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Of this issue of the ELECTRIC RAILWAY JOURNAL 9,500 copies are printed.

Separate Cars for Women

When there is plenty of room for everybody no great delay or detriment to the service of a transportation company results if there are separate accommodations for different classes of passengers, because if any person finds himself in the wrong part of the car or train he can move to the other. But as soon as the car or train becomes crowded, delay and confusion are inevitable in any plan of segregating the passengers. This is shown in the slowness with which the ordinary type of open cars, with cross benches, are loaded, because people run forward and back searching

for satisfactory accommodations before entering the car. The same condition will be found in any plan to supply separate cars for women. In a letter which we publish elsewhere in this issue, the author shows that the cars of this kind used on the Hudson & Manhattan Railway are not favored by the women themselves, and in the hearing on the question of requiring the Interborough Rapid Transit Company to operate similar cars in the New York subway, considerable opposition developed from the women themselves. The plan also undoubtedly presents the serious drawback that some men would be more reluctant to give up their seats to women if they knew there was a separate car for them in which there might be seats in the rear of the train. Altogether the proposition does not seem to be particularly feasible, nor one for which there is serious demand.

The Convention at Denver

It is finally settled that Denver will be the convention city for 1909. When Denver was first suggested, a little more than a year ago, as the convention city for the 1908 convention, the plan aroused a great deal of enthusiasm. The National Electric Light Association met in Denver in 1905 and at that time held one of the largest and best conventions in its history. The industrial depression last year, however, made it seem inadvisable to the executive committee of the American Street & Interurban Railway Association to hold the convention so far west, and Atlantic City was chosen for the second time. The members of the convention committee who visited Denver a year ago were greatly impressed, however, with the many advantages which Denver possessed as a convention city as well as the desire of a great many members of the association to hold a convention in the Rocky Mountain district, and the city immediately became a strong possibility for 1909. The visit of the committee last week confirmed all that the previous committee had reported as to Denver. The new auditorium is ideal for the exhibits and for the meetings; the hotel accommodations in Denver are ample; finally, the local railway system is highly efficient and its inspection is well worth a trip across the continent to railway men who wish to study new ideas and methods. The scenic attractions around Denver are unsurpassed by any city of equal size in the country. Although Denver may seem somewhat far away to those on the Atlantic Seaboard, it is no farther distant from the cities in the great Mississippi Valley than is Atlantic City and is practically midway, in point of time, between New York and San Francisco. The 1909 convention should attract not only a very large number of attendants from the Pacific Coast, Southwest and Middle West, but also from the East. The decision to meet in Denver is the best that could be made.

Satisfactory Service on Long Island

The Long Island Railroad was the first steam railroad company to change over a considerable portion of its line to electric power. The electrical equipment has been in operation now about four years, or long enough to determine whether the service is satisfactory. It is gratifying to note therefore that President Peters of the Long Island Railroad Company heartily endorses the system in his report for the year ended Dec. 31, 1908. In addressing the stockholders, he says:

The extension of electric service from Queens to Hempstead was put in service on May 26, and all train service to Hempstead Branch has since been operated by electric power. The results therefrom are very satisfactory both in economy and increased business and it may be here noted, that the general results on that portion of your system which has been electrified fully justify the expenditure made in accomplishing that result.

We regret that the financial and other statistics of the Long Island Railroad are not so divided that it is possible to determine the performance of electrical equipment or the amount of the repairs per car-mile. We trust that next year the detailed information which characterizes the reports of this company will be so divided that the satisfactory results to which Mr. Peters refers will be easily evident.

A Generous System of Transfers

The *Electrical Review* of London, in speaking of the agitation for increased street railway fares in this country, stated in a recent issue: "We think it quite wonderful that the vast street tramway systems of the States have been able to avoid universal bankruptcy under the burden of the 5-cent fare and a preposterously generous system of transfers." To amplify the foregoing statement, it might have been added that some of the systems in this country have failed to avoid bankruptcy and that it has been shown that the tendency of others is plainly toward the same regrettable destination. The reasons why this is so have been stated many times in the issues of the *ELECTRIC RAILWAY JOURNAL* and are familiar to those who have followed closely the development of the urban traction industry from its early simple stages to the present time, when the problems attendant upon operation are many and complex. In some cities, as on Manhattan Island, the transfer privilege has been extended so far during the last few years, as public appreciation of its manifest possibilities for abuse increased, that it has been practically beyond control. While this condition has been remedied in New York City by the segregation of various lines, it is still causing a dissipation of assets on the railway systems of other cities which managers should take pains to terminate before the damage is irreparable.

A Discussion by Judge Gaynor

The solution of the New York transportation problem will not be assisted by the contribution from Judge Gaynor in the current issue of *Pearson's Monthly*, and those who take all of this article seriously will be as misled as were the residents of Brooklyn who some three years ago acted upon the author's advice and tried to ride from Brooklyn to Coney Island for 5 cents. Judge Gaynor thinks that in spite of the fact that the Interborough Company pays the

interest on the bonds of the city required to build the subway and also 1 per cent additional to retire those bonds at the end of the 75-year lease, the city will find at that time it is in the possession of a gold brick. He goes on to say: "Napoleon Bonaparte had been dead about 75 years the day the subway was opened," and the changes wrought since that time indicate to the Judge that at the termination of a similar period from the opening of the subway it will be obsolete or practically so. Does the Judge think that people will not wish to travel then? Or will they use aeroplanes? The possession of the only available subway space under the principal artery of travel in New York City ought certainly to be of as great value in 1975 as at present, unless the precedents of other railroad companies and practically every other possessor of real estate in large cities counts for nothing. We wonder whether the New York Central Railroad would surrender its Park Avenue entrance to Forty-second Street for its original cost.

After a contemplation of this and other conditions, Judge Gaynor suggests that governmental control and operation seem the only refuge. But even here, he thinks, there is danger. According to the article, one little ferry to Brooklyn which was recently purchased by the city of New York is being run at an annual loss of \$313,000. For the land and appurtenances \$750,000 was paid by the city, whereas their assessed value for the purpose of taxation was only \$183,000. And he pertinently asks: "Was this property assessed at only one-quarter of its value through official favoritism, or was four times its value paid for it?" We believe that if Judge Gaynor searches farther he will not find the facts of private ownership so black as he has depicted them; that the Third Avenue Railroad, for instance, has some other assets to show for its \$48,560,000 of capitalization than 34 miles of track; that the \$60,000,000 capital stock of the Metropolitan Elevated Railway Company (we presume he means the Manhattan Railway Company) is not all "paper stock"; that the average ride in American cities per average fare paid compares very favorably in length with that given in European cities, and finally that the arrangement by which New York obtained the construction of the subway when its building seemed hopeless and will secure the property at the end of the lease without any expense for investment or interest, is a profitable one for the city.

Side-Door Cars in New York

The question of whether a side-door car should be used in the New York subway has now been changed to that of which design of side-door shall be used. Precedent does not seem to afford much guide in the matter, partly because the traffic in the New York subway is much greater than in any other, and partly because two different kinds of service are given in the subway. One of these is that on the express tracks and the other that on the local tracks, so that the company has really to provide rolling stock for two double-track roads each having different conditions. The most important of these differences is the shape of the station platforms. Those of the express stations between Ninety-sixth Street and the Battery are so nearly straight that it is possible to use a center-door car at them, but at many of the local stations between and beyond these points

the use of center-door cars is out of the question because the platforms are curved. The company and the commission's engineers have then to decide: (1) whether a standard car should be adopted to give improved loading and unloading facilities at all stations or (2) whether only the express service need be considered. It is not until this question is settled that the problem of the best type of car can be determined. As readers of this paper know, the railway company advocates the center-door car on the theory that if the crowding and length of station stops at the express stations are reduced the principal part of the problem is solved. Mr. Arnold, on the other hand, still favors the double end-door car, partly because it can be used at all stations, and partly because he considers it more desirable even for the express tracks.

The new center-door train, which has been built by the Interborough Company and was put into service this week, will be of interest to car designers everywhere because it differs radically from the Boston, Brooklyn Bridge, or any of the European center-door cars. The first change from previous models is that a barrier waist-high will extend to the aisle from the middle of the center opening on each side. The effect of this barrier is in a sense to divide the car into two compartments, each with a door near the center of the car; the object of the plan is to discourage persons from standing in the doorway. The company has found that where there is a wide doorway some passengers insist upon standing on each side of it and thus make it of little or no greater practical value than if it was narrower. But with two narrow center openings, anyone who attempts to stand in the passage when the car stops will be apt to find himself carried out on the station platform by the departing crowd. Another point in which the car will differ from some center-entrance cars is that no attempt will be made to differentiate between entrances and exits. Barriers will not be erected in all of the cars of the experimental train, however. One car will have a single wide center door to test its serviceability.

Education and Industrial Progress

Two of the most striking developments of the past few years in educational matters have been the increased interest taken in education by the technical associations of the country and the close relations which exist between the large industrial and public service corporations of the country and the technical schools and colleges. The present conditions reflect the changes made during the past 20 years in business conditions and in scholastic methods. These changes can be briefly summarized as follows: (1) The schools have established curricula which far better adapt their graduates to the requirements of industrial life than ever before. (2) Business methods themselves have come to be conducted on a more scientific basis and engineering problems now constitute a very important part of practically every line of industry. Finally (3), it is by no means uncommon now to find in positions of responsibility of the large organizations of the country men who have graduated from technical schools during the past 20 or 30 years, or since instruction in engineering problems and methods has become general. These men realize the value of being surrounded and assisted by others who

have acquired the mental discipline and knowledge which the technical school or college gives. Hence a degree from either of these institutions is now a larger asset than ever before in any application for employment; indeed in some cases it is a pre-requisite. The day when it was a common saying that the graduate must forget all he learned in college, before he was any good in business, has passed.

The recognition of such a training as a desirable preparation to business life extends even to mercantile enterprises in a way which would not have been thought possible 40 years ago, when theology, law and medicine were considered the only learned professions. One of the most important recent acts of President Eliot of Harvard was the establishment, at that ancient seat of learning, of a post-graduate course in "business." The principles upon which this course is patterned are very similar to those followed in the study of engineering at the leading technical schools of the country.

The engineering professions and schools, however, were naturally the first to secure the benefits of this happy close alliance between the institutions of learning and the active workers in the field, between the theoretical and the practical, and the technical associations have become the medium by which these two branches have been and are being brought together. Practically all of the important technical associations have now special committees on education and devote meetings to papers and discussions dealing with educational subjects. The work of the committees is to arrange for these meetings and also to keep the members of the association alive to the vital relation between their work and that of the schools. In this line of endeavor the American Institute of Electrical Engineers has perhaps gone further than any other body. Its last meeting on education was held April 16, when the subject of industrial education was discussed, and at the coming convention an entire afternoon will be given over to the same subject.

The Electric Railway Committee on Education

The establishment of apprenticeship courses by the steam railroad companies of the country shows that they have recognized for a long time the value of training a corps of men to take responsible positions in their operating organizations. Among those who are now directing the affairs of steam railroad companies there are many who are graduates of the railroad courses established at Altoona and elsewhere. It was on account of the successful results attained through these courses as well as in the electrical and gas industry that the American Street & Interurban Railway Association, at the suggestion of President Goodrich, decided last year to appoint a special committee on education. There is every reason to believe that the scope of this committee's work in the electric railway industry will be as broad and the advantage to be secured from it as great, if not greater, than in any of the other fields mentioned. The committee presented a preliminary report last year and is now actively preparing to make a good showing at the coming convention.

A tangible evidence of the work of the committee is the data form which has just been sent to the members. This is the result of a careful consideration of the relations

of the railway companies, their employees and the schools. The members of the committee believe that it is financially profitable to all if all of the elements are understood. Even more important is the spirit of co-operation and loyalty which is fostered when the employees feel that their employers desire to increase their efficiency and promote their general welfare. As the data blank indicates, there are two more or less distinct classes among the ambitious employees in a railway organization: (1) That comprising young men who have the qualities for executive work and who need only the proper training to bring them to the full possession of their faculties; and (2) that comprising young men who are naturally adapted to mechanical pursuits and who aim to be as perfect in their trades as possible. It is the highest kind of wisdom on the part of general managers and superintendents to encourage every ambitious young man in their employ to make the utmost of himself. Such encouragement will reflect on the man who gives it and it will create the strongest ties between his subordinates and himself.

As the committee on education understands its duties, these are to formulate such plans as seem to its members expedient and practicable and to carry out those which appeal to the association as most desirable under existing conditions of finance and executive force. At present the most promising field of activity appears to be in stimulating interest in some kind of apprentice or cadet corps such as have been found so profitable by the manufacturing companies. Something has been accomplished in this field, as the annual report of the committee will show. But the cadet corps is limited in its possibilities. Its function is to produce executives, and only a limited number of these are needed. Further, but a comparatively small proportion of the young men in such corps will have the talent for executive work. There still remains the larger problem of assisting and stimulating the rank and file of the coming electric railway mechanics and operatives. For these the committee tentatively suggests a correspondence course similar in purpose to that of the American Gas Light Association. This is based upon the belief that the every-day surroundings of the shop, the power house, the car house, etc., may be made to furnish a substitute for the laboratory and the school drafting room. All that is needed is intelligent observation and suggestive direction. Willing and competent teachers are available in foremen, superintendents and better-educated fellow-workmen. If a disinterested agency, such as the association, can be used to furnish the external stimulus needed, the other agencies mentioned will do the rest. Of course, there are practical difficulties in the way of this plan, but undoubtedly if the members think it should be done these difficulties can be overcome. At any rate, the plan deserves consideration before, during and after the convention.

A. C. vs. D. C. Again

The May *Proceedings* of the American Institute of Electrical Engineers contain the now somewhat belated report of the discussion of Mr. Murray's paper on the New Haven electrification, read before the Institute Dec. 11. A synopsis of the oral discussions was printed in the *ELECTRIC RAILWAY JOURNAL* for Dec. 19, but the published report

shows several additional contributions to this discussion which did not appear in the technical press at the time because they were sent in after the meeting. Among these late contributors are advocates of both the direct- and alternating-current systems, who hasten to throw another wreath (or shaft) before the tourney lists are closed. Three contributions to the discussion come from abroad: two from Great Britain and one from Sweden.

We shall not attempt here to discuss all of the points brought out by these latest remarks on the subject of this paper, the most actively debated of any before the Institute for many years. In reading them over, however, we cannot but feel that some of the critics of alternating current apparatus, in condemning its lapses, have failed to recall the early traction experience with direct-current apparatus. All that is now more than a score of years ago and time has softened many blows. To the best of our recollection, however, the victory was not won without blood and occasional retreat and the burial in the scrap heap, "unwept, unhonored and unsung," of many a device sent to the front with confidence and cheers. Indeed, had the engineers of divers early electric street-car lines set down the whole unvarnished truth in an open log book and appended to it a rigorous statement of costs, we greatly doubt whether electric traction would be as far advanced as it is to-day. It is no reflection upon the courage, ingenuity and ability of the engineers of all of those pioneer railways, and detracts no jot or tittle from the credit and honor which are due them to say this, or to admit that the record of those days would show a line of troubles at least equal to any that Mr. Murray has yet been able to report. The times when "Drop a nickel in the slot and see the trolley come off" was a common gibe have happily passed away and things go more smoothly, as we trust in due season they will go—in fact, largely have gone—on the New Haven railroad.

There is no dodging the fact that the a.c. motor of the commutating type is heavier for its output than a d.c. motor. But that in other respects it cannot be made thoroughly effective we are disposed to doubt. The trouble most to be feared, bad commutation, seems not to have developed and the general motor troubles show no signs of being more numerous than would be expected with any radically new type of machine and none of them is in the least grave so far as has yet appeared. That the whole New Haven locomotive equipment is intricate and costly admits of no dispute, but this is mainly due to the necessity of having to equip for d.c. operation in the terminal territory. The actual extra cost of the a.c. equipment as such is a far less serious matter. The New Haven electrical equipment is steadily getting into smoother operating form and the service shows very satisfactory improvement. So far as reliability is concerned it is already superior to the steam operation that it has supplanted. It has proved a serious task to bring it into operative condition and perhaps some of those who have criticised the system could have foreseen and avoided some of the difficulties, yet the system has to all appearances come to stay. That it needs improvement and will be improved we have no doubt, but not by the way of substituting in its place direct-current equipment.

Improvements in Air Brakes

At the last meeting of the New York Railroad Club W. V. Turner and S. W. Dudley presented a very voluminous paper outlining the improvements which have been made recently in air-brake apparatus for high-speed trains. While the authors dealt especially with the types of equipment designed for steam passenger trains, some of the facts presented are interesting to electric railway managers, because the improvements made have appreciably increased the braking power at very high speeds and make it possible to maintain this power to the end of the stop. The authors emphasize the point that brakes are more than a mere safety device. Their function is as important as the function of the locomotive or other propelling power. Modern high-speed brake apparatus is vastly more powerful than any steam locomotive or electric locomotive which has yet been built. The brakes will absorb and dissipate the energy of a train moving at 60 m.p.h. in about one-twentieth the distance required for the train to accelerate from rest to that speed. The prediction is made in the paper that it will not be long before electric locomotives are built which will accelerate an ordinary passenger train to a speed of 60 m.p.h. in not more than one minute. If it is worth while to consume tremendous amounts of power in accelerating thus rapidly and to build locomotives of the weight and size required to give this acceleration, it is equally worth while to work further improvements in the braking apparatus. A gain of one second in accelerating to a given speed is worth no more than a gain of one second in bringing the train to a stop.

Aside from their effect in shortening running time, powerful brakes are, of course, one of the best and most indispensable safety appliances. Their value in preventing collisions can be measured in tenths of a second. The improvements outlined by the authors of the paper have resulted in bringing about a reduction of 320 ft. in the distance required to bring a 10-car train to a stop from a speed of 84 m.p.h. The resulting gain is perhaps more strikingly presented by the statement that at the point where a train with the new apparatus would be stopped a train with the old brake equipment would still be running at a speed of 30 m.p.h.

The new equipment described makes possible an average retardation of 2.8 m.p.h. per second from a speed of 84 m.p.h. The retardation at the end of the stop has about reached the maximum possible with the usual ratio of braking force to braking weight of 90 per cent, running up to 9 m.p.h. per second. Room for further improvement seems to lie only in improving the efficiency of the brakes at the beginning of the stop, when the coefficient of friction between the brake shoes and the wheels is less than half that at the end of the stop and the retardation is correspondingly low. If it were not for the necessity of making air-brake apparatus "fool-proof," much higher braking pressures might be employed to advantage, at least at the beginning of the stop. It will be remembered that the standardization committee of the Central Electric Railway Association last year recommended a maximum ratio of braking force to braking weight of 240 per cent. The members of this committee had in mind, presumably, some plan of bleeding off the pressure in the brake pressure as

the speed decreased, in order to reduce this ratio to something near 100 per cent at the end of the stop. So far as we know, no experiments of this kind have yet been tried by any members of the committee.

Classifying and Indexing Technical Information

Several recent articles in this paper on the subject of classifying and indexing the articles published in technical papers have elicited two interesting letters, which are published in our correspondence department this week. As Mr. Herrick says, next best to knowing something is to know where to find it and this is the object of all systems of indexing. The better they assist in locating information, other things being equal, the better they are.

The electrical industry is growing so rapidly that for authoritative literature on the subject one is forced to look to technical papers. As with any industry in which the conditions are rapidly changing, a book can hardly be published before it becomes obsolete. Hand books with formulæ, dimensions and weights of equipment and other fundamentals can be made of fairly permanent value, but even they have to be frequently revised to be anywhere near up to date. Books on practice possess even more of an ephemeral character. New methods and new apparatus are constantly being devised to take the place of the old, and while acquaintance with the latter is often necessary, complete knowledge requires familiarity with the present as well as the past. It is this constantly changing element in electrical matters which makes a record of events and progress essential to the up-to-date manager and engineer.

Mr. Herrick refers at some length to the Dewey decimal system of classification. This system, as is generally known, has been adopted in most libraries and is a method of classifying all knowledge by numerals. Its chief advantage is that it is capable of indefinite expansion by the use of suffix numbers to distinguish the subdivisions in the main Dewey classification. It may not, however, be generally known that the International Railway Congress, with headquarters at Brussels, Belgium, has elaborated the system to cover steam railroad operation and that the engineering department in the University of Illinois has done similar work in the electrical field. Mr. Herrick has applied the Dewey system to his methods of classifying clippings in the electric railway field and by this means has secured 1600 index heads with, of course, an opportunity of increasing this number without disturbing the general plan. He has also employed a system for filing clippings which is novel.

In addition to the methods described, it might be said that most large firms of consulting engineers provide, as part of their operating organizations, facilities for digesting and recording the technical literature relating to the subjects in which they are most interested. Many financial institutions and manufacturing companies follow the same plan. Individual methods of conducting this work will necessarily vary as they are shaped to suit individual conditions. But the fact that both correspondents this week have developed the elaborate systems which they describe indicates that there is a demand for some purposes for a more complete record than can be supplied by combining the publishers' indices or by the indices of current engineering literature now on the market.

CONDITIONS OF ELECTRIC RAILWAY OPERATION IN MEXICO CITY

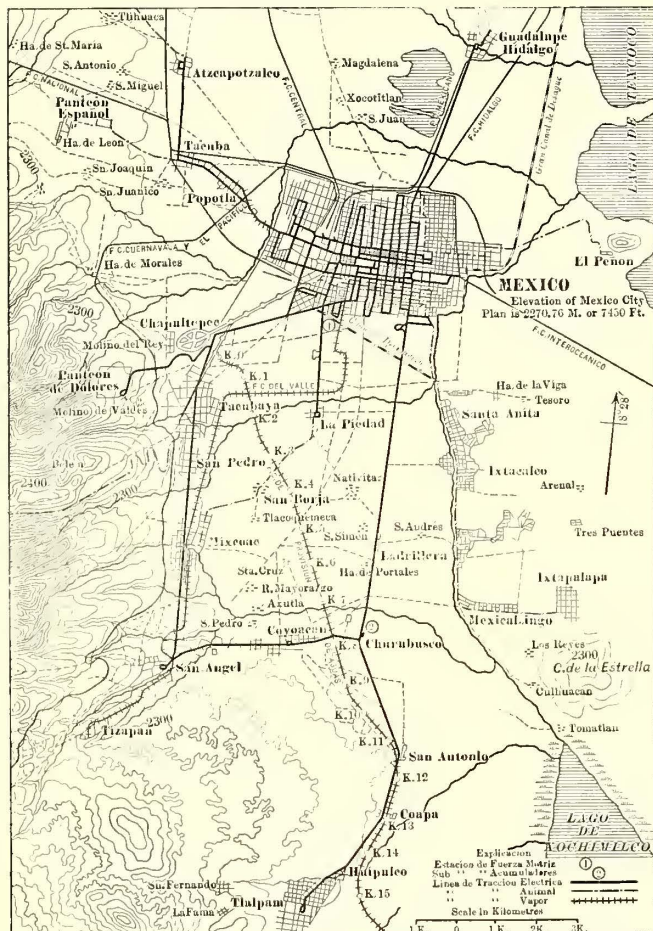
Some of the first impressions made upon the visitor to Mexico City soon after his arrival at that capital are that he has been taken back to medieval times, when men rode astride of asses, carried their burdens on their backs

the tramways company. In fact, the electric railway in Mexico City enters more intimately into the life of the citizens of the Aztec capital than probably any other of the improvements which have been introduced into this ancient modern city within the last 100 years. The Mexican is dependent upon the tramway in his daily business life; it enters into his pleasures because it conveys him to and from his bullfights, his chief source of amusement; it enables him and his family to attend any or all of the innumerable festivals in honor of the saints; he uses it when moving for the transportation of his household goods and domestic animals, and, finally, it is the electric tramway that takes him to his last resting place after death. Thus the Mexico City tramway system performs more important functions in the daily life of the people than fall to the lot of city railways elsewhere. Notwithstanding the part which the street railway system, the telephone and other enterprises of the foreigners play in the daily life of the city, the natives look with suspicion on the "gringos," or outsiders, who have flocked to Mexico City in large numbers and who are the leaders in all business and engineering pursuits.

CHARACTER OF POPULATION AND RIDING

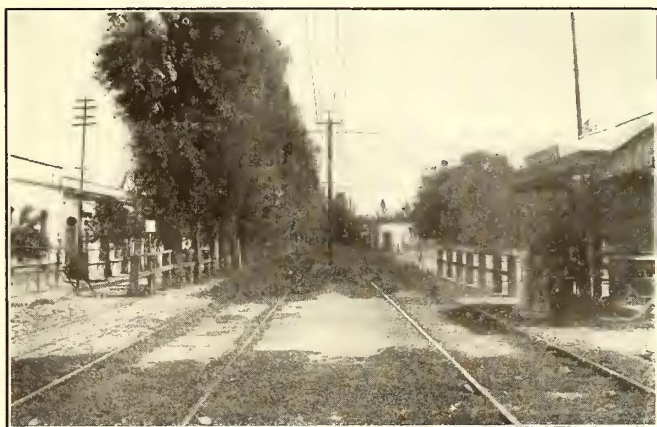
The City of Mexico is both the political and industrial center of Mexico, and consequently has a large percentage of foreign residents. The German, English, American, Belgian, French, Italian and Spanish nations all have large colonies, and mining, railroading, manufacturing, and even farming, have received a new impetus from them. These foreigners have each their own casinos or clubs, schools and churches, but they mingle constantly in the business life of the country. They live well and have been largely responsible for the development of the suburbs. Naturally, the tramways and lighting companies have benefited by the activities of these progressive aliens.

The Americans constitute the largest colony, and they devote their energies chiefly to the development of large engineering enterprises, such as electric power, railway and mining projects; the Germans control the hardware and drug trades; the French are leaders in silk and dry goods and the Spaniards in groceries. The English colony is interested in much the same lines of business as the Americans. The chief industries of the city are tobacco factories, grist mills, ore refining and foundries.



Mexico City Tramways—Map of City and Suburban Lines

and lived in mud huts, for it is a fact that the lower classes of Mexico still practice these and other customs which are hallowed by age. A closer inspection, however, will show the traveler that he is in a modernized ancient city,



Mexico City Tramways—Station at Condesa on One of the Interurban Lines

that most of the people ride in up-to-date electric cars, and that freight, especially building material, is largely carried by electric cars which run over the same tracks as the passenger cars. Even the funerals are in charge of



Mexico City Tramways—American Country Club and Station on the Tlumpam Line

The population of the City of Mexico proper is about 400,000, but the population of the outlying cities and villages of the surrounding federal district which are also served by the city tramway system brings the total up to

800,000. The habit of riding is not so highly developed as in most cities of the United States. The 650,000 inhabitants of St. Louis, Mo., for example, pay annually for passenger traffic alone about four times the amount received by the Mexico Tramways Company for every kind

of traffic. There is a considerable amount of hack and carriage riding, but motor bus service did not prove a financial success in the one instance where it was tried.

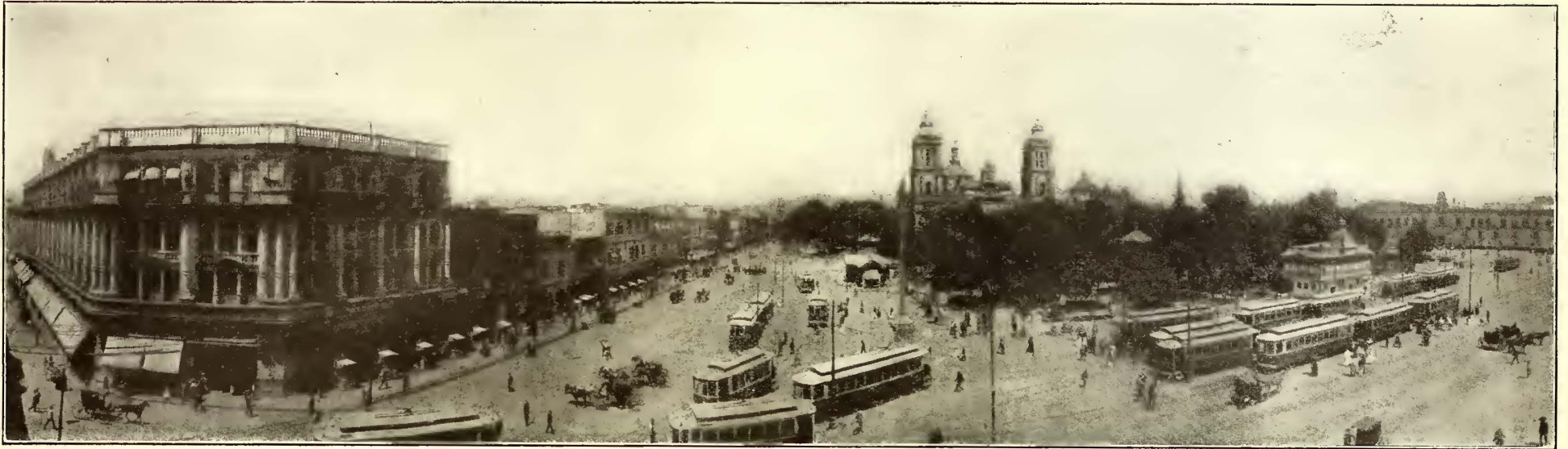
The streets in the older portion of the city are narrow, but by using reverse curves in some places in rounding



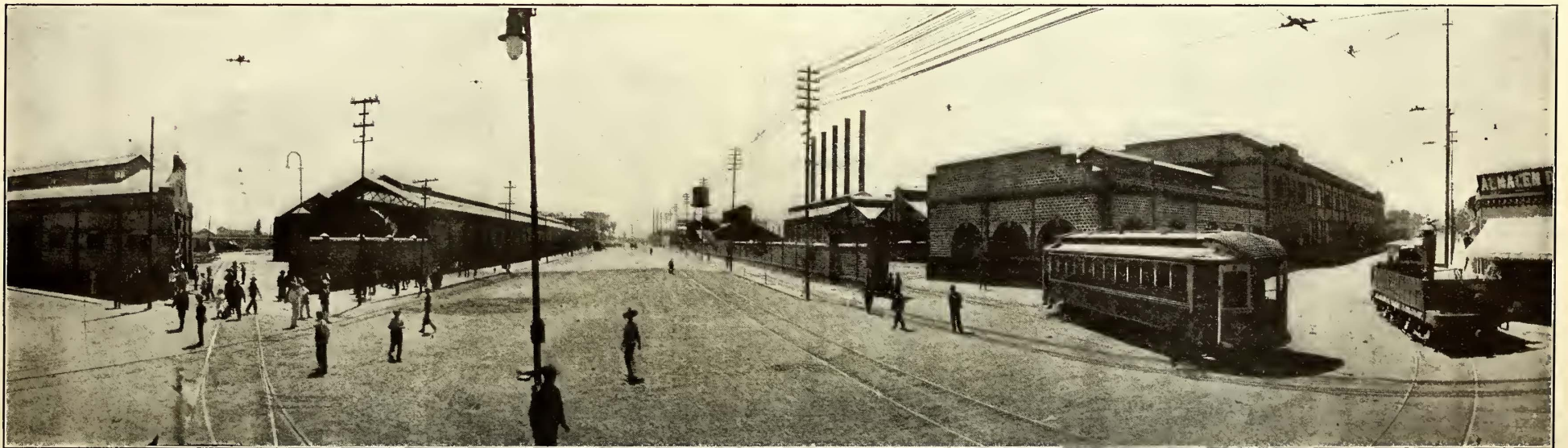
Mexico City Tramways—San Juan de Letrán, One of Mexico's Busiest Thoroughfares



Mexico City Tramways—Cars Leaving the Postoffice with Mail Matter



Mexico City Tramways—View of Cathedral Square in the Center of the City



Mexico City Tramways—General View of Shops, Car House and Power House at Indianilla

corners it has been found possible to run double-truck cars everywhere. Within the past few years the physical and sanitary conditions have been greatly improved in many quarters by laying out wider streets, improving the sewerage system, and pumping pure water to the city from a spring 18 miles away.

FEATURES OF THE TRAMWAY SYSTEM

About two years ago Dr. F. S. Pearson, of New York, the pioneer electrical engineer, and of late well known by his foreign enterprises, took over the control of the tramway system from German interests, and began improvements. To-day it is fast approaching the high standard of service and equipment attained by the best American electric railways. It has many distinctive features which are not common in American systems. Among these features is, first, the fact that Americans are successfully operating a tramway system in a foreign country, dealing with officials and employees who speak only Spanish, and

speed within certain limits, which make it necessary to have high and low-speed controller handles and change them at fixed stations; the extensive second-class baggage and freight traffic and its complicated tariff; the extended use of special private and presidential cars; the graded fare system and absence of transfers; the lack of heater equipment; the loop system of car operation and centralized car barns and dispatching systems; the giving of free baths and barber service to the employees; the general custom of running cars in trains, both for first-class passengers and for mixed classes.

ORGANIZATION

The officers and heads of departments of the tramway company are nearly all foreigners. The operations of the company are in charge of R. C. Brown, managing director, who handles important questions of policy, deals with the government and directs new projects. Harro Harrsen, general manager, who speaks several languages.



Mexico City Tramways—Well-Armed Guardians of the Peace Assisting in the Transportation of Passengers from the Plaza del Torro or Bull Ring

doing it under conditions which to some would seem extremely difficult and almost impossible, and to others quite easy and ideal. The second feature worthy of mention is the use of class distinctions in transporting passengers, there being first and second-class cars and two rates of fare. The third departure from American methods is the noonday siesta, during which business is at a standstill, stores are closed up, and the people return to their homes. A fourth is the intermixture of funeral and freight traffic with the passenger cars. The fifth is the absence of any appreciable night passenger traffic. The sixth is the conductor and ticket inspection system of fare collection. Other novel features which can be enumerated are the use of mirrors to enable the motorman to see the rear platform and to start without signal from the conductor; the absence of fare ringing; the strict regulations as to

including Spanish and the Mexican patois, has charge of the operation of the system, and is assisted by a corps of able lieutenants, superintendents, etc. Both of these gentlemen are Americans. Others of the same nationality fill the offices of treasurer (A. S. Palfrey), purchasing agent (George J. Troop, Jr.), supervisor of traffic (E. H. Bellamy), master mechanic (G. M. Murray), electrical engineer (W. H. Fiske), civil engineer (V. L. Havens), auditor, building inspector, division superintendents, superintendent of employment, chief draftsman, storekeeper, transitmen and superintendent of track construction and some positions of foremen. The secretary of the company, Pedro Mendez y Mendez, is a prominent Mexican, and the heads of the legal and claim departments, the head of the funeral department, the chief dispatcher and the supervisor of trainmen are also Mexicans. The interrelation

ing 18,000 people, tax the company's capacity for special service. The shrines at Guadalupe and the Viga Canal and Floating Garden rendezvous are good drawing cards

FUNERAL SERVICE

The returns from the Mexico City Tramways funeral service now amount to between 3 per cent and 4 per cent

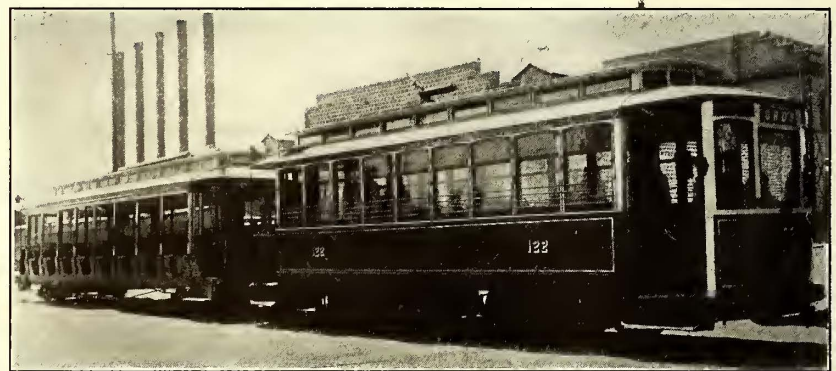


Mexico City Tramways—Siding on the Double-Track Tlalpam Division



Mexico City Tramways—Tacubaya Station on the San Angel Line

on certain days. The Viga Canal is always busy, and the company, although now only operating one electric line part way and a mule line the balance of the distance, is planning to extend the electric line to Lake Zochimilco. This promises to be a very attractive and good-paying route. There is considerable interest in athletics, but principally by foreigners who have their outdoor and indoor clubs, while the natives have their cockfights. All the suburban feasts, fairs and fights, as well as those in the city, are carefully attended to by the electric railway company. As the number



Mexico City Tramways—Motor and Trail Car for Extraordinary Service



Mexico City Tramways—Junction of Tacubaya and San Angel Lines at Tacubaya

of feast days throughout the year is very large, the revenue from this special riding forms a large proportion of the tramway company's gross receipts.

of its total traffic. The company, in fact, conducts all the city funerals, even to furnishing the hearse and trailer cars for mourners. In accordance with a clause in its city concession all corpses of paupers are carried free. There are a number of types of funeral cars which can be secured at a wide scale of prices. The business is done principally through undertakers who have a special arrangement with the company. Their patrons indicate the amount which they can pay and the tramway company is prepared to furnish cars and decorations for any grade of funeral, from Government official to pauper. The cemeteries are so far away, the country roads so difficult for vehicles to traverse and the general scarcity of vehicles not engaged in public carriage service around the city is so pronounced, that the advantages of the more showy method of carrying the corpse on a catafalque car and the mourners in passenger cars behind outweigh all other considerations. On receipt of a call the company sends the cars to an appointed place on a car line nearest the home of the deceased and then the casket is carried to the "caroso" or funeral car, which has a canopied top. Masses of flowers and floral designs are spread over the casket, the mourners enter the passenger car and the train proceeds. While delays in passenger traffic may occur, the movements of funeral trains are timed to interfere with the passenger service as

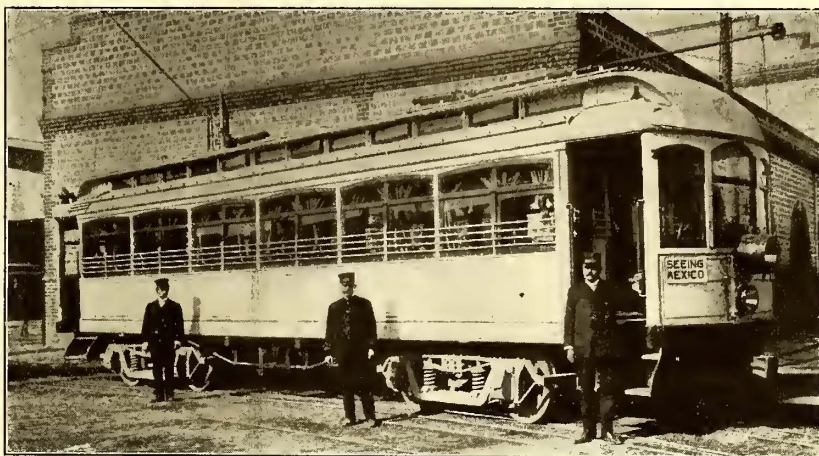
little as possible. In general, the lines of least traffic are used for funeral traffic and in some instances special tracks are run to the cemetery. Some of the types of

fine uniforms and distinctive badges for each class of employee. Thus motormen, conductors and inspectors wear blue uniforms, but inspectors wear silk caps while those of the trainmen are of cloth. Again, the conductors' caps have straight visors, while those of the inspectors and motormen are bell-shaped. In addition, the inspectors wear lapel badges to denote their rank.



