line pressure; another advantage was the ability to obtain efficient braking power at all times, within limits set only by the ultimate capacity of the pump.

MR. TURNER'S REMARKS ON AIR BRAKES

Mr. Turner prefaced his explanation of the lantern slides by an apology for the brief time he would necessarily have to allot in discussing each detail of a modern braking system. He said that the improvement of the air brake was largely due to the designer's contact with the men who operated it. Of brakes it could always be said that the best is not good enough. When a motorman looks under a car he sees that the space occupied by the braking apparatus is insignificant in comparison with the electrical equipment. Nevertheless, not only must the brake do in seconds what the motors do in minutes, but it must also be operative every time or something is going to happen. If you cannot start, it is merely an inconvenience; if you cannot stop, it is a tragedy. In short, the brake system must be operative under all conditions as long as there is air in the reservoirs. This want is met only by the quick-action brake.

Mr. Turner pointed out that the brake formerly was considered as a safety device for emergencies. A great deal of money was spent for accelerating machinery but it took a long while to realize that a minute saved in braking is the same kind of a minute that is saved in accelerating. When emergency stops only are considered the shortest kind of a stop is desirable even if the passengers are thrown from their seats; but when one must make the far more numerous service stops without sliding the wheels and without subjecting

cars and passengers to shock, it is necessary to have a brake which has a wide division between the emergency and service applications.

There are other points involved in making a stop. Every motorman knows that when he is crowded for time he can save it by keeping the power on to the last instant to attain the maximum inter-station speed and then by putting the brakes on full. There are three considerations involved in making a stop: the first is the time element, which is the most profitable to the railway; the second is the accuracy of the stop; the third is the smoothness of the stop, the consideration which is the most important to the public.

Of course, the best way to make a smooth stop is to shut off the power and drift to a standstill, but this method would not save running time or insure accuracy. There must be some means for controlling the train to accomplish a smooth, accurate stop within a given distance for known conditions of speed, track and grades. The power applied in braking should be in proportion to the power used in running. In general, to secure a proper stop, the brakes should be applied so the train would stop a car length short of the spot desired, then by gradually reducing the air pressure in the brake cylinder as the speed decreases, the train will smoothly come to rest in the shortest practicable time and at the place required. Mr. Turner wished to impress his hearers with these points as strongly as possible. It was useless for a railway company to go to the expense of purchasing the best apparatus if the motormen did not get the improved results possible from the new design. The motormen should understand that they were paid for using their brains and individuality to save money and not simply for moving cars back and forth. If the other fellow did not take this view of his duties so much the better for the man who did. He hoped that what he could tell the hearers would only whet their minds for a keener study of the subject of air brakes.

Taking up the descriptions of the numerous lantern slides, Mr. Turner began with sections of the straight air brake. The latter he defined as the acme of simplicity but also of danger. It was all right from the standpoints of flexibility and power but if the hose bursts there would be no braking power, nor was it possible for an application to be made anywhere else than at the motorman's valve. Hence, arose the necessity for an automatic brake including the triple valve. The auxiliary reservoir and the triple valve represented the only important items added to the straight air brake to enable each car to carry its own brake pressure. The original automatic brake, however, made it possible for the motorman to lose his air by too many applications back and forth.

Mr. Turner gave particular attention to the equalizing piston. This device was necessary on long trains, due to the differences in the release of air throughout the train pipe, thereby causing surges. The equalizing piston gives the same reduction on one car as on 20 cars, but a greater length of time is required for the reduction of the brake pipe pressure.

The quick recharge feature of the new air brake not only avoids any shortage of air supply but it also gives the flexibility of the straight air brake. Nevertheless, the degree of flexibility depends upon the motorman. The brake is not automatic in its manual operation nor can it be kept operative without maintenance.

With the old brake, the motorman could make only one full service application and he was helpless if any emergency arose between that application and the stop. Now he can stop within a shorter distance than he calculated and brake again. Mr. Turner stated that the emergency application after full service was developed at the request of the Brooklyn Rapid Transit System. Lack of space forbids any reference to the details of the apparatus shown on Mr. Turner's slides. It may be stated, however, that the audience had no difficulty in following the course of the air in the various kinds of applications, because the air passages were shown projected on one plane instead of appearing in part on a large number of sections as is usually the case.

PRELIMINARY INSTRUCTION BOOK

Pending the completion of an elaborate text book on the new brakes, including the use of colored charts, the company has prepared a preliminary catechism covering the most important points in 98 questions and answers. There are chapters on the different types of air brakes, the main reservoir, the triple valve and train operation. It is mentioned in this book that no part of the air brake or electrical equipment is to be adjusted or tampered with by employees of the transportation department.

HEARING ON ELEVATED SERVICE IN NEW YORK

The hearing before William R. Willcox, chairman of the Public Service Commission of the First District of New York, and Commissioner John E. Eustis, regarding service on the elevated lines of the Interborough Rapid Transit Company was continued on March 17, 1910.

Frank Hedley, vice-president and general manager of the company, said that since the hearing on March 11, 1910, he had inspected the charts prepared by D. L. Turner, chief of the bureau of transit inspection of the commission, and that they indicated that more cars were needed at certain times during the non-rush hours. Whereas 94 trains were operated past Thirty-fourth Street southbound over the Third Avenue line between 7 a. m. and 9 a. m., Mr. Hedley suggested that 104 trains be scheduled to cover this period and proposed a schedule of 115 trains northbound past Forty-second Street between 4.30 p. m. and 7 p. m. as compared with 103 trains at present. Between 7 p. m. and 10 p. m. Mr. Hedley suggested that 74 trains be operated past Forty-second Street northbound, an increase over the present schedule of six or seven trains.

On the Second Avenue line, between 7 a. m. and 9 a. m. Mr. Hedley proposed to run 59 trains south as against 24 at present, and between 4.30 p. m. and 10.30 p. m. he proposed to run 96 trains northbound or about 580 cars as compared with 526 cars at present. During the other hours of the day the investigation showed that the service more than fulfilled the requirements.

On the Sixth Avenue line between 7 a. m. and 9 a. m. southbound at Fiftieth Street, Mr. Hedley proposed a schedule of 50 7-car trains, as compared with 44 trains at present. Between 9 a. m. and 4.30 p. m. the schedule exceeded the demands. Between 4.30 p. m. and 7 p. m. northbound past Fiftieth Street he proposed that 62 trains be run instead of 59 as at present.

On the Ninth Avenue line passing Fiftieth Street southbound between 7 a. m. and 9.30 a. m. Mr. Hedley proposed to operate 37 local trains and the same number northbound between 4.30 p. m. and 7 p. m. and 40 express trains southbound, as compared with 37 at present between 7 a. m. and 9.30 p. m., and 34 express trains southbound between 4.30 p. m. and 7 p. m., as compared with 33 at present. As both the local and the express trains of the Ninth Avenue line use the local tracks north of 116th Street, it was impossible to add any more trains than the number suggested by Mr. Hedley, as his proposal called for a headway of only 55 seconds.

Mr. Hedley reiterated that he was decidedly opposed to the suggested plan of adding a car to each train, this car to overhang the station platform.

Mr. Eustis announced that the commission would draw an order in accordance with the suggestions made by Mr. Hedley, but Mr. Hedley said that he did not feel that the necessity existed for a formal order. The hearing was then adjourned until March 28.

The operation of trains in accordance with the schedule suggested by Mr. Hedley was begun on March 21, 1910.

The electrification of the Vienna Metropolitan Railway, Vienna, Austria, is to be taken in hand by Messrs. Siemens-Schuckert, with the financial assistance of the Austrian Länderbank.

ANNUAL REPORT OF THE WISCONSIN RAILROAD COMMISSION

The first section of the annual report of the Railroad Commission of Wisconsin for the year ended June 30, 1909, has been issued. During the year 67 formal and 496 informal complaints relative to public utilities have been filed, as against 83 formal and 246 informal complaints in the preceding year. The total number of utility cases in which the commission was involved numbered 623.

On June 30, 1909, the files of the commission showed 27 electric urban and interurban railways in the State.

The report states that since the passage of the public utilities law a portion of the facilities of the statistical department has been devoted to obtaining data concerning conditions fundamentally affecting rates and services in connection with those plants which have come before the commission. To the statistical department has been assigned the preparation of the uniform classification of accounts for utilities as provided for in the public utilities law. During the year this classification has been completed and ordered by the commission to take effect on July 1, 1909. Generally speaking, the larger utilities, with the exception of many municipally owned plants, have prepared excellent reports. Municipal plants, as a rule, have been exceedingly delinquent in filing their statements and have shown an almost general lack of accounting system. Much the same conditions were found to exist in the smaller plants.

The report discusses in some detail the methods and principles followed in the preparation of the uniform classification of accounts and comments upon the results obtained as follows: "It is believed that this scheme is logical, correct in principle, comprehensive in its scope, sufficiently elastic to cover all conditions of size and methods of operation and that it is based upon practical considerations. The experience of the utilities with this system during the period in which it has been followed has already proved the value of the requirements and demonstrated the technical correctness of the classifications. Recognition of this fact is still further shown by the endorsement of the classifications at utility association conventions and by large number of instances where the principles and forms have since been adopted by utilities outside of Wisconsin."

The statistical department has acted in an advisory capacity in all matters concerning the proper keeping of the utility books and accounts and it frequently has been found necessary for employees of the department to audit the books of the utilities and to secure various financial and statistical data from the original books of entry.

In commenting on the "indeterminate permit," the commission says: "Much to the surprise of those who conceived the plan, less than 10 per cent of the public service corporations availed themselves of the privilege."

The distinctive feature of the development of the work of the engineering department is found in the increased emphasis given to investigations relating to the quality of service rendered to the public.

The commission feels that the public has more to gain in the way of improved service than through reduction in rates. Complaints of service are discussed in the report.

The report contains digests of three special reports prepared by the engineering staff in relation to investigations, viz: (1) upon the service rendered by the Milwaukee street railway system; (2) upon the damage caused to telephone service by the sleet storm of Jan. 27-29, 1909; (3) on the inspection of the Wells Street viaduct, Milwaukee.

The result of the investigation of storm loss showed that the total reported damage caused by this storm would range approximately from \$60,000 to \$75,000, and that, furthermore, the damage was confined to a limited area in the southern part of the State.

During the year 38 public utility properties were valued upon order of the commission. The total amount of property valued, including railroads, was \$310,440,868.

PERMANENT CITY TRACK CONSTRUCTION FOR INTERURBANS*

BY H. L. WEBER, CHIEF ENGINEER, COLUMBUS, MARION & BUCYRUS RAILROAD

Interurban cars generally enter cities over the tracks of the local traction companies, but if they are to enter over their own tracks and the streets are paved, it is well to construct the permanent way before commencing operations. It is always better to build the track when the street is being paved. In Northern latitudes, where the ground freezes more than 6 in. in depth, the track is apt to lose its alignment and grade if the whole street is not improved at the same time.

There are two plans that have proved very satisfactory for permanent way construction in city streets, namely: a sheet concrete foundation for both track and street pavement, and, second, a crushed-stone foundation, grouted, for the track foundation and a concrete foundation for the street pavement. With the former, traffic has to be suspended for one week at least on all new work to allow the cement to set or else the cars must run over a temporary track. The latter plan cannot always be followed without a great deal of expense to the railway company and inconvenience to the public. If there is a double track the service can be handled on one track while the other is being reconstructed. With a sufficiently large number of cross-overs, still a third plan is to shunt the traffic around the new work.

If new track has to be built in a city street before the service is installed, I would recommend a sheet concrete foundation for the track and roadway foundations, built at one operation. The track should first be laid, blocked up to grade and lined. The concrete, made very soft, can be then well puddled under the rails and under and around the ties with tamping bars. This part of the work must be done very faithfully by competent men who fully understand the object sought, for upon their proper manipulation of the concrete at this stage depends the success of the work, whether steel or wood ties or anchors are used. The purpose, of course, is to have the concrete one homogeneous mass when finished, and this end can be accomplished only by having the concrete of such consistency that every particle of sand shall be coated with cement and every particle of the aggregate with mortar, all so mixed that the mixture will readily flow with slight agitation with the tamping bars in the desired direction to find the voids. When the concrete has set there, it should be close up to the base of the rails, under and around the ties, forming a bearing for both.

In all concrete work, the art of proper mixing and depositing comprises the secret of good work. These two things must be done correctly and at the proper time to make the work a success. This is especially the case with street construction, for no class of work receives greater shocks and is more liable to failure from fatigue. The subbase can be reinforced when necessary by using a rail section No. 90 S. Carnegie Steel Company. This has a ball 2¾ in. wide, a base of 5¾ in. wide and height of 5¾ in., all very desirable dimensions, the ball especially. This rail costs no more per yard than the 6-in., 73-lb. rail, although it weighs 20 per cent more, and with the extra steel which it possesses no rail brace is necessary.

If paving bricks, wooden block or asphalt are to be used for paving it will not be necessary to have a greater depth of rail than 5¾ in. or 6 in. If the steam railroads find such a rail of sufficient strength, why should street railways use a deeper rail, unless the street paving requires it? I believe much money has been unnecessarily spent in providing too deep a rail and foundation, and in too deep a rail with too shallow a foundation, and that too little attention has been given to the proper draining of the subgrade foundation. It is far better to have a fairly heavy rail with a good foundation under the ties, than a rail of greater weight on a poor foundation.

All agree that in ballasted track the rail first receives the shock, transmits it to the ties, and the tie to the foundation, but

is this true with concrete foundation, where the rails rest directly upon the concrete as well as on the tie? If the work of concreting has been properly done, the rails will have a bearing throughout their length, therefore a lighter rail could be used successfully than on ballasted track. On the other hand, if a rail should be adopted that will sustain the load without deflection, when supported in ties, say, 4-ft. centers, it will be strong enough, with a concrete foundation, for a great increase in the traffic loading. With a base 7 ft. to 8 ft. wide and sheet concrete 11 in. to 12 in. thick below the base of the rail and 6 in. under the tie, there are few subgrades, when properly prepared, which will not sustain any load which either a steam or electric road has. If greater strength is necessary the concrete can be reinforced.

A machine mixture of concrete 1 in 10 is preferable to a hand mixture of 1 in 8. All wet subgrades should be subdrained and all trenches thoroughly rolled or tamped before the track is laid so that the concrete laid may meet the maximum resistance. Sheet concrete when placed and made in the way specified, except that the mixture should be richer, can carry from 25 per cent to 35 per cent of rubble, boulders or old brick bats. In most localities in Ohio and Indiana concrete costs about \$5 per cubic yard, so if from 25 per cent to 35 per cent of this rubble, boulders or brick bats are added the cost of the concrete is reduced to that extent. Concrete of this kind was used in Fort Wayne, Ind., on East Washington Street and cost only \$3.07 per cubic yard in place.

A track constructed as shown in Fig. 1 with 90-lb. rails 6-in. x 8-in. x 7 ft. white oak ties, 35 in. centers, with suspended joints 21 in. centers, sheet concrete 7½ ft. wide and 6 in. deep under the tie, standard angle splice bars, brazed rail bonds on the ball of rails, brick paving and 1¾-in. sand cushions, will cost complete per linear foot of track about as follows:

Track work material.....	\$1.41
Track foundation and one-half excavation.....	.57
Pavement foundation and one-half excavation.....	.53
Brick paving complete.....	.79
Total cost per foot of track.....	\$3.30

Fig. 2 shows a section of reconstructed track with a grouted, crushed-stone foundation. It illustrates work actually performed on Taylor Street, Fort Wayne, Ind., in 1908, and I am informed by Frank M. Randall, city civil engineer, that the work is holding up well. The track was a single line, laid with 73-lb., 6-in. rail. During reconstruction it was necessary to excavate the street from 1 ft. to 3 ft., remove the old ties and rails and install the new material. During this work 50-ton interurban cars used the track under a 1½-hour schedule. There were also extra limited and express cars and a small city car service under a 15-minute headway. The city car service was at times delayed a few minutes, but the interurban cars had simply to operate under a slow order. A sufficient number of the old ties were removed so the excavation could be expeditiously done, and enough new ties were added to hold the rails to gage and make it safe under slow running. The tracks were then let down to the subgrade. A trunk sewer had previously been constructed through a portion of the street. This portion was subdrained with a 3-in. drain tile as the section shows. All trenches were examined and if soft places were found or developed after a rain, they were filled with suitable material and rammed with the ordinary 45-lb. paver's rammer, manipulated by two laborers.

