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The Close of the Convention

The papers read on Wednesday, Oct. 9, and the discussion on them at the meetings on that day of the two associations were published in our issue of last week. In this issue will be found the papers read on Friday before the American Street Railway Association, together with the proceedings of the two associations, an account of the entertainments provided for the delegates on that day, as well as the further particulars of the exhibits at the Garden. Owing to the pressure of space on our columns this week, the publication of the papers read on Friday before the Accountants' convention has been postponed until next week.

The estimate made in the last issue of the unqualified success of the convention in every particular, and the prediction that in attendance it would exceed that of any other meeting of the association, have been more than justified as a result of the last day of the attendance, which showed that the accredited representatives of railway and supply companies to the convention numbered slightly more than two thousand. The papers and discussions presented on Friday were equal in interest to those of Wednesday, and were participated in as generally by the delegates, while the discussion was as productive of valuable results. The banquet held in the large dining-room at Sherry's was largely attended, and the speeches were excellent. The entertainments, particularly the automobile trip to the ladies, given through the courtesy of Henry Sanderson, of the New York Electric Vehicle Transportation Company, was most enjoyable, and was participated in by

about 350 ladies. The weather, which in New York at this time of the year is very uncertain, was unusually propitious during all of the three days of the convention, and we feel satisfied that no one returned from New York except with the feeling that the Twentieth Annual Convention of the Association had been the most successful in its history.

Before closing our remarks on the convention, it would be unjust not to make a further reference to the excellent manner in which President Holmes discharged his arduous duties as president of the association. As chairman of the meetings he managed the presentation of the papers so that there was ample time for a complete discussion of all those upon which there was any debate, and his promptness in suggesting speakers and knowledge of those who had a special acquaintance with the topics under consideration added very much to the value of the proceedings and the number of facts elicited. But his duties did not consist only of those in the convention hall. As president of the association during the past year, he had much to do with the appointment of speakers at the meeting and the investigations carried on by the committee on standards and the other work accomplished by the association during the past year. By these efforts the association has been brought to a more efficient and influential position than it has ever occupied. In this work, it is needless to say, he has had the cordial and efficient services of the popular secretary, T. C. Penington, whose able management of the finances of the organization created great applause when the report of the secretary and treasurer was read. On Mr. Penington has devolved not only a great part of the labor of securing the prompt presentation of the papers read at the convention, but also that of increasing the membership. This is now larger than ever before, and the additions reported at the New York meeting show that the association enters upon its new year of activity possessing to a still greater degree the confidence and co-operation of the leading railways in the country.

The Coming Year

The report of the committee on nominations was one which gave eminent satisfaction to the association, and the latter is assured of the best possible guidance in entering upon the year in which it will attain its majority. The qualifications of Mr. Vreeland for directing the interests of the association during the coming year are unquestioned. Ever since he entered the street railway field he has been one of the most prominent members in it, and his attendance at the meetings of the association has shown that he has its interests at heart. The selection of Mr. Wason as first vice-president is a well deserved tribute to his knowledge of street railway conditions and his prominence in the electric railway field. Mr. Wason is one of the few street railway financiers of the country who has also taken a prominent position as an electrical and mechanical expert, and is a most successful operator. As one of the leading members of the Everett-Moore syndicate, Mr. Wason has been an active constructor of electric railways during the last few years, and has perhaps added more mileage to the electric railways of this country than any other person. Mr. Foster, of Boston, the new second vice-president, and Mr. Sloan, of Chicago, the third vice-president, are also prominent in the street railway field. Their election adds great strength to the governing body. The association is also fortunate in retaining on the executive committee the services of Mr. Holmes, of Kansas City, and in securing on that committee Mr. Rigg, of Reading; Col. Dyer, of Augusta; Mr. Nicholl, of Rochester, and Mr. Dickinson, of Seattle. All of these gentlemen have taken an active part in the past history of the association, and all are well representative of the most progressive element in electric railroading. Altogether, the association can look forward to a year of even greater accomplishment than ever in the past, and one whose completion in Detroit next year will be productive of results of great value. Detroit is an ideal city in which to hold a meeting of this kind, being not only central to the portion of the country in which there is the greatest electrical activity, but also

containing within its contiguous area some of the longest and most modern interurban systems in the country. A study of these interurban roads will show the latest development of American practice. Detroit is also a city of great natural attractions, and has been a popular one for conventions of all kinds in the past. The invitation of the Everett-Moore syndicate to meet in that city was greatly appreciated by the delegates.

The Report of the Committee on Standards

The report of the committee on standards, which has been eagerly looked forward to during the year by all the members of street railway companies, was presented to the association on Friday, and justified the universal interest which had been felt in the report and the confidence in its value which had been inspired by the reputation of the gentlemen composing the committee. It is not too much to say that the work of the committee has been more arduous than that which has ever been assigned to any other committee of the association, while the results sought were certainly of as great practical value as any which the association has ever attempted to accomplish. It has been argued that because there is not the same interchangeability of rolling stock on street railways as on steam railroads, the same necessity for standards does not exist. This is undoubtedly in part true, but independent of the fact that the rolling stock on our modern interurban electric railways is interchangeable to a considerable extent, and will be to a greater degree in the future, there are other reasons for the establishment of a set of standards in equipment. One of these lies in the fact that street railway equipment has been subject to so many changes by the development of powerful motors and improved methods of distribution during the past ten years, that practice in construction and equipment in different parts of the country has been extremely diverse. There have been so many theories that it has been extremely difficult for the average railway manager to determine what the best practice is, so that while the recommendations of the committee on standards will still leave ample opportunity for a variation in details to suit individual conditions, the general principles underlying the most successful street railroading will be generally understood. Another reason for the promulgation in this way of the most approved practice is that, in the absence of any such recognized standards, considerable pressure is often brought upon different railway companies to adopt unusual types of equipment and forms of rails, etc., simply because they appeal to the passing whim of some local city engineer. If, however, the company can show that such and such a form has been recommended by the association as being far better adapted to the purpose, a much stronger argument can be made in favor of approved practice.

In this connection it should be borne in mind that the report of the committee has not yet been adopted by the association, nor even when it has been adopted will it carry any binding effect on the members. The report, as it exists now, is simply suggestive, and before any action looking to its adoption will be taken by the association, comments on and criticisms of it are solicited from the different members, so that if it should be the consensus of opinion that modifications are necessary, they can be incorporated into the report by the new committee to be appointed by the president, and the whole can then be presented in a modified form at the next convention.

We do not intend at this time to comment upon the details of the report, as presented at the New York convention, especially in view of the fact that owing to the large number of engravings which accompany this report, and without which it is not wholly intelligible, the publication of the report must be postponed until a later issue. It is sufficient to say, however, that the committee has carefully worked out all the details, and as the report will be reprinted in pamphlet form, and distributed to the member-companies, there will be ample time for a careful consideration of its provisions.

The Return Circuit

Mr. Connette, in his paper on rail-bonding and the return of the current to the power station, summarizes in a concise way the improvements which have been made in the art, and the necessity of providing a path of low conductivity to the station. The defects which may exist in the rail return are all the more serious, because the bonds are out of sight, and many a railway manager has pursued his course serenely without a suspicion that anything was wrong until he has discovered that owing to an interruption in his return circuit he was practically throwing away a large amount of the power which had been supplied from his station. The remedy suggested by the writer was that of using a copper wire return circuit connected to the middle of each rail; in other words, a supplementary wire, either underground or overhead, provided either cast welded or electrically welded joints are not used, and not to rely on the conductivity of the rails and bonds. The point is well made that it is not safe to depend absolutely on the conductivity of all rail-bonds in a long length of track, but even granting this, it seems hardly advisable to throw away whatever value the bonded track might have as a conductor, simply because no known method of bonding or welding is absolutely perfect or free from occasional defects. As we have pointed out before, the usual cross bonding, together with the cross bonding afforded by every pair of car wheels, is sufficient to prevent serious trouble from defective bonds, unless they are very numerous, for which latter condition there is no excuse. Indeed, the supplementary wire advocated is itself liable to breakage, poor contact with the rail and impairment from electrolysis. The supplementary wire is nevertheless undoubtedly a good thing in some cases, and supplementary copper, or return conductors in other forms, is essential on all large roads.

The whole question of bonding and the return circuit is one about which general rules as to construction are difficult to lay down, and are liable to be worthless. Each case calls for common sense and engineering judgment. Furthermore, tests of bonds and joints from time to time, after the work is done, are necessary. That is the only way of keeping the return circuit permanently in good condition known to the art, for no matter what are the condition of electrical joints and contacts underground when new, there is always the chance that some of them will become defective in time.

In regard to the use of copper in the return circuit, it does not, by any means, follow that if as much, or even more, copper is put in the return circuit as in the trolley feeders, there will be no electrolysis or trouble with the return circuit. So long as the return is grounded, an "independent" metallic circuit is impossible. There will always be a difference of potential between two points of the earth with a possible flow of current, and whether there is electrolysis or not depends on the local conditions.

The real measure of the need of improvements in the return circuit is not potential differences, but the amount of the current which returns, partly or entirely, to the station by paths other than metallic ones. Potential differences are, therefore, an indication only, and on the whole rather a deceptive indication that electrolytic trouble may exist. This will be appreciated when one remembers that if the track is completely insulated, all of the current would return through it, and there would be no stray currents, in spite of highest kind of potential readings, which might be taken along the line. It is only when the potential differences permit the escape of current through moist earth or some other electrolyte that there are any disturbances from electrolysis. The amount of this current flow can easily be measured, and in a variety of ways. The return current will divide itself among the paths offered to it inversely, according to their respective resistances, and in case leakage is discovered, the proper steps to take are either to improve the current-carrying capacity of the return circuit, by better bonding of the rails, or the introduction of supplementaries, or else to reduce the electrical conductivity of the

other paths. In investigating the subject it may often be found that the most prolific cause of trouble is not the high resistance of the rail return, but the abnormally low resistance of the outside return. This was clearly shown in the historic Peoria case, where the railway company provided an excellent return circuit, but its care in this particular was thwarted by the water company, whose gate boxes, connected to its water pipes, were located adjoining to, and sometimes abutting, the track rails. As a result, the current passed into the pipes when it otherwise would have been confined to the rails.

A word now as to bonding. Independent of the claims made in favor of different types of rail-bonds, it is safe to say, and we believe that in this the bond manufacturers will agree with us, that the best bond may be made practically worthless by careless installation, while on the other hand, even a poor bond, if put in intelligently, is fairly satisfactory.

Civil service rules which have been applied to so many branches of work could well be employed in rail bonding. By this we mean that the price paid for installing bonds could be made dependent on their conductivity; that is, a standard could be adopted. This has been done by a number of contractors; all bonds which fall below this standard are rejected, those above this standard, but below a second rating, are to be paid for at half price, while those higher than the second rating are to be paid for at full price.

The electrolysis bugaboo is, unfortunately, one which takes a terrifying shape when it enters the minds of city authorities, especially when the water plant belongs to the municipality, or when its owners, for their own reasons, exaggerate the possible danger to the underground pipes from the operation of local street railways. It ought to be clearly understood by all that there is absolutely no danger from electrolysis in a properly bonded track. Inspections of rail-bonds have to be, and are, made just as they are of the boilers used in the steam plant and of other parts of the equipment, but there is no more inherent difficulty in making the return circuit innocuous than in preventing the boilers from exploding, the fly-wheels from breaking, or the cars from tearing through the streets unmindful of their controllers. It is simply a question of vigilance and the application of common sense in remedying weaknesses when they occur. There is no single way of keeping the return circuit on the rails. Any one of a dozen methods is amply sufficient, provided care be taken in its installation, and this care, it is safe to say, will be exercised without compulsion by every member of the American Street Railway Association.

Some Possible Power House Economies

A number of suggestions as to possible ways of increasing the efficiency of modern power plants are given by J. H. Vail in his paper before the American Street Railway Association. He expects little in the way of increased economy in the engines themselves, in which respect he is probably right, although there remain still possibilities for reduced first cost by the use of higher rotative speeds. Pulverized fuel is another suggestion which certainly has great possibilities, although very little has been done in the way of practical work along this line. Superheated steam is already finding a place in modern power houses, while cooling towers for condensing water are becoming the standard for running plants not located near rivers or lakes. The use of artificially cooled water for condensing purposes in electric railway and lighting plants is almost limited to the last five years. Previous to that time there were a number of scattered cases where cooling towers or ponds were in use, but it is only within the last five years that engineers have waked up to the economy and practicability of cooling towers for almost every location where a cheap supply of water for condensing purposes is not available. As Mr. Vail states, many a time in the past has a power house been located in an unfavorable place in order to get the benefit of condensing water, while the use of a cooling tower makes it possible often to put a power house in a much better place as regards transmission and coal handling than if it were near some body of water. It is

true, on the other hand, that cases are to be found where power houses have been located directly on rivers, and have not been fitted with condensing apparatus, but engineering of that kind is not often found in these days, for the economy of condensing is becoming too well recognized to let a difference in first cost cause the non-use of condensing apparatus. To be sure, as Mr. Vail says, there may be places where fuel is extremely cheap, and here the saving would not pay interest on the condensing apparatus, but such instances are few and far between. As time goes on, we look to see greater attention paid to these minor improvements and requirements in station engineering, for waste is even more inexcusable than a loss which comes through error in judgment, as the former can occur only through carelessness.

Storage Batteries for Power Stations

The paper on the use of storage batteries as station auxiliaries, by Mr. Harrington, brought out a variety of opinions as to their value in this connection. The trend of sentiment, however, was undoubtedly in favor of the storage battery, and it was interesting to notice the large number of companies which seem now to be employing the battery as a regulator of the station loads. It is only eight years ago that a paper on this subject was read at the Milwaukee convention, but at that time storage batteries were in such disfavor that any plea for their use fell almost on deaf ears. It was not until several years later that the real value of the battery for this service became apparent, and this was due quite as much to subsequent improvements made in the batteries themselves as to any unreasonable unwillingness on the part of the station engineers previous to that time to use them to any extent. At present, storage batteries occupy a well recognized function in the operation of power stations, particularly those for electric railways, from the fact that in the latter the momentary, as well as the hourly, fluctuations of load are of great extent. Mr. Harrington threw some very interesting light on the practical application of the batteries to the work in hand, and went into the subject in the way of diagrams and drawings to a considerably greater extent than the space at our disposal this week warrants us in following him. Nevertheless, the diagrams reproduced herewith were the most important of those shown by the speaker, and will give an excellent idea of the treatment of the subject accorded by him.

Electric Block Signals on Interurban Lines

The question of operating single-track interurban lines without delay at meeting points is becoming more and more serious. There are two general ways of solving the problem; first, by telephonic train despatching, and, second, by electric block signals, automatic or otherwise. None of these systems has attained the perfection that has been reached in despatching or block signaling on steam railroads. This is due to inherent difficulties connected with the operation of electric lines. The elaborate despatching system of steam roads is made possible by the presence of an employee at each meeting point. The possibility of using the track for signaling purposes on steam roads also gives an immense advantage over electric roads in automatic signaling. A block signal, operated by a track circuit, cannot be at clear position as long as there is a pair of wheels on the block short-circuiting the two rails of the track. Any automatic system operated by a trolley or track instrument at either end of the block, to be protected, may indicate clear, with a car in the block, under certain conditions that are likely to occur in operation, for example, when one car closely follows another, and yet such systems are the only ones available for use on electric lines at present, because track-circuit signaling is prohibited by the necessity of using the rails for a return circuit. The Boston elevated lines have been recently equipped with a block signal system employing a track circuit, in which one rail is continuous and the other is divided into sections insulated from each other. This is the only block signal track circuit ever installed on electric lines, so far as we know, and is

made feasible by the ease of insulation of track rails on an elevated structure, and by the presence of the steel structure, which can be used for the return circuit. On lines with dirt ballast, and where one rail of the track can ill be spared from the return circuit for the purposes of signaling, this plan is not available. It is not to be inferred from what has been said that because present signal systems are not perfect, they are not far better than nothing. The perfection of block signals on steam roads, and the few chances there are that such signals will give a false indication of safety, makes one who is familiar with them loath to endorse a block signal system for electric roads which, in the parlance of the block signal expert, is "full of holes"; that is, presents numerous possibilities of false indications, even when the apparatus itself is in perfect order. However, when used in connection with strict rules and discipline, the signal systems available for use on electric interurban lines offer much more safety than no signals at all. Here it may be well to note that any signal system, however perfect, may be made worthless by disobedience to rules on the part of trainmen, and the cost of safety is always eternal vigilance.

The Work of the Convention

WASHINGTON, D. C., Oct. 15, 1901

EDITORS STREET RAILWAY JOURNAL:

In the paper of Captain McCulloch presented to the convention in New York appears a pregnant and eloquent paragraph, which, had time permitted, might have been the seed of fruitful discussion. The paragraph begins thus: "The street railway of the future stands in grand relief as an institution of all future progress and development," and continues to set forth fairly and sympathetically this thought, that the physical and mental comfort of the street railway employees, the non-commissioned officers and privates of our great and increasing armies of occupation should occupy a large share of the attention of officers and directors. Several companies, I know, have made much progress recently in this direction. Would not the collection of data on these subjects be valuable? Would it not be a most worthy work of the association to have a committee report on what has been done, and perhaps recommend what may yet be done? Some such suggestion to the association of positive action on its part is implied, I think, in the paragraph cited.

Captain McCulloch's long, intelligent and responsible experience in street railway matters is known to nearly all of his co-workers in this country. Emboldened by the authority of his words and by my own convictions in the matter, I had hoped that time would have been available for considering the appointment of a committee to report next year on the subject generally—of what may be done to increase the comfort and pleasure of street railway employees—but the pressure of business was too great to permit full discussion of all papers. By putting the question now in your pages, ample time is had that all may meditate as to whether the subject is one desirable to be undertaken by the association at its next meeting. And, after all, this slower method may be the wiser in dealing with a matter as delicate as it is important.

The report of the committee on standards richly deserved, I am sure, all the commendation it received from President Holmes in his official references to it and in the grateful remarks of many members. Animated by a desire to prevent such excellent work from being nearly futile, permit me to recall the following facts: Several years ago—at the Cleveland convention, I think—a paper on the subject of association standards was presented by me, and at the same time, or perhaps later, a number of technical terms and a number of dimensions of materials were recommended for adoption, among the latter such items as the dimensions of wheels and axles. These recommendations were adopted—and there the matter ended—ended so completely that probably nobody recalled the former official action when the recent report—much richer, much more thoroughly studied than anything preceding it—was submitted for consideration.

It is not for the purpose of setting forth the ancestry of the standardizing movement that these lines are written, but to point out that unless we learn the secret of our brothers of the steam railway lines, we shall see our committees work for nothing. It is not sufficient that the association should adopt standards; but the constituent companies, the real purchasers, must adopt them. In their isolation from each other, in their relatively new conditions, the street railways feel less than do the interchanging steam railroads the need of uniformity of material. But the interurban

roads—and time—are changing the status; the need of uniformity is much greater than at the date of the Cleveland association. At that time there was very little of that uniformity of thought which must precede uniformity of action. Few indeed really sympathized with the proposition, I think; and the official adoption of standard terms and dimensions was largely dictated by a good-natured idea of recognizing in a complimentary way any serious work presented to the association. Particularly was the interest feeble, except among a few technical men, in the subject of standardizing the names of things used. Nevertheless, while at the convention, a few days ago, a member told me that the meaning of the term "center-bearing rail" came into dispute between his company and a city engineer; reference was made to a girder-rail-making company, who decided that their product was meant to be described by the text of the franchise. I do not here mean to enter the lists as to that interpretation, but only to point out that a supposedly familiar term was found to be differently interpreted by different supposedly competent engineers.

To give effect to such standards as the association may adopt, the following suggestions, perhaps, will be of some avail: First, as to terms, contracts between seller and buyer, or between two or more operating companies, might contain a clause providing, substantially, that in cases of dispute as to the proper meaning of any term that may have been standardized by the association, the adopted definition shall prevail as against the contention of either party. Second, as to standardized material dimensions, contracts with manufacturers might provide that cases of doubt shall likewise be determined by reference to the association standards—thus a "wheel" shall be, in case of doubt, interpreted to mean a "33-in. wheel," etc. Contracts for inclusive equipment of roads, specifications being comparatively scanty or loose, might bind the parties to supply and accept all material not otherwise specified, according to association standards.

How to urge a more general adoption by constructing companies, in cases not doubtful, of association standards is more difficult. The isolation of companies, the diversity of construction, the yet plastic state of the art, must limit very narrowly the number of thoroughly standardized dimensions; yet this small number may be among the most important dimensions, and then uniformity would save work and money to all concerned. Just now my object is to modestly suggest to the standardizing committee that the methods of having standards actually applied require almost as much study as the determination of the standards themselves.

In the matter of standard accounting, I desire to suggest, without feeling entirely sure of my ground, that diversity of car-weight may properly lead to the ton-mile, or, better, the ton-hour, as being the best unit for cost of operation. Roughly speaking, the weight of a car is proportional to its length—its length is nearly proportional to its seating capacity. Such a unit would certainly diminish the incongruity of results now reached when comparing by the car-mile or car-hour unit, operations based upon cars which vary from 16-ft. bodies to 35-ft. bodies, and from using units of a single car to using units of three cars.

O. T. CROSBY.

The Local Committee

No account of the twentieth annual convention of the American Street Railway Association would be complete without a tribute to the excellent manner in which all the details of the convention were performed by the local committee. The undertaking of providing for the social entertainment of such a large body of guests was enormous, but every detail was most successfully planned and executed. The entertainments were started on time and were carried out with the least possible delay and with no hitches, while all the appointments were most complete. The credit for this belongs, in large part, to the efficient direction given to them by Henry A. Robinson, solicitor of the Metropolitan Street Railway Company and secretary of the local committee. In this work he had the valuable co-operation and assistance of D. R. Almy. Both Messrs. Robinson and Almy were most assiduous in their management of the different features, and in looking after the needs and requirements of the attendants at the convention.

The convention badge prepared by this committee was a most artistic one, and will undoubtedly be preserved by all the delegates in attendance at the convention. A silver medallion was suspended by a satin ribbon from a pin, on which the word "New York" was inserted. Enclosed within a circle in the center of the badge was a view of Madison Square Garden, encircled by the words "American Street Railway Association." On the opposite side of the badge was the inscription, "Twentieth Annual Meeting, New York City, Oct. 9, 10, 11, 1901."

A. S. R. A. PAPERS READ AT FRIDAY'S SESSION

The Storage Battery Located in the Power Station

BY W. E. HARRINGTON
General Manager, Camden & Suburban Railway Company

The installation of a storage battery in a street railway power station will lead to economical results, under the following conditions:

- (a) When the load is of a very fluctuating character.
- (b) When the peak of load is of short duration, and is either considerably in excess of the average load or, perchance, in excess of the capacity of the station.
- (c) When light night loads are to be carried, which permits shutting down the steam plant.
- (d) When a station is equipped with a diversity of engines and generators having different characteristics.

The results obtainable from the installation of a storage battery

An incidental advantage of a storage battery installation is in its lightning arrester capacity. The plates offer, through the electrolyte, such an excellent path to ground, as well as acting as a large condenser, serve as the best protection against the serious effects of lightning discharges that can be obtained. This latter fact of lightning protection has been frequently noted, in that, on the lines on which substorage battery stations are located, lightning discharges have never been experienced in the Camden & Suburban Railway Company's stations.

In order to illustrate the application of the storage battery recorded in the power station, a twenty-two-hour test was made, running our old plant, which consists of two 100-kw Edison generators, one 225-kw General Electric generator, one 180-kw Westinghouse generator, one 250-kw Westinghouse generator, all belted units. The storage battery in the station consists of 265 cells, type 17-F Electric Storage Battery Company's make, installed in lead-lined tanks, sufficiently laid to permit of 100 per cent increase.