Mexico City Tramways—First-Class Train of Two Motor Cars for Suburban Service

funeral trains are shown in the accompanying views. They vary in price from \$3.75 to \$140 for a funeral. There are electric and mule "carosos," two-horse and four-horse hearses with wheels that will run on roads or rails, and combination funeral cars. The trailer cars vary from the common mule car to the white and gold passenger car of up-to-date design. Nothing is more depressing than the continual presence of these special evidences of death, yet the people are used to them and seem to prefer this method. The most pathetic scene is the frequent foot procession led by a peon carrying a child's white coffin on his head, the mourners following on foot, all bearing the signs of extreme poverty.



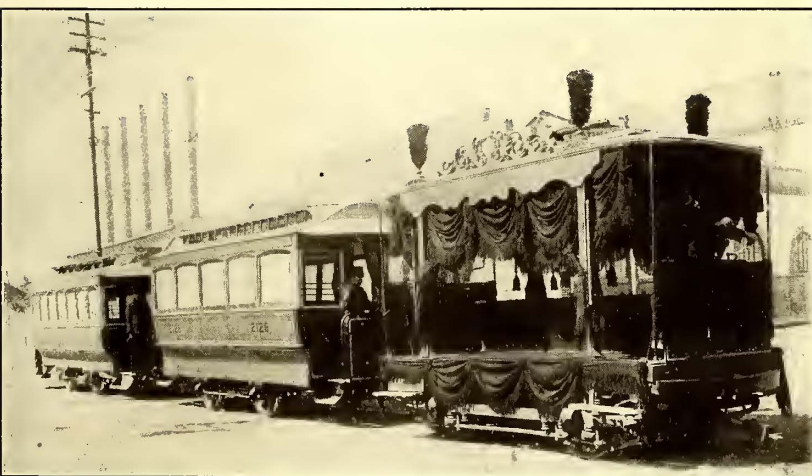
Mexico City Tramways—The "Seeing Mexico" Car with Crew

EMPLOYEES

All the rank and file of the tramway company forces are native Mexicans, who make very satisfactory employees. They are good students and learn rapidly. The company

The natives engaged in the transportation, line, track, power and other departments, have proved efficient employees even though they are slower to learn than the average American. There is no employees' association, but the company itself has done considerable welfare work and has especially concentrated its efforts on attaining high standards of cleanliness and keeping the men away from influences of saloons.

FARES AND TICKETS

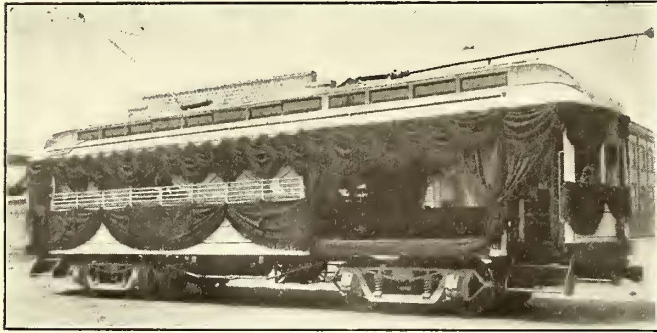


Mexico City Tramways—A First-Class Funeral Train, Consisting of a Motor Hearse and Two Trailers

pays careful attention to the wants and personal appearance of its men. It gives them free baths, barber service, amusements and instruction besides furnishing without cost

The first-class fare on the interurban lines averages 3 cents (Mexican money) per mile and the second-class fare is usually 40 per cent less. First-class and second-class

commutation tickets are issued on all suburban lines. These entitle the holder to an average of three or four round trips a day. On one line where the one-way first-class fare is



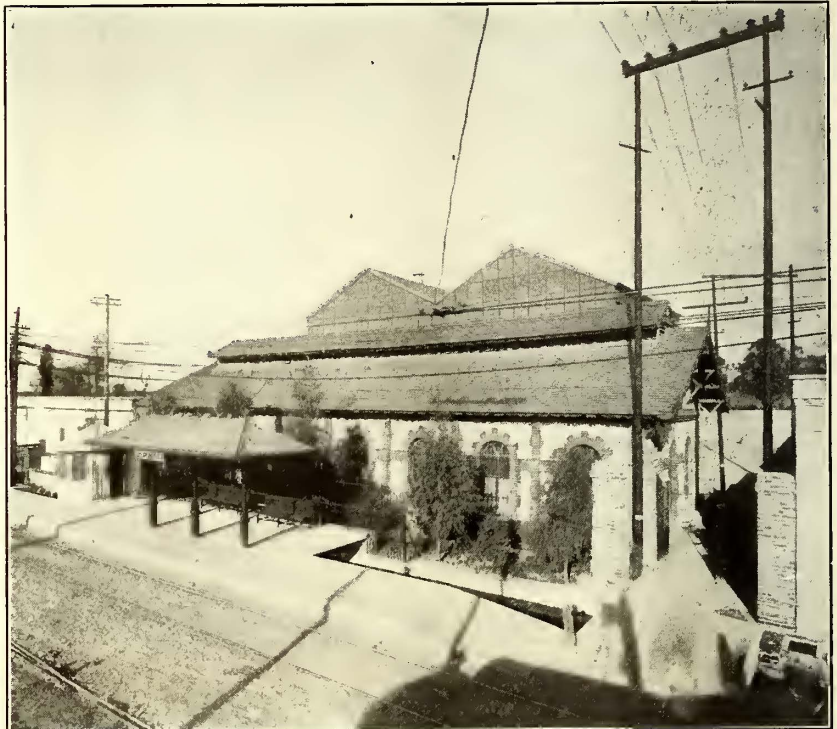
Mexico City Tramways—First-Class Funeral Car, with Coffin Compartment

10 cents (Mexican money) a monthly commutation ticket costs \$5.75. This represents an enormous reduction from the regular fare, as four round trips a day would cost 80 cents, or \$24 a month. This proportion, however, is subject to variations in accordance with the franchise conditions. The company prints all classes of tickets issued, and varies the colors every day to avoid counterfeits. The lottery system is not now used by the company, but when it was in use, some time ago, it was customary to offer prizes in connection with the tickets exchanged for fares.

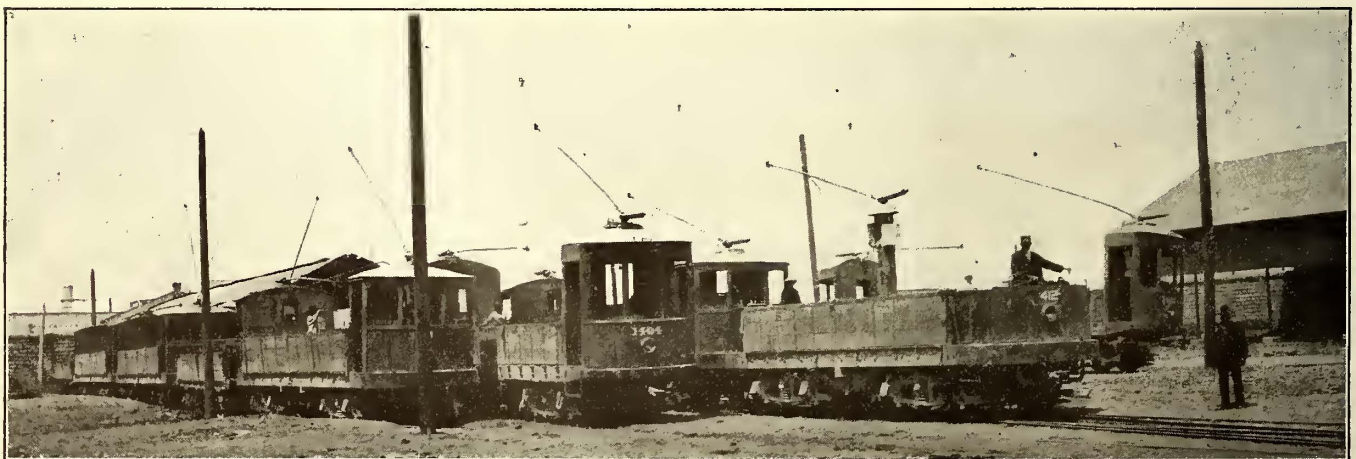
Fare registers have not been found practicable. The conductor is therefore obliged to use the European system of fare receipts, which are viséd by inspectors, who tear the ticket, thus cancelling its value for further use. The inspectors are virtually uniformed traveling auditors, who examine all receipts and tickets on both city and interurban lines to see that the proper fare has been paid, and if not the conductor is called and made to collect the fare. In this way many fares that would otherwise be missed are taken.

tain rendezvous from which they board cars, and in view of the attitude of the upper classes toward the peon conductor their presence in their distinctive uniform prevents much trouble. The inspector enters a car at the front, and taking a number which has been given the conductor for his trip before starting, he compares all receipts presented to see that they are not wrongly numbered, out of date or the wrong color. All passes or "abonos" (commutation tickets) must be punched, and at irregular intervals their numbers are taken down by the inspectors for checking the amount of free and reduced rate riding and locating the holders of passes.

For the information from which this article was prepared this paper is indebted to Harro Harrsen, general manager at Mexico City, and H. P. Quick, of the engineering staff in the New York office of Dr. Pearson. A second article on the Mexico City system will be printed in a subsequent



Mexico City Tramways—Chunbusco Substation and Passenger Depot



Mexico City Tramways—One of the Freight Yards of the Company

There are about three inspectors to five conductors, and they are a picked body of trusted men with previous experience as conductors or motormen. They have cer-

issue and will describe the track and line construction, power equipment, the modern car shops and the methods of car operation.

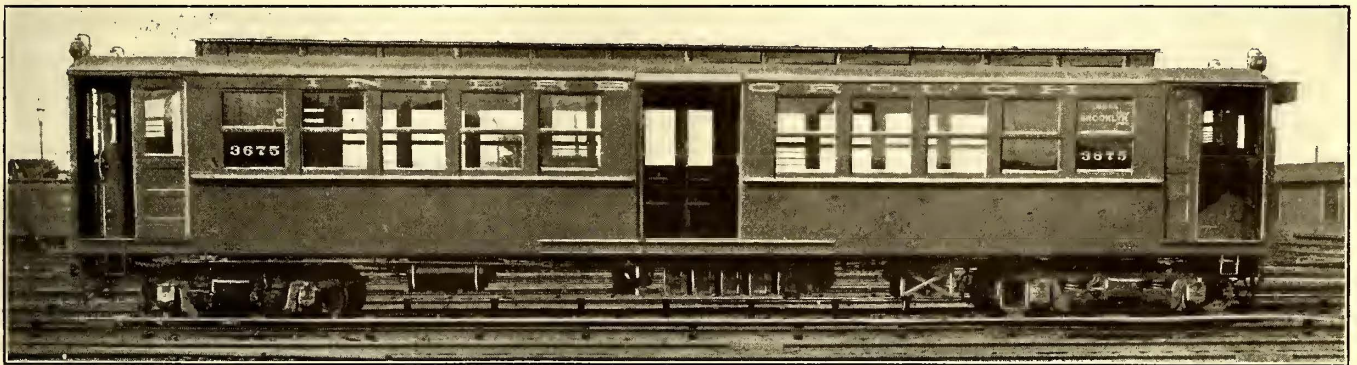
CENTER-DOOR TRAIN ON TRIAL IN THE NEW YORK SUBWAY

On midnight of Tuesday, April 20, the Interborough Rapid Transit Company, New York, made a non-passenger experimental run over the express station stops with an eight-car center-door train. Regular operation of this train was begun on Monday, April 26. These center-door cars were designed by the railway company in the belief that they will alleviate loading and unloading conditions at express station platforms better than the Arnold end side-door cars, described in the *ELECTRIC RAILWAY JOURNAL* of Feb. 27, 1909. It will be recalled that these end side-door cars, which were tried at the request of the Public Service Commission of the First District, had a side door at each end as well as the original end doors, which were used for entrance only. Both doors were $38\frac{3}{4}$ in. wide and were operated by the train guard. The entrance door was operated by the original hand equipment and the exit door by pneumatic means. After being in service from Feb. 16 to Feb. 27, the Arnold train was taken off so that a number of changes could be made. Before these changes were completed the Interborough Rapid Transit Company offered to experiment with an express train made up of eight center-door cars of the design shown in the accompanying illustrations. The new center door is 50 in. wide and, like the original end doors, is used for both entrance and exit. The striking feature in connection with the center door is the use of a barrier to permit two streams of passengers to enter or leave without interfering with each other. This barrier does not extend far enough into the body of the car to prevent free passage from one end to another. The company was led to try the barrier through observations made on the standard subway cars.

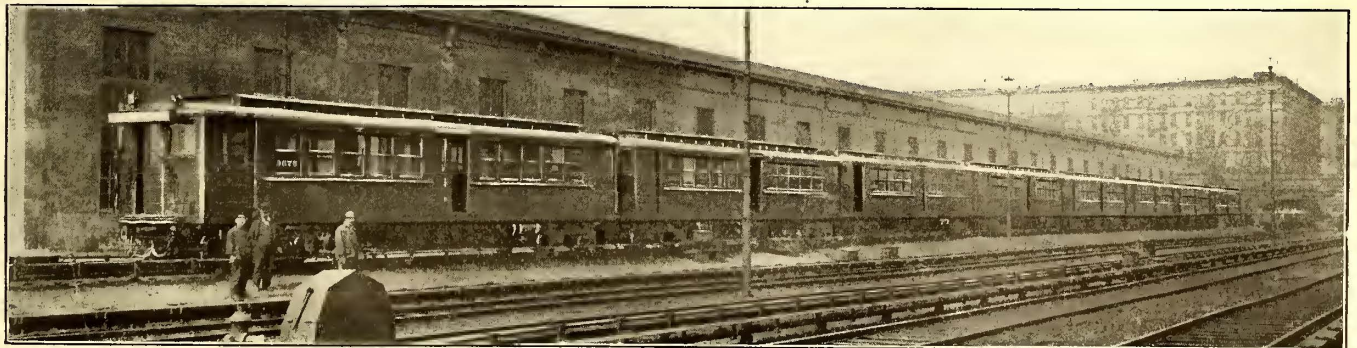
wider vestibules passengers would stand alongside the doors, thus reducing the entrance width, say 20 in. The division of the new center door therefore is made on the assumption that two unimpeded exits are better than one



Interior of Car, Showing Barriers



Center Side Door Car for New York Subway



Experimental Train of Center Side Door Subway Cars

some of which have 40-in. doors and other 50-in. doors. It was found that in most cases the wider doors were really no better than the narrow doors because in the

which is wide but is subject to blockades by standing passengers. It is expected that those who attempt to stand in the narrow aisles of the new car will be bowled out of the

way by the rush of incoming or outgoing passengers. For purpose of comparison, one car in the experimental train will have no barrier at the center doors.

The center door will be arranged so as to be operated by the guard on the car platform by pneumatic door openers, and as the barriers are only waist high the guard can see the shoulders and heads of the passengers on the other side of the partition. Iron tubing carried up from the partition to the roof serves to keep the barrier in place. When the door on one side is not in use, folding longitudinal seats are let down to minimize the loss in seating capacity.

The cars which make up this train are modifications of the type illustrated in the *STREET RAILWAY JOURNAL* of March 14, 1908. At that time ultimate center-door operation was provided for by extra-wide side posts in the center and by angle iron and plate reinforcement in the carline over the new doors as far as the first window on each side. A 6-in. outside channel, which was also provided in the original plan, is placed on the side sills under the doors, and is of the same length as the carline reinforcement. The Interborough company decided to build subway cars for eventual center-door operation over two years ago.

SIDE DOOR HEARING IN NEW YORK

The hearing before Commissioner Eustis of the Public Service Commission of the First District of New York on the operation of side-door cars in the New York subway was continued on April 22. Bion J. Arnold, consulting engineer of the commission, said that he had carefully considered the testimony of the Interborough Rapid Transit Company in connection with the trial runs of the double end door as recommended by him and that he did not find any facts in them to lead him to alter his previously expressed opinion that "the double end door possesses the elements of maximum comfort, decency and capacity which can be attained with cars that are operated in the present subway."

In comparing the records of the company and the commission regarding the length of stops of the side door train at stations, Mr. Arnold said that in nearly 50 per cent of the cases the records did not agree by from 4 to 10 seconds. Tables showing the combined records were presented by Mr. Arnold. To emphasize the differences between the records of the company and his own, Mr. Arnold had a blue ring drawn around all figures where they varied from 4 to 7 seconds, inclusive, and a red ring where they varied from 8 to 11 seconds, inclusive. Of 477 comparative statements he said that 48 per cent showed a difference of 4 seconds to 7 seconds between his figures and those of the commission and that 28 per cent showed a difference of 8 seconds or more. The records of the total elapsed time of the train from one end of the run to the other, Mr. Arnold said, showed that the train was often on time, and that "a careful comparison of the record fails to show that the special train suffered any serious delays which were not shared by the trains immediately preceding and following it." Mr. Arnold saw no reason, after carefully reconsidering the data, to change his conclusion to the effect that where the trains were heavily and equally loaded the side door train would be able to save from 10 seconds to 15 seconds of the time required by the trains of regular cars.

Mr. Arnold said he regretted very much that the guards on the train had been changed by the company so often. He had kept only a partial record of the numbers of the men who manned the special train, but said that about 200

different men had been used on the train. The figures on which he based this estimate were submitted as evidence. Reiterating statements made in his report on the subway car issued in February, 1908, Mr. Arnold said that he was familiar with the advantages of the center door car and appreciated the degree of success it had attained in service on the Brooklyn Bridge, in the tunnel of the Hudson & Manhattan Railroad, and in the Boston subway. Continuing, Mr. Arnold said:

I am satisfied, no matter what type of car I had recommended, if it involved any change from the present type, that it would have been opposed by the Interborough Company with the same degree of opposition that the double end side door type of car which I did propose met. In my judgment the center side door type of car is the most vulnerable one for attack, not only from the standpoint of lack of safety in operation at stations having curved platforms, but for other reasons, such as the elimination of cross seats and the inability of the passengers to circulate rapidly from the end to the center, in case the circulation principle is adopted, which principle it seems to me will give the greatest comfort to the passengers when entering and leaving the cars.

It seemed, therefore, advisable to devise some type of car which would not introduce the dangers incidental to the use of the center side door type, and which would be applicable to not only the express tracks but also to the local tracks, thus making a car universally applicable to the entire subway, which the center side door type of car is not, as admitted by the Interborough officials, for they propose to use it only upon the express tracks.

Since the type of car which I recommended has been developed and put into service, the Interborough officials seem to have completely reversed their attitude toward the center side door type of car, and have now asked permission to try a train thus equipped.

I am very glad to have this disposition shown, and hope that it will result in the development and adoption of some type of car which will relieve the present unbearable conditions in the subway during the rush-hour periods. If the Interborough officials are willing to assume the responsibility for the dangers incidental to the operation of the center side door type of car it will relieve the commission from the necessity of having to order the adoption of the type of car opposed by the Interborough Company, and place the responsibility for the successful operation of the center side door type of car upon a company who advocates it, and under these conditions it ought to succeed, if success is possible. I am still of the opinion, however, that the type of car that I have recommended, viz., the double end side door type, will, if the conditions that I have outlined for its successful operation are given it, prove preferable in the present subway, as it will give all of the advantages that the center door type of car can give, without the necessity of extending the station platforms, and be equally applicable to the local as well as to the express tracks. In other words, it should be recognized by the commission and the public that if the center side door type of car is now adopted it means that a car is adopted which cannot be used upon the local tracks, and this fact will be used by the Interborough Company in the future to prevent the elimination of the present type of cars from the local tracks. Furthermore, the center side door type completely eliminates the cross seats, which have been heretofore thought to be desirable, and increases the standing capacity of the car, while the type of car which I propose retains all of the advantages of the present cross seats, and, as previously stated, makes a car which is universally applicable to the entire subway, although should it be found that the center side door type of car can be operated without unnecessary danger the supplemental doors of the car I have recommended could be moved somewhat nearer the center, thereby combining the advantages of this type of car with those claimed for the center side door type.

I wish to state that I have no desire that the particular car which seemed to me best should be adopted if any other type of car can be proved better for the service, as the only object I have had in suggesting changes in the present

type of car now used by the Interborough Company has been to get introduced into the subway some type of car which would not only reduce the time now lost in station stops, but also make it more comfortable for passengers to enter and leave the cars.

A. A. Gardner, counsel for the Interborough Rapid Transit Company, in going over the tabular exhibits of Mr. Arnold, discovered that the columns of figures on one of the sheets had been inadvertently transposed and at Mr. Gardner's request Commissioner Eustis agreed to have the sheet corrected and to submit a new table to the company on April 24. Asked how much time would be required further to consider the data, Mr. Gardner said about a week, and the hearing was adjourned until April 29.

Frank Hedley, general manager of the Interborough Rapid Transit Company, then outlined the plans of his company for operating the experimental center side-door train. He explained that the last cars purchased by his company had been especially designed with a view to their ready conversion to cars of the center-door type. Eight cars for use as an express train are now fitted with center doors and arrangements are being made for placing them in service on Monday, April 26, at 6 a. m. on the same run as the end-door trains.

Mr. Hedley said that it had taken about a month to equip the train, but that this record in car reconstruction was largely due to the fact that the door operating mechanism of the end-door train and other fittings had been used on the center-door train. He explained that this was done purely to expedite matters, and that duplicate equipments had been ordered for the end-door cars and had been promised by the manufacturers for delivery by May 1. Mr. Hedley said he did not think that the public could be educated up to the idea of "circulating" and that the end doors and the center door of the center-door car would all be used for entrance and exit. The center doors will be arranged for pneumatic operation, but guards will be stationed at all express stations to assist the trainmen. Records of the operation of the car will be made by the company and the commission.

TESTS OF ENERGY CONSUMPTION OF CARS IN MILWAUKEE

In the account of the hearing of the Milwaukee case, published in a recent issue of this journal, reference was made to some tests of power consumption conducted by Messrs. Rau and Olds, of the company's engineering force. The voltmeter-ammeter method of determining the power consumption was used, with readings every five seconds. The cars ran on their regular schedules and carried passengers. The object of the test was to see which motor equipment under test conditions gave the best results. The figures obtained were as follows:

An interurban car 51 ft. 6 in. long, weighing 55,000 lb., having four 60-hp motors, consumed 3000 watt-hours per car-mile.

A city car 41 ft. long, weighing 43,300 lb., having four 40-hp motors, consumed 2580 watt-hours per car-mile.

A city car 41 ft. long, weighing 38,500 lb., with two 35-hp motors, consumed 1665 watt-hours per car-mile.

Two motors were taken off this car to demonstrate what it would do in competition with the car with four motors. The two cars are therefore the same.

The a.c.-d.c. interurban car, 53 ft. 4 in. in length, weight 82,000 lb., with four 75-hp motors, consumed 3895 watt-hours per car-mile.

TROLLEY MAIL BOXES IN WILMINGTON, DEL.

At the request of the United States mail authorities, the Wilmington (Del.) City Railway Company started a trolley mail box service on one of its lines on March 17. The scheme met with the immediate favor of the public. As many as 2008 letters have been deposited in five car boxes in one day. Some of these letters, in fact, were transferred by carriers from street boxes to save time. Another evidence of confidence in the new service was the insertion of special delivery letters in the car receptacles in preference to the street boxes. The company now has an average of six boxes in daily operation on cars running at about 10-minute intervals from 8 a. m. on its principal double-track line. One-third of this line passes through the principal business street (Market Street), and the balance traverses a residential section. Most portions of the latter have but two regular collections of mail daily, and the farthest point is $2\frac{1}{2}$ miles from the post office.

In Wilmington the cars stop at the far side of the intersecting streets to load and discharge passengers. As the company's rules require slowing up when approaching a crossing, the instructions issued by the post office authorities are that a person not wishing to ride, but only to mail a letter, is to take the near side and hold up the letter for



Mail Box on Trolley Car in Wilmington, Del.

insertion when the motorman is slowing down to, say, 2 m.p.h. to 4 m.p.h. It has been found easy to deposit letters even at a speed of 8 m.p.h. Consequently, it is believed that there is no appreciable delay to the operation of the cars, and certainly no more than is required to induce a driver to clear the track.

The post office authorities have a collector one square from the office, at a place which happens to be one of the junction points. Here the boxes are emptied once per round trip. The longest time yet noticed for this work was 13 seconds, but the average is 7 seconds. There is practically no delay here, as the cars are required to stop for passengers at this point on at least 90 per cent of their trips. The collector, upon emptying a box, takes the mail matter to the office, and has ample time to return before the next car arrives.

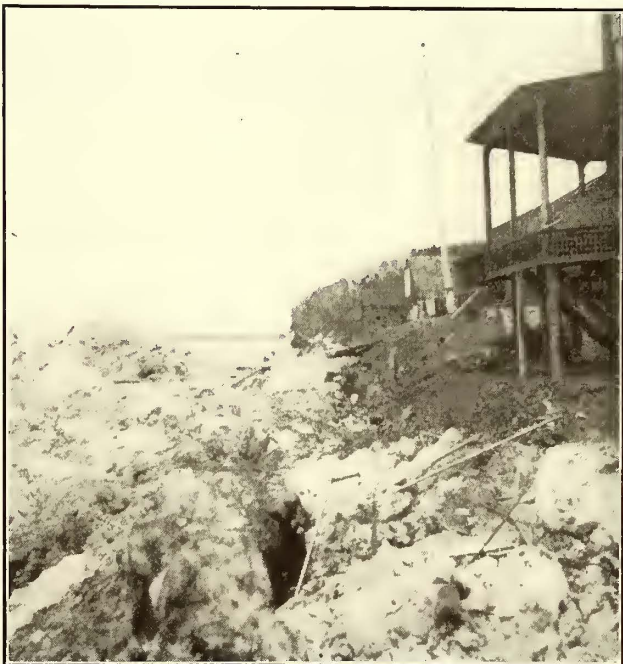
The drop box, which is of metal, is attached to the side of the car as shown, and is about 24 in. wide, 34 in. deep and 5 in. thick. The open top, or mouthpiece, is V-shaped, 4 in. wide at the top, $\frac{3}{4}$ in. wide at the bottom and 5 in. deep. The special feature of the box is the provision for excluding rain and snow. The front of the lower half is provided with a hinged locked door, through which the mail is removed by the post office collector. The boxes are attached to the forward right-hand end of the car body by hangers which hook over a bar fastened to the bottom of the car body and by a bolt on either side of the box, fitting into a slotted plate on the underside of the

water table strip. The boxes were made for easy detachment, as it is necessary to transfer them from one side of the car to the other every round trip. This operation takes about 20 seconds.

The Wilmington City Railway Company receives no compensation for this experiment, but, of course, it would not have all cars equipped to carry mail matter, with its attendant responsibilities, without remuneration. The management believed that great benefits would accrue to the post office department, the public and to itself from a fair trial, and therefore was willing to assist in the test of the new system. The trolley mail cars certainly have cut down the greatest delay in the first step of mail transportation, namely, the collection and distribution in the local post office. Acknowledgment is due S. S. Hoff, general manager of the Wilmington City Railway Company, for the data in this article.

APPROVAL OF RULES BY RAILROAD COMMISSIONERS SOUGHT

It will be remembered that at the last meeting of the Transportation & Traffic Association at Atlantic City a proposed code of rules covering the operation of high-speed interurban railways was submitted by the committee on interurban rules. During the discussion which ensued it was considered desirable to submit this proposed code to the various boards of railroad commissioners as well as to various operating officials throughout the country and obtain the criticisms and suggestions of these gentlemen. The committee has decided that a conference of these men



Ice and Débris 30 Ft. High Near Lewiston Terminal

would be of the greatest advantage in formulating a code which could be adopted as standard by all of the companies operating high-speed interurban railways.

With this end in view, J. N. Shannahan, chairman of the committee of rules for interurban railways of the American Street & Interurban Railway Transportation & Traffic Association, has invited the attendance of one or more representatives of each of the railroad commissions of the different States at a conference to be held at the New Willard Hotel, Washington, May 25, at 10 a. m.

REPAIRING NIAGARA GORGE RAILROAD

George R. Ricker, chief engineer of the Niagara Gorge Railroad, Niagara Falls, N. Y., has made a thorough inspection of the roadbed of the line through the lower Gorge since the subsidence of the ice jam and reports the roadbed in good shape and that beyond the destruction of the poles and wires no serious damage was done. The steel trestle-work between Giant Rock and Devil's Hole is intact and uninjured. The washouts are few and are along the outer



Niagara Gorge Railroad Under 25 Ft. of Ice

track. The repairs were delayed by the second rising of the ice, but no further damage was done and the officials of the company now expect to have all repairs completed and the road again in full operation by May 15, or in time for the opening of the Niagara Navigation Company's line of steamers between Lewiston and Toronto on May 17. The principal work and delay in reconstruction will be the removal of ice which still lay in masses many feet high over the tracks and roadbed on April 27.



Looking Upstream from Above Lewiston Bridge

The conditions on the Niagara Gorge Railroad and at Niagara were described in the article on page 794 of the *ELECTRIC RAILWAY JOURNAL* of April 24, 1909. The work of restoring the railroad was well under way when the second jam occurred, and while the statements in the article of the height of the water and the ice served to convey an excellent idea of the state of the gorge and rapids, the accompanying illustrations supplement the description contained in the previous article by showing conditions at various points along the line. In one instance the effect

of a washout on the roadbed is illustrated. In another the tracks are under 25 ft. of ice, the protruding trolley poles being the only visible mark of identification of the railroad. The third photograph shows the ice and débris piled many feet high and gives an idea of the work that is before the company in removing the ice before the tracks are reached so that work can be done on them.

ELECTRIFICATION OF THE STATE RAILWAYS OF ITALY

A recent issue of *The Engineer* contains a summary of the progress of electrification of the steam railways of Italy and a synopsis of the program of electrification up to the year 1912. The only two lines which have been converted to electric traction and which are now in operation are given in the table below:

Date of opening.	Name of line.	Nature of service.	Form of power.	Miles in operation.
Oct. 16, 1901..	Milan-Varese, Porto Ceresio.	Local suburban	Steam	46
Sept. 4, 1902..	Lecco-Colico, Sondrio-Chiavenna.	Country, local tourist	Water	66

Total mileage of lines for suburban and local traffic in operation up to December, 1908..... 112

From the opening of the Lecco-Chiavenna line in September, 1902, there was a long period of cessation from active work. Several projects have been under way for the last two years, however, and are rapidly nearing completion. The Government budget calls for the conversion of a total of 186 miles by the end of 1912, and a large part of this mileage is well under way. The two centers of the government's activity in electrifying its steam railway system are Genoa and Milan. Around Milan four projects have been started. The first is 16 miles of the Milan-Ceresio suburban line from Gallarate to Avona Junction, which is a new single-track railway running along the west shore of Lake Maggiore, connecting with the Simplon tunnel line at Domodossola. Another project is 20 miles of the road from Gallarate to Laveno on the St. Gotthard line. North of Domodossola it is proposed to electrify the remaining 11 miles up to the mouth of the Simplon tunnel at Iselle, on which the ruling grade is 2½ per cent. Still another project is the electrification of the suburban lines northeast of Milan connecting Lecco, Usmate, Colozio, Ponte San Pietro, having a total length of 50½ miles.

In southern Italy the Naples-Salerno line, together with a short branch line, totaling 31.6 miles, is to be operated electrically if suitable water-power can be developed for generating purposes.

Several small projects, comprising in all 32 miles, will be completed in northern Italy by the end of 1911. These consist chiefly of short sections on heavy grades in the Ligurian Alps. One of the longest of these lines is the section from Savona to San Giuseppe di Cairo, which is 12 miles long. No work has yet been done on these lines, but the plans have been completed.

The most important electrical project of the Italian State Railways is the conversion of the line from Genoa to Busalla, on the road to Milan and Turin, in connection with the proposed electrification of the entrance tunnels in Genoa. This project will involve the conversion of nearly 20 miles of track. This will be the first line in Italy on which electric traction will be employed under conditions closely approaching main line traffic, as the trans-Alpine service is conducted on Swiss territory. The new road will be used very largely for freight traffic. The road to be electrified was formerly part of the main line between Genoa and Milan. The grades were excessive, and there was one long tunnel near the summit. Several years ago an-

other line was built, having much easier grades, and this new line; at the present time, carries the major part of both freight and passenger traffic. The old line, which is being electrified, has been used only as a relief track when congestion was severe on the new line.

Current for operating the electric locomotives will be generated in a steam power station in Genoa. Two Westinghouse steam turbo-generators of 5000-kw normal capacity have been installed, and a third unit will be added when the underground lines in Genoa are electrified. The generators deliver three-phase, 15-cycle current at 900 r.p.m. The generator voltage is 13,000, and current is transmitted at this voltage over transmission lines to four substations equipped with static transformers, to reduce the potential to 3000 volts between phases on the line. The two trolley wires have each an area of 100 sq. mm, which is slightly less than 0000 B. & S. wire gage. The rails are electrically bonded for the return current.

The three-phase electric locomotives which will be used on this line are of the Westinghouse type, and are remarkable for their great weight. They have five driving axles coupled together, and each locomotive carries two 800-hp motors which are connected to the wheels by a system of rods and cranks. The two motors are of the three-phase type and have eight poles. With a frequency of 15 cycles they are designed to drive the locomotive at a constant speed of 28 miles per hour when running in parallel, or 14½ miles per hour when connected in cascade. The locomotives have an adhesion weight of 60 tons, which can be increased to 75 tons by adding ballast. It is the intention to operate one of the locomotives at the head of a freight train and another in the rear, and it is believed that it will be possible to run trains of 20 freight cars, having an average weight of 20 tons, or a total train weight of 550 tons, at a constant speed of 28 m.p.h. up the long grades, which exceed 3½ per cent. As the line is divided into three block sections, it is expected that it will be possible to haul 1680 cars over the line in 20 hours, allowing a 10-minute interval between trains.

Traffic on these lines, of course, is heavy in both directions, and the adoption of three-phase locomotives makes it possible to utilize much of the energy expended in hauling trains to the summit by regenerating current and feeding it back into the line as the locomotives and trains descend the grade into Genoa. Provision has been made whereby a maximum of 4000 kw regenerated by trains descending the steep grade can be absorbed at the power house through an automatic rheostat.

PROTECTING SHOPMEN AT WORK UNDER CARS

A very useful precaution for protecting shopmen at work under cars has recently been adopted in the car houses by one of the large Eastern electric railway companies. When a shopman starts to work on a disabled car he fastens his individual flag on the operating end as a sign that he has begun his labors. No one but this shopman is permitted to remove the flag and in the meantime all other employees must refrain from operating the car on any pretext whatever. Cars in the shop for general overhauling or for other purposes which take them out of the control of the transportation department are usually indicated by "out of service" signs, but the special employee's flag is added whenever anybody is at work under the car or train. Movements of damaged equipment are permitted only in exceptional cases and must be made under the direction of the men whose flags are on the cars.

HEARING BY PUBLIC SERVICE COMMISSION ON SCHENECTADY FARES AND SERVICE

A hearing on the action of the Schenectady Railway in discontinuing the sale of six tickets for 25 cents and making certain changes in interurban and commutation fares and on various matters of service affecting the company took place before the New York Public Service Commission, Second District, at Albany, on Monday of the present week.

After brief statements regarding the reasons for the complaint made before the commission Lewis E. Carr, general counsel for the Schenectady Railway, stated its position: First, that the commission was without power so far as commutation rates were concerned; second, that the rates of the company were reasonable.

DOUBTFUL AS TO POWER OF COMMISSION

Chairman F. W. Stevens, of the commission, said that ever since the commission took office it had had presented to it in one form or another the question of regulating general commutation rates, school commutation rates and excursion rates. It had never made any decision as to whether or not it had the power to regulate such rates. Under the statute existing it was a grave question whether this power regarding these rates did rest with the commission. The commission had suggested amendments to the law making it perfectly clear in this respect. A bill containing the amendments had been passed by one branch of the Legislature and the understanding of Mr. Stevens was that the bill had been reported to the other branch. If the bill was passed the question would be simplified; if not, the matter would be left where it is now, with the same doubt existing, and would be taken to the courts to determine whether in law the commission had power over such rates. The commission had reached the unanimous conclusion that it would be better not to take up school or general commutation rates or excursion rates until the question of jurisdiction was settled. It would be a waste of time to take up the subject of rates of this character in the Schenectady case until more was known about the acts of the Legislature, as the power of the commission had been questioned so seriously. The principal question in all the cases affecting the Schenectady company involved the power of the commission to fix commutation, school and excursion rates. An act of the Legislature on the subject would avoid long and costly litigation and the commission thought it better judgment to wait and see if that issue could not be eliminated.

Mr. Carr said he did not see why the sale of six tickets for 25 cents was not the same as a commutation rate.

MATTERS OF SERVICE

Arguments and testimony relating to matters of service were then presented by Jacob W. Clute, Alderman August Tinnerholm, George R. Lunn and other citizens of Schenectady. It was stated by members of the citizens' committee that Horace E. Andrews had said in conference with them that he was perfectly willing to have a committee of reputable men examine the books of the company. Mr. Andrews was quoted as having said also that he was ashamed of the service the company was giving, but that it could not do better without higher rates of fare.

The complaints related largely to headway during rush hours and to the interurban waiting-room at Schenectady, which was criticised as inadequate and generally unsatisfactory.

Mr. Carr said that if the members of the committee

would sit down with E. F. Peck, general manager of the company so that he could have a clear understanding of what they wanted in addition to the present service, the railway would do the best it could to accommodate itself to their desires. This arrangement would avoid taking up the time of the members of the commission and of others. Practically the same condition during rush hours existed at Schenectady as at other places. Crowds traveled during the morning and evening rush hours and probably the noon hours also to some extent. It was not possible, however, to avoid this crowded condition. As to the waiting-room, he would like to have the commission make suggestions as to what could be done to improve it. The company did have a very satisfactory plan that would have effected improvement, but the city authorities were unwilling to have the arrangement made. The company owned only a small strip of land where the waiting-room stood and it could not acquire more by condemnation. The waiting-room was not one that he could approve and he thought the subject should be taken up seriously and some good advice given by the commission.

Chairman Stevens said that if a better waiting-room was needed it should be provided.