The outside of the rail from the web from the outside of the ball to the base of rail was filled in advance of the paving with a stiff concrete, made of sand and cement, in the proportions of one part cement and four of sand. This plan is much cheaper and more durable than to use wood. Eight inches of crushed stone were put under the track in two 4-in. lifts. When the stone was in place all the old ties were removed and the new ones were put in position. New rails were then substituted for the old. The track was then thoroughly tamped to grade four times. The men commenced at one end and continued through the entire length of the line, and a close watch kept on all portions for apparently soft places. When the tamping was com-

* Abstract of paper presented at meeting of Central Electric Railway Association, South Bend, Ind., March 24.

pleted the crushed-stone foundation was thoroughly grouted for a distance of 15 in. on each side of each rail, with a Portland cement grout of one part cement and four parts good sharp sand. Over the sewer trench 6-in. x 8-in. x 8-ft. ties were used, for the rest of the track 6-in. x 8-in. x 7-ft. ties. At the

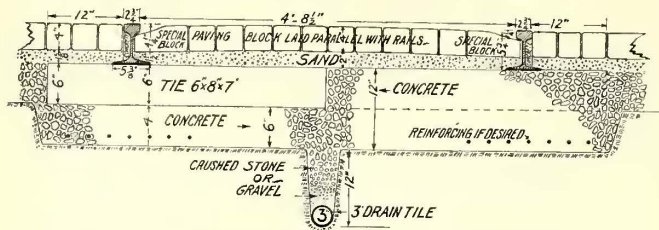


Fig. 1—Section of Track on Concrete Base

suspended joints the ties were placed 20 in. centers. Thirty ties were used to each 60-ft. rail, making the spacing practically 24 in. It will be noticed that one-third more ties, but less concrete, are required by this method of construction. The space between the ties, from the base of the rail to the bottom of the ties, was filled with a very soft concrete, consisting of one part Portland cement, 2½ parts sand, 2½ parts gravel, the gravel containing the sand and 5 parts crushed stone. The concrete was thoroughly puddled so as to fill under the base of the

Track work and material:		Per linear foot of track.
Labor laying track and one-half excavation.....		\$0.413
Ties.....		0.274
6-in., 74-lb. steel rails.....		0.700
Rail and cross bonds (compressed).....		0.012
Belts.....		0.004
Spikes.....		0.004
Splice bars.....		0.055
Total cost of track work per linear foot.....		\$1.462
Track foundation, 8-in. crushed stone, grouted:		
Labor.....	\$0.129	
Stone delivered.....	0.231	
Drain tile.....	0.011	
Cement and sand for grouting.....	0.035	
Total cost of foundation per linear foot.....		0.406
Paving:		
Concrete foundation.....		
Labor, including one-half of the excavation.....	\$0.336	
Stone delivered.....	0.114	
Cement.....	0.114	
Sand.....	0.028	
For use of tools.....	0.013	
Total cost of paving, linear foot.....		0.605
Brick pavement:		
Labor.....	\$0.114	
Metropolitan paving block.....	0.505	
Metropolitan special shops.....	0.180	
Cement.....	0.028	
Sand.....	0.021	
Track drains.....	0.005	
Mixing boxes, etc.....	0.004	
Total cost per linear foot.....		0.857
Grand total cost per linear foot.....		\$3.328
Cost of concrete per cubic yard, \$4.34.		
Cost per square yard of brick paving, including foundation complete, \$1.946.		
Length of track constructed, 2332 lin. ft.		
Brick pavement, 1794 sq. yds.		

rails and around the ties, thus giving a bearing surface equal to twice that of the ties. The space between the rails and for

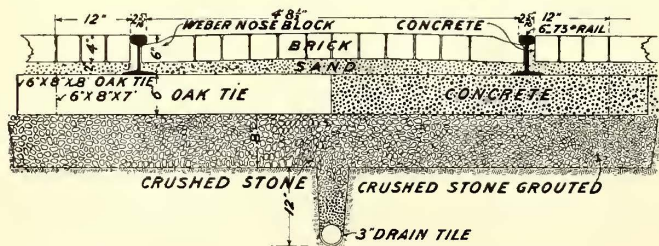


Fig. 2—Section of Track on Crushed Stone

a distance of 1 ft. outside the rails was paved with Metropolitan paving brick, with a special shaped block on the inside of the rail, to form the flange way shown in Fig. 1. An itemized cost of the work follows:

A comparison of the work done on Columbia Avenue with sheet concrete and no traffic while the track was being built with the work done on Taylor Street with crushed-stone grouted and traffic maintained, shows that the work on the latter street cost 6.4 per cent, or 21 cents, per linear foot more. The cases are very few where a temporary track could be built and maintained for 21 cents per linear foot.

ADDRESS OF PRESIDENT OF THE CENTRAL ELECTRIC RAILWAY ASSOCIATION*

BY GEORGE WHYSALL, GENERAL MANAGER, COLUMBUS, MARION & BUCYRUS RAILWAY

It is with some hesitation that I ask for your attention for a short time, because of an opinion formed some years ago that the president of an association similar to this should confine himself strictly during sessions to presiding over the deliberations of its members.

I cannot, however, permit the opportunity to pass of calling to your attention some matters which it is hoped will create discussion, leading to better service to our patrons, and consequently improved conditions from an operating viewpoint.

Upon inquiry I find there is still a feeling on the part of some of the companies indicating a lack of confidence in each other. This prevents that co-operation which is so necessary in undertakings of this character. Let us continue our differences of opinion, but in such a way as not to interfere with the duty we owe to the patrons of our various lines.

Our Traffic Association has been the means, undoubtedly, of doing more to create new conditions for interline travel than has any other work of this association, and it now behooves the operating departments to make some radical changes, if we are to take advantage of the wonderful progress already made. For instance, there is much difficulty on practically all roads in securing necessary information covering the time of trains and connections at junction points, and some method should be introduced which will cultivate courtesy on the part of those having to deal directly with our patrons.

Much legislation unfavorable to public utilities is due to the fact that many of our employees perform their duties grudgingly, and in many instances lead our patrons to believe that the accommodation is that of the patron rather than the company represented. Naturally, the management is censured and, possibly, such censure is just. Possibly a charitable view is that this situation is due to the rapid increase in the interurban business, and that when we have been operating as long as the steam roads, our employees also will become imbued with the idea that it is to their advantage, as well as that of their employers, to do all in their power in the way of making patronage of the roads a pleasure rather than a necessity.

I do not wish to criticise unnecessarily, as the "beam is not gone from my own eye." There are some exceptions, even in the matter of dirty and poorly ventilated cars and waiting-rooms, but how often do we hear our particular patrons, especially the ladies, complain of dirty car seats and filthy floors; and why is it that when a car becomes dingy on the outside, the inside and the windows do not receive the same care and attention given a car just out of the shops? Recently I made a trip over one of the large interurban roads in a car which from its appearance inside led me to believe it had been out of the shop 60 or 90 days, and to my surprise I learned later that this car had been out for 18 months and received no more care and attention than the other cars of its class on the same property. If this condition can be maintained on one property, it would appear that other properties can do likewise unless it is the general opinion that clean cars entail an unnecessary expense, and that we have as much business as we care to handle.

It has been suggested that this association publish an official interurban map to show impartially all the companies members of this association in heavy red lines, and that non-member

* Abstract of address read before the meeting at South Bend, Ind., on March 24, 1910.

companies have their lines shown in light red lines. These maps could be made with the space for the company name blank, if desirable, and purchasers might have any desired name inserted. This would not only enable the companies to purchase maps at a minimum price, but give outside interests an opportunity to purchase reliable maps for advertising purposes. Many of the maps now in the hands of the public are not only out of date, but inaccurate. I think that properly handled, the official map would be of great assistance to all interested in interurban railways, and at the same time prove a source of revenue to the association.

Your attention is also directed to the large amount of promiscuous advertising matter scattered broadcast containing time cards long since annulled. Much annoyance to the public is thereby caused, due no doubt to lack of attention on the part of advertising solicitors who frequently secure a time card as a basis for an advertising scheme, and then spend three or four months securing advertising matter, by which time the card originally secured is out of date. The result is that the innocent and unsophisticated patron places the responsibility upon the interurban road, condemns the service, and not content at that, goes out of his way to tell his friends and neighbors his troubles.

While it is no doubt true that anyone can publish a time card gratuitously, there should be some method devised to prevent this imposition on the unsuspecting public.

The claim index bureau started 18 months ago is receiving reports with a degree of regularity from some of the roads, while other roads have not a single report to their credit. It is to be hoped in the case of the latter roads that nothing worth reporting has occurred, but we should all bear in mind that every report filed adds to the value of the index and that if but one fakir is located in five years, the labor of running the bureau will have yielded a profit.

In a communication received recently from the secretary he states that "many matters referred to committees are allowed to die even when they are of real importance." This appears to be due largely to the failure of our members to furnish information when requested to do so, and I therefore ask in the name of each committee of the association that you give them every assistance in your power in the way of data and information.

My attention has been called recently to the fact that 65 per cent of the companies members of this association are also members of the American Street & Interurban Railway Association, thereby indicating that the interest in association work is more than local, and that a large number of our companies feel the need of information obtainable only through the American Association because it covers the entire country. I therefore recommend some action, through a committee or otherwise, which will bring the members of this association in closer touch with the national organization.

Few of us are in a position to realize the vast amount of work involved in securing and compiling the data sent out by the secretaries of the various associations, to say nothing of the difficulties encountered due to lack of attention or interest on the part of those from whom information is asked. Our secretary is always on duty and prompt in sending out information. Our part, therefore, is to assist him to the utmost, and do away, if possible, with the use of the rubber stamps, second and third requests.

I recently asked a gentleman well versed in electric railway matters, but not an operating official, for his views on some of the problems confronting the interurban industry, and from his reply I quote in part the following:

"To intelligently decide the expenditures which are justified in order to develop any particular branch of the service, it is necessary to know accurately what each branch of the service costs, and what it produces in revenue. The handling of United States mail is the case in point. How many managers are prepared to say exactly what it costs them to handle mail, and what would they consider a fair and reasonable remuneration for the service given?"

The proposition advanced is doubly interesting in view of our standing committee appointed to co-operate with a similar committee of the American Association for the purpose of securing a more equitable rate for this class of service. The above criticism applies with equal force to freight, express and package business.

As the work of this association is largely educational, I suggest that all papers and subjects presented be thoroughly discussed, if not referred to committees for investigation. However, in order to get the full benefit it is necessary to use all the time at our command, and even then, doubtless, many important points will have to be passed by unless some steps are taken in the way of two-day sessions, and many of the supply men feel that they are at a disadvantage in having to talk business during the meeting, instead of being able to hear the papers and their discussion. It might be well, therefore, to consider the advisability of having two-day sessions once or twice each year.

SUBJECTS FOR DISCUSSION

Those having had to do with association work are well aware of the difficulties encountered in securing papers for our meetings, and as their preparation requires much time, I believe it is not an infringement on the subject committee's rights to suggest a few subjects, to the end that some of the members may volunteer the preparation of papers for some future meeting. For instance:

"The Reduction of Unnecessary Accommodation or Contract Stops."

"The Advantages of Interurban Belt Lines Connecting Industrial Plants."

"The Future Effects on High-Speed Service of Private Rights-of-Way Adjoining Highways Near Large Cities."

"Possibility of a Standard Practice for the Collection of Tickets and Fares on Interurban Cars."

"The Necessity for a Reserve Depreciation Fund."

"Methods of Handling Passenger Traffic During Rush Hours; Additional Trains or Trailers."

"Unaccounted-for Current; How to Determine It and What Is Reasonable."

"The Advantages of Large Motor Wheels with Low Gear Ratio Over Small Wheels with High Gear Ratio."

"Automatic Versus Straight Air Brake Equipment for Single Car Operation."

"Methods of Preventing the Use of Interurban Cars by Local Passengers in Municipalities."

The above subjects would, I think, form live topics for discussion.

In conclusion, I would call your attention to the unusual activity during the past winter of the many legislative bodies pertaining to transportation companies, and urge you strongly to keep in close touch, in season as well as out of season, with all who may have to do in any way with proposed legislation.

The necessity of such action on our part was recently brought to my attention at a hearing before a legislative committee when a bill of vital interest to all utilities in the State of Ohio was under consideration. At that time it developed that the author of the bill was unfamiliar with all of its provisions, and upon the proof being submitted he became much provoked and more antagonistic than ever to the people who were there to speak against the unjust measures contained in the bill. I believe it is due our patrons, as well as our stockholders, to keep thoroughly advised and fight every measure which tends to increase the burden, which is already greater than it should be.

A municipality in Latin America, according to the report of an American consular officer, is considering the electrification of its three tramway lines. The city has an electric light plant already. Communications, in Spanish, should be addressed to an official whose name is given in the report. The address of this official can be obtained upon application to the Bureau of Manufactures, Washington, D. C., No. 4544.

SOLICITING BUSINESS *

BY C. O. WARFEL, GENERAL AGENT TRAFFIC DEPARTMENT, INDIANAPOLIS & CINCINNATI TRACTION COMPANY.

Methods of soliciting business for an interurban railway vary in different localities. Methods that are the most successful in one section of the country are utterly useless in another. Their success or failure depends upon the ability of the road to meet requirements, the class of people to be dealt with and the kinds of business to be solicited.

Soliciting business for an interurban road was unknown until a few years ago. The interurban roads then existing were kept too busy extending their lines and caring for what local business naturally came to them to give much attention to more. But with the completion of the roads and the decrease in the rush of enthusiastic patronage, came the necessity for seeking more business. The interurban companies began to realize that before they could expect success they must inform the public of the service they could offer.

In competition with long established steam roads with experienced solicitors, it is necessary that the interurban lines make the public fully acquainted with any advantage they can offer. Although there are three classes of traffic—passenger, non-delivery express and freight—all desired and solicited by an electric railway, the freight and express business is increasing most rapidly and making the interurban more the competitor of the steam road. The passenger business presents less opportunity for work because the solicitor is limited almost entirely to chartered cars, theatrical troupes (not always desirable on account of excessive baggage and scenery), excursions and occasional long-haul parties.

Freight rates as a rule are the same on both steam and electric roads, therefore the solicitor for the latter must rely upon his own personality and tactfulness and the advantages offered by his road, such as frequency of service, quick time, difference in drayage, changes at various junctions, and like points. These are the arguments upon which he must secure business.

A capable solicitor is always wide-awake to the best interests of his road. He watches the newspapers for any items which might place him in touch with a shipper. He visits manufacturing establishments of all kinds, wholesale houses, retail merchants, and in fact anyone who might become a shipper.

For every shipment there are two persons to be influenced. Remember that it is not always the man who pays the freight that controls the routing. First, there is the consignor to be canvassed. If he cannot be influenced or persuaded the solicitor is not discouraged, but goes to the consignee. Perhaps, through some means of argument, he may be persuaded to order his goods shipped via the line represented. The solicitor exerts a very good influence for his road by keeping in close touch with shippers and consignees, finding out what they need in the way of service and getting it for them. He is often able to go to shippers and point out markets, or to give them information of sources of supply. But the best argument in the hands of the traffic man is the frequency of service and short time which he can offer. To the shipper whose goods have been delayed for a considerable time by the freight congestion on some steam line, this is an important asset.

The solicitor should be thoroughly familiar with the facilities, time tables, rates, etc., not only of his own line, but with those of connecting lines, but should not give any information unless he is quite sure it is correct. He should have a general knowledge of prices and costs of different commodities, so as to be able to talk intelligently with shippers.

The method of approaching a business man largely determines your success with him. Remember your previous conversations with him, if any, and if they have not produced results approach him in a different manner. Go straight to the point and state your business in as few words as possible; such methods appeal to the business man.

One of the most difficult things in the work of the solicitor is a diplomatic refusal to requests for concessions that cannot be granted. The reply must be firm and leave no doubt as to the impossibility of granting the request, yet it must be couched in such words as to arouse no ill feeling. If there is some possibility of granting the request, the solicitor must not arouse false hopes, but rather leave the impression that it cannot be granted. Then if it is granted, it is appreciated more fully, and if it is not granted, he has broken no promises. He should keep in close touch with the head of his department and of the transportation department, know just what his authority is, and how much he can offer in the way of special rates, cars, etc.

The solicitor may become discouraged if he cannot at once see the result of his work, but he must consider the fact that many results of his work will show themselves in the future and that much of his time is taken up calling on men who are too busy to see him. It takes many visits and much argument to convince a man that your road is the one he should patronize.

Perseverance, tactfulness, good general knowledge of the work and all around good fellowship, are characteristics of a successful solicitor.

The fact that great difficulties still confront the interurban lines and that their deficiencies are realized by the public, makes the solicitor work all the harder. The average electric railway is still unable to compete with the steam roads on car-load business. The reason for this is obvious. Furthermore, there is need for better facilities for handling bulky and heavy articles, such as vehicles, vehicle bodies, showcases, agricultural implements, machinery, lumber, general building material, etc. This class of business is at present considered undesirable, because there are not sufficient facilities to handle it.

Another of the difficulties with which the solicitor contends is the need of a more uniform exception sheet. Such articles as inflammable oils, pipe over a certain length, fertilizers, etc., are accepted by some lines and refused by others. When a shipper once learns that his product is refused by one company he naturally infers that all others will do likewise and the steam road profits by his mistake. The adoption of a uniform exception sheet would further the interests of all the roads, for there is a tendency on the part of the public to consider two or more electric railways, not as separate and individual companies, but merely as "the interurban." In large cities entered by more than one interurban line, a joint shippers' guide issued by all the lines concerned, giving rates, schedules and exceptions, stated in a clear and concise form, would be of benefit to the shipper and consequently bring more business to the interurban roads.

Claims for goods lost or damaged in transit are the nightmare of the traffic solicitor. The interurban company is justified in protecting itself against illegitimate claims, but most claimants become impatient when payment is deferred unnecessarily and withhold their traffic from the company at fault, hoping thus to force a settlement; and the company often loses more in traffic than the amount of the claim. The effect of this non-payment of claims is shown not only in the direct loss of traffic, but in the attitude of the shippers toward the company. To illustrate: Some time ago we received a claim from a shipper which was considered excessive. When we called upon him, acknowledging our responsibility in the matter and agreeing to pay the claim at once, he reduced it to less than half the original amount, stating in explanation that his experience with interurban roads had taught him not to expect payment within four or five months and so he was merely making his claim large enough to pay him for his annoyance and delay in settlement.

Claims should be weighed cautiously by adjusters, and not settled hastily without investigation, but certainly not delayed more than is necessary after prompt investigation. These matters are out of the control of the solicitor, but he must deal first hand with the irate shipper, the threatened loss of business and the angry feeling toward the road.

Regardless of these deficiencies, the interurban roads are

*Abstract of paper read before the Central Electric Railway Association, South Bend, Ind., March 24, 1910.

making great progress and many improvements in their service. Through the solicitor and advertising the public is gradually becoming aware of this fact. With the correction of the faults already noted—the inability to handle carload and bulky freight, the lack of a uniform exception sheet, and the delay in settling claims—the amount of business secured by the interurban roads through their solicitors will be limited only by their facilities for handling it.

MAINTENANCE OF WAY CONVENTION

The eleventh annual convention of the American Railway Engineering and Maintenance of Way Association was held March 15, 16 and 17 at the Congress Hotel, Chicago. The proceedings terminated with a dinner at the same hotel on Thursday evening, March 17. According to the secretary's report, the receipts for the preceding year were \$19,758.08, the expenses \$21,203.40, and the cash on hand \$16,403.01. The membership on March 12, 1910, was 869. Abstracts of the papers of electric railway interest read at the meetings were published in the *ELECTRIC RAILWAY JOURNAL* of March 19, J. B. Austin, Jr., engineer maintenance of way, Long Island Railroad, said in regard to the work of the committee on electrification, published in abstract last week:

"In explanation of the form in which the report is presented I will say that this is a new committee on a new subject, and in gathering information we find it takes rather more time, possibly, than in a case of a subject that has been under discussion for some years. We have had four meetings of the general committee and about 10 or 11 meetings of the various subcommittees, but we feel that our foundation work has not progressed far enough yet to enable us to draw any definite conclusions, or present any recommendations to the association for adoption. I move the adoption of the report of the committee." The motion was carried.