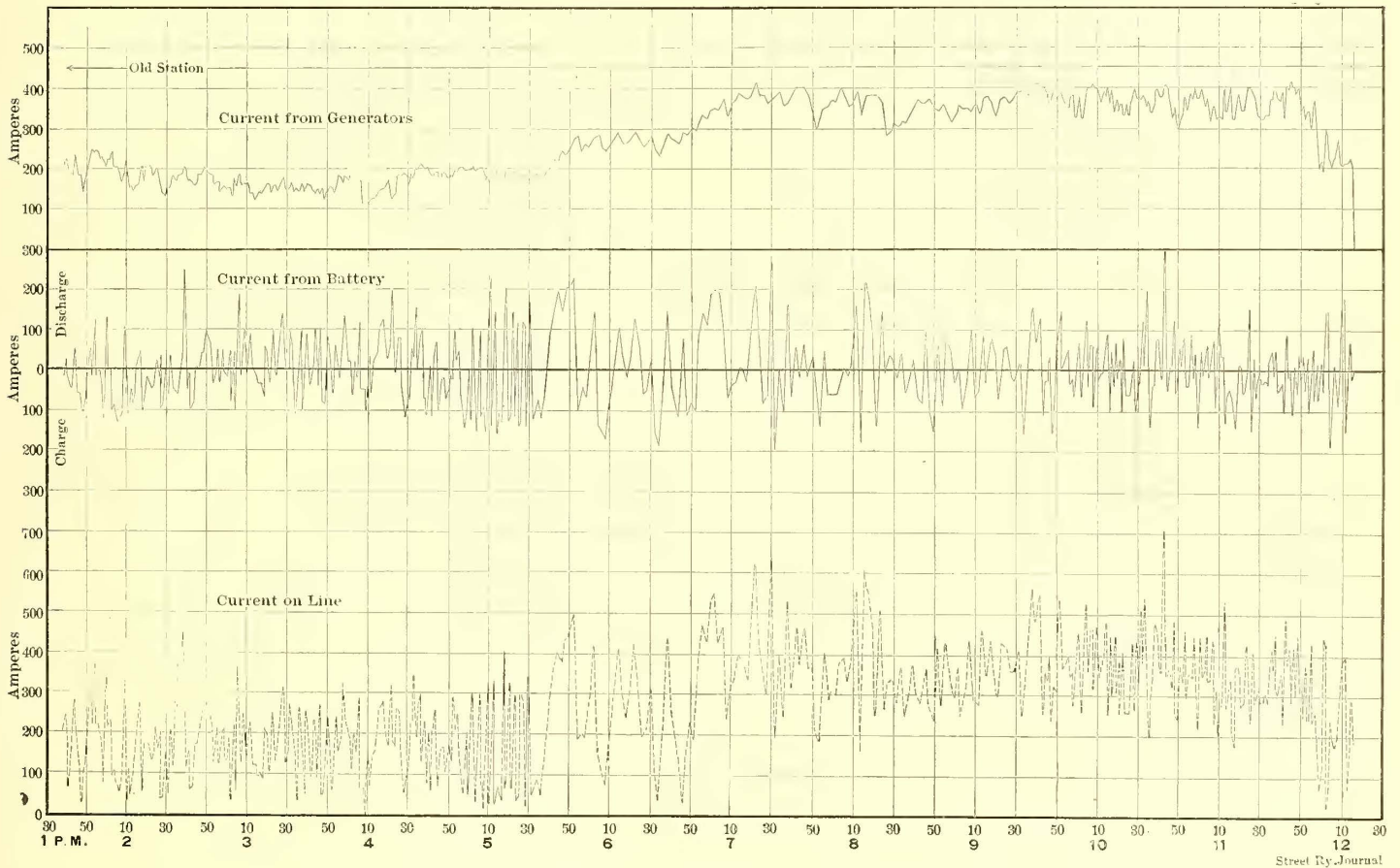


FIG. 1.—CURRENT CURVES FROM 1 P. M. TO 12 P. M.

in the power station only affect the economy of the station, and in no wise can be considered as an aid to the feeder distribution, except, perhaps, in maintaining a more uniform voltage at the station. The use of a storage battery in such a location calls for special apparatus in the shape of boosters, special reversing rheostats and switchboard auxiliaries not required in a storage battery sub-station located upon feeder lines. With all this, however, conditions may be such as outlined above as to fully warrant installations.

A storage battery does not in itself generate energy as the generator does, but under the conditions a, b, c and d may, by the economies obtained, have the same effect as the installation of additional generating apparatus, with the attendant advantages of more economical operation and lesser capital investment.

In considering depreciation a point is usually lost sight of, to wit: Power station generating apparatus depreciation should be carefully weighed. There is no question but that the battery materially reduces the rate of depreciation of the machinery in the power station, and may more than pay, by the reduction in the expenditures in repairs and by prolonging the life of the generating apparatus, the expense charged as storage battery depreciation.

The present battery has a capacity of 300 amps. for one-hour discharge. This battery was installed Oct. 13, 1899. The test was begun at 1:40 p. m., Aug. 17, and concluded 11:30 a. m., Aug. 18, making practically a twenty-two-hour test.

Figs. 1 and 2 give a clear representation of the power station loads during the tests. The upper curve in each case is the current from generators. The second curve from the top is the current from the battery, and shows the discharge above the heavy black line marked zero, and below the line the charge into the battery. The bottom curve shows the output from the power station to the line. It will be noticed that the fluctuations are on the battery. If the difference between the charge into and the discharge from the battery be taken, it will be seen that the average charge is 59 amps. and the average discharge is 57 amps.

Figs. 1 and 2 show that the current from the battery on discharge frequently uses above 200 amps. and at times reaches 300 amps. and over; also that on the charge side the current frequently reached 180 amps. The maximum fluctuations, therefore, range about 450 amps.

Fig. 3 shows the switchboard storage battery, booster and generator connections.

In the study as to the advisability of installing a substorage

battery station several questions immediately present themselves, viz.:

1. What will be gained?
2. How much will it cost to install?
3. How much will it cost to maintain?
4. Where shall it be located?
5. What is the depreciation?
6. What kind of attention is required?

The above questions require a careful study of conditions. The writer will take a case occurring in his own experience, and the reader can then draw deductions to suit the particular cases in which they may be interested.

The Camden & Suburban Railway Company, of Camden, N. J., has a line running to a town called Haddonfield, $7\frac{1}{2}$ miles from the power station, 40 ft. double-truck cars weighing 14 tons each, equipped with two 38-B Westinghouse motors. A car running on ten-minute headway gave a fluctuating voltage at Haddonfield varying between 350 volts to 550 volts. The power station voltage was maintained at 550 volts; two No. 0000 feeders run from the station to a point 6 miles from the station to a place called West-

the apparent expense, in that the line voltage is constant, thus saving in motor depreciation. The saving in interest on the copper we would have had to purchase amounts to \$370 per annum. The night car on this line is run from the battery, an average of four hours each night, saving the net cost of coal at the power station per year at least \$60, which, added to the interest saved of \$370, makes \$430. The more uniform loading at the power station is the principal feature. The engines work with less fluctuation. The economical attendant upon this feature alone, in the writer's judgment, is sufficient to compensate for the apparent expense attendant upon the investment.

The question as to the location of a subbattery station is one of peculiar interest. I will, therefore, dwell upon this point quite fully. The determination of the most economical point to locate a sub-station battery is one requiring careful calculation. There are several constants entering into the calculation, which are purely a question of engineering judgment, such as loss or drop in volts, ampere flow and particularly the distribution of the loss or drop in volts.

Experience has indicated the necessity of having an independent

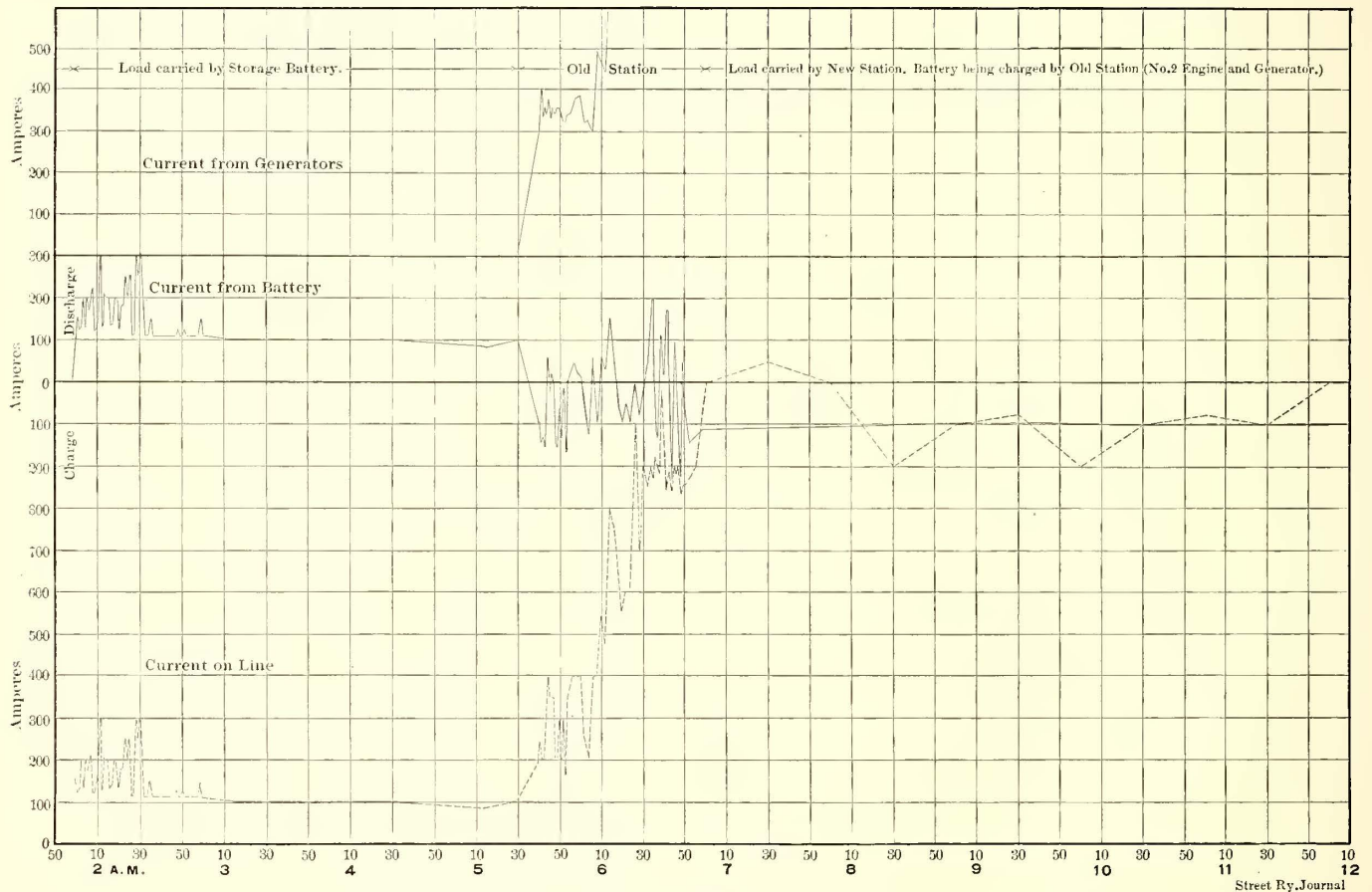


FIG. 2.—CURRENT CURVES FROM 2 P. M. TO 12 P. M.

mont, and one No. 0000 runs through from there to a point about 1000 ft. from extreme end of line. About two and one-half years ago careful readings were taken on the feeder, and the fluctuations on this line showed a mean or average variation of 150 amps. A calculation showed that the installation of sufficient copper to bring the average drop not to fall below 450 volts would require the installation of \$16,416 investment in copper. We obtained prices upon a storage battery, ground and a building to accommodate a battery to have a discharge rate of 160 amps., one-hour discharge, but having the racks and building to permit at any time in the future of a 100 per cent increase. The cost of this layout proved to be \$9,000, showing a net saving in first outlay of \$7,416. Upon this showing the installation was made.

This battery consists of 240 cells, type 9-F Electric Storage Battery Company's make.

The cost of maintenance has not cost to date over \$100 per year. The depreciation is covered in a fund carried at 6 per cent on the cost of the battery amounting to \$480 per annum. The attention required is only nominal; the battery is tested by a man sent from the power station once a week to the test voltage and specify gravity of each cell, and he makes report of this data, a copy of which, as has been our custom, is sent to the manufacturer.

The advantages and saving effected we are confident exceed

feeder line running from the main power station to the subbattery station, the line then being fed from feeders running from the sub-station. The chief reason for the feeder running independently from the power station to the subbattery station is so that it shall be able to charge the battery without interfering with the line.

Fig. 4 illustrates quite clearly the method as practiced by the writer:

A is the main power station.

B is the subbattery house.

C is an automatic magnetic circuit breaker.

D is the extreme end of the subfeeder away from the station.

E is point on line at the sub-station battery house where connection is made.

F is the independent feeder running from the power station to the subbattery station, having no taps or connections of any kind between the two stations. This feeder may be boosted either by booster, or run on generator at a higher voltage or off a bus-bar of a switchboard operating on different voltages.

G is an ordinary feeder running out of the station and from which taps are made to the trolley as usual. This feeder should run to join the feeder.

H is the subbattery station feeder running back from the sub-station toward the main power station.

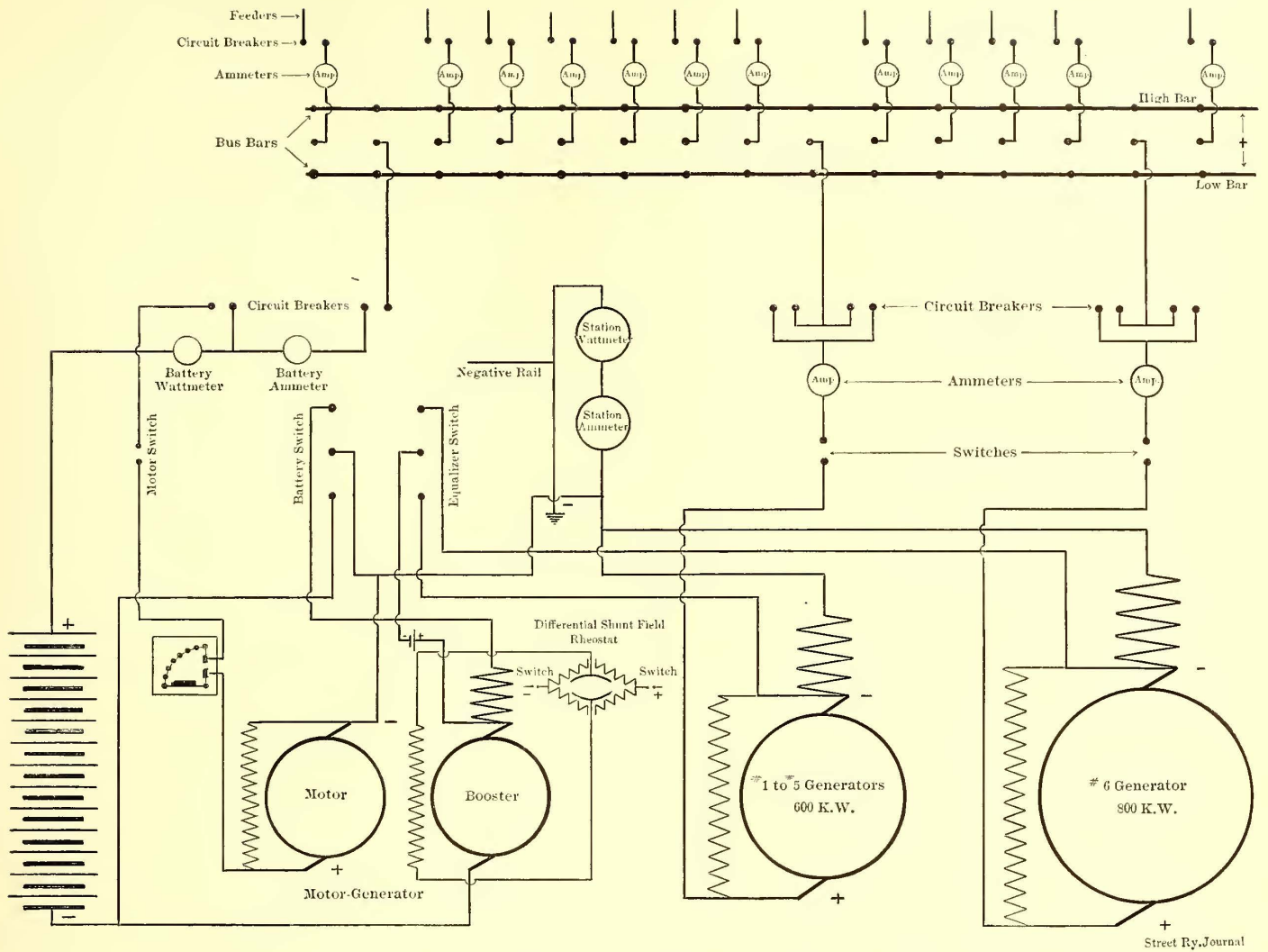


FIG. 3.—SWITCHBOARD CONNECTIONS FOR BATTERY, BOOSTER AND GENERATOR

G and *H* are joined together through an automatic magnetic circuit breaker, the function of which is so clear that no explanation is necessary.

T is the feeder running from the subbattery station to the distant end of the line.

The writer has been using a formula which gives, in terms of

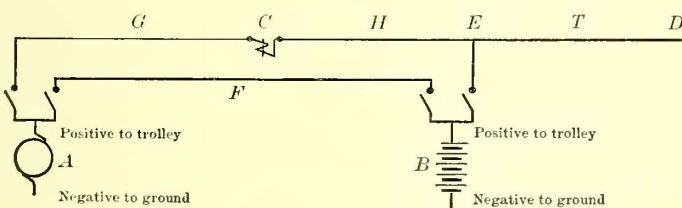


FIG. 4.—ARRANGEMENT OF CONNECTIONS

Assuming that V_2 and V_3 are each 50 per cent. of V_{1a} the General Formula becomes,

$$\text{COST OF COPPER} = K = 304 \left[\frac{c_1 d_1^2}{V_{1a}} + \frac{c_2 d_2^2}{\frac{V_{1a}}{2}} + \frac{c_3 d_3^2}{\frac{V_{1a}}{2}} \right]$$

$$\text{or } K = \frac{304}{V_{1a}} [c_1 d_1^2 + 2 c_2 d_2^2 + 2 c_3 d_3^2]$$

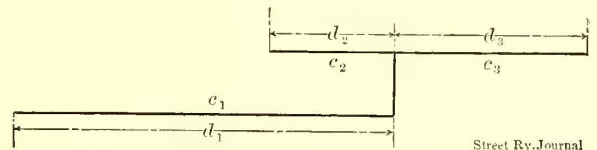


FIG. 5.—DIAGRAM TO ILLUSTRATE FORMULA

dollars, the cost of the copper, and has found it quite useful in determining the most economical point to locate the subbattery house. In all the calculations it is assumed that the track returns will be at least equivalent to the overhead feeders. It is given below:

GENERAL FORMULAE.

$$\text{WEIGHT OF COPPER} = \frac{3.03 \text{ C M} \times \text{d}}{1,000,000}$$

in which C M = circular mils, d = distance in feet.

$$\text{WEIGHT OF COPPER} = \frac{16 \text{ C M} \times d_1}{1000}$$

in which C M = circular mils, d_1 = distance in miles.

Substituting cost of copper at 18 cents per pound.

$$\text{COST OF COPPER} = \frac{\$304 \text{ c } d_1^2}{V}$$

in which c = amperes, d_1 = miles, V = volts lost.

By substituting for values in the elements of the diagram Fig. 5 gives

$$\text{COST OF COPPER} = \$304 \left[\frac{c_1 d_1^2}{V_1} + \frac{c_2 d_2^2}{V_2} + \frac{c_3 d_3^2}{V_3} \right]$$

Assume $d_1 + d_3 = 10$ miles
 $d_1 = 8$ miles $c_1 = 100$ amperes
 $d_2 = 3$ " $c_2 = 75$ "
 $d_3 = 2$ " $c_3 = 50$ "

then $K = \frac{304}{V_{1a}} [(100 \times 64) + (2 \times 75 \times 9) + (2 \times 50 \times 4)]$
 $K = \frac{304}{V_{1a}} [6400 + 1350 + 400]$
 Cost = $\frac{\$2,480,000}{V_{1a}}$

Assume $d_1 + d_2 = 10$ miles
 $d_1 = 7$ miles $c_1 = 100$ amperes
 $d_2 = 2$ " $c_2 = 50$ "
 $d_3 = 3$ " $c_3 = 75$ "

Cost = $\frac{304}{V_{1a}} [(100 \times 49) + (2 \times 50 \times 4) + (2 \times 75 \times 9)]$
 (A) Cost = $\frac{\$2,020,000}{V_{1a}}$ (minimum)

Assume $d_1 + d_3 = 10$ miles

$d_1 = 6$ miles $c_1 = 100$ amperes
 $d_2 = 1$ " $c_2 = 25$ "
 $d_4 = 4$ " $c_3 = 100$ "

$$\text{Cost} = \frac{304}{V_{1a}} \left[(100 \times 36) + (2 \times 25 \times 1) + 2 \times 100 \times 16 \right]$$

$$\text{Cost} = \frac{\$2,080,000}{V_{1a}}$$

Assuming that V_2 and V_3 are each equal to V_{1b} , the General Formula becomes

$$\text{COST OF COPPER} = \frac{304}{V_{1b}} \left[c_1 d_1^2 + c_2 d_2^2 + c_3 d_3^2 \right]$$

Substituting the values of each of the three conditions as follows:

Case 1 $d_1 + d_3 = 10$ miles
 $d_1 = 8$ miles $c_1 = 100$ amperes
 $d_2 = 3$ " $c_2 = 75$ "
 $d_3 = 2$ " $c_3 = 50$ "

$$\text{Cost} = \frac{2,210,000}{V_{1b}}$$

Case 2 $d_1 + d_3 = 10$ miles
 $d_1 = 7$ miles $c_1 = 100$ amperes
 $d_2 = 2$ " $c_2 = 50$ "
 $d_3 = 3$ " $c_3 = 75$ "

$$\text{Cost} = \frac{1,760,000}{V_{1b}}$$

Case 3 $d_1 + d_3 = 10$ miles
 $d_1 = 6$ miles $c_1 = 100$ amperes
 $d_2 = 1$ " $c_2 = 25$ "
 $d_3 = 4$ " $c_3 = 100$ "

(B)
$$\text{Cost} = \frac{1,590,000}{V_{1b}} \quad (\text{minimum})$$

Case 4 $d_1 + d_3 = 10$ miles
 $d_1 = 5$ miles $c_1 = 100$ amperes
 $d_2 = 0$ " $c_2 = 0$ "
 $d_3 = 5$ " $c_3 = 125$ "

$$\text{Cost} = \frac{1,710,000}{V_{1b}}$$

Assuming that V_2 and V_3 are each twice V_{1c} , the General Formula becomes

$$\text{COST OF COPPER} = \frac{304}{V_{1c}} \left[c_1 d_1^2 + \frac{1}{2} c_2 d_2^2 + \frac{1}{2} c_3 d_3^2 \right]$$

Substituting similar values to cases 1, 2, 3, 4, there results respectively

Case 1—Cost = $\frac{\$2,080,000}{V_{1c}}$
 Case 2—Cost = $\frac{\$1,620,000}{V_{1c}}$
 Case 3—Cost = $\frac{\$1,340,000}{V_{1c}}$
 Case 4—Cost = $\frac{\$1,240,000}{V_{1c}} \quad (\text{minimum})$

In all the above cases a total loss of 150 volts will be assumed—which will appear as follows in the various cases:—

Where V_2 and V_3 are each 50 per cent. of V_{1a} then $V_{1a} = 100$ volts
 " V_2 and V_3 are each equal to V_{1b} then $V_{1b} = 75$ volts
 " V_2 and V_3 are each twice V_{1c} then $V_{1c} = 50$ volts

By substituting these values of V_1 in each case appearing as the minimum cost of copper, there results:—

A	$\frac{2,020,000}{V_{1a}}$	$\frac{2,020,000}{100}$	\$20,200
B	$\frac{1,590,000}{V_{1b}}$	$\frac{1,590,000}{75}$	\$21,200
C	$\frac{1,240,000}{V_{1c}}$	$\frac{1,240,000}{50}$	\$24,800

The above calculations demonstrate clearly that case A is the most economical in copper distribution with the data as given. The fact is clearly apparent that great care must be exercised in determining upon the location of the battery house. Each case must be carefully studied upon its own merits, every available location examined and calculated.

The use of formula

$$\text{COST OF COPPER} = \$303 \left[\frac{c_1 d_1^2}{V_1} + \frac{c_2 d_2^2}{V_2} + \frac{c_3 d_3^2}{V_3} \right]$$

gives a ready means for quickly determining the most economical point of locating the battery house.

The remarkable features attending the use of storage battery sub-stations is most happily illustrated in the ampere charts. As stated before, the Westmont station is fed with a special No. 0000 feeder, which we call our Westmont booster feeder, as it can be used for charging the Westmont battery as well as permitting feeding this end of the line at a higher voltage from the power station. Readings were taken at the power station with a Bristol recording ammeter, with a dial requiring only one hour to complete one revolution, thus giving a chart faithfully reproducing the frequent and detail fluctuations. (The speaker then presented samples of these charts.) Chart I. was taken first with the booster and battery out, and showed pronounced fluctuations between 0 amp. and 350 amps., and represents exactly what the conditions were prior to the adoption of the Westmont storage battery. Readings were again taken with the booster feeder in and the battery out, and showed fluctuations between 0 amp. and 270 amps.

Chart II. showed the current flow with the booster, battery and the original feeder, and, of course, gave the fluctuating current brought about by the cars near the power station practically out of the range of the Westmont battery. The fluctuations varied from 70 amps. to 240 amps.