Mr. Carr said there was no justice in the use of the waiting-room by passengers on local cars. There was not the slightest objection to examination of the books. The subject of commutation rates could be held until it was ascertained what would be done by the Legislature. If the amendments to the law were passed and there was no question as to the power of the commission the subject could be brought up, involving the reasonableness of the rates.

A REASONABLE RATE

Chairman Stevens asked what constituted a fair rate.

Mr. Carr said it was fairly well agreed, or ought to be, that a company should obtain enough to meet its operating expenses, fixed charges and a reasonable return by way of a dividend on the stock.

Chairman Stevens asked if that would not depend on what the stock represented.

Mr. Carr said the stock represented property to the fullest extent.

Chairman Stevens said that the courts in their decisions had gone into the question of the value of the property used in the service; that would naturally require an appraisal.

Mr. Carr said he could not say how he should go about it. The subject opened a very wide field. In some form the question must be determined. He assumed that the commission would not determine it as a guess or speculation; but it must be determined in some reasonable way. The extent to which an inquiry might go might be more limited in some cases than in others.

Chairman Stevens said it was a question of applying the law to the facts of the case. The commission would like to be informed why the company had departed from the usual custom, giving a discount on tickets sold in quantities.

Mr. Carr said the scheme had been tried as an experiment and now discontinued. The company was entitled to a 5-cent fare. When the transfer traffic was added the company was carrying its passengers for an average of just a fraction over 4 cents per passenger. If the public wished to have the 4-cent fare without transfers the company and the public would not be very far apart.

A discussion regarding service followed. Francis K. Kernan, of counsel for the company, said he thought the railway was using its trackage to the fullest extent. The

city of Schenectady had refused to give extra trackage rights that were needed.

Mr. Peck explained the plan of the company to have the terminal for its interurban lines separated from the central district terminal for the city lines, which was rejected by the city authorities. He said that in the rush hours the headway in the congested district was practically one minute. Out of 17,000 people employed by the General Electric Company at Schenectady 5000 had to be carried away in 20 minutes when they stopped work in the afternoon.

Chairman Stevens said the commission would take the matter of rates under consideration and see what it could do and what it ought to do. The commission had full power to investigate questions of capitalization; it was very largely a question of how to pay for such investigation. The question would be different if plenty of money had been appropriated for the commission.

A suggestion was made by Chairman Stevens that the citizens' committee write to the commission making specific suggestions respecting the waiting-room and arrangement of tracks. These matters then will be taken up with the company by the commission.

Adjournment was then taken, the commission holding the cases open without fixing a day for a subsequent hearing.

ELECTRIC RAILWAY FIRE INSURANCE CHANGES PROPOSED

A number of interesting matters have recently occurred in connection with the subject of fire insurance on the properties of electric railway, light and power companies and gas plants. At present the rates on these properties in different sections of the country are fixed by different rating organizations, of which there are some 50 or more, each having jurisdiction over a different territory. The result is that there is no uniformity either in rates or regulations covering improvements in risks, a condition which has resulted in great confusion. Where the ownership of widely distant railway properties has become united, as in a number of cases, this difference in rules and rates has become very apparent and has resulted in great dissatisfaction.

To remedy this evil a number of the leading insurance companies have thought that it would be desirable if the power to fix rates and unify the conditions regarding improvements from a fire-protection standpoint should be invested in one central bureau. This is the plan followed in the case of the steam railroads. The condition of the electric railways is coming to be largely the same, because the executive offices of many of the largest electric railway companies are now in New York and it has been thought that a central rating bureau in New York could deal directly and much more efficiently with this problem than if these matters were left to the local rating bureaus.

In consequence the following series of resolutions has been introduced for ballot at the periodical meetings of a number of the rating organizations throughout the country:

Whereas, The concentration of financial control of electric railway properties and allied classes has produced conditions which threaten the gradual loss of the business to stock companies under present methods of control by the various underwriting associations, be it

Resolved, That this exchange hereby delegates all jurisdiction over rates, rules and forms having to do with electric traction and allied properties, also electric light and power stations and gas works to a central rating committee to be made up of duly authorized representatives of this and other organizations hitherto having jurisdiction over

such risks in various parts of the country and this exchange agrees to bear its pro rata proportion of the expenses of said central committee.

Resolved, That this exchange reaffirms and declares to be mandatory all existing rates and rules, both specific and general, governing such risks until changes and alterations in the same shall be duly promulgated by said central rating committee and that all rates, rules and forms promulgated by said central rating committee as hereinafter provided shall thereupon immediately be binding upon all members of this exchange. It being understood that all changes and alterations in the rates, rules and forms governing such risks in the territory of this exchange shall be promptly communicated to members by the said central committee through the manager of this exchange by promulgation on rate cards and circulars.

Resolved, That this exchange names its manager as its representative on such central rating committee.

Resolved, That the foregoing resolutions are to become effective May 1, 1909, or as soon thereafter as the said central committee shall have been formally organized.

This resolution has been adopted by some half a dozen various exchanges and it is thought will be adopted by all of them. It has, however, created some opposition, particularly among the local fire insurance agents, some of whom are protesting against the change proposed. The following circular letter voicing the opposition has been sent to the members of the National Association of Local Fire Insurance Agents:

We believe it is for your interest to be advised that the Eastern Union has requested rating organizations in territory under its jurisdiction to relinquish control of rates on street railways, electric light, power and gas plants. The apparent object is to have the rates made from a central bureau in New York and the insurance written therefrom.

The Springfield, Mass., local board, at its regular monthly meeting April 12, adopted the following vote:

"Voted: That the influence and help of the National Association of Local Fire Insurance Agents be invoked to assist us in obtaining from companies assurance that any change in the method of handling street railway insurance will not result in the overhead writing of these lines and the disregard of territorial rights of local agents."

At the same time it was voted to file a protest with the New England Insurance Exchange against any action permitting the overhead writing risks. The Fall River board has since taken similar action and other boards will do the same.

You are also advised that the Boston Board of Fire Underwriters has declined to accede to the request of the Eastern Union to throw off rates on the property named. It may interest you to know that there is a bureau established in New York City comprised of some 40 companies, the apparent object of which is to secure insurance on the street railways on the plan adopted by the so-called steam railroad syndicate.

Coincident with this movement there is a disposition on the part of some companies to take street railways and other similar risks out from under the overhead writing rules of the National Association of Local Fire Insurance Agents. Brokers handling those lines are urging companies to adopt this course in the writing of these risks. We shall be glad to have you advise this office of any action which may be taken in your locality regarding this matter.

The natural result of a central rating organization would be to put the insurance of electric railway properties on a more economical and scientific basis than under the present somewhat chaotic condition, and the proposed move seems to be in the interests of the electric railway companies.

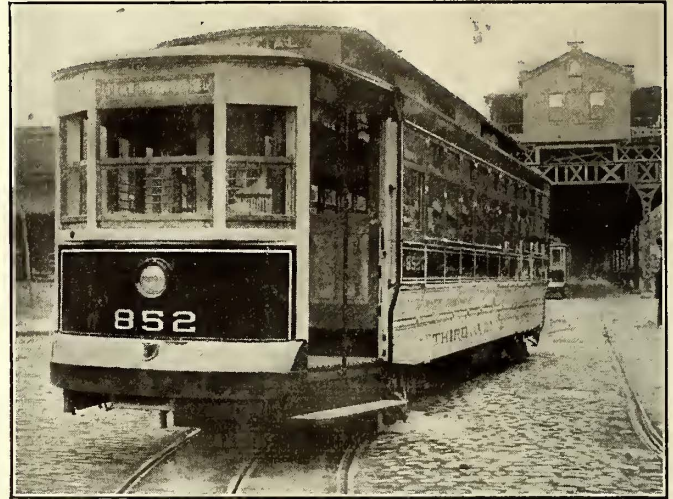
The Rensselaer Polytechnic Institute, Troy, N. Y., which recently received a bequest from Mrs. Russell Sage of \$1,000,000, has announced that the money will be used to build laboratories for the new departments of mechanical engineering and electrical engineering.

OPERATION OF CONVERTIBLE PAY-AS-YOU-ENTER CARS BY THE THIRD AVENUE RAILROAD COMPANY, NEW YORK

The Third Avenue Railroad Company, New York, has just begun the operation of some of the 200 convertible pay-as-you-enter cars ordered in January of this year. The company's first pay-as-you-enter cars were of the closed type, with 6-ft. platforms and longitudinal seats, and were so satisfactory that F. W. Whitridge, receiver of the company, was desirous of applying the prepayment idea on open cars. As this would have been impossible on the ordinary open car, the problem was solved by combining the Brill convertible car with the pay-as-you-enter platform. The appearance of the new cars in both summer and winter dress will be noted from the accompanying illustrations. In making the conversion to summer service no changes are required on the platforms except the substitution of a folding gate for the doors on the controller side. The sash and supporting panels removed from the body make way for storm curtains and a metal screen of sufficient height to prevent passengers from boarding or alighting except by way of the platforms.

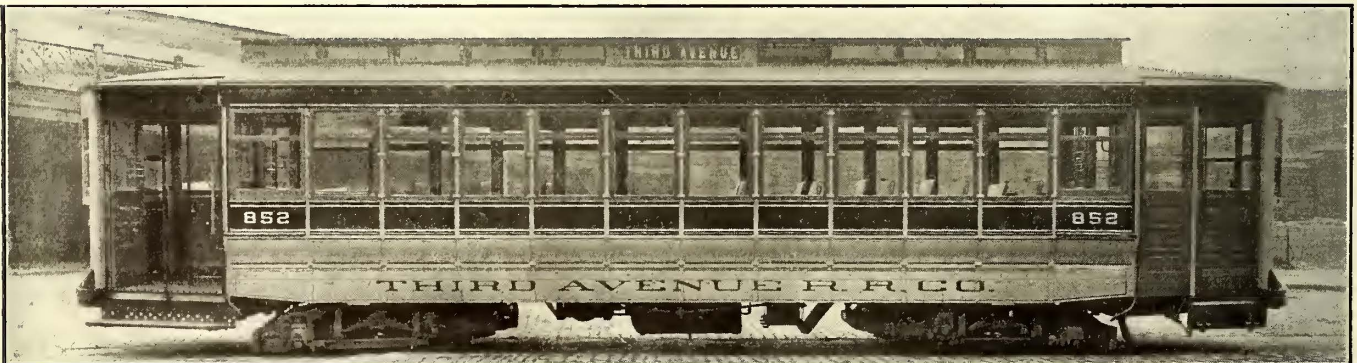
The new car affords what seems to be a very satisfactory substitute for the ordinary open car. The latter, of course, is very popular in New York, as elsewhere in the East, but with a crowded running board and many openings is exceptionally dangerous on Third Avenue because the elevated pillars are so close to the street railway tracks. The

free and easy open cars. Cross-seats with a center aisle have not been used to any great extent on the New York surface cars, but it is thought that this feature will attract many passengers, especially during the summer months.

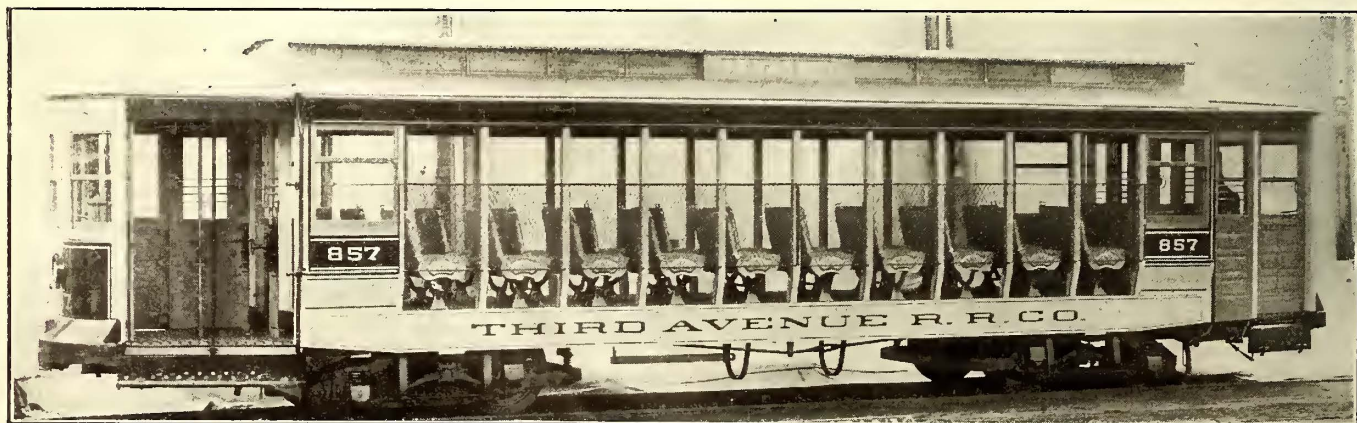


Convertible Pay-As-You-Enter Car—Head-On and Part Side View

The cross-seats, which are 36 in. wide, will not impede passenger movement, as the center aisle is 26 in. wide, and short longitudinal seats with folding ends are placed at the body doors.



Convertible Pay-As-You-Enter Car—Sides in for Winter Service



Convertible Pay-As-You Enter Car—Sides Removed for Summer Service

pay-as-you-enter convertible car will reduce accidents from this source to a minimum, as the conductor and motorman will be able to give close attention to the entrance and exit of the passengers. It also provides the security in regard to collection of fares which is not possessed by the

The platforms of the new cars are about 6 ft. long and, like the ordinary closed cars, are fitted with removable benches. The body is 30 ft. 1 in. long, and has a maximum width of 8 ft. 3½ in. over all and 8 ft. 2 in. at the window posts. A detailed description of this design was

published in the Jan. 23 issue of the *ELECTRIC RAILWAY JOURNAL*. In all, the Third Avenue Railroad Company will soon be operating a total of 350 pay-as-you-enter

are submitted to either the bureau or the Accountants' Association and in this way a complete understanding will be obtained by the electric railways of the interpretation placed upon such matters as will be brought up.



Convertible Pay-As-You-Enter Car—Interior View with Sides Removed

cars, 150 of the closed type and 200 of the convertible type. All of these cars were ordered from The J. G. Brill Company under license of the Pay-As-You-Enter Car Corporation.

A uniform system of numbering the accounts of the three classifications in such a way that companies using either classification B or C may use account numbers in harmony with the account numbers of classification A was considered and preliminary steps were taken to bring out such a suggested plan of numbering.

The Accountants' Association proposes to publish immediately the complete classification of revenue, construction and operating accounts in pamphlet form.

COST OF ROLLING STOCK MAINTENANCE OF THE MARION, BLUFFTON & EASTERN TRACTION COMPANY

The Marion, Bluffton & Eastern Traction Company operates a high-speed interurban railway 31.57 miles long, connecting Marion, Ind., and Bluffton. The line was opened for operation on Dec. 15, 1906, with five passenger cars, Nos. 325, 330, 335, 340 and 345; one express car, No. 264, and one work car, No. 278. One additional passenger car, No. 350, was put in service late in 1908. The passenger cars are 45 ft. long and weigh about 30 tons each. They are mounted on Taylor trucks and are equipped with four Westinghouse 93-A motors, geared to 50 m.p.h., K-14 controllers and straight air-brakes. The roadbed consists of 70-lb. rail laid on ties well-ballasted with gravel. There are no grades outside of towns which exceed 1.5 per cent, and only one short-radius curve. All other curves are of large radius and in the 31 miles of track there are two tangents each 6 miles long, and two tangents each 5 miles long. These conditions, of course, are favorable for low maintenance costs for the rolling stock.

The following table shows the mileage each car has made since they were put in service up to Jan. 1, 1909; it also shows number of car miles run, number of direct-current kw-hours used per car mile, watt-hours consumed per ton mile, cost of oil, brake shoes and trolley wheels per 1000 miles for the year 1908, compared with the year 1907. The table also shows the mileage of steel-tired wheels.

Car No.	Car miles run—		Total car miles for each car.	Mileage of steel tires before turning.
	1907.	1908.		
325....	69,508	53,102	122,610	{ 3 Pair 69,508
330....	78,390	87,224	165,614	{ 1 Pair has not been turned
335....	88,084	84,060	172,144	{ 3 Pair 100,080
340....	77,578	86,518	164,096	{ 1 Pair has not been turned
345....	28,336	7,091	35,427	100,000
350....	.....	8,211	8,211	{ 3 Pair 101,043
264....	49,124	26,230	85,354	{ 1 Pair has not been turned
278....	15,286	14,384	29,670	101,043
	406,306	376,820	783,126	Have not been turned

	1907	1908
Total car miles run.....	406,306	376,820
Direct-current kw-hours used in year.....	1,039,262	1,022,130
Direct-current kw-hours per car mile..	2.56	2.71
Watt-hours per ton mile.....	80	85
Cost per 1,000 car miles for oil and gear shield.....	\$0.35	\$0.19
Cost per 1,000 car miles for brake shoes	1.02	.60
Cost per 1,000 car miles for trolley wheels and supplies for same.....	.42	.32

The average mileage for the steel-tired wheels is very large. The accompanying engraving shows the condition of one of a pair of wheels which had made 195,525 miles

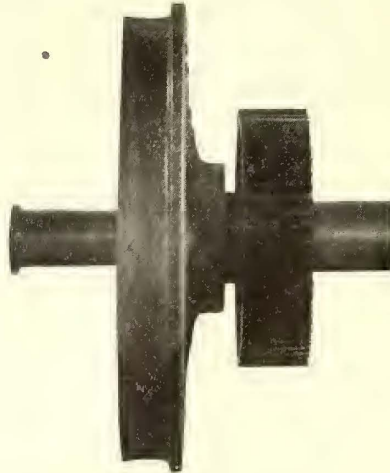
CONFERENCE WITH INTERSTATE COMMERCE COMMISSION ON STANDARD CLASSIFICATION OF ACCOUNTS

A meeting was held at the New Willard Hotel, in Washington, D. C., April 22 and 23, for the purpose of considering answers to the questions propounded to the Interstate Commerce Commission and to the Accountants' Association regarding the working of the standard classification of accounts, which has been adopted as standard by the Interstate Commerce Commission and the Accountants' Association. Those present were: C. A. Lutz, chief examiner of accounts; F. W. Sweeney and C. I. Dawson, representing the Bureau of Statistics and Accounts of the Interstate Commerce Commission, and W. F. Ham, chairman; H. L. Wilson, W. B. Brockway and W. H. Forse, Jr., of the committee on standard classification of accounts, and R. N. Wallis, president, representing the American Street & Interurban Railway Accountants' Association. Upward of 75 cases were considered and agreed to in the light of the classification.

In regard to future questions it was decided that electric railways doing an interstate business should, in case doubts arise as to the proper distribution of accounts, write the Bureau of Statistics and Accounts of the Interstate Commerce Commission, and before formally deciding the matter, the questions are to be submitted to the standard classification committee of the Accountants' Association so that the answers will be in harmony with the opinions of the bureau and of the Accountants' Association. All roads not doing an interstate business may address their questions to W. F. Ham, comptroller, Washington Railway & Electric Company, Washington, D. C., chairman of the standard classification committee of the Accountants' Association, and before the decision is rendered they will be submitted to the Bureau of Statistics and Accounts in order that its views may be had.

The Bureau of Statistics and Accounts will publish from time to time all of the questions and answers that

before they were turned. The diameter of these wheels when new was 34 in.; when taken out for turning they calipered 33½ in., showing ½ in. wear on the treads. After they were turned they calipered 33 in., showing a loss of but 1 in. in diameter. The wheels are Railway Steel-Spring Company's manufacture, with Midvale bolted type tires 2½ in. thick, ¾-in. tread and 1⅛-in. flange. Up to the present time no motor armatures have been re-wound and no motor or axle bearings have been changed.



Steel-Tired Wheel After Running
195,525 Miles

This paper is indebted to C. W. Clark, superintendent of the Marion, Bluffton & Eastern Traction Company, for the information and photograph.

DENVER SELECTED FOR CONVENTION CITY

As a result of the visit of the committee on location of the convention of the American Street & Interurban Railway Association and the American Street & Interurban Railway Manufacturers' Association to Denver last week, a decision was reached to hold the next convention of the association in Denver during the week commencing Oct. 18. The names of the gentlemen composing the two committees were published last week. On arrival at Denver they found the conditions there excellent for convention purposes. The conditions included facilities for holding the meetings, for making the exhibits and the hotel accommodations for the attendants at the convention.

The meetings and the exhibits will be held at the new auditorium, which is a beautiful brick and concrete structure built to accommodate national political conventions and other large assemblies which desire to meet in Denver. This auditorium contains an open area of 50,000 sq. ft., which will be available for exhibit purposes. It also contains several halls suitable for the meetings of the American association and its affiliated organizations. Electric current can be supplied exhibitors at 500 volts direct and 220-110, 60-cycle alternating. There is also steam at 100 lb. pressure. The space available for exhibit purposes is by no means confined, however, to the hall itself. Arrangements have been made by which additional exhibits, especially the larger apparatus and equipment, like cars, can be placed on the streets adjoining the auditorium. The streets are asphalted and the area thus occupied will be closed off from regular traffic and roofed over, so that it is certain that sufficient space can be had for all manufacturers desiring to make exhibits of apparatus and material next October.

While in Denver Mr. Beggs acted, by unanimous consent, as joint chairman and spokesman of the two committees. The committees were received and courteously entertained by W. G. Evans, president of the Denver City Tramway Company, as representative of the Denver City Tramway Company, which owns the city railway system

and a number of the interurban systems around Denver, and also by the Denver Convention League, of which W. F. R. Mills is chairman. It was through the co-operation of these gentlemen that the arrangements for the Convention Hall, already outlined, were made. At a dinner given to the committees, at which the Governor of the State and other prominent city and State officials were present, the representatives of Denver expressed themselves as very enthusiastic over the selection of that city for the convention and assured the committees that all who should attend the convention would receive a most cordial welcome. Regrets were expressed that John A. Beeler, vice-president and general manager of the Denver City Tramway Company, was not able to be present at the dinner on account of illness.

En route to and from Denver the committees visited Milwaukee, Kansas City and Chicago, and at each of these cities fulfilled the enjoyable duty of presenting a badge to a past-president of the American association. It will be remembered that in January of the present year, at the annual banquet extended to the executive committee of the American association by the Manufacturers' association, similar badges were presented to those ex-presidents of the association who were in attendance. Badges also were prepared for all living ex-presidents of the association, and it was the request of President Shaw that members of the executive committee of the Manufacturers' association should present these badges in person to those ex-presidents who were not in attendance at the banquet in New York. The first badge thus presented was that given to John I. Beggs, president and general manager of the Milwaukee Electric Railway & Light Company. Later on the trip presentations of badges were made to Walter H. Holmes, who was president of the American Street Railway Association, 1900-1901, and to Capt. Robt. McCulloch, president of the United Railways Company, of St. Louis. Captain McCulloch was president of the American Street Railway Association in 1896-1897. On the return to Chicago, at a luncheon at the Union League Club, the final badge with which the committee was intrusted was presented to John M. Roach, president and general manager of the Chicago Railways Company. Mr. Roach was president of the American Street Railway Association in 1899-1900.

During its trip the committee of the Street Railway Association had opportunity to learn the sentiment of a great many managers of the electric railway companies in the Middle West and Far West upon the plan of meeting at Denver. They found all with whom they discussed the matter very enthusiastic over the prospect.

The German Government is said to have drawn up plans for electrifying sections of the main line of the State railway system between Magdeburg and Zerbst, Bitterfeld and Leipsig and Leipsig and Halle.

There is a complete system of narrow-gage railways connecting many of the small villages and towns in Belgium with the larger cities. All of the 136 lines, which aggregate 2055 miles, are owned and operated by one company, the Société Nationale des Chemins de Fer Vicinaux. The tracks are laid along the country roads and sometimes across the fields. Most of the lines are still operated by steam locomotives, but the change to electric traction with overhead trolley is progressing rapidly. Already about 120 miles have been converted.

ANNUAL CONVENTION IOWA STREET & INTERURBAN RAILWAY ASSOCIATION

A very successful annual meeting of the Iowa Street & Interurban Railway Association was held at Cedar Rapids, Ia., April 22, 23 and 24. The Iowa Electrical Association held its convention at the same time and the supply men displayed an interesting exhibit of machinery and materials for railway and lighting plants. P. P. Crafts, general manager, Iowa & Illinois Railway Company, Clinton, Ia., and president of the Iowa Street & Interurban Railway Association, was in the chair. The following officers were elected to serve during the coming year: President, P. P. Crafts, general manager, Iowa & Illinois Railway Company; vice-president, E. M. Walker, general manager, Citizens' Railway & Light Company, Muscatine, Ia.; secretary and treasurer, L. D. Mathes, manager, Union Electric Company, Dubuque.

A brief abstract of the president's annual address presented by Mr. Crafts follows:

Considering existing conditions the Iowa properties made an excellent showing during the past year. Several lessons were taught which should remain firmly fixed in our memories. The results accomplished by the association have been widespread and beneficial. During the past year there were introduced before the general assembly a number of bills seriously affecting the railway interests, but no very harmful measures were passed.

City and interurban managers more and more realize that proper service and not low fares induce traffic and therefore during the past year they have devoted more time and money to the maintenance of accurate train schedules and the better up-keep of equipment and tracks with correspondingly good results in net earnings. By this policy not only are earnings increased, but the good will of the general public, which is so necessary to public-service corporations, and which many corporations have not enjoyed in the past, is being gradually won and in many cases has been restored after long and trying dissensions.

All these improved conditions have a strong tendency to increase the faith of the investor in electric railway securities. The increasing number of proposed interurban lines in Iowa indicates the truth of this statement. Many of these proposed lines will never be constructed, but a number, which because of the example set by operating properties, can confidently be expected to produce good results, will be built when the conditions of the money market improve. It is probably safe to predict that within a few years the State of Iowa will have as many or perhaps more miles of interurban railways for its population than any other State of the Union. The resulting benefits will be felt by existing as well as by the new properties, both city and interurban roads.

With regard to the gaining of public confidence, with shining examples to follow, many of us are too reticent and secretive about our business, give too little attention to small complaints, do not demand sufficient courtesy from our employees toward our patrons, and in many other ways fail to properly fulfil our obligations to our customers—the public. If a patron makes a complaint don't pass him down the line or keep him waiting. Don't give him an evasive answer or a reason which leaves him unsatisfied. Don't be mysterious. Don't hurry him away. Don't try to make him believe that your road is perfect and that mistakes never occur; he won't believe you.

Take him in hand promptly. Show an interest in his complaint. Acknowledge that mistakes occur. Look for the cause of his complaint while he is there if possible. Show a desire to correct the mistake. If you cannot give him an explanation then obtain his address and write him an explanation later. Do something, do it then, and many times you will turn a possible enemy into a staunch friend for your road and he will make other friends for you. After a while the public will believe that you want their patronage and support and will show a more friendly spirit to your interests. They will be less prone to listen to the

buluncombe of the ward politician and the latter's day of harmfulness will have passed.

At the 1908 convention your attention was directed to the fact that the Iowa Railroad Commission would probably adopt the report forms of the Interstate Commerce Commission. This prediction has been fulfilled, and such of our companies as are under the jurisdiction of the Iowa Railroad Commission have been obliged to change their accounting systems to conform. In the limited time allowed the change has proved a burden, but once in effect the new system was found easy to maintain and far superior to some of the old methods. The trend of the times is toward government supervision of public utilities, as evidenced during the recently adjourned General Assembly of the State. Although a commission was not created during the past session, it may come during the next. Such a commission might have jurisdiction over street railways and would in all probability adopt the accounting system of the Interstate Commerce Commission. Permit me to urge upon you, therefore, the importance of adopting the Interstate Commerce Commission system of accounting without alteration or addition.

The day of the so-called interurban road, whose small cars meandered slowly along one side of the public highway without much regard for schedules, is past. We are now operating heavy rolling stock at steam-railway limited-train speed, and, generally speaking, on closer headway. In addition nearly all interurbans are operating freight trains, from the single-car trains to those of several cars each, under varying conditions of schedule and speed. Not more than two interurban railways in the State operate under the same code of rules. City roads have various codes in use, probably no two of which agree in their general application. No doubt some have tried standard steam railway rules and finding them unsuitable in many respects for use on electric railways have altered them to fit peculiar local conditions. There is urgent need for standardization in this field.

The annual report of the secretary and treasurer showed the business affairs of the association to be in a healthy state. Every road but one in the State of Iowa is a member of the association.

OPERATING RULES

A paper on "Operating Rules for Street and Interurban Railways" was presented by J. A. Du Bois, chief dispatcher, Cedar Rapids & Iowa City Railway & Light Company. An abstract of this paper will be found on page 835.

F. J. Hanlon, Mason City & Clear Lake Railway, did not agree with Mr. Du Bois in his argument that a comprehensive set of rules similar to those used by steam roads should be adopted by a small interurban railway. For an extensive interurban system, however, the comprehensive rules were ideal. Mr. Hanlon formerly had been connected with a steam road and appreciated the value of the rules of the American Railway Association for a large road. His road, however, was less than 20 miles in length and operation by time card for a number of years had been so satisfactory that he did not feel the need of an elaborate code of rules. With the passenger trains operating on time cards and the freight trains keeping out of the way of the passenger trains there have been so few delays that the expense of a dispatcher did not seem warranted.

C. B. Fairchild, Jr., *Electric Traction Weekly*, suggested that the greater frequency of trains on electric lines would necessitate most careful study of any rules to be adopted. He recommended that a committee from the Iowa association be appointed to discuss train rules in conjunction with the committee of the American Street & Interurban Railway Association.

P. P. Crafts outlined his experience in formulating train rules for the Iowa & Illinois Railway. When this road started operation rules were adopted which then were thought satisfactory, but as the traffic grew these rules

were found not to cover every situation and therefore Mr. Crafts studied the rules proposed by the American and the Central Electric Railway associations with the purpose of formulating rules as closely as possible in line with steam railroad practice, but better suited to interurban conditions. Mr. Crafts called attention to several criticisms which he would make in the American Street & Interurban Railway Association rules. These suggestions had been embodied in a letter to the secretary of the association for the use of the rules committee of that association. It was his principle to make the unusual condition rather than the usual condition an excuse for issuing a train order. He did not feel that the American Street & Interurban rule regarding the protection of a train was as complete as it should be and therefore he had adopted the rule covering this situation as used by the Chicago & Northwestern Railway. This rule definitely states what each man shall do in protecting a disabled train between stations and includes instructions for moving a disabled car on a curve to straight track or to a place where the disabled car can be seen from both directions. The method of receiving a train order required by the rules on his road, he thought, offered every possible check against mistakes. This rule requires that the motorman shall call up the dispatcher outside of the hearing of the conductor, receive and write out the order on a tripling machine which locks up one copy beyond the control of the dispatcher and the trainmen. After the motorman has written down the order the conductor, who in the meantime has not heard it, is required to repeat the order to the dispatcher. This method offers a double check against misinterpretation of wording or transcribing and against the possibility of the order being repeated from memory by the conductor.

J. D. Wardle, Cedar Rapids & Iowa City Railway, described the train rules used by his road. These rules approached very closely to steam railroad practice and provide for all contingencies. He had found under the usual interurban rules that there were situations in which the traffic would come to a standstill. The steam rules, however, provided for these emergencies. Mr. Wardle favored the adoption of standard rules for the Iowa roads so that with the exchange of men there would be no probability of misinterpretations of rules. One point in favor of the standard steam rules used by the Cedar Rapids & Iowa City Railway was that in the past it had been possible for this interurban road to send steam trains and crews of the Chicago, Rock Island & Pacific and the Chicago, Milwaukee & St. Paul railroads from end to end of the line in addition to the regular interurban service with only the customary pilot.

Regarding the keeping of copies of orders Mr. Du Bois said that all train orders were made in triplicate and the lowest copy was deposited in a locked box. The dispatcher wrote the orders in ink in a copy book and no erasure was permitted.

INTERSTATE COMMERCE COMMISSION ACCOUNTING SYSTEM

A paper on the "Application of Interstate Commerce Commission System of Accounting with Regard to Street and Interurban Railways" was presented by H. E. Weeks, secretary and treasurer, Tri-City Railway, Davenport, Ia. This paper will be found in abstract in the *ELECTRIC RAILWAY JOURNAL* for April 24, 1909, page 785.

Methods used in the adoption of these rules were outlined by C. L. Wight, auditor, Interurban Railway and the Des Moines City Railway, Des Moines, Ia. The city and interurban companies used the same classification with 88

accounts for the city property and 34 for the interurban. The additional clerical assistance required in the auditing office since the adoption of the new classification had been only one man. The accounting for the items of demurrage, mileage and per diem charges were more complete than formerly. Expense items were not subdivided except on the vouchers. When a company was to adopt the new classification Mr. Wight would suggest getting a new set of forms. A new set of books would not be necessary, but would be advisable. The adoption of the new system might make difficult a thorough comparison of operating items with those as kept in the past, but this was not a serious objection because the electric roads were growing so fast that the records of more than one or two years back were not worth much for comparisons of operation. The Des Moines companies had found much less difficulty in adopting the new classification than had been anticipated. In redistributing the accounts typewritten distribution sheets have been given to department heads and where these were not fully understood the doubtful points were discussed in conference. Mr. Wight recommended the adoption of the interstate classification by all electric railways in Iowa.

F. J. Hanlon stated that the Mason City & Clear Lake Railway had adopted the interstate classification beginning July 1, 1908. It was the practice of this road to use parts of the classifications for the roads falling under classes A, B and C. This furnished most complete operating statistics and when the report was made to the commission it was an easy matter to reduce the items to the class C classification under which this road was required to present its accounts.

Mr. Weeks stated when questioned that the matter of the disposition of discount on securities had been discussed repeatedly and that a committee of the Accountants' Association was endeavoring to get a conference with the Interstate Commerce Commission so that a decision might be rendered on this point.

F. J. Hanlon and H. E. Weeks had found in changing over to the interstate classification on the Mason City and the Des Moines roads practically no additional expense was incurred except for stationery.

L. E. Gould, *ELECTRIC RAILWAY JOURNAL*, outlined the discussion presented on the subject of changing accounts by the Wisconsin Street & Interurban Railway and other associations recently in session at Sheboygan, Wis. This discussion was abstracted in the *ELECTRIC RAILWAY JOURNAL* for April 24, 1909, page 773. Those Wisconsin roads which had adopted the new classification had done so with practically no additional office expense and it was thought in many instances that the very complete system of accounts would be of great value to the roads for managerial purposes.

H. B. Noyes, Omaha & Council Bluffs Street Railway, stated that he was not connected with the accounting department of his company, but knew that while the adoption of the new classification had required some additional men the results obtained from the new accounts had been of considerable value to the electrical and mechanical department of which he was the head. Mr. Noyes had put into effect a system of estimates and job orders for handling work in the mechanical department. Before beginning a new job the subheads of the department made estimates which were checked by him and approved by the general manager. Copies of these estimates were then sent to the auditing department. With such estimates on record there was available a means of urging the men to do work at a

low cost. This method also encouraged the shop assistants to be careful about wasting labor and material.

DEVELOPMENT OF TRAFFIC

A paper on the "Recent Development of Street Railway Traffic" was presented by E. M. Walker, general manager, Citizen's Railway & Light Company, Muscatine, Ia. This paper will be found elsewhere in this issue.

H. B. Noyes, Omaha, told of new cars which were being built in Omaha in which a sacrifice in carrying capacity had been made with a view of offering the passengers additional conveniences. One of the improvements in these cars was the installation of cross-seats.

I. B. Smith, traffic manager, Cedar Rapids & Iowa City Railway, thought that the most effective way to encourage traffic for an interurban road was by being persistent in soliciting business by letter.

Mr. Walker had obtained good results as regards reducing accident claims by using a recently published lithograph showing the right and wrong ways to get off cars.

Mr. Fairchild mentioned the present wave of publicity through the newspapers carried on by large city railways.

H. W. Garner, general manager, stated that the Oskaloosa Traction & Light Company in the past had supported a baseball team and he was satisfied that this was a good means of increasing traffic. The 15 extra cars required to handle the baseball crowds were manned by linemen and other employees that could be called upon.

L. E. Gould called attention to the desirability of encouraging the settlement of suburbs. An electric railway might very profitably devote considerable attention toward the development of suburban property in cities of moderate size where the haul was not unduly long. He described a scheme which a number of railway managers in the North Central States have entered into whereby a magazine will be issued monthly bearing the name of the local road. The contents of the magazine will include articles bearing on the value of small garden plots, the healthfulness of suburban life and the possibilities of making good investments in home properties outside of the crowded city districts. Mr. Gould also called attention to the great need for operating cars in small towns exactly on schedule. He described the plan followed by the Sheboygan Light, Power & Railway Company. This company printed many thousand schedules for city distribution showing the time at which cars on each route would pass closely spaced time points. The management exerted special efforts and brought about extreme accuracy in the maintenance of city schedules. As a result the short-haul traffic had been greatly increased.

F. J. Hanlon described how a shortening of the headway of the cars serving a suburban district near Mason City had not only developed a property in which the road was interested, but had more than doubled the earnings in that particular section. The short headway cars had encouraged people to move out of town and where a few years ago there were but 10 houses when cars were operated 30 minutes apart, there are now 300 houses and cars are run 15 minutes apart. This road uses time-tables with five-minute intervals for the convenience of its passengers and the convenience of the passenger of knowing exactly when a car will pass a time point has greatly increased short riding.

Mr. Crafts described his earlier experience with a city property which, when he took it in hand, did not have a very reliable schedule. An effort was made to run cars exactly on time and time cards with two-minute spacing points telling where each car would be every two minutes served greatly to increase the short riding.

On motion the chair appointed the following committee to consider standard rules for the Iowa roads and to confer with the rules committee of the American Street & Interurban Railway Association: C. D. Cass, general manager, Waterloo, Cedar Falls & Northern; J. A. Du Bois, Cedar Rapids & Iowa City; C. P. Wilson, Des Moines City Railway and Interurban Railway Company.

DEVELOPMENT OF INTERURBAN TRAFFIC

A paper on "Recent Development of Interurban Traffic" was presented by C. M. Cheney, general freight and passenger agent, Waterloo, Cedar Falls & Northern Railway. This paper was printed in abstract in the *ELECTRIC RAILWAY JOURNAL* for April 24, 1909, page 786.

F. J. Hanlon stated that the Mason City & Cedar Lake Railway depended very largely for its success on its freight traffic. This company has just carried out a novel enterprise for obtaining freight traffic. A large icehouse has been built on the shore of a lake close to one end of the line. During the past winter this house was filled with an excellent quality of ice and it is proposed to put out a salesman during the summer who will take orders for ice. He stated that the freight revenue alone from this enterprise would be between \$20,000 and \$25,000 during the present season in addition to which there would be a profit on the ice sold.

Mr. Crafts outlined his methods of handling chartered car service. The Iowa & Illinois Railway Company makes a charge of \$50 for a motor car and \$40 for a trailer during regular operating hours and an additional charge of \$5 per hour for the use of a car after midnight. No limit is placed on the number of passengers that can be carried. This service is found to be profitable.