The election of officers resulted as follows: President, L. C. Fritch, chief engineer, Chicago Great Western Railway; second vice-president, Charles S. Churchill, chief engineer, Norfolk & Western Railway; secretary, E. H. Fritch (re-elected); treasurer, C. F. Loweth, engineer and superintendent of bridges and buildings, Chicago, Milwaukee & St. Paul Railway; directors (for three years)—Robert Trimble, chief engineer maintenance of way, Northwest System, Pennsylvania Lines West, and F. S. Stevens, superintendent, Philadelphia & Reading Railway.

ELECTRIC TRACTION ON CANALS

The royal commission on canals and inland navigation of the United Kingdom which has just issued its final report, was appointed in August, 1906, and was presided over by the Right Hon. Lord Shuttleworth.

Referring to the use of electricity for haulage purposes on canals the report points out that recent experiments have been made in France and elsewhere by electric tractors running on rails laid on the towpath. A system of this kind has been established on the Canals d'Aire, de la Dûle, and the diversion of the Scarpe for a distance of 36 miles. By a decree of July, 1907, a concession was given to the Northern Electric Company to establish electric traction on a crowded part of the St. Quentin Canal for a distance of 55 miles. This concession is for 40 years, and reserves to the State full control and the right to purchase. It is also proposed to use electric haulage on the new Canal Du Nord, now in course of construction. On the Tetlow Canal electric haulage is obligatory, other forms of traction not being permitted.

The report adds that discussions at the recent International and Inland Navigation Congresses of European and American Engineers show that the tendency is to accept electric haulage as the best and most economical form of traction on canals on which the traffic is, or may become, sufficient to repay the cost of installation.

THE PHILADELPHIA STRIKE

Several unsuccessful attempts have been made to settle the Philadelphia strike since the conference in the office of George H. Earle, Jr., one of the representatives of the city on the board of directors of the Philadelphia Rapid Transit Company, on March 14, 1910, as mentioned last week. One of these was brought about by Senator B. Penrose, and on March 20, 1910, the company offered to re-employ its former men upon substantially the following conditions: Runs be given as many men as possible at once, those not assigned to runs to be placed on the payroll at \$1.50 a day until employment can be provided; a wage of 23 cents an hour effective on June 1, 1910, with an increase of ½ cent an hour each year until the rate becomes 25 cents an hour; the cases of the 173 men who were discharged to be submitted to arbitration; the company to retain the right to discuss grievances with individuals or representatives of any organization of the men; union buttons may be worn, but are not to be more than ¾ in. in diameter and not to be conspicuously displayed.

These terms were rejected by the men, who insisted that the company increase wages to 25 cents an hour immediately and treat with only one grievance committee, this committee to be selected by a majority vote of the men at each barn. Subsequently the representatives of the men submitted a proposal which included a provision that the agreement of June, 1909, be revived as part of the settlement.

Meanwhile there is dissension among the officers of the State Federation of Labor over the advisability of declaring a State-wide sympathetic strike. The president of the State organization was at first enthusiastic about this proposal, but the petering out of the sympathetic strike in Philadelphia and the refusal of avowed union organizations in Philadelphia to break with their employers has served as an omen to the more conservative leaders of the State organization. On March 22 the executive board of the unions, which include among their members the textile workers of the northeastern section of the city, adopted a resolution recommending the return to work on March 23 of all the mill and factory operators on strike. Defections have also been the order among the employees of other trades who struck in sympathy with the conductors and motormen.

COMMITTEES OF THE TRANSPORTATION & TRAFFIC ASSOCIATION

R. I. Todd, president of the American Street & Interurban Railway Transportation & Traffic Association has announced the following committees of that association for the current year:

COMMITTEE ON INTERURBAN RULES

C. D. Emmons, chairman, general manager, Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind.

H. A. Nicholl, general manager, Indiana Union Traction Company, Anderson, Ind.

J. W. Brown, superintendent of transportation, West Penn Railways Company, Connellsville, Pa.

F. D. Carpenter, second vice-president and general manager, Western Ohio Railway Company, Lima, Ohio.

C. A. Coolidge, superintendent, Oregon Electric Railway Company, Portland, Ore.

W. R. W. Griffin, general superintendent, New York State Railways, Rochester, N. Y.

COMMITTEE ON CITY RULES

R. E. Danforth, chairman, general manager, Public Service Railway Company, Newark, N. J.

Harry Bullen, general superintendent, Detroit United Railway, Detroit, Mich.

F. I. Fuller, vice-president, Portland Railway, Light & Power Company, Portland, Ore.

D. A. Hegarty, treasurer and general manager, Little Rock Railway & Electric Company, Little Rock, Ark.

H. H. Hunt, district manager, Stone & Webster Management Association, Boston, Mass.

L. H. Palmer, superintendent of transportation, Metropolitan Street Railway Company, New York, N. Y.

COMMITTEE ON TRAINING OF TRANSPORTATION EMPLOYEES

G. O. Nagle, chairman, general manager, Wheeling Traction Company, Wheeling, W. Va.

C. E. Learned, superintendent of inspection, Boston Elevated Railway Company, Boston, Mass.

W. H. Douglass, general superintendent, Northern Ohio Traction & Light Company, Akron, Ohio.

J. E. Duffy, superintendent, Syracuse Rapid Transit Company, Syracuse, N. Y.

L. C. Bradley, general manager, Eastern Pennsylvania Railways Company, Pottsville, Pa.

C. N. Wilcoxon, general manager, Chicago, Lake Shore & South Bend Railway Company, South Bend, Ind.

COMMITTEE ON PASSENGER TRAFFIC

F. W. Coen, chairman, vice-president, Lake Shore Electric Railway Company, Cleveland, Ohio.

Franklin Woodman, general manager, New Hampshire Electric Railways, Haverhill, Mass.

W. S. Whitney, general passenger agent, The Ohio Electric Railway Company, Cincinnati, Ohio.

C. E. Flag, publicity agent, Spokane & Inland Empire Railroad Company, Spokane, Wash.

W. H. Collins, general superintendent, Fonda, Johnstown & Gloversville Railroad (Electric Division), Gloversville, N. Y.

A. E. Potter, general manager, The Rhode Island Company, Providence, R. I.

COMMITTEE OF EXPRESS AND FREIGHT TRAFFIC

P. P. Crafts, chairman, general manager, Iowa & Illinois Railway Company, Clinton, Ia.

C. V. Wood, vice-president and general manager, The Electric Express Company, Springfield, Mass.

E. H. Hyman, manager, Electric Package Agency, Cleveland, Ohio.

Frank Walsh, manager, Electric Express Company, Schenectady, N. Y.

W. F. Towne, general agent, freight department, Pacific Electric Railway Company, Los Angeles, Cal.

Chas. Floyd, general passenger and freight agent, Grand Rapids, Holland & Chicago Railway, Grand Rapids, Mich.

COMMITTEE OF TRANSFERS AND TRANSFER INFORMATION

M. R. Boylan, chairman, general auditor, Public Service Railway Company, Newark, N. J.

Alexander Rennick, second vice-president and assistant general manager, Philadelphia Rapid Transit Company, Philadelphia, Pa.

F. T. Wood, assistant to general manager, Metropolitan Street Railway Company, New York, N. Y.

Harry Bullen, general superintendent, Detroit United Railway, Detroit, Mich.

R. E. Lee, general superintendent, The Cincinnati Traction Company, Cincinnati, Ohio.

T. C. Cherry, superintendent, Utica & Mohawk Valley Railway Company, Utica, N. Y.

COMMITTEE OF TOPICS OR SUBJECTS

J. H. Pardee, chairman, operating manager, J. G. White & Company, New York, N. Y.

G. W. Parker, general express agent, Detroit United Railway, Detroit, Mich.

H. W. Fuller, general manager, Washington Railway & Electric Company, Washington, D. C.

COMMITTEE ON CONSTRUCTION OF SCHEDULES AND TIME TABLES.

N. W. Bolen, chairman, superintendent of transportation, Public Service Railway Company, Newark, N. J.

The municipal authorities of Schaerbeek, near Brussels, Belgium, have just granted a concession for the establishment of a trackless trolley in that town.

HEATING SYSTEM IN CAR HOUSE OF TORONTO & YORK RADIAL RAILWAY

The Toronto & York Radial Railway Company's car house and adjoining buildings at North Toronto, Canada, are heated by a unique fan system designed by the Chicago office of the Harrison Engineering Company, of New York City. Included in this system are a fan and distributing ducts similar to those of a steam hot-blast apparatus, but the heat is transferred directly from the fuel instead of through the medium of steam. This plan has the advantage that there is no steam boiler, coils or other accessories to be drained to prevent freezing should it be necessary to shut down the plant in winter. The fuel used in Toronto is oil, but any kind can be employed. The system has been very satisfactory during the entire winter and seems especially adapted to this kind of service.

The Harrison Aertube heater, the unique feature of this system, consists of a bank of 4-in. cast-iron tubes, 4 ft. long, between headers placed above the furnace in which any fuel may be burned. In action it resembles a hot-air furnace in that the heat is transferred from the coal directly to the air passing through the tubes, but unlike the ordinary furnace, the heating surfaces are particularly well adapted to large systems requiring a fan.

The buildings to which the system has been applied consist of a machine shop, a blacksmith shop, paint room, and car house with its pits. Adjoining the blacksmith shop is the room containing the fan and heater with underground tanks 4 ft. in diameter and 20 ft. long for storing the oil which is used as fuel. There are two six-section Aertube heaters operated in series with a total of 384 tubes. The motor-driven fan takes air from out of doors, but the air can be recirculated from the barn if desired. The air for heating is forced through the tubes of the heater, and thence through the galvanized-iron distributing ducts by the fan, which is 7 ft. x 4 ft., three-quarter housed.

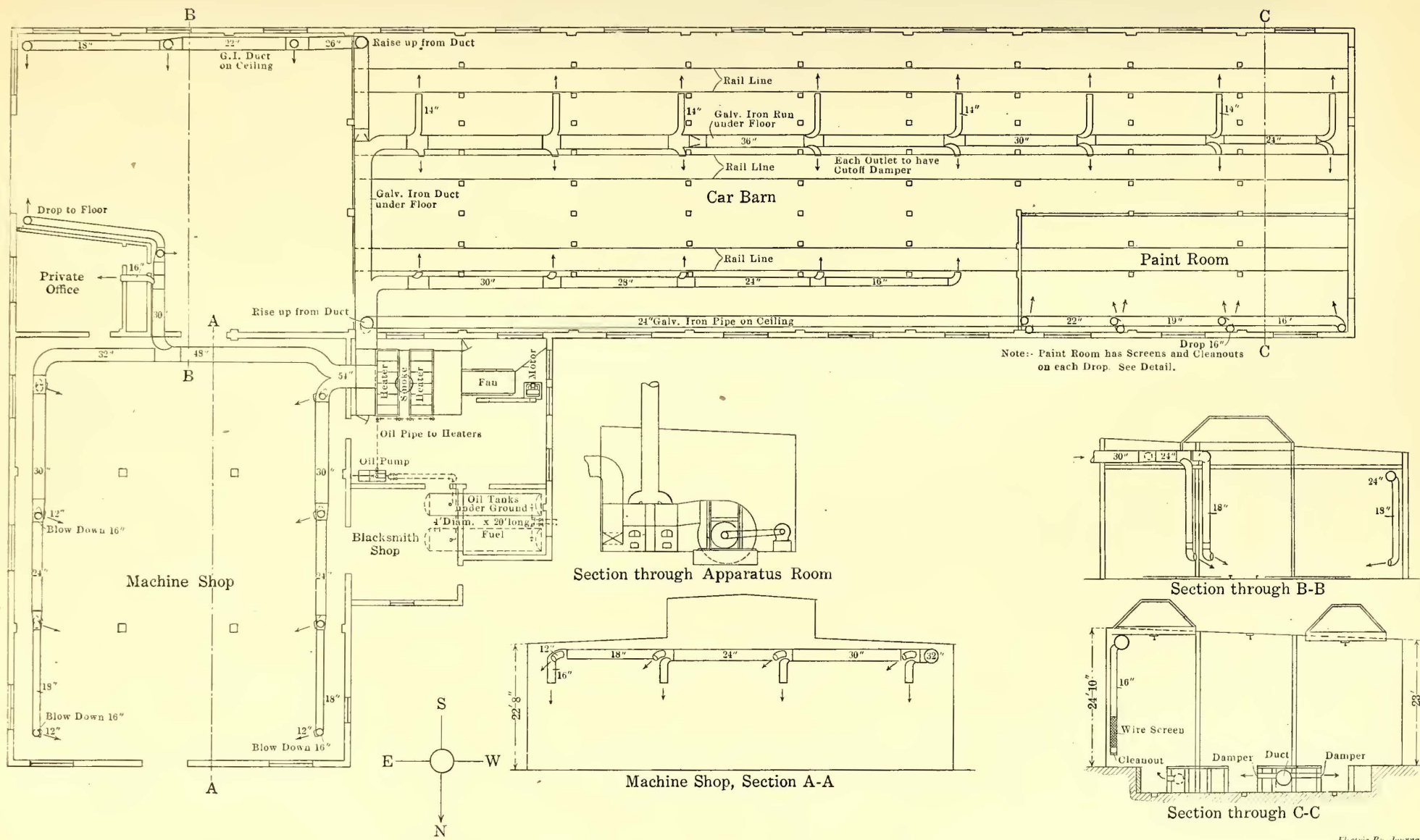
To distribute the heated air throughout the building the main duct branches soon after leaving the heater. One pipe conveys air to the car house, and the other nearly encircles the machine shop at the ceiling. In the machine shop the air is discharged at 16 different points by means of short galvanized-iron pipes, eight of which discharge directly downward, while the rest discharge at an angle of about 45 deg. A branch pipe conveys warm air to the private office.

From the heater a 48 in. x 48-in. galvanized-iron duct leads to the car house. From it are taken three branches, two of which run beneath the floor. To maintain a sufficiently high temperature in the pits so that ice and snow may be melted from the car trucks, branches provided with dampers for regulating the discharge extend at intervals from the underground duct to the pits.

This arrangement of air distribution will allow an effect identical with that secured by ordinary steam hot-blast apparatus. From the main duct in the car house a branch extends at the ceiling the entire length, discharging its air into the paint room located in a corner of the car house. The distribution in the paint room is effected by vertical pipes extending within about 3 ft. of the floor and discharging the warm air at an angle of about 45 deg. Each drop is provided with a wire screen and a cleanout.

With a temperature below zero the system has maintained 65 deg. in the car house and machine shop, 70 deg. in the office, and 80 deg. in the paint room.

The result of the ballot for a strike on the New York, New Haven & Hartford Railroad was announced at 2:15 o'clock March 22, 1910, as follows: Total number of votes cast 3844. In favor of a strike, 3758; against a strike, 86. There were 99 per cent of the trainmen who voted in favor of the strike and 97 per cent of the conductors. Late the same afternoon the brotherhood officers were invited to meet President Mellen, of the railroad.



Plan and Sections of Car House of Toronto & York Radial Railway, Showing Heating System

Electric Ry. Journal

OPINIONS ON BILL AMENDING PUBLIC SERVICE COMMISSIONS LAW

At a hearing before the railroad committee of the Assembly of the New York Legislature at Albany, on March 16, arguments were made in relation to the Parker bill, which is designed to amend the public service commissions law. Joseph H. Choate, representing F. W. Whitridge, receiver of the Third Avenue Railroad, of New York, made the principal argument against the bill. Mr. Choate said, in part:

"Beaten in the courts, the commissions now come to the Legislature and ask for power which is not within the tenor and meaning of the present act. Instead of considering a bill such as this, which is perplexing legislators and giving the members of the committee hopeless headaches, they might introduce a bill of four lines which would read as follows:

"Be it enacted, that any powers in respect to traction companies not already conferred upon the Public Service Commission are hereby conferred."

"The commission has issued orders compelling impossibilities. No greater power over franchises should be given to it.

"Universal transfers were the final blow to the Metropolitan Street Railway Company. It is not practicable to authorize a person to travel all over creation for 5 cents. The commission wants to return to the old transfer system, with unlimited power to order universal transfers without regard to the financial consequences.

"The commission wants also the power to compel the companies to add to their tracks without providing any financial assistance. It is too great a power to give to an irresponsible commission. It was not the intent of the Legislature to take the management out of the hands of the companies or confer powers which are mischievous, insidious and damaging, and this proposed additional power should not be given."

REPLY OF W. R. WILLCOX

William R. Willcox, chairman of the Public Service Commission, First District, issued a reply to the criticisms of Mr. Choate, saying in part:

"I do not care to enter into any lengthy reply to the statements of attorneys hired by those managers of corporations who wish to escape regulations. Such attorneys are paid for their work, and are supposed to make some effort toward earning their fees. It is proper to say, however, that the commission has not reached out for any more power, but has asked the Legislature to make definite and certain some provisions of the law, which are now doubtful of interpretation. This applies particularly to joint rates and fares.

"There is at present much doubt in the minds of lawyers whether the law is broad enough to enable the commission to deal with the transfer question. If the Legislature wishes the commission to deal with transfers, it should make it definite and certain. The constituents of New York members of the Legislature have demanded that we deal with the transfer question. Our position is, if the Legislature wants us to deal with the transfer question, then let it put it in the law.

"So far as being 'vindictive and grasping' is concerned, Mr. Choate does not specify any particular case. Perhaps he means vindictive because the commission began an action against his client, Mr. Whitridge, for failure to put wheelguards on his cars in conformity with an order of the commission. Practically all other roads of the city have lived up to the terms of this order, and after Mr. Whitridge's failure to do so and a serious accident had happened, which might have been averted, the commission brought action against him for failure to live up to its order. If this is vindictive, then Mr. Choate must make the most of it."