Chart III. was similar to Chart II., but taken at another time of the day.

Chart IV. showed the reading taken on the Westmont booster feeder, and illustrated in most interesting fashion the uniformity of load on the station. The current varied from 65 amps. to 80 amps. and averaged about 75 amps.

Chart V. showed the readings taken on the Westmont booster feeder with the Westmont storage battery sub-station cut out of service. The variations were from 0 amp. to 400 amps., and, in comparison with Chart IV., illustrated clearly the advantages of the use of the battery.

Chart VI. was the readings of a recording voltmeter and showed the pressure at the Westmont storage battery house with the battery in. This was a typical chart, and shows very clearly the uniformity of voltage at the Westmont storage battery house.

Chart VII. was another pressure chart taken at the Westmont storage battery house, but showed the effect on the voltage when all the storage battery is cut out, owing to circuit breakers being open. Between the hours of 8 a. m. and 2:45 p. m. the voltage varied between approximately 325 volts and 560 volts.

The Adoption of Electric Signals on Suburban and Interurban Railways of Single or Double Track and Their Economy of Operation

BY WILLIAM PESTELL

Superintendent of Motive Power, Worcester Consolidated Street Railway Company

The subject of signals for electric railways is of the greatest importance, and is receiving, very deservedly, a great deal of attention among practical railway men in all sections of the country at the present time.

The necessity of some system of signalling becomes more pronounced as the weight and size of cars increase and the volume of traffic and the speed at which our cars are run is increased.

The delays and inconveniences arising from the operation of suburban and interurban roads without a properly designed signal system adapted to the service are only too apparent, and become more pronounced as we examine into and get into closer touch with the various signal systems that are to-day being tried in the various sections of the country. Whatever signals have been introduced for street railway work, even though their operation has not been perfectly satisfactory, have illustrated the fact that delays can be reduced and a schedule maintained in a more satisfactory manner.

Signalling, as applied to steam railroads, for some years has been in satisfactory and general use, and has been brought to a high state of perfection and efficiency. Apparatus, such as applies to steam roads, would be practically of no use in street car service, as the conditions governing the operation are so entirely different.

The use of signals on steam railroads is mostly for double-track lines, and is principally for keeping a proper difference between trains going in the same direction. At the present time it seems doubtful if this class of signals would be required on street railways, but if the necessity should arise, some form of signal now in general use on steam railroads could be adapted to the purpose.

On steam railroads where temporary increase in traffic demands a greater carrying capacity, more cars are added to the

train, the train still being maintained as a unit, so far as its effect on the signal system is concerned. On street railway service the conditions are not usually such that this can be conveniently accomplished, and it is necessary to send out several cars, each detached from the other, and all working to maintain the same schedule. As these cars cannot ordinarily keep in sufficiently close touch with each other to indicate their location, it complicates the work to be done by a signal system to properly take care of their operation. It is not always safe to depend upon the crew of one car notifying the crew of another car at a passing point of cars that are due to follow to pass at the same point. Different roads use various means to obtain this end, even when no signal system is in use. Some do it by attaching signs to the dasher of the car, indicating that another car is to follow. These signs the crew on the car waiting at the turnout are supposed to observe, and are not to leave until the last car, which should have no sign on the dasher, has passed.

On steam railroads stopping places, where passengers are to be taken on or let off, are practically a constant factor, and are comparatively long distances apart. This has the effect of allowing trains to keep to their schedule more easily, and obviates the necessity of frequent orders from train despatchers. In cases of necessity of change of orders to a train crew on a steam railroad the telegraph is almost universally used. The presence of employees at every stopping place along the line renders this easy of accomplishment without the loss of valuable time, or chance of costly mistakes.

The telephone is rapidly being introduced along the lines of street railways for this purpose, but the street railway companies are at a disadvantage in the use of the telephone, in not having men permanently located at frequent points along the line of the road, and having to depend on the car crews for one end of their despatcher system, much valuable time is lost in receiving and imparting the necessary information. Another defect of the telephone system for despatcher work on street railways is the inability to reach car crews at the time required, and the likelihood of several crews trying to use the "phone" on different points of the line at the same time.

It is not intended to convey the idea that the telephone is not desirable as an aid in operating street railway systems, but that the telephone of itself for general use is not to be wholly relied upon. In connection with a reliable signal system, it should be of inestimable value, as the use for despatcher work would be reduced to a minimum, and with proper rules, intelligently followed, practically all conditions could be provided for, giving the single-track road its maximum efficiency and putting it more nearly on the basis of a double-track road.

Where the necessity of a signal system on electric roads seems to be generally indicated is on single-track roads, both for suburban and interurban service, city service usually requiring special applications to cover local conditions.

The object of a signal system for such purpose would be to indicate a safe passing point for cars going in opposite directions, giving single-track roads with fairly frequent passing points more nearly the same operating conditions as those of double-track roads, thus avoiding delays and maintaining the schedule.

The experience of steam railroads in the use of signals, their reliability and the confidence now placed in them, makes it reasonable to suppose that equally good apparatus would be developed on the vast mileage of electric railways represented by this association.

Different signals for day and night use (as discs or semaphores by day and different colored lights at night) seem to be thoroughly established for any class of signal work, as regardless of the purpose for which a signal is set, it should always be easily discernible.

All signals will add certain elements of danger due to chances of failure inherent in every piece of mechanism. It is therefore important to select a signal with the chances of failure so slight that only the added safety resulting from its use need be considered. The use of block signals on steam roads has reduced the liability of rear-end collisions, and yet were the signals of such construction as to be unreliable the danger would be greater with than without the signals.

In this connection it would be well to note the care bestowed by steam roads on their signals. They employ trained mechanics whose duty it is to see that all signals are properly inspected and maintained. An electric road usually puts its signal under the care of a lineman, or some other man who may know but little of either their principle or mechanical construction. It is natural to suppose that, as the use of signals increases, more care will be bestowed upon their inspection and maintenance.

The first and most essential element to be considered in connection with any signal system is that of safety, and no signal

should be considered unless its reliability can be demonstrated to such an extent that it adds to the safety of operation of the road.

Among the various types of signals in use we find those depending wholly on incandescent lamps, those depending wholly on semaphores or discs illuminated at night, and those depending on discs or semaphores by day and upon colored lights at night for their visual indication. Another type of signal is that which leaves the trolley wire dead on the entering side of a turnout ahead and leaving side of a turnout behind, thus preventing a car from either end of the block entering until the block is clear.

Again we find various devices in use for operating the above types of signals. First the manually-operated switch, which has been in use for perhaps the longest time and is generally conceded a failure, owing to the fact that the men cannot be relied upon for its proper operation. Second, we have the rail-contact devices which have been very little used, and, so far as I can learn, are not generally exploited. Third, we have switches operated automatically by the passing of the trolley, which are coming into more general use as the state of the signal art progresses.

These may be divided again into several classes: one in which a contact is simply made by the wheel sliding upon a contact surface normally insulated from the trolley wire; another operating a switch mechanism by the passing of the trolley, making various connections selected according to the direction the trolley passes under the switch; still another, in which the mechanical work of the signal is partly done by the trolley in passing under the switch. Each of these types of signals and switches in service may have a particular value for the location to be protected, and it would be unwise at this time to make any recommendation covering general conditions. The following is a copy of resolutions drawn up by a committee appointed by the Massachusetts Street Railway Association, on which the writer had the privilege to serve:

"The committee appointed by the Massachusetts Street Railway Association on the 'Recommendation of Electric Signals for Street Railway Service' would make the following recommendations:

"That a telephone system in conjunction with a proper block system is necessary for a safely and satisfactorily operated suburban single-track road.

"That it is impossible to make any recommendations to cover the needs of general city traffic, the necessities of the same being largely determined by conditions entirely local.

"That the telephone system should be owned and operated by the railway company.

"That a system of selective signals should be used in connection with the telephone system to call outside telephone stations.

"The block-signal system should be entirely automatic; should contain a minimum number of parts; should contain some other means of visual signal besides incandescent lamps; should not depend upon incandescent lamps for continuity of circuits; should set as far as danger end first and be looked at danger before it is possible to operate cautionary signal at near end; should not burn out under ordinary conditions of contact with live parts of trolley system; should be normally at danger and cannot be set at safety unless all parts are in normal working conditions; that signal, after being set at danger, cannot return to safety until all cars that have gone onto block have gone off again; should be capable of working satisfactory from 200 volts to 600 volts, and should be of the best possible construction, mechanically and electrically."

The following is a copy of blank sent out to various street railways throughout the country to enable the writer to get a fair idea of the extent of the use of signals for street railway work, a general idea of the defects existing, the economies produced and the apparent demand for a signal of any kind.

Have you signals in use?
 How long?
 What kind and make?
 On single or double track?
 Suburban or interurban?
 Are they satisfactory?
 Are they reliable?
 What particular trouble have you had with them?
 Do they affect the economy of operation?
 How?
 Are they affected by lightning?
 In what respect is the signal in use on your road lacking?
 Do you desire signals on your road?
 For what purpose?
 Would they affect the economy of operation?
 How?
 What particular requirements are necessary in a signal for your services?

The general idea prevalent seemed to be that signals were not required for double-track work, but were required for single-track work, producing economy where in use by dispensing with flagmen in some places and, as some have stated, "by indicating the position of cars and thereby enabling the schedule to be better maintained under extraordinary conditions." The principal defects noted were the fact that signals were not absolutely reliable and were generally affected by lightning. Also, their lack of ability to indicate more than one car on a block at a time; that is, the first car passing off the block sets the signal to normal condition, giving no indication of any other cars that might be on the block.

It has not been the purpose of the writer to go into the details of the different devices gotten out for use as signals for street railway work, or to criticize or recommend any particular type or make. A number of signals of various types are now on the market, and while, from the standpoint of the writer, they are all in a more or less experimental state, they are deserving of every encouragement, for until the various conditions of our service have been thoroughly brought out and enlarged upon, by both the operators and signal engineers, no satisfactory device can be produced.

The street railways generally manifest a great deal of interest in the question of signals, and I would therefore recommend to your association that, owing to the present apparent experimental condition, this matter be further followed up and a report be submitted to the next meeting of the association. I regret that the press of business since my acceptance of the honor of writing this paper has been such that I have been unable to devote the time necessary to obtain and properly work up the data for a paper dealing with such an important subject.

I trust, however, the discussion will be free, and that my feeble efforts may result in the bringing out of some points of value to us for further work.

The Best Manner and Mode of Conducting the Return Circuit to the Power House

BY E. G. CONNETTE

General Manager, Syracuse Rapid Transit Company

The writer is somewhat at a loss for material to offer on this subject, as it has been discussed for years and improvements introduced until the present practice of using the rails with bonded joints for conducting the return circuit has been practically perfected, so far as the use of the rails of the track can be utilized for that purpose, especially when the highest state of the art of bonding the joints is particularly observed and the work carefully done. A large portion of the troubles which exist under the present practice is on account of the inefficient, careless work, and the use of faulty material; but even when the greatest care is observed and the best material is used in bonding the joints, the deflection of the joints in the course of time, from various causes, will impair the efficiency of the ground return.

A few years ago, when electricity as a motive force had been perfected to such a degree as induced the street surface railroads to transform their motive power from horse power to electric power, there were two electric companies in the field offering apparatus for street-car propulsion, viz., The Sprague Electric Railway & Motor Company and the Thomson-Houston Electric Company. In 1890 the writer assumed the management of a street railway company, a part of which was being equipped by the Sprague Electric Railway & Motor Company and the other by the Thomson-Houston Electric Company. The Sprague company used the rails of the track exclusively for conveying the return circuit, and used a No. 6 galvanized iron bond, riveted to the rails, around each joint. The Thomson-Houston Electric Company used an auxiliary copper wire, the same size as the trolley wire, laid in the center of the tracks on the tops of the cross-ties, connecting with a wire of a smaller size with a rivet to the center of each rail, and I believe it was their idea to use the same amount of copper wire for the ground return along the tracks, connected in the manner as above described, as was used overhead. In a few months it was discovered that the voltage on the lines equipped by the Sprague company was very low, especially toward the end of each line. Upon investigation it was found that the galvanized iron bonds had almost entirely disappeared, while on the lines equipped by the Thomson-Houston Company the loss in potential was about the same as when the work was first installed. The rail joints of the Sprague lines were re-bonded with copper bonds riveted to each rail, but in the course of time it was further discovered that these bonds were too small in size, and that the loss of potential was gradually increasing, on account of the bonds deteriorating and be-

ing broken off, and it was necessary to go over the lines again and re-bond them. On account of the large initial expense of an auxiliary ground wire and of the improvements and progress in the method of bonding the joints and the use of heavier rails, together with the improved method of supporting the joints, the use of the auxiliary wire in the ground for the return circuit was abandoned.

With the great variety of devices and improvement in the art of bonding the rail-joints at the present time, there is yet more or less trouble experienced, and the tendency is towards a jointless metallic return by using electrically welded or cast-iron joints, which practically makes an unbroken metallic return, so far as the tracks are concerned. Unfortunately, a large number of street railways are not financially able to re-lay their tracks with heavy rails and use the improved method of joint support and connections, and the problem with them is yet unsolved as to how to bond the joints of the rails so, as to get a perfect connection, and one that will stand and overcome all resistance or loss. It must be remembered that in a mile of track there will be from 176 to 352 joints, and while the rails of the track have more than ample capacity for conveying the current, the joints must be so connected as to give the current a path across of but little or no resistance. When the joints are properly bonded the track for a period of time answers well for a return circuit, but after a while the connections at the joints become corroded, the bolts are worn, the joints defect, and the bonds here and there are either broken or worn in two, or corroded and loose at the connection, and the result is a very imperfect and inefficient ground return. In some instances an insufficient amount of wire is used for the return circuit from the tracks to the power house, and in some cases when there is enough wire for this purpose the connections to the rails are inadequate and create a resistance that neutralizes the conveying capacity of the copper intended to convey the return circuit to the power house. The wires of the return circuit should be connected to the rails with a connection of equal capacity to the conductor, and should be connected in three or four places, so that if one should become broken or disconnected there would still be ample carrying capacity in the other connections.

In the early days of telephone exchanges the ground was used as a return circuit, and we are all familiar with the inefficient and poor telephone service while this state of things continued. The service was disturbed by the trolley currents and other influences, until finally the telephone exchanges were forced to put up a metallic return in order to save trouble, annoyance and disturbances to their service. I believe after a trial it was discovered that the expense of putting up the metallic return was more than compensated for by the improvement in the efficiency of their service and was money well invested.

It is, therefore, the opinion of the writer that "The Best Manner and Mode of Conducting the Return of Circuit to the Power House" is by using practically a jointless and independent metallic return, connected to each rail, and the connection made with ample surface contact and absolutely water-tight. On account of the chemical action which is likely to take place between the copper rivet and the steel rail, the rivet should be covered with a thick coating of lead, solder or tin. The best connection which can be used, if the facilities are available, is to electrically weld the connection from the auxiliary ground wire to the center of each rail, and I dare say that even with the extra initial cost of an independent ground wire, it will result economically in the long run. If an independent metallic return circuit was the custom now, there would be no necessity for a paper to be written on this subject; there would be no more need of discussing the subject of rail bonding or of electrolysis, or of the best method for discovering bad connections in the return circuit, and the expenditure of a large amount of money for expert investigation and advice to cure the bad results of the present imperfect system of conducting the return circuit to the power house. The amount saved by loss of power, cost of rail-bonds and labor of renewals, tests and investigations, as well as the trouble and expense incident to electrolytic action will be more than ample to pay a large interest upon the cost of installing an independent ground return.

Cast-iron joints and electrically-welded plates on the joints make the rails of the track practically a jointless metallic circuit as a conveyance for the electric current, but the very large number of joints in the rails of the track makes the certainty of an unbroken and continuous metallic circuit a doubtful proposition, as the wear and tear of heavy traffic, and the expansion and contraction of metal will, in the course of time, produce results which may very materially impair the efficiency of the joints as a perfect conductor, and it appears to the writer that it is just as essential to have a conductor of as perfect design and as efficient in carrying capacity to convey the current back to the power house as is used to convey the current from the power house to the car, and if this were the case there would be no more troubles with the return

circuit. I do not advocate a double trolley, because of the difficulties which are well known to street railway people, but an independent metallic return used in connection with the single trolley system is not as expensive to install as the double trolley system, and practically obviates all the troubles incident to the ground return where the rails with bonded joints are used for the return circuit.

The Modern Power House, Including the Use of Cooling Towers for Condensing Purposes

BY J. H. VAIL, PHILADELPHIA

It is not the purpose of this paper to enter into the minute details of what should comprise the equipment of an individual modern power generating station; these general features are too well known to warrant repetition, but I preferably invite your attention to improvements in certain directions which make for economy, and that may with advantage be introduced into existing or prospective stations. I submit the proposition that it is not good business policy to maintain in operation a wasteful plant, for the reason that, as compared with an economical plant of equal capacity, the wastefulness in fuel, water or other costs of operation must be capitalized according to the ratio of the increased cost of operation and maintenance. Therefore the engineering question of judicious selection of auxiliary equipment to reduce wastefulness becomes of prime importance to the business man who anticipates reaping the largest attainable profit from his investment in the electrical field.

There should be a sensitive perception of the particular advantages to be derived from the combination of certain types of appliances in any particular station according to its locality. The application of economical auxiliaries in a station is, to a certain extent, a commercial as well as an engineering problem for the reason that the engineer is expected to design and build the station equipment to the end that the highest commercial results may be obtained.

The application of any special economic device will be justified when, by careful analysis, it is determined that the savings derived will repay:

First—All cost of maintenance, depreciation, attendance and operation.

Second—A fair interest on the initial investment.

Third—A reasonable profit in addition.

The environment of the station will largely determine many of the leading features of its equipment. For instance, there are towns in the coal regions where the cost of fuel is so low that the saving elsewhere, usually secured by condensation, will not be sufficient to pay the interest on the cost and maintenance of the additional equipment needed to operate a condensing engine, but these exceptionally favorable conditions are so rare that, while worthy of notice, we can best devote our attention to the locations where money can be saved by the introduction of new methods at reasonable cost.

Prof. R. H. Thurston, at the New York meeting (1899) of the American Society of Mechanical Engineers, has fully set forth the progress in steam engine efficiency, summarizing the economy obtained in the best practice to date, and finally concluding that the steam engine has now been so far perfected that but little more can be expected from the designer. If we would secure additional economies we must look for them outside of the engine, and I venture to advance some suggestions that I believe are justified from results attained, and which, if adopted in combination where fuel and water are important items of operating expense, will materially reduce the cost per hp-hour.

THE USE OF PULVERIZED FUEL

I venture to advance as one of the lines for greater economy of fuel in the future for several reasons.

First—More perfect combustion can be obtained resulting in the possible utilization of a larger proportion of the heat units contained in the coal.

Second—As the coal is pulverized by machine and by automatic regulation supplied to the furnaces, the labor of firing is reduced to minimum expenditure. One man can attend the furnaces for at least 1000 hp of boilers.

Third—As every available particle of combustible is burned there is a saving in the handling of ashes. I have seen stations where 5 per cent to 10 per cent of good coal was thrown away with the ashes.

At many large cement works most effective and satisfactory methods of firing with pulverized fuel have to my personal knowledge for a long time being in successful and continuous service in rotary kilns for burning cement clinker, which require to main-

tain a temperature of 3000 degs. F. The method of burning pulverized fuel with an air blast is the most advantageous, as it admits of a more accurate adjustment of the supply of air and fuel, almost ideal combustion is secured, similar to the burning of natural gas, and all requisite flexibility may be obtained for controlling the supply of combustible and the steaming production of the boilers. In adopting the use of pulverized fuel there will be required a larger combustion chamber, and the boilers should have a larger proportionate heating surface to enable them to absorb the increased available heat units obtained from the better combustion of fuel, or with boilers of a given heating surface and steaming capacity less fuel will be used; the opportunity of using a cheaper grade of fuel should not be overlooked.

SUPERHEATED STEAM

At the May meeting, in Milwaukee, of the American Society of Mechanical Engineers this subject was presented and discussed, showing that its employment has emphatically passed far beyond the theoretical stage. The superheating of steam means the raising of its temperature after its generation in the boiler without greatly increasing its pressure. The idea is not new, as the subject has been followed up with more or less success for the past fifty years. The theoretical economy hoped for and practicable methods of its attainment have been persistently sought, the difficult problems have one by one been worked out, and the obstacles one by one overcome, until now application of superheating will be contracted for by reputable concerns, and very high economies obtained. It is stated that with horizontal tandem-compound engines of comparatively small power an economy of 9.50 to 9.76 lbs. of steam per ihp is obtained, while in larger engines 8.97 has been reached. The writer does not claim to have personal experience with superheated steam, but is informed by one of our most conservative engineering firms that they will contract for installations, and guarantee under stipulated conditions a steam consumption not exceeding 10 lbs. per ihp with large compound or triple-expansion condensing engines.

COOLING TOWERS AND CONDENSING SYSTEMS

The advantages obtained with a condensing equipment are so fully and generally recognized by engineers of good repute that we need not dwell on these details, but we all recognize the fact that many stations for various reasons are so unfavorably located as to be deprived of the advantages of an ample supply of cooling water, and to the managers of such stations the benefits to be derived from the cooling tower must appeal with unusual force, if care is bestowed in analyzing the cost of equipment, the benefits derived, and the company effected.

The idea of artificially cooling the temperature of circulating water to make its continuous use available for condensing purposes is not new. Many methods were described in a series of articles published in *Power* in 1892. There have been used series and tiers of iron pans, plank troughs, spray pipes, tubular tiles set vertically, with broken joints, suspended woven wire nets or partitions set as open towers, or with enforced air circulation by fans, shallow tanks, ponds, etc., all of which have been more or less effective. Thus it will be seen that the methods of artificially cooling water for condensing purposes have been subjects of experiment along various lines for many years, and the final result of experiments and investigations is concentrated in the present successful design of a cooling tower that so distributes the water that the greatest area of surface is exposed to the air circulation, and the vapors resulting from evaporation are successfully dissipated, either by natural circulation or forced draft. The cooling tower therefore actually fills the gap of affording the needed opportunity for economy where the environment of an inland station would otherwise require that particular company to continue to expend its money for an extravagant waste of fuel and water.

A practical illustration is the Twenty-Sixth Street station of the New York Edison Company, designed by the writer in 1887 and started in 1888. The maximum equipment was limited to 2600 hp, with the best selection of apparatus then obtainable. But with the originally designed boiler capacity we now find that improvement in engine and dynamos, and the application of a cooling tower and condenser system, the maximum capacity is increased to 6000 hp.

I could state several instances where I know large expenditures were purposely made to locate the power house at a convenient point for water supply, frequently incurring an extra expense for coal delivery and a large investment in long pole lines or systems of underground conduit and conductors, the combined cost of which was greater than a cooling tower and the net results would not compare favorably.

There are now upward of 500 cooling tower installations that range in capacity from 250 to 12,000 hp, which is substantial evidence that the cooling tower is not experimental, but when ap-

plied by an experienced engineer is beneficial; the advisability of its application in any specified station becomes a question that must be determined from the commercial and engineering analysis previously suggested. To those who may contemplate the installation of cooling tower and condenser equipments I would earnestly suggest that for the entire equipment a liberal margin of capacity be allowed over and above the maximum estimated service, for the reason that a combination of conditions may arise where a heavy load is demanded under adverse atmospheric conditions, and in such event a very liberal supply of cooling water will be required for effective condenser service. The cooling water should be estimated at not less than thirty times the steam consumption of the engine and two thousand times more air than water will be required.

The degrees of heat extracted from the water by passing through the tower will depend upon atmospheric temperature, humidity, etc.; but actual results show a range of from 30 degs. to 50 degs. reduction of temperature, and a vacuum from 23 to 27 ins. is readily obtained. Under certain conditions there will be a small loss of water, due to evaporation in passing through the tower, say from 1 to 3 per cent; where the circulating water is kept separate from the boiler feed this loss can be made up at slight cost.

In a carefully designed equipment of cooling towers, with surface condensers and grease extractors, the cost of boiler feed water can be reduced to the purchase of a very small amount to make up for losses by evaporation and leakage. Where conditions for installation are favorable, the open cooling tower, requiring no expenditure of power for driving fans, shows excellent results, as attested by the following extracts from daily log records of the power station at Plainfield, N. J., during July, 1901:

OPEN TOWER

Date	Temperature Atmosphere, Degs.	Condenser Discharge, Degs.	Condenser Suction, Degs.	Degrees Reduction	Vacuum, Inches
July 1, 3 p. m.....	104	124	100	24	25
July 1, 12 m.....	100	130	100	30	25
July 1, 6 p. m.....	102	130	100	30	25
July 1, 9 a. m.....	98	130	100	30	25
July 2, 3 p. m.....	106	146	104	42	23
July 2, 12 m.....	104	140	102	38	23
July 2, 9 a. m.....	102	138	102	36	23
July 3, 12 m.....	100	134	102	32	24
July 4, 6 a. m.....	76	112	84	28	26
July 6, 12 m.....	84	126	100	26	26
July 9, 6 a. m.....	68	120	96	24	26
July 10, 3 p. m....	86	123	92	31	26
July 12, 6 a. m....	70	106	84	22	27
July 13, 6 p. m....	77	124	96	28	26
July 15, 12 m.....	90	120	94	26	26
July 15, 3 p. m....	90	128	98	30	26
July 16, 9 a. m....	86	128	94	34	26

The forced draft or fan type of tower possesses a wide range of flexibility in manipulation, and where the amount of heat to be removed is great and under severe duty in the hot summer months more work can be done than with the fanless type.