C. D. Cass thought that a flat rate for a car as offered by Mr. Crafts promoted the use of such cars because the organizations contracting for them could know how much the service would cost.

L. D. Mathes, Dubuque, mentioned the fruit special operated by the Spokane & Inland Empire System, an article regarding which was presented in last week's issue of this paper on page 790.

C. M. Cheney thought it more profitable for a small road to handle its heavy carload freight in trains drawn by steam locomotives, as was the practice on the Waterloo, Cedar Falls & Northern Railway.

J. D. Wardle stated that the Cedar Rapids & Iowa City road had an excellent location for freight handling with but one short 2 per cent grade and a few grades of 1½ per cent. Over this line, 28 miles long, a 35-ton electric locomotive with four Westinghouse No. 56 motors could economically handle a 300-ton train. It was a serious question, however, as to how to make time with the heavy trains and not overload the power station so that the passenger schedules might not be deranged. Mr. Wardle asked for information as to the best rule for determining when to install a siding for some source of traffic, such as a local manufacturing plant along the route.

Mr. Cass stated that in some instances the shipper served by the siding could be encouraged to pay for the cost of building a side track. He explained that the courts had ruled it lawful for the road to make a contract with the user of the siding and deduct from the freight bills proportionate amounts until the siding had been paid for.

Mr. Crafts described the methods of soliciting freight used by the traffic representative of the Iowa & Illinois Railway. Freight is solicited all the year round and the traffic representative also devotes part of his time in the

summer to encouraging passenger travel. This work is supplemented by having the officers of the company make friends at clubs and public gatherings.

INSPECTION AND MAINTENANCE OF ROLLING STOCK

A paper on "Inspection and Maintenance of Rolling Stock," by W. F. Raber, general manager, Ottumwa Railway & Light Company, was read by Charles E. Fahrney, superintendent of the same company. This paper was printed in abstract in the *ELECTRIC RAILWAY JOURNAL* of April 24, 1909, page 782.

L. D. Mathes, Dubuque, emphasized the importance of clean cars. It was advisable to make certain that all the cars were cleaned whenever in service. A clean car unconsciously had a good effect on the passengers. The Dubuque road had about 65 cars and painted each of them every year so that at the beginning of the season they looked fresh and clean. Three men were required in the paint shop, a painter at \$75 per month and two helpers at \$50 per month. This company had used a blowing outfit for cleaning the hidden corners in cars, but on account of the dust raised a suction machine had been substituted. This machine was an essential part of the car-house equipment. For car washing a floating crew made up of men from the track gangs called in in wet weather was used. Often 8 or 10 men were thus utilized in cleaning all the cars within a short period at the time the streets were dirty. The cleaning of box cars in the winter was found to be a serious problem. The company had tried to use brushes with a continuous discharge of water flowing through the handle, but had found that these brushes marred the varnish and so the box cars are now all cleaned by hand. An occasional fumigation of the car interiors made a good impression on the passengers.

B. Bohson described the car-cleaning methods of the Clinton Street Railway. All cars were cleaned at night by two men. No washing was done during the day, and these men, who were paid \$2 a night, cleaned an average of four or five cars per night. They worked seven nights in the week. The exteriors of the cars were cleaned with soap and water and the interiors were disinfected. Cars were inspected in rotation.

H. B. Noyes described the car-cleaning methods in Omaha. One-sixth of the cars in service were taken in each day for inspection and the cars were cleaned in the daytime. The management did not believe that this work should be done at night. Each car was overhauled and varnished every 12 months.

F. J. Hanlon had experimented with the use of spar varnish. He had varnished one-half of a car with spar varnish and the other half with the best high-grade coach varnish. The results with the spar varnish were not satisfactory. Mr. Crafts found spar varnish satisfactory.

E. M. Walker stated that the Muscatine road employed a carriage painter to paint the cars by contract. Mr. Hanlon stated that the Mason City & Clear Lake Company employed a painter the year round, but used him as a conductor in the summer after all the work at car painting had been finished.

Mr. Mathes favored planning painting work so that it would be distributed over the year. Men thus steadily occupied would produce better results. The Union Electric Company when buying new cars had them delivered in the white and finished them at Dubuque. When cars were finished at the car builder's they were often damaged in transit and needed touching up. The builders allowed \$50 per car for finishing.

A RAILWAY STORAGE BATTERY

F. W. Laas, chief engineer and chief electrician, Cedar Rapids & Marion City Railway, presented a paper describing the successful load regulation on the lines of that company by the use of a storage battery. This paper is presented elsewhere in this issue.

L. H. Flanders, chief engineer, storage battery department, Westinghouse Machine Company, emphasized the value of the storage battery floating on a railway feeder system. Such a battery provided not only against stoppage of the current supply by engine breakdowns, but also exercised an important function in cutting down the peaks in the curve of the load carried by the engine.

ACCIDENT CLAIMS

A paper entitled "Handling Accident Claims" was presented by A. G. Rippey, attorney claim department, Des Moines City Railway Company and Interurban Railway Company. (See *ELECTRIC RAILWAY JOURNAL* of April 24, 1909, page 783.)

In discussing Mr. Rippey's paper Mr. Walker stated that the Muscatine company this year had offered a reward of \$10 to each crew that at the end of the year showed a clear accident record. In four months since this offer was made there had been none but trifling accidents while in the same period a year ago several accidents had happened of a more serious nature. This prize offer had not decreased the number of accident reports made because it was understood that even in event of accidents if the crew was not liable it still would be eligible for the prize.

Several members of the association discussed the best methods for getting witnesses and accident statements.

BRAKES

A paper on "Brakes," by F. D. Miller, National Brake Company, was read by title and ordered published in the *Proceedings*. (See *ELECTRIC RAILWAY JOURNAL*, April 24, 1909, page 781.)

Through the courtesy of the local street and interurban railway companies at Cedar Rapids enjoyable entertainment was provided for those in attendance at the convention. The executive committee announced that the annual convention in 1910 would be held at Sioux City, Ia.

An instructive exhibit of railway and lighting materials was displayed in the auditorium during convention week. The following supply firms were among those represented which exhibited articles of interest to railways:

- Atlas Railway Supply Company—Rail joints.
- Rooke Automatic Register Company—Hand register and stationary fare register for pay-as-you-enter cars.
- Walcott & Murray Manufacturing Company—Block signal installation.
- Electric Service Supplies Company—Overhead materials, controller regulators and general supplies.
- Handlan-Buck Manufacturing Company—General supplies.
- O. M. Edwards Company—Window and car fittings.
- American Steel & Wire Company—Wires, cables, rail bonds and bonding machinery.
- Ohio Brass Company—Overhead fittings and general railway supplies.
- Westinghouse Electric & Manufacturing Company—Railway supplies, lightning arresters, meters, etc.
- J. B. Terry Company—General electrical supplies.
- International Register Company—Fare registers.
- General Electric Company—Railway supplies and materials.
- W. R. Garton Company—Railway and line supplies.
- W. N. Matthews & Brother—Line and railway supplies.
- Everstick Anchor Company—Guy anchors.
- National Lead Company—Paint supplies and bearing metal.

RECENT DEVELOPMENTS IN STREET RAILWAY TRAFFIC*

BY E. M. WALKER, GENERAL MANAGER CITIZENS' RAILWAY AND LIGHTING COMPANY, MUSCATINE, IOWA

The factors in the promotion of traffic are, first, the people to be served, and second, service. Under the latter head come the transportation facilities, including the layout of the tracks, rolling stock, the operators, and the convenience of schedule. The rate of fare has been pretty well standardized, and it is doubtless the exception where a limit of fare to be charged is not specified in the contract with the municipality. Therefore, the potentiality of the rate of fare as a factor in the upbuilding of traffic is more apparent than real.

Riding in cars is a matter of necessity, or a matter of habit, and under the stimulus of first-class service the former becomes merged into the latter. Habits must be formed, however, and this habit of car-riding takes years to develop. Indeed to the truth that it takes longer to develop a good habit than a bad one any street railway man will attest very quickly, after subjecting himself to a little introspection and noting how readily he takes on a bad habit and then how slowly his neighbor welds himself to the good habit of patronizing the cars.

In many cases the size of cars has been reduced, as it has been found that smaller cars operating at more frequent intervals have made possible a vastly improved service and at the same time a reduced car-mile cost of operation.

Much thought has been expended on what may be the most useful schedule, that is to say, the schedule which will reach the needs of most of the traveling public. That schedule is most useful that will deliver the mechanic at the factory, and the professional man at the office, or the traveler at the railroad station with the utmost economy of time. These are all features which enter into schedule making, and they appear in infinite variety wherever street railways are operated. It is, moreover, the writer's opinion that the regular schedule should be as closely as possible strictly adhered to, and that it is a mistake to yield the right of track to spasmodic traffic such as baseball and amusement park traffic, classes which too often cost more than they are worth.

That it is the rule rather than the exception to have rates of fare fixed by franchise has already been alluded to, and this is the case in one of our companies in Eastern Iowa. The franchise under which this company operates provides for: A maximum 5-cent fare; six tickets for a quarter; a 3-cent fare between 6 and 8 a. m. and between 5 and 7 p. m., and a 3-cent unconditional fare for children aged 6 to 12. The 3-cent time limit fare was primarily designed by those who granted the franchise to protect the man with the dinner-pail. Yet it has not worked out that way, as a large majority of the regular passengers of whatever sex or station in life carry both classes of tickets and in paying fare use the ticket best adapted to the time of day. The result of this discrimination has been to crowd the cars uncomfortably at the so-called rush hours of the day, whereas a fixed and uniform rate of fare would distribute the loading and would no doubt accommodate just as many passengers.

Furthermore, the thoughtful man fails to see why it should be worth more to ride in a car at 4:45 p. m. than at 5:15 p. m. Under the system, too, there are constant requests to stretch the limit, first, by school teachers, who wish the time limit to be moved down to 9 a. m. and up to 4 p. m., then by the retail clerks, who want the privilege of the low rate between 12 m. and 1 p. m. It appears, therefore, that this system of a low rate of fare at certain hours of the day or on certain days is a potential mill-stone, and it is pretty fairly well established that the surest way to get to shake hands with the receiver is to try to prove that you can carry passengers for a 3-cent fare.

The best and most complete development of traffic will follow not so much on reduced rates of fare as by having established an adequate and uniform rate of fare, coupled

with a constant effort on the part of the traction company to make the purchasing power of the fare unit higher and higher in the way of improved equipment, improved rolling stock, improved schedules, more extended trackage, and higher-class employees.

The development of traffic through periodic or spasmodic media, such as amusement parks, baseball, picnics, etc., depends almost wholly upon localities and size of towns, as well as upon a considerable floating or transient population, which supplements the pleasure-seeking home population; and all these elements must combine to make profitable development possible through these means. Experience has shown even in our own little circle that some traction properties could not exist without their amusement parks, while others could not exist with them.

The development of the freight, express or parcel delivery feature of street railway traffic is more or less dependent on local conditions, and in a great many cases is even made a matter of franchise restriction. Some railways are so located that they might make a very profitable addition to their traffic by transferring the package freight from the freight depots to the houses in the business section of their towns, while in others this is not possible. Parcel delivery also has in many cities great possibilities.

There is one idea which seems to possess great possibilities for the development of traffic, especially as our towns and cities continue to grow and become more and more congested; and that is, the development of suburban living. It needs no argument to establish the advantages of a home just on the outskirts of the town. The only problem to the householder is that he may be assured of a ready, reliable and reasonable means of transportation from his home to his work; and therein lie the manifold advantages to the street railway industry. Missionary work along this line would be well expended, as in this way a considerable body of regular patrons would be created to whom the street railway facilities would be just as much a daily necessity as they may have hitherto been a luxury.

OPERATING RULES FOR INTERURBAN RAILWAYS*

BY J. A. DU BOIS, CHIEF DISPATCHER, CEDAR RAPIDS & IOWA CITY RAILWAY & LIGHT COMPANY

When the interurban line of the Cedar Rapids & Iowa City Railway & Light Company was opened for operation on Aug. 13, 1904, a so-called standard code of rules was put into effect. After working under these rules for four years, it was found that there were certain rules which were objectionable and could not be carried out to the letter in practice; also that there were situations arising which were not covered by the rules. On Jan. 1, 1909, there was put into effect the book of rules adopted by the American Railway Association in 1906. These rules are complete and can be used for either steam or electric railways. In the writer's opinion they are far ahead of any interurban rules yet proposed. They are the result of years of experience, and interurban railways might profit by this experience, and not adopt some rules which were discarded as bad practice 25 or 30 years ago. Some of the interurban lines are now running steam trains in addition to electric cars, and the time is coming when there will be more or less interchange between the steam and electric lines. Therefore, the standard steam railway rules should be adopted and trains operated accordingly.

A comparison of the American Street and Interurban Railway Transportation and Traffic Association rules presented at the convention in October, 1908, and the standard code of rules as adopted by the American Railway Association in 1906 may be of interest. In making this comparison only the most important rules will be taken up.

The rule regarding new timetables as given in the interurban code provides that when a new timetable goes into effect "a train of the preceding timetable thereupon loses both right and class and can thereafter proceed only by train order." This rule is radically wrong. It is one that was used on steam roads years ago and proved unsatisfactory. The standard code makes the following provision:

*Abstract of paper read before the Iowa Street & Interurban Railway Association, Cedar Falls, April 22-24, 1909.

*Abstract of a paper read before the Iowa Street & Interurban Railway Association, Cedar Rapids, Iowa, April 22-24, 1909.

Each timetable from the moment it takes effect supersedes the preceding timetable, and its schedules take effect on any division at the leaving time at their initial stations on such division. But when a schedule of the preceding timetable corresponds in number, class, day of leaving, direction and initial and terminal stations with a schedule of the new timetable, a train authorized by the preceding timetable will retain its train orders and assume the schedule of the corresponding number of the new timetable.

Schedules on each division date from their initial station on such division.

Not more than one schedule of the same number and day shall be in effect on any division.

This rule, as will be noted, makes a provision whereby certain trains may assume the same schedule on the new timetable under the conditions as stated.

The interurban code provides that: "Scheduled trains in either direction have superior right over trains of the same class in opposite direction, but will meet trains as per timetable, unless otherwise ordered by the superintendent or other designated authority." This rule is similar to the rule regarding change of timetable in that it was abolished years ago as impracticable on steam railways. If trains become late and the dispatching wire is down so the train dispatcher cannot get orders out to trains, trains will not only become later, but may be tied up indefinitely. The rule should read "Trains in the direction specified in the timetable are superior to trains of the same class in the opposite direction," and should also provide that "Direction is superior as between trains of the same class."

The writer does not approve of the rule in the interurban code: "Extra trains are of inferior class to all scheduled trains of whatever class, and have no rights except those conferred upon them by train order." The reason for disapproving this rule is that extra trains have no class whatever. A train to have a class must be shown on the timetable.

Rule 203 of the interurban code states: "Where train registers are maintained, if the motorman or conductor cannot reach train dispatcher, the train will proceed on timetable rights, then call from all succeeding telephone stations until he has succeeded in reaching the dispatcher." This is entirely unnecessary and causes delay. If the timetable under which trains are operated is made up correctly there is no necessity whatever of calling the dispatcher, but simply proceed. If the dispatcher wishes to get in communication with the train crew, there would be operators available through which they can be reached.

Rule 210 provides that "Trains running in same direction must keep not less than 3000 ft. apart." It would be better to specify "three or five minutes" apart, as the conditions of each individual road require to insure safety.

Rules 212 and 213 contain a provision that when the telephone is out of commission "All extra trains will lose their rights as extra trains and such trains whose movement is essential to the maintenance of the passenger service will become sections of regular schedule trains, all other extras clearing main track and remaining clear until telephone service is restored." If the timetable is made up correctly there is no necessity of delaying extra trains simply because the telephone is out of commission. There is no reason why they should not proceed as before and clear the time of all regular trains 5 minutes as required by rule.

The rule in the interurban code referring to delayed trains says "All regular trains, or sections of a regular train, when becoming — minutes late, must report to the dispatcher and will also report for each successive — minutes late. After they become — minutes late, such trains will lose their time-card rights." This is another cause of delay to trains which is unnecessary. The only rule recognized by the standard code provides: "Regular trains 12 hours behind either their scheduled arriving or leaving time at any station lose both right and schedule and can thereafter proceed only as authorized by train order." The dispatcher will know from the reports he receives from operators how late a train is running, and it would only cause more delay to require trains to stop and telephone at every station when they continued to lose time.

In the matter of handling train orders the interurban code does not provide that the conductor shall sign any order to obtain "complete" on it, but only that he sign the order after "complete" has been given. This gives the dispatcher nothing whatever to show that the order has been delivered. The standard code provides for a "31"

order which is used to restrict the rights of trains and a "19" order which is used only to confer rights upon trains. A "31" order is handled as follows in the standard code:

When a "31" order has been transmitted operators must, unless otherwise directed, repeat it at once from the manifold copy in the succession in which the several offices have been addressed, and then write the time of repetition on the order.

Each operator receiving the order should observe whether the others repeat correctly.

Those to whom the order is addressed, except enginemen, must then sign it, and the operator will send their signatures preceded by the number of the order to the train dispatcher. The response "complete," and the time, with the initials of the train dispatcher, will then be given by the train dispatcher. Each operator receiving this response will then write on each copy the word "complete," the time and his last name in full, and then deliver a copy to each person addressed, except engineer. The copy for engineman must be delivered to him personally by the conductor.

No. 19 train orders are handled in exactly the same manner except that no signatures are taken from the train crew or the person addressed, but "complete" is given by the dispatcher when the order has been repeated correctly by the operator. This provides for a signature from the person or train addressed in a "31" order which gives the dispatcher something to show that the order has been delivered and thereby provides a protection for him.

The rule in the interurban code regarding second sections says: "Trains running as sections of any train must report when the opposing train is to be met at a point other than the schedule meeting point, or a meeting point made by order, and must not attempt to follow preceding section without an order from the dispatcher to do so." This is wrong, as each section of a train should have equal timetable authority.

Train orders should be given in as few words as possible, but should be plain. The example of an order as shown in the interurban code reads "Train No. 10, Car 106 and Train No. 9, Car 105 will meet at Cedar Rapids." This order should be shortened down to read "No. 10, Eng. 106, meet No. 9, Eng. 105, at Cedar Rapids." This is a saving of time both in putting the order out and to trainmen when reading it over. The words engine and engineer have been used in several places in this discussion. The definition of engine as given by the standard code is "A locomotive propelled by any form of energy." In order to meet the requirements a little more fully this definition was changed in the rules adopted by the Cedar Rapids & Iowa City to read "A locomotive or motor car propelled by any form of energy."

The form of work train orders and the holding order are plainer and better in the new standard code of the American Railway Association than is the interurban code.

The writer has tried to explain the importance of adopting rules which have been tried and proven to be the best for the operation of trains, and also the necessity of avoiding unnecessary delay to trains. The public demands better transportation facilities than ever before and adherence to schedule is a very important matter. Avoid all delays possible. Many lines advertise making connections with other steam and electric lines, and if these connections are not made regularly, the public is quick to find it out and withdraw its patronage. The writer would like to see some definite action taken toward having each road in the State adopt the American Railway Association's code of rules.

AUTOMATIC LOAD REGULATION ON TRACTION SYSTEMS BY STORAGE BATTERIES*

BY F. W. LAAS, CEDAR RAPIDS & MARION CITY STREET RAILWAY
COMPANY

In general, the results from the use of a storage battery installation on the Cedar Rapids & Marion City Street Railway have been positive and satisfactory. The degree of regulation over the very widely fluctuating ranges of load has been all that could be desired. The steam plant has been entirely relieved of light load running, and its operation under load rendered more efficient. An increase in generating capacity has been avoided, with even greater insurance against break-downs than if extra generating capacity had been employed, and the net commercial result

*Abstract of a paper read at the meeting of the Iowa Street & Interurban Railway Association, Cedar Rapids, Iowa, April 22 to 24, 1909.

of the installation represents a balance considerably in favor of the storage battery system under the conditions of service at Cedar Rapids.

In order fully to appreciate the conditions under which this installation was made, a few words of description are necessary. This plant is equipped as follows: One 18-in. x 36-in. x 42-in. cross-compound Allis-Corliss engine direct-connected to a 450-kw, 550-volt Bullock d.c. generator, and one 22-in. x 42-in. simple Allis-Corliss engine belted to a 300-kw, 550-volt General Electric generator. Both engines are connected to surface condensers. The boiler plant consists of one 385-hp Erie City, and one 335-hp Erie City water-tube boiler (based on the usual 10 sq. ft. heating surface per horse-power rating). The steam pressure carried is 150 lb. The fuel used is a poor grade of Iowa slack, containing 20 per cent to 28 per cent ash, 5 per cent to 15 per cent moisture and a large per cent of volatile matter.

LOAD CONDITIONS

Increasing year by year, the load had finally reached a point where the peak, due to the sudden fluctuating railway demand, greatly exceeded the capacity of the smaller unit. It then became a problem to decide on the proper apparatus to install to act as a reserve unit. The location of the power station and grounds being so situated that there could be no extension, it would have been necessary to install a unit of at least 800-kw capacity to avoid the necessity of replacing a smaller unit after a short period of time. As the company now operates only one boiler at a time, to change the load from the 450-kw unit to the 800-kw unit contemplated in case of emergency peak, would certainly call for an unusual demand on the boiler. And in cleaning fires, handling cars during peak hours, and for park and certain amusement purposes, the larger unit would be equally disadvantageous to the boiler room. The fact that one unit would be standing idle the entire time would mean a large interest charge.

There was this fact to consider also: The cars run from 5:30 a. m. to 1:15 a. m., after which time the necessary lighting was obtained from the local lighting company. If any work were to be done on the line, extra cars sent out, such as the salt car or snow plow, the plant had to operate under very unfavorable circumstances.

The variable load, which would range from 100 amp to 1500 amp within three seconds, brought about numerous operating difficulties, such as "looping" of the indicator cards, either in the high or low-pressure cylinders (depending on the receiver pressure and the load carried, part of the time engine not "cutting off") raising the water level in the boiler, loss of vacuum, etc.

After considering all of these factors, the decision was made to install a storage battery to absorb the excess energy on light load and return it to the line on the heavy peaks, thus allowing the company to retain the 300-kw unit, which is of ample capacity to carry the average load. For this purpose a Westinghouse battery comprising 272 cells, with a capacity of 540 amp hours, and a momentary discharge rate of 960 amp, together with the necessary booster and Westinghouse automatic relay load regulator to control the charge and discharge, was selected.

OPERATION

The method of operation is as follows: At 5:20 a. m. the battery is switched on the line and all cars run off the battery until 6 a. m. The generator is then run in parallel with the battery and the regulator set to carry the average load in the generator. At 12:30 a. m. the generator is cut out and the battery again operates the cars until all are in the barns, and it is then used to furnish the lighting in the barns and cars the balance of the night.

ECONOMIES

Several important economies result from this method of operation. First and most important, both engine and boilers may be operated at substantially a constant load, which is the condition for obtaining the very best economy. The Wheeler condenser pump may be run at a definite speed corresponding to the highest vacuum with the highest practical temperature of hot well. The boiler feed pumps may also be run at a practically constant speed. The receiver pressure may be adjusted at the proper point for a given load. Feed water temperature remains constant at 204 to 210 deg.

The firing of the boiler may be done under a fixed load condition best suited to economical operation. In cleaning fires under a boiler working up to its capacity, there is some drop in steam pressure. This is avoided by giving the load regulator one-third turn and allowing the battery to carry the greater part of the load. If a grate becomes "stuck," the same course is followed.

There has been some saving in fuel on the plant, ranging from 3 per cent to 5 per cent. The battery builders, however, did not claim any saving in fuel in this particular case at the present time, for the reason that the load factor remains practically the same, for while the simple engine may be operated with a high load factor, yet the difference in economy of the compound unit even at a low load factor slightly overbalanced the economy of the simple unit, while the booster and battery losses nearly balance the gain due to the steady load on the engine. While the battery was primarily installed to allow the smaller unit to act as a reserve in carrying the load in a very few years it will serve the same purpose with the larger unit.

COMMERCIAL RESULTS

From a commercial standpoint the results are as follows: The company was able to dispense with the services of one man at the car barns, as there are now lights in the cars all night, so the men can handle their work with less delay. This represents a saving of \$600 per year. The lighting bill was formerly \$200 per year. There was also a reduction in the premium on the insurance on the car barn. The difference in interest charge between the cost of the storage battery and a new 800-kw unit will alone pay the maintenance charge on the battery, as the builders installed this battery under a 10-year guarantee that the renewals and maintenance would not exceed a certain per cent.

In other words, the chief value of a storage battery in a plant of this description is not so much in the fuel saved as in the reduction of fixed charges, wear and tear on machinery, the readiness to serve in an emergency, and, finally, the capability of the plant being operated with a maximum economy due to the fact that every phase of the situation can be studied under fixed conditions and the necessary steps can be taken to secure the best results.

OTHER USES

The battery has been used for several unusual purposes. The railway company has a tie line running from the switchboard to the switchboard of the local electric light company, which operates an interurban line 27 miles in length with three substations. There is also a 550-volt d.c. local power circuit operated from a 200-kw d.c. generator. It has happened that this generator has been out of commission and the substation has been called upon to supply the commercial circuit.

The drop in voltage on the line from the substation, due to the distance, was so serious that the service given was very unsatisfactory. Now, whenever necessary, the battery is connected in parallel with the substation through the tie line and maintains a constant voltage on the circuit.

A Thomson integrating wattmeter is placed in the line between the two power stations, running in one direction when the railway company is taking power and in the opposite direction when the electric company is taking power. The aim is to keep the interchange of power even by one company or the other pulling the extreme light loads. This 200-kw generator at the electric light station is belted to a 180-kw a.c. generator, which is operated as a synchronous motor. The set was formerly brought to synchronism with one engine, but the engine has been taken out and the set is now started from the d.c. end, taking current from the railway company.

BATTERY OPERATION

The condition of the battery is determined by the daily record of a pilot cell selected for this purpose. For all normal conditions the aim is to maintain the specific gravity of the pilot cell between 1.18 and 1.19. Between full discharge and full charge the specific gravity ranges from 1.15 to 1.2. High voltage and high specific gravity indicate an overcharge of the battery, resulting in poor efficiency, and low voltage with low specific gravity shows over-discharge of the battery, which, if allowed to exist for any length of time, will cause rapid depreciation. Occasionally the battery has had to carry the entire load.

DISCUSSION ON MR. MURRAY'S PAPER

The May *Proceedings* of the American Institute of Electrical Engineers contains the text of the discussion on the paper by W. S. Murray on the New Haven electrification, presented at the Institute Dec. 11, 1908. A synopsis of the oral discussion was published in the *ELECTRIC RAILWAY JOURNAL* for Dec. 19, 1908. The *Proceedings* contain some additional contributions made by letter. These are abstracted below:

MR. DAVIS' LETTER

Minor M. Davis refers to the effect of single-phase current upon telephone and telegraph wires. Transformers do not completely correct the trouble, although they are beneficial to some extent. The transformers introduced to correct this trouble on the New Haven road were applied only to single-wire operation and did not neutralize the disturbing effects of the single-phase current sufficiently to permit the operation of duplex, quadruplex and printer circuits upon the wires to which Mr. Murray referred. The pilot wires and transformers necessary for this protection, mentioned by Mr. Murray as being "not costly," really involve considerable expense, and are an additional cost which the use of single-phase current entails.

MR. PARSHALL'S LETTER

The letter from H. F. Parshall, the English electrical engineer, said that the relative merits of a.c. and d.c. apparatus were very thoroughly discussed in 1901, at the time of the selection of the proper system for use in the London tunnels. Mr. Parshall at that time advocated direct current, and nothing since then had occurred to justify him in departing from his original conclusion in favor of the d.c. equipment. He continued:

"From the nature of things the a.c. motor is inherently heavier and more complicated and must be more expensive as regards first cost and vastly more costly to maintain than the d.c. motor. The sole advantage incident to the use of an a.c. motor is in the supposed saving in the first cost of the collector system; but when a high-tension system is safely installed it must be more expensive than a third-rail system, consequently the whole reason for the existence of an a.c. system disappears in the final result.

"The perfected a.c. motor weighs about 40 per cent more, has all the objectionable features of the d.c. motor and practically twice over on account of the construction of the stator. The air gap of this motor in practice may not exceed 60 per cent of that of an efficient and well-designed d.c. motor and higher armature speeds have generally been found necessary. With the features above mentioned inherent to a.c. motors, the first cost of a train equipment, as also the maintenance, must be nearly double that of a d.c. equipment of a like capacity. Further, I doubt in the heaviest class of electric traction installation, such, for instance, as that in the New York subway, whether the a.c. motor can be made to do the work satisfactorily at all over a period of time. In addition to the above well-known features of the a.c. motor, the use of a train transformer has to be considered. What ultimate size and form this transformer may take in heavy high-speed work remains to be determined, since with a jumping contact the strains on this transformer are practically incalculable. I think it must be conceded by all that the a.c. train equipment, per se, is inferior as regards cost and maintenance to a d.c. train equipment, and that it gives no tractive advantage. The advantage then must be external to the train and confined to the system of transmission, or more properly, the collector system, since the transmission system would naturally be the same either with d.c. or a.c. As a matter of experience it has been found that the cost of a high-tension overhead system properly installed is greatly in excess of that of a third-rail system, and having regard to the exceedingly numerous difficulties as put in evidence by Mr. Murray's paper it cannot be contended that the action of an overhead high-tension system is anything like as satisfactory as the third-rail system. Considering all that has gone on in the New Haven system up to Sept. 5, 1908, which appears to be the termination of Mr. Murray's log, there is absolutely nothing to indicate that during 1909 some such series of occurrences are not again to be expected.

"The absolute lack of commercial data as regards the cost of the installation, cost of operation and cost of maintenance vitiate any conclusion that may be drawn other than that the system when compared with such a system as has been installed by the New York Central is entirely unjustified by the practical results. Some two years ago I was shown a diagram of the feeders and electrical system of the New Haven Railroad. I could only state that it transgressed every established principle as to safe and reliable working and that if the system as a whole was to be in any way justified there was no excuse for starving the system of feeders to such an extent and mixing up what might be properly termed the collector system with the transmission system. In my judgment many of the troubles that have been experienced would have been avoided had the a.c. system been installed in accordance with accepted a.c. practice, with a high-tension system of transmission, say, from 20,000 volts to 30,000 volts with substations at the different sections and a trolley voltage not exceeding 5000. The cost need not have been greater and the system would have been far and away safer in that the different sections could be independently controlled. Further, the volume of stray current in the earth causing electrolysis and induction troubles would be greatly lessened.

"Looking at the a.c. system broadly, it seems to be that its advocates are more interested in the electrical than the mechanical aspects of electric traction field and its opponents are those who have had the longest experience in traction matters and are not inclined to experiment with the fundamental elements of a traction system considering the sole and total advantage that can seriously be suggested in cheapness. Why a railway should spend its tens of thousands per mile endeavoring to make a system as safe as possible and then attempt to effect a minor saving by the introduction of a system bringing with it fatal and most experimental elements is beyond my comprehension. Mr. Murray states that there have been no fatalities so far as the public is concerned, nor would one expect such fatalities considering the short time the system has been in operation and the overhauling to which it has been subjected. In the fulness of time, however, there may be collisions, derailments or some such occurrence in which the overhead system will be disarranged at the same time as passengers debouch from the trains.

"No amount of rules and regulations will ever suffice to make a system having inherent fatal elements safe to the employees, in fact, having regard to the exigencies that have occurred in normal railway practice, rules and regulations in general may be taken as existing in form and not in substance. I regret to have to make use of Mr. Murray's expression in stating as my conclusion that his paper furnishes conclusive material of how not to install a traction installation, and it appears to me the only way he could possibly justify his belief as regards the commercial usefulness of the system would be by the publication of such commercial data as would show that the a.c. system as regards first cost and cost of operation has such material advantages over the d.c. system that all such occurrences as are recited in this paper are as nothing considering the proved commercial advantages.

"Having regard to the history as regards reliability and freedom from trouble with a third-rail system as also the wider field over which it is applicable on account of recent improvements, I am of the opinion that so far as the working of passenger services over the widest districts is concerned the direct-current system of electric traction is superior to the a.c. system for dense traffic movements and in the majority of cases in which electricity can properly compete with steam. That there are problems in connection with freight haulage over long distances in which the multiphase system possesses commercial advantages, I do not feel in a position to deny, although an examination of the individual cases which have been submitted to me has not in my judgment made this an indisputable fact. As regards the single-phase a.c. system there may be special applications to which it is commercially applicable. I have given the deepest study and thought to various problems, but in each case the use of the single-phase system has proved illusory. I do not wish to go further than to state that I have not found a problem to which it is properly applicable considering all the facts as I now see them. I

have recently very thoroughly investigated railway matters in the United States and my conclusion is that the d.c. system of electric traction is superior to all others and is likely to remain so for many years to come."

MR. LYFORD'S LETTER

O. S. Lyford, Jr., gave some particulars of the Erie Railroad single-phase equipment at Mt. Morris. This line has been in operation for 18 months with 34 miles of track and six cars. There has been one fatality of an employee, who lost his life during the first few days by coming in contact with the trolley wire. There have been no other personal injuries to employees or to the public due to the electrical equipment.

In October, 1908, there were no detentions chargeable to the electrical equipment. In November there were four detentions of this character, one due to control trouble, two due to hot motor bearings, one due to breakage of air-compressor crankshaft. Three of these detentions were of a character preventable by more rigid inspection. In December there had been no detentions up to the date of the meeting. It should be noted that only one detention was due to a strictly electrical cause, and none was due to high voltage or to the single-phase features of the equipment.

It is believed that this record of nearly 2.5 months will compare favorably with any other electrically operated road. This record, however, was obtained only after the equipment had been in process of "tuning up" for many months. In the 12 months ending Oct. 31, 1908, there were 120 detentions chargeable to the electrical equipment, which detentions totaled 4800 minutes. These include a number of serious detentions due to the 90-mile, 60,000-volt transmission line over which power is received from Niagara Falls for the operation of this road. The record is much better than that of the steam equipment replaced.

There have been no transformer troubles, either on the cars or in the substations. Motor troubles have been very few. No mechanical troubles with the contact wire. The wear on this wire up to August, 1908, was from 0.004 in. to 0.009 in., at which rate it would be between 20 and 30 years before the wire would be worn back to the supporting clips. Stretch of the copper wire and abnormal wear at hard spots will no doubt result in a life materially less than this. There has been no apparent deterioration of the galvanizing of the messenger cable and other galvanized parts, but such painting as was done on the overhead work has not lasted. There have been no material troubles or expense caused by locomotive gases. The life of the pantograph shoes average about 15,000 miles.

The operating cost under the usual transportation and maintenance headings of the Interstate Commerce Commission classification averaged during last summer about 18 cents per car-mile. Multiple-unit service with trains of more than two motor cars shows up better than single-unit service, owing to the fact that many of the faults of car equipment can occur without causing detentions, the other equipment carrying the train through on time.

Some schedules are operated under conditions well within the speed limit of the equipment, so that time can be made up after a detention. On other roads the schedule is practically up to the speed limit. Equipment troubles increase with the speed, particularly troubles with the moving contact.

In an analysis of the troubles which actually occur in electrical operation, whether d.c. or a.c., it is apparent that the power station, transmission lines, substations and distribution system, whether third-rail or overhead, cause but a small proportion of the train detentions. The record of the third-rail is especially good in this particular. Most of the detentions are due to trouble on the cars, and of these by far the largest proportion results from defective control.

In the light of this experience it is believed by the writer that the New Haven troubles will soon be confined mainly to the locomotives, and these will not be serious. The forced use of the combined alternating-current and direct-current systems is an abnormal burden on this operation. In view of the fact above stated, that is, that most of the train detentions are caused by the control, it may be anticipated that the New Haven operation will not do quite

as well in the long run as a straight single-phase service. The use of multiple-unit motor cars will help to improve the log. The Erie record above quoted gives no indication that detentions due to locomotive troubles with a straight single-phase system will be materially greater than with the direct-current system. The maintenance cost is another matter. The greatly increased cost of the electrical equipment of the locomotive or motor-car must necessarily involve greater cost of repair and maintenance. The savings effected in other parts of the system must carry this burden.

MR. SMITH'S LETTER

W. N. Smith pointed out that while the greatest number of train detentions on the New Haven system were due to trouble with car operation, the detention due to line or other arrangements of the power station are of far greater average duration than those due to car failures. Mr. Smith believed that the boldest feature of the New Haven installations was the adoption of a previously undeveloped line construction. The means adopted by the New Haven engineers to overcome the trolley difficulties seem to have been successful, although further improvement is probable. The apparently simple yet fundamental problem of improving the contact system still presents a field for the exercise of inventive genius.

MR. DAWSON'S LETTER

Philip Dawson presented some particulars of the overhead system of the London, Brighton & South Coast Railway, which is of the double catenary construction. An abstract of the information given by him follows:

The form of construction is the double catenary, details of which are shown herewith. The illustrations show the trolley wire after it has been put up and while it is only temporarily supported, before being finally fixed to the clips and droppers which support it from the two cate-

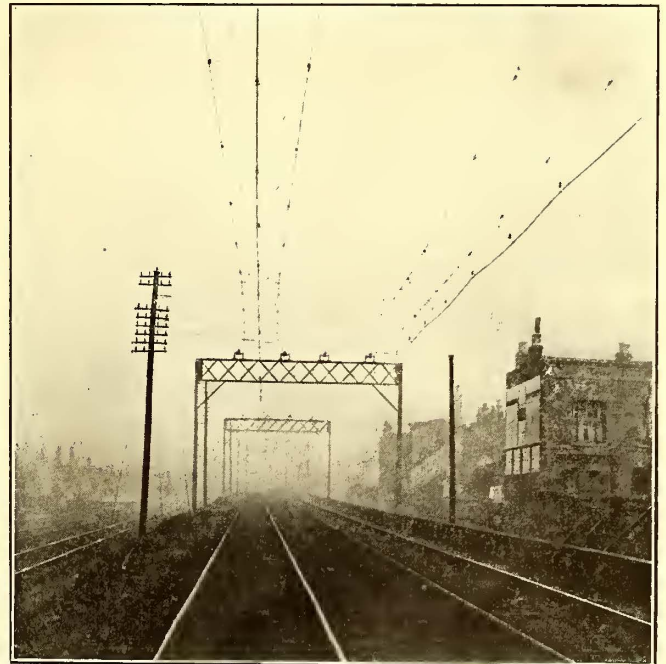


Fig. 1—London, Brighton & South Coast Railway—Overhead Line During Construction

naries. The droppers are solid sherrardized steel wire, the shorter ones having a loop at each end, the longer ones consisting of two parts looped in the middle. This arrangement gives great flexibility in the vertical plane while insuring great stability in the horizontal plane for the trolley wire. The catenaries are of galvanized steel wire cable $\frac{3}{8}$ in. in diameter. Each catenary is independently fixed by means of a turnbuckle and insulator, and supported from a saddle-piece resting on the top of the main insulator. The sag in the catenaries is calculated so as to produce absolute balancing at the supports. The principal insulator has to bear a dead weight which amounts to 850 lb.