STATEMENT OF MR. WHITRIDGE

After publication of the interview with Mr. Willcox a statement by Mr. Whitridge was made public, in which he said:

"The Third Avenue Railroad Company is not seeking to escape regulation or to evade the law. The whole trouble with Mr. Willcox is that he has evidently confounded the commission's desires and orders with the statutes. He thinks that he

is the law, and he is expounding it to the people. The Public Service Commission sits in its snug offices and issues orders and thinks it is solving the transit problem.

"Why, the Public Service Commission couldn't solve any problem. It hasn't the brains to do so. It proclaims, with a loud beating of tom-toms, that the railroad companies are trying to put it out of business, when, as a matter of fact, it is rapidly committing suicide through its own acts.

"With any sane order of the commission I shall be only too happy to comply, but I don't propose to spend other people's money in order to gratify the ambitions of certain officials."

COST OF REPAIR SHOP EQUIPMENT ADDITIONS

In connection with a petition filed some months ago for a stock and bond issue the Union Street Railway Company, New Bedford, Mass., sent to the railroad commission an extended

COST OF MACHINERY ADDITIONS, WELD STREET REPAIR SHOPS.	
Emery wheels	\$28.23
Little Giant drill No. 2	125.00
Hendley universal milling machine No. 3	950.00
Reed lathe, 9 x 18 in.	495.00
Reed lathe, 27 x 13 in.	1,029.00
Motor driven air compressor, capacity 75 cu. ft. min.	950.00
Shafting and fittings	131.46
Three Whitney cranes, 5-ton capacity each	2,550.00
Pneumatic gear hoist, No. 413, capacity 5 tons	322.50
L. G. drill No. 5	110.00
Hose, etc.	52.40
Two grinders	32.00
Two Dake hoists, 5 tons each	480.00
One class G hoist, 76-in. lift	42.00
Three plain trolleys, etc.	127.46
Two No. 12 3-ton pneumatic hoists	379.30
Franklin portable crane	100.00
Ranch wrecking rig	120.50
One 15 hp 500-volt motor	125.00
Davis boring tool, No. 12	97.08
Band saw file and saw	23.13
Two Weston portable voltmeters	123.51
Whitewash sprayer	20.00
Band saw, Fay and Egan, No. 50, and blades	184.70
Continental surfer No. 2	150.00
Universal rip and cross-cut saw No. 76	227.60
Belting	86.33
New Century field tester	80.00
Four jacks	60.00
Machado and Roller "A" ohm-meter	51.00
New Britain saw setting machine	15.00
Columbia pinion puller	100.00
Cincinnati shaper and back No. 24	536.25
Vise, dogs and jacks	176.00
Two 1-ton triple falls	75.00
Shafting	14.32
G. E. compressor, 8 x 8 in., geared to 35 hp motor	1,316.00
One 5 hp 500-volt suction fan motor	750.00
Blocks and swedges	66.69
Total	\$12,302.46

tabulation of its construction expenditures between 1903 and 1908. Included among these were the details given in the table relating to shop equipment added during the period covered.

NEW CAR HOUSE IN DAYTON

The People's Railway Company, of Dayton, Ohio, is planning to erect a new car house alongside the main line of the Big Four Railroad, just outside the southerly limits of the city of Dayton. The building will consist of five bays, each 23 ft. in width from center to center of columns and 240 ft. long, divided into 15 panels of 16 ft. each. Four of the bays will contain two tracks each, and the remaining bay one track. There will be pits under all tracks except those to be used for washing purposes. The entire building will ultimately be used as an operating barn, but for the present will be equipped as a repair shop, being subdivided into carpenter, machine and paint shops and store room, leaving about 1152 ft. of track available for the storage of cars outside of these portions.

The construction is of reinforced concrete for the foundations, columns, pits and roof. The temporary partitions are to be built of hollow tile and the exterior curtain walls of sand lime brick. The main floor of the car storage space will be broken by columns only, the bays being formed for the purpose of fire protection by means of metal and concrete screens or curtains extending from the roof down to within about 8-ft. of the floor. The building will be protected by automatic sprinklers and heated with steam or hot water.

News of Electric Railways

Program for Meeting of the Iowa Street & Interurban Railway Association

The following program has been announced for the meeting of the Iowa Street & Interurban Railway Association, to be held at the West Hotel, Sioux City, Ia., on April 21, 22 and 23, 1910:

APRIL 21—MORNING SESSION

Address of welcome by the Mayor of Sioux City.

Response by C. T. Cass, general manager of the Waterloo, Cedar Falls & Northern Railway.

"Medical Side of the Claim Department," by Dr. A. J. McLaughlin, surgeon of the Sioux City Traction Company.

APRIL 21—AFTERNOON SESSION

"Track and Overhead Construction"—(a) "City Railways," by J. G. Huntoon, general superintendent of the Tri-City Railway, Davenport, Ia.; (b) "Interurban Railways," by F. J. Hanlon, vice-president and general manager of the Mason City & Clear Lake Railway, Mason City, Ia.

APRIL 22—MORNING SESSION

"Why Fares Should Not Be Lowered"—(a) "City Fares," by L. D. Mathes, manager of the Dubuque Electric Company; (b) "Interurban Fares," by Wm. G. Dows, president and general manager of the Cedar Rapids & Iowa City Railway & Light Company.

"Treatise on the P-A-Y-E-Car," by a representative of the Pay-As-You-Enter Car Corporation.

APRIL 22—AFTERNOON SESSION

"Handy Legal Points for Everyday Use," by J. L. Kennedy, Sioux City.

"Depreciation," by H. V. Ferguson, vice-president and secretary of the Cedar Rapids & Marion City Railway.

APRIL 23

Discussion of problems encountered in the operation of their properties by those in attendance at the convention.

The Sioux City Traction Company and the Sioux City Gas & Electric Company will act as hosts. As usual, manufacturers who desire to exhibit their appliances and apparatus will be furnished by the association with space in the Sioux City Auditorium free.

Cleveland Traction Situation

At a meeting of the directors of the Cleveland Railway on March 19, 1910, plans for improving the system were discussed, but no announcement was made regarding the outcome of the meeting.

The policy in regard to the fare to Collinwood and Euclid Beach was formulated at this meeting, but no public announcement will be made until Mr. Dahl, the street railway commissioner, has been notified. Horace E. Andrews, president of the company, said that the request that all pay-as-you-enter cars be equipped with fare registers could not be granted, as the directors believed that the results would not justify the expenditure of \$90,000, which it had been estimated would be required to comply with the request.

A dividend of 1½ per cent has been declared by the directors of the Cleveland Railway, as authorized by the Talyer grant. The present stockholders will have the privilege of subscribing to the 10 per cent increase in the stock of the company until April 10, 1910. On March 18, 1910, the stock sold at par for the first time on the Cleveland Stock Exchange and on the following day small blocks of it changed hands at 100¼. This sustains the opinion of Judge Talyer regarding the settlement.

Newton D. Baker, city solicitor, has rendered an opinion to the City Council that the authority of that body in the case of stock issues made by the company extends only to the approval of the expenditure of money secured by the sale.

On the evening of March 14 Councilman Laferty introduced an amendment to the Talyer ordinance which provides for a fare of 3 cents for Collinwood. Mayor Bachr

had hoped that legislation of this kind would not be attempted until the matter had been discussed with the officers of the company. Six other street railway ordinances relating to re-routing and other unimportant matters were also introduced at this meeting.

Street Railway Commissioner Dahl spent the greater part of the week ended March 19, 1910, in Chicago and Milwaukee studying the pay-as-you-enter systems and the methods of fare collection. He believes that registers are well adapted to the requirements in Cleveland and said that he could see no objection to the use of T-rail in the residence and outlying sections of the city.

The Humphrey Company, which operates the resort at Euclid Beach, has threatened to run automobiles to transport passengers to its amusement grounds, if the city and company keep the fare at 10 cents.

Tentative Ordinance for Extension of Chicago & Oak Park Elevated Railroad

The local transportation committee of the Chicago City Council has approved a tentative ordinance granting a franchise for the extension of the Chicago & Oak Park Elevated Railroad from a point near Western Avenue to a terminal between Montrose and Lawrence Avenues. There are several conditions in this franchise which are objectionable to the company. Tentatively the franchise is offered for 30 years. The franchise has not yet been considered by the City Council. Some of its provisions follow:

Grant through routes and universal transfers as soon as the other elevated roads come to an agreement on the subject.

Deposit with the city cash or approved bonds to the extent of \$100,000, which shall be forfeited, together with the franchise and structure already completed in case the branch line is not completed and the Austin tracks are not elevated in the time specified.

Complete the branch line in three and one-half years and elevate the tracks at once.

Sell its road to the municipality at the option of the city any time within 15 years at an appraised value to be not less than the actual cost price of the right of way, structure and equipment, less the amount of depreciation fixed by the board of appraisers.

Open its books to the city controller and furnish him with such financial statement as he may require.

Purchase the right of way within 18 months from the acceptance of the ordinance.

Accept the ordinance within 16 days of its passage.

Erect stations on the new branch at or near the following streets: Grand Avenue, Chicago Avenue, Division Street, North Avenue, Armitage and Milwaukee Avenues, with entrances from both streets, Fullerton Avenue, or between Fullerton and Humboldt Boulevard, Diversey Boulevard, Belmont Avenue, Addison Street, Irving Park Boulevard and Montrose Avenue.

Transit Affairs in New York

The Public Service Commission has asked the Board of Estimate and Apportionment for an appropriation of \$2,000 to pay the expenses of maintenance of the Brooklyn loop subway for the next six months. This subway extends up Centre Street from Chambers Street and connects with both the Williamsburg and Manhattan bridges. It has cost \$10,000,000 and is practically complete except for the Chambers Street terminal, which has been delayed because it is located in the basement of the Municipal Building, on which work is delayed. The commission states that it will be necessary to have the subway looked after until a contract can be made for its equipment, which is expected to be done within six months. This contract may be made for equipment and operation in connection with either the Fourth Avenue subway, Brooklyn, or the Broadway-Lex-

ington Avenue subway, the plans for which are now almost completed.

A hearing was held on March 13, 1910, before the Public Service Commission on the application of the Manhattan Bridge Three-Cent Line for a certificate of convenience and necessity to operate a surface railroad from the shopping district of Brooklyn to the North River in Manhattan. John C. Brackenridge, vice-president and chief engineer of the company, was cross-examined by Prof. C. A. Collin on behalf of the Brooklyn Rapid Transit Company regarding the amount of new track the Three-Cent Line would have to lay and the average rate of speed at which it intended to operate. The new company contemplates using cars about 28 ft. long, each equipped with two 50-hp motors. With such cars, Mr. Brackenridge testified, it would be possible, if other conditions permitted, to attain a speed, even on an up-grade, of 30 m.p.h. He fixed the probable average rate of speed at which the cars of the Three-Cent Line would run as 10 m.p.h.

Riverbank Subway to be Built in Boston

The Boston Elevated Railway has accepted the act providing for the construction of the Riverbank subway to connect the Park Street district with the Charlesgate section of the outer Back Bay. The new line will be more than two miles long and the route from Park Street will be under Boston Common, Beacon Street, Joy Street, Walnut Street and Chestnut Street to the south bank of the Charles River, whence it will be carried to the vicinity of the intersection of Beacon Street and Commonwealth Avenue. The proposed subway will supplement the new Cambridge subway and relieve congestion in the Boylston Street district of the Back Bay. The estimated cost of construction is \$4,000,000, and it is expected that the road will be in operation in three years. A tunnel under Beacon Hill will be required, which may be brought into Park Street in connection with the Boston terminus of the Cambridge subway under construction. The Riverbank subway will enable the Boston Elevated Railway to compete more successfully with the suburban lines of the Boston & Albany Railroad by reducing the running time between Newton and other outlying places and Boston. A minimum number of stations will probably be asked by the company to continue the express service between the downtown district and suburban centers.

Meeting of the Arkansas Association of Public Utility Operators.—The next meeting of the Arkansas Association of Public Utility Operators will be held at Pine Bluff, Ark., on April 27, 28 and 29, with headquarters at the Jefferson Hotel.

Meeting of the Colorado Electric Light, Power & Railway Association.—The executive committee of the Colorado Electric Light, Power & Railway Association has decided to hold the next convention of the association at the Hotel Colorado, Glenwood Springs, Colo., on Sept. 21, 22 and 23, 1910.

Date Set for Opening Pennsylvania Railroad Tunnels in New York.—The Pennsylvania Railroad has announced that the company's tunnel under the East River^s between Long Island City and its terminal station at Thirty-third Street and Seventh Avenue, New York, will be opened to the public on May 15, 1910. On March 28, 1910, the officers of the company will conduct a party of invited guests through the station and the tunnel.

Huntington Lines To Build Cars.—The requirements of the Huntington lines in Southern California have increased to such proportions that it has been decided by the Pacific Electric Company, Los Angeles, Cal., to erect a plant in that city which will be equipped for turning out car bodies complete. At present 30 cars of the Los Angeles Railway are in the shops being reconstructed for pay-as-you-enter operation.

Opinion Regarding Franchises.—Attorney-General Denman, of Ohio, has rendered an opinion that a franchise granted a street railway becomes inoperative after a petition for a referendum vote signed by 15 per cent of the electors has been filed with the clerk of the municipality.

The petition acts as a veto and a majority vote is necessary to legalize the grant. Electors who have signed the petition cannot withdraw their names after it has been properly filed with the clerk. The opinion was rendered in response to a request from the city solicitor of Ashtabula, Ohio.

Franchise Questions in San Francisco.—The Supervisors of San Francisco on March 14, 1910, directed the Attorney-General of the State to bring suit to forfeit the franchise of the Sutter Street Railroad, which operates a horse car daily on the outer track on Market Street from Sutter Street to the Ferry Building. Progress on the Geary Street, Park & Ocean Railway is interrupted temporarily pending the outcome of the suit brought by Horace G. Platt for an injunction to restrain the city from disposing of the bonds to provide funds for equipping the road as a municipal undertaking.

Subsidiary Companies Organized in Minneapolis.—On account of the recent decision by the Supreme Court of Minnesota in which it was held that the suburban lines of the Twin City Rapid Transit Company are railroads and amenable to the Minnesota law fixing a tax of 4 per cent on gross earnings, it has been decided so to rearrange the incorporation that the suburban railways, the steamer lines operated on Lake Minnetonka and White Bear Lake, and the hotels, restaurants and amusement enterprises of the company might be handled separately for taxation and accounting purposes, and the Minneapolis, St. Paul & Suburban Railway, capitalized at \$1,000,000; the Minnetonka & White Bear Navigation Company and the Rapid Transit Realty Company have been incorporated in the interest of the Twin City Rapid Transit Company.

Decision by Ohio Railroad Commission Reversed.—On March 15, 1910, the Supreme Court of Ohio decided that railroads can reduce passenger rates in competition with electric railways between different places on their own lines. A. A. Price, an attorney of Athens, Ohio, filed charges with the Railroad Commission that the Hocking Valley Railroad discriminated against Athens by cutting the rates between places reached by the lines of the Scioto Valley Traction Company and not between others. The Railroad Commission held that the railroad rates were made lower than the rates by electric railway not to meet, but to destroy, competition, and ordered the railroad to charge the same rates as the electric railway between the points served by the lines of both companies, and not to extend the reduction beyond these towns unless by general tariff affecting all the points on the system.

Officers of the New England Street Railway Club.—The nominating committee appointed by W. D. Wright, president of the New England Street Railway Club, recommended that the following officers be voted for at the annual meeting of the club on March 24, 1910: Charles H. Hile, Boston, Mass., president; Franklin Woodman, Haverhill, Mass., Calvert Townley, New Haven, Conn., J. Brodie Smith, Manchester, N. H., G. S. Haley, Rutland, Vt., C. F. Berry, Portland, Me., and D. F. Sherman, Providence, R. I., vice-presidents; John J. Lane, Boston, Mass., secretary; E. P. Shaw, Jr., South Framingham, Mass., treasurer; W. D. Wright, Providence, R. I., Carl A. Sylvester, Newtonville, Mass., W. G. Cory, New Haven, Conn., Thomas Lees, Lowell, Mass., A. S. Michener, Boston, Mass., A. F. Walker, Boston, Mass., and C. V. Wood, Springfield, Mass., executive committee; Charles H. Hile, Boston, Mass., Elton S. Wilde, New Bedford, Mass., Fred F. Stockwell, Cambridgeport, Mass., finance committee.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Maryland.—President Gorman, of the Maryland Senate, is having a public utilities bill prepared for introduction. Four utility measures are now pending, but it is believed to be the plan of the Democratic leaders to put the Gorman measure through over the other bills. Mr. Benson, the floor leader of the House, is also fostering this measure. The new bill will provide for the appointment of three commissioners, each to be paid \$3,000 a year, and a secretary and a general counsel. At least one of the commissioners must be a voter of Baltimore, and the Governor will have power to name them all from the city if he so desires. The commission is authorized to report its find-

ings and recommendations to the Legislature to put them into effect by an enactment. The commission could, however, order the laying of additional railroad switches or the operation of more cars. Attorney-General Straus, who drew the original public utilities bill, is decidedly opposed to the Gorman measure. He is even quoted as saying that he would urge the Governor to veto the measure if it should be passed.

Massachusetts.—W. A. Bancroft, president of the Boston Elevated Railway, appeared in opposition to the immediate construction of the tunnels from Park Street, Boston, to South Boston and Dorchester at the hearing before the committee on metropolitan affairs on March 16. He contended that the company was already committed to extensions in the form of rapid transit routes which will cost \$31,550,000. When the Boston Elevated Railway began operation 12 years ago the system comprised 304 miles of track and an investment of about \$31,000,000. The investment now is about \$85,000,000, and the system comprises 484 miles of track. This increase of nearly 200 per cent in investment has been accompanied by an increase in income from \$8,750,000 to \$14,500,000. The company is not opposed to any extension which will be supported by the revenue.