In an equipment of forced draft towers it is very important to have facilities for driving the fans at variable speed. This requisite flexibility is better obtained by having a small engine direct connected to the shaft of each pair of fans than by a motor drive. The exhaust from the engines can be used to heat the boiler feed or can be condensed. Under varying conditions of temperature and load the speed of the fans can be increased or decreased. In winter there are many hours when the low temperature of the air circulating through the tower will cool the water without running the fans, while during the high temperature in summer the fans must be run at maximum speed.

The combined air pump and jet condenser may be used where the cooling tower is located at the ground level, but where it is set on a roof, or much elevated above the pumps, it is preferable to use the surface condenser, as there will be a balanced water column and the work on the pump is simply against the head of water due to the height of the tower. Motor-driven pumps are suggested as being preferable to steam pumps on the score of economy.

Having stated the conditions under which the cooling towers may be installed to secure the advantages of condensing systems, let us briefly investigate the results attained. I submit the following table, prepared from daily records in the logbook of a power station equipped with the fan type of cooling towers and operated under the writer's supervision, which gives a fair range of working conditions in different months:

Time	Jan. 31 9 p. m.	Feb. 8 p. m.	June 20 6 p. m.	July 8 p. m.	Aug. 26 8 p. m.	Nov. 4 5:35
Temperature atmosphere..degs.	30	36	78	96	85	59
Temperature condenser discharge to cooling tower, degs.	110	100	120	130	118	129

Time	Jan. 31 9 p. m.	Feb. 8 p. m.	June 20 6 p. m.	July 8 p. m.	Aug. 26 8 p. m.	Nov. 4 5:35
Temperature condenser suction returned from tower to tank	65	84	84	93	88	92
Degrees of heat extracted through tower	45	26	36	37	30	37
Speed of fans at tower..r. p. m.	36	0	145	162	150	148
Vacuum at condenser.....	35½	26	25	24½	25½	25
Strokes of condenser pump....	30	30	37	44	43	28
Boiler pressure	110	110	120	120	120	112
Temperature boiler feed..degs.	212	212	210	211	213	213

It will be noted from the above that with an atmosphere temperature of 96 degs. and the temperature of condenser discharge 130 degs., we extracted 37 degs. of heat by passing the water through the towers, and obtained a vacuum of 24½ ins.

In the same station we did the following work with a tandem-compound condensing engine, 20 and 30 x 42, 120 r. p. m., rated at 750 hp:

	Maximum.	Minimum.
Temperature, atmosphere.....	103 degs.	83 degs.
Temperature, condenser discharge to tower	128 "	106 "
Temperature, condenser suction.....	98 "	91 "
Degrees of heat extracted through tower..	32 "	21 "
Speed of fans, revolutions per minute....	160	140
Vacuum at condenser.....	26	20
Strokes at condenser pump.....	50	38
Pounds boiler pressure.....	121	100
Temperature, boiler feed.....	212 degs.	200 degs.
Engine, horse-power developed.....	900	400

I note these instances, which I know to be facts, simply to show results obtained under extreme conditions.

In this same plant indicator diagrams were taken of the engine, air pump and fan engines. The results were as follows:

Engine revolutions per minute.....	120
Steam pressure, pounds.....	112
Vacuum at condenser, inches.....	25
Work done in high-pressure cylinder.....	311.8 hp
Work done in low-pressure cylinder.....	331.5 hp
Total indicated horse-power.....	643.3 hp
Work done in low-pressure cylinder below atmospheric line, indicated horse-power.....	185.1
Deduct work done by air pump....	13.75 hp
Deduct work done by fan engines..	13.5 hp
Net gain.....	27.25 hp

Net gain by the use of the condenser and cooling tower..... 157.85 hp

The cooling tower was located on the roof, and water was elevated 58 ft., using an air pump and jet condenser. Had a surface condenser been used, the results would have been still better, as the work on the pump would have been less with a balanced water column.

A fan tower is also used at Plainfield, N. J., and extracts from daily log records show the following results:

FAN POWER

	Temperature Atmosphere, Degs.	Condenser Discharge, Degs.	Condenser Suction, Degs.	Degrees Reduction	Vacuum, Inches
July 4, 3 p. m.....	94	128	96	32	25
July 4, 6 p. m.....	86	132	96	36	24
July 10, 3 p. m....	86	123	92	31	26
July 11, 12 m.....	90	138	102	36	24
July 11, 3 p. m....	92	138	102	36	24
July 11, 6 p. m....	88	136	96	40	25
July 14, 6 p. m....	88	130	98	32	24
July 15, 12 m.....	90	120	94	26	26
July 15, 3 p. m....	90	128	98	30	26
July 15, 6 p. m....	84	130	98	32	25
July 16, 8 p. m....	86	142	102	40	23
July 16, 10 p. m....	84	140	104	36	23
July 16, 12 m.....	80	138	102	36	24
July 17, 6 a. m....	78	130	102	28	25
July 17, 12 m.....	74	122	100	22	25

It is a matter of regret that careful log records of operations are not maintained in all power stations. Special emphasis should be placed on the value of careful inspection, regular cleansing and skilful adjustment of the entire station equipment. Carelessness in these matters wastes many dollars that could readily be saved without extra cost of labor.

In conclusion, I thank you for your courteous attention, and in summing up will say that I believe the time is near at hand when the engineer who is afforded sufficient scope in designing a plant can select a combination for a station equipment of upward of 1000-hp capacity that will in daily operation successfully produce 1 ihp from 1 lb. of good coal.

THE PROCEEDINGS OF THE CONVENTIONS

In the last issue a full report was published of the proceedings, on Wednesday Oct. 9, of the American Street Railway Association. Thursday was devoted to an examination of the exhibits, and the association reassembled in the meeting hall Friday morning. President Holmes called the meeting to order at 10:30 a. m.

Secretary Penington made the following announcement:

"The Rapid Transit Commissioner of New York City announces that the stations at Elm and Bleecker Streets and at Fifty-Ninth Street and Broadway will be lighted to-day, and attendants will be at these points to show the delegates to the American Street Railway Association the construction of the subway at the above-mentioned points."

The secretary also read the following telegram:

"I regret my inability to attend the sessions of the association at its present meeting, but am detained by pressure of important business. Please accept my best wishes for the fullest success of the convention. W. C. ELY."

PRESIDENT HOLMES: The first business this morning will be the reading of the paper on "The Best Manner and Mode of Conducting the Return Circuit to the Power House," by E. G. Connette, of Syracuse, N. Y.

Mr. Connette read the paper, which is published in another column.

MR. ROBERTS: The matter of bonding is a serious one to all of us. I have been connected largely with interurban roads of considerable length, and I very much question whether the plan to have return wire conductors throughout is one that is commercially desirable. I believe you can obtain a good return circuit without a continuous wire. The matter of cross-bonding is an important one. It should be done frequently at the top of grades and at the bottom of grades, at the end of curves and at all special work. It does not cost very much and nothing at all to what it would cost to install a conductor for the entire circuit. It is more a commercial problem than one of engineering, though, of course, good engineering includes the consideration of financial matters, and I question whether it is commercially practicable or, from an engineering standpoint, necessary, to run a complete metallic return. The returns to power house and sub-station especially should be made with the greatest of care, and conductivity of the return circuit should be frequently tested. This can be done without much trouble by the use of a telephone system.

MR. MYERS: I quite agree with what Mr. Roberts said as to the desirability of increasing the bonding at the curves and at the top and foot of grades. I think Mr. Connette's paper presents the best practical way of carrying the current back to the station, but in spite of all we seem to be able to do we have more or less leakage. In one instance where the bonds were welded we found, after a couple of years' service, that as time went on the losses became greater. This would seem to show that eventually, even with that method, troubles will develop.

W. E. HARRINGTON, of Camden, N. J.: I think this question of bonding is one of the most interesting with which we have to deal. It is necessary, of course, with large roads to provide a reinforced return circuit as you get near the station; but with an ordinary sized road, operating fifty or one hundred cars, distributed over miles of territory, as in the ordinary small cities, the use of return feeders does not seem to be warranted if proper steps are taken and proper methods are adopted in bonding. In Camden we tried, from time to time, the different forms of bonds on the market, and we experienced all the troubles Mr. Connette refers to. Three years ago we began using a heavy copper plate 4 ins. x 6 ins., with two grooves in it, and bolted to the web of the rail with two 1-in. bolts, with an iron plate with grooves in it over the two No. 0000 wires. That bond has been quite expensive, costing about \$1.50 for each bond. We feel, however, that we have been warranted in this expense, because our track-return loss has been very low, so low, indeed, that we consider we have as nearly a practically successful return as can be obtained. We bond at the railroad crossings, which are invariably places where the bond wires break, with No. 0000 wires from one side to the other through terra cotta pipes under the tracks. In one crossing we have thirty-two No. 0000 wires running across and bonded into the double tracks on each side, with one tap every 3 ft. of the rails on to the middle of the crossing. The bonds have been examined at different times and have been found to be in perfect condition. I might say that we grind off the rail with an emery grinder, and use the Edison-Brown alloy as a surface for the rail and as a surface on the cast-copper plate. This makes an intimate contact and the ohmic resistance of the joint is less than the corresponding rail section length.

I think the running of auxiliary copper returns is uncalled for in most cases. I do not approve of it under any circumstances for the ordinary sized road. It is very expensive, and you do not always accomplish what you are aiming to do. We had an experience last year which I will recite. We have a park 4 miles from the power station, and on heavy loads our line shows a voltage of 400 volts to 425 volts. Thinking this could be increased, we ran this last spring two No. 0000 return feeders from the power station to that point and connected them into the track, at sixteen different places, with the same class of bonding just described. We did not notice any material difference in our drop across the line at the park from what it had been the summer before, consequently this year we changed the feeders from the ground return to the line feeding that section, and our voltage jumped up 50 volts to 60 volts and we had better service. I ascribe our success to this fact. It was as if we had a water pipe 16 ins. in diameter and were trying to feed that pipe by an intake ¼ in. in diameter. By putting the wires as supplementary to the overhead feeders the conditions were changed, which showed that the loss was in the overhead lines. Mr. Herrick checked and tested our system and found our feeder return losses were very low, practically negligible, but it was necessary to connect the track leading into the power station carefully and in an ample way. We have four 1,000,000 circ.-mil cables, running out to the station and connecting to the track in about eighty different places; and it is certainly remarkable how this brings down the trouble and reduces the voltage loss in the vicinity of the power station.

I wish to emphasize the point that I do not approve of this matter of a supplementary copper return, because the troubles can be overcome by putting in solid, heavy, massive, joint connections.

MR. MYERS: What is the thickness of the plate which you use, and how do you take care of expansion and contraction?

MR. HARRINGTON: The copper plate is ½ in. to ⅝ in. in thickness, 4 ins. wide, 6 ins. long. The iron plate is 1 in. thick, 4 ins. wide and 6 ins. long. We have a lock washer under the head of the nut on the 1-in. bolt, and the holes are drilled back a sufficient distance around the fish-plates to allow us to easily bend a No. 0000 wire underneath. As to the question of expansion, I would say that we have opened dozens of joints in the last two years and have not found any joint has been depreciated in any manner.

MR. MYERS: I understand that the plate is rigid and made so with bolts. I understood that it was the usual bolt hole and the plate attached in that way. Do you provide for any contraction or expansion in the copper plate?

MR. HARRINGTON: I do not consider that there is enough expansion and contraction in the plate to make that a matter of much moment, because you have the heavy lock washer on the nut, and it is taken up in that way. I have not noticed any trouble of any account in the contacts.

MR. PESTELL, of Worcester, Mass.: It seems to me that the matter of supplementary wires should be looked at purely from the condition of operation of the roads. We have a case where our power station is some miles from the center of distribution, and we have practically a double track of 60-lb. T-rail to this center of distribution. We find that if the bonds are in good shape there is very little need of having supplementary copper wires, our output being at a maximum something like 5000 amps. If we were to use, as on some roads, 20,000 amps or 30,000 amps., it would be necessary to run the copper out to the center of distribution.

In regard to bonding, we have been cross-bonding every sixth or eighth joint, and have been bonding, where the maximum amount of current is being taken, up to the capacity of the rail, as near as possible. I believe the writer of the paper mentioned that the resistance of the return circuit should be as low as that of the overhead system. I believe that almost anyone who has made any tests on railroad work of this kind will admit that the resistance of the track circuit, in almost all cases, is a great deal less than that of the overhead circuit. We cannot have as much drop in our track as on the overhead system on account of the difficulties to be overcome and possibility of electrolysis. It is sometimes stated that a great deal more copper is run out for the overhead than for the track. That is usually so, in fact, is so in almost all cases, for the reason that the overhead circuit is split up into several sections and the copper of each section takes care only of the current for that section, whereas the copper for the track is a unit; consequently all the current that is flowing at any time is flowing through all the copper in the track section.

Mr. Roberts spoke of bonding around special work and at tops of hills and at places of that kind. I believe that is a proper

thing to do. In my experience, in almost every case where we have a broken bond, we find it to be either at a street intersection, where heavy teams cross the track, and where special work is placed, or at the foot or top of grades.

There is another point which, it seems to me, should be followed up with care, and that is the testing of the bonds. We often find that a bond has at first a very low resistance, but frequently, when testing that bond some twelve months or eighteen months afterward, we find its resistance has increased, due to deterioration, which we cannot always explain.

MR. UHLENHAUT, of Pittsburgh: I think the question of a proper auxiliary bond return depends on the geographical location. In a station in Pittsburgh, where the Monongahela River is on one side and the Allegheny River on the other, with two branches of the road running on the outskirts and connecting in the rear, it has been found that cross currents would run from one side of the town to the other, causing a drop of 15 volts to 20 volts. In this case the installation of auxiliary bonds was a necessity. It was found with four No. 0000 copper wires we could save a drop of from 10 volts to 15 volts. The power station was located on one side of the system, and had a maximum power consumption output of from 13,000 amps. to 15,000 amps., all of which must be returned through the rails of two streets. The current density of the maximum output is such that the drop in voltage on the return was more than that on the outgoing feeder, and hence the use of an auxiliary return was an absolute necessity. We found this cross connection of auxiliary feeders running across the country has given beneficial results, so that I think the question of whether auxiliary feeders should be run depends largely on where the power station is located in relation to the sections of the line.

PRESIDENT HOLMES: We will now take up the paper on "The Values of Storage Batteries as Auxiliaries to Power Plants," by W. E. Harrington, of Camden, N. J.

Mr. Harrington's paper is published on another page.

COLONEL HEFT: I am sorry to say that my experience with storage batteries has not been very satisfactory, judging from the commercial side of it. We have eight installations. They have been very expensive to maintain, and until the makers of storage batteries can develop a storage battery of more satisfactory type than those which they are producing at the present date I would not recommend installing any more storage batteries.

MR. WASON: I would ask Colonel Heft if the size of the battery chosen was commensurate with the work which the battery was called upon to do?

COLONEL HEFT: I can only say that when we installed these batteries we were guided wholly by the advice of the manufacturers. When we complained of the expense they said that our superintendence had not been sufficient, and believing that we were short in this respect we suggested that they send us a superintendent to look after these matters. The results in dollars and cents has been practically about the same. I say this without hesitation, as I do not believe any member of the association should state what he does not believe and know from the records of the books of his corporation to be true. I simply speak from the standpoint of the controller's report of the cost of these batteries on our road.

MR. DAVISON, of Pittsburgh: I ask Colonel Heft if the large expense which he mentions is due, in large part, to the cost of superintending these stations, or consists principally of repairs?

COLONEL HEFT: The principal cost is the replacing of the plates.

MR. UHLENHAUT, of Pittsburgh: I think the question of storage batteries is one of the amount of work required from each battery. In Pittsburgh we had three batteries, all of which were floating on the line and left practically to themselves. Two of the batteries have been in service for about four years and the other battery for about two years. The two batteries in service for four years have given excellent results with practically no depreciation whatever. The second battery, in service for two years, was found afterward to have been overcharged, and it has been rather expensive in maintenance of positive plates. I think the question of the amount of work the battery is required to do is the determining element in the whole matter.

MR. WASON: In the location of sub-stations there is one thing which should be taken into consideration, and that is the possibility of using the sub-station as a depot for freight and the selling of tickets, etc., rather than to consider only the question of having the sub-station placed in the best locality from an engineering standpoint. We have had several sub-stations on our lines, located by scientific gentlemen, who did not appreciate the operating expense involved, and who installed the batteries at points where nothing else could be done other than taking care of the batteries. If something could be sacrificed in the location

of the battery from the engineering point of view, and they could be placed in charge of those who have work to do other than taking care of the battery, there would be a gain in the cost of maintaining the battery in this respect.

MR. DAVISON, of Pittsburgh: I am glad to hear Mr. Wason's statement regarding the location of sub-stations for the batteries, for the reason that the company with which I am connected has just chosen three points for sub-stations on a long line, and we have taken the view of the matter which he has advocated. We have placed these stations at points where the batteries will receive the necessary attention, with scarcely any expense on account of attendance, as other operations are carried on in the same premises.

MR. ROBERTS, of Cleveland: Mr. Wason's statement recalls the original design for power houses for this storage-battery system, which has been placed in operation. The question was whether to build two sub-stations at what might be considered a normal distance apart, or to build one station in a place where an attendant had to be, in order to take care of the package freight business that was anticipated, and which has now developed. The first cost of the two sub-stations included the feeder wire, and the cost of the plant complete was somewhat greater than the cost of the one sub-station. But, capitalizing the salaries necessarily paid to the employees in the two sub-stations, plus the attendant in the place where they wanted an attendant for package express, made the difference in the cost almost negligible. Moreover, one important element of that cost was this—that in two sub-stations a large part of the money went into machinery, which has a considerable depreciation and repair account and a possibly increased repair account due to lighting. On the other hand, with the one sub-station, the money went to a greater degree into feed-wire on which the interest only was to be paid, and where there was practically no depreciation or repair account, because the pole line was not increased in size. That is an important matter which is sometimes not taken into consideration—that it is not only the difference in the interest account, but whether your investment has a greater depreciation and repair account, as compared with some other investment. When the specification for that road was submitted to two representatives, one from each of the larger companies manufacturing such machinery, each immediately claimed that there were not sufficient sub-stations for the best results. They had a diagram giving the length of the line and distance, taking into account the actual local conditions. Mr. Wason very properly refers to these local conditions as being an important factor in the matter. I consider that good engineering includes consideration of matters of a financial as well as technical character.

I have been informed, as to the Union Traction Company, of Indiana, that its storage batteries have proved efficient as lightning arresters, and that at times of heavy storms they throw out the differential boosters. By throwing them out the battery discharges less for each time, but they have been very effective in preventing trouble from lightning.

The first road to which I referred proposes to start very shortly a milk train from the end of the road, to run into the principal city, a distance of 38 miles, the train to start at 3 o'clock in the morning. The power house ordinarily starts up at 5 o'clock. The milk train will be run into town with current supplied from the storage battery, and the power house will not have to start up any earlier than is the case now. With storage batteries, as with everything else, every case depends on local conditions. We have one line, on which we have just decided we shall not put storage batteries at the present time, though they would effect a considerable economy, because we propose in another year to extend the line some 15 miles. By putting in certain sized units now we can put in storage batteries in another year, and with the capacity we now have we shall be able to operate the entire line. We run at an increased cost of fuel now, but we shall operate with increased economy later; and not having to add generating machinery, when the storage batteries are added, it will be more economical.

MR. WASON: I think there is one point in connection with the storage battery, as regards its location with reference to the power house, which has not been touched on, and that is the ability of a battery to take care of the load in case something happens to a large unit, in case the power house is equipped with large units. This occurred in the power house of a road with which I am connected. The battery was floating on 1600 kw, and one of the valves stuck and threw the engine out, but the battery carried the load without anyone knowing anything about it.

MR. CROSBY: In line with the statement made by Mr. Wason I would say that in the city of Washington a storage battery, installed near the center of the city, was able to carry the load of the whole of the central portion with seventy-five cars in motion at one time for a period of something like six hours, when, through

some unfortunate accident, the whole station capacity was out of commission. That, of course, was a considerable and heavy drain on the battery, but it did its work satisfactorily. Referring to the experiences of Colonel Heft, I think the different methods of installing the batteries, that is, the physical conditions surrounding them, may explain why, in one case, excessive repairs are necessary, and in another case the repairs are not so excessive. In a road in which I am interested the two batteries are installed in the same region of the city, the conditions approximating the same for both. There is no question as to the capacity of the batteries to do their proper work, but one of them had a very disastrous repair account, while in the other the repair account was quite favorable when the advantages of the battery are taken into question. So far as could be ascertained, the unfortunate case arose from the fact that the installation was made in the basement of an opera house. It was the only available place in which to install the battery in the particular region in question, but it was not well adapted for the purpose. The temperature in the basement rose to a very high point, whereas in the battery station, made specially for the purpose, proper provision had been made and the temperatures were normal. In the high temperature room the repair account was excessive and in the other room it was not. I put this experience in evidence as a possible explanation of some of the difficulties which occur here and there, while similar difficulties do not arise in other cases.

I want also to suggest that the use of a storage battery on outside lines may extend considerably the area of the distance over which the direct current can be satisfactorily operated, and may thus obviate the necessity of installing high-tension service for such lines. In the neighborhood of Washington recently the operation of a rotary sub-station has been discontinued by reason of the installing of the battery far over on the direct-current lines. The service from the direct-current station was carried 4 miles further than was first intended, this being possible by reason of the installation of the battery. The alternating-current system was relieved from that service and the spare capacity of the direct current used where it was not supposed it could be, and the service of attendants which thus far seems to be necessary on rotary stations has been saved. That is to say, in this battery station there are no attendants whatever, whereas in the rotary station it was necessary to maintain one man all the time. In such a case the wages of the man necessary in connection with the rotary station would in itself take care of a considerable amount of battery depreciation. In such cases it seems to be clear that the battery is useful. I have no doubt that Mr. Harrington's paper covered all the general considerations in mind, and I bring up these points as illustrating cases where conclusions might be reached different from those which are usually held.

COLONEL HEFT: I may have been misunderstood, and for fear that I may have given a wrong impression I will say that under one condition I am willing to admit that the storage battery can be used successfully, and that that condition is, that the price of the battery shall be reduced. I am also willing to admit that the basement of an opera house is a bad place to put a battery, because it might affect the voices of the singers. I am also willing to admit that my knowledge as to the proper location of these batteries is limited; but I must also say that I look upon the battery principally from the commercial side and not from the engineering side, and until such times as a storage battery can be produced at a price that is inviting I certainly do not feel like recommending any further investments in storage batteries.

MR. HARRINGTON: In connection with the statement of Colonel Heft of considering the question from a commercial standpoint instead of from an engineering one, that is just the way our road has considered it. We put in an installation, and it was so satisfactory that within six months we made still another purchase, and our decision was based solely on commercial considerations. What engineering knowledge we have gleaned from the use of the batteries I have tried to put into this paper.

PRESIDENT HOLMES: I want to say to you on behalf of the association that we appreciate your work in preparing this paper. You have certainly gone at it in a scientific way. On behalf of the association and myself I desire to thank you very sincerely for your kind effort.

Now we will hear the report of the standard committee—the committee on standardizing. Mr. Graham, will you read that report, please.

MR. GRAHAM: Mr. President and gentlemen of the convention, I have the honor to present this report of the committee appointed by you last February, and I will read it. I would say, Mr. President, that we have a great lot of data and material that we have collected, and we are ready to turn it over to any new committee that is appointed here.

(This report will be published in an early issue.)

PRESIDENT HOLMES: Gentlemen, you have heard the report so ably presented by the committee, and I am sure they deserve great credit for the valuable services they have rendered.

MR. SLOAN: I move that the report be received and spread on the minutes, and that the thanks of the association be extended to the gentlemen composing the committee, and that the same be extended for another year.

Motion seconded.

MR. BEGGS: I suppose that in Mr. Sloan's motion it is the intention that those blueprints shall be produced in the minutes; I think they should be very fully set forth. I would like to suggest that the report should also be published in pamphlet form as one of the special papers of the association. Copies might be sent to each company, possibly in advance of the publication of the regular minutes, in order that it may be put in the hands of the several departments of the several roads who may not receive a copy of the regular minutes of the association. I would like to add that to the motion.