All of the insulators are of the best quality porcelain.

All of them have been tested, the principal ones to 65,000 volts and the secondary ones to 25,000 volts for 30 minutes; 10 per cent of the insulators were tested mechanically. The whole construction of the catenaries, girder bridges, insulators, etc., is calculated so as to result in a factor of safety of 10.

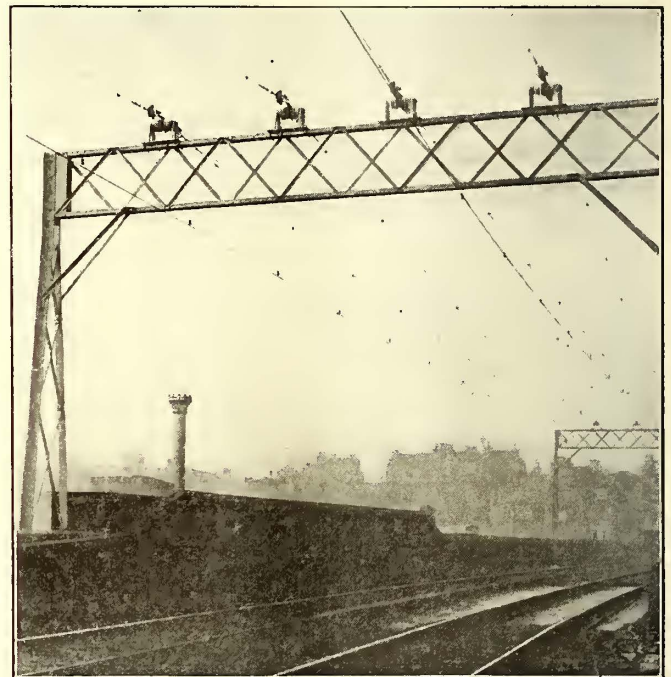
The trolley wire itself is round, with sharp grooves at the sides, into which mechanical clips fix, and its area is 0.197 sq. in.; its tensile strength being in all cases superior to 49,280 lb., or 22 English tons, per square inch. To prevent the hammer blows from which the New Haven line has suffered, the whole construction has been designed so as to make the clips and the droppers from which the clips are supported as light as possible in comparison to the weight of the trolley wire itself. Three years ago, at the time the London, Brighton & South Coast Railway installation was planned, the writer made the most careful investigation, and then decided on the flexible system instead of the rigid one originally adopted by the New Haven line.

The greatest span so far is 195 ft. The vertical projection of the sag of the catenary wire at 50 deg. Fahr. for this span corresponds to 6 ft. Contrary to Continental practice, the trolley wire is drawn up and anchored at both ends with due regard for the lowest temperature to which

insure sparkless running and operating with a pressure of from 12 lb. to 15 lb. between the collector strip and the contact wire. There are two bows, one for operating in each direction. On the top of the collector bows are fixed renewable grooved aluminum strips, as it is believed that by this means the wear of the wire will be localized on the contact strip, virtually no wear of the trolley wire taking place. Furthermore, owing to the form of strip and to the low pressure exercised by it against the trolley wire, the writer thinks that the cost of the strip itself will not be a very large item in the working expenses.

MR. OFVERHOLM'S LETTER

Ivan Ofverholm, of the Swedish government railways, gave some details of the experimental single-phase road installed by that government. Owing to the strains upon the generator in cases of short circuits, the engineers installed a weak coupling between the generator and turbine designed to break when a severe short circuit occurred. The catenary construction was not used on the Swedish railways, but the bow pressure was so adjusted that the resultant stress in the contact wire (the sum of the normal stress in the contact wire and the bending stress resulting from the bow pressure) never exceeds the elastic limit. He thought that the steel-working conductor on the New Haven line would be more affected by the locomotive gases



Figs. 2 and 3—London, Brighton & South Coast Railway—Views of Overhead Line During Construction

it may be subjected, so that in the coldest weather the elastic limit should not be exceeded in the wire. The wire is staggered 18 in. altogether, or 9 in. on either side of the center line of the track, and at points has been diverted so as to go as far as 13 in. from the center line. The normal height of the wire will be between 16 ft. and 17 ft., while in the two terminal stations the height is 21 ft. At some of the lowest bridges the wire descends to a height of 13 ft. 10 in., or only 4 in. above loading gage. The train service which will operate over this line at present is of a purely local character, and it is not likely that for the present a speed of 45 m.p.h. will be exceeded.

The extensions that will be proceeded with as soon as satisfactory results are obtained on the first portion, now nearing completion, may, however, involve the operation not only of multiple-unit local trains, but of trains hauled by electric locomotives, which, of course, may obtain speeds considerably higher than at present contemplated.

Careful consideration led the writer not to adopt the pantograph type of collector, but to adopt a type of trailing bow collector. This collector consists of a tubular frame, the top of which is fitted with two bows, one forming the rigid portion of the frame itself while the other is hinged and sprung from it. It is believed that this method will

than bronze wire. In the Swedish locomotives two bows, 6 meters or more apart, are used.

MR. EVELETH'S LETTER

C. E. Eveleth referred to the oil circuit breakers used on the New Haven feeders and gave some particulars of some tests conducted by him and Mr. Hewlett in 1902 with oil switches under short circuits at 75,000 volts with and without transformers, transmission lines, etc. Simultaneously with these tests investigations were conducted concerning the requirements of reinforcement of the end windings of generators. In 1904 he built an oil circuit breaker which opened repeatedly on a single break current of 20,000 to 25,000 amp at 2200 volts without throwing the oil or otherwise damaging the switch. He believed that it would have been better to have used single-phase generators for the operation of the system than polyphase apparatus and to have supplied polyphase generators for the operation of the shops and direct-current substations.

MR. MURRAY'S REMARKS

Mr. Murray in closing the discussion replied to both the oral and written remarks. The following abstract relates only to the points brought out by the written communications mentioned above.

He said that while probably it would be possible to design generators of the voltage and capacity used in the Cos Cob station capable of withstanding short circuits, it might have been advisable to use low-voltage generators (say, 2300 volts) and step-up transformers. In regard to the type of generators, one reason that two-phase generators were not selected was owing to the location of the power station, which is about 18 miles from one terminal of the electrified track and $3\frac{1}{2}$ miles from the other. If two phases divided at the power station had been used they would have been very much unbalanced and it would have been impossible to keep the voltage of both phases constant. With its three-phase generators the company regulates the voltage of the propulsion phase and the copper-clad rotors of the generators smooth out to a great degree the unbalanced voltages of the other two phases.

In referring to M. M. Davis' suggestion, he said that the paper had touched only lightly upon matters other than traction. He did not see any occasion, however, to change his remarks in regard to the effect on telephones and telegraphs except to say that Mr. Davis' position possibly enabled him to judge better than the speaker in regard to the cost of the transforming equipment necessary to effect the voltage compensation described.

Mr. Parshall's decision in 1901 was previous to development of the modern type of single-phase motor and the subway conditions in London and New York have little relation with those on the New Haven railroad. The alternating-current motor does not weigh as much more than the direct-current motor as assumed by Mr. Parshall. High armature speeds are an advantage rather than a disadvantage, and the speaker did not think that the cost of an overhead system properly installed would be greatly in excess of that of a third-rail. Even if more expensive in first cost, the system might be more economical to operate. The operating cost of the New Haven locomotives on the direct-current zone is 40 per cent greater than on its a.c. zone. The speaker did not think the faults found previously with the a.c. system would be repeated.

Referring to Mr. Dawson's description of his overhead system Mr. Murray stated it might be quite possible that the clips to be used on the Brighton & South Coast Railway will be sufficiently light to prevent kinks in the trolley wire and probably no trouble will be experienced at speeds of 45 m.p.h. or less, but he did not think this construction suitable for the New Haven line. His preferred construction for an overhead line was, briefly:

1. One single steel stranded messenger cable with deflection corresponding to economical values fixing distance of span.

2. One horizontal solid copper conductor supported from steel messenger at intervals of 10 ft. with light tension on same.

3. One horizontal solid grooved steel (contact) wire supported by light clips (weight not greater than 9 oz.) from the solid copper wire at mid-points between messenger hangers. The tension in this wire not to exceed the elastic limit of the steel at lowest temperature.

Mr. Ofverholm's experience with the deterioration of steel contact wire from the smoke of the locomotives has not been duplicated on the New Haven line.

—◆◆—
The Melbourne (Victoria) Tramway & Omnibus Company on April 1 declared a dividend on its capital stock at the rate of 15 per cent per annum.

—◆◆—
The Stone & Webster Engineering Corporation has contracted for the design, construction and equipment of an interurban electric railway between the cities of Galveston and Houston, Tex. The distance is about 50 miles and the road will be designed for high-speed operation. The engineering work includes the final surveys, determination of right of way, design of bridge structures, the working out of the most economical car schedules and the selection of types of rolling stock best adapted to the conditions. The contract includes the design and construction of the power station, transmission lines and substations.

COMMUNICATIONS

METHODS OF CLASSIFYING CLIPPINGS FROM TECHNICAL PAPERS

PUGET SOUND ELECTRIC RAILWAY
TACOMA RAILWAY & POWER COMPANY

TACOMA, WASH., April 7, 1909.

To the Editors:

I have read with interest your editorial in the *ELECTRIC RAILWAY JOURNAL* of April 3 on the "Size of Technical Papers." In view of the fact that I clip and file all articles from the various railway magazines in a much more elaborate manner than is generally customary among readers of the magazines, an account of the method followed will perhaps be interesting.

I subscribe to all the papers in duplicate. Upon receipt of the copies each week I put them in order and remove the advertising matter and the clips which bind them together. Then I put them in a paper cutter which cuts them all to the standard size. These loose pages are then sorted so that duplicates are together, and, starting with the first page, I clip out all articles of short length, and if extending into more than one column, bind the parts together with paper clips. Whenever possible, I retain the loose page as a whole, drawing a red line through the article clipped from the duplicate page.

After having completely clipped the paper, I date all articles with a rubber stamp and then sort them according to the following classification:

1. Management.
2. Transportation.
3. Traffic.
4. Parks.
5. Claim and Legal Depots.
6. Purchasing and Stores.
7. Electrical Engineering.
8. Power Plants, Overhead and Bonding.
9. Track Maintenance, Construction and Structures.
10. Shop Construction and Shop Operation.
11. Rolling Stock.
12. Accounting and Auditing.

For each of these general subjects I use a letter file with the interior folders removed and others substituted that are made from tag paper folded to form a folder with a projecting tab. There is one of these folders for each subdivision of the general subject, and in each I place the clippings on that subject from the pile on that general subject.

When these clippings have accumulated sufficiently I prepare them for binding permanently. I take the letter file on the subject to be bound and remove the folders and sort the clippings according to my detail index. Clippings which are less in size than that of a whole page or which have to be clipped from a duplicate page are pasted on sheets of good bond paper cut to the standard size page and are arranged in order of date and of importance. When all the loose pages and clippings have been properly arranged in order, beginning with the first page on top, they are numbered in consecutive order with a numbering stamp. Then an index of the articles is typewritten on standard sheets, a front title page is lettered, and the whole is turned over to a local binder for a regular book binding. He returns to me a fine-looking book which is of great value for reference.

I have used this method for preserving the subject mat-

ter in the various railway magazines since 1902 and have found that it was not a very difficult way of solving a perplexed problem. As a result, I have a set of books of great value to myself and my friends for reference purposes when it is desired to look up what other companies are doing in some particular detail of electric railway operation.

J. RUSSELL MORSE.

NEW YORK, April 24, 1909.

To the Editors:

Next to knowing a thing is to know where to find it. To expand the horizon of our knowledge and to aid memory nothing is more important than an accurate and exhaustive classification and indexing of the material belonging to the subject.

The method which I have employed for 10 years in my office for the classification of matter pertaining to the electric railway industry may prove of interest. Every article which has appeared in the *ELECTRIC RAILWAY JOURNAL* for the above period, for example, has been classified according to this method until the subdivisions have reached some 1600 heads, under which over 18,000 cuttings are arranged.

From this mass of matter has been evolved the following general classification: First, the financial and then the engineering. The latter begins at the foundation structure, then passes out of the power station, over the transmission system to the trolley, includes the equipment and the rail and is then carried back to the ground at the negative bus, thus completing the cycle. All divisions and subdivisions are numbered by the Dewey decimal system, first employed in cataloging and indexing the volumes in the Columbia College Library. The system is so elastic that it permits the interpolation of any number of items, divisions or subdivisions, without the change of any original number. The index can thus be expanded indefinitely, and no index made upon this principle can become obsolete.

The general index is, in part, as follows:

- .10 Finance.
- .11 Franchises.
- .12 Stocks and bonds.
- .13 Cost of installation.
- .14 Accounting.
- .15 Cost of production.
- .16 Depreciation.
- .17 Expenditures.
- .18 Purchasing department.
- .19 Forms and blanks.
- .20 Statistics of electric railway systems.
- .21 Power station.
- .215 Substation.
- .22 Terminal stations.
- .24 Rates of charging.
- .25 General description of railway systems.
- .26 Legal decisions.
- .27 Legislation.
- .28 Insurance.
- .40 Station buildings.

The classification is carried out in this way for 118 main divisions, which are again subdivided into minor divisions. For example, take the subject of trucks. The first number, 2, always appears opposite any article on trucks and the minor details follow, as seen below:

- 2.16 Trucks: General information.
- 2.160 Repairs; cost of and maintenance of.
- 2.1601 Single, compared with double trucks.
- 2.1602 Types of.
- 2.1603 Tests of.
- 2.1605 Single.
- 2.161 Double.
- 2.1612 Maximum traction.
- 2.1613 Radial.

This division is carried further to seven other subdivisions, which cover, specifically, everything which has been published about trucks in the principal technical journals during the last eight years. The matter thus collected and classified amounts to some 240 clippings, of over 12,000 words.

The value of assigning a decimal number to all articles, and even to all paragraphs, in a general discussion, is that the subject matter is often foreign to the title of the article. In that case as we read over our technical literature the number of each article or paragraph can be written on the margin of the sheet opposite to the subject indexed. Even an office boy is then able to make the clipping and place it in the file where it belongs. For quick reference as to subject, headings are again alphabetically arranged in a card index which gives filing number and cross-references.

The only method by which a title alone can be filed is alphabetically by the subject matter, as indicated by the title. Often the valuable part of an article is not included within the scope of the title and, not infrequently, remarks made upon related topics are of great value and are exactly those things it is difficult to find when needed. This classified indexing system, however, is inexhaustible, in that all the information of a kind that has been published is gathered together under one head and can easily be referred to.

The index can also be developed geographically. It is very often necessary to ascertain where certain apparatus is used or to find out everything that has been published about an electric railway system in a certain place. This information can easily be reached by means of an alphabetically arranged index which has been made of all the towns in the United States and Canada of 5000 population and over. These are numbered consecutively, are divided by States and the towns in each State are arranged alphabetically. All general information is arranged, not only as to its classification, but also as to its geographical location in that class. We have thus at hand a quick means of locating information as well as complete cross-references. For instance, in looking up the material under the number 2.1613, which refers to radial trucks, it is found by means of the cross-reference card that at Harrisburg, Pa., and at Boston, Mass., these trucks are used, and in the general description of the system we find matter pertaining to the use of radial trucks.

The method of classification can be carried still further by adding reference letters to cover specific details. Thus, in the writer's index the small "d" always stands for dimensions and "c" for operating conditions. At a glance we can therefore know whether the cross-reference would probably give the specific information of which we are in search. The letter suffixes may or may not be used, as they are rather a matter of personal convenience than a necessary part of the system.

The actual method of filing employed was the outcome of considerable experience. A number of methods were tried and rejected because they proved clumsy and too complicated for use by an ordinary assistant. An attempt was made to use the envelope system, the cutting being placed inside, the indexed number written on the left-hand outside corner of the envelope and the title across the top. The name and date of the periodical in which the enclosed matter had appeared was also affixed. It was found impracticable to use this method as the cuttings sometimes became misplaced. Long cuttings are now pasted to a folder, 6½ in. x 3½ in., with a slot across the top. The title of the article

projects through this slot. The cross-reference numbers are written on the outside of the folder below the title. Small cuttings are pasted on cards, the same size as the folder, down the front and up the back. If too long for this treatment folders are used as described. In all cases the titles are visible when filed.

The actual filing case is a cabinet of drawers each deep enough to hold the cards and the folders, both being of the same dimensions. Each drawer is divided by partitions so as to form a place for three rows of the folders and cards. A case, 42 in. x 60 in., with 18 drawers, will hold 12,000 clippings; the front of each drawer is labeled by both index number and title of contents. So that the approximate date of the articles may be known at a glance, all the clippings of each year are placed in folders or on a card of a particular color or tint. This plan has proved very useful. A card showing the colors used for each year is affixed to the filing cabinet. By this means the date of the information is roughly indicated.

This method of classifying data has proved of real value, especially because it is a perpetual system growing more valuable as time goes on. The index can be introduced into the Dewey system in any library, a system generally used to-day in all libraries, by prefixing the Dewey number 621.33.

The authors of articles cannot, of course, be found by this system, as all data are classified strictly as to subject matter.

It is with the hope that this brief explanation of a system worked out through years of practice may be of help to co-laborers in the field of electrical engineering that it is here given.

ALBERT B. HERRICK.

SEPARATE CARS FOR WOMEN ON THE McADOO LINE

NEW YORK, April 20, 1909.

To the Editors:

Among the various suggestions that have been made to render subway traffic in New York less disagreeable to women, none has been more strongly advocated than setting aside one car in each train for their exclusive use. The theoretical advantages of it have been strongly urged, and have been supported by a good many people who are not acquainted with the actual problems of handling large numbers of people during rush hours. The theory is nice in writing, but those who have watched its practical trial by the Hudson & Manhattan Railway, operating a subway service between Hoboken and Twenty-third Street, New York, have observed that actually the reserved car for women is an absolute failure.

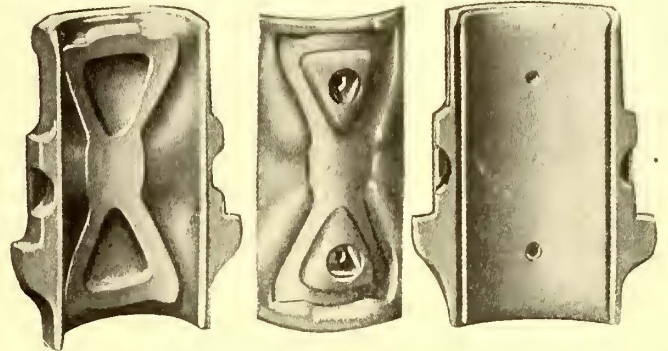
Ever since the plan was put in operation by the company mentioned I have watched the reserved car carefully. It is now rarely filled, a third of the seats being often empty, although women may be standing in the "mixed" cars of the same train. On the other hand, these latter cars are more crowded than before. Consequently the practical result of the experiment has been to overcrowd all cars but one, and haul that only partly filled. Only a very small percentage of the women traveling on the line pay any attention to the reserved car, which really seems to be a fizzle from the point of view of at least nine-tenths of the women.

LACKAWANNA COMMUTER.

The Prefect of Oran, Algiers, is asking for applications for concessions to construct and operate electric railways 18 miles in length in that city.

A TWO-PART JOURNAL BEARING

The Paragon Metal Company, Chicago, Ill., has placed on the market a journal bearing known as "Two in One," which, as the name implies, is made up of two parts, one serving as a shell and the other as the lining of the bearing. The shell, as shown in the accompanying illustration, is provided with ribs on its inner surface which fit into

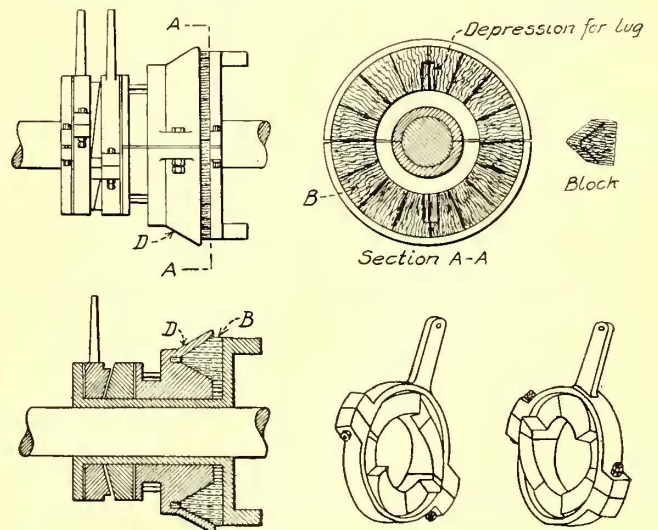


Two-Part Journal Bearing

grooves of the lining and are intended to give it practically the same strength as that of the standard M.C.B. solid bearing. This portion of the bearing is of bronze, and is designed to receive the removable lining, so that both form a practically integral structure. The lining is made of an anti-friction and lubricating white metal. These bearings are manufactured in all the M.C.B. standard sizes, and as the two parts are interchangeable, the linings can be furnished separately for replacements.

A NOVEL MOMENTUM BRAKE

For the past two months one of the large electric railways near New York has had on trial under a car in regular service a momentum braking equipment supplied by the Momentum Automatic Brake Company, New York.

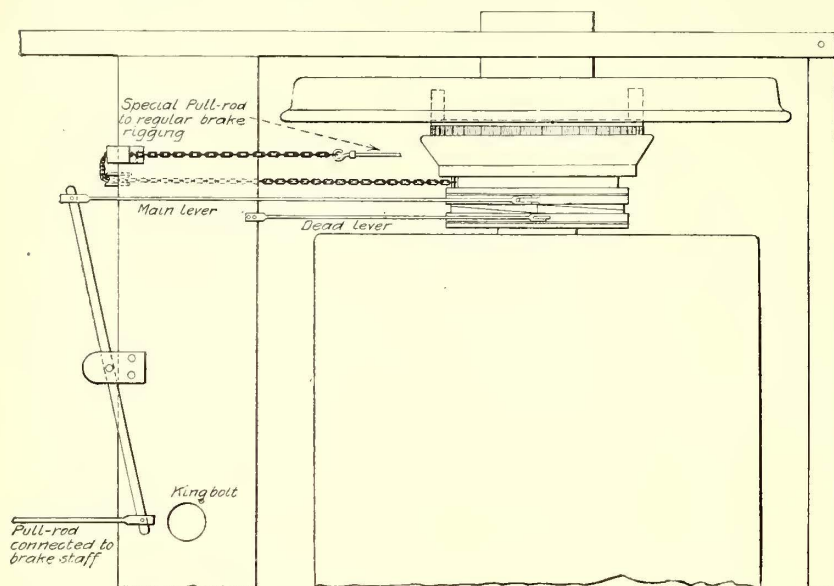


Momentum Brake—Details of Single-Truck Equipment

This device differs from other momentum brakes in not depending upon anything outside the regular brake shoes for stopping the car. The momentum principle is applied simply to cause the revolution of a drum, which, in turn, actuates the ordinary brake rigging as if hand, electric or air power had been applied from the platform. The entire mechanism is so simple and compact that its weight for the double-truck car under test does not exceed 80 lb. The

car which carries this equipment weighs about 15 tons, empty, and has longitudinal seats for 40 passengers. It is being operated on several routes under different crews, so that its effectiveness can be determined under all the diverse conditions prevailing in a crowded hill city. In fact,

tation when the car is running, because they have two depressions to take lugs on the vertical portion of the sleeve bearing against the car-wheel hub. As the drum is brought against these backs, it revolves and draws up a chain which pulls forward a special pull-rod connected to the regular brake rigging, and thereby applies the brake shoes simultaneously on all the wheels.



Momentum Brake—Plan of Equipment for Double-Truck Car

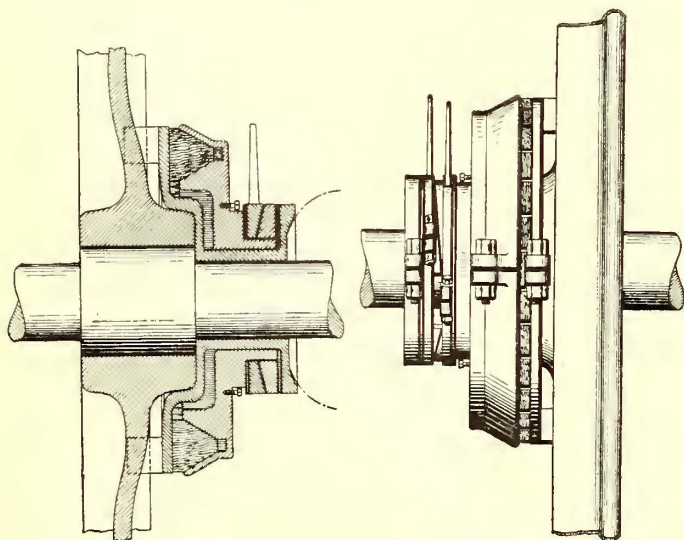
many of the stops must be made near sharp curves at the base of long grades.

The operation of this brake can be made clear from the accompanying drawings and description of a complete braking movement. Since no great leverage is required on the platforms, the motorman's brake handle is no larger than that used with an air brake. This handle, on being moved a couple of inches, turns a 1-in. staff. The latter

drum naturally is subjected to considerable heat during the braking period, but the rise in temperature is not great enough to carbonize the blocks.

To prevent automatic action on curves, the bell-crank lever is set on the truck framing within a few inches of the kingbolt. The pull-rod connection to the bell-crank lever is therefore about the same distance from the kingbolt at all times, so that all the brake rigging must remain in the same relative position and tend to turn around the kingbolt. None of the braking equipment is attached to the car body. Variations in this momentum brake are, of course, required for different classes of cars. On a single-truck car, for instance, no dead lever is used, the lug of each wedge plate being connected to the opposite bell-crank levers, which, in turn, are connected to each end of the car. By this arrangement the braking movements are the same in either direction. Turnbuckle adjustments are provided for any kind of equipment, but the braking mechanism is not likely to require attention more than once or twice a year.

The question of space needed on the axle by this brake is of particular importance. If all the equipment is mounted on the axle between the motor and car-wheel hub fully 6 in. would be required—a distance too great on double-truck cars. Provision, therefore, is made to carry as much of the vertical sleeve, blocks and drum above the wheel hub as may be necessary.



Momentum Brake—Section and Side Elevation of Double-Truck Equipment

operates the pull-rod and through a bell-crank movement pushes a main lever connected to the lug of a movable wedge plate loosely attached to a sleeve on the car axle. When the main lever pushes over the movable lug it makes the wedge plate ride over and away from a second wedge plate whose lug is connected to the dead lever, causing a gradual increase of pressure against an adjacent cast-iron drum, which, in turn, comes into contact with a set of revolving blocks made of hard end maple. These blocks are loose with respect to each other. They are in constant

GE-205 MOTOR

A short account was published in the *ELECTRIC RAILWAY JOURNAL* for April 17 of the GE-205 1200-volt motor used on the lines of the Central California Traction Company. Further particulars of this motor are now available.

It is designed to run at approximately the same revolutions per minute as the company's standard railway motors of similar capacity. The commercial rating is 75 hp. The number of commutator bars is approximately double that of the company's standard practice for 500-600-volt motors.

The motor is fitted with commutating poles, and on 1200 volts, which is the maximum operative potential guaranteed, the commutation is said to be very good. The creepage distances on the commutator and brush holders are practically double that of the standard 500-600-volt motor.

The field is wound with wire and insulated in the same way as the standard 600-volt, wire-wound field coil, with the exception that about twice as much insulating material is used. The frame is of the box type, having a solid magnetic steel shell with bored openings in the ends. These ends are fitted with frame heads, which carry the armature bearings. The lubrication is of the standard oil and wool description.

PROTECTION SLEEVE FOR SPAN WIRE POLES

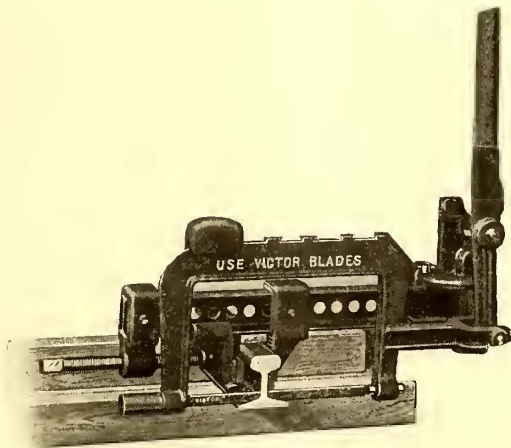
The point of greatest strain in a tubular steel span wire pole is at the ground line, and this is also the point of most active corrosion. Many poles which have been in the ground only a few years have been found to be corroded at the base to such an extent that they were a menace to life and property, while above the ground they are perfectly sound and capable of giving good service for many more years. Ornamental bases such as are commonly used with bracket-arm trolley poles and electric light standards protect them in a large measure from corrosion, but span-wire poles usually are not finished off in this manner. To protect and strengthen its standard types of steel span-wire poles the Pittsburgh Pole & Forge Company, Pittsburgh, Pa., has recently originated the idea of swedging by its patent hot process a sleeve 24 in. long on the poles at the ground level. Half of the length of the sleeve projects above the ground and half is buried. The sleeve is made of the same thickness of metal as the lower part of the pole itself and in the swedging process is practically welded to the pole. It is claimed that the addition of this sleeve doubles the strength of the poles, and by preventing any corrosion of the pole itself more than doubles the life.



Protection Sleeve on Pole

PORTABLE HACK SAW

The accompanying illustration shows a portable hack saw recently placed on the market by the Massachusetts



Portable Hack Saw

Saw Works, of Chicopee, Mass. This machine weighs about 90 lb. and can easily be operated by one man who should be able to cut a 9-in. I-beam in from 20 minutes to

30 minutes without resting. The saw takes a 14-in. blade and makes a clean straight cut, and as the saw is held in a frame, the danger of breaking the blade is reduced to a minimum.

The principal object sought by the manufacturer of this machine was to construct a device which was so light that it could be easily transported and so simple that it could be set up and operated by one man. The manufacturers make a special blade which is particularly adapted for this saw.

POWER STATION EQUIPMENT IN MINNEAPOLIS

Edward H. Scofield, mechanical and electrical engineer, Twin City Rapid Transit Company, lectured before the senior electrical engineers of the University of Minnesota, Wednesday, April 7, upon "The Development of the Power System of the Twin City Rapid Transit Company." Beginning with the days when cars were drawn literally by horse-power, Mr. Scofield outlined the various steps in the development of the power houses to meet the ever-increasing demands for power. In the early days of the system small electrical generators were driven by triple expansion Corliss engines through long lines of shafting, the 150-hp generator being the largest obtainable at that early day. Triple-expansion engines were used because of the high economy of steam obtained by them in running under favorable conditions. The violent fluctuations in the load which characterized electric railways were found to make such high efficiencies unattainable, and the violent changes of load were found to be destructive to the engine, involving heavy repair and maintenance expenses. The triple-expansion engines were succeeded by compound vertical Corliss engines. The latest additions to the steam plant have been steam turbo-generators. The economy of water-power was early recognized, and the "lower dam" was built half a mile below St. Anthony Falls, where the maximum of 10,000 hp became available. As one result of the control of the Mississippi River by the government reservoirs, the flow has been more uniform, so that it has been possible to develop more power at St. Anthony Falls. Twelve thousand horse-power is available at this new plant during times of normal water and on Sundays, when many of the mills are closed. The establishment of the main steam plant close to the river and adjacent to the railroads, together with the installation of modern coal-handling and stoking apparatus, has rendered possible the substitution of slack coal for the more expensive grades formerly used. Fortunately, there is plenty of water during the months when slack coal is scarce.

For the last 10 years the demands for power have increased at the nearly constant rate of 20 per cent annually. The extension of the system, including suburban lines, has required the adoption of alternating current for transmission and distribution to the numerous substations where the power is changed to 600-volt direct-current for the trolley circuit. Detailed descriptions of the equipment of the power stations and substations were given in the proceedings of the American Institute of Electrical Engineers for February, 1907.

A new electric railway is to be built this year between Buda Pesth and Waitzen, 30 miles. It is to be equipped for single-phase operation, using 10,000-volt, 15-cycle current on the trolley. The rolling stock will consist of 11 motor cars each carrying two 120-hp motors and four 500-hp locomotives.

LONDON LETTER

(From Our Regular Correspondent.)

Perhaps the most important item of tramway news of Great Britain this month is the abandonment by the London County Council of the surface contact system which had been installed between Aldgate and Bow. The highways committee has also recommended that the lines be reconstructed, partly on the conduit and partly on the overhead systems, but whether it will be possible to secure permission for the overhead system is a matter of doubt. This has been an unfortunate experiment. When the surface contact system was completed and the first efforts were made to put it into service some 9 or 10 months ago, it was decided to discontinue running the cars as complaints of sparking and of live studs were frequent. Later, at the request of the Council, W. M. Mordey, president of the Institution of Electrical Engineers, was called in to suggest some remedy, and at his recommendation experiments were conducted on a section of the track, and he suggested that the live studs could be remedied by installing a condenser on the cars. The Board of Trade, however, after witnessing the experiments on cars as amended by Mr. Mordey, refused to approve of the working of the tramways until completed, so that nothing was left for the London County Council to do but to abandon the line or put the modifications over the whole of the line already installed. As no guarantee could be secured that after re-equipping the line as suggested it would be approved by the Board of Trade, abandonment has seemed the better course.

Some interesting figures were given by Hayes Fisher, chairman of the finance committee, in the annual budget of the London County Council, presented recently. It is estimated that the surplus on the tramways for 1909-10 will be £44,557, after meeting a deficiency of £43,695, caused by the working of some of the lines by horses, and after providing all interest and sinking fund charges and two-thirds of a penny per car mile for renewals. This may be considered quite satisfactory. The total capital expended on the London tramways up to March 31, 1909, was nearly £9,500,000, the debt outstanding was £8,150,000, as a considerable portion of the debt has been repaid. The estimated expenditure on capital account in prospect, apart from new proposals now before Parliament, amounts to £3,250,000, about half of which will be expended in 1909-10.

It is interesting to note that for the purpose of coping with heavy traffic at certain periods of the day, the London County Council is endeavoring to obtain permission to run trail cars such as are used on the Continent and in the United States. In several instances the Board of Trade has sanctioned trailers, and the commissioner of police is prepared to consider their application for London, provided their use is limited to early morning and evening at times of congestion.

It seems probable, after a long period of discussion, that the bridge house estates committee of the City of London Corporation will soon recommend the entire reconstruction of Southwark Bridge, as the present hog-backed nature of the structure prevents its use by heavy traffic. The width of the bridge will doubtless be increased from 40 ft. to about 80 ft. This will leave ample room for constructing a double-track tramway, and in this way a valuable addition to the "across-river" tramway traffic will be made. In the event of the bridge being rebuilt, the London County Council has agreed to pay rent for the privilege of a tramway service over the bridge, as in the case of Blackfriars Bridge, the widening of which is now approaching completion. The total cost of the new bridge will probably be about £1,000,000.

C. W. Mallins, general manager of the Liverpool Corporation Tramways, seems to be prolific in inventions of modern tramway devices. His latest device consists in arranging a visible sign near the driver of the car by which the driver is made aware that a passenger wishes to descend from the car without having to wait for a communication from the conductor, who might be at the time on the top of the car, and consequently unable to see the passenger. A footboard on the car is worked on a hinge, so that when a passenger steps on it, it makes an electric connection by which a lamp is lighted near the controller in the front of the car.

The Blackpool & Fleetwood Tramroad has at last gained a well-deserved victory over the Urban District Council of Thornton, which assessed the company as a tramway and not as a railway. The company maintained that it was a railway within the meaning of the act entitling the company to assessment on the basis of one-fourth the full net annual value. The House of Lords decided in favor of the company. Lord MacNaughten, who delivered the leading

judgment, stated that it seemed to him that this was none the less a railway because the promoters called it a tramroad.

The City of York has not yet definitely settled its tramway problems, although the corporation is now operating the old system of horse trams, during which time the receipts have increased. The tramway committee has secured tenders from 18 contracting firms and is now aware that the complete electrification of the York tramways will entail an expenditure of more than £109,000, including street widening and the purchase of the old trams. Opinion is divided, however, as to whether the city should operate the lines itself or lease them to a company. Doubtless the citizens will eventually have to decide this matter by poll.

A son of Colonel Thys, to whom the construction of the well-known railway from Matadi to Leopoldville is due, has gone to Africa to examine the rapids and falls of the Lower Congo in order to decide whether it would be possible to obtain sufficient hydraulic power to operate the railway electrically. It is reported concerning the line now under construction on the Upper Congo to the Great Lakes, for which an additional capital of £1,000,000 has lately been raised, that the first section from Stanleyville to Ponthierville, 125 km in length, has been completed, and the temporary bridges have been replaced by permanent structures. The second section, extending a distance of 340 km, between Kindu and Kongolo has been fully surveyed and laid out for 300 km. As soon as Kongolo is reached, the further portion of the navigable Upper Congo for a distance of 640 km will become available for navigation of boats of 500 tons burden. It is hoped that all will be ready by the end of 1910.

The decision of the Leeds tramways committee to have the employees of the tramway inspected medically seems to have led to the same kind of trouble that a similar decision gave rise to about a year ago in London. There have been so many avoidable accidents in England lately that tramway managers have come to the conclusion that it is necessary that employees should be thoroughly examined as to their physical fitness for the exacting requirements of tramway service. The men contend that an ordinary examination of their hearts, hearing and sight is sufficient.

Some months ago the Bournemouth Town Council called upon J. B. Hamilton, the general manager of the Leeds tramways, to report on the condition of the Bournemouth tramway system and the methods by which the system could be made more remunerative. Among the many suggestions made by Mr. Hamilton was one that the council should appoint a general manager. This the committee has done, Charles William Hill, chief assistant and electrical engineer to the Birmingham Corporation Tramways Department, having received the appointment.

It would appear that the attempt to introduce first-class cars on the Garston route of the Liverpool Corporation Tramways has not proved as successful as was hoped and the committee has decided in future to adopt a penny outside fare and also reduce the inside fares. By this method these cars will only be first class hereafter insofar as the inside is concerned.

The borough engineer of Edinburgh has reported to the tramway committee of the Town Council in favor of railless electric traction for the suburban districts of the city. The engineer proposes a route commencing at Tollercross, the center of a large population, extending along Earl Grey Street to Fountainbridge, Dundee Street, down Henderson Terrace, to tap the Gorgie tramways, along Slateford Village and Colinton to Juniper Green. This is a total route of 2¼ miles within the city and 2¾ miles without. The capital cost would be £20,000.