New York.—The commission created by the Legislature in 1909 to inquire into the subject of employers' liability and the causes of industrial accidents has made its report to the Legislature. It recommends a fundamental change in the method of compensating injured workmen, and presents two bills to carry out its recommendations which were introduced in the Senate by Senator Wainwright and in the Assembly by Assemblyman Phillips. The first bill applies only to certain specified employments. It recommends the principle of compensation for all accidents regardless of negligence by providing for compensation for all workmen injured in such employments by either the negligence of the employers, his agents, or by the "necessary risk or danger of the employment or one inherent in the danger thereof." Among the employments specified are the following: The erection or demolition of bridges or buildings; the construction of tunnels or subways; all work carried on under compressed air; construction, or repair of wires, or apparatus charged with electric currents; the operation of locomotives, motors or cars, or the construction or repair of steam railroad tracks and roadbeds. The schedule of compensation provided is, in case of death, four years' wages, not to exceed \$3,000; and in case of total or partial disability, 50 per cent of the last earnings of the injured person payable weekly, but not more than \$10 per week, during the continuance of the disability, not to exceed a period of eight years. The second bill recommended covers all accidents to employees not coming within the purview of the first bill. It introduces the principle of compensation for all accidents, but makes this principle voluntary and subject to agreement between the employer and the employee. This bill, in addition to its elective scheme of compensation, amends the employers' liability act so as to considerably increase the liability of the employer by abrogating or at least greatly modifying the assumption of risk rule. It affects the defense of contributory negligence by placing upon the employer the burden of proving contributory negligence on the part of the employee, whereas, the law now requires the employee to prove his freedom from contributory negligence.

Ohio.—The Langdon tax commission bill, amended as suggested by Attorney-General Denman, has been passed by the House of Representatives. The bill would replace all tax boards with a State commission of three members, to which all corporations would pay their taxes direct. The bill fixes rates as follows: Steam railroads and pipe lines, first \$1,000,000 gross receipts, 2 per cent; excess, 3 per cent; interurban railways, first \$1,000,000 gross receipts, 1 per cent; excess, 1½ per cent; all other public utilities, first \$300,000, 1 per cent; excess, 1½ per cent. Public utilities now pay a tax of 1 per cent on their gross earnings. The Willis law, which requires the payment of a tax of one-tenth of 1 per cent on the capital stock of private corporations, will probably not be changed. The Woods public utilities bill will probably be so amended that the present Railroad Commission will constitute the public utilities commission.

Financial and Corporate

New York Stock and Money Market

March 22, 1910.

Yesterday and to-day the stock market showed some recovery from the depression earlier in the week. The volume of trading, however, continues to be light and price recoveries are fractional. The successful sale of the new issue of New York City bonds—the subscription being four times the offering—has increased the hopeful sentiment. Interborough-Metropolitan has been active. More than 67,000 shares of the two issues were traded in to-day, although the advance was merely nominal.

In spite of the sharp advance last week in the discount rate of the Bank of England, the local money market is but little advanced. Rates to-day were: Call, 2¾ to 3 per cent; 90 days, 4 to 4¼ per cent.

Other Markets

With the failure of the prospect of successful arbitration in the Philadelphia Rapid Transit strike, the stock of that company and Union Traction stock were lower to-day. The pressure to sell is very insistent.

In the Boston market, the issues of Massachusetts Electric and Boston Elevated have been fairly active. The latter especially has been more in evidence during the past week than for many months. Prices remain practically unchanged.

There has been little trading in traction stocks in the Chicago market. A few sales of Metropolitan Elevated and an occasional offering of Chicago Railways Series 2 comprise the entire trading. Prices are unchanged.

In Baltimore, the bonds of the United Railways have been the only traction securities in evidence. These continue to be traded in quite liberally at former prices.

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

	Mar. 15.	Mar. 22.
American Railways Company.....	45¾	44½
Aurora, Elgin & Chicago Railroad (common).....	*57¾	*57¾
Aurora, Elgin & Chicago Railroad (preferred).....	*94¼	*94¼
Boston Elevated Railway.....	130½	129
Boston & Suburban Electric Companies.....	a16½	a16
Boston & Suburban Electric Companies (preferred).....	a76	a76
Boston & Worcester Electric Companies (common).....	a10½	a10½
Boston & Worcester Electric Companies (preferred).....	a46	a46
Brooklyn Rapid Transit Company.....	76	77½
Brooklyn Rapid Transit Company, 1st pref. conv. 4s.....	84	84¾
Capital Traction Company, Washington.....	a133	*133
Chicago City Railway.....	a195	*195
Chicago & Oak Park Elevated Railroad (common).....	*3¼	*3½
Chicago & Oak Park Elevated Railroad (preferred).....	*7½	*7½
Chicago Railways, pteptg., ctf. 1.....	a106	a106
Chicago Railways, pteptg., ctf. 2.....	a33	a33
Chicago Railways, pteptg., ctf. 3.....	a18	a19
Chicago Railways, pteptg., ctf. 4s.....	a9¾	*9¾
Cleveland Railways.....	*91½	*91½
Consolidated Traction of New Jersey.....	a76	a76½
Consolidated Traction of New Jersey, 5 per cent bonds.....	a105½	a105½
Detroit United Railway.....	*62	*62
General Electric Company.....	154	154½
Georgia Railway & Electric Company (common).....	106½	107
Georgia Railway & Electric Company (preferred).....	a88	a88
Interborough-Metropolitan Company (common).....	22	23½
Interborough-Metropolitan Company (preferred).....	55¾	59½
Interborough-Metropolitan Company (4½s).....	81¾	82
Kansas City Railway & Light Company (common).....	a34	a30½
Kansas City Railway & Light Company (preferred).....	a75	*75
Manhattan Railway.....	*139	137½
Massachusetts Electric Companies (common).....	a18	a18
Massachusetts Electric Companies (preferred).....	a84	a84
Metropolitan West Side, Chicago (common).....	a16	a16½
Metropolitan West Side, Chicago (preferred).....	a55	a53
Metropolitan Street Railway.....	*15	*15
Milwaukee Electric Railway & Light (preferred).....	*110	*110
North American Company.....	*81¼	*81¼
Northwestern Elevated Railroad (common).....	a16	a17
Northwestern Elevated Railroad (preferred).....	a68	60
Philadelphia Company, Pittsburg (common).....	a51	a51¾
Philadelphia Company, Pittsburg (preferred).....	a44½	a44
Philadelphia Rapid Transit Company.....	a21¼	a22
Philadelphia Traction Company.....	86	87
Public Service Corporation, 5 per cent col. notes.....	*100¾	*100¾
Public Service Corporation, ctf. s.....	a105½	a105½
Seattle Electric Company (common).....	a115	a115
Seattle Electric Company (preferred).....	a102	*102
South Side Elevated Railroad (Chicago).....	a53¾	a53
Third Avenue Railroad, New York.....	*8¾	*8¾
Toledo Railways & Light Company.....	*11¾	*11¾
Twin City Rapid Transit, Minneapolis (common).....	*114	115¼
Union Traction Company, Philadelphia.....	a4¾	a49
United Rys. & Electric Company, Baltimore.....	a14	a13½
United Rys. Inv. Co. (common).....	*37	*37
United Rys. Inv. Co. (preferred).....	*67	*67
Washington Ry. & Electric Company (common).....	38	*40
Washington Ry. & Electric Company (preferred).....	a90¾	a90½
West End Street Railway, Boston (common).....	a95	a94½
West End Street Railway, Boston (preferred).....	a105	a106
Westinghouse Elec. & Mfg. Company.....	68½	a70
Westinghouse Elec. & Mfg. Company (1st pref.).....	*125	*125

a Asked.

* Last Sale.

Annual Report of Massachusetts Electric Companies

The income of the Massachusetts Electric Companies during the year ended Sept. 30, 1909, amounted to \$1,094,799, divided between \$967,630 from dividends on stocks owned and \$127,169 interest on notes and bank balances. Expenses were \$19,395, leaving a net income of \$1,075,404. Against this amount there was charged \$157,500 interest on coupon notes, leaving a net divisible income of \$917,904. From this sum \$513,935, or a total of 2½ per cent dividends on the preferred stock, was deducted, leaving a surplus of \$403,969. A profit of \$115,997 was realized on the sale of stocks, making, with the surplus of \$2,378,792 existing on Sept. 30, 1908, a total surplus as of Sept. 30, 1909, of \$2,987,758.

Gordon Abbott, president of the company, says in his statement to shareholders:

"In the last annual report which your board of trustees presented to you it was stated that it seemed probable that the decreases in gross earnings which marked the concluding months of the year ending Sept. 30, 1908, would continue during the first six months of that which has just closed. This expectation happily proved to be unfounded; the gross earnings of the companies in which you are interested were slightly greater for the first half of this fiscal year than those of the same period of the previous year. During the last six months there was a marked improvement in the gross, so that the year as a whole showed an increase in gross earnings for all the companies of \$258,843, 3¼ per cent.

"Operating conditions during the year have been sufficiently favorable, owing to the low price of supplies, to produce an increase of \$125,000 in net earnings despite increasingly liberal expenditures on maintenance over those of the previous year. Of this increase \$42,569 was absorbed by dividends on the preferred shares of the operating companies, but the remaining increase in net was large enough to justify the Old Colony Street Railway in increasing its dividend from 4 per cent to 5 per cent. The dividend rate of the Boston & Northern was maintained at 5 per cent.

"The sale of preferred shares produced the sum of \$1,205,820, and this amount, together with the proceeds of \$1,654,000 bonds of the operating companies sold during the year, enabled them to pay off all their floating debt, excepting that owed to the Massachusetts Electric Companies, and in addition left the operating companies with a surplus of cash to pay for cars and new electrical machinery ordered during the past fiscal year, but not yet delivered.

"During the past year the operating companies expended \$793,406, as follows: Track construction, \$211,515; track reconstruction, \$399,407; cars and electrical equipment, \$2,368; wires and bonding, \$99,932; power stations, \$33,503; land and buildings, \$32,119; sundry equipment, \$14,562; total, \$793,406.

"With this expenditure half a mile of new track was built, 18¼ miles of old track reconstructed, 21 miles of new line construction done, and an 800-kw generator added to the Lowell station. Besides this, 40 semi-convertible cars and a 1200-kw generator for the Lawrence station were ordered, but not delivered before the end of the fiscal year. As a result of this expenditure and of the expenditures on maintenance, the trustees are able again to report that the physical condition of the properties has improved.

"On July 1, 1909, a dividend of 1½ per cent was paid on the preferred shares of the Massachusetts Electric Companies, and the trustees have felt justified by the results of the year in increasing the distribution on Jan. 1, 1910, to 1¾ per cent. Although the earnings for the past year would appear to justify the declaration of a dividend at a higher rate than this, your trustees are of the opinion that the time has not yet come when it would be wise to resume the 4 per cent rate, in view of the fact that the past year is the first since 1903 in which the full 4 per cent was earned. They think that the interests of the shareholders will be best served by maintaining a strong financial condition until the earning power of the property has been demonstrated over a longer period."

A consolidated statement of profit and loss of the operating subsidiary street railway and electric light companies for the year ending Sept. 30, 1909, is as follows:

Earnings	\$8,052,355.61
Expenses	5,148,396.87
Net earnings.....	\$2,903,958.74
Interest, rentals and taxes.....	1,778,128.97
Net divisible income.....	\$1,125,829.77
Dividends on common stock.....	\$957,895.00
Dividends on preferred stock.....	42,569.10
	1,000,464.10
Surplus for the year.....	\$125,365.67
Surplus Sept. 30, 1908.....	210,887.38
Total	\$336,253.05
Deductions:	
Injuries and damages prior to insurance.....	\$8,271.45
Premium on bonds redeemed.....	2,188.00
Adjustment of accounts.....	5,561.18
Reconstruction	74,387.83
Reconstruction of leased properties.....	25,444.38
Depreciation of Hyde Park Electric Light Company property.....	4,002.60
Total deductions.....	119,855.44
Surplus Sept. 30, 1909.....	\$216,397.61

Binghamton (N. Y.) Railway.—The holders of the \$137,000 of first mortgage 6 per cent bonds of the Binghamton Street Railway due on April 1, 1910, are offered the privilege of exchanging their bonds, bond for bond, interest to be adjusted, for first consolidated mortgage 5 per cent tax exempt gold bonds of the Binghamton Railway due in 1931, which cover the entire system of the company.

Brooklyn (N. Y.) Rapid Transit Company.—There have been listed on the New York Stock Exchange \$1,230,000 more of first mortgage convertible 4 per cent bonds of the Brooklyn Rapid Transit Company. There have been issued to date \$48,296,000 of the refunding bonds of the company, of which \$34,787,000 have been listed on the exchange and \$13,509,000 are held in the treasury of the company.

Camden & Trenton Railway, Camden, N. J.—The property of the Camden & Trenton Railway was sold under foreclosure on March 18, 1910, for \$675,000 to Henry W. Thomson, Jr., representing the bondholders' committee.

Catskill (N. Y.) Traction Company.—The Catskill Traction Company, which has succeeded to the property and franchises of the Catskill Electric Railway, sold at foreclosure on Jan. 12, 1910, has asked the Public Service Commission of the Second District of New York for consent to mortgage its property and franchise to secure a bond issue to the amount of \$200,000 and for permission to issue \$60,000 in bonds in part payment of the purchase price of the property of the Catskill Electric Railway; also for permission to issue \$12,000 capital stock to the incorporators, which has been paid for in cash and \$48,000 par value capital stock to W. C. Wood in payment of the balance of the purchase price of the property of the Catskill Electric Railway.

Chicago (Ill.) Railways.—It is said that before April 1, 1910, an announcement will be made of the details of a plan by which the Chicago Railways will operate the lines of the Chicago Consolidated Traction Company under lease for 99 years.

Chicago (Ill.) City Railway.—The report of the Chicago City Railway for the year ended Jan. 31, 1910, as presented at the annual meeting of the stockholders of the company on March 16, 1910, shows earnings briefly as follows: Gross receipts, \$9,094,047; expenses, taxes, renewals, etc., \$8,230,734; net earnings, \$863,313; city's proportion of net earnings, \$474,822; amount left for company, \$388,491; interest on capital, \$1,864,901; income from operation, \$2,253,392; other income, \$555,714; total, \$2,809,106; interest on bonds, \$1,110,666; net, \$1,698,440; regular dividends, \$1,080,000; balance after paying dividends, \$618,440. The stockholders have elected E. R. Bliss, B. E. Sunny and Honore Palmer directors to succeed A. J. Earling, Robert M. Fair and S. M. Felton. The officers have been re-elected.

Cleveland (Ohio) Railway.—The holders of the present \$14,675,600 of outstanding stock of the Cleveland Railway are offered the right until April 10, 1910, to subscribe for and take 10 per cent of new stock at par. Payment is to be made on the basis of 25 per cent on or before May 1, 1910;

25 per cent on or before July 1, 1910; 25 per cent on or before Sept. 1, 1910, and 25 per cent on Nov. 1, 1910, or optionally in full at any time before Nov. 1, 1910.

East Liverpool Traction & Light Company, East Liverpool, Ohio.—Van Horn Ely, president of the East Liverpool Traction & Light Company, is said to have arranged to take over the Valley Electric Company, New Brighton, Pa., in the interest of the East Liverpool Traction & Light Company.

Interstate Railways, Philadelphia, Pa.—It was stated that about \$7,000,000 of the \$10,776,000 of 4 per cent bonds of the Interstate Railways had been deposited with the Real Estate Trust Company up to March 14, 1910, in accordance with the terms of a readjustment committee.

Little Rock Railway & Electric Company, Little Rock, Ark.—An extra dividend of 1½ per cent on the \$1,500,000 of common stock of the Little Rock Railway & Electric Company was paid on March 1, 1910.

Louisville (Ky.) Railway.—The Louisville Railway reports earnings as follows for the year ended Dec. 31, 1909: Gross earnings, \$2,969,132, of which \$2,685,288 was derived from the revenue of the city lines, \$17,634 from mail and advertising, \$162,668 from the revenue of the interurban lines, \$24,711 from the freight and express revenue of the interurban lines, and \$78,829 from other sources; operating expenses and charges, \$2,391,790, of which \$1,568,473 was incurred in operating the city lines, \$96,932 in operating the interurban lines, \$216,000 for State, county and city taxes, \$385,384 for interest on debt paid and accrued, and \$125,000 for the dividend on the preferred stock; net earnings, \$577,341, of which \$545,650 was used to pay the dividend on the common stock, \$25,000 was set aside for accident reserve, and \$6,691 was carried to surplus account.

Metropolitan Street Railway, New York, N. Y.—Judge Lacombe, in the United States Circuit Court, has reserved decision on a motion of the Twenty-third Street Railway to have the receivers of the Metropolitan Street Railway set aside the surplus earnings of the Twenty-third Street Railway in a special account as a fund to meet the interest on the notes held by the Mercantile Trust Company of \$2,200,000 and interest on \$400,000 underlying bonds.

Milford & Uxbridge Street Railway, Milford, Mass.—The Milford & Uxbridge Street Railway has petitioned the Massachusetts Railroad Commission for authority to issue \$88,000 of preferred stock at a par value of \$100 per share.

Nashville Railway & Light Company, Nashville, Tenn.—The Nashville Railway & Light Company reports earnings as follows for the year ended Dec. 31, 1909: Gross earnings for 1909, \$1,724,379, as compared with \$1,597,029 for 1908; operating expenses and taxes for 1909, \$1,013,882, as compared with \$954,296 for 1908; earnings from operation for 1909, \$710,497, as compared with \$642,733 for 1908; interest for 1909, \$394,353, as compared with \$393,099 for 1908; net earnings for 1909, \$316,144, as compared with \$249,634 for 1908; reserve, including depreciation, for 1909, \$51,513, as compared with \$47,742 for 1908; net income for 1909, \$264,631, as compared with \$201,892 for 1908; reserve, miscellaneous, for 1908 transferred to profit and loss, \$45,000; surplus for 1909, \$264,631, as compared with \$246,892 for 1908; 5 per cent dividend on preferred stock for 1909, \$125,000, as compared with \$123,445 for 1908; surplus for 1909 after dividend, \$139,631, as compared with \$123,447.