COLONEL HEFT: May I be allowed to offer a suggestion? I may assure the gentleman that we appreciate fully all that he has said, but for the successful carrying out of the standardizing of the different materials and of the equipment, I believe that the selection of such a committee should be left to the executive committee. In order to get a working committee it is necessary that this committee should be made up so that the committee can get together readily, discuss these different questions, and take up the work in a systematic manner. If it is agreeable to the convention, then, I would suggest that Mr. Sloan include that in his motion, that either the president or the executive committee should make the selection of the committee after the adjournment, or at such time as they desire.

MR. BEGGS: I think the remarks of Colonel Heft are very pertinent. I have no doubt that the incoming officers and executive committee of the association, whoever they may be, will give preference to those who have been on the committee and have gathered this data. I think the officers of the executive committee feel their own responsibility in a matter of this kind, and would participate to a certain extent in the labors of that committee, and I think it highly desirable that Colonel Heft and the others be kept in that committee. There may be a motion that another committee be appointed; it may be the same gentlemen, but they should derive their authority from the incoming officers of the association. I hope Mr. Sloan will accept that suggestion. I appreciate the labors of the committee.

There is one point that I desire to say a word about—the question of T-rails—before this matter is finally disposed of by the association. I think that to a great extent the street railway companies of the country have been required to use a class of city construction which was in many cases the fad of some city engineer who had no practical knowledge of the requirements of the service that was to be passed over the rails. The time has now come when this association should, through their various managers, make an earnest effort to show the municipal authorities that there are certain conditions necessary in the construction of tracks and roads by which good transportation facilities may be rendered to those who may require to use this means of transportation. We have permitted city engineers to dictate the type of rail. One has a fad for one kind of a groove, and in an adjoining city another city engineer has a fad for something else. I do not mean any disrespect to them, but I think there are a great many of them whom we would not employ as the engineer of our roads. It is too frequently the case that their appointment is dictated by political reasons rather than for their fitness for the position they hold. In the city in which I have been located for the past four or five years we have been able up to the present time to maintain the installation of T-rails, though not without considerable argument.

In our own city we use granite headers and stretchers and a chamfered groove worked into the granite itself. That forms the groove for the rim of the wheel, but it will not collect ice and snow as readily as the ordinary grooved rail. On the other side of the rail we also use, and supply at the expense of the company, granite headers and stretchers, except not chamfered, for the outer edge of the rail. The asphalt companies put them in place. I think if any gentleman sends to the City Engineer of Milwaukee, he will show him miles of this T-rail construction with those granite headers and stretchers, and I believe that our Board of Public Works, the head of which is the City Engineer, admits that for asphalt pavement we have got what is a perfect roadway. I consider that a step in the right direction. We likewise use T-rail in brick pavement, with a beveled-edge brick for the inside of the track. We lay all of our work on a concrete base of 6 ins. the entire roadway under our ties, and with this permanent pavement we put down a 6-in. T-rail, leaving a sand cushion of 1 in.

Our action has been prompted to a certain extent by the fact

that we own everything in the way of surface railways in our section of the State of Wisconsin, and we propose to try to continue to own them, and for that reason we have made our city construction to accommodate our interurban equipment.

I would like to say in connection with the standardizing committee and the remarks made, that I think the interests of the association and the millions and tens of millions of capital we are here to represent can be advanced if we take an additional step in the line that was taken when we induced the accountants to form a separate organization. I do not mean that it is necessary to have an independent association, but I believe that the master mechanics of our several properties should meet together just as our accountants have done this morning; that the superintendents of construction and maintenance should also meet together and discuss matters just as they do with the steam roads. I think it would be much more important, Mr. President, than even if we meet here. We are simply, as I may say, the hub on which these spokes—our superintendents of maintenance and equipment, our superintendent and our electricians, and the superintendents of our lighting department—turn. I may say that there are five representatives of the Milwaukee Company here, and I think, as did Captain McCulloch, that it was more important that they should be here than the general manager of the property. I am here at very great personal sacrifice, and I expect to take the 6 o'clock train in order to get back to Milwaukee as quickly as possible. These conventions are to me times of hard work.

I know the good work that has been done by the accountants' association. I, perhaps, participated in it to a greater extent than most managers. Our auditor has been an active official in that organization, and has done a great deal of work in trying to perfect the methods of accounting. For instance, our money is going out to a very great extent through our superintendents of transportation. My superintendent of transportation is here. I think he is out listening to a school of the Metropolitan Road, and they go from here to several cities before going back to Milwaukee; they have already been away ten days. I feel most earnestly that they are the people that ought to get together, and they should help our standardizing committee.

MR. GRAHAM: As chairman of the standardizing committee, I very reluctantly accepted that position. I thought I was probably not capable of fulfilling all the requirements; but after accepting it and getting to work on it, it opened up a new field for my thoughts and I began to see where the importance of standardizing the street railway equipment came in. After nearly a year's experience, however, I believe that the committee ought to be changed; there ought to be new blood gradually worked into it. Hence, I feel that this committee ought to be appointed by the executive committee after a very careful consideration.

MR. SLOAN: I beg to withdraw my original motion and substitute another:

"Resolved, That the report of the committee be received and spread upon the minutes, and that the thanks of the convention be extended to this committee, and that the executive committee choose another committee for the ensuing year, if that meets their ideas, and that all data which have been collected shall be published."

MR. CROSBY: I would like to ask whether in accepting the report of the committee the particular declarations are adopted as the sense of the association.

PRESIDENT HOLMES: No; they are simply submitted like any other paper before this convention, and are really suggestions. I want to say, gentlemen, before I put the motion, that when the committee was appointed it was very hard to get anybody to serve on it, and that is always the case with our association committees. I have been a member of this association a great many years, and I do not believe that during that time there has ever been a report as good as the one just presented. I feel personally very grateful to the members of the committee, and I do not blame them for wanting to be relieved of their great responsibility. I only hope that the incoming executive committee will continue this good work, for what has been done is only the beginning of what must be done in the future.

It is moved that the report be received and filed, with the recommendation of this body that the committee be appointed by the new executive committee, and that all be published in an independent form.

(Carried.)

COLONEL HEFT: It seems to me now that when the report is sent out it should be at the instance of the new committee, and that this report should be sent to the different roads along those lines, asking for their views and replies. This would assist the new committee, and we should be able to cover more ground, and cover it more thoroughly in one year than we should otherwise cover in ten. I merely offer it as a suggestion to you; I think it would assist the work of the committee.

MR. BEGGS: It is a very good suggestion, and I hope Mr. Sloan will incorporate it in his motion.

MR. SLOAN: I accept the suggestion.

(Motion seconded and carried.)

PRESIDENT HOLMES: Gentlemen, I believe it will be just as well for us to adjourn until, we will say, 2 o'clock. If that meets with your approval, the meeting will stand adjourned until 2 o'clock this afternoon.

Recess.

Friday Afternoon Session

President Holmes called the meeting to order at 2:45 o'clock.

PRESIDENT HOLMES: The first paper to be considered this afternoon is entitled "The Modern Power House, Including the Use of Cooling Towers for Condensing Purposes," by J. H. Vail, of Philadelphia.

Mr. Vail presented the paper, which is printed on another page.

MR. CROSBY: Mr. Vail spoke of a very low percentage of evaporation—1 per cent to 3 per cent—and I will ask Mr. Vail whether the conditions had any special advantages which would keep the evaporation down so low, as ordinarily I think it is much higher?

MR. VAIL: A great deal depends on the humidity, the atmospheric temperature and general conditions. It must be kept in mind that the losses by evaporation will vary according to the type of condenser used. If the condensed steam is combined with cool water through a jet condenser, then the water, which actually passes as boiler feed, is apt to be cool water, and the loss is not perceptible. But if it goes through a surface condenser the loss is perceptible and will run as high as 3 per cent.

MR. CROSBY: I ask if Mr. Vail has in mind any cost at which it becomes uneconomical to use the ordinary condenser; that is, the cost per 1000 gals. of water and economical to use the special condenser which he describes? The case is one which often presents itself in all engineering problems, whether one line of practice or the other is less expensive. We can get a supply of water in several ways. We can either get the water by paying the city for it or we can build a pipe line. The point is, at what price per 1000 gals. of water does it become less economical to use the ordinary condenser, as compared with the cooling towers. I think that would be the crucial question, as it presents itself to me.

MR. VAIL: I do not know that I can state the exact price for water, at which price it would cease to be economical for use in an ordinary condenser, but there is no question that a cooling tower is a saver of boiler water, for the reason that it enables a station to use more economical engines. These towers of which I have spoken have been placed in locations where the water is purchased from the city, and is used over and over again for condensing purposes. The amount of boiler feed is reduced. I have not made any calculation on the price of water on the basis that Mr. Crosby mentions, and I am not prepared to answer that question. As I said in the paper, it is a matter of a great deal of regret that it is very difficult to obtain from the general run of our stations in this country accurate data as to the cost of operation and what they save by the use of certain appliances. In regard to the use of water, with the cooling tower, there is only a very slight waste by evaporation, but to the best of my knowledge there are no figures in existence which show where the line should be drawn as to the cost of water per 1000 gals. I can refer to a station where there was a pond in the town, and a power station of 3000-hp capacity was located three-quarters of a mile from an otherwise desirable situation for the sake of using that water. In six months the water of the pond, after continual circulation, without any means of cooling, was so warm that it was of no use for condensing purposes. I recall another case where we built the cooling tower and the condenser in the station in the heart of the city and bought water from a water company, and we actually saved the operation of two boilers. The water bills in the station were not increased one dollar, but we increased the output of the station 1000 hp. These figures I know to be facts, but when it comes down to the drawing of a line where the cost of water should enter in, I have not those data.

MR. UHLENHAUT, of Pittsburgh: Referring to the special inquiry of Mr. Crosby, I would say that a case has recently come to my mind of a station located near a river where the maximum high-water rise was 71 ft. and the average about 60 ft. The question of locating the station above the high-water mark was important, and the figures submitted by one of the manufacturers as to whether it would be advisable to erect a cooling tower and use city water at 6 cents per 1000 gals., or put in a pumping station to pump water for condensing purposes to the elevation, showed that it would be advantageous to put in cooling towers and buy water from the city at the rate of 6 cents per 1000 gals.

PRESIDENT HOLMES: We will now have the paper on "The Adoption of Electric Signals on Suburban and Interurban Railroads, Single or Double Track, and Their Economy of Operation," by William Pestell, of Worcester, Mass.

This paper is published elsewhere.

MR. McCORMACK: The question of signals on suburban roads, particularly as most of them are single-track roads, is something which is very important. I have given the question some study, but not having any such roads in charge I possibly do not fully realize the importance of the subject of signals as do other gentlemen who operate single-track suburban roads. My opinion is that the suburban roads have got to go to steam railroad practice in formulating rules and to operate signals on the same principles which the steam roads operate them. Some of the suburban roads running out of Cleveland depend entirely on the train despatcher. That is, they have a telephone system, and at each box the conductors report their car numbers and the direction in which they are bound, and ask for orders. The orders are given to meet a car at one point or to go to another point. The conductor then repeats the order to the motorman, who repeats it back, so as to have a thorough understanding. When the telephone system is disrupted by storms, or otherwise, there are delays on account of the fear of making any general rule to govern the cars when they cannot get the telephone orders. I therefore think that rules which would give suburban trains the right of way on the same conditions as those on which steam railroads are run would be necessary for the government and operation of suburban lines. The steam railroads have what is called a time convention, in which a committee is appointed, and for some eight or ten years they worked to arrive at conclusions concerning the best rules to govern the operation of trains by telegraph orders, and by rules when they could not get telegraph orders. The principal involved is that a train in one direction has the right of the road. Meeting points are shown at different places along the road, and the opposing train has up to a certain time to arrive at the designated points. If the other train does not arrive the opposing train proceeds. I think that some such rules would be advisable for the operation of suburban lines.

PRESIDENT HOLMES: Mr. Vreeland, won't you favor us with a few remarks on the subject? I know that you asked not to be called upon in the discussions, but we think that this is a subject upon which you can give us some information.

MR. VREELAND: So far as the operation of the lines with which I am connected is concerned, this subject has no particular relation, because our lines all have double tracks. I think the question is a very important one, however, and it is pertinent to the subject to say that I do not think that the average suburban road is operated as it should be in the interests of safety. Four years ago I examined a railway property as to its general physical condition and methods of operation. I mentioned to the general manager that his suburban line was operated without any signal lights on the cars, and that this seemed to me to be unsafe. He at once answered: "Those are some of your steam railroad ideas; this is a street railroad." His cars were running at a higher rate of speed than prevailed on the steam railroads of the United States twenty years ago when I was running a train as conductor. All of the conditions which belong to steam railroad operations pertained to his operation. Within ten days after I was there, on a foggy, stormy night a car lost the trolley, and before the pole was replaced and the car relighted, the car behind it went into it and killed three persons and injured five others. On another road, shortly afterward, I called the attention of the manager to the same thing, and he laughed at the idea and made about the same answer: "You are a steam railroad man and not a street railroad man, Mr. Vreeland." That road had a bad accident the same summer. I had a similar experience with a third road, and my conclusions at the end of these experiences were that I would prefer to be a steam railroad man with steam railroad ideas, operating a street railroad, under steam railroad conditions, than to be a street railroad man with ideas that prevailed in horse-car operation.

MR. WHEATLY, of Brooklyn: I think it is also true that the problem of signals applies to electric roads operating a double track. The object of a signal is to give an indication to the motorman or the engineer as to whether the track ahead of him is clear or obstructed. I can conceive of conditions on double-track electric roads where there are danger points that ought to be protected by signals. Those danger points may be junction points, or curves where the view is obstructed by trees or by hills, or tunnels in which there are curves and where it is desirable to have an indication given whether the track ahead is clear or is obstructed.

Referring to any given proposition in the operation of a double-track electric railroad, the question as to whether signals are or are not necessary must be settled entirely on the basis of the traffic and

speed. Where the traffic is dense and the speed is high, signals are very necessary in double-track operation. Where the traffic is light and the headway long, and where the speed is slow, the road may be very safely operated without signals. We have several lines on which our traffic is exceptionally heavy and on certain portions of which we operate at high speed. We have our danger points protected by safety signals. We have not yet gotten to the question of block signals for the purpose of spacing our cars, because we have covered that rather freely by flagging, which we are required to do at highway crossings and at other points that must be protected.

I think, however, that in the operation of suburban and interurban lines, where the conditions more nearly approach steam railroad operation, that the gentlemen operating those roads will sooner or later come to the question of adopting some signal to protect their operation, and when that time comes it will be necessary for them to determine whether they ought to operate a system known as the absolute block system or whether they will operate a permissive block; whether they will operate an automatic system or whether they will operate a manual control system. There are perhaps at present very few of the suburban and interurban roads that will care to go to the expense of an extensive automatic signal system. They will probably find it convenient for many years to come to depend upon the manual control system, and confined to such points as are known as danger points.

MR. FULLER: I am now building a high-speed road where we are proposing to have our cars run 55 miles an hour. I would give a good deal of money at the present time to be able to get a good signal system for that road, but I cannot find it. I have had my electrical engineer study the two or three systems in the exhibit hall; whether they will do or whether they will not he will not say. They are automatic signals, I think, all of them; but whether they would be safe or not to put on to a high-speed road is more than I am able to determine. I wish I was.

MR. WASON: On the suburban roads out of Cleveland from time to time we tried different signalling devices; all of them from time to time failed to operate, and so far we have yet been unable to find a signal that will always do the work required. In consequence of that we are depending entirely upon telephone messages from the train despatcher to the turnouts. On one of the roads, that from Toledo to Norwalk, the cars are run on the steam railroad system if the telephone is out of circuit; otherwise they get their orders through the telephone. The conductor writes them on a slip, and he in turn gives them to the motorman; they are repeated by the motorman, and he runs over the road according to the orders received and written on this slip. That slip is turned into the office and compared with that given out by the train despatcher.

There is no question but that the suburban roads are running at a disadvantage due to the lack of any apparent specific signals, as Mr. Wheatly suggested. The expense necessary to install the automatic device has not been permissible with the amount of work that the suburban road yet has been called upon to do. There is no question but that if any device could be found that would be sure to work it would be welcomed by the suburban road, but the trouble is that you are not sure of it always performing the work desired; and then if you have not some other method you are at a disadvantage. You must have orders that will be carried out in case the motormen are unable to get the train despatcher, and that is bound to occur during storms, when the falling of trees interferes with the telephonic lines. This is more apt to occur on suburban roads than on steam roads, because the former pass through streets and villages, where obstructions are more likely to break down the circuit. Steam railroad practice, it seems to me, must be carried out as nearly as possible by the suburban road.

MR. FULLER: I do not think the first cost of any signal system, provided it is efficient, should be considered, as it may prevent a bad accident.

MR. C. E. BAKER: I would like to ask Mr. Wason if the train despatcher writes fully all orders given.

MR. WASON: The despatcher transmits the message by word of mouth—does not write the order himself. The motorman or the conductor writes the order; on the particular line to which I just referred the conductor writes the order. The train despatcher does not do any of the writing on the roads out of Cleveland; the despatcher tells the conductor—gives the conductor the order, and he in turn gives it to the motorman.

MR. VREELAND: I would like to ask if any member of the association present operates under the system of colored lights that is very largely used throughout the United States. The motorman applies a lever as he goes along and changes the lights at each end of a single-track block.

MR. FULLER: I have a number of roads operated in that manner with the usual result—very unsatisfactory. The lamps are

sometimes destroyed by lightning; then the motorman comes to a turnout and sees the lights are out; he proceeds, believing the block is clear. There is always a chance of that and a misinterpretation of signals.

COLONEL HEFT: Along the lines of this question I would suggest that the executive committee ask the next committee on standards to make a report at the next annual convention on the best signal system. There are several that have just come into the market, and I know of one that I think will be very satisfactory. It not only enables you to stop the cars at different points on the lines, but also to test your signals before your cars are placed on the road, and records the fact in the despatcher's office. I shall be very glad to give the committee any information I have on the subject.

MR. SERGEANT: In organizing our elevated service in Boston the question arose as to how collisions were to be prevented. We have a system of elevated cars which are run in the subway as well as upon the elevated structure, and the grades in making the transition from one to the other, as well as those within the subway, are very severe. We were proposing to run maximum speed of trains of 40 miles an hour, and I will say we have attained 45 miles an hour; only, however, for short distances. We felt it necessary, regardless of the expense, to introduce something to keep these trains apart. We questioned whether the ordinary track circuit system could be used on what I may describe as a single trolley road; that is to say, on a road that used the rails for the return circuit. We made some experiments, and some were made by the Union Signal Company, and they were so satisfactory that we finally decided to introduce a block signal system of the electric-pneumatic type, and divide our road into as nearly as possible minute blocks. Of course, it introduced a great many signals, but that was necessary to provide for the greatest possible frequency of trains.

When we started out we found that the conductivity of the rail devoted to the track circuit in the subway was not sufficient, and our signals flickered. By introducing additional copper for returns in the subway we overcame that difficulty entirely. On the elevated portion the structure provides in part for the return current, and there was not the same trouble there. The general result has been that after placing individual men for the first week or so at every signal in the subway to flag the trains, we got the system working all right, and it has been very satisfactory.

I think it has become apparent to nearly all of us that the conditions of operation on the single-track trolley roads have not been surmounted, and the endeavors, as I understand it, of the signal inventors to overcome these difficulties have been complicated by the old horse-car system of running what we used to call double headers, or what are now quadruple headers, endeavoring to get greater travel—two, three and four cars, one behind the other. Obviously that prevents the use of the track circuit system in the ordinary sense. The roads have not, so far as I know, undertaken to meet that difficulty by putting the cars into trains. I believe they could be operated with far greater safety if, under these conditions, the cars were coupled and put into trains, so that there was one unit going over the block instead of four or five. I do not know but it may have been tried in a good many places, but it has not come under my notice; and in that connection it is quite possible that those roads, by using some form of multiple-unit control, would save a great deal of money and waste, because in that class of traffic there is always ample time for one conductor to go through a train and get his fares; perhaps not in the city, but surely some motormen might be saved by that system, and I believe that safety would be promoted by it.

MR. HARRINGTON: In Philadelphia they have a system, a modification, possibly only a petty modification, of what I understand is the system used by the Reading Railroad Company. This is a block system, with semaphore lights, and it seems to operate very satisfactorily. The roads are double-track, and are laid out by the block system for ordinary railway and suburban lines. The points that have been made in regard to the forms of signals I must say I agree with; everything that we have tried has been unsatisfactory and has been abandoned. We are using the ordinary switch-backs, and stacks as well. In the night time we have a red lantern on the back of the car and a red light in front. If we could get a signal that would not cost as much as the Pennsylvania system, and which could be operated in a satisfactory way, we would like to adopt it on our suburban extension.

MR. POWERS, of Glens Falls: I came in only after this discussion had progressed to some degree, but it is a matter that vitally concerns us all. In the railroad I represent, the Hudson Valley Railway, which runs from Troy northeasterly to Lake George, and has about 103 miles of track, about 85 miles are on a private right of way and are intended to be operated at high speed. Of course, the first consideration was to have something that was reliable,

and for that reason we have in the first place adopted a telephone despatch system, and have employed men trained in the steam railroad despatch service, and use triplicate orders. Two copies are taken by the conductor and motorman, and the third copy is deposited in a receptacle for it, so that in case of a mistake in carrying out the order the third copy cannot be destroyed. That system has proved somewhat cumbersome, and we are now preparing a triplicate order system to be taken by the conductor. The motorman receives the order over the telephone; it is repeated back by the conductor and OK'd by the despatcher, and then the three slips are taken—one by the conductor, the second by the motorman and the third deposited in the box. This seems to be a good deal quicker, but there is a great deal of delay, the motormen being not very rapid at writing.

The first point seems to be to provide some system that would insure safety on the portions of the road which are crooked; that is, where the cars cannot see one another for any considerable distance, and we have worked on that line by taking up the old staff switch system, and are putting it in force on three or four sections where the danger is greatest. In order to make the thing perfectly sure and beyond the mere memory of the motorman—for a motorman may forget his stop and go into a block, as well as forget his switch and the passing of a car at the proper switch—we have modified the system somewhat by putting a spring derail at each end of the turnout, to be locked with a duplicating padlock. The key is attached to the staff, so that the motorman can get his car out of the block, but he cannot get into it without having possession of the staff and the attached key.

Of course, that would not do on the complete block system, because the delay would be too great. It is perfectly safe, however. The system, if the travel becomes heavy enough to require double headed cars, is simply to allow the conductor of the first car to unlock the block and hold the lever over until the cars enter the block and the second car carries the staff. The cars carry the regular signals of lights by night and flags by day, the same as are used on the standard steam roads. That is as far as we have gone in this matter.

It seems to me, after a long study of this matter occupying forty years, and having had control of some of the interurban roads in the country, that we are, after all, working in the wrong direction, and we should have to make the system of blocking as complete as possible, not a stationary block on the railroad, but an indicator of some sort on the car itself. I have had some conversation with persons who have a great deal of capacity in the direction of original research in electrical matters, and I have asked them whether it would not be possible to provide on each car a signal of some sort, for instance, an incandescent lamp which would glow on the approach of another car within, say, 1000 ft. That sounds like a difficult problem, but I think that is the direction to be looked for. I think there should be something used like the signals employed in elevators to-day in the city and elsewhere to indicate to the operator of the elevator that he is desired to make a stop at the next floor. One of these signals will indicate the presence of a car in advance and another of a car in the rear within a limited distance. I believe this is perfectly practicable to attain. Indeed, we are working at the thing ourselves.

We have tried several of the block-signal systems. We do not believe that any of those which we have investigated or tried will be satisfactory or sufficiently reliable to warrant their use, and to-day we are standing in the position of simply getting along with something that is absolutely safe as far as it goes.

In times of fog we do not allow any car to leave its switch except on the passing of the regular car that was to meet it at that switch, and we do not vary from that rule, even if we hang up our line for half a day. We believe a delay of that character is much better than taking chances in a fog. It does not pay to take chances in operating cars at high speed on a single track.

The territory we cover consists of a number of towns, and in the entire 103 miles outside of Troy and Cohoes, which have 150,000 people, we serve a population of about 100,000, and we are not able at this time (and probably will not be for some years to come) to double-track much of the road. Of course, that is the final remedy for this sort of thing, but we do believe that we can by these precautions reduce the danger of accidents very greatly; but what we do insist upon is that whatever device we adopt shall be as nearly perfect as possible. No single device that we have even seen is anything more than taking another chance, for a single service that does not work occasionally is far worse than none at all. I hope the problem will be worked out so that we may have a satisfactory system of signalling, but I believe the proper way is to advise the motorman of the presence of a car and have him know in which direction the car is. If that is done I think we will have eliminated a very large proportion of the dangers of collision.