The sub-committee appointed by the Dundee Town Council to inquire into the use of the trackless trolley system has again reported in favor of an experimental equipment along the esplanade at an estimated cost of £5,000. The manager of the tramways undertaking has expressed the opinion that the venture would be a financial success.

A collision happily without serious consequences occurred recently on the tramway from Llandudno to Great Orme's Head, two of the cars getting onto the same line at a passing loop about midway on the very steep gradient. The cars are worked by cable from the top, so that when the upward car by some mischance got onto the downward loop a collision was unavoidable.

It is expected that a start will shortly be made with the construction of an important tramway in Central Lancashire, as the Preston and Wigan corporations and the Lancashire & Yorkshire Railway have withdrawn their opposition to the Preston, Chorley and Horwich tramways bill. This proposed tramway will connect the industrial towns of Preston and Bolton, passing through Chorley and Adlington and linking up with the Bolton system at Horwich.

A. C. S.

News of Electric Railways

Cleveland Traction Situation

The greater part of the week ended April 24 was taken up by discussions of the interurban question by the City Council and the representatives of roads entering Cleveland. The conditions contained in the revised draft of the proposed ordinance were insisted upon by Mayor Johnson, while the railway men contended that the administration had placed the cost of operation per car-mile too high and that the extent of control was too great to allow the management of the roads to operate to advantage either in the city or on their lines outside. The proposed subway project was also discussed in connection with this matter. The interurban companies desire the privilege of making arrangements for subway terminals if they find it to their advantage, but Mayor Johnson has intimated that he would like to make it compulsory for the roads to use the subways in case a system is built.

The cost to the Cleveland Railway of operating interurban cars also received attention. Representatives of the interurban companies reiterated that they are willing to pay the full cost of operating their cars over the city tracks and make an allowance to the interest fund besides, but said that they should not be asked to pay an exorbitant price in order that citizens of Cleveland may enjoy a reduced fare. J. T. Ross, chief engineer of the Lake Shore Electric Railway, presented a schedule which he had prepared of the cost of operation per car-mile, with the individual items entering into it. The 38 general subdivisions which went to make up the operating cost per car-mile were divided into four general groups as follows:

Group No. 1.—Those that, in the accounting of the Cleveland Railway, are in direct proportion to the total car-miles.

Group No. 2.—Those that are caused solely by, and are chargeable to, the city service in proportion to the city car-miles.

Group No. 3.—Those which are not increased or decreased in the same ratio as the mileage, but which might be increased to some extent by increasing the mileage of city cars or by the mileage of the interurban cars.

Group No. 4.—Those which are fixed and would be the same regardless of the mileage of either the interurban or city cars.

In addition to this operating charge there was added to the total cost per car-mile taxes and interest. The proportionate division of taxes and interest for each group was based on the values by which the capitalization of the Cleveland Railway is fixed. These subdivisions, together with taxes and interest, were shown in a separate schedule. The average cost for all the cars operated on the city company's tracks was shown in cents per car-mile for each subdivision in the column of the groups to which they belong. The total of Group No. 1 was 12.04 cents; of Group No. 2, 4.96 cents; of Group No. 3, 1.18 cents, and of Group No. 4, 4.90 cents. This made the total cost per car-mile for all cars 23.08 cents.

The representatives of the interurban companies assert that the items in Groups No. 1 and No. 3 represent the actual cost of operating their cars on the city tracks and that if more is paid it will go to reduce the fares for all who travel on the city cars. The sum of Groups No. 1 and No. 3 is 13.22 cents, while Mayor Johnson claims that the cost of operating interurban cars in the city is about 31 cents. By combining the expense represented in Groups No. 2 and No. 4, with which the interurban companies claim they are not concerned, the cost of operating all cars is 23.08 cents per car-mile. The officers of the interurban companies say that the cost shown in these columns would be the same if the interurban cars did not come into the city. They are willing to pay 18 cents per car-mile for the right to operate in the city and feel that even at that compensation they are contributing 4.78 cents toward the reduction of the general fare.

The interurban companies through their representatives say that the current for their cars can be measured and the actual cost of the power used can be ascertained and charged against them. Power consumption tests will be made with both city and interurban cars. Mayor Johnson and the officials of the Cleveland Railway argue that the depreciation of tracks and special work is greatly increased by the operation of the heavy interurban cars over the city lines. On April 23 it was decided to employ experts to consider this question and report their findings.

Horace E. Andrews, president of the Cleveland Railway, proposed that the wage clause be eliminated from the or-

dinance under discussion and that the company be allowed to treat with the men as circumstances demand at the time. The Mayor said that the only provisions in which the city is interested are the dead-head list and the question of seniority. While he has receded from the stand at first taken, that the city should have something to say regarding wages in relation to the effect on fare, he still wishes to be able to dictate what shall be done with men appointed to the company during the control of the Municipal Traction Company by the city. President Andrews stated that 100 new cars should be secured at once. This is 30 more than was suggested by J. J. Stanley, vice-president of the company. He also said that a new power house should be built, but that the construction of this plant might be deferred for some time without serious consequences.

The subject of subways came before the meeting on April 22. W. R. Hopkins, of the Cleveland Subway Company, recently incorporated, said that no effort would be made to finance the company until a franchise had been granted. Mayor Johnson said he favored disposing of the franchise by bid to the company that offered the best terms and Mr. Andrews intimated that the Cleveland Railway might be a bidder for the right to construct the subway.

When the question of fare was brought up on April 22 President Andrews stated that he believed that matters would be greatly simplified if the Mayor would admit that he is mistaken regarding his assertions that a 3-cent fare will pay. Mr. Johnson said again that he believed that 3 cents with a charge of a penny for a transfer will pay the operating expenses and interest on the investment.

At the meeting on April 23 Mr. Hopkins went further into the subway plans. From what he said they include the electrification of the Nickel Plate Railroad and possibly the Lake Shore & Michigan Southern Railroad. This would be in addition to routing the interurban cars over the tracks of these companies into the city.

At the meeting on April 23 President Andrews stated that there must be a maximum fare of at least 4 cents with 1 cent for transfers without refund if a settlement is to be made on the Taylor plan that will attract capital. The maximum of seven tickets for 25 cents, as voted by the City Council, will not be sufficient. He said that the property might as well be left in the hands of the receivers if the fare is not made at least 4 cents, as another receivership would be sure to follow. City Solicitor Baker summed up the important points that are still unsettled as follows:

Valuation of property—waiting on report under preparation by Superintendent Bemis, of the water-works department.

Maximum rate of fare—to be discussed some time this week.

Right of the city to name a purchaser and when the nominee may exercise the option—to be discussed this week.

Car-mileage rate for cost of operation—to be taken up when the schedules forming the basis of charge are completed.

Interurban companies—experts are at work endeavoring to determine the wear on tracks and the amount of current used.

Data Sheet on Education

The committee on education of the American Street & Interurban Railway Association has sent out the letter and data sheet below to all member companies. The letter is signed by the members of the committee, H. H. Norris (chairman), R. E. Danforth, H. F. Grant, D. C. Jackson and A. S. Richey:

The letter and data sheet follow:

Your Committee on Education held a meeting on Wednesday, March 10, 1909. As a result of this meeting and of the experience gained by the committee during the preceding year, the following decisions were reached:

(1) That the committee divide its activities into two parts; (a) Those designed to assist the companies in preparing thoroughly trained young men for executive positions, and (b) Those designed to increase the efficiency of young men for high grade work in special departments.

(2) That, as the results of the experiments made during the past year with the apprentice plan previously outlined by the committee have been highly successful, the committee should endeavor to interest the membership at large in this work.

(3) That the committee should ascertain the practice of the member companies relative to efforts made for the training of young men in their employ.

(4) That the committee should ascertain from the membership to what extent a correspondence course, as outlined below, would be favorably received.

APPRENTICE COURSE. The apprentice plan outlined in the 1908 Convention report of this committee has been put into operation by the Public Service Railway Company with satisfactory results. An account

of this work will be presented to the 1909 Convention. The committee desires to include also an account of similar work accomplished by other companies.

CORRESPONDENCE COURSE. The committee suggests a correspondence course somewhat along the lines followed by the American Gas Light Association. It is proposed that question sheets be sent out at regular intervals to young men in the employ of member companies. The replies to the questions are to be worked out by observation, reading and consultation with foremen and superintendents. The replies will be examined by competent, practical railway men and returned for revision. It is suggested that companies place a few books and periodicals at the disposal of the young men.

In conclusion the committee desires to point out that the expense of educational work done for the benefit of young employees will bring the very best financial returns. The expense of this work is not considerable. Young men receiving such a training are glad to work for the wages of an ordinary helper, as they feel that their compensation is not all in the money paid them. A loyal, efficient corps is built up by such means, and a spirit of co-operation is sure to result. Your committee therefore desires to assist you in every possible way, and is willing to undertake any plan which will bring about the desired results.

In order that the committee may properly serve the members of the Association, it is necessary that each should reply to the accompanying questions, which have been carefully reduced to a minimum number and made as explicit as possible.

PART I—QUESTIONS RELATING TO GRADUATES OF TECHNICAL SCHOOLS.

(1) Do you employ technical graduates? (2) If so, how many at present? (3) Of these how many have been in your employ (a) one year? (b) two years? (c) three years or over? (4) Of the number named, how many hold regular positions of responsibility in some department? (5) Are any of these heads of departments or chief officers? (6) In what line of work in general are the remaining men engaged? (7) What is the average pay of technical graduates in your employ? (8) Have you adopted any systematic plan for training technical graduates or for adjusting them to your work? (9) What is your scheme for recruiting your executive and engineering force? (10) If you have no plan for taking technically trained men into your organization, would you consider some plan for this purpose? (11) What plan do you advise as best adapted to your system for getting technical men into the organization?

PART II—QUESTIONS RELATING TO YOUNG MEN WITHOUT TECHNICAL EDUCATION.

(1) Have you young employees who would be interested in a correspondence course like that outlined? (2) If so, about what number? (3) Would such a plan be of advantage to the company? (4) Does this plan appeal to you as reasonable? (5) Will you make such suggestions in regard to this or any other plan which you think would be of benefit to your employees?

Convention of Southwestern Electrical & Gas Association

The program of the fifth annual convention of the Southwestern Electrical & Gas Association, to be held in Dallas, Tex., on May 20-22, has just been made public. The headquarters of the association will be at the Southland Hotel, where the meetings will also be held and the exhibits shown. Those desiring space for exhibit purposes should address the assistant secretary of the association, D. G. Fisher, 300 Commerce Street, Dallas, Tex. Other hotels in Dallas are the Oriental, St. George, Park and Imperial. Reservations for hotel accommodations should be made through O. E. Turner, chairman committee on hotel accommodations, Scollard Building, Dallas.

The executive committee has adopted a standard badge for the association, with the idea that this badge will remain a permanent one and be used at future conventions. All members and member companies will be entitled to one badge free of charge. All extra badges will cost 50 cents each. A departure from the past policy of the association has been made in the issue of the "Question Box." Advance copies of this book will be published and bound in with the souvenir program, and copies will be distributed on the first day of the convention. Arrangements have been made for reduced railroad fare on trains due to arrive in Dallas before noon of May 20, with final return limit of May 24. Round trip rates of practically one and one-third fare will be given from points within 90 miles of Dallas. Beyond this point in Texas the charge will be one fare, plus 20 per cent, for the round trip. Delegates from the East can take advantage of the one-week excursion tickets, good for 21 days, and on sale Tuesday, May 18. These rates provide round trip transportation at one fare, plus \$2. Those desiring additional information should confer with James P. Griffin, transportation committeeman, 300 Commerce Street, Dallas. Those from the East should confer with Sam A. Hobson, St. Louis, Mo., or to Manton Mill, room 539 Frisco Building, St. Louis, Mo.

The entertainment program includes an automobile ride for visiting ladies, luncheon and theater party for the first day; luncheon and entertainment for the ladies and entertainment for the gentlemen by the "Sons of Jove" on the second day, and a visit to the public utility plants and points of interest in the city on the third day. On the evening of Friday, May 21, there will be a grand rejuvenation of the "Sons of Jove" at Turner Hall.

The following papers have been prepared for the convention: Producer Gas Plants for Small Central Stations, by W. B. Head, Stephenville, Tex.

Scope of Legal and Claim Departments and Their Relation to Each Other, by H. S. Cooper, Galveston, Tex.

Organization and Operation of a Claim Department, by W. C. Forbes, Fort Worth, Tex.

Lamps for Residence Illumination: Their Characteristics and Comparative Economy of Operation, by Prof. Arthur Curtis Scott, Austin, Tex.

Low-Pressure Turbines, by Fred. M. Lege, Jr., Galveston, Tex.

High-Pressure Gas Distribution for Commercial Purposes, by H. M. Moore, Austin, Tex.

A Method of Determination of Total Sulphur in Gas, by L. B. Morehouse, San Antonio, Tex.

Preparation of Purifying Material, and the Purification of Gas, by Clark F. Farmer, Austin, Tex.

Economies That Can Be Made in the Operation of a Small Central Station, by Thomas Cook, Waxahachie, Tex.

Association Meetings

Massachusetts Street Railway Association, May 12.

Arkansas Association of Public Utility Operators, Little Rock, May 12, 13 and 14.

Southwestern Electrical and Gas Association, Dallas, Tex., May 20, 21 and 22.

Central Electric Railway Association, Fort Wayne, Ind., June 3.

Elevated Entrance to Indianapolis Discussed.—At a meeting of the representatives of several electric railways entering Indianapolis on April 23 the advisability of elevating the tracks leading into the terminal station was informally considered. Traffic congestion is increasing rapidly in Indianapolis, and besides the time ordinarily consumed in operating within the city, interurban cars are subjected to frequent delays through extraordinary circumstances, which at times completely upset their operating schedules and the schedules of companies with which they connect. An elevated entrance to the city would also obviate the necessity of stopping for passengers at cross-streets. Within a short time Indianapolis will be connected with Chicago, Cincinnati and St. Louis by electric railway, and some such entrance for the interurbans as has been suggested will be necessary.

Hearing on Terms for Extension of the Hudson & Manhattan Railroad.—The Public Service Commission of the First District of New York held a hearing on April 23 to determine the form of the contract for the extension of the Hudson & Manhattan Railroad from Sixth Avenue and Thirty-fourth Street to the Grand Central Station. That the time was past for objecting to the extension of the Hudson & Manhattan Railroad was made plain by Chairman Willcox in an opening speech limiting the hearing to the form of the contract. Alfred A. Gardiner, counsel for the Interborough Rapid Transit Company, asked about the intentions of the commission as to granting station territory to the Hudson & Manhattan Railroad on the north side of Forty-second Street. Commissioner Willcox said that further opportunity would be given to the Interborough Rapid Transit Company to file its views if any changes were made in the station sites of the Hudson & Manhattan Railroad, such as might interfere with the arrangements of the Interborough Rapid Transit Company and the Steinway tunnel.

Municipal Ownership Proposed in San Francisco.—The Board of Supervisors of San Francisco has voted to pass to print a bill providing for the reconstruction of the Geary Street Railroad and operation by the city. The proposed ordinance reads: "It is hereby determined and declared that the public interest and necessity demand the acquisition or construction by the city and county of San Francisco of a public utility, namely, a municipal street railway over, upon and along the following streets, to wit: (Route given in detail.) The board of public works is hereby directed to procure, through the city engineer, and file with the Board of Supervisors plans and estimates of the cost of original construction and completion of such public utility. This ordinance shall be published for two weeks in the official newspaper and shall take effect immediately." Following the passage of the ordinance and the submission of the required plans and estimates, the board proposes to call a special election for June, at which the electors of San Francisco will be asked to vote on the question. It will require a two-thirds vote to carry the proposal.

Meeting of the Massachusetts Street Railway Association.—The regular monthly meeting of the Massachusetts Street Railway Association was held at Young's Hotel, Boston, on April 14. William A. Murphy of Boston delivered an interesting address on street railways and the General Court of Massachusetts. Mr. Murphy discussed at some length the political situation and sketched the doings of the Legislature in a witty vein. Later he stated that the policy of the square deal is working out to the advantage

of the public service corporations and the public as represented in the Legislature, and that a better understanding of mutual purposes is close at hand. He pointed out that while some corporations have not been blameless in the past, the public gained nothing when it heeded the appeals of demagogues and jumped to the conclusion that all corporate management and policies are reprehensible. The corporation is the creature of the times, made necessary by the inability of the individual to accomplish what civilization demands. Anti-corporation attacks have sometimes been inspired by men of sound motives, but lack of appreciation of the conditions has made much trouble. Street railway men are now educating the public to a better appreciation of the problems which have to be solved. The majority of legislators are honest, according to the experience of the speaker, and work in many cases overtime for the public good for absurdly small compensation. Mr. Murphy paid glowing tributes to President Sullivan of the Boston & Northern Street Railway and Old Colony Street Railway and to Hon. Bentley W. Warren, counsel for those roads, for their fair-minded and straightforward work in administrative and legal circles, with reference to public relations. In conclusion Mr. Murphy referred to the power of the press for good or ill, and urged the value of a right and open course in the conduct of corporate business.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—Governor Draper has sent a special message to the Legislature recommending that the so-called railroad merger question shall be solved by the creation of a Massachusetts corporation to hold the stock of the Boston & Maine Railroad, giving to any of the other large railroads incorporated under the laws of the State the power to finance the holding organization. State control of future sales of stocks is a feature of this message, which points to a constructive solution of the transportation problem in New England, leading toward a concentration of interests in that section. Closely related to the question of joint steam railroad ownership and operation is the future of steam and electric railway relations in Massachusetts. It is anticipated that if the Legislature acts favorably upon the Governor's message a possible result may be the later authorization of electric railway developments in western Massachusetts by the New York, New Haven & Hartford Railroad. It is felt that while the Railroad Commission and the courts have exhibited all proper diligence in interpreting the laws, a somewhat broader policy may be inaugurated in the event of a satisfactory adjustment of steam railroad relations. Although the bills to permit the Berkshire section to be developed electrically through the ownership of electric railways by the New York, New Haven & Hartford Railroad have so far failed to pass, favorable action on the Governor's message will indirectly tend to provide the electric railway facilities which are so generally desired in the western part of the State. An effort was made to refer the Governor's message to the committees on railroads and street railways, sitting jointly, but the former committee secured jurisdiction. The committee on railroads has voted in executive session to report a bill to incorporate the East Boston Railroad to handle freight in East Boston. Electricity may be used as a motive power if desired. The committee on street railways has reported that no further legislation is needed on the part of the Railroad Commission's annual report dealing with street railways. The House has accepted the "leave-to-withdraw" report of the committee on metropolitan affairs on the Bryant bill, which aimed to change the Boston terminus of the Cambridge subway from Park Street to Scollay Square. The bill to authorize the Connecticut Valley Street Railway to fund its floating debt has been passed, to be engrossed and sent up for concurrent action. A resolve has passed the first stage in the House directing the Railroad Commission and the Boston Transit Commission to investigate and report upon the terms of the proposed consolidation of the Boston Elevated Railway and the West End Street Railway. The committee on street railways has reported in favor of the extension of the Boston Elevated Railway into Medford. The bill to regulate and define the purposes of street railway stock and bond issues has been given its third reading in the House.

New York.—Both houses have passed the Travis-Robinson bill, which contains the amendments to the Elsberg rapid transit measure desired by the Public Service Commission of the First District of New York, making possible the construction of additional rapid transit lines in New York by either the city or private capital. The bill by Senator Wagner providing for a 5-cent fare to Coney Island over the lines of the Brooklyn Rapid Transit Company and the Coney Island & Brooklyn Railroad was defeated in the Senate on April 23 by a vote of 22 to 15. The vote on this measure was reconsidered on April 28 in the Senate and the bill was passed. Senators Cobb and

Hinman opposed the measure on the ground that rates should not be fixed arbitrarily. A 5-cent fare bill was passed last year, but Governor Hughes vetoed it. Assemblyman Phillips' public service law amendments bill, as desired by the Public Service Commissions, and as finally amended in the Assembly by Chairman James S. Parker of the railroad committee, was reported favorably in the Senate on April 23 by the judiciary committee, with further amendments made by that committee. Senator Cullen objected to the bill going to a third reading, and it was referred to the committee of the whole. The Senate judiciary committee has also reported favorably the consolidated railroad law, introduced by Assemblyman Phillips. The Senate committee reported this bill as it came from the statutory consolidation commission. It has been advanced to a third reading. The Senate has passed the bill providing for a 5-cent fare over the lines of the New York Central & Hudson River Railroad within New York City. A final hearing was given on April 20 by the Senate judiciary committee on the Davis-Parker bill for the purpose of giving the members of the Public Service Commissions an opportunity to show why the Public Service law should be amended as proposed by the new measure. The new act is drawn to define the powers of the commission clearly regarding fares, joint rates, etc. In reply to the statement that the Commission of the First District by its acts had deterred and repelled capital in New York City, Chairman Willcox cited the offer of the Interborough Rapid Transit Company to spend \$50,000,000, the proposal by the Bradley-Steers-Gaffney Company to build the Lexington Avenue subway at a cost of \$50,000,000, and the desire of the Hudson & Manhattan Railroad to construct an extension in New York, and spend \$8,000,000 in improvements in the city. The Senate has passed the Waddell bill providing that proceedings for the review of special franchise tax assessments shall be heard before extraordinary terms of the Supreme Court instead of the referees. About \$47,000,000 is involved in pending litigation. The Assembly has passed a concurrent resolution providing for the appointment of legislative committees to investigate the advisability of extending the jurisdiction of the Public Service Commissions to telephone and telegraph companies and the adoption of the proposed New York City charter. Each committee is to be composed of three Senators and five Assemblymen, and to have \$1,000 for expenses, and to report to the next Legislature.

Pennsylvania.—Governor Stuart was inclined to resent the action of the Legislature in placing upon him the responsibility of cutting down appropriations aggregating about \$67,000,000, covering a period of two years, so that they can be met by revenues for this same period which are not expected to exceed \$47,000,000. While he could sign all these appropriation measures as they were passed before final adjournment on April 15, thus making it necessary for an extra session to provide new revenue to meet the additional \$20,000,000 appropriated, it is expected that he will work economies necessary to bring about the reduction. In all the Legislature considered 1912 measures, 1272 of which were introduced in the House and 640 in the Senate. Among the first bills signed by the Governor were those providing for an executive controller and requiring street railways to transport United States mails upon demand. The bulk of the bills introduced, however, never reached the dignity of final passage, half of them being killed in committee. Among the measures which did not get out of committee was that enabling street railways operating in whole or in part on a public highway to straighten, relocate and otherwise improve their lines and to lay additional sidings and prescribing the proceedings to compensate the owners of land thus taken. Another important measure which failed of passage was the Reynolds bill giving electric power companies the right of eminent domain. The efforts of the State Railroad Commission to obtain authority to regulate stock issues of transportation corporations were without avail. The measure taxing the real estate of corporations for local purposes, which was vigorously opposed by the Pennsylvania Street Railway Association, and the Dunmore 2-cent and 2½-cent railroad fare bills were also defeated. Among the more important measures reaching the Governor were the Stuart bill providing for a State highway from Philadelphia to Pittsburgh, carrying an appropriation of \$5,000,000; the constitutional amendment permitting Philadelphia to borrow money for the construction of subways, which can be leased to transportation companies; the Murphy bill, allowing steam and electric railways to connect their tracks; the Shields bill empowering street railway companies to carry all kinds of freight franchises to be revocable in 10 years, and the bill providing for the incorporation of motor omnibus companies in cities.

Financial and Corporate

New York Stock and Money Market

April 27, 1909.

The stock market to-day was dull, with a tendency that resulted in price losses for almost every issue. The week's trading has been professional and colorless, and at top figures there was considerable evidence of profit taking. Traction issues have been fairly active and prices have advanced to a limited extent. Brooklyn Rapid Transit broke sharply to-day on the announcement that the Senate at Albany had passed the Coney Island 5-cent fare bill, but at the close of the market had almost entirely recovered.

Money continues to be easy, and several considerable offerings of bonds that were made during the week were at once absorbed. Quotations to-day were: Call, 1/4 to 2 per cent; 90 days, 2 3/4 to 3 per cent.

Other Markets

In the Boston market, Boston Elevated and Massachusetts Electric have both been prominent, but price changes have been insignificant. West End preferred has been moderately active.

In the Philadelphia market, 20,000 shares of Rapid Transit were traded in to-day with the price advancing to 36, a new high level. Union Traction has moved up to 58.

There has been little trading in traction securities in the Chicago market. The only issue of the Chicago Railways that has been in evidence is the Series 2, and this has been much less in demand than formerly. A few lots of Northwestern Elevated and Metropolitan Elevated have been sold.

In the Baltimore market, United Railways 4s are selling at 87 1/4, the incomes at 55 1/2 and the funding 5s at 80.

At the sale of securities at auction in New York last week the following transactions were recorded: \$15,000 Newburg Electric Railway 5 per cent bonds, at 62 1/2; 20 shares Dubois Electric & Traction temporary certificates, \$100 each, \$7 per share.

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

	Apr. 20.	Apr. 27.
American Railways Company.....	46	45
Aurora, Elgin & Chicago Railroad (common).....	*a39	a38 3/4
Aurora, Elgin & Chicago Railroad (preferred).....	*a90	a88
Boston Elevated Railway.....	131 1/2	131
Boston & Suburban Electric Companies (common).....	*15	*15
Boston & Suburban Electric Companies (preferred).....	*70	*70
Boston & Worcester Electric Companies (common).....	15	12
Boston & Worcester Electric Companies (preferred).....	a58	56
Brooklyn Rapid Transit Company.....	76 3/8	76 3/4
Brooklyn Rapid Transit Company, 1st ref. conv. 4s....	*a137	85 3/8
Capital Traction Company, Washington.....	*a137 1/2	a138 1/2
Chicago City Railway.....	*a190	a190
Chicago & Oak Park Elevated Railroad (common).....	*a4 1/2	*a4 1/2
Chicago & Oak Park Elevated Railroad (preferred).....	*a11	*a11
Chicago Railways, ptcptg. ctf. 1.....	*a112	*a110
Chicago Railways, ptcptg. ctf. 2.....	*a41	*a40
Chicago Railways, ptcptg. ctf. 3.....	*a28 1/2	*a27
Chicago Railways, ptcptg. ctf. 4.....	*a11 1/2	*a11
Cleveland Electric Railway.....	*a78	*a78
Consolidated Traction Company of New Jersey.....	a77 1/2	a77 1/2
Consolidated Traction Company of New Jersey, 5 per cent bonds.....	a106 1/2	a106 1/2
Detroit United Railway.....	57	57
General Electric Company.....	158	158
Georgia Railway & Electric Company (common).....	82	82
Georgia Railway & Electric Company (preferred).....	*85	82
Interborough-Metropolitan Company (common).....	15 1/2	15 3/8
Interborough-Metropolitan Company (preferred).....	44 1/8	44 5/8
Interborough-Metropolitan Company (1 1/2s).....	78 3/4	78 3/8
Kansas City Railway & Light Company (common).....	*a44	a47 3/4
Kansas City Railway & Light Company (preferred).....	*a83	a82
Manhattan Railway.....	143 1/4	143 3/4
Massachusetts Electric Companies (common).....	14	13 1/2
Massachusetts Electric Companies (preferred).....	71	71 3/4
Metropolitan West Side, Chicago (common).....	a18	a19
Metropolitan West Side, Chicago (preferred).....	a52	a50 1/2
Metropolitan Street Railway.....	*23	26
Milwaukee Electric Railway & Light (preferred).....	*a110	*a110
North American Company.....	83 1/2	82
Northwestern Elevated Railroad (common).....	*a23	a24
Northwestern Elevated Railroad (preferred).....	*a68 1/2	a70
Philadelphia Company, Pittsburg (common).....	42	41 1/2
Philadelphia Company, Pittsburg (preferred).....	42 1/4	41 3/4
Philadelphia Rapid Transit Company.....	35	35 3/4
Philadelphia Traction Company.....	93	92 1/2
Public Service Corporation, 5 per cent col. notes.....	a100 1/4	a100 1/2
Public Service Corporation, ctf. s.....	a81	a81 1/2
Seattle Electric Company (common).....	*91 1/2	a91
Seattle Electric Company (preferred).....	*a98	a98
South Side Elevated Railroad, Chicago.....	*a56	a56
Toledo Railways & Light Company.....	12	12
Third Avenue Railroad, New York.....	30 1/2	32 3/4
Twin City Rapid Transit, Minneapolis (common).....	103 1/2	*103 1/2
Union Traction Company, Philadelphia.....	56 3/2	57 1/4
United Railways & Electric Company, Baltimore.....	12 1/4	11
United Railways Investment Company, San Francisco (common).....	*a37 1/2	*37 1/2
United Railways Investment Company, San Francisco (preferred).....	56	56
Washington Railway & Electric Company (common).....	*a43 3/8	a42 3/4
Washington Railway & Electric Company (preferred).....	*a92	a92 3/8
West End Street Railway, Boston (common).....	97 1/2	98
West End Street Railway, Boston (preferred).....	*a110	111
Westinghouse Electric & Manufacturing Company.....	82 1/2	81 7/8
Westinghouse Electric & Manufacturing (1st preferred).....	119	*119

a. Asked. * Last sale.

Annual Report of the General Electric Company

The seventeenth annual report of the General Electric Company, that for the year ended Jan. 31, 1909, was made public this week. President Coffin reports that the profits of the company for the year (including \$35,912.48 from securities sold and \$1,453,942.63 from royalties, dividends, interest, etc.), after deducting all patent, general and miscellaneous expenses, fixed charges and allowances for depreciation and losses, and writing off \$1,524,295.32 from factory plants, were..... \$4,802,252.67
Paid in dividends during the year..... 5,214,026.00

Deficit charged to surplus account..... \$411,773.33
Surplus at the end of last fiscal year..... 16,513,836.14

Total surplus Jan. 31, 1909.....\$16,102,062.81

He continues: "The year of 1908 was marked by severe and continued depression in the business of your company. During the period very few new enterprises requiring apparatus for the generation and distribution of electricity were brought out, and in consequence the business of your company since the last report has largely depended upon current renewals and supplies, with occasional additions to plant on the part of the older and more prosperous companies. The result has been that the orders received by your company during the year were only 70 per cent of those received for each of the two previous years, and the shipments to customers were only 63 per cent of the shipments for 1907.

"Business conditions are slowly improving, and with a resumption of normal activity throughout the country the present unemployed factory facilities of your company and its large accumulation of cash will, it is hoped, be profitably used."

Vice-President Lovejoy reports that the total number of separate orders and contracts received during the year was 248,384, as compared with 236,864 last year, an increase of 11,520, while the average value per order was 30 per cent less. The terms of payment secured for the year compared favorably with the four previous years, as shown by the following statement:

	1904	1905	1906	1907	1908
	per ct.	per ct.	per ct.	per ct.	per ct.
On Shipment.....	13.0	16.3	13.7	17.8	16.6
30 Days.....	68.5	63.1	68.6	68.5	68.0
60 Days.....	9.0	12.7	10.1	9.7	6.0
90 Days.....	5.7	5.3	3.0	2.5	3.9
Over 90 Days.....	3.8	2.6	4.6	1.5	5.5

Some of the more important contracts received were: Chattanooga & Tennessee River Power Company, Chattanooga, Tenn.: 60,000 kw capacity in generators and transformers, stepping up to 44,000 volts for transmission to Chattanooga, Tenn.

Connecticut River Power Company, Brattleboro, Vt.: Five 2500-kw generators with switchboard and complete transformer equipment stepping up to transmission potential of 66,000 volts.

Washington Water Power Company: For a new plant at Little Falls, on the Spokane River, two 5000-kw generators, together with necessary transformers, stepping up to 63,000-volt transmission line.

Hudson Tunnels Company, New York: Additional car equipments. All of the cars operated in the various tunnels owned by this company connecting Manhattan with New Jersey are equipped with motors of the company's manufacture.

Southern Pacific Railroad Company, Oakland, Cal.: Rotary converter apparatus to be used in supplying current for its 1200-volt direct-current car equipments.

Great Western Power Company, San Francisco, Cal.: One 10,000-kw generator and 10 transformers additional to the apparatus previously purchased from the company for the power company's 100,000-volt, 165-mile hydro-electric transmission plant, now in operation.

In speaking of the 1200-volt direct-current system, Mr. Lovejoy says:

"The continued successful operation of our 1200-volt direct-current railway apparatus fully demonstrates the reliability of this most valuable system which fulfills the requirements of railway companies for extensions and for interurban service beyond the economical limits of 600-volt distribution, avoiding the complications incident to single-phase alternating-current equipments when operated over direct-current lines."

ENGINEERING

Of the company's engineering progress, Vice-President Rice says:

"Experience in the use of the high electric pressures of from 60,000 to 100,000 volts, needed for the economical distribution of electricity over very long distances, has been so satisfactory that higher pressures up to 150,000 volts are being considered in pending propositions. In this connec-

tion it is an interesting fact that the sales of transformers of 60,000 volts and over in 1908 were nearly double those in 1907.

"We have made many improvements in our switches for the control of high-tension circuits, and have designed and placed in commercial operation switches capable of controlling 110,000 volts, which is the highest voltage now in practical operation.

"Two of the 14,000-kw turbines mentioned in my last report have been placed in operation in Chicago and two in New York. These have proved satisfactory in every respect, and orders for additional units of the same size have been placed with us. Our engineers have completed the design of a number of turbine generators for operation by low-pressure or exhaust steam. Important turbines of this character have been designed up to 5000-kw capacity.

"Our new type commutating pole railway motor, mentioned in previous reports, has proved most satisfactory in practical operation, and large numbers have been sold. Several new sizes have been developed during the year. Our 1200-volt railway system has been further perfected, and the installations already made have proved an unqualified success.

"The 35 electric locomotives sold the New York Central for operation of its New York terminal and tunnel have made an unequaled record for reliability and low cost of maintenance, and we have just completed an order for 12 additional locomotives of similar design. The electric locomotives sold the Great Northern Railway Company for its Cascade Tunnel Division have been completed and satisfactorily tested and shipped. They will be in operation this summer, and are notable as possessing the greatest tractive power of any electric locomotives built to date.

"The vertical type of rotary converters of our design, mentioned in previous reports, has continued to give satisfaction, and many additional installations have been made during the past year. They are of particular value, because of the saving in space afforded by the compactness of design. We are building a number of these vertical rotaries of 2500 kw capacity, which are the largest rotaries ever constructed."

The consolidated balance sheet of Jan. 31, 1909, follows:

ASSETS	
Patents, Franchises and Good-will.....	\$ 1.00
Cash	22,233,671.29
Stocks and Bonds	21,922,189.21
Real Estate (other than Factory Plants).....	85,124.66
Notes and Accounts Receivable.....	18,873,057.63
Work in Progress.....	607,276.59
Merchandise Inventories.....	18,393,899.40
Factory Plants	13,900,000.00
Copper Mining Investment.....	3,174,580.76
	\$99,189,800.54
LIABILITIES	
5 per cent Gold Coupon Debentures of 1892.....	\$ 41,000.00
3½ per cent Gold Coupon Debentures of 1902.....	2,047,000.00
5 per cent Gold Coupon Debentures of 1907.....	12,875,000.00
Accrued Interest on Debentures.....	107,633.36
Accounts Payable	2,836,834.51
Unclaimed Dividends	1,469.86
Capital Stock Issued.....	65,178,800.00
Surplus	16,102,062.81
	\$99,189,800.54

The consolidated profit and loss account of Jan. 31, 1909, was as follows:

EXPENSES	
Cost of Sales (inc. depreciation of Plants \$1,524,295.32).....	\$41,649,573.13
Interest on Debentures.....	716,643.61
Profit for the current year.....	4,802,252.67
	\$47,168,469.41
Dividends paid in Cash.....	\$ 5,214,026.00
Surplus at Jan. 31, 1909, carried forward to next year.....	16,102,062.81
	\$21,316,088.81
EARNINGS	
Sales	\$44,540,675.57
Profit on sales of Stocks and Bonds.....	35,912.48
Royalties, Dividends, Bond Interest, and Sundry Profits...	703,942.63
Surplus Earnings Manufacturing and other Companies	750,000.00
Interest and Discount.....	1,137,938.73
	\$47,168,469.41
Surplus brought over from last year.....	\$16,513,836.14
Profit for the year ending Jan. 31, 1909.....	4,802,252.67
	\$21,316,088.81

Annual Report of Twin City Rapid Transit Company

Total earnings from operation of the Twin City Rapid Transit Company in the year 1908 amounted to \$6,399,510, of which \$6,333,297 came from passenger travel and \$66,213 from miscellaneous sources. The increase in total gross earnings over the preceding year was 5.68 per cent. The charges to operating expenses aggregated \$3,166,056, representing an increase of \$185,620, or 6.23 per cent over the previous year. Of this increase, approximately \$50,000, the

report states, was due to the higher scale of wages authorized in June, 1907.

The expenditure for operating expenses as shown amounted to 49.47 per cent of gross earnings. The expenditures for maintenance aggregated \$496,675, or 7.8 per cent of gross earnings. There was appropriated for renewals, however, from the surplus remaining after provision for the dividends on the preferred and common stocks, the sum of \$544,000.

The cost of operation of the power plants was \$516,418, or 8 per cent of gross earnings, as compared with \$513,867, or 8.5 per cent of gross earnings in the preceding year. The cost of "car service" was \$1,480,495 in 1908, or 23 per cent of total gross earnings from operation, comparing with \$1,340,962, or 22.1 per cent of gross, in 1907. The number of car-miles run increased 7.41 per cent.

The receipts and expenses for the two years, 1907 and 1908, compare as follows:

RECEIPTS.		
	1908.	1907.
Passenger earnings	\$6,333,297	\$6,020,542
Miscellaneous earnings	66,213	35,201
Total earnings	\$6,399,510	\$6,055,743
EXPENSES.		
Maintenance of way and structure....	\$ 205,624	\$ 192,209
Maintenance of equipment	291,051	209,748
Operation of power plants.....	516,418	513,867
Car service	1,480,495	1,340,962
General expenses	388,694	412,518
Injuries and damages	235,774	203,132
Insurance	48,000	48,000
Total operating	\$3,166,056	\$2,980,436
Net earnings from operation	\$3,233,454	\$3,075,307
Interest on debt and taxes	\$1,359,363	\$1,223,171
Surplus available for dividends and depreciation.....	\$1,874,091	\$1,852,136
Dividends preferred stock	\$ 210,000	\$ 210,000
Dividends common stock	1,005,000	1,005,000
Total dividends	\$1,215,000	\$1,215,000
Surplus from operation	\$ 659,091	\$ 637,136
Appropriated for renewals	544,000	506,000
Income account, surplus	\$ 115,091	\$ 131,136
Per cent total operating (including taxes and renewal appropriations) to total earnings....	64.35	63.84

The annual report to shareholders states:

"There was an increase in net earnings of \$158,147. Owing, however, to an increase in taxes of \$28,824 and in bond interest of \$107,368, together with a larger appropriation to renewal funds, this increase in net earnings for the year was more than absorbed, so that the net surplus is \$16,045 less than the previous year.