New Orleans Railway & Light Company, New Orleans, La.—Bertron, Griscom & Jenks announce that they have not received sufficient assents to warrant them in proceeding further with their proposal to buy from the stockholders of the New Orleans Railway & Light Company \$4,000,000 of the common stock and \$2,000,000 of the preferred stock of the company, as noted in the ELECTRIC RAILWAY JOURNAL of Feb. 12, 1910, page 295.

St. Louis, Monte-Sano & Southern Railway, St. Louis, Mo.—Peter Kerth has been appointed receiver of the St. Louis, Monte-Sano & Southern Railway, which has completed 8 miles of line out of St. Louis.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—The Waterloo, Cedar Falls & Northern Railway has called for payment at 103 and interest on April 1, 1910, the \$755,000 of 5 per cent first mortgage gold bonds of the Waterloo-Cedar Falls Rapid Transit Company.

Traffic and Transportation

Coney Island & Brooklyn Railroad Ordered to Equip Its Cars with Fenders and Wheel Guards

After allowing nearly a year for experimenting with the types of fenders and wheel guards to be used by the Coney Island & Brooklyn Railroad, the Public Service Commission of the First District of New York has ordered the company on or before Oct. 15, 1910, to equip all its closed passenger cars with wheel guards of a type or types to be approved by the commission; to equip all open passenger cars on or before July 1, 1910, with wheel guards or platform trip fenders of a type to be approved by the commission, and to file with the commission by April 5, 1910, drawings and specifications showing the types of wheel guards and fenders to be used. There is an order in force which directs the company to use projecting fenders and wheel guards, but the order just adopted provides that as soon as the wheel guards are installed the company shall have the right to fold up the fenders on cars operated over Brooklyn Bridge, Williamsburg Bridge, Washington Street, High Street, Fulton Street between Washington Street and DeKalb Avenue, and Roebling Street between Broadway and Williamsburg Bridge Plaza. The order was adopted on an opinion submitted by Commissioner Maltbie.

The companies operating in Brooklyn and Queens asked for an opportunity to test various types of wheel guards to determine which were best suited to local conditions. On April 28, 1909, the Coney Island & Brooklyn Railroad and other street railroads were ordered to equip their cars with fenders, but the order for wheel guards was withheld pending experiments to be made by the company. The Coney Island & Brooklyn Railroad operates 450 cars over about 50 miles of single track, of which 32 are paved with granite blocks and four with cobblestones, while for about 14 miles there is no pavement at all.

Pursuant to the agreement to allow experiments, the commission took no action until the fall of 1909, when it held hearings, and on Dec. 24, 1909, an order was adopted directing all the companies of the Brooklyn Rapid Transit System and the Coney Island & Brooklyn Railroad to equip their cars with wheel guards of a type or types to be approved by the commission. The Coney Island & Brooklyn Railroad was then granted an independent rehearing, the avowed purpose of the company being to make a record, with a view of testing the legality of the order under a writ of certiorari.

Mr. Maltbie recites the various objections offered by the company, which he dismisses with the exception of the objection made to the expense of altering the open cars. Of the 450 cars operated 259 are open cars, so constructed that there is not sufficient space between the ends of the car and the trucks properly to adjust wheel guards. The cars could be altered to permit of the installation of wheel guards, but it would cost from \$150 to \$250 for each car. The former figure is the estimate of the commission's expert, the latter that of the company's engineer. Since the hearings it has been suggested that the company be allowed to use a projecting platform-trip fender on the open cars, carried several inches above the rails. The commissioner does not approve altogether of the platform drop fender for the reason that its action depends upon the quickness of the motorman. He says:

"In view of the expense which would be incurred to transform immediately the open cars—approximately \$40,000—it seems reasonable to allow the company to determine for itself, as respects these open cars, whether it will install wheel guards and the ordinary fender or substitute for both a platform trip fender. The commission believes that the safety of the public is the fundamental consideration, and prefers that the company should place wheel guards and fenders upon all of its cars; but if the company exercises the privilege allowed it in the order and decides to put on the platform drop fender, and if such a fender shall prove to be inefficient, the commission will feel free to act immediately and order the substitution of more efficient devices for those in use."

Mr. Maltbie, in conclusion, points out that the surface cars of the Brooklyn Rapid Transit System, which operate

under conditions similar to those existing on the lines of the Coney Island & Brooklyn Railroad, are equipped with wheel guards and fenders in accordance with the order of the commission. About 2500 cars of the Brooklyn Rapid Transit System are affected, as against 450 operated by the Coney Island & Brooklyn Railroad.

Decision Regarding Service in Newton, Mass.

The Railroad Commission of Massachusetts has rendered the following decision in the case of the petition of the residents of Newton, Mass., regarding service on the Middlesex & Boston Street Railway:

"The petitioners complain of the infrequency of car service on the Auburndale line, so-called, after 7:30 p. m. At the hearing it appeared that the service was half-hourly during the winter season. The complaint raises two questions—the insufficiency of the service between Lake Street and Centre Street and the service beyond Centre Street in the direction of Auburndale. At the hearing the company agreed to restore the 15-minute service between Lake Street and Centre Street, and this service is now in operation. After the hearing, at the request of the commission, the company filed reports showing the amount of traffic after 7:10 p. m. for 10 days between Centre Street and Auburndale in both directions. A study of these returns, taken in connection with the service already restored, does not show a sufficient demand of the traveling public for the restoration of the 15-minute service from Centre Street to Auburndale.

"A demand is disclosed, however, for additional service to and from the Brae-Burn Country Club upon occasions when winter sports or other events are taking place. While this demand must of necessity depend in some part upon weather conditions, we recommend that such additional service as will meet it be installed."

Lower Car Steps in Portland, Ore.—The Portland Railway, Light & Power Company, Portland, Ore., has agreed to reduce the height of the steps on 40 cars recently equipped for service from 18 in. to 15½ in.

Complaint Against Service on International Railway.—The Public Service Commission of the Second District of New York has received a complaint from residents of Lancaster and Depew against the International Railway, alleging insufficient passenger car service at certain hours of the day and unsanitary condition of passenger cars.

Seattle-Tacoma Fare Case to Be Appealed.—The Puget Sound Electric Railway proposes to appeal to the courts from the finding of the Railroad Commission of Washington, fixing the rates of fare between Seattle and Tacoma and other places along the line of the company. The order of the commission was published in the *ELECTRIC RAILWAY JOURNAL* of March 19, 1910, page 508.

Service of the Washington, Baltimore & Annapolis Electric Railway Extended.—The cars of the Washington, Baltimore & Annapolis Electric Railway are now operated in Washington to the Treasury Building, and transfers are issued between the cars of this company and the cars of the local companies at five places in Washington. Sixty-four limited cars are operated daily between Baltimore and Washington.

Decrease in Fares Asked at Westborough, Mass.—The Selectmen of Westborough have petitioned the Massachusetts Railroad Commission to reduce the fare on the Worcester Consolidated Street Railway between Westborough and Worcester from 20 to 15 cents. The Selectmen also urge that the company be required to continue to operate its power plant and car house in Westborough. There was a hearing at Boston on March 21.

Express Passenger Service Between South Framingham and Boston.—The Middlesex & Boston Street Railway, by arrangement with the Boston Elevated Railway, has begun operating an express passenger car service on week days between South Framingham and the Park Street subway, Boston. Three round trips are made daily. The running time is 1 hour and 20 minutes between South Framingham and Park Street. Stops are made at Natick, Wellesley and the Newtons.

Ohio Electric Railway Benefit Association.—At a meeting of the grand council of the Ohio Electric Railway Benefit Association, held at Newark, Ohio, on March 17, 1910, the following officers were elected: E. J. Kessler, Lima, president; W. H. Robinson, Newark, vice-president; George Heckethorne, Springfield, secretary-treasurer. Special cars from Lima and Springfield carried the delegates to the meeting. A banquet was served in the evening and representatives from chapters in Cincinnati, Dayton, Springfield, Hamilton, Lima, Columbus, Zanesville and Newark were present.

Abandonment of Unprofitable Line Upheld in Wisconsin.—The Wisconsin Railroad Commission has dismissed the complaint of H. W. Brown for the restoration of a discontinued street car service by the Janesville Street Railway. The complaint was based upon the failure by the company to run its cars over a section of its track in Janesville that formerly was used for service. The company contended that it could not maintain the abandoned service; that the entire service in Janesville was unprofitable; that the business of the company was not sufficient to pay running expenses; that the company had not paid dividends or interest on its bonds. In dismissing the petition the commission says that the ordinary rule that a railroad must operate all of its branches as an entirety and that abandonment of any part of a system because it fails to pay a profit is against public policy will not hold in this case, because the entire system is not profitable, and no public good could come from the requirement asked by the petitioners.

Binghamton Fare Complaint Closed.—The Public Service Commission of the Second District of New York has closed on its records the complaint against the Binghamton (N. Y.) Railway regarding passenger fare in which it was alleged that a clause in the contract between the company and the village of Union which stated that "the fare for passengers may be, but shall not exceed, 10 cents for each person for a single ride between Union and Lestershire, or 15 cents for the round trip made the said day between said villages" was not being complied with, because the company compelled passengers who had purchased round-trip tickets for 15 cents to leave the cars at the westerly boundary of Lestershire or pay an extra fare from this boundary to regular stopping places within the village, although passengers who purchased one-way tickets at 10 cents were carried the entire distance between these villages. Under date of March 14, 1910, G. T. Rogers, president of the company, wrote the commission that the officers of the company believed that it would stimulate harmony and good feeling upon the part of its Union, Endicott and Lestershire patrons to issue and accept round-trip Lestershire-Union tickets from and to any place within the village limits of Lestershire, and had decided to do so.

Petition for Owl Service in Harrisburg.—A number of steam railroad employees who live in Harrisburg have asked the State Railroad Commission to require the Central Pennsylvania Traction Company to operate an all-night car service on the more important city lines. The company denies that there is any necessity for the service asked in the complaint. To the charge that about 225 passengers arrive at the Union Station, Harrisburg, between 12:24 a. m. and 5 a. m. the company says that the number of passengers who arrive between the hours mentioned that do not continue to some other destination by steam railroad is not in excess of 75. It also says that the number of railroad train crews leaving Enola, five miles from Harrisburg, and five miles from the nearest point of connection with its line, is very small and has no bearing upon the subject matter of the complaint; that there is no public need for the all-night service; that the expense of such service maintained by cars operated even at infrequent intervals during the hours mentioned would greatly exceed the receipts, and that to compel the company to operate such service would burden it unjustly. The company is prepared to present comparative data upon the general subject matter of the complaint to the commission if the objection which it has entered in general terms should be considered insufficient.

Report on Transit Conditions in Trenton.—Samuel Whinery, who was retained recently by Charles E. Bird, City Counsel of Trenton, N. J., to investigate street railway

conditions in Trenton and make recommendations to the Council for changes in the operation of the lines, has submitted his report, and it has been transmitted to the Council. He took Scranton, Pa.; Syracuse, N. Y.; Utica, N. Y., and Grand Rapids, Mich., which are approximately as large as Trenton, for purposes of comparison, and prepared a table showing the bonds and stock issued in these cities per mile of road and per 1000 inhabitants and the gross earnings and net earnings per mile of road and per 1000 inhabitants and the passengers carried per mile of road and per 1000 inhabitants. Mr. Whinery recommends that more cars be operated during the rush hours; that the cars be kept cleaner and that the traffic ordinance relating to the obstruction of car tracks by vehicles be rigidly enforced. These recommendations should be carried into effect at once. For the future he recommends an increase in the capacity of the power plant of the Trenton Street Railway by the installation of a 1500-hp engine and generator and 600 hp in boilers, the substitution of larger cars for those now in service and the reconstruction and repair of the company's tracks on portions of the system specified in the report. Mr. Whinery says that a sum practically equivalent to the capitalization of the company would be required to replace the present property.

Terre Haute, Indianapolis & Eastern Traction Company.—A new timetable has been issued by the Terre Haute, Indianapolis & Eastern Traction Company which includes an excellent map of the territory served by the company and an alphabetical list of the stations. The other information contained in this publication includes the timetables on 10 divisions, a general statement regarding baggage, chartered cars, mileage and coupon books, interline tickets and the following statement regarding lost tickets and disputes: "If you lose your ticket you are out of pocket the value thereof. The railroad company is under no obligation to give you another in its place, nor to allow you to ride free. Give notice of your loss to the conductor. Pay your fare to him or purchase another ticket from first ticket station. Take conductor's or ticket agent's receipt for the amount paid. When you reach your destination write to the general passenger agent of the road of which you bought your ticket, enclose receipt and explain the circumstances. If your ticket is found and returned unused the company will refund your money. Agents and conductors are governed by the rules of this company. In case of dispute with them, it is always best to pay the fare requested and refer the matter to the general passenger agent, who will promptly investigate and adjust any differences." The new folder shows the connections with steam railroads at 11 of the more important intersecting points. It is made up of a single sheet folded to $3\frac{1}{4}$ in. by $6\frac{1}{4}$ in.

Vice-President H. E. Niesz presided at the meeting of the Electric Club of Chicago on March 16, 1910, in the absence of F. P. Vose, president, who was detained by illness. The object of this meeting was to discuss means of enabling the members to get better acquainted with one another. In any organization of considerable size there is a large proportion of the members who are unacquainted or only slightly acquainted, and Frank L. Perry, chairman of the reception committee of the Electric Club, presented a plan designed to further the spirit of good-fellowship among electrical men, which is one of the important objects of the club, by a scheme of identification cards. These cards are the size of an ordinary business card. A supply of blank cards is provided at the door and also a marking pencil. Each member of the club, on entering the place of meeting, prints in capital letters about three-quarters of an inch high his last name in one line on one of these cards and also, in a word or two, in a line beneath, the distinguishing name of his company or occupation. Clip steel pins are provided, and by this means every man present will have a sufficient identification in a form that may be read at a distance of 20 ft. or more. Before the meeting adjourned the plan advocated by Mr. Perry was adopted unanimously. Among those who addressed the club were A. A. Gray, J. R. Cravath, J. E. Dostal and George R. Bliss, Jr.

Personal Mention

Mr. C. G. Guild has resigned as superintendent of the light and power department of the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., to enter the manufacturing field.

Mr. J. W. Hewitt has been appointed trainmaster of the Oregon Water Power division of the Portland Railway, Light & Power Company, Portland, Ore., to succeed Mr. S. T. Jones, resigned.

Mr. W. S. Dimmock has retired as manager of the Puget Sound Electric Railway, Pacific Traction Company and the Tacoma Railway & Power Company, Tacoma, Wash., to return to the home office of Stone & Webster, Boston.

Mr. M. J. Kehoe, superintendent of power of the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., has been appointed superintendent of the light and power department to succeed Mr. C. G. Guild, resigned. The position of superintendent of power has been abolished.

Mr. Samuel B. McLenegan has resigned as general manager of the Central California Traction Company, Stockton, Cal. Mr. McLenegan has served continuously for 17 years in electric railway work in California, and proposes for the present at least to devote his attention to his olive orchard interest in the Santa Clara Valley, near San José.

Mr. L. H. Bean, local manager of the Whatcom County Railway & Light Company, Bellingham, Wash., has been appointed manager of the Puget Sound Electric Railway, Pacific Traction Company and the Tacoma Railway & Power Company, Tacoma, Wash., to succeed Mr. W. S. Dimmock, who has returned to the home office of Stone & Webster, in Boston.

Mr. John J. Cotton has been appointed advance agent of the Middlesex & Boston Street Railway, Framingham, Mass., a newly created position, in which he will have charge of all arrangements for the operation of special cars over the lines of the company and the routing of excursions, etc. Mr. Cotton was formerly a conductor on the Waltham division of the company.

Mr. George F. Staal has been appointed first assistant engineer of way of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., to succeed Mr. H. B. Kamschulte, whose resignation was announced in the *ELECTRIC RAILWAY JOURNAL* of March 12, 1910. From 1890 to 1896 Mr. Staal was engaged in private and government engineering work in the Argentine Republic, S. A., and from 1896 to 1900 was engaged in private and government engineering work in the South African Republic. Since April, 1902, he has been connected with the civil engineering department of the Milwaukee Electric Railway & Light Company.

Mr. A. D. Miller, recently manager and superintendent of the Reno (Nev.) Traction Company, has been appointed manager of the Central California Traction Company, Stockton, Cal., to succeed Mr. S. B. McLenegan, whose resignation is announced elsewhere in this column. Mr. Miller was graduated from Stanford University, California, in 1905, with the degree of electrical engineer. His first commercial work was with the engineering department of the Truckee River General Electric Company, Reno, Nev. Subsequently he was appointed assistant engineer of the company, which controlled the Truckee River General Electric Company, the Reno Power, Light & Water Company and the Reno Traction Company. When the property of the Truckee River General Electric Company and the Reno Power, Light & Water Company was sold in 1909 the former owners retained the property of the Reno Traction Company as their only interest in Nevada. The former manager of all three properties entered the employ of the owners of the Truckee River General Electric Company and the Reno Power, Light & Water Company and Mr. Miller was appointed general manager of the Reno Traction Company.

Mr. L. H. Conklin, recently general manager of the Scranton (Pa.) Electric Company, has been engaged by J. G. White & Company, Inc., New York, N. Y., as an engineer

in their operating department. Mr. Conklin was graduated from Pratt Institute, Brooklyn, N. Y., in 1891. From 1891 to 1894 he worked in various capacities in several manufacturing plants to gain practical experience, and in 1894 became expert on the arc apparatus for the Excelsior Electric Company, which then manufactured the arc machines designed by Mr. Wm. Hockhousen, to whom Mr. Conklin afterward became chief assistant. From 1896 to 1900 Mr. Conklin was superintendent of the electric plant of the Flatbush Gas Company, Brooklyn, N. Y., and from 1900 to 1904 he was a member of the firm of Weiderman & Conklin, New York, N. Y., which business is still being conducted. In the spring of 1905 Mr. Conklin entered the employ of Mr. A. M. Young, a director of the American Gas & Electric Company and several other electrical companies, for whom as engineer in the New England territory, he rebuilt and modernized several electric light plants and constructed an electric railway. In the spring of 1907 Mr. Conklin became connected with the West Penn Electric Company, Pittsburgh, Pa., as superintendent of lighting, and in August, 1907, was appointed general superintendent of the West Penn Railways, the West Penn Electric Company, McKeesport & Greensburg Railway, Westmoreland Light, Heat & Power Company and the Latrobe Street Railway, constituting what is known as the West Penn System. Mr. Conklin is a member of the American Institute of Electrical Engineers, a past president of the Pennsylvania Electric Association and an ex-officio member of the executive committee of the National Electric Light Association.