PRESIDENT HOLMES: Gentlemen, I propose we close discussion on that subject, as our time is limited, and I will now ask for the report of the nominating committee.

The report was read as follows:

NEW YORK, Oct. 11, 1901.

To the President and Members of the American Street Railway Association:

Gentlemen—Your committee on nominations beg leave to submit the following report:

They recommend as nominees for officers of the association the following names:

For president, H. H. Vreeland, of New York, N. Y.

For first vice-president, C. W. Wason, of Cleveland, Ohio.

For second vice-president, E. C. Foster, of Boston, Mass.

For third vice-president, H. M. Sloan, of Chicago, Ill.

For secretary and treasurer, T. C. Pennington, of Chicago, Ill.

• For members of the executive committee:

Walton H. Holmes, of Kansas City, Mo.

John A. Rigg, of Reading, Pa.

D. B. Dyer, of Augusta, Ga.

T. J. Nicholl, of Rochester, N. Y.

G. W. Dickinson, of Seattle, Wash.

Your committee has received several invitations for the entertainment of the next convention. It recommends the acceptance of the invitation received from the Everett-Moore syndicate to hold the next convention at Detroit, Mich.

Respectfully submitted,

C. S. SERGEANT, *Chairman.*

ALBION E. LANG.

F. L. FULLER.

W. W. WHEATLY.

W. P. READ.

COLONEL HEFT: I move that the secretary be empowered to cast one vote for the nominations as read. (Carried.)

I move that it be resolved that we accept the invitation of the Everett-Moore syndicate to hold the convention at Detroit the ensuing year. (Carried.)

SECRETARY PENNINGTON: The vote has been cast for the gentlemen whose names have been read.

MR. SERGEANT: If general business is in order, I move you, sir, that the thanks of this association be tendered to the Metropolitan Street Railway Company, the Brooklyn Rapid Transit Company, the Manhattan Elevated Railway Company and the other corporations and individuals that have done so much in behalf of the association, and enabled it to have such adequate provisions for this convention and such a satisfactory convention altogether. I believe that a great deal has been done for us, and that we all appreciate it, and that a motion of this sort is certainly in order. (Carried.)

COLONEL HEFT: I move that a vote of thanks be tendered to the gentlemen that have prepared the papers that have been read here, and those that led the discussion. (Carried.)

MR. LYON: I offer the following resolution:

"Resolved, That the thanks of the association be and are hereby extended to the president, Walton H. Holmes, for the able and impartial manner in which he has presided over the deliberations.

"Resolved, That it is the sense of the association that the present highly satisfactory condition of its affairs is in great measure due to his zealous and untiring efforts, which not only reflect great credit upon the association, but himself, as the youngest man ever elected to the office." (Carried.)

PRESIDENT HOLMES: I thank you very much, indeed, for the resolution, and I hope that what little work I have done for you will be of benefit to us all in the future; but I have been more fortunate, I suppose, than most presidents. I have had the able assistance of a good executive committee, and the papers which were prepared were ably prepared and ably discussed. I think if we continue in the same line of policy as this, that really our meetings will grow more interesting each year.

I hardly think it proper for me to say much at this time, as I expect to say something to-night, but I am going to thank you all for your attention and the promptness with which you have attended these meetings, and for giving such careful attention. We would welcome you back to Kansas City; our people have asked that everyone of them that met you there last year to be remembered, and some day hope to have the pleasure of seeing you out West again.

There is one more matter. Mr. Cooper wishes to say something about the transportation of the mails.

MR. COOPER: I have here the report of the committee appointed by the Postmaster-General in 1896 (act of Congress, June 9, 1896) making appropriation for the service of the Postoffice Department for the year ending June 30, 1897, providing for the transportation of mail, \$150,000. That report was made to Congress—I mean to say \$150,000 was appropriated for the transporta-

tion of the mails by electric cars, and I will read some excerpts from the report of the committee bearing on the division of that \$150,000 for the transportation of mails by electric cars.

One says: "Our conclusion is that a rate of 16 cents per car-mile for cars not exceeding 16 ft. in length, inside measurement, would cover operating expenses, and in most cases allow a fair margin of profit. The most notable exception would be the West End Street Railway Company, of Boston, and even in that case we believe it would pay the additional expense incident to the service."

In another place the report recommends that the change of rates for carrying the mails be postponed for a year. The effect of that is that railways operating postal cars 16 ft. in length will get 16 cents per car-mile. In Cincinnati we get 11.62 per car. That is hardly what the operating expenses amount to, and our executive committee some time ago passed a resolution that it would discontinue the service. We had some correspondence with the postoffice authorities, and they asked us to wait awhile. My object in bringing up the matter is to suggest that we offer a resolution to memorialize or petition Congress to grant a further appropriation for this service so that it may be adequately paid. I had some little correspondence with Mr. Pennington on that. His cars, I believe, are 20 ft., so that he is getting less than we do, that is taking into consideration the length of the cars.

PRESIDENT HOLMES: Mr. Cooper, do I understand that you offer a resolution requesting that a committee be appointed to memorialize Congress to increase that appropriation?

MR. COOPER: Yes; I put it in that shape. (Carried.)

PRESIDENT HOLMES: The next president, Mr. Vreeland, will do that, I know.

MR. VREELAND: If I may say just one word, the next president does not care to do it, having been connected with it twenty years. I understand the government position very thoroughly. I have absolutely refused to take the mail business in New York City on a non-paying basis. If the government of the United States cannot pay a proper compensation for carrying the mails (we are certainly taxed enough in other ways) I do not propose to carry them. The elevated railroads have done just exactly what the steam railroads did some years ago. The Second Assistant Postmaster-General came to me when I notified them that I would discontinue the mail service on Third Avenue. He said: "You accept our rate and we will try to get an appropriation." I said: "I will accept your rate if you will get your appropriation." The railroads have taken the question up, but have not considered it on a paying basis at all. I feel satisfied that I can take care of my property without the help of the United States mail, and I, for one, would not be in favor, as a member of the association, of putting ourselves on record as sending a memorial to Congress to ask them to do something which they should do before we do the business.

COLONEL HEFT: I think, then, Mr. Vreeland is the very man to take this thing up, because he has refused to do anything with it unless they do pay.

PRESIDENT HOLMES: I am sure I do not want to shirk any responsibility. I fully agree with what Mr. Vreeland says.

MR. McCLARY, of Birmingham: I ask the gentleman to embody in his resolution that Congress shall be memorialized to increase the rate per mile on suburban roads. Quite a number of roads are carrying the mails, and Congress allows 3 cents a mile, which is not adequate compensation.

MR. WHEATLY, of New York: I want to say that the question of handling the mails is something that concerns us over in Brooklyn quite as vitally as any railroad in the country perhaps. We have been handling United States mails for some years under an arrangement to which we fell heir, an arrangement, I think, the present management would not have made had it been left to them. We handle the mail in 16-ft. cars. As I understand the present arrangement, we are paid 12 cents a car-mile, which we think is insufficient. We have had numerous cases of unavoidable delay and failure to make proper time with the mail, and we have been subjected to fines by the government, which, in many cases, amounted to double the revenue that we obtained for the particular service in question. I think this is a question which this association might very well take into consideration, provided there is any considerable number of roads that are interested, or likely to become interested in the future. It seems to me that the small appropriation of \$150,000 for the handling of mail matter on the street railways of this entire country is utterly inadequate, especially taking into consideration the fact that the government is now desirous of making agreements with the suburban and interurban roads which are being developed all over the country to carry the mail. I think all of the gentlemen present will agree with me that 12 cents per car-mile is not sufficient compensation.

COLONEL HEFT: I move that this matter be referred to the

executive committee for future action. (Motion seconded and carried.)

Secretary Penington announced that the following-named companies had joined the association:

Altoona, Pa.—Altoona & Logan Valley Electric Railway Company.

Ashtabula, Ohio.—Pennsylvania & Ohio Railway Company.

Atlanta, Ga.—Atlanta Traction Company.

Belleville, Ill.—St. Louis & Illinois Suburban Railway Company.

Cleveland, Ohio.—Lake Shore Electric Company.

Denison, Tex.—Denison & Sherman Railway Company.

Grand Rapids, Mich.—Grand Rapids, Holland & Lake Michigan Rapid Railway Company.

Hancock, Mich.—Houghton County Railway Company.

Kenosha, Wis.—Kenosha Street Railway Company.

Little Rock, Ark.—Little Rock Traction & Electric Company.

Maynard, Mass.—Concord, Maynard & Hudson Railway Company.

Oneida, N. Y.—Oneida Railway Company.

Plymouth, Mass.—Plymouth & Brockton Street Railway Company.

Providence, R. I.—Providence & Danielson Railway Company.

Pittsburgh, Pa.—Pittsburgh, McKeesport & Connellsville Railroad Company.

Richmond, Va.—Richmond Passenger & Power Company.

San Antonio, Tex.—San Antonio Railway Company.

COLONEL HEFT: I move that we tender a vote of thanks to the supply men for the magnificent manner in which they have conducted their exhibit at this meeting. (Motion was unanimously carried.)

The meeting then adjourned to reconvene at Sherry's, at 7:30 o'clock Friday evening, when the installation of officers was announced to occur.

Proceedings of the Street Railway Accountants' Association

FRIDAY MORNING

President Ham called the meeting to order at 10:30 a. m.

S. E. Moore, comptroller of the United Traction Company, of Pittsburgh, then read his paper on "Consumers' Accounts for Electric Lighting Companies." It will be published next week.

In reply to Mr. Mackay, Mr. Moore stated that the meter readings were carried on the original meter's loose leaf sheet, and all that went on the ledger was the net amount, which was the amount less the discount for cash. Mr. Moore further stated that the ledger was closed each month, and any balance due from the previous month was carried over, plus the discount. The company carried over what was unpaid. In the event of payment after the discount date and before the close of the month, the only note made on the ledger was that provided for in the blanks referred to in the report, and it showed the balance carried over, the exact amount due, adding the discount. For instance, the discount day was ten days after the bill was rendered. If the bill ran fifteen days, the dunning cards were sent out. In the course of three or four days more the current was shut off, and necessarily the amount carried over as falling due from that man would be the net amount; although afterward, when he paid and the discount was added to it, it would be added in the month that it was paid, this balance being carried from month to month.

The principal objection to the meter reader reporting to the customer the state of his meter was that memories were defective, and relying upon them led to trouble in the office with customers. The only advantage in it was that it saved trouble at the office.

In reply to a question, Mr. Moore stated that if a consumer had three contracts he would be in each of the books, one for power, one for arc and one for incandescent lighting, and one for anything else that they might have, and the consumer got three bills. Then, when they posted the cash they posted the coupons, and each of those coupons had reference to its own book, kept by the different clerks, and there was no conflict at all.

After some further discussion of this paper H. H. Vreeland, of New York, was introduced and addressed the convention.

Mr. Vreeland said he was very glad to see so representative a gathering of accountants. A great deal of time and money had been spent to make the convention worthy of Greater New York. Vice-President Skitt, of the Manhattan Elevated; President Greatsinger, of the Brooklyn Heights system; President Heins, of the Brooklyn & Coney Island Railroad Company; President Beetem, of the New York & Queens County Road; President Maher, of the Union system, and Vice-President and General Manager Young, of the North Jersey Street Railway Company, Mr. Vreeland said, were all on the general committee, and had all joined in the work and had put no limit upon him (the

speaker) as chairman of the general committee, in the way of expense to make this a very satisfactory and representative meeting.

The work which the Accountants' Association was doing could not be over-emphasized as to its importance, he said, and he thanked the convention for the opportunity of addressing them.

President Ham said that he wished to say, officially, for this association, that while it might be much smaller in numbers than the American Association, its appreciation of the courtesies extended by the city of New York and its railway companies was fully as great as that of the other association. Furthermore, all the members appreciated most heartily the attitude of the American Association toward them at all times.

Benjamin F. Chadbourne, Railroad Commissioner of Maine, was then introduced to the convention. He said it was a great pleasure to him to meet with them on this occasion, and that he had a high appreciation of the work they were doing, which was brought under his observation many times. He was glad to say that the committee of this association, chosen to attend the National Convention of Railroad Commissioners, were now, under the constitution of the latter organization, elected to membership therein, and he believed they would be the means of doing a great deal of good, because it was a great benefit to every railroad man to understand what systematized accounting meant. It had been his painful duty to observe at times a sort of "now you see it and now you don't" system of accounting, and any movement toward a standard system was of great benefit to railroad corporations, to all commissions having anything to do with them and to the great investing public, who were watching at all times with a critical eye the management and operation of all railroad lines, whether steam or electric. He had come to this convention to meet the gentlemen of the Accountants' Association from a selfish motive. It was the desire of every man connected with railroads to find out what gave the best account, of the workings, the operation and the maintenance of street railways, and just in proportion as they became educated in these matters, they were more efficient as officers. He thanked the convention for the reception which they had given him, and should they ever come to the State of Maine, he would do his part toward their entertainment, and felt that he was safe in saying that they could find much to entertain them in the northeastern corner of this great country.

President Ham expressed the gratification felt by this association at the relations existing between it and the National Association of Railroad Commissioners, and said that it was due to Mr. Chadbourne as much as to anyone else that they owed a portion of the recognition which was afforded them.

Secretary Brockway then read the report of Mr. Tripp, chairman, of the committee on "A Standard System of Accounting for Electric Light Companies." This report will be published next week.

After some discussion on the report of Mr. Tripp a vote of thanks was tendered the National Electric Light Association for its courtesy in permitting its presentation.

Mr. Duffy, chairman, read the report from the committee on "Standard System of Street Railway Accounting," which will be published in the next issue.

The convention then resumed the discussion of the report of the committee on Storeroom Accounting, which was presented and discussed in part at the session of Wednesday afternoon.

The subdivision "Purchase—Requisitions for Purchase" was considered, and a vote taken resulted in a unanimous expression in favor of this clause and also in favor of clause 2 of the report, with the exception of the recommendation that the company send out its own billheads, on which point a vote taken showed a preference for this plan on the part of only thirteen members as against seven who did not approve of it.

The subject of lot numbers was then further considered, and in the course of the debate on this branch of the report the president asked for an expression of opinion as to the keeping of a stock ledger, showing an account of each individual item, and a vote thereon resulted, ayes 11, noes 7.

President Holmes, of the American Association, was then introduced, and expressed his pleasure at being able to appear before the convention, and compared present methods with those prevailing in the seventies, when he (the speaker) entered the street railway business as an office boy, and when they would have sometimes to unlock the old-fashioned Slosson fare boxes to get money enough to pay for corn, at \$1.50 per bushel, with which to feed the mules and horses. He believed the present meeting was the most successful in the history of the American Association, and that the results of the movement toward organizing the different departments of railroading would be of the greatest value. He hoped some day to see the associations again in the West, and to have the pleasure of meeting members personally.

Mr. Duffy moved that the STREET RAILWAY JOURNAL and the *Street Railway Review* be elected to honorary membership in the association in recognition of the past service that those papers had afforded. The motion was seconded by Mr. Burington, and carried.

The president introduced S. C. Cooper, of Cincinnati, who addressed the convention briefly.

The association then adjourned until 2:30 p. m.

FRIDAY AFTERNOON

President Ham called the meeting to order at 2:45 p. m. E. M. White, cashier of Hartford Street Railway, read a paper on "Conductors' Accounts," which will be published in this paper next week.

Mr. White added that since writing the report the company had made experiments with the comptometer, and found that they could do in an hour, or a trifle over, the work that without it was taking from three to three and a half hours to perform.

Mr. Duffy recommended the use of computing machines to all who had not already adopted them. His company were using the Burroughs register accountant, or, as it was called in Chicago, the Burroughs arithmometer. The comptometer did not record; the arithmometer did. In other words, the latter was an adding typewriter. They had been using the arithmometer since April, 1900, when they got three of them, and found them a wonderful help.

Mr. Hibbe called attention to the invention of Mr. Wilson, of Boston, a member of the association, of a tabulating typewriter, which was well worth looking into, and which Mr. Duffy said he regarded as another step forward.

The president called for a show of hands from those who favored the counting of the returns of conductors by trips or by the day's work, as applied to those only who counted the conductors' money instead of receiving it through a sack. Four members indicated a preference for counting the money by trips, while ten employed receivers to count it at the end of the day's work.

Mr. White showed a picture of the register to which he had referred, and explained the manner of its working. He said it was known as the Hartford Street Railway Register. Before the conductor could reset it he had to turn a button, and that did the printing. The register was locked all day; the conductor could not get at it. All he had to do was to turn the button, and print what was visible.

After considerable further discussion of this paper, Mr. Mackay read a report on "Standard Unit of Comparison," which will be printed, like the other papers presented on Friday, in our following issue.

Mr. Duffy explained the use of the car-hour system, as in use in Chicago since Nov. 1, 1900, and said that he found the task of getting the car hours very easy and simple. They had not increased their office force, nor neglected anything else that needed to be done, and yet they had all this additional information, given by keeping the car hours. There was no question in his mind that as compared with the car-mile, it was a far superior unit, more equitable, more practicable and fairer.

On motion, the report of the committee was adopted.

Mr. Judson, accountant of the Board of Railroad Commissioners, of the State of New York, then addressed the convention, and spoke very emphatically of the help which they had derived from the work of this association. He said, that beginning next year, they would use the car-hour basis.

The president read the following telegram received from ex-President Calderwood, of Minneapolis:

"To the boys I send a greeting. Wish you all a profitable and pleasant meeting."

The president stated that it had been the intention to discuss further the report of the committee on storeroom account, but on motion of Mr. Ross, of Montreal, further discussion of this question was postponed until the next meeting, and the same committee was continued, with power to add to their number, and with instructions to submit with their next report the forms which they proposed.

Mr. Poole, for the committee on resolutions, presented resolutions thanking the various street and elevated railway companies of Greater New York for their many courtesies; the press of New York, and the STREET RAILWAY JOURNAL and *Street Railway Review* for their co-operation; Mr. Heminway, for acting as secretary in the absence of the secretary; and the various officers and committees for their services to the association.

On motion, the report was adopted.

The committee on nominations presented the following report: For president, H. C. Mackay, of Milwaukee.

First vice-president, C. L. S. Tingley, of Philadelphia.

Second vice-president, W. B. Longycar, of Brooklyn.

Third vice-president, S. C. Cooper, of Cincinnati.

Secretary and treasurer, W. B. Brockway, of New Orleans.

Executive committee: W. F. Ham, of Washington; F. R. Henry, of St. Louis; Irwin Fullerton, of Detroit, and D. D. Bartlett, of Boston.

On motion of Mr. Duffy the report was accepted, with the thanks of the convention for the very good selections made by the committee.

On motion of F. E. Smith, of Chicago, the secretary was instructed to cast one ballot for the officers nominated.

The secretary cast the ballot accordingly, and the president declared the gentlemen named duly elected to the respective offices.

President Ham thanked the members for the successful manner in which the convention had been conducted. He said the attendance had been very gratifying, and that they had added one more to the successful list of meetings of the association.

President-elect Mackay was then conducted to the chair and expressed his appreciation of the honor conferred by his election as president, and assured the association of his best efforts in its behalf.

Adjourned.

The Banquet

The twentieth annual convention of the American Street Railway Association was fittingly concluded on Friday evening by the banquet given in the large ballroom at Sherry's, Forty-Fourth Street and Fifth Avenue. This ballroom, which for beauty of decoration, is probably not equalled outside of a few of the State ballrooms in Europe, was completely filled by long tables, which were entirely occupied by guests. In spite of the fact that the room is large enough to accommodate the many large dinners given there every season in New York, its capacity was not sufficient for those who wished to attend the banquet of the American Street Railway Association. In consequence of this the banquet committee, who foresaw this condition of affairs, was reluctantly compelled to provide a separate dining-room for the ladies. This, however, was on the same floor as the main dining-room, and the doors were opened between the two so that the festivities and singing were in common. In all, there were 468 diners, of whom about one hundred were ladies.

The two seats of honor at the head of the table were occupied by the retiring president, Mr. Holmes, and the incoming president, Mr. Vreeland. Also at the head table were the officers and executive committee of the association, the speakers of the evening and the invited guests, who included William C. Whitney, Thomas F. Ryan, John D. Crimmins, Henry Sanderson and others.

The repast was served in Sherry's best style, and was heartily enjoyed by all. A souvenir menu, attractively engraved and containing a series of historical pictures, was presented to each guest, and two orchestras—one in the main dining-room and one in the ladies' room—discoursed music during the evening.

After the dinner had been served the ladies took seats in the large gallery surrounding the main dining-room, and President Holmes made his official farewell in the following address:

ADDRESS OF EX-PRESIDENT HOLMES

It is not always wrong to be proud. At times every man ought to be proud. It is my turn to be proud to-night. I shall not miss my turn. I am proud to be the president of this organization at the time of its most successful meeting. Of all our twenty conventions this has certainly been the most nearly perfect of all. We have literally had the "freedom of the city"—this most wonderful city of the world. We have had the unwearied attention of the bravest of men and the fairest of women. We have been "personally conducted" by every conductor in the metropolis, from the chief executive of the city and President Vreeland down to the smiling manipulators of the punch. Our money has been refused and our paths have been upholstered with roses. From the highest to the lowest we have received a courtesy which will not end with this matchless banquet—a courtesy which will surely yield friendships and sweet memories which will end only with the close of life. Is it any wonder that I am proud? Can any man blame me for being proud? Can anyone here refrain from showing this pride with me? I think not.

Gentlemen, I wish here and now to thank you for the honor you have conferred on me in the past year—an honor which I shall soon lay down, but which I shall never forget. I congratulate you, as I do myself, on having been permitted to enjoy the fascinating and instructive sessions of the convention. No meetings were ever held in this country more deserving of the profound respect of the most critical.

Gentlemen, we have come to that part of our programme in which I know I ought to disappear. I am a good man with knife and fork but a poor hand at talking. I have asked our chief entertainer, our host of hosts, Mr. Vreeland, to take up the pleasant and, for him, congenial task of managing the silver-tongued orators who are to further entertain us this evening. Mr. Vreeland will please take the chair.

Gentlemen, I thank you, and introduce one who needs no introduction, President Vreeland, of New York.

REMARKS OF PRESIDENT VREELAND

President Holmes, Members and Guests of the American Street Railway Association—I have received a great many compliments upon the manner in which the affairs of this association and its convention have been conducted, and I want to say that you are just as much indebted to President Greatsinger, of the Brooklyn Rapid Transit Company; President Heins, of the Coney Island & Brooklyn Railroad Company; General Manager Beetem, of the New York & Queens County Railroad Company; President Maher, of the Union Railway Company; Vice-President Young, of the North Jersey Railroad Company; General Manager Skitt, of the Manhattan Elevated Railway Company; General Manager Bryan, of the New York Rapid Transit Company, and President Sanderson, of the New York Electric Vehicle & Transportation Company, who have all joined with the Metropolitan Street Railway Company in the invitation to hold our meeting in this city, and who have united with us in making the convention a success. The executive officers and staffs of the companies mentioned, who have been on the various committees, have attended very assiduously to the duties assigned to them; and it is but justice to them and myself to say that you are just as much indebted to them as myself.

We are honored to-night, gentlemen, with the representative street railroad men of the United States and Canada. We are also honored to-night with the presence of men of wealth, power and distinction of this and other communities, who have stood by us and held up our hands in carrying on the great work that has been intrusted to our care. The work in which we, as managers, are engaged, has made tremendous strides during the last decade. The street railways of the United States, with a half-century of experience behind them, only commenced to develop their resources a few years ago, in the way of consolidations, modern equipments, higher speeds, better standards of roadbed and rolling stock, and all that goes to make a first-class railway. We, without any experience back of us, without footprints that we could see, without any path blazed for us, had to take up the work, and, in conjunction with the great electrical manufacturing companies and supply houses of the United States, carry forward and bring to a financial success the properties intrusted to our care. The advance in electrical science during the past ten years has been at a very fast pace for all of us. Things that only four years ago seemed to be as perfect as could be evolved in the art have disappeared. Each year we are called upon to add to our electrical equipment and plant, and discard that which we thought a few years ago represented the highest point of perfection.

The work in which we are engaged, gentlemen, is a work that is probably as important a factor in the development of this country as any that is being prosecuted. The steam railroads have developed the great stretches of country, and we are aiming to develop and build up the interurban territory. We have developed that territory to such an extent that we have populated all of the outlying sections adjacent to the cities. We have made it possible for the poor man to own his home outside of the city environments, where there is fresh air and freedom for his wife and children.

Gentlemen, I now come to that part of the exercises which is the most pleasant, and that is saying a good word for our friends in Kansas City, and especially President Holmes. (Applause.) The entertainment that we received in Kansas City last year was unparalleled and unprecedented in the history of this organization. It is true that we have received a great deal of courtesy and attention in the various places where we have been, but I never received such courteous treatment and consideration from the leading citizens of a place as I did in Kansas City. The press, the legal profession and all the people turned out to do us honor, and it is but due to President Holmes for me to say here to-night that the great success of the convention last year, and the success that has followed the American Street Railway Association during the past year, and during this convention, so far as its proceedings are concerned, and the value of that to us, as railway managers, is very largely due to President Holmes, together with the executive committee, which has given us such a splendid session (applause).