"Considering the business depression that was experienced during the year, your directors feel that the results attained may reasonably be regarded as gratifying, and would seem fairly to indicate what might be expected under favorable business conditions. A review of the comparative statement of expenses shows that the larger surplus from operation has not been secured at the expense of adequate maintenance. These expenses have, in fact, been increased by \$34,718, and the property of the company maintained at a high standard of efficiency. The service afforded the public has been extended and improved.

"In addition to the maintenance charges of \$496,675, renewals have been made during the year and charged to the renewal fund to the amount of \$256,006. The direct appropriation to the fund for the year was \$544,000 and interest to the amount of \$29,800 was further added to it, an increase of \$50,300 on the appropriation of the previous year. The renewal fund now amounts to \$1,173,714, of which \$1,173,500 is invested in 5 per cent bonds of the company. The conservative policy of setting aside funds to provide for renewals was inaugurated in 1904. The following statement shows how the provision for maintenance and renewals has been gradually increased, and the relative percentage that the appropriation for these purposes for each year bears to the gross earnings:

Year.	Maintenance and renewals.	Per cent of gross earnings.
1903	\$328,833.49	8.09
1904	488,224.24	11.33
1905	587,253.46	12.34
1906	917,253.34	16.25
1907	985,456.92	16.27
1908	1,070,475.56	16.73

"The insurance fund has been increased to \$107,246.74 by the addition during the year of \$22,503.38. Of the total fund, \$107,000 is invested in the 5 per cent consolidated bonds of the company.

"There was expended in new construction during the year \$1,131,868.51, distributed as follows:

Additions to power plant	\$386,285.40	
New shops at midway	26,592.90	
Car equipment	449,606.68	
Track—		
Minneapolis	\$152,644.36	
St. Paul	23,805.19	
Suburban	41,738.19	
		218,187.74
Selby tunnel		18,577.36
Buildings and fixtures		3,064.17
Big Island and Tonka Bay		29,554.26
		\$1,131,868.51

"Of the Minneapolis Street Railway Company's 7 per cent bonds, \$20,000 were redeemed on May 1, 1908. An equivalent amount of first consolidated mortgage bonds may be issued in place of them. There were issued during the year \$1,643,000 of the consolidated 5 per cent mortgage bonds, due 1928. Of these, \$343,000, were acquired for renewal and reserve fund investments."

Gross Earnings of Third Avenue Railroad Increase

Frederick W. Whitridge, receiver of the Third Avenue Railroad, New York, recently issued a statement to the effect that for the year ended April 1, 1909, the gross receipts of the company had increased more than \$500,000 over the previous year. Commenting on this extraordinary showing, Mr. Whitridge is reported to have said:

"A number of causes have combined to bring about the increased business. Times are better, the service of the road is better, the cars are cleaner, the system by which they are operated through the different sections of the city has been improved, better time is now made, there is no 'knocking down' fares by conductors, and few passengers ride for nothing. The last two improvements are directly caused by the installation of the new pay-as-you-enter cars, but as they have been in service only for the last four months of the fiscal year, and as this installation is being accomplished gradually, and is not yet completed, obviously all the credit cannot be placed with them.

"Undoubtedly, the loss of fares has been reduced to a minimum by the new cars. I never believed that conductors filched thousands of dollars of any street railway's earnings, but I do believe that the total number of fares 'knocked down' by dishonest men amounted to a considerable item in the course of a month. Another loss was occasioned by passengers on crowded cars keeping their nickels in their pockets and deliberately stealing rides. This item, I believe, was, and is still, the cause of a much heavier loss than that which is attributed to the conductors.

"On the new cars every passenger that enters has to produce his fare or he cannot ride. Moreover, the fare goes into a box in plain view of the passenger, and the only way the conductor can possibly get a 'rake-off' is when the passenger gives him by mistake more than 5 cents. So you can see that the loss in the collection of fares has been reduced to an almost infinitesimal leakage. The company gets almost every nickel paid in by the riding public.

"If the pay-as-you-enter cars had been put on all at once, and were all on to-day, there would be some means by which we might get at the proportionate income increase they have contributed. I cannot say that they are largely responsible for the increased earnings any more than I can say that increased earnings were caused by the canceling of transfers. As a matter of fact, the transfer changes had very little, if anything, to do with it.

"In the first three days after the stoppage of the transfers the road lost 60,000 passengers. Then gradually we changed our lines, and we have now overhauled our system of operation so that the lines of the Third Avenue Railroad run direct to places heretofore covered by transfers."

Reorganization of Camden & Trenton Railway Adopted

The Camden & Trenton Railway, Camden, N. J., which went into the hands of a receiver on Feb. 18, 1908, after defaulting on the interest on its first mortgage bonds on Nov. 1, 1907, will shortly be reorganized under a plan prepared by the protective committee representing the first and general mortgage bondholders. A new company, to be known as the Riverside Traction Company, will be formed to take over the property. It will be managed by A. Merritt Taylor, president of the Philadelphia & West Chester Traction Company, who is chairman of the protective committee of general mortgage bondholders of the Camden & Trenton Railway, as president.

The new company will have an authorized bond issue of \$1,500,000 and capital stock of an equal amount, consisting of \$400,000 preferred and \$1,100,000 common stock. The committee representing the original first mortgage bonds, of which there are \$710,000 outstanding, nearly all of which were deposited with the committee, will receive for their

constituents new first mortgage bonds to the amount of 80 per cent of their holdings, minus the coupons for the first year, and preferred stock for the remaining 20 per cent.

The committee representing the general mortgage bondholders is required to pay in \$120,000 in cash, receiving a like amount in par value of preferred stock of the new company and \$747,000 common stock, 80 per cent paid in. Of this common stock the committee will distribute \$311,250 to the holders of the general mortgage bonds. The remainder, \$435,750, will be given as a bonus to purchasers of the new preferred stock at the ratio of 3½ shares of common to one share of preferred stock, and the general mortgage bondholders will be given first right to subscribe to this preferred stock in the proportion of 20 per cent of their bond holdings. The holder of a general mortgage bond who accepts this provision will thus acquire total common stock of \$1,200, on which \$1,000 is paid in, and \$200 preferred stock for each bond.

Berkshire Street Railway, Springfield, Mass.—A hearing will be held before the Massachusetts Railroad Commission on May 10 on the application of the Berkshire Street Railway for authority to issue bonds and stock amounting to \$250,000 for improvements.

Central Crosstown Railroad, New York, N. Y.—On May 1, 1909, \$2,250,000 of three-year 5 per cent collateral notes of the Central Crosstown Railroad mature. The notes are guaranteed by the Metropolitan Street Railway as lessee of the Central Crosstown Railroad. In view of the maturity of the notes and the fact that the Metropolitan Street Railway is in the hands of a receiver, the following protective committee has been organized under an agreement dated April 9, 1909, and requests the deposit of the notes with the United States Mortgage & Trust Company, New York, the depository, before April 26, 1909, or the City Trust Company, Boston, as agent for the depository: C. C. Cuyler, chairman; Chas. Francis Adams, 2d, Allen Curtis, Herbert L. Griggs and Paul M. Warburg, with Julius M. Mayer as counsel and Calvert Brewer as secretary.

Chicago & Milwaukee Electric Railroad, Chicago, Ill.—It was reported in Chicago recently that Kansas City interests were negotiating for the purchase of the property of the Chicago & Milwaukee Electric Railroad. The attorney for the receivers of the company, however, is said to have stated that he knows nothing about the proposed sale to the interests mentioned. Negotiations in regard to the organization of the property are still pending, but no definite plan has been proposed.

Georgia Railway & Electric Company, Atlanta, Ga.—The Georgia Railway & Electric Company has filed for record at Atlanta its new mortgage to the American Trust Company, Boston, Mass., as trustee, to secure an authorized issue of \$20,000,000 of 40-year 5 per cent bonds, dated Jan. 1, 1909. Of the bonds, \$1,500,000, it is stated, are to be issued at present; about \$10,000,000 will be reserved to retire the outstanding underlying bonds and the remainder will be issued from time to time to provide for improvements and extensions.

Helena Light & Railway Company, Helena, Mont.—The Helena Light & Railway Company has declared a dividend of 1 per cent on its \$561,000 of common stock, payable May 1. This action by the company resumes dividends on the common stock, the last disbursement on this issue being 1 per cent, paid on Nov. 1, 1907. The regular quarterly dividend of 1¼ per cent on the preferred stock is also payable on May 1.

Las Vegas Railway & Power Company, Las Vegas, N. M.—The recent sale of the property of the Las Vegas Railway & Power Company under foreclosure was confirmed on April 13 by District Judge McFie, at Santa Fe, N. M. The property was purchased by J. M. Cunningham, president of the San Miguel National Bank, Las Vegas, for \$65,000. The purchaser, it is stated, represents Denver capitalists. There were outstanding \$300,000 of first mortgage 5 per cent bonds, of which the Trust Company of St. Louis County, Clayton, Mo., was mortgage trustee. An appeal from the order confirming the sale has been taken by bondholders of the company, who are said to be dissatisfied with the terms under which the property was sold.

Southern Street Railway, Chicago, Ill.—The Southern Street Railway has made its new first mortgage to the First Trust & Savings Bank, Chicago, Ill., as trustee. The amount of the issue, as in the case of the Chicago Railways and the Chicago City Railway first mortgages, is limited only by the company's requirements under the city ordinance for retiring the old bonds and for financing additions and improvements present and future. It is unofficially stated that the rehabilitation of the property will require that about \$1,500,000 of the bonds shall be issued within the next year.

Traffic and Transportation

Hearing on Separate Cars for Women

On complaint of the transportation committee of 50 of the Women's Municipal League a hearing was held before Commissioner Eustis of the Public Service Commission of the First District of New York on April 23 on the question of the reservation of the rear car on subway express trains for the exclusive use of women. L. E. Opdyke appeared as counsel for the Municipal League and T. L. Waugh as counsel for the Interborough Rapid Transit Company.

Mr. Opdyke in opening said that the complaint was not a critical or a hostile one, and concluded with a tribute to the efficiency of the employees of the Interborough Rapid Transit Company, which operates the subway. He said that the complaint had been carried to the commission because the president of the league had been told by the company that it considered that the cars could not be operated successfully on its lines, whereas subsequent trial of the separate car for women by the Hudson & Manhattan Railroad, according to Mr. Opdyke, appeared to indicate that the cars might possibly be run successfully by the Interborough Rapid Transit Company.

Despite the fact that Mr. Eustis, for the commission, told Mr. Opdyke that the commission and the company fully realized that conditions in the subway during the rush hours work a serious hardship on women passengers, Mr. Opdyke called as witnesses the president of the league, a physician, a trained nurse and several business women, all of whom recited in detail their experiences in the subway, which were quite the average of all women passengers. All the testimony was to the effect that despite the efforts of the guards of the company to control the passengers, there was a great deal of crowding and discomfort at rush hours.

Mr. Willcox said that any change in the operation of cars which would decrease the carrying capacity of the subway would work to the detriment of all the people using the subway, and asked Mr. Opdyke to show, if possible, that the separate cars could be run without decreasing the efficiency of the service. One woman said that her experience was largely in chaperoning parties of young ladies, and was told by Mr. Waugh for the company that in all such cases special accommodations would be provided if the company were apprised in advance of the time and the place of the starting of a large body of passengers. The report of the general inspector of the Public Service Commission regarding the operation of separate cars by the Hudson & Manhattan Railroad was admitted as evidence. This report was abstracted and published in the *ELECTRIC RAILWAY JOURNAL* of April 17, page 752.

The principal witness for the Women's Municipal League was E. T. Munger, general superintendent of the Hudson & Manhattan Railroad. Mr. Munger reviewed his previous railroad experience, especially that with the Metropolitan West Side Elevated Railway, Chicago. He said that on that road trains were not so long as in the subway and that there was practically no comparison between the volume of business on the Metropolitan West Side Elevated Railway and the subway. Mr. Munger had been asked by W. G. McAdoo, president of the Hudson & Manhattan Railroad, for his opinion regarding the advisability of operating separate cars on that road for women, and advised that they be given a trial. He added that the cars were an experiment and that it had not yet been decided to make their operation permanent. He explained that the station men on his line were re-assigned when the separate car for women were placed in operation, and that no additional men had been hired to assist in operating trains since the cars had been in service. The expense of trying the experiment, Mr. Munger said, was confined to the printed signs for the cars and the station platforms directing women to the cars for their use. He said that the company is now preparing records of the operation of the trains to which the separate cars for women are attached. Employees of the company pass through the cars while they are under the river and count and record the passengers on each of the five cars making up a train.

According to Mr. Munger, the trains to which the separate cars are attached are being stopped so as to bring the women's car nearer to the entrance to the stations. This is possible because the stations were built for eight-car trains, whereas only five-car trains are now in service. Subsequent questioning brought out the fact that the trains of the Hudson & Manhattan Railroad are operated under a three-minute headway, whereas trains in the subway are operated under a headway of 1 minute 48 seconds during the rush hours. Asked as a railroad man by Mr. Eustis for his opinion of the experiment with separate cars for

women on his line, Mr. Munger said that women appear to understand traffic conditions pretty well, especially those who travel during the rush hours, and that they have shown a willingness to co-operate with the company in its trial of the cars. He repeated, however, that the evidence so far obtained regarding the separate cars was not conclusive.

A Mrs. Herzog, who represents the Equality League for Self-Supporting Women, with a membership of 17,000, was called as a witness by the Interborough Rapid Transit Company. She said that none of the many women members of the body that she represented with whom she talked had complained to her about uncivil treatment in the subway. Mrs. Herzog also said that she herself was a frequent patron of the subway and the elevated, but that her experiences were only such as ordinarily would be incident to the handling of so many passengers. She said that absolute segregation of the sexes was necessary if the plan of separation were to be adopted at all. Reserving the rear car of an eight-car express train for women, Mrs. Herzog pointed out, would necessitate a long walk by them to reach their car, and that this effort to reach the car might be fraught with greater dangers than under the present plan.

Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, said that his experience and that of his associates in the company indicated that the separate cars for women could not be run with success in the subway. Of course, if the commission issued a formal order for a trial of the cars the company would place them in service. He said that George Keegan, his assistant, had explained the company's attitude to the president of the Women's Municipal League. Mr. Hedley was of the opinion that the league could do its best work by devoting its energies to instructing women in boarding and leaving trains and especially in instructing working girls in acting courteously. According to Mr. Hedley, the female employees of the department stores who use the Fourteenth Street station are offenders in that their conduct in forming cliques and taking trains by storm, as it were, is as bad, if not worse, than is ever resorted to by men in their efforts to board a train. He said that these girls and young women disregard the right of members of their own sex. Mr. Hedley also said that women, without the restraining influence of men, were liable under any but ordinary circumstances to become panicky, and that on account of their temperament it would be inadvisable to separate the sexes. In conclusion Mr. Hedley said that more than 800,000 people are handled daily in the subway at this time of the year, and that the minimum is about 600,000 a day during July and August. It might be possible, Mr. Hedley said, to try the experiment if not more than 500,000 persons were carried daily.

The commission will consider the evidence and announce its finding later.

Electric Railway Connections Advertised by Lehigh Valley Railroad

The Lehigh Valley Railroad has issued a booklet showing connections made by its trains with electric railways. The booklet mentions the service of the following lines from points reached by the Lehigh Valley road: Public Service Railway of New Jersey; Easton & Washington Traction Company; Easton (Pa.) Transit Company; Northampton Traction Company, Easton, Pa.; Philadelphia & Easton Electric Railway; Lehigh Valley Transit Company; South Bethlehem & Saucon Street Railway; Allentown & Reading Traction Company; Blue Ridge Traction Company; Carbon Street Railway; Eastern Pennsylvania Railways Company; Lehigh Traction Company; Wilkesbarre & Hazleton Railway; Schuylkill Railway; Shamokin & Mt. Carmel Railway; Lackawanna & Wyoming Valley Railway; Wilkesbarre & Wyoming Valley Traction Company; Waverly, Sayre & Athens Traction Company; Elmira Water, Light & Railroad Company; Cortland County Traction Company; Geneva, Waterloo, Seneca Falls & Cayuga Lake Traction Company; Rochester & Eastern Rapid Railway; Auburn & Syracuse Electric Railroad; Auburn & Northern Electric Railroad; Rochester Railway; Rochester & Suburban Railway; Rochester, Syracuse & Eastern Railroad; International Railway.

The introduction to the booklet states:

"To the Public.—The information contained in this folder has been compiled for the convenience of the traveler over the Lehigh Valley Railroad whose final destination may be some interior point not reached direct by the lines of this company, but for which connection may be made via electric lines divergent therefrom. It is given as furnished by the companies operating such electric lines, and due care has been exercised to have it correct, but this company does not hold itself responsible for any errors or changes which may occur.

"Service.—Unless otherwise noted, it will be understood that electric cars are operated between the hours of 6 a. m. and 10 p. m.

"Baggage.—Personal baggage is handled by several of the electric lines shown herein, the charge being same as passenger fare for ordinary-sized trunks, etc., unless otherwise noted. Baggage will be checked by the Lehigh Valley Railroad only to point of connection with electric line.

The following shows the manner of presentation of the information regarding the different properties:

FROM GENEVA, N. Y.

Via Geneva, Waterloo, Seneca Falls & Cayuga Lake Traction Company:

(Baggage Handled.)
Half-Hourly Service.

Cayuga Lake Park.....	20c
Waterloo.....	10c
Seneca Falls.....	20c

Via Rochester & Eastern Rapid Railway:

(Personal Baggage, not over 250 lb., 25c per Piece.)

Hourly Service, 6.30 a.m. to 11.15 p.m.

	FARE	ROUND TRIP
Litigation Hill.....	8c	10c
Seneca Castle.....	11c	19c
Spangle Street (Cross Road).....	17c	29c
Freshours.....	20c	35c
Canandaigua.....	28c	48c

Express Service Between Fall River and Newport.—The Old Colony Street Railway, Boston, Mass., has announced that on May 1 a special express service will be established between Fall River and Newport in connection with the through passenger service.

New Wabash Valley Schedule.—The Wabash Valley Traction Company, Fort Wayne, Ind., will put a new schedule into effect on May 1, which provides for two additional trains daily. A through car to leave Fort Wayne at 3:30 p. m. for Lafayette will also be a feature of the new schedule. The operation of through limited cars to Indianapolis via Bluffton has not been fully decided upon.

Advice to Passengers.—With the idea of educating patrons to avoid arguments with conductors, the Twin City Rapid Transit Company has recently had the attached notice printed in large type and put in the front of each of its cars: "In all cases of dispute with conductor regarding fares or transfers, passengers will please pay conductor's claim and report facts promptly for adjustment to general superintendent. Conductor has no discretionary power in such matters but is governed by rules, which he is not authorized to change."

Revision of Fare on Michigan Road.—On Feb. 1, 1909, the Michigan United Railways, Jackson, Mich., revised the local rates on its line between Battle Creek and Kalamazoo on the basis of 2 cents per mile, but gave patrons the privilege of purchasing a 1000-mile ticket, good on all divisions, for \$15, limited to one year from the date of sale, good for bearer or for one or more persons, and a 52-ride ticket between any two points between Jackson and Kalamazoo at 1 cent per mile, limited to one month from date of sale, and to the individual use of purchaser.

Interurban Conductor Sentenced for Stealing.—Robert St. Clair Moody, alias William E. Ellis, a conductor in the employ of the Washington, Baltimore & Annapolis Railway, Baltimore, Md., was sentenced on April 19 by Judge Gorter, in Part II of the Criminal Court, to serve one year in jail for the embezzlement of \$1.40 from the company. Moody was arrested as the result of an investigation begun by J. N. Shannahan, general manager of the company. He is said to have been an old offender and at one time to have been discharged from the employ of the United Railways & Electric Company, Baltimore, Md., for a similar offence.

Freight Service on the Springfield & Eastern Street Railway.—The officers of the Springfield & Eastern Street Railway, Palmer, Mass., have been in conference with the officers of the Boston & Albany Railroad, looking to the establishment of a freight service for towns south of Palmer on the Springfield & Eastern Street Railway, which connects with the Boston & Albany at Palmer. The franchise of the Springfield & Eastern Street Railway permits the company to operate trains of four cars or less. Provision for the interchange of traffic between the Springfield & Eastern Street Railway and the Boston & Albany Railway, it is said, will be made a part of the agreement between the companies.

Hearing on Lower Car Steps in Toronto.—A hearing was held on April 19 before the Ontario Railway and Municipal Board on the application of the city of Toronto to compel the Toronto (Ont.) Railway to adopt a uniform height for the steps of all its open summer cars. Duncan Campbell, of the Preston Car Works, testified that he thought that

standards of 15 in., 14 in. and 11 in. would make ideal side steps. H. S. Osler, for the Toronto Railway, said that the company had lowered the steps of one of its cars for the purpose of experimenting with the car in service, and it was decided by the board to adjourn the case until May 26 so as to have the benefit of the experience that would be gained in the meantime with the new car.

Limited Service Between Toledo, Lima and Springfield.—The Ohio Electric Railway, Cincinnati, Ohio, inaugurated limited service between Toledo and Lima and Lima and Springfield on April 25. The running time between Toledo and Lima, 72 miles, is 2 hr. 15 min., or about the same as the schedule over the Cincinnati, Hamilton & Dayton Railroad. Six cars will be operated in this service. It will also be possible to make the trip between Toledo and Columbus, although not on a direct line, in 5½ hr.; between Toledo and Dayton, 166 miles, in 5 hr. 15 min., and between Toledo and Fort Wayne, Ind., 134 miles, in 4 hr. and 10 min. The Ohio Electric Railway and affiliated companies operate 600 miles of line in Ohio and Indiana. The new station of the company at Avondale Avenue and Belmont Avenue, Toledo, was opened for business at the time the limited service was started.

Accident on Chicago, Lake Shore & South Bend Railway.—Particulars of the accident which occurred on April 12 on the Chicago, Lake Shore & South Bend Railway, South Bend, Ind., indicate that it was not so severe as at first reported. The crews were composed of experienced steam railroad men, but for some reason one crew misunderstood the meeting point with the other. The collision occurred on a curve whose entire length was in full view of both car crews. There was a heavy rainstorm when the collision occurred. The motorman of one car saw the car approaching from the opposite direction and stopped, but the motorman of the other car did not see the car approaching him until it was too late for him to stop, thus one of the cars had been brought to a standstill when the cars collided. Only three passengers were seriously hurt, a leg fracture being the most serious injury.

Limiting the Number of Passengers to a Car.—Under date of April 2, 1909, the United Traction Company, Albany, N. Y., issued the following notice, signed by Charles H. Smith, superintendent, to the conductors of its Pine Hills line: "On and after Monday, April 5, 1909, and until further notice, the following orders are issued in relation to the cars running on the Pine Hills line: Conductors must not allow more than forty (40) passengers on the '400' type of box car at one time, or not more than thirty-five (35) passengers on the smaller type of box car at one time. Whenever a car has the above number of passengers, the conductor will give 'two bells' to the motorman after the car is started, which shall be the signal to the motorman that he is not to stop for passengers, and to stop only on signal from conductor. If, when the car stops to discharge passengers on signal from conductor, additional passengers get on the car to the requisite number, the conductor must again give the signal 'two bells' after the car is started. If the motorman does not receive 'two bells' after starting his car, he will stop for passengers at regular stations as usual. No passengers must be allowed to ride on the rear platform of any Pine Hills car while this order is in effect."

Pittsburg Railways Refuse to Increase Wages.—The agreement of the Pittsburg (Pa.) Railways with its employees expires on May 1, and the men have asked for an increase in wages of 3½ cents over the present scale. The company has replied that industrial conditions do not warrant an increase at this time, but has signified its willingness to renew the agreement between it and the men under the terms that now apply. The opinion has been expressed by the men by ballot that a strike should be ordered if the demands are not complied with by the company. On April 18 the company issued this statement: "A short conference was held at 2 p. m. on April 17 between officials of the Pittsburg Railways and representatives of the men. The committee asked Mr. Callery to reconsider the wage rate and working rules which have been posted at the various car houses. Mr. Callery stated that the company had granted the most liberal concession it was possible to make in view of the prevailing business conditions and the uncertain outlook, and that the company's final position was the rate and conditions as posted at the car houses." On the committee's referring to the embarrassing position in which it was placed by having nothing to take back to the men, Mr. Callery reminded the members that at the previous conference he had offered to withhold posting the last year's working rules until the committee had taken up the question with the men, provided the committee would agree to recommend to the men the acceptance of said agreement, but that the committee had positively refused to make such a recommendation.

Personal Mention

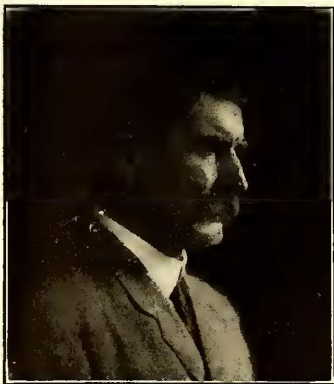
Mr. Charles B. Scott has been appointed assistant general manager of the Louisville & Southern Indiana Traction Company and the Louisville & Northern Railway & Light Company, New Albany, Ind., a position recently created. Mr. Scott was formerly claim agent for both companies.

Mr. T. T. Snell has been appointed private secretary to Mr. William McCarroll, of the Public Service Commission of the First District of New York, to succeed Mr. F. L. Perine, resigned, who has become connected with the advertising department of the Standard Oil Company. Mr. Snell is a graduate of the Columbian Law School, Washington, and has recently been connected with Fraser & Usina, New York.

Mr. A. M. Robertson has been elected second vice-president of the Minneapolis (Minn.) Street Railway and the St. Paul (Minn.) City Railway and will act as assistant to Mr. C. G. Goodrich, president of the companies. Mr. Robertson has filled the position of assistant to Mr. Goodrich for the last three years, and the title of second vice-president is conferred to give him identity and to show his official relation with the companies. Mr. Robertson received his education and business training in Minneapolis, and has a large acquaintance among the business men in Minneapolis, St. Paul and the Northwest.

Mr. Wilhelm Wechmann, chief electrical and mechanical engineer of the Royal Prussian Railroad, Berlin-Charlottenburg, Germany, is in this country on a visit to inspect the recent electric railway installations here. He will spend about three months in this country and will go as far as the Pacific Coast during his visit. Mr. Wechmann is taking particular interest in single-phase lines. In speaking of the progress of the single-phase system in Germany, he said that the most important single-phase line now under construction in Germany is that connecting Halle and Magdeburg. This line is about 60 miles in length and is to be equipped with a 10,000-volt overhead system and will be operated by 15-cycle single-phase locomotives. Another 15-cycle line is under construction between Basel and Zell. This line will also be equipped with 10,000-volt locomotives. Current in this case is derived from a water-power station.

Mr. William D. Williams, Fort Worth, Tex., has been appointed a member of the State Railroad Commission of Texas by Governor Campbell and has entered upon the duties of his new office. At the time of his appointment Mr. Williams was Mayor of Fort Worth, having been recently elected to that position. Mr. Williams is a lawyer by profession. He entered politics about eight years ago, and was elected to the lower branch of the Legislature, where he attracted attention as the author of the intangible assets law, which was passed by the Legislature four years ago, while he was serving his second term as a member of the House. Mr. Williams was a candidate for Railroad Commissioner in 1905, but was defeated. His recent appointment was made to fill the vacancy caused by the recent death of L. J. Storey, chairman of the commission. Mr. Williams will be a candidate for election to the office in 1910.



W. D. Williams

OBITUARY

Frederick P. Olcott, formerly president of the Central Trust Company, New York, and a well-known financier, died at his home, Bernardsville, N. J., on April 15. Mr. Olcott was 68 years old at the time of his death, but had not been engaged actively in business for several years. He was born in Albany, N. Y., and was educated at the Albany Academy. In 1884 Mr. Olcott became president of the Central Trust Company, and held this position until August, 1905, when he retired from business. During his connection with the Central Trust Company Mr. Olcott became interested in many street railway and railroad projects, and was connected at one time or another as a director or officer with the Denver City Cable Railway, Brooklyn Elevated Railroad, Third Avenue Railroad, New York, and the Delaware, Lackawanna & Western Railroad. Mr. Olcott is survived by a widow, a son and a daughter.

Construction News

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

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

RECENT INCORPORATIONS

*Glendale & Eagle Rock Railway, Los Angeles, Cal.—Incorporated to build a 2½-mile street railway from Eagle Rock to Glendale. The motive power will be gasoline or electricity. Capital stock, \$25,000. Directors: E. D. Goode, R. E. Goode and George Benson.

*Coos Bay, Oregon & Idaho Railway, Marshfield, Idaho.—Incorporated in Oregon to construct a railway to be operated by steam or electricity from Coos Bay, Ore., east via Roseburg, to Boise, Idaho. Headquarters, Marshfield. Capital stock, \$25,000. Incorporators: William Grimes, Henry Sengstacken, J. V. Pugh, J. C. Gray, John R. Smith and P. Hennessey.

Lakewood & Seashore Railroad, Lakewood, N. J.—Incorporated, as the successor to the Trenton, Lakewood & Atlantic Railway, to build an electric railway from Lakewood to Point Pleasant, 10 miles. Capital stock, \$300,000. Headquarters, Lakewood. Incorporators: Charles R. Le Compte, Ernest E. Le Compte, Nicholas MacDonald, Harry J. Terwilliger, Lakewood; James H. Butcher, J. Arthur Butcher, Ardena; Roderick A. Clark, Point Pleasant. [E. R. J., April 24, '09.]

*Defiance, Napoleon & Wauseon Railway, Wauseon, Ohio.—Incorporated for the purpose of building a railway, to be operated by electricity or steam, between Wauseon and Defiance. The projectors have not stated their intentions as yet. Capital stock, \$1,000. Incorporators: Charles E. Bennett, J. Walter Bennett, Jay H. Miller, W. W. Campbell and Henry Rohrs.

Rapid Transit Subway Company, Pittsburgh, Pa.—Application has been made for a charter for this company to construct an underground passenger railway in Pittsburgh. The applicants are: F. W. Mueller, W. E. Kusen, Paul H. Mueller, John A. Staley and John F. Mueller, Pittsburgh. [E. R. J., March 27, '09.]

*Chillisquaque Connecting Railway, Sunbury, Pa.—Chartered to build a 2½ mile street railway from Lewisburg to the Pennsylvania Railroad. Capital stock, \$18,000. Directors: W. H. Lyons, Sunbury, president; Boyd A. Musser, J. C. H. Newcomer, C. M. Clement and Guy Webster.

*Montandon & Milton Electric Railway, Sunbury, Pa.—Chartered to build a 9-mile street railway from a point in West Chillisquaque Township to Milton, via Montandon and Chillisquaque. Capital stock, \$54,000. Directors: W. H. Lyons, Sunbury, president; Boyd A. Musser, J. C. H. Newcomer, C. M. Clement and Guy Webster.

*Sunbury, Lewisburg & Milton Electric Railway, Sunbury, Pa.—Chartered to build a 10-mile electric railway from a point in Monroe Township to Lewisburg via Winfield. Capital stock, \$60,000. Directors: W. H. Lyons, Sunbury, president; Boyd A. Musser, J. C. H. Newcomer, C. M. Clement and Guy Webster.

*Washington-Marianna Street Railway, Washington, Pa.—Application will be made on May 17 for a charter for this company, which proposes to build a street railway from Washington to South Strabane Township. Applicants for the proposed charter are: C. B. Coldwell, J. W. McKay, M. J. Hosack, E. B. Hartman, Jr., and Roger Knox.

FRANCHISES

Birmingham, Ala.—The Board of Revenue has granted a franchise to the Birmingham Railway, Light & Power Company to extend its North Highlands line from North Haven to the pipe shops, a distance of about 1¼ miles.

Little Rock, Ark.—The City Council has passed an amendment to the franchise of the Little Rock Railway & Electric Company, which provides for the extension of the Union depot line along Water Street from Cross Street to Chester Street.

*Tehama, Cal.—Application has been made to the Town Trustees by J. J. Worthington for a franchise for an electric railway on D, E and Second streets in Tehama.

Sacramento, Cal.—The City Trustees have granted the Central California Traction Company, San Francisco, a franchise which provides that the Northern Electric Railway, the Vallejo & Northern Railway and two more such railroads shall be permitted to use the tracks the company will lay on X Street and Eighth Street.

Warsaw, Ind.—The City Council has granted J. A. Barry, representing the Wabash & Northern Traction Company, a franchise to construct an electric railway in Warsaw.

Creston, Ia.—The City Council has granted to the Des Moines, Winterset & Creston Electric Railway a year's extension of its franchise. The proposed railway will extend from Des Moines to Winterset, Macksburg and Creston, a distance of 60 miles. [E. R. J., Jan. 30, '09.]

Ann Arbor, Mich.—Application has been made to the City Council by the Ohio & Michigan Southern Railroad for a franchise through the city, to enter on Geddes Avenue and leave by North Main Street. [E. R. J., Feb. 6, '09.]

Grand Forks, N. D.—The County Board has granted to the Grand Forks Street Railway a franchise to construct a street railway to the fair grounds and the cemetery. [E. R. J., Feb. 6, '09.]

Cincinnati, Ohio.—John E. Bleekman, New York, president of the Southwestern Ohio Traction Company, which was recently incorporated, has applied to the City Council, Cincinnati, for a franchise for an underground and elevated railroad system extending from the heart of the city to Norwood, a suburb. [E. R. J., April 24, '09.]

Xenia, Ohio.—The Greene County Commissioners have granted Thomas L. Ferneding a franchise for an electric railway following close the right-of-way of the Rapid Transit division of the Dayton & Xenia Traction Company from Xenia to a point 3 miles west where it connects with this line which is to be followed the remainder of the distance to Dayton. It is said that the franchise will be transferred to the Dayton, Springfield & Xenia Southern Traction Company, which was organized some months ago to extend these lines to Washington C. H.

Portland, Ore.—The City Council has adopted a resolution releasing the United Railways from the provision of its franchise, which prohibited it from running cars until the line is connected with Hillsboro and Mount Calvary Cemetery.

Portland, Ore.—The City Council has granted to the Portland Railway, Light & Power Company a blanket franchise to construct and operate several new lines, spurs and switches in Portland.

Roseburg, Ore.—It is stated that Kendall Bros. have withdrawn their application for a franchise for a street railway in Roseburg. [E. R. J., April 3, '09.]

***Knoxville, Tenn.**—The County Court has granted Charles Dawes a franchise to build an electric railway from Knoxville to Bearden. Branches are to be built to Concord and Lyons View.

***Seattle, Wash.**—E. L. Blaine has applied to the County Commissioners for a franchise to build and operate an electric railway between Renton and Issaquah, a distance of 10 miles.

***South Bend, Wash.**—The County Commissioners have granted a franchise to the Ilwaco General Electric Company, which proposes to light the cities of Ilwaco and Long Beach, and build an electric railway from Ilwaco to Stackpole Harbor on Willapa Bay, a distance of about 20 miles.

TRACK AND ROADWAY

Modesto (Cal.) Interurban Railway.—This company advises that it has awarded contracts for the grading of its proposed standard-gage railway and the construction of a bridge over Dry Creek at Modesto. The line will connect Oakdale, Waterford, Empire, Turlock, Newman, Crow's Landing and Modesto. Construction work has already been started. The motive power has not yet been definitely decided upon. Capital stock, authorized, \$200,000, of which \$60,000 has been subscribed. Principal office, Modesto. Officers: T. K. Beard, president; George Perley, vice-president; L. L. Dennett, secretary; G. P. Schafer, treasurer, all of Modesto. W. A. Cooper, 1370 Franklin Street, Oakland, chief engineer. [E. R. J., April 3, '09.]

San Francisco, Vallejo & Napa Valley Railroad, Napa, Cal.—It is stated that this company is making preliminary arrangements for extending its line to Calistoga. Negotiations are now under way to secure the necessary rights-of-way for the proposed extension.

San Diego & El Cajon Valley Interurban Railway, San Diego, Cal.—E. Fletcher, a director in this company, is quoted as saying that preliminary surveys have been completed for this proposed electric railway from La Mesa to Lakeside, 15 miles. Practically all of the field work has been completed and portions of the right-of-way have been secured. [E. R. J., Feb. 27, '09.]

Visalia (Cal.) Electric Railroad.—It is stated that the Visalia Electric Railroad plans to construct an extension running out to the Woodlake district, and connecting with

the Naranjo district, provided the right of way for the railway can be secured without cost to the company.

Tampa Sulphur Springs Traction Company, Tampa, Fla.—L. Brill, general manager, advises that this company expects to place contracts during the next two weeks for the construction of 3 miles of new track.

***Gainesville, Ga.**—It is reported that Col. T. G. Dorough, Elberton, is interested in a plan to build a street railway in Gainesville.

St. Louis & St. Libory Railway, Belleville, Ill.—This company has filed with the Illinois State Trust Company, as trustee, a mortgage to secure an issue of \$600,000 of 6 per cent, 25-year gold bonds. The company proposes to build an electric railway from East St. Louis to St. Libory. E. L. Thomas, Belleville, president. [E. R. J., Oct. 24, '08.]

Chicago & Oak Park Elevated Railroad, Chicago, Ill.—It is stated that this company is planning to extend its line from Harlem Avenue to Elmhurst, a distance of 4 miles.

Illinois Light & Traction Company, Streator, Ill.—This company expects to place contracts during the next two weeks for the construction of 1 mile of new track.

Bluffton, Geneva & Celina Traction Company, Bluffton, Ind.—This company is reported to have started construction work on its proposed electric railway from Bluffton to Celina, Ohio. The section between Bluffton and Celina, 18 miles, is to be completed during the summer. Geneva has raised \$75,000 by subscription and election, and the sale of \$150,000 in preferred stock has been placed in the hands of local promoters, this amount forming the basis of construction. Fred Davenport, chief engineer. [E. R. J., Oct. 17, '08.]

Evansville & Southern Indiana Traction Company, Evansville, Ind.—At a meeting of the directors of this company, April 20, it was voted to expend \$60,000 for ballasting the roadbed this year. The matter of extending the line from Poloka to Hazleton was not considered.

Wabash & Northern Traction Company, Warsaw, Ind.—It is stated that this company's engineers are at work surveying and preparing estimates for its projected electric railway between Wabash, North Manchester and Warsaw, and that the company will soon be ready to receive bids for the grading of the line. J. A. Barry and W. L. Moyer are said to be interested in the company.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Maine.—It is stated that this company will immediately begin work on the extension of its railway from Augusta to Hallowell, 3 miles.