OBITUARY

Don Cameron Gillman, at one time superintendent of employment of the Seattle (Wash.) Electric Company, was one of the victims of the Wellington avalanche on the Great Northern Railroad. Mr. Gillman was a native of Atlantic, Ia., and had been a cadet at West Point Military Academy. He came to the Seattle Electric Company eight years ago and was in its employ for a period of more than two years. Later he entered the service of the Great Northern Railroad. He was 32 years old.

J. J. Mahony, of the railway department of the General Electric Company, died at the home of his sister in Holyoke, Mass., on March 19, 1910. Mr. Mahony was about 48 years of age. He was a native of Worcester, Mass., and was graduated from the Worcester High School. Early in 1888 he entered the works of the Thomson-Houston Company at Lynn, Mass., and after taking the shop course with the company was assigned to construction work. Subsequently he was transferred to the railway department of the company and for a number of years supervised the installation of railway generators and car equipment. In 1893 Mr. Mahony was sent to Australia by the foreign department of the General Electric Company and for several years he was in charge of railway installations in various parts of that country. Upon his return to the United States, Mr. Mahony became associated with Mr. W. B. Potter, chief engineer of the railway department of the General Electric Company, but was eventually transferred to commercial work in the railway department with headquarters in New York City. For the last six or seven years his work had been commercial, confined largely to the Metropolitan district. He was a member of the American Institute of Electrical Engineers, the Engineers' Club, the New York Railroad Club, and the Machinery Club. The remains were interred at Worcester on March 22, 1910.

As a result of the increased demand for power, the Interborough Rapid Transit Company, New York, N. Y., has placed with the General Electric Company an order for two additional 7500-kw low-pressure turbines of the Curtis vertical type with induction generators, to be installed during the summer in the company's Fifty-ninth Street power plant. These units will be duplicates of the three machines already installed in the same station, which were recently discussed at length by H. G. Stott, in his paper before the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, entitled "Tests of a 15,000-kw Steam Engine Low-Pressure Turbine Unit," an abstract of which was published in the *ELECTRIC RAILWAY JOURNAL* of March 12, 1910, page 451.

Construction News

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

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

RECENT INCORPORATIONS

***Omaha, Council Bluffs & Sioux City Railroad, Des Moines, Ia.**—Application has been made by this company for a charter to build an electric railway from Council Bluffs to Sioux City in Iowa. Capital stock, \$10,000. Officers: M. H. Miller, president and secretary; B. J. Ness, vice-president, and J. W. Russell, treasurer.

***English Consul Estate, Landsdowne & Baltimore Railway, Baltimore, Md.**—Application has been made in Maryland by this company to build an electric railway from Baltimore via Westport to Landsdowne. Capital stock, \$100,000. Incorporators: James Rittenhouse, Henry J. Emerich, S. Newton Robinson, Jr., Charles H. Werner, W. Elmer King, Ernest E. Robinson and Charles J. Hull.

***Silver Springs & Damascus Railway, Silver Springs, Md.**—Application has been made in Maryland for a charter to build an electric railway between Silver Springs and Damascus, Md. Capital stock, \$250,000. Incorporators: Charles F. Nesbitt and Lee L. Latimer, Washington, D. C.; H. M. Martin, Charles D. Muir, J. Dawson Williams and Preston B. Ray.

Minneapolis & St. Paul Suburban Railway, Minneapolis, Minn.—Incorporated in Minnesota in the interest of the Twin City Rapid Transit Company to operate a line between the business centers of Minneapolis and St. Paul, included in the system of the Twin City Rapid Transit Company. Capital stock, \$1,000,000. Directors: C. G. Goodrich, Minneapolis, president; W. J. Hield, vice-president and general manager; S. E. Pattee, secretary and controller; A. M. Robertson and Horace Lowry.

Citizens' Traction & Power Company, Albuquerque, N. Mex.—Incorporated in New Mexico to build an electric railway in Albuquerque. Capital stock, \$75,000. Incorporators and officers: A. W. Hayden, president; D. H. Boatright, vice-president; J. C. Baldrige, treasurer, and Isaac Barth, secretary. [E. R. J., March 5, '10.]

***Neuse-Trent Traction Company, Newbern, N. C.**—Incorporated in North Carolina to build an electric railway from Newbern to Trenton. Capital stock authorized, \$300 to \$300,000. Incorporators: C. L. Stevens, W. G. Gilbert and H. I. Crumpler, Newbern.

***Citizens' Street Railway, Wilburton, Okla.**—Chartered in Oklahoma to build a 10-mile interurban electric railway from Wilburton to Paterson and Lutie. Capital stock, \$1,000,000. Incorporators: James M. Connell, Richard Howard, Benjamin Mills, Elias M. Cooper and William Powers, Wilburton.

***Niagara Falls, Welland & Dunnville Electric Railway, Welland, Ont.**—Incorporated in Ontario to build an electric railway from Niagara Falls City through Stamford, Thorold, Crowland, Welland, Humberstone, Wainfleet, Moulton and Sherbrooke. Capital stock, \$200,000. Those interested are: F. R. Lalor, Dunnville; Franklin Buell, Buffalo, N. Y.; J. C. Gardener, Geo. Arnold, F. E. Misener, G. H. Bugar and H. A. Rose.

Orangeburg (S. C.) Railway.—Incorporated in South Carolina to build a 30-mile electric railway between Orangeburg and Springfield, via Livingston, Elizabeth City, Rock Grove, Goodland, Liberty, Hebron, Zion and Williams. Capital stock, \$50,000. Incorporators: W. C. Wolfe, J. A. Berry and Lawrence Manning. [E. R. J., Feb. 12, '10.]

Eastern Texas Traction Company, Greenville, Tex.—Incorporated in Texas to build an electric railway from Greenville to Wolfe City, with probable extensions to Bonham, Denison, Honey Grove, Paris, Cooper, Clarksville, Dallas, Plano, Chisholm and Forney. Capital stock, \$12,000. Incorporators: J. H. Blocker, J. B. Murphy, H. E. Vaughan, W. M. McBride, H. C. Tittsworth, Glen A. Coulson and J. R. Green. [E. R. J., Dec. 19, '09.]

Valley Railway & Power Company, Kent, Wash.—Incorporated in Washington to build an electric railway to con-

nect Kent, Renton, Auburn, Seattle and Tacoma. Right of way has been secured as far as Renton. Officers: H. B. Madison, Kent, president; I. P. Calhoun, Kent, secretary; A. T. West, Seattle, general manager, and Lee Monohan, Renton, treasurer. [E. R. J., March 19, '10.]

FRANCHISES

Santa Barbara, Cal.—The City Council has granted the Santa Barbara Consolidated Railroad a 25-year franchise to build an electric railway in Santa Barbara, beginning at the intersection of State Street and Victoria Street and along State Street.

Vacaville, Cal.—The City Trustees have granted the Vallejo & Northern Railway, Vallejo, a franchise to build an electric railway over certain streets in Vacaville. This projected railway will connect Vallejo, Cordelia, Suisun, Vacaville and Sacramento. [E. R. J., March 5, '10.]

Owosso, Mich.—At a special election recently held in Owosso, the Lansing & Northeastern Electric Railway, Lansing, was voted a franchise to build an electric railway in Owosso. This is part of a plan to build a 30-mile electric railway from Lansing to Owosso. The line is almost completed between Morrice and Owosso. [E. R. J., March 22, '10.]

***Valley City, N. D.**—The City Council has granted to the Valley City Street Interurban Railway a franchise to operate electric railways over certain streets in Valley City.

Sandusky, Ohio—The County Commissioners have been offered \$12,000 for a 25-year franchise by the Lake Shore Electric Railway, Sandusky, to build an electric railway over the new bridge to be erected over the Huron River at Huron. F. W. Coen, general manager.

***Dallas, Ore.**—E. W. Thomas, representing Philadelphia capitalists, has been granted a franchise to build an electric railway in Dallas. It is the intention to extend the railway to Dry Hollow and Three-Mile Creek.

***Welland, Ont.**—C. J. McLaughlin, Hartford, Conn., has asked the Town Council for a 20-year franchise to build an electric railway in Welland.

Pottsville, Pa.—The City Council has granted the Eastern Pennsylvania Railway the right to double-track its line in Pottsville. L. C. Bradley, general manager.

Poultney, Vt.—The Trustees have granted the Rutland Railway, Light & Power Company, Rutland, the right of way necessary to build an electric railway in Poultney. This is part of a plan to build a 23-mile extension from Rutland to Lake St. Catherine.

Seattle, Wash.—Application has been made by the Seattle, Snohomish & Everett Railway, Seattle, for a 50-year franchise to construct an electric railway between Seattle and Snohomish. The line is to be extended to Everett and will be 32 miles long. Charles W. Kimball, Seattle, secretary and treasurer. [E. R. J., Feb. 13, '09.]

Seattle, Wash.—The City Council has granted the Seattle Electric Company a franchise to construct and operate an electric railway upon certain parts of Atlantic Street and Utah Street in Seattle.

Stoughton, Wis.—The Common Council has granted an extension of six months to the franchise of the Cincinnati Construction Company, Janesville. It is expected that construction of this electric railway between Madison and Janesville will be started May 1. [E. R. J., Jan. 8, '10.]

TRACK AND ROADWAY

Citizens' Light & Transit Company, Pine Bluff, Ark.—Press reports state that this company expects to rebuild most of its railway and make important extensions, commencing the work in July. W. Y. Ellis, Pine Bluff, chief engineer. [E. R. J., March 6, '09.]

Fitzgerald & Ocilla Electric Railway, Fitzgerald, Ga.—This company is said to have financed its projected railway between Fitzgerald and Ocilla, and work has been started at Fitzgerald by the American Construction Company, New York, N. Y., which has the contract. The company has purchased 450 acres of land on the route of the projected railway between the two cities, where it is proposed to establish an amusement park. The following officers were recently elected: S. Tilden Holtzendorf, New York, president; Elmer P. Morris, New York, first vice-president;

D. B. Jay, Fitzgerald, second vice-president and general counsel; C. A. Holtzendorf, Fitzgerald, secretary, and W. A. Heller, New York, treasurer. [E. R. J., March 12, '10.]

***Vidalia, Ga.**—A. L. Gillis, Gillis Springs, is interested in a plan to build an 8-mile electric railway between Vidalia and Gillis Springs. Power for the railway could be secured from the Penhoopee River.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.—This company expects to build 2 miles of city track and 5 miles of interurban track. Material for this work has been purchased. C. G. Ballentyne, Honolulu, general manager.

Indiana Union Traction Company, Anderson, Ind.—This company has recently bought \$5,000 worth of property at Beech Grove, which will be used to eliminate a few curves at that point, thereby cutting down the running time on the Indianapolis-Muncie division.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—At the annual meeting of the company it was planned to extend the railway from Denver Junction to Waverly and from Waterloo to Belle Plaine. The company has arranged to issue bonds.

Covington, Big Bone & Carrollton Railroad, Covington, Ky.—The Covington & Big Bone Railway has filed amended articles of incorporation changing its name to Covington, Big Bone & Carrollton Railroad. Capital stock is increased from \$100,000 to \$250,000. M. J. Crouch is interested. [E. R. J., March 12, '10.]

Athol & Orange Street Railway, Athol, Mass.—This company will soon purchase 7 miles of trolley wire to replace the old wire. W. D. Smith, Athol, general manager.

Lansing & Northeastern Electric Railway, Detroit, Mich.—The Michigan Railway Commission has authorized this company to issue \$800,000 in bonds to provide funds for the construction of a 30-mile electric railway from Lansing to Owosso. An extension is projected from Morrice east through Duran, thence northeast to Flint, also an extension from Owosso northeast to Saginaw. This new line will be operated in conjunction with the Michigan United Railways. The Owosso & Corunna Electric Company's line will be acquired and rebuilt. The grading contract has been let and about 8 miles of roadbed completed. All bridges have also been constructed. The necessary construction material is on hand, with the exception of a small amount to be used for overhead construction. The third rail system will be installed. The company will build substations at Haslett and Morrice. Power will be leased from the Commonwealth Power Company. Capital stock, authorized, \$300,000; issued, \$25,000. Officers: T. W. Atwood, Morrice, president; Kirke Lathrop, Detroit, secretary and treasurer; William White, Morrice, purchasing agent; J. J. Martindale, Jackson, electrical engineer; W. J. Sullivan, Morrice, chief engineer. [E. R. J., March 12, '10.]

***Portland-Westphalia Transit Company, Portland, Mich.**—This company has been formed to build an electric railway between Portland, Westphalia and Forest Hill. The promoters have already taken preliminary steps and have partially arranged for bonding the line. Local capital is interested in the plan.

Wahpeton-Breckenridge Street Railway, Breckenridge, Minn.—This company expects to commence construction of its proposed electric railway over principal streets in Breckenridge, Minn., and Wahpeton, N. D., about May 1. Surveys have been made and capital and rights of way have been secured. F. L. Sturm, Wahpeton, general manager. [E. R. J., Nov. 6, '09.]

Mexico, Santa Fé & Perry Traction Company, Mexico, Mo.—This company has filed for record a deed of trust for \$1,500,000 with the Fidelity Trust Company, Kansas City, as trustee. Of this amount \$600,000 of bonds will be issued after the power house and 4 miles of track are built, and the bonds are then to be issued in the amount of \$15,000 for each mile of track. The proposed railway will connect Mexico, Fulton, Columbia and Hannibal.

United Railways, St. Louis, Mo.—This company announces that 51 miles of track and roadway will be reconstructed in St. Louis before the end of the year. It is estimated that the track work will cost approximately \$1,500,000.

Morris County Traction Company, Morristown, N. J.—This company advises that it has at present 9 miles of track under construction, and it is expected to begin work at an early date upon another section about 12 miles in length. The work is being done by the Tennis Construction Company, having been awarded the contract last fall. Material for the new work is being purchased through the Morris County Construction Company.

Isothermal Traction Company, Rutherfordton, N. C.—This company advises that construction will commence within 60 days on its projected 50-mile electric railway between Rutherfordton and Gastonia, via Dallas, Cherryville, Waco, Stubbs, Shelby, Boiling Springs, Cliffside, Henrietta, Caroleen and Rutherfordton. Capital stock, \$100,000, to be increased to \$3,000,000. Three power stations will be located on Broad River and an amusement park will be built at Chimneyrock. Power will be furnished for lighting. Officers: K. S. Finch, Charlotte, president and general manager; John C. Mills, Rutherfordton, vice-president; J. F. Flack, Rutherfordton, secretary and treasurer. All communications should be addressed to the company at Rutherfordton. [E. R. J., March 12, '10.]

Lake Erie, Bowling Green & Napoleon Railway, Bowling Green, Ohio.—This company opened its 6-mile extension from Bowling Green to Tontogany for operation March 14. It will connect with the Lake Shore Electric Railway at Woodville and with the Ohio Electric Railway at Tontogany. [E. R. J., May 8, '09.]

Fostoria, Napoleon & Defiance Railway, Columbus, Ohio.—This company announces that most of the right of way has been secured and that franchises have been granted by Seneca, Wood, Henry, Hancock and Defiance Counties. Plans for construction are now under consideration, and work will begin as soon as the weather permits. Officers: Charles A. Bliss, Bowling Green, president; G. H. Yesbera, Bowling Green, vice-president; Rufus T. Betts, Bowling Green, secretary, and W. S. Reese, Toledo, treasurer. [E. R. J., Jan. 15, '10.]

Galion Southern Electric Railway, Galion, Ohio.—It is reported that interest has again been revived in this proposed electric railway, which will connect Galion, Fredericktown and Mount Vernon. Entire right of way has been secured and a new syndicate will build it. Gasoline motor cars will be operated. [E. R. J., March 18, '08.]

Oklahoma, Kansas & Missouri Interurban Railway, Miami, Okla.—Preliminary steps are being taken by this company to build a 23-mile electric railway between Hattonville, Okla., and Galena, Kan. Power for operating the cars will be furnished by the Baxter Light & Power Company, Baxter Springs, Kan. This proposed railway will extend through the new lead and zinc district in Oklahoma. Franklin M. Smith, Joplin, Mo., president and general manager. [E. R. J., Jan. 1, '10.]

Shawnee (Okla.) Electric Railway.—This company is reported to have let a subcontract for grading to the Davis Construction Company. The Shawnee Railway Construction Company is the general contractor. The grades will not exceed 1½ per cent and the curvatures 3 deg. Two steel bridges will be built over the Canadian River. A. Hardgrave, Shawnee, general manager and purchasing agent. [E. R. J., Feb. 19, '10.]

Huntingdon, Lewistown & Juniata Valley Traction Company, Huntingdon, Pa.—This company has awarded a contract to the Pennsylvania Excavating Company, Allentown, for grading 50 miles of its electric railway from Huntingdon to Mount Union and from Huntingdon to Lewistown. This railway will form a connecting line by trolley between Pittsburgh and Philadelphia when completed. J. M. Stare, Huntingdon, secretary and treasurer. [E. R. J., Oct. 30, '09.]

New Wilmington & New Castle Railway, New Castle, Pa.—This company announces that work will begin within 90 days on its proposed 21-mile electric railway between New Castle, New Wilmington and West Middlesex. The route has been surveyed and preparations have been completed for beginning actual work. [E. R. J., March 12, '10.]

***Regina, Sask.**—Mayor R. H. Williams and other civic officials are said to be negotiating with various railway companies in Winnipeg for the erection of a union depot and the construction of an electric railway in Regina. It is expected that 8 miles of track will be laid this year.