There has been evidence of satisfaction on every hand. This satisfaction has been possible only by the co-operation of our members and their support of the efforts of the officers. I ask the same co-operation and support from the members of the asso-

ciation for the work of the next year. You, gentlemen, who bring with you your heads of departments, should see to it that they attend the business sessions of the convention. If they do not do this and take a proper interest in the proceedings, let them understand that they will not another year be permitted to attend the convention at the expense of the company. If we attend to these matters as we should, we will certainly have a successful convention next year in Detroit. (Applause.)

President Vreeland, who acted as toastmaster, then introduced Jocelyn Johnstone, who, in the absence of Mr. Guggenheimer, to whom had been assigned the first speech, replied to the toast on Greater New York. At the conclusion of this address the toastmaster called upon Hon. C. S. Glead, of Topeka, who spoke on "Our Friends, the Steam Railroads." The speech was an excellent one, and proved the justice of the title often given to the speaker of the "Silver-tongued Orator of the Sunflower State." Simeon Ford then responded to the toast of "The Kickers." Mr. Ford has a high reputation as a witty after-dinner speaker, and his response produced roars of laughter. Like all kickers, his criticisms were most severe, but this made the speech all the more amusing. T. C. Martin, editor of the *Electrical World and Engineer*, then replied to the toast of the "Technical Press." He sketched, briefly, the progress made in electric railroading during the last ten years, paid a well-deserved tribute to some of the pioneers in the art, and closed with a glowing eulogy of the benefits which had been conferred by street railways, and the prominent position taken by America in the development of the industry. The toastmaster then called upon Gen. Eugene Griffin to respond to the toast of "West Point and Annapolis." This speaker referred to the valuable contributions to electric railway invention made by graduates of these two schools, a record of which they must be proud, and which is a source of patriotic gratitude to every American. The Hon. John S. Wise then spoke on the "Mule in the Field of Traction." Mr. Wise was one of the associates of Mr. Sprague in his early Richmond work, and had charge of all the early litigation between the electric railway companies and the telephone companies in regard to interference with the ground return of the latter by the return circuit of the electric railway companies. Other toasts were: "The Street Railway in Law and Politics," by Job E. Hedges, and "The Only Railroad Man I Ever Knew," by Martin W. Littleton. The guests did not depart until after 1 o'clock, when the exercises were finally concluded to the tune of "Auld Lang Syne," in the singing of which all joined.

Change of Ownership at Atlanta

The recent transfer of the interests of Joel Hurt and his associates in the Atlanta Railway & Power Company, of Atlanta, Ga., to a syndicate composed of the Old Colony Trust Company, of Boston; New York Security & Trust Company, of New York, and the Mercantile Trust & Deposit Company, of Baltimore, finally brings to a close the lasting and bitter controversy between that company and the Atlanta Rapid Transit Company. The actual fight between the various interests began about three years ago, when H. M. Atkinson asked the City Council for grants in behalf of the Atlanta Rapid Transit Company along certain unoccupied streets and the right to condemn certain stated lengths of tracks belonging to the Atlanta Railway & Power Company. These grants were strenuously and bitterly opposed by the latter company, and fully three months were consumed in arguments before Councilmanic committees having the matter in charge. Finally, by a close vote, Mr. Atkinson and his associates were granted the franchises they had asked for. This, however, proved to be but the preliminary skirmish to the fight that was at once begun, and which continued without cessation up to November, 1900. Injunction suits were filed by both parties. The city, State and Federal courts were appealed to, and at length the United States Court of Appeals in New Orleans. While these suits were in progress a board of arbitrators named \$12,000 as the price to be paid by the Transit Company for the right to use the tracks of the Atlanta Railway & Power Company on Peachtree and other streets, which had been condemned. The Rapid Transit Company objected to this price and another suit was begun. According to the agreement entered into by both parties in November, 1900, all litigation was to have ceased. The Atlanta Railway & Power Company agreed to withdraw all its injunction suits then pending against the city of Atlanta. In turn the Atlanta Rapid Transit Company agreed to pay the Atlanta Railway & Power Company \$12,000 for the use of its tracks. In addition the company agreed to cease opposition to the effort of the Atlanta Railway & Power Company and its interests to secure an electric light franchise from the City Council. The termination of the fight thus reached in 1900, it was thought would preclude further differences, but in April, 1901, the controversy was again renewed.

The New President

Mr. Herbert H. Vreeland, the newly-elected president of the American Street Railway Association and the president of the Metropolitan Street Railway Company, of New York, is one of the ablest and best-known street railway managers in the country, and is often referred to as an example of the success which a man, unaided only by his own ability, can acquire in this country. He was born at Glen, N. Y., and was the youngest son in a family of several children. The determination and persistence to adapt himself in the most trying circumstances, which qualities won for him the position of president of the largest street railway com-



H. H. VREELAND

pany in the world, were early manifested by Mr. Vreeland, and at the early age of ten years he was engaged in driving a wagon in Jersey City, to which place his family had moved from Glen. When only thirteen years of age he was given a place under his brother as one of a gang of men and boys engaged at menial pay to fill ice carts for city delivery. In fact, it has been said that Mr. Vreeland's desire to work was hereditary, his father having refused a life of comparative ease and luxury in order to enter the ministry.

Mr. Vreeland, like many other prominent street railway men, received his early training while in the employ of a steam road. Entering the service of the Long Island Railroad in 1875, he remained with the company until 1881. His first position was on one of the company's night construction trains, but later his ability secured for him a position as inspector of ties and roadbed. The sum of \$1 a day accompanied this title of inspector. An accident on the road resulted in Mr. Vreeland being appointed as a switchman. The switch station was located near one of the company's division headquarters, and Mr. Vreeland, after having finished his day's work, was often to be found assisting the clerks at the division headquarters. Despite his assiduity, Mr. Vreeland was discharged at one time by the company, as the switch he operated was a temporary one, put in for construction purposes only. Mr. Vreeland appealed to the officers of the company, and was reinstated, being given a position as brakeman. After serving a few months he was appointed a conductor on a regular train, jumping a long "waiting" list. Control of the road passed into other hands shortly after, and under the new management he was given a most important charge by the president of the company. Again the control of the Long Island Railroad changed, and Mr. Vreeland severed his connection with it for good.

Promotions now followed rapidly. He next became connected with the New York & Northern Railroad, a short steam railroad running from 155th Street, New York, to Yonkers, and owned largely by William C. Whitney, Daniel S. Lamont and others. From the office of general manager of this road Mr. Vreeland was elected president and general manager of the Houston Street, West Street & Pavonia Ferry Railroad, then recently acquired by the same interests. In 1893 he was elected president of its successor, the Metropolitan Street Railway Company. It is quite unnecessary to recount his railroad experience since this time or to dwell upon the many problems of finance, construction and operation that he has surmounted, as they are familiar history. It is sufficient to say that it is mainly owing to his ability and experience that the

Metropolitan Street Railway has been brought to the state of perfection in which it is to-day.

Mr. Vreeland is a fine speaker, courteous, and popular with his force, associates and all with whom he is brought in contact. He is a member of a number of New York clubs, and has been honored with elections many times to offices on the governing board of the American Street Railway Association, New York State Street Railway Association, New York Railroad Club and other transportation organizations.

C. W. Wason

Charles W. Wason, purchasing agent of the Cleveland Electric Railway Company, and president of the Cleveland, Painesville & Eastern Railroad Company, received a well-deserved tribute in his election this year as first vice-president of the American Street Railway Association. Mr. Wason has a high reputation in electric railway affairs, not only as a builder and operator, but also as a financier.

Mr. Wason comes naturally by his mechanical knowledge, as his father was proprietor for a long time of the Wason Car Company. After being graduated with high honors at Cornell University in the mechanical engineer's course, Mr. Wason entered the services of the Cleveland Electric Railway Company, and went directly into the shops to obtain an intimate knowledge of the practical mechanical conditions surrounding the rolling stock of an electric railway and its equipment. In 1892 he was appointed electrical engineer of the Cleveland Electric Railway. In this capacity he has purchased practically all of the equipment used in the power stations of that company, and his progressiveness is shown by the fact that he was the first to use power-station units of 2400-kw capacity. He was also one of the pioneers in the establishment of interurban railways, and is largely interested in most of the interurban railways centering in Cleveland, as well as being one of the largest stockholders in the Everett-Moore syndicate. He is a firm believer in the financial possibilities of suburban roads, and was one of the first to advocate the construction of



C. W. WASON

these roads and the operation on them of high-speed cars. As president of the Cleveland, Painesville & Eastern Railway, one of the largest of the Cleveland interurban lines, he has introduced on that line a morning and evening express, or high-speed service, in which certain cars, making only a few stops, cater to the commuter traffic between Cleveland and the towns to the east of the city. This has resulted in building up a very large traffic of this kind.

Mr. Wason has also taken an active interest in the American Street Railway Association, has been a regular attendant at its meetings, and last year was a member of the executive committee of the association. Although naturally somewhat diffident as regards his own achievements, he has always shown a willingness to discuss the technical papers presented at the association, and his remarks have been characterized by great clearness and a thorough knowledge of the electrical and mechanical features of the street railway operation. Mr. Wason's home is in Cleveland, where he has a handsome residence on Euclid Avenue, the well-known residential street of that city.

The Automobile Ride

Through the courtesy of the New York Vehicle & Transportation Company, the ladies attending the convention were treated to a novel excursion on Friday, Oct. 11. President Henry Sanderson, of the automobile company, who was on the entertainment committee, placed at the disposal of the association a large number of his vehicles, giving much pleasure to all who could accept his hospitality.

When plans were made it seemed likely that not more than



THE ARRIVAL AT CLAREMONT

one hundred ladies would participate, but when the start was made from Madison Square Garden at 11:30 a. m. it proved that such an estimate and provision was alike inadequate. It had been in-

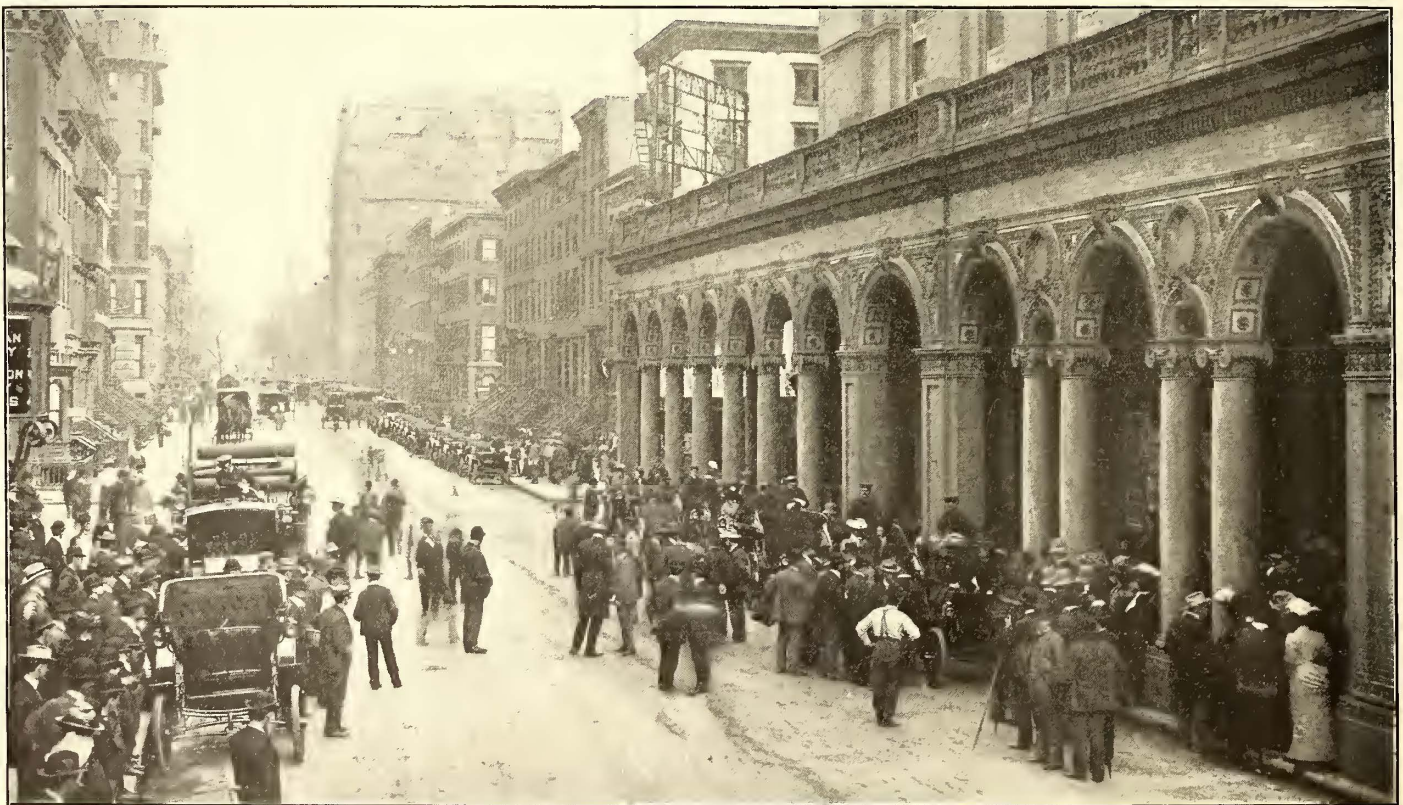
stopped at the Claremont. There the famous restaurant was practically turned over to the party, and an elaborate luncheon was furnished to the ladies and to some forty or fifty gentlemen who had proceeded to the same point by other means of locomotion. The entertainment committee was represented by Messrs. Sanderson, Brady, Cook, Meneely, Hasbrouck, Wakeman, Martin, Mullin, Palmer and other members, all of whom were actively employed for an hour or two in attending to the comfort of the ladies in their charge.

After the luncheon to the ladies, and while the committee itself snatched a hasty repast, the party, as a whole, visited Grant's tomb in the vicinity, or strolled about the plateau around the restaurant, looking down upon the new Lafayette Avenue viaduct, the broad sweep of the beautiful Hudson, the distant Jersey shore and the misty approaches to the Tappan Zee to the north. About 3 p. m. the party returned to the vehicles, which had been waiting on the drives around the inn, and proceeded back to the Garden. The trip was of a most joyful nature, the day being bright and the weather balmy, and no contretemps of any kind occurring to mar the enjoyment of the occasion.

Mr. Sanderson and his associates were not only voted hearty thanks, but all who participated are entitled to great credit for the smoothness and success with which the thing was handled. If the rush for seats in the automobiles is any indication of the feelings of street railway men toward the new means of locomotion, it might well be inferred that they view the coming of the electric automobile with pleasure, regarding it as a valuable adjunct to their existing systems, in the near future.

Distinguished Visitors from Abroad

As usual, there were a number of gentlemen prominent in electrical affairs abroad who were at the convention, and to those of them who had never before attended an American Street Railway



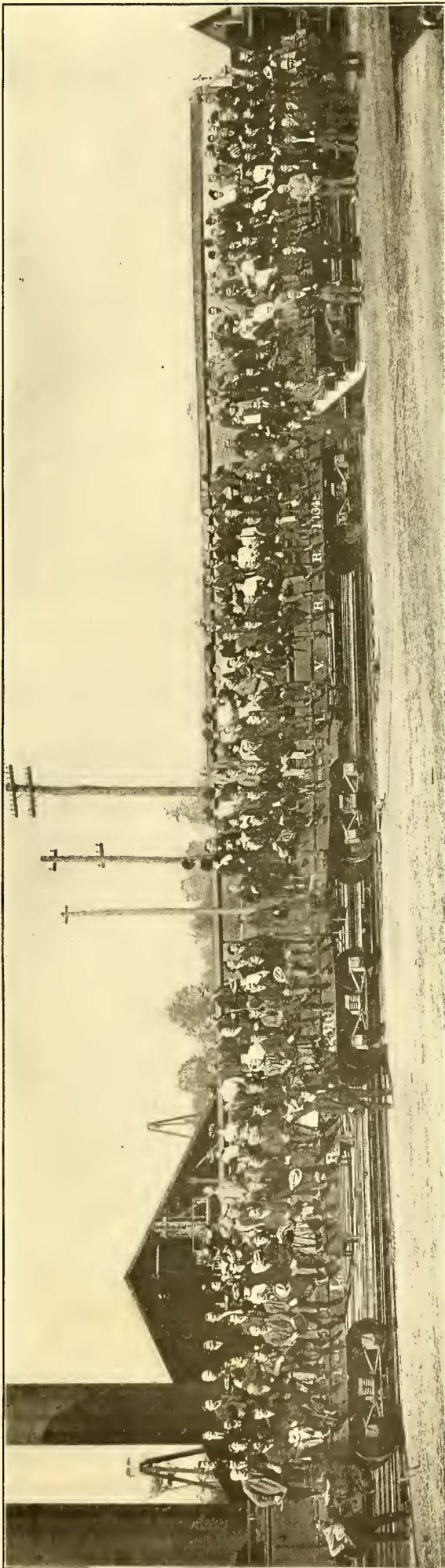
THE START FROM MADISON SQUARE GARDEN

tended at first to furnish accommodation for as many male delegates as possible, but it became necessary to exclude these altogether, and when at last the cavalcade was started, consisting of about 120 vehicles, and, inclusive of stages, wagonettes, park busses, hansoms, victorias and runabouts, no fewer than 360 ladies had been accommodated. It is true that quite a little crowding was necessary to make room for so many, but whatever crowding was experienced was endured quite good-naturedly.

The automobiles made a sensation as they passed through the upper part of the city. Proceeding at an easy pace, they went up Fifth Avenue to Central Park and then up the Eastern Driveway to 110th Street; they then crossed over to Riverside Drive and

Convention, the elaborate arrangements made for the entertainment of the delegates and the extent of the exhibits were a revelation of American enterprise in this particular.

Among the gentlemen present from abroad was Prof. Sidney H. Short, who, although an American, and one who has been most prominent in electric railway development in this country, is now technical director of the English Electric Manufacturing Company, and has been living abroad for several years. Professor Short was accompanied by Mrs. Short, and reached this country only a few days before the opening of the convention. One principal object of his visit to this country was to attend the convention, but he and Mrs. Short intend to remain in this country about



VIEW TAKEN AT THE BETHLEHEM WORKS

six weeks. They, of course, met many friends among the delegates and other attendants, and Mr. Short received many compliments on the work, in the manufacture of electrical apparatus, which is being carried out under his direction in England.

Another visitor from Europe was I. K. Sieber, engineer and general manager of the Nürnberg-Fürth Electric Railway Company, of Nürnberg, Germany. Mr. Sieber is on a visit of six weeks to this country to study American Railway conditions, and soon after the close of the convention left for Pittsburgh and the West, where he will carry out the course of investigation which has called him to this country. Prof. Gustav Gillon, of the University of Louvain, Belgium, was also in attendance at the convention. Professor Gillon has been in this country for about three months for the purpose of making a report to the Belgium government on the progress in electric railway construction in the United States, and returned to Europe this week.

The Trip to the Works of the Bethlehem Steel Company

A party almost 200 strong responded to the kind invitation of the Bethlehem Steel Company to visit its works at South Bethlehem, Pa., and left Jersey City, by a special train, at 8 o'clock on the morning of Saturday, Oct. 12. The excursion was in charge of H. F. J. Porter, of the New York office, who was assisted in his duties of host by H. E. Flewellin and from the time of leaving New York until the return, about 4:30 p. m., the guests enjoyed themselves to the utmost. A large number of ladies were in the party, and seemed to receive as much entertainment out of the heavy operations of steel manufacturing as the delegates did instruction. Upon arriving at Bethlehem, the special train was backed up against a train of flat cars, upon each of which three longitudinal seats had been arranged, and in this most comfortable manner one of the company's special locomotives drew the party through the works, enabling a close inspection of a number of the most interesting operations, such as pouring and the working of the hydraulic presses, which had been carefully timed to accommodate the arrival of the visitors. The large hollow-forged steel shafts which are to be placed in the Manhattan power station were, of course, one of the greatest features of interest, but the company had labeled all pieces of work, so that the delegates could readily appreciate the service to which the various heavy forgings, etc., lying around were to be used. Much interest was exhibited by the visitors in watching the numerous machines, where tools made of steel, manufactured by the Taylor-White process, were cutting steel without water to keep them cool. Many brought away $\frac{1}{4}$ -in. shavings made in this way, the heat of the operation having caused the steel to take on beautiful iridescent hues without affecting the temper of the tools. After the circumlocution of the works, the party adjourned to one of the company's dining-rooms, where a generous luncheon was served. Among those who participated in the pleasure of the trip were the following:

C. C. Martin, New York & Brooklyn Bridge; Y. Vasuya, Tokyo Densha Railway Company; E. A. Merrill, McIntosh, Seymour & Company; W. T. Thompson, Brooklyn Heights Company; Thomas Hawken, Rockland, Thomaston & Camden Street Railway, Rockland, Maine; Merle R. Griffith, St. Louis Transit Company, St. Louis; H. M. Hease, Buffalo Street Railway, Buffalo, N. Y.; T. C. Martin, *Electrical World and Engineer*, New York; Charles H. Smith, superintendent, Lebanon Valley Street Railway Company, Lebanon, Pa.; Luther Stieringer, New York, N. Y.; J. M. Smith, Toronto Railway Co., Toronto, Canada; Charles E. Warren, Metropolitan Street Railway Company, New York City; Lincoln Van Cott, Brooklyn Heights Railroad Company; Charles L. Hull, superintendent, Chicago General Railway Company, Chicago, Ill.; Frank H. Taylor, vice-president, Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.; Charles H. Bigelow, Boston Elevated Railway Company, Boston, Mass.; L. H. McLain, Massachusetts Railroad Inspector, Newtonville, Mass.; J. O. Kirkland, American Circular Loom Company, Chelsea, Mass.; J. R. Carrier, Connecticut Railway & Lighting Company, Bridgeport, Conn.; E. C. Foster and H. E. Farrington, Boston & Northern Street Railway Company, Boston; David Young, Charles H. Thorne, J. G. Elliott, E. D. Hibbs and E. N. Hill, North Jersey Street Railway Company; E. H. Mullin, General Electric Company; William C. Andrews, *STREET RAILWAY JOURNAL*; William R. Hill, Holyoke Street Railway Company; E. Woodruff and W. H. Glenn, Atlanta Railway & Power Company; W. E. Richardson, Allis Chalmers Company, Milwaukee; C. E. Corby, Metropolitan Street Railway Company; E. F. Schermerhorn, Weber Railway Joint Manufacturing Company.

THE EXHIBITS IN CONVENTION HALL

Last week descriptions, with a few illustrations, were given in these pages of a number of the exhibits at the convention. There was no intention made to include all of the exhibits or to pick out those of greatest importance, so that the list given below is in no wise supplementary to that given last week, but should be considered as simply the second installment that it is. Many of the booths in Convention Hall were described in considerable detail in the previous issue, and lack of space prohibits their repetition, but since those descriptions were published photographs have been obtained and are reproduced herewith.

THE STREET RAILWAY JOURNAL occupied one of the most prominent positions in the hall. It was on the right of the



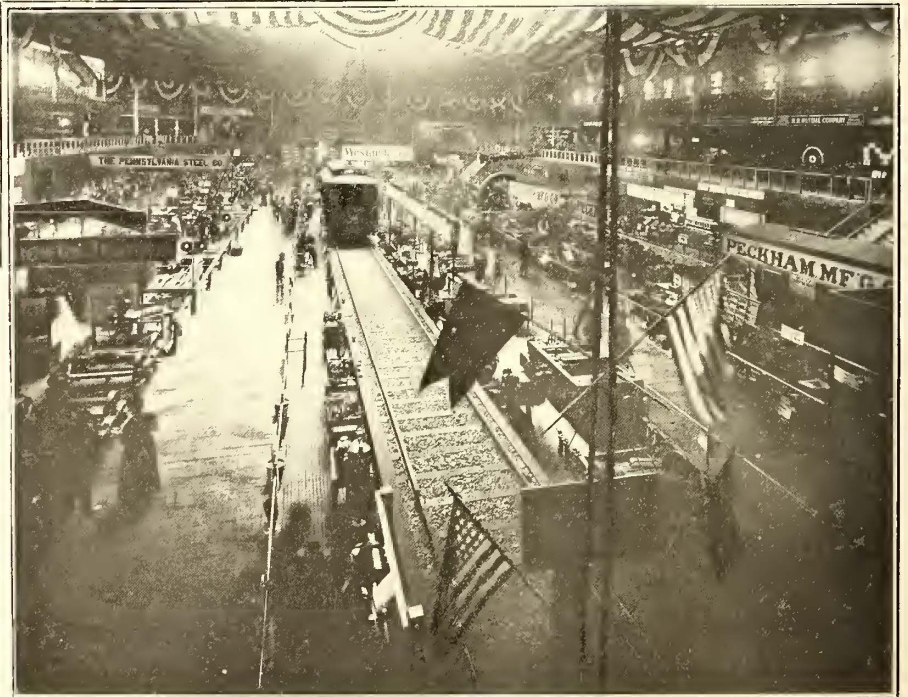
main entrance, and its friends among the delegates and supply men in attendance received the hearty welcome which it always extends upon such occasions. The numerous members of the STREET RAILWAY JOURNAL staff who were present were aided by representatives from both the editorial and business departments of the papers with which it is affiliated, including the *Electrical World and Engineer*, the *American Electrician* and the *Engineering and Mining Journal*.