Peninsula Traction Company, Cambridge, Md.—It is stated that this company, which proposes to build an electric railway from Claiborne to Ocean City, Md., about 85 miles, and from Cambridge, Md., to Seaford, Del., will begin construction early this summer. The McCay Engineering Company, Baltimore, has made surveys for the line, the backers of which are not yet disclosed. From Claiborne and Cambridge the promoters of the railway propose to establish steamboat routes to Baltimore. The main power station will be located at Cambridge. Four substations will be built: One between Easton and Hurlock, one at Vienna, one at Hurlock and another at Berlin. The railway will serve a population of about 100,000. [E. R. J., March 27, '09.]

Twin City General Electric Company, Ironwood, Mich.—Work was started by this company on April 19 on the extension of its street railway from Ironwood to Bessemer, Ramsay and Wakefield. Work on the Jessieville extension was begun at the same time. [E. R. J., Jan. 30, '09.]

***Breckenridge, Minn.**—Joseph Gunn, Breckenridge, and his associates have about completed arrangements to construct a railway between Breckenridge and Wahpeton, N. D. The line will be equipped with gasoline electric cars.

Delta Electric Light, Power & Manufacturing Company, Greenville, Miss.—This company is engaged in building 1½ miles of additional track to its present system. Material has already been purchased for this work. The company has just placed in operation a 1½-mile extension to the new city park.

Hattiesburg (Miss.) Traction Company.—This company has awarded a contract to A. M. Hewes, Monadnock Building, Chicago, Ill., for the rehabilitation of about 6 miles of track and erection of overhead work. It is expected that these improvements will be finished by Aug. 15.

Blue Valley Traction Company, Kansas City, Mo.—At a meeting of the directors of this company the following officers were elected: M. M. Sweetman, president; C. W. German, secretary, and J. M. Lowe, treasurer. The company proposes to build an electric railway from Sheffield south through Manchester and across the Blue River to

Swope Park, then east to Raytown. Eventually it is to be extended to Sweet Springs. [E. R. J., April 17, '09.]

Hornellsville Electric Railway, Hornell, N. Y.—This company expects to place contracts during the next two weeks for the rebuilding of 2000 ft. of track.

Burgrahaw Interurban Company, Burlington, N. C.—This company, which proposes to build an electric railway which will connect Burlington, Graham and Haw River, has completed the grading between Burlington and the Graham Depot. The line will run on the north side and almost parallel with the Southern Railway from Burlington to Haw River, and a spur will be run from Graham, a distance of about 1 mile. An amusement park and a baseball park are being arranged by the promoters in the suburbs of Burlington along the line and will be completed before the railway is put in operation. The Southern Power & Traction Company, recently chartered with an authorized capital stock of \$350,000, and which has been granted franchises by Burlington, Graham, Reidsville, Wentworth and other towns, is being promoted by the same interests who are engaged in the building of the Burgrahaw Interurban Railway. [E. R. J., Jan. 23, '09.]

Illinois Central Electric Railway, Canton, Ohio.—This company is building a 5-mile extension to its system from Canton to Norris. W. D. Plattenburg, secretary.

Hocking Valley Railroad, Columbus, Ohio.—It is reported that this company is considering the feasibility of electrifying the Puritan Railroad and extending the electric service between Wellston and Hamden, Ohio.

Bellefontaine & Sidney Traction Company, Bellefontaine, Ohio.—Plans are being made by this company for the construction of a railway to connect Bellefontaine and Sidney. It is said that prominent business men of the two towns have arranged to donate the right-of-way through Logan and Shelby counties to the company. Gen. R. P. Kennedy, Bellefontaine, and Gen. Asa W. Jones, Warren, Ohio, are said to be interested in the matter. Judge Hugh T. Mathers, Sidney, president. The advisability of operating straight gasoline motor cars is being considered. [E. R. J., Dec. 19, '08.]

***Guthrie, Okla.**—It is reported that H. M. Dougherty, Columbus, Ohio, is interested in a plan to build an electric interurban railway from Guthrie to Norman.

Shawnee-Tecumseh Traction Company, Shawnee, Okla.—This company has placed a contract with the Illinois Steel Bridge Company, through its general agents, Hughes & Hammond, Kansas City, Mo., for the erection of a 95-ft. steel span bridge and the reconstruction of its present trestle across the Canadian River.

Toronto, Ont.—The Kearney High-Speed Railway Company, London, England, is said to be endeavoring to interest the city in an underground railway. G. W. C. Kearney has written to the city engineer suggesting two lines. One would run from some point in part of the city under Yonge Street to the Custom House. The other would start in East Toronto and run under Queen, Dufferin and Dundas Streets to Toronto Junction.

Chester, Concordville & West Chester Electric Railway, Concordville, Pa.—Joseph Shortlidge, Concordville, recently addressed the Chester Board of Trade in the interest of this proposed electric railway, which is to extend from Chester to West Chester. The matter was placed in the hands of the committee on transportation, and it has been recommended that the board co-operate with and support the company. [E. R. J., Nov. 14, '08.]

Clairton, Pa.—It is stated that construction work will be started within 30 days by the Jefferson & Wilson Street Railway, and the Peters Creek Street Railway on the proposed 5-mile street railway which is to connect Glassport, Coal Valley, Wilson, Blair and Clairton. A steel bridge, 1500 ft. in length, with a 500-ft. span, will be built across the Monongahela River. All the necessary right-of-way has been secured and franchises have been granted by the boroughs through which the new line will pass. Connection may be made with lines of the Pittsburgh Railways. Officers: W. G. Wilson, Dravosburg, president; W. G. Weimer, secretary. [E. R. J., March 20, '09.]

Donora & Eldora Street Railway, Donora, Pa.—This company has filed for record an amendment to its charter which authorizes it to extend its line to Webster, West Newton, West Elizabeth and Monongahela. B. M. Hanna, Pittsburg, president.

Central Pennsylvania Traction Company, Harrisburg, Pa.—It is stated that this company will soon begin work on improvements to its line. It will extend its Market Street line to Whitehall Street, thence to Prospect Street, enabling the company to handle the Reservoir Park traffic during the

summer months more expeditiously. Tracks on Third and Fourth Streets will be relaid.

Slippery Rock & Grove City Electric Railway, Grove City, Pa.—This company announces that it will be prepared to let contracts about July 15 for the construction of its broad gage electric railway between Slippery Rock and Grove City, a distance of nine miles. A power station will be built near Grove City. The proposed railway will reach Barmore Lake, an amusement resort, one and one-half miles from Grove City. Power for lighting will be furnished to the State Normal School also in Slippery Rock. Bonds authorized, \$200,000. Officers: J. P. Barr, Grove City, president; James A. Joliffe, Slippery Rock, secretary; J. H. Pizor, Slippery Rock, treasurer; S. L. McClure, Grove City, general manager and purchasing agent. [E. R. J., April 3, '09.]

Schuylkill & Dauphin Traction Company, Williamstown, Pa.—This company has placed contracts for the construction of two new turn-outs and the erection of a 100-ft. steel bridge.

Austin (Tex.) Electric Railway.—W. J. Jones, president, writes that this company plans to add 1 mile of new track to its railway during this year.

Rockdale, Tex.—J. F. Coffield, Rockdale, confirms the report that he and associates are promoting the construction of a broad-gage electric railway between Rockdale and Florence, 60 miles. Capital stock will be \$1,000,000. It is the plan to build a power plant and repair shop at Rockdale. Power will be furnished for lighting. A company has not yet been incorporated. [E. R. J., April 17, '09.]

***Stamford (Tex.) Street Railway.**—The ELECTRIC RAILWAY JOURNAL is advised that this company has been organized for the purpose of building a 5-mile street railway in Stamford, which is to extend to the College Heights addition. It is proposed to start work on this line in the early part of the summer. It is being financed by local capitalists. L. M. MacArthur, Stamford, chief engineer.

Everett & Tacoma Railway, Snohomish, Wash.—It is officially announced that this company has made surveys and secured practically all right-of-way for its proposed electric railway from Everett to Snohomish, Issaquah, Seattle and Tacoma, 110 miles. Capital is practically obtained and construction contracts will be let about June 1. Headquarters, Snohomish. Officers: O. E. Crossman, president; E. Colburn, vice-president; J. F. Taylor, treasurer; C. A. Barren, secretary; E. Lloyd Colburn, assistant secretary; C. A. Barron, general manager; E. Colburn, chief engineer. [E. R. J., Feb. 20, '09.]

Grafton (W. Va.) Street Railway.—It is stated that this company has decided to extend its line west to Flemington, a distance of 10 miles.

Okanogan Electric Railway, Spokane, Wash.—Official announcement is made by Col. Albert M. Dewey, Spokane, president of this company, that French capitalists have taken over a bond issue of \$3,000,000, the proceeds from which will be used to build an electric railway from Nighthawk to a point near the head of navigation on the Columbia River, 75 miles. It will pass through Loomis, Okanogan, Ophir, Malott, Brewster and Riverside, and will connect at the north end with Victoria, Vancouver & Eastern extension of the Great Northern Railway, thus giving it Spokane connection on the east and the Sound cities on the west. It will also be extended east to Spokane and west to Seattle, making a system of more than 500 miles, for the construction and equipping of which ample capital has been secured. Engineers have been in the field several months, running preliminary surveys for the line from Spokane to Seattle, and the company is now looking for a feasible pass through the Cascade Mountains near the west fork of the upper Methow River. The company already has a 50-year franchise, right-of-way and charter. [E. R. J., March 20, '09.]

POWER HOUSES AND SUBSTATIONS

Hattiesburg (Miss.) Traction Company.—A contract has been awarded to A. M. Hewes, Monadnock Building, Chicago, Ill., by this company for the erection of a new power station building to be equipped with 1500-kw and 1325-kw direct-connected units and a 150-kw motor-generator set. It is expected that the above work will be completed by Aug. 15.

Cincinnati (Ohio) Traction Company.—This company's power plant on Eastern Avenue, Cincinnati, was damaged by fire on April 16 to the extent of \$7,000. Service on 12 of the main lines was tied up for over two hours.

Chatham, Wallace & Lake Erie Railway, Chatham, Ont.—This company has recently placed contracts for two Gould storage batteries, one for the north end and the other for the south end.

Manufactures & Supplies

ROLLING STOCK

Ocean Electric Railway, Far Rockaway, N. Y., is in the market for four double-truck cars.

Portland, Eugene & Eastern Railway, Portland, Ore., has ordered one car from the Danville Car Company.

Kanauga Traction Company, Gallipolis, Ohio, is reported to have ordered one car from the Jewett Car Company, Newark, Ohio.

Toledo Railways & Light Company, Toledo, Ohio, is reported to be contemplating the purchase of 50 city cars early in the summer.

Boston & Northern Street Railway and Old Colony Street Railway, Boston, Mass., contemplate purchasing 40 new cars. Specifications have not been drawn.

Oklahoma Midland Electric Railway, Hobart, Okla., a proposed electric road, is in the market for two small gas-line motor cars for city service, to seat from 12 to 25 passengers.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa., has purchased two 15-bench, open, second-hand cars fully equipped from John B. Watson, Philadelphia.

Colfax Springs (Ia.) Electric Railway has purchased one second-hand, 16-ft. closed car equipped with two GE-62 motors from the Dorner Railway Equipment Company, Chicago.

Defiance (Ohio) Street Railway has ordered one 10-bench, open, second-hand car equipped with Westinghouse 12-A motors from the Dorner Railway Equipment Company, Chicago.

Central Pennsylvania Traction Company, Harrisburg, Pa., mentioned in the ELECTRIC RAILWAY JOURNAL of April 24, 1909, as having purchased 8 cars, has placed the order with The J. G. Brill Company.

Manor Valley Railway, Irwin, Pa., is in the market for two 45-ft. double-truck and two 30-ft. single-truck passenger cars and one single-truck baggage car. C. A. Thompson is the general manager.

Huntsville, Chattanooga & Birmingham Railway, Light & Power Company, Huntsville, Ala., has bought two second-hand, 10-bench open cars equipped with Westinghouse No. 49 motors from the Dorner Railway Equipment Company, Chicago.

Oak Bluffs (Mass.) Street Railway, mentioned in the ELECTRIC RAILWAY JOURNAL of March 20, 1909, as contemplating the purchase of one or more cars with gasoline motors, advises that it will not place its order for rolling stock until the fall.

Norfolk City & Suburban Railway, Norfolk, Va., will purchase two interurban cars either new or second-hand, with Brill 27-G or 27-G1 trucks, four GE-57, 80 or 90 motors, to seat about 50. Address Box No. 920, Norfolk, Va., by mail only, with prices.

Houston (Tex.) Electric Company, mentioned in the ELECTRIC RAILWAY JOURNAL of Feb. 20, 1909, as having bought 15 cars, has not purchased these cars. Some equipment will soon be ordered, however, through Stone & Webster, general managers, Boston, Mass.

Chicago & Milwaukee Electric Railway, Chicago, Ill., mentioned in the ELECTRIC RAILWAY JOURNAL of March 27, 1909, as contemplating the purchase of 12 cars, has purchased pay-as-you-enter cars from the St. Louis Car Company, St. Louis, and has specified McGuire 20-A trucks.

People's Traction Company, Galesburg, Ill., mentioned in the ELECTRIC RAILWAY JOURNAL of April 24, 1909, as being in the market for two trailers, through the Knox Engineering Company, Chicago, has purchased two second-hand closed trail cars from the Dorner Railway Supply Company, Chicago.

Syracuse & Suburban Railway, Syracuse, N. Y., mentioned in the ELECTRIC RAILWAY JOURNAL of April 10, 1909, as having specified Brill 27-E trucks for the three cars purchased from the G. C. Kuhlman Car Company, it is learned specified American Locomotive Company's type B M.C.B. trucks for these cars.

Jacksonville (Fla.) Electric Company has been licensed by the Pay-As-You-Enter Car Corporation to operate pay-as-you-enter cars on its lines, and will start this service shortly. It is reported the company will purchase some

new rolling stock for this use through Stone & Webster, general managers, Boston, Mass.

Geneva, Waterloo, Seneca Falls & Cayuga Lake Traction Company, Seneca Falls, N. Y., reported in the ELECTRIC RAILWAY JOURNAL of April 17, 1909, as contemplating the purchase of some single-truck cars, has ordered three closed, single-truck cars from the Wason Mfg. Company, through Meikleham & Dinsmore, N. Y. They will be the same as the other cars bought (described in the above-mentioned issue) except for the following: Length of body, 22 ft. 7 in.; platform, 4 ft. 6 in.; wheel base, 7 ft. 6 in.; H. & K. seats; GE-216 motors and hand brakes.

Chicago & Southern Traction Company, Chicago, Ill., mentioned in the ELECTRIC RAILWAY JOURNAL of March 27, 1909, as having ordered four interurban trailers from the Niles Car & Manufacturing Company, has specified the cars to be 47 ft. 10 in. over all, 8 ft. 7½ in. wide over all. They will be equipped with Hale & Kilburn 99-A rattan seats, with a capacity for 50, Pantasote curtain material and Edwards 13-O sash fixtures. The cars will weigh 24,000 lb. and will be mounted on Baldwin Class 60-20 trucks, with Symington journal boxes.

Salt Lake & Ogden Railway, Salt Lake City, Utah, mentioned in the ELECTRIC RAILWAY JOURNAL of April 10, 1909, as being in the market for 12 motor cars, has placed an order with the Jewett Car Company, Newark, Ohio, for 10 three-compartment interurban cars. These cars are to be of the steam coach type, 56 ft. in length over all, 44 ft. bodies; width over all, 9 ft.; height sill to trolley base, 9 ft. 7 in., and are to have a seating capacity of 60. The following special equipment has been specified: Solid bronze car trimmings; Symington center bearings; Janney radial couplers; Curtain Supply Company's curtain fixtures; Pantasote curtains; Agosote headlinings; pneumatic air gongs; Peter Smith heaters; combination arc and incandescent headlights; Hale & Kilburn pressed steel seats; Wood's side-bearings; Globe ventilators.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis., mentioned in the ELECTRIC RAILWAY JOURNAL of March 6, 1909, as contemplating the purchase of two cars, has ordered two interurbans from the St. Louis Car Company, St. Louis, Mo., for May 1, 1909, delivery. The cars will be 45 ft. long over all, 9 ft. wide over all, will have a body length of 34 ft., an inside width of 8 ft. 4 in., will weigh 26 tons, have a 6-ft. wheel base and seat 52. Other details of interest are:

Height inside.....	8 ft. 6 in.	Headlights	Crouse-Hinds
Sill to trolley base,	9 ft. 4 in.	Motors	GE
Body	wood	Registers	Ohmer
Underframe, wood and iron		Sanders, Ohio Brass Com-	
Air brakes, National Brake	pany		
& Electric Company		Trolley retrievers,	Knutson
Gears and pinions....	Nuttall	Trucks	St. Louis
Hand brakes.....	St. Louis	Varnish	Standard
Heaters	Consolidated		

The company has also purchased four new GE-1000 motors from the Dorner Railway Equipment Company, Chicago.

Emigration Canyon Railroad, Salt Lake City, Utah, mentioned in the ELECTRIC RAILWAY JOURNAL of Feb. 27, 1909, as having purchased two motor and two trailer cars from the American Car Company, advises that the Danville Car Company will construct this rolling stock, and that they will all be closed cars, 34-ft. body length, and 43 ft. 5 in. over vestibules, weight, 25 tons, and seat 48. Other details of interest follow:

Body	wood	Hand brakes.....	Brill
Underframe	wood	Headlights, Electric Trac-	
Air brakes, Westinghouse		tion Supply Company	
AML		Motors, 4 Westinghouse 93-	
Brakes	Brill	A2	
Control system, L-4 West-		Sanders	Dumpit
ingham		Seats	Winner
Couplers	Brill	Step treads	Mason
Curtain fixtures, Curtain		Trolley attachments, U. S.	
Supply Company		No. 1	
Curtain material, Pantasote		Trucks	Brill
Gongs	Brill	Varnish	Murphy

The company also purchased 12 gondola flat-cars from Kilbourne & Jacobs Manufacturing Company, Columbus, Ohio.

East St. Louis & Suburban Railway, East St. Louis, Ill., mentioned in the ELECTRIC RAILWAY JOURNAL of April 17, 1909, as having purchased five interurbans from the St. Louis Car Company, writes that these cars will be double-truck closed cars with smoking compartment, 45 ft. 4 in. long over all, 8 ft. 8 in. wide over all and are being built by the American Car Company. The body length will be 33 ft. 4 in., length over vestibule, 44 ft. 4 in. The cars will

each weigh 53,800 lb. and have a seating capacity of 46. Other specifications follow:

Height, sill to trolley base, 10 ft.	Gongs and bells, two Brill each
Height from top of rail to sills, 3 ft.	Hand brakes Ratchet
Body wood	Heating system, Consolidated
Underframe wood	Headlights, GE luminous arc
Brake shoes Walsh	Markers Handlan-Buck
Car trimmings...solid bronze	Motors .....four GE 216-A
Control system, GE multiple unit	Paint ... Sherwin-Williams
Couplers Tomlinson	Registers Ohmer
Curtain fixtures, Curtain Supply Company	Seats Hale & Kilburn
Curtain material..Pantastote	Trolley retrievers, Earll No. 5.
Destination signs ...Hunter	Trolley poles, Shelby Seamless
Fenders, company's own make	Trucks Brill 27-E 1½
	Varnish Murphy

The cars will be practically the same as the 15 purchased last fall for Belleville service.

TRADE NOTES

Chicago Mica Company, Valparaiso, Ind., elected M. L. Kohler, of Philadelphia, president at its annual meeting held April 14 at Chicago.

Weston Electric Instrument Company, Newark, N. J., will move its New York office from 74 Cortlandt Street to 114 Liberty Street on May 1.

Rail Joint Company, New York, N. Y., announces that James A. Greer is now acting as its representative in San Francisco, in place of W. E. Clark, who has been transferred to the New York office.

McKean Motor Car Company, Omaha, Neb., has received an order from the Northern Pacific Railway for one 55-ft., all-steel gasoline motor car which will have passenger and baggage compartment.

Sunbury & Northumberland Electric Railway, Sunbury, Pa.—This company advises that it expects to give free concessions to riding devices for its Island Park, which will be opened on May 24. R. V. West, manager.

Massachusetts Chemical Company, Walpole, Mass., announces that its Chicago office has been moved from Room 464, Monadnock Block, to suite 429-30 in the same building. On account of increasing business this change in quarters was found necessary. Arthur E. Ducos is in charge of the office.

Electric Service Supplies Company, Philadelphia, Pa., has just closed a contract with the American Railways Company to equip all of this company's cars with Automotoneers. This will include its entire equipment in Scranton, Pa.; Springfield, Ill.; Dayton, Ohio; Altoona, Pa., and Bridgeton, N. J.

Barrett Manufacturing Company, Chicago, Ill., has purchased through Samuel H. Bingham, president of the company, a 24-acre tract of ground on Sacramento Avenue, Chicago, on which it is reported the company will erect a large plant for the manufacture of its roofings, paints, building paper and paving materials. The Barrett Manufacturing Company has two manufacturing plants in Chicago and other plants in several large cities.

Hurley Tracklaying Machine Company, Chicago, Ill., has recently closed a second contract with the Erie Railroad, whereby it has leased one of its machines for laying the track on the Genesee River Railroad in New York. The work is expected to start from Cuba, N. Y., the latter part of April. The Erie Railroad was much pleased with the results obtained with the Hurley machine used last summer in laying the track on the Erie & Jersey Railroad, and is now using it wherever available.

Automatic Car Coupler Company, Los Angeles, Cal., the incorporation of which was noted in the *ELECTRIC RAILWAY JOURNAL* of April 17, 1909, has elected the following officers: President, Frank R. Bonney; vice-president, Frank H. Norwood; secretary, Karl Elliott; treasurer, C. H. Wills. The company will manufacture and sell the Norwood-Bonney car coupler which has been applied on a number of interurban cars of the Los Angeles & Redondo Beach Railway. It is said that the company has also received an order to equip 100 cars of another railway with this coupler.

Fire Protection Company, Indianapolis, Ind., has been organized by T. M. Goodloe, for 12 years manager of the Indianapolis Fire Inspection Bureau, and M. DeF. Sample who, in addition to general fire inspection work, has made a specialty of hydraulic and electrical engineering from an insurance standpoint and who has been connected with various large industrial concerns. The Fire Protection Company will act as manufacturers' agent for equipment

covering the entire field of fire protection and fire fighting, and will furnish and install fire-fighting devices subject to the approval of the underwriters having jurisdiction.

W. H. Dayton, who for several years has been connected with the Railroad Supply Company, Chicago, Ill., and recently with the New York office of that company, has taken up his residence in St. Louis and will be associated with E. W. Hodgkins in the railway supply business under the firm name of Hodgkins & Dayton, who will represent the following well-known companies as sales agents for St. Louis and Southwestern territory, with offices in the Security Building, St. Louis, Mo.: Railroad Supply Company; Dressel Railway Lamp Works; Paul Dickinson, Inc.; Chicago Bridge & Iron Works, and Wyandot Refineries Company.

Willans & Robinson, Rugby, Eng., will shortly take up the manufacture of water turbines from designs prepared by Jens Orten-Boving. It is their intention to proceed at first with the manufacture of turbines for high heads of the Pelton type, and afterward to take up low-pressure wheels. In the manufacture of the latter, Willans & Robinson will be assisted by the experience of Messrs. Verkstad, of Kristinehamn, Sweden, with whom Jens Orten-Boving has been connected. Messrs. Verkstad have supplied the complete hydraulic plant for some 250 hydroelectric stations, and have also made turbines for some 1500 other plants.

ADVERTISING LITERATURE

Corrugated Bar Company, St. Louis, Mo., has distributed its March bulletin discussing special problems met with in the design of reinforced concrete conduits and sewers.

F. Bissell Company, Toledo, Ohio, is sending out a leaflet illustrating and quoting prices on Fletcher mast arms, pole brackets, reflectors, clusters and iron-pole bands for railway service.

Hyatt Roller Bearing Company, Newark, N. J., announces a new bulletin, No. 300M, which describes the company's high-duty bushings. The description is accompanied by tables of dimensions and safe loads.

American Engineering Company, Traction Building, Indianapolis, Ind., has prepared for distribution a large blue print map showing all the interurban lines in operation and under construction in the Central West.

American Carbon & Battery Company, East St. Louis, Ill., has issued several pamphlet sheets calling attention to the advantages of its American graphite, American special and American Diamond "A" carbon brushes.

Ohio Brass Company, Mansfield, Ohio, has just issued its April bulletin, and in addition to the usual interesting descriptions of railway materials it contains a series of caricatures of the most popular American in Africa.

Allis-Chalmers Company, Milwaukee, Wis., has printed a descriptive bulletin No. 1059 on d.c. engine-type generators of the following sizes: 12 kw to 500 kw 120 volts; 12 kw to 1000 kw, 240 volts; 90 kw to 850 kw, 525 volts.

H. W. Johns-Manville Company, New York, N. Y., has supplemented its catalog of "Noark" fuses published in 1905 with a new catalog which covers the improvements made in the "Noark" fuses since the first catalog appeared.

Schutte & Koerting Company, Philadelphia, Pa., has just issued Catalog No. 5, Section B, illustrating and describing the Koerting multi-jet eductor condenser. Although this condenser is new to the United States, it is in general use abroad.

Paint Manufacturers' Association, Philadelphia, Pa., is distributing two pamphlets, one entitled "Why Paint Peels," and the other "Paint Modernism." Copies may be obtained by addressing the publicity bureau of the Association, Room 623, The Bourse, Philadelphia.

General Electric Company, Schenectady, N. Y., has issued Bulletin No. 4657, devoted to the subject of search-light projectors for commercial use, and Bulletin No. 4656, in which is described a transformer for use in connection with the measurement of large amounts of current.

J. W. Jones, Harrisburg, Pa., has issued a catalog of the appliances manufactured by him for railways, printing and allied trades. A feature of the publication is a page showing examples of receipts, coupons and transfers, illustrating the Jones system for cash street railway fares, transfers and for merchants' advertising mediums.

Allgemeine Elektrizitäts-Gesellschaft, Berlin, Germany, announces that hereafter it will send to others on request its house organ known as the "A. E. G. Zeitung." This monthly was formerly published for the information of employees only. It is devoted principally to describing applications of the company's large line of electrical apparatus.

TABLE OF MONTHLY EARNINGS

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

COMPANY	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income	COMPANY	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income
AKRON, O. Northern Ohio Tr. & Light Co.	1 " Mar. '09	150,684	86,720	63,964	43,803	20,161	KNOXVILLE, TENN. Knoxville Ry. & Lt. Co.	1 " Mar. '09	47,131	*24,158	22,972	11,483	11,489
	1 " " '08	129,659	81,273	48,386	43,953	4,433		1 " " '08	46,522	*23,251	23,270	11,623	11,647
	3 " " '09	435,083	251,971	183,112	131,486	51,266		3 " " '08	139,215	*71,428	67,787	34,450	33,337
	3 " " '08	375,086	241,631	133,454	131,595	1,860		3 " " '08	128,017	*73,346	54,672	34,469	20,203
BELLINGHAM, WASH., Whatcom Co. Ry. & Lt. Co.	1 " Feb. '09	30,745	19,235	11,510	8,790	2,721	LITTLE ROCK, ARK., Little Rock Ry. & Elec. Co.	1 " Mar. '09	56,589	*27,549	29,040	11,023	18,017
	1 " " '08	27,569	16,001	11,468	7,623	3,945		1 " " '08	56,552	*28,220	28,326	8,191	20,136
	12 " " '09	366,238	212,880	153,358	101,381	51,977		3 " " '08	171,031	*82,189	88,842	32,784	56,058
	12 " " '08	359,805	202,256	157,550	90,425	67,124		3 " " '08	163,509	*81,439	82,070	27,500	54,570
BINGHAMTON, N. Y. Binghamton Street Ry. Co.	1 " Mar. '09	25,554	15,185	10,369	9,187	1,182	MEMPHIS, TENN. Memphis St. Ry. Co.	1 " Mar. '09	133,151	*84,512	48,639	35,489	13,150
	1 " " '08	22,339	13,303	8,976	8,287	689		1 " " '08	128,857	*83,705	45,152	34,836	10,316
	3 " " '09	75,908	42,820	33,088	27,502	5,586		3 " " '09	379,712	*246,331	133,382	106,340	27,042
	3 " " '08	66,138	41,924	24,214	24,852	7638		3 " " '08	360,264	*237,464	122,799	103,786	19,013
BIRMINGHAM, ALA. Birmingham Ry., Lt. & Power Co.	1 " Mar. '09	181,818	*114,204	67,614	44,787	22,827	MONTREAL, CAN. Montreal St. Ry.	1 " Mar. '09	298,728	206,832	91,896	35,901	55,995
	1 " " '08	177,003	*112,686	64,317	42,863	21,454		1 " " '08	288,674	202,390	86,284	38,119	48,165
	3 " " '09	551,615	*342,287	209,328	134,356	74,972		6 " " '09	1,813,342	1,166,834	646,959	181,243	465,716
	3 " " '08	522,091	*348,338	173,753	130,168	43,586		6 " " '08	1,747,137	1,145,866	601,271	186,253	415,018
CHARLESTON, S. C. Charleston Con. Ry. Gas & Elec. Co.	1 " Mar. '09	60,394	*39,636	20,758	13,917	6,841	OAKLAND, CAL. Oakland Traction Co.	1 " Feb. '09	205,101	102,258	102,842	45,367	57,475
	1 " " '08	61,497	*40,604	20,833	13,817	7,016		1 " " '08	210,591	110,303	100,288	45,831	54,457
CHICAGO, ILL. Chicago Rys. Co.	1 " Jan. '09	945,856	*549,694	396,162	160,390	235,772		2 " " '09	419,685	211,288	208,396	90,734	117,661
	1 " " '08	813,274	*633,880	179,394	135,243	44,151		2 " " '08	435,676	229,208	206,468	91,662	114,807
	12 " " '09	11,037,071	*7,725,950	3,311,121	1,739,684	1,571,436	San Francisco, Oakland & San Jose Cons. Ry.	1 " Feb. '09	68,591	33,151	35,439	23,142	12,297
	12 " " '08	10,560,571	*7,392,400	3,168,171	1,566,158	1,602,012		1 " " '08	68,407	35,464	32,943	20,852	12,092
CLEVELAND, O. Cleveland, Painesville & Eastern R.R. Co.	1 " Mar. '09	20,345	*10,729	9,616	8,311	1,305		2 " " '08	138,784	67,288	71,495	46,284	25,211
	1 " " '08	20,709	*11,146	9,563	7,946	1,617		2 " " '08	138,433	72,235	66,199	41,704	24,496
	3 " " '09	55,813	*31,839	23,974	24,557	7583	PADUCAH, KY. Paducah Traction & Light Co.	1 " Feb. '09	17,807	11,069	6,739	7,034	7296
	3 " " '08	56,355	*31,957	24,398	23,854	544		1 " " '08	18,455	12,215	6,240	7,033	7793
LAKE SHORE Elec. Ry. Co.	1 " Feb. '09	60,471	*44,019	16,452	34,520	†18,068		2 " " '09	225,099	131,797	93,301	82,574	10,727
	1 " " '08	63,675	*40,633	23,042	31,009	†7,968		2 " " '08	237,712	151,769	85,943	82,598	3,345
	2 " " '09	134,062	*89,593	44,469	68,012	†24,443	PENSACOLA, FLA. Pensacola Electric Co.	1 " Feb. '09	19,081	10,124	8,958	4,366	4,591
	2 " " '08	134,553	*87,423	47,130	61,874	†14,744		1 " " '08	15,378	13,929	1,448	4,134	22,686
DALLAS, TEX. Dallas Electric Corporation.	1 " Feb. '09	94,588	57,953	36,636	28,772	7,863		2 " " '09	214,515	140,448	74,067	51,634	22,433
	1 " " '08	84,650	57,725	26,926	29,183	†2,257		2 " " '08	214,515	149,291	77,715	48,214	29,501
	12 " " '09	1,193,006	784,913	408,093	346,490	61,603	PHILADELPHIA, PA. American Rys. Co.	1 " Mar. '09	214,155	.....	.....	.....	.....
	12 " " '08	1,134,078	753,199	380,880	331,472	49,406		1 " " '08	207,618	.....	.....	.....	.....
DETROIT, MICH. Detroit United Ry. Co.	1 " Feb. '09	530,314	*348,711	181,603	154,457	27,146		9 " " '09	2,108,093	.....	.....	.....	.....
	1 " " '08	469,839	*332,046	137,793	135,122	2,671		9 " " '08	2,181,044	.....	.....	.....	.....
	2 " " '09	1,101,321	*703,407	397,914	308,159	89,755	PLYMOUTH, MASS. Brockton & Plymouth St. Ry. Co.	1 " Feb. '09	6,730	5,241	1,489	2,088	†599
	2 " " '08	984,519	*671,519	313,000	271,168	41,832		1 " " '08	6,341	6,415	74	2,324	†2,399
EL PASO, TEX. El Paso Elec. Co.	1 " Feb. '09	45,373	27,864	17,509	7,911	9,598		2 " " '09	123,154	86,013	37,141	26,327	10,815
	1 " " '08	43,863	29,682	14,181	7,148	7,033		2 " " '08	120,612	85,419	35,193	27,246	7,947
	12 " " '09	540,443	381,217	159,226	88,557	70,870	PORTLAND, ORE. Portland Ry., Lt. & Pwr. Co.	1 " Mar. '09	370,730	175,720	195,009	.....	.....
	12 " " '08	523,757	374,279	149,478	122,904	76,574		1 " " '08	336,153	173,366	162,780	.....	.....
FAIRMONT, W. VA. Fairmont & Clarksburg Tr. Co.	1 " Feb. '09	28,534	11,555	16,979	12,306	4,673		3 " " '08	1,064,958	528,973	535,984	.....	.....
	1 " " '08	27,161	11,303	15,858	11,500	4,358		3 " " '08	1,009,264	521,713	487,551	.....	.....
	2 " " '09	60,067	24,745	35,322	24,635	10,687	ST. JOSEPH, MO. St. J. & Ph. Ry., Lt., Heat & Pwr. Co.	1 " Mar. '09	75,511	40,364	35,147	.....	.....
	2 " " '08	58,164	24,408	33,756	23,001	10,755		1 " " '08	66,594	35,528	31,066	.....	.....
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1 " Feb. '09	99,235	58,290	40,945	.....	.....		3 " " '08	228,190	120,860	107,330	.....	.....
	2 " " '08	97,455	56,680	40,775	.....	.....		3 " " '08	203,565	109,507	94,059	.....	.....
	2 " " '09	208,909	122,503	86,340	.....	.....	ST. LOUIS, MOs United Railways Co. of St. Louis.	1 " Mar. '09	903,151	*587,104	316,047	235,504	80,543
	2 " " '08	200,475	114,177	86,298	.....	.....		1 " " '08	858,908	*559,135	299,773	233,290	66,483
FORT WORTH, TEX. Northern Texas Elec. Co.	1 " Feb. '09	82,661	48,090	34,570	17,190	17,381		3 " " '09	2,540,348	*1,603,635	876,713	705,990	170,723
	1 " " '08	71,311	44,227	27,083	14,435	12,648		3 " " '08	2,461,761	*1,633,934	828,727	700,103	128,564
	12 " " '09	1,106,663	645,103	461,560	195,400	266,154	SAVANNAH, GA. Savannah Elec. Co.	1 " Feb. '09	45,855	28,234	17,621	15,747	1,875
	12 " " '08	1,064,221	595,002	469,220	161,073	308,147		1 " " '08	43,718	36,508	7,211	15,395	†8,184
GALVESTON, TEX. Galveston-Houston Elec. Co.	1 " Feb. '09	82,552	53,388	29,164	21,561	7,603		2 " " '09	601,621	375,126	226,495	187,361	39,134
	1 " " '08	74,715	48,252	26,463	20,414	6,049		2 " " '08	603,050	403,079	199,971	178,444	21,527
	12 " " '09	1,107,104	641,021	466,084	247,965	218,110	SEATTLE, WASH. Seattle Elec. Co.	1 " Feb. '09	379,692	230,038	149,653	96,511	53,142
	12 " " '08	1,061,866	626,414	435,452	230,275	205,178		1 " " '08	347,616	202,248	127,369	84,803	42,566
HOUGHTON, MICH. Houghton County Tr. Co.	1 " Feb. '09	21,869	15,346	6,523	5,297	1,227		2 " " '09	4,589,625	2,690,751	1,898,874	1,117,084	781,789
	1 " " '08	17,330	13,030	4,300	4,767	7407		2 " " '08	4,250,149	2,532,806	1,718,063	958,484	759,579
	12 " " '09	274,922	153,664	121,328	60,628	60,700	TACOMA, WASH. Puget Sound Elec. Ry. Co.	1 " Feb. '09	128,441	94,088	34,353	44,313	†9,960
	12 " " '08	254,783	144,601	110,182	57,311	52,871		1 " " '08	117,502	79,788	37,714	41,150	†3,436
JACKSONVILLE, FLA. Jacksonville Elec. Co.	1 " Feb. '09	36,793	23,076	13,718	8,185	5,533		2 " " '09	1,710,189	1,130,177	580,012	519,675	60,337
	1 " " '08	31,378	20,764	10,614	8,116	2,498		2 " " '08	1,691,470	1,042,809	648,662	469,171	179,491
	12 " " '09	441,329	257,647	183,683	99,342	84,341	TAMPA, FLA. Tampa Elec. Co.	1 " Feb. '09	53,460	29,838	23,622	4,643	18,980
	12 " " '08	394,898	234,511	160,387	81,106	79,281		1 " " '08	48,569	30,644	17,924	2,104	15,819
KANSAS CITY, MO. Kansas City Ry. & Lt. Co.	1 " Feb. '09	505,813	283,633	222,181	150,460	71,721		2 " " '09	563,151	367,233	195,918	44,706	151,212
	1 " " '08	464,110	251,390	212,729	151,050	61,678		2 " " '08	532,355	379,164	153,192	17,712	135,479
	9 " " '09	4,849,120	2,750,549	2,098,571	1,390,602	707,968	TOLEDO, O. Toledo Rys. & Light Co.	1 " Mar. '09	218,032	124,077	93,955	70,942	23,013
	9 " " '08	4,639,178	2,391,635	2,247,543	1,379,072	868,471		1 " " '08	202,187	114,880	87,307	68,809	18,401
MEMPHIS, TENN. Memphis St. Ry. Co.	1 " Mar. '09	133,151	*84,512	48,639	35,489	13,150		3 " " '09	657,532	374,025	285,506	212,866	72,648
	1 " " '08	128,857	*83,705	45,152	34,836	10,316		3 " " '08	628,624	356,270	272,354	205,953	66,402
	3 " " '09												