Norfolk & Portsmouth Traction Company, Norfolk, Va.—This company will place contracts during the next six weeks for rebuilding Grandy Street tracks preparatory to paving. E. C. Hathaway, Norfolk, general manager.

Richmond & Chesapeake Bay Railway, Richmond, Va.—The survey for the extension of this electric railway to Washington has been completed between Ashland and Fredericksburg. It will cross the Chesapeake & Ohio Railway just west of Doswell.

Seattle (Wash.) Electric Company.—It is stated that Stone & Webster, Boston, Mass., have approved plans for electrifying the Madison Street Cable Railway and authorized an appropriation of \$500,000 to cover this improvement.

***Seattle, Wash.**—C. C. Quakenbush and W. B. Sammons are planning to build a gasoline motor railway connecting Aberdeen with Seattle via Elma, cutting down the distance 87 miles. It will probably be known as the Western Washington Railway & Navigation Company, with headquarters at Aberdeen. The capital stock will be about \$1,500,000. Most of the right of way is secured and the route has been surveyed. The grade will not exceed 1 per cent. A fund for preliminary work amounting to \$35,000 has been raised.

Sabraton Railway, Morgantown, W. Va.—It is stated that this company, which has been sold, with all its rights and franchises, to Harry R. Warfield for \$70,000, will be extended to the State line near Cheat Haven. At present it operates between Morgantown and Sabraton.

SHOPS AND BUILDINGS

Athens (Ga.) Electric Railway.—This company states it will soon build a reinforced concrete car house 100 ft. x 240 ft. C. L. Proctor, Athens, general manager.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.—This company advises that it will build a new car house in Honolulu, the necessary excavation for which is now under way. Building material has been received. C. G. Ballentyne, general manager.

Rockford & Interurban Railway, Rockford, Ill.—This company has bought a 25-acre tract of land in Rockford, on which it proposes to build a new car house and repair shop. The company will still continue its work at the Kishwaukee Street shops, which are not now equipped to do all the heavier work. C. P. Wilson, Rockford, general manager.

Winona Interurban Railway, Warsaw, Ind.—This company advises that during the next three weeks it will place contracts for building repair shops. J. C. Schade, Warsaw, assistant secretary.

Boston (Mass.) Elevated Railroad.—The machine shop of this company on Harrison Avenue and its equipment were destroyed by fire on March 12, 1910. It was a four-story brick structure, 300 ft. x 100 ft. The loss is unofficially estimated at \$500,000, and is said to be entirely covered by insurance.

Old Colony Street Railway, Boston, Mass.—This company has purchased a tract of land in Brockton, near the Brockton fair grounds, on which it will erect a new car house. It has not yet been decided whether it will be used as an operating car house or for storage purposes.

United Railways, St. Louis, Mo.—This company is planning to build new car sheds on the 55 acres of land it purchased recently in University City. The estimated cost is \$250,000. The company has sold its old car sheds at Gravois Avenue and Jefferson Avenue.

Ohio Electric Railway, Cincinnati, Ohio.—This company has leased a site in Bellefontaine upon which it proposes to erect a union passenger and freight station.

POWER HOUSES AND SUBSTATIONS

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.—During the next four weeks this company will purchase a complete 1000-kw turbine unit, 550-volt, d.c., including boilers. C. H. Ballentyne, Honolulu, general manager.

Uxbridge & Blackstone Street Railway, Uxbridge, Mass.—This company has awarded the contract for building an addition to its power house in Uxbridge to E. D. Ward.

Manufactures & Supplies

ROLLING STOCK

Ogden (Utah) Rapid Transit Company is in the market for six trailer cars.

Northwestern Elevated Railroad, Chicago, Ill., is considering the purchase of 20 cars.

New Orleans Railway & Light Company, New Orleans, La., will shortly be in the market for 25 cars.

Metropolitan Street Railway, Kansas City, Mo., it is reported, is planning to buy a number of new cars.

Norfolk & Bristol Street Railway, Foxboro, Mass., expects to buy one double-truck snow plow before next fall.

United Railways, St. Louis, Mo., will add 50 steel pay-as-you-enter cars with concrete floors to its rolling stock equipment.

Rio de Janeiro Tramway, Light & Power Company, Rio de Janeiro, Brazil, S. A., will soon build one parlor car in its own shops.

Lehigh Valley Transit Company, Allentown, Pa., is in the market for 10 double-truck closed cars with motor and trucks complete.

Montreal & Southern Counties Railway, Montreal, Que., is in the market for a number of freight, combination passenger and baggage and some express cars.

Central Pennsylvania Traction Company, Harrisburg, Pa., it is reported, is in the market for a number of single-truck and double-truck cars.

New Paltz, Highland & Poughkeepsie Traction Company, New Paltz, N. Y., has ordered 10 bench, open cars from The J. G. Brill Company.

Fremantle Tramways of Australia has ordered three 30-ft. combination cars from The J. G. Brill Company, to be mounted on Brill 21-E trucks.

Los Angeles (Cal.) Railway, reported in the ELECTRIC RAILWAY JOURNAL to be in the market for a number of cars, will buy 90 cars in the very near future.

Fitchburg & Leominster Street Railway, Fitchburg, Mass., reported in the ELECTRIC RAILWAY JOURNAL of March 12, 1910, as contemplating the purchase of two cars, will not buy any cars.

Public Service Railway, Newark, N. J., has ordered 190 trucks, type 27 M. C. B., from The J. G. Brill Company for use under 95 of the 100 cars being built by the Cincinnati Car Company.

Portland Railway, Light & Power Company, Portland, Ore., placed an order with the American Car Company for 40 passenger cars, and has purchased 80 trucks from The J. G. Brill Company.

Chicago, Ottawa & Peoria Railway, La Salle, Ill., is preparing specifications for eight 55-ft. interurban motor cars, to be built with turtle-back roofs, heavily braced. The order will be closed very soon.

Kingston, Portsmouth & Catarqui Electric Railway, Kingston, Ont., is in the market for one 30-ft. closed car, one 10-bench open car to be mounted on a single truck and one 13-bench double-truck car.

Utah Light & Railway Company, Salt Lake City, Utah, is drawing specifications for 24 new cars complete, 12 of which will be for city service and 12 for interurban service, and will place the order at once.

Oregon Electric Railway, Portland, Ore., has ordered five Smith No. 2-C hot water equipments through W. S. Barstow & Company, New York, for use on the three combination and two observation cars recently ordered.

Cleveland (Ohio) Railway, mentioned in the ELECTRIC RAILWAY JOURNAL of Feb. 5, 1910, under the name of the Municipal Traction Company as expecting to buy 250 cars, will order 100 cars and will rebuild about 250 cars.

Roanoke Railway & Electric Company, Roanoke, Va., mentioned in the ELECTRIC RAILWAY JOURNAL of March 12, 1910, as being in the market for four interurban cars, has contracted with The J. G. Brill Company for this number of 40-ft. semi-convertible pay-as-you-enter cars equipped with GE-80 motors.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, which was reported in the ELECTRIC RAILWAY JOURNAL of Feb. 26, 1910, to have ordered 10 open cars from The J. G. Brill Company, advises that the cars will be equipped with GE No. 218 60-hp motors and K-36 controllers, and will have a seating capacity of 60 each.

Northern Texas Traction Company, Fort Worth, Tex., recorded in the ELECTRIC RAILWAY JOURNAL of March 12, 1910, to have ordered 10 cars from American Car Company, has purchased 15 double-truck car bodies, 26 ft. over corner posts, mounted on Brill 39-E trucks, and equipped with GE-219 two-motor equipments with K-36 controllers.

Lynchburg Traction & Light Company, Lynchburg, Va., reported in the ELECTRIC RAILWAY JOURNAL of Dec. 25, 1909, as being in the market for four double-truck cars, has placed the order for these cars with The J. G. Brill Company. The cars will be 40 ft. long, of the semi-convertible type, and built under the license from the Pay-As-You-Enter Car Corporation, New York, N. Y. The company will reconstruct a number of its 40-ft. convertible cars for pay-as-you-enter service.

Lexington (Ky.) Railway has included the following in its specifications for the four 20-ft. 8-in. semi-convertible cars recently ordered from The J. G. Brill Company:

Seating capacity.....	32	Journal boxes.....	Brill
Weight, inc. truck..	16,000 lb.	Registers.....	Ohmer No. 2
Wheel base.....	8 ft.	Roofs.....	Monitor deck
Length over vestibule..	30 ft.	Sanders.....	Dumpit
Body.....	wood	Sash fixtures.....	Brill
Underframe.....	wood	Seats.....	Winner
Brakeshoes, Am.St.& Int.Std.		Springs.....	Brill
Car trimmings.....	bronze	Step treads.....	wood
Curtain fix....	Curtain S. Co.	Trucks.....	Brill 21-E
Curtain material..	Pantasote	Vestibule...Portable at each	
Gongs.....	Dedenda	end.	
Headlights..	2 U. S. No. 1561		

Seattle, Renton & Southern Railroad, Seattle, Wash., which recently ordered nine steel cars from the Moran Company, of Seattle, has drawn up the following specifications:

Seating capacity.....	70	Bolsters, body,	
Weight.....	50,000 lb.	Moran cast steel	
Wheel base.....	78 in.	Car trimmings.....	bronze
Length of body.....	49 ft.	Control system..	Westinghouse
Length over all.....	50 ft. 2 in.	Curtain fix....	Curtain S. Co.
Width inside.....	8 ft. 6 in.	Curtain material..	Pantasote
Width over all.....	9 ft.	Gongs.."Keystone" pneumatic	
Height inside.....	8 ft. 3 in.	Headlights..	General Electric
Sill to trolley base..	9 ft. 4 in.	Motors.....	2 Westinghouse
Height, rail to sills.....	3 ft.	Trolley poles and attach-	
Body.....	metal	ments.....	Westinghouse
Underframe.....	metal	Trucks,	
Air brakes....	Westinghouse	Baldwin Locomotive Works	
Axles.....	Baldwin	Ventilators.....	Globe
		Vestibule....	center entrance

TRADE NOTES

Griffin Wheel Company, Chicago, Ill., had its Denver plant partly destroyed by fire recently.

Peter Smith Heater Company, Detroit, Mich., has received an order for 75 hot-air forced-draft heaters from the Detroit United Railway.

George Batten Company, New York, N. Y., has moved from 11 East Twenty-fourth Street to the Fourth Avenue Building, at Fourth Avenue and Twenty-seventh Street.

Robert M. Babbitt, representative of the ELECTRIC RAILWAY JOURNAL in Chicago, has resigned to become associated with the National India Rubber Manufacturing Company, New York, N. Y.

Electric Storage Battery Company, Philadelphia, Pa., announces that the St. Louis offices of its contract agent have been moved from the Wainwright Building to 1205-6-7 Fullerton Building, at Seventh and Pine Streets, St. Louis.

Patton Paint Company, Newark, N. J., has opened an office in the Hudson Terminal Building, Room 1366, 50 Church Street, New York, N. Y., which will be used as the headquarters for salesmen representing the Eastern factory at Newark.

Locke Insulator Manufacturing Company, Victor, N. Y., has purchased the plant and business of the Lima Insulator Company, Lima, N. Y. The factory at Lima will be maintained and will give the Locke Insulator Manufacturing Company four additional kilns.

Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y., has placed in service an additional area, 150 ft. x 158 ft. in extent, as a gear case, forge and general railway machinery department. Every part of the works is busy. The total number of men employed at this time is 350.

Aberthaw Construction Company, Boston, Mass., is preparing a special report in which are embodied the results of an investigation made recently regarding the use of granolithic and other floors in manufacturing plants. The company will welcome information regarding experience with granolithic floors as to cost, durability, hygienic effect and general convenience.

Edward J. Hunt has been appointed to succeed Robert M. Babbitt as representative of the *ELECTRIC RAILWAY JOURNAL* in Chicago. Mr. Hunt was formerly associated with the *ELECTRIC RAILWAY REVIEW* and has been connected with the Chicago office of the *ELECTRIC RAILWAY JOURNAL* since the consolidation of the *STREET RAILWAY JOURNAL* and the *ELECTRIC RAILWAY REVIEW*.

McKeen Motor Car Company, Omaha, Neb., has recently received the following orders for its gasoline motor car: Buffalo, Rochester & Pittsburg Railroad, one 70-ft. car; El Paso & Southern Railroad, one 55-ft. car, and the Rock Island Line two 70-ft. cars. This makes a total of 66 cars built to date and in use in the United States and Mexico by this company. Twenty-nine railroads are operating or have ordered McKeen cars.

Whitney & Underwood, New York, N. Y., consulting engineers and specialists in trackless trolley and storage battery traction work, report that the amount of business now before them for consideration is very gratifying. They are prepared to take over an entire proposition as consulting engineers, furnish plans and specifications and finance, build and equip traction lines of all kinds for operation.

American Locomotive Company, New York, N. Y., has let contracts for the construction of a large new manufacturing plant and steam shovel works on a 200-acre tract 1 mile east of Gary, Ind. The plant when in operation will employ 3000 men. Construction will begin within a few weeks, and will include the erection of 12 shop buildings and a power house. It is stated that the plant will cost \$3,000,000.

J. B. Crawford has been appointed sales manager of the Whipple Supply Company, 50 Church Street, New York, N. Y. Mr. Crawford has had a wide experience and is well known in the electric railway world. His early training was obtained with the Hartford (Conn.) Street Railway and the Groton & Stonington Street Railway, but for several years Mr. Crawford has been located in the Central States with the Ft. Wayne & Wabash Valley Traction Company, Ft. Wayne, Ind., and the Lexington & Interurban Railways, Lexington, Ky. More recently Mr. Crawford was superintendent and purchasing agent of the Winona Interurban Railway.

Graphic Chart Systems Company, New York, N. Y., has been organized with headquarters at No. 1 Wall Street to market a system of charting electric transmission cables devised by W. E. Rundle. This system is in use by the following properties: Interborough Rapid Transit Company, New York (4,000,000 ft. of cable installed), Manhattan Elevated Railway, New York, New York & Queens County Railway, New York & Long Island Railroad, United Railways & Electric Company and Consolidated Gas, Electric Light & Power Company, Baltimore, Md., Niagara Falls Power Company, Underground Electric Railways Company, of London, and Mt. Whitney Electric Power Company. The president of the company is L. F. Deutzman, formerly secretary to Walter G. Oakman, president of the Hudson Companies, and now a partner in the firm of J. S. Merrill & Company. L. R. Fitzgibbon is secretary and treasurer of the company. W. E. Rundle is consulting engineer.

Allis-Chalmers Company, Milwaukee, Wis., has received an order from the management of the Pennsylvania lines West of Pittsburgh for electric generating units to increase the capacity of the power plant at Conway, Pa., from which current is supplied for operating the shops there and for signal work. The new machinery consists of two 750-kva, 3600 r.p.m., 60-cycle, three-phase, 2300-volt steam turbo units. The turbines will receive steam at 145 lb. pressure and 100 deg. superheat. During warm weather the turbines will exhaust into a condenser in which a 28-in. vacuum is maintained. During cold weather, steam from the turbines will be used in heating the plant, and a maximum back pressure of about 2 lb. will be effective on the exhaust end. For exciting the alternators, a 25-kw, 120-volt, 260 r.p.m. direct-current generator coupled to an engine, and a 25-kw, 125-volt generator are to be installed. Two 12-kw fly-wheel type motor-generator sets will be installed to supply current for the railway signal system.

Duplex Metals Company, New York, N. Y., has received a number of letters commending its copper-clad steel wire. Among the users of this wire who have written to the company are the Great Northern Railway, the New York, Ontario & Western Railway and the Police Department of York, Pa. The Great Northern Railway has within the last year and a half equipped five of its divisions with telephone train dispatching apparatus and has used exclusively in this connection the Duplex Metals Company's copper-clad wire. So well satisfied is the company with the wire that E. J. Little, superintendent of telegraphs of the company, says he is about to make requisition for 6000 or 7000 additional miles of the wire. The wire served specially well during heavy sleet and snow storms in the past winter. The New York, Ontario & Western Railway also comments favorably upon the results achieved during the winter with the 12 miles of copper-clad wire installed near Oswego, N. Y. This wire stood the storms without a break whereas new No. 8 galvanized iron wire on the same poles as the copper wire broke in several places.

ADVERTISING LITERATURE

Speer Carbon Company, St. Marys, Pa., is distributing order forms for carbon brushes.

Electrical Testing Laboratories, New York, N. Y., have issued an attractive booklet in which the value of coal for power purposes is discussed.

O. J. Childs Company, Utica, N. Y., has issued a series of folders in which its various fire extinguishers and chemical engines are described and illustrated.

Goldschmidt Thermit Company, New York, N. Y., has included in its publication *Reactions*, for the first quarter of 1910, the following articles: "Largest Thermit Repair Ever Made," "How to Figure the Amount of Thermit Required for a Weld," "Around the Railroad Shops," and "Welding Electric Motor Cases."

Allgemeine Elektrizitäts-Gesellschaft, Berlin, Germany, has issued two pamphlets, one of which contains illustrations of electric locomotives for narrow gage railways, and the other illustrations of electric locomotives for standard gage lines. The illustrations are accompanied by lists of installations.

Electric Service Supplies Company, Philadelphia, Pa., has issued a 20-page booklet, entitled "A Method for Preventing Lightning Troubles," in which are contained a detailed description of the Garton-Daniels lightning arrester, and illustrations which show how the apparatus is operated and how it should be installed.

Standard Paint Company, New York, N. Y., has printed a 24-page booklet which has for its subject preservative coatings. In it are described briefly the properties and uses of the various paint preparations manufactured by the company. Several tables convey a general idea of the purposes to which the company's paints can be put and illustrate their relative drying properties.

Western Electric Company, New York, N. Y., has issued a bulletin, No. 5111, descriptive of its new design of "Hawthorn," type "LL," multipolar, engine-driven, direct-current generators. In addition to the regular two-wire generators, there are described and discussed type "LL" three-wire generators and balancer sets for use with either of two systems for the maintenance of a three-wire system of distribution with balanced voltages.