THE ELECTRIC STORAGE BATTERY COMPANY, of Philadelphia, had an exhibit in the main hall. The interests of the "Chloride Accumulator" were ably looked after by Messrs. Blizard and Reynolds, of Philadelphia, and Taylor and Kundsén, of New York. The company showed a railway battery switch-board panel with differentially-wound motor-driven booster, and samples of typical railway cells. Among the new features in construction that are a step in advance are glass sand trays and alloy tanks. A map of the city, showing the locations of "Chloride Accumulator" installations by means of colored "bull's eyes," graphically illustrated by a liberal sprinkling of color, the confidence placed in storage batteries, by not only owners of isolated plants, but by the engineers of the railway and lighting companies. Col. G. H. Day, president of the company, also participated in the convention.

THE AMERICAN CIRCULAR LOOM COMPANY, of Chelsea, Mass., was well represented by H. B. Kirkland, general sales manager; J. L. Kirkland, New York office; Thomas G. Grier, Western manager, and R. B. Corey, New York agent. American circular loom is used extensively by the leading street railways all over the world, as street railway managers are beginning to realize that American circular loom can be applied to a great many purposes in street railway operation. The representatives distributed

some handsome souvenirs, which were especially attractive to smokers, to all their friends and customers who called at their booth in the main entrance hall.

THE CROCKER-WHEELER COMPANY, of Ampere, N. J., was one of the new exhibitors at the convention, the reputation which this concern has achieved in the other direct-current lines of electrical development being now supplemented by this new branch of its business. The company already has a large number of friends among street railway men, especially in the engineering departments, and the large illuminated sign which surmounted the space occupied by its exhibit attracted to the booth at all times a great number of old friends who were glad to see this new venture in railway power station development. Two large generators were shown, consisting of one 200-kw and one 400kw. The smaller machine was shown complete, but the latter was exhibited without its armature. The company, through its numerous representatives who were present, made a thorough canvass among the delegates and utilized the opportunities for making new friends most successfully, obtaining many new fields wherein to place their dynamos and boosters. The company already has a large number of its machines distributed throughout the country, and representatives of the roads using the apparatus helped its business considerably by their praise of its operation. The Waltham Street Railway Company, of Waltham, Mass., had installed a 400-kw machine and a



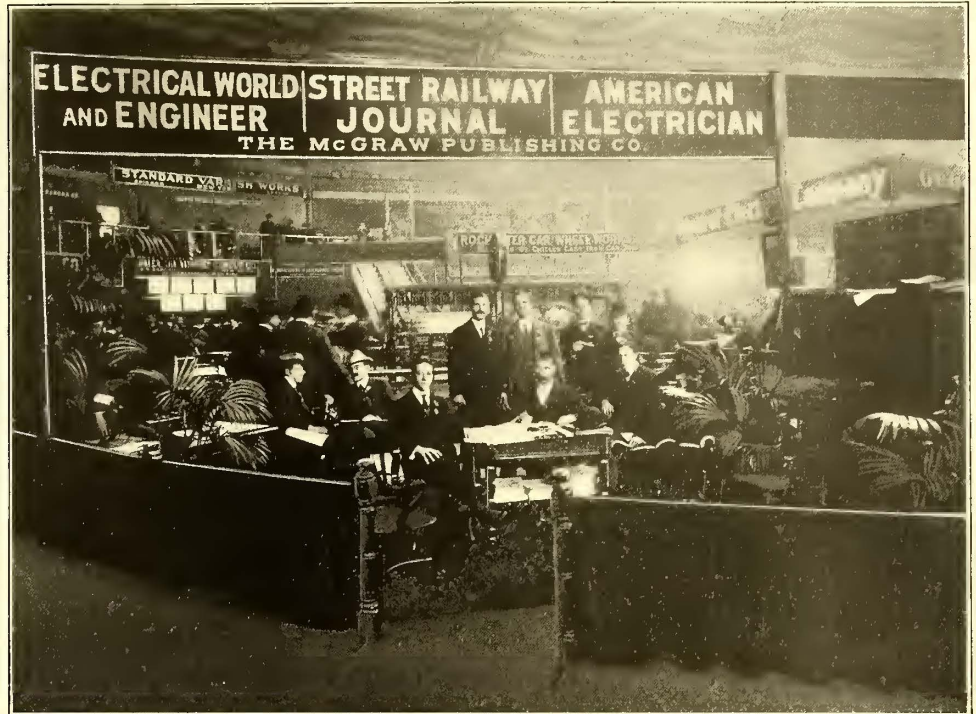
TWO VIEWS OF CONVENTION HALL

200-kw machine practically a duplicate of the exhibit at the Garden. Among the other roads using "C-W" apparatus may be mentioned John Blair MacAfee's Ohio River Electric Railway & Power Company, of Pomeroy, Ohio, which has two 200-kw generators; the Cumberland Valley Traction Company, which has one 200-kw machine; the Mt. Mansfield Railway, of Stowe, Vt., which has two 150-kw machines; the Detroit, Rochester & Lake Orion Company, of Rochester, Mich., which has two 200-kw and one 400-kw machines, together with two booster sets, and the Union Traction Company, of Anderson, Ind., which has nine booster sets. The Crocker-Wheeler Company was ably represented by a large number of its officers and managers of out of town offices, among whom were noted S. S. Wheeler, president; F. B. Crocker, vice-president; A. L. Doremus, secretary; P. A. Bates, assistant secretary; W. L. Brownell, treasurer;

G. W. Bower, assistant treasurer; G. S. Dunn, chief engineer; F. V. Henshaw, assistant engineer; H. L. Patterson, purchasing agent; A. Hartmann, superintendent; S. Russell, Jr., manager of the Philadelphia office; J. H. Craig, manager of the Boston office; L. P. Hall, manager of the Washington office; Julian Roe, manager of the Chicago office, and W. H. Wissing, manager of the St. Louis office. The exhibit was in charge of F. B. De Gress, manager of the New York office, assisted by L. P. Hammond and H. C. Mortimer, Jr. Its installation had been superintended by L. S. Horner, of the Ampere works.

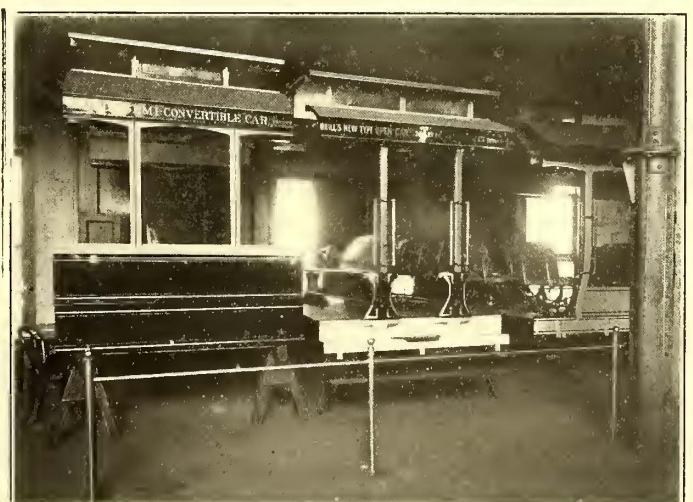
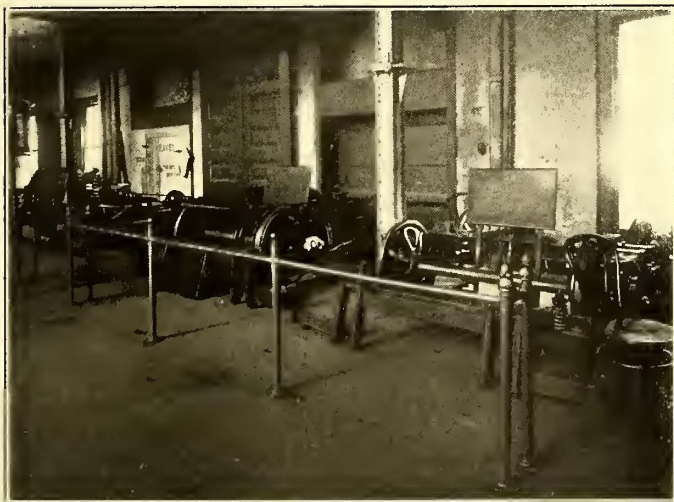
THE MAYER & ENGLUND COMPANY, Philadelphia, had a very extensive exhibit in the northeast gallery, which was always crowded. C. J. Mayer, A. H. Englund, H. G. Lewis, B. Hayllar, Jr., W. A. Armstrong, Jr., E. B. Ross and H. J. Mayer, of Philadelphia; W. A. Cockley, of New York, and G. W. Provost and J. A. Merrill, of Pittsburgh, formed the army of representatives this company had on hand. There was a special display of protected rail-bonds, with hydraulic tools for applying them. In the way of overhead material, there was a line of trolley-wire ears of the company's own design. The overhead material which this company exhibited showed that they have been making a specialty of extra-heavy patterns of overhead insulators for high-speed interurban work. The Keystone cable hanger, for supporting lead-covered cables in conduit manholes, was a new device which caused much favorable comment. Telephone apparatus specially adapted to the needs of street railway service was another interesting feature of this extensive exhibit. The concerns which the Mayer & Englund Company represents are the Speer Carbon Company, of which J. S. Speer was the representative at the convention; The Garton-Daniels Company, represented by J. V. E. Titus; the Sterling Varnish Company, represented by H. L. Bragg and S. C. Schenck; the Simplex Electrical Company, the Universal Safety Tread Company, W. C. T. Macallen Company, William

floor, frames, roof and a pair of posts on each side, precisely as though a section had been sawn from a car. This method of constructing a model has the advantage of showing the frame and the operation of the sash, curtains and panels. The first of these models was that of the new convertible car, the invention of John A. Brill. This car is arranged so that the sash and the panels below



HEADQUARTERS AT THE CONVENTION OF THE STREET RAILWAY JOURNAL

can be raised and placed in pockets in the roof, completely out of sight and out of the way. In doing this the interior form of the car is but slightly changed from the ordinary. The second model was quite as remarkable a departure from ordinary open cars as the other is from the standard type. It is an open car capable of operation upon trucks having equalized wheels, but is not wider than the standard car, nor is it necessary to carry it any higher.



TWO VIEWS OF THE EXHIBIT OF THE J. G. BRILL COMPANY

Hall Company, Strieby & Foote Company, the Trolley Vestibule Shade Company, the Sun Electric Manufacturing Company, and the Protected Rail-Bond Company. The Conant rail-bond testing instrument for testing the conductivity of bonds in place on the track, for which Mayer & Englund Company is sole agent, proved very interesting to track-work men.

THE J. G. BRILL COMPANY, Philadelphia, occupied an extensive space at the eastern end of the Garden. In it the company had a line of its most important trucks and a series of sections of cars, which were very much more instructive than the ordinary full-size cars. These models or sections consisted of

This is also accomplished by John A. Brill's ingenious inventions. The new type has been given the name of "Narragansett," as the first cars of the kind were sent to Narragansett Pier. It seems likely to be popular, as it meets the several wants of railway men which have not been hitherto supplied by any kind of car now in service. The semi-convertible car is a modification of the Brill convertible. The third model, which is of this type, is also of great interest to railway men, as it represents a successful solution to a problem which has long puzzled car builders. Those who were specially interested in the semi-convertible car found one complete in the Standard Traction Brake Company's section of the Westinghouse exhibit. This car was mounted on No. 27-F

trucks, and was for use on the Utica Belt Line. It had all the latest appliances, and in every way was finished with unusual richness. A number of the standard Brill trucks were shown adjoining the car sections. These included a No. 27-G, with solid forged frame and swinging links, arranged for one or two outside-hung motors; an unusually interesting No. 27-E of the heaviest type, as used

THE LEHIGH CAR, WHEEL & AXLE WORKS, of Catsauqua, Pa., was represented by B. F. Swartz, who was welcomed by his many friends. Mr. Swartz' face is a very familiar one at street railway conventions, he having for a number of years represented McKee, Fuller & Co., who were succeeded by the Lehigh Car, Wheel & Axle Works.

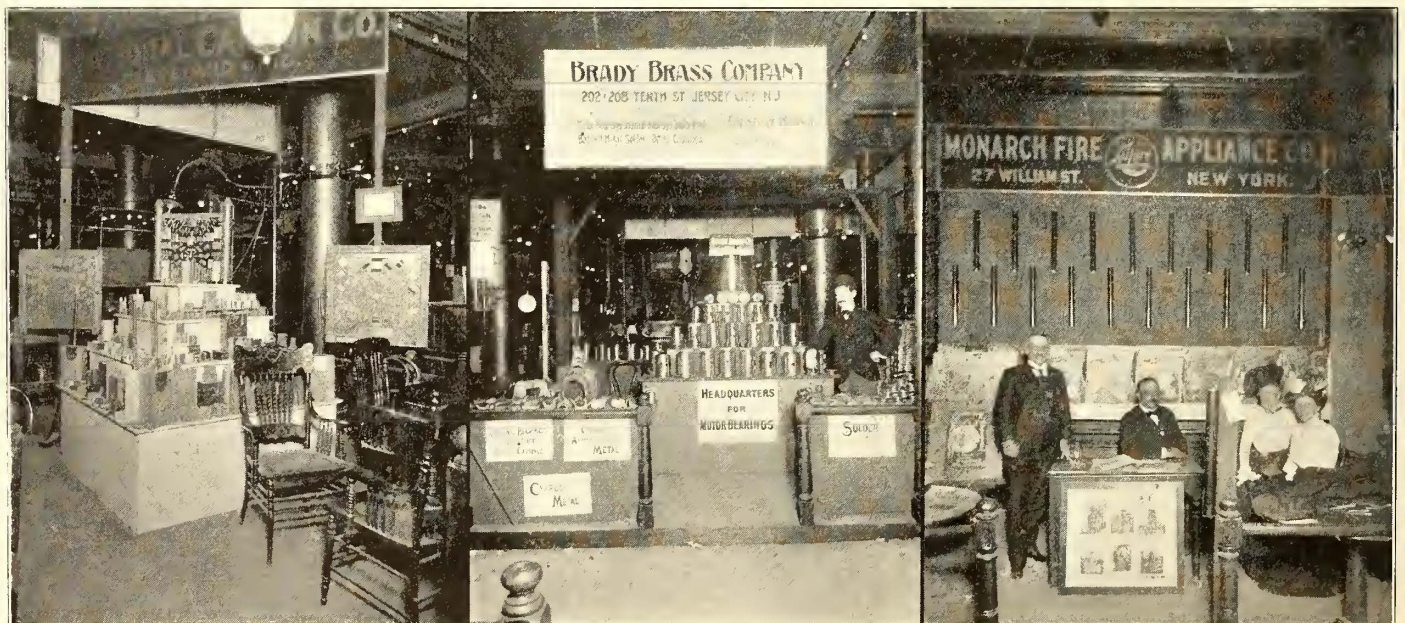


EXHIBITS OF PHONO-ELECTRIC WIRE, DE WITT SAND BOXES AND BARRETT LIFTING JACKS

on the Brooklyn elevated roads and the New York, New Haven & Hartford third-rail road; one of the well-known No. 21-E trucks, with half-elliptic springs at the end of the frame, which have become such favorites on long single-truck cars; and a "Eureka" maximum-traction truck, such as is in general use in Manhattan and Brooklyn. One of the features of the exhibit which might have escaped attention if notice had not been called

THE CRESCENT BRAKE-SHOE COMPANY, of Philadelphia, Pa., exhibited models of its apparatus, and was represented by J. M. Greene, treasurer.

THE SPEER CARBON COMPANY, of St. Marys, Pa., was represented by John S. Speer, general manager, and Andrew Kaul, Jr., treasurer. Mrs. Speer and Mrs. Kaul were also at the



EXHIBITS OF NATIONAL CARBON COMPANY, BRADY BRASS COMPANY AND MONARCH FIRE APPLIANCE COMPANY

to it by the gentlemen in attendance were the specimens of truck frames exhibited just as they came from the hammer. They had been left untouched, and those expert in forging were not a little surprised at the smoothness and accuracy of these large and intricate pieces of work. In two or three instances they were mistaken for castings on account of the complication of the form and the smoothness of the finish. A large number of Brill men were at the convention, among whom were John A. Brill, vice-president; James Rawle, secretary and treasurer; S. M. Curwen, general manager; W. H. Heulings, Jr., W. E. Partridge and E. P. Rawle.

convention with their husbands, and made many friends for the company.

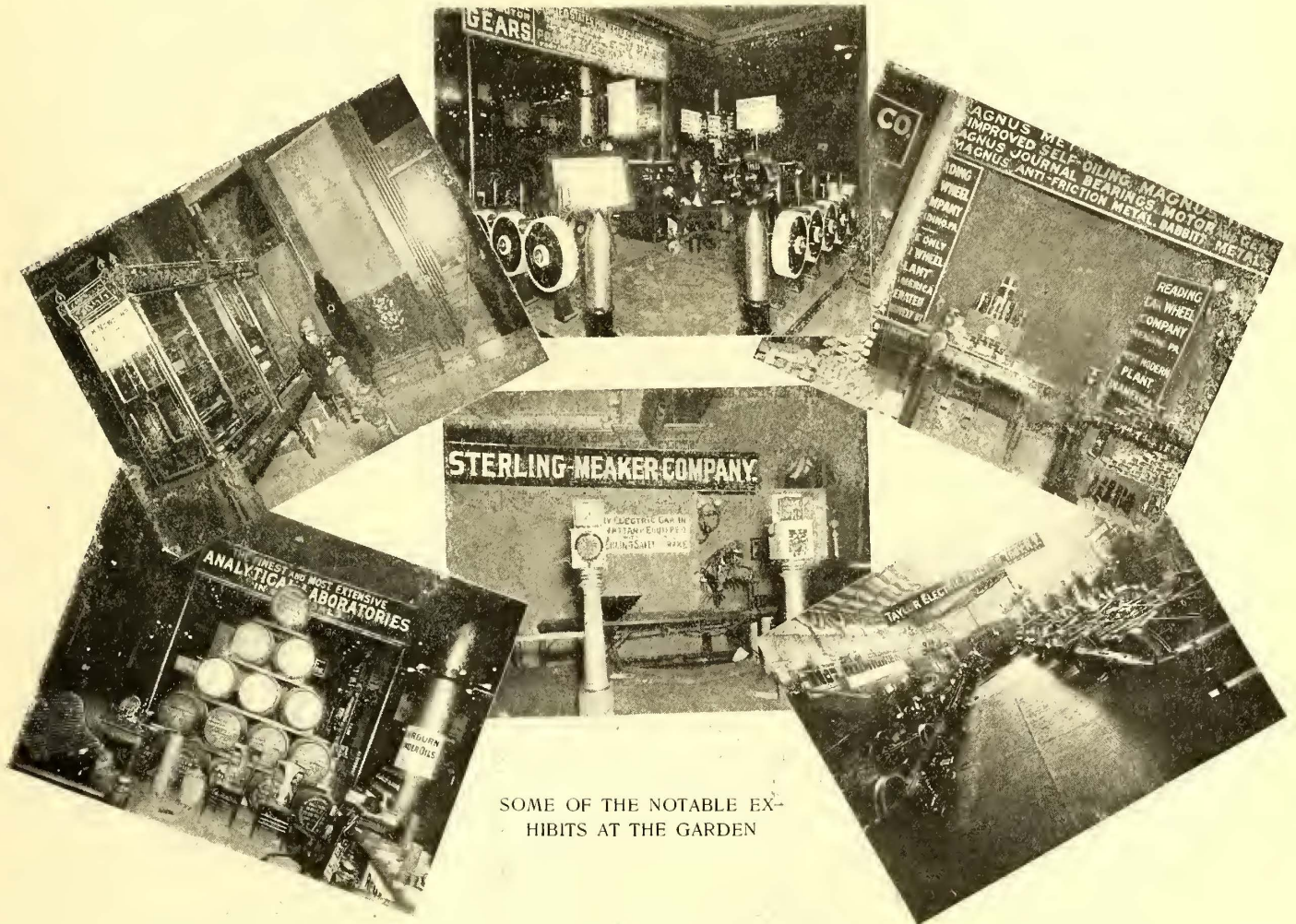
THE AMERICAN ELECTRIC SWITCH COMPANY had an exhibit with the Morris Electric Company, and was represented by W. S. Berry, general manager.

THE NILES CAR & MANUFACTURING COMPANY, of Niles, Ohio, was represented by W. C. Allison, general manager, and George E. Pratt, assistant general manager and contracting agent. Mr. Pratt was circulating among his many railway friends

securing contracts for cars to be built at the new works, which will be in operation in the very near future.

THE STANDARD PAINT COMPANY, New York, considered it sufficient simply to show the "P. & B." trade-mark, knowing that the company was well enough known without making

THE AMERICAN BRAKE-SHOE COMPANY, Chicago, showed various types of the famous "Diamond S" brake-shoes, which are in extensive use on railroads around the country. The Diamond S shoe consists of a body of soft cast iron surrounding and penetrating a bundle of expanded sheet steel, the idea being to combine the frictional properties of soft cast iron with the tough-



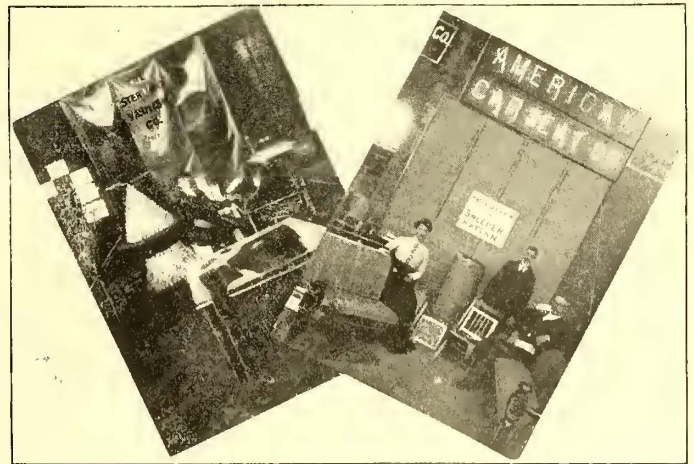
SOME OF THE NOTABLE EXHIBITS AT THE GARDEN

a warehouse display of its goods. G. A. Mayer, of Hamburg, Germany, said that his latest sale before leaving Germany for the convention was for Ruberoid roofing paint for the new wing of the Austrian Emperor's castle (Hofburg) in Vienna. The European factory is now in full swing, supplying all the European trade. Even now extensive additions to this factory are planned. Both the German and the United States governments made extensive purchases of Ruberoid at the time of the Chinese war. Ralph L. Shainwald, president; J. N. Richards, general superintendent, F. F. Van de Water, Charles Earnshaw, Boston representative, and G. A. Mayer, of Hamburg, formed the company's representation at the convention. The pleasant news was received from Buffalo during the convention that four medals and diplomas had been awarded the company at the Pan-American, with all its exhibits there not yet heard from. The space was very popular with souvenir hunters on account of a handsome leather pocket-book for bills and an ivory-handled paper cutter or envelope handle which were being distributed.

THE ATLAS RAILWAY SUPPLY COMPANY, Chicago, represented by J. G. McMichael, president, and R. B. Kent, exhibited the "Atlas" rail-joints, braces and tie-plates. This company also makes the "Atlas" priming and surfacing paints for street railway cars. Some striking examples of the finish this paint can put on to old and spongy car panels were shown. A car panel which had apparently outlived its useful life was finished with "Atlas" paint on a portion of its service, and the part so painted looked fully equal to new.

THE CRANE COMPANY, Chicago and New York, was represented at the Madison Square Garden by P. A. Kimburg. It is being congratulated upon the largest contract for valves and fittings ever let in New York, which is that for the new glucose works being built at Edgewater, N. J. This company is also furnishing valves and fittings for the new 100,000-hp plant of the New York Edison Company at Thirty-Sixth Street, and valves of this kind were on exhibition at the company's booth.

ness of the mild steel. The brake-shoe was tested by the Master Car Builders' committee, and fully met the specifications for coefficient friction, while at the same time being one of the durable class. The exhibit of the American Brake-Shoe Company was in charge of F. W. Sargent, managing engineer, assisted by the fol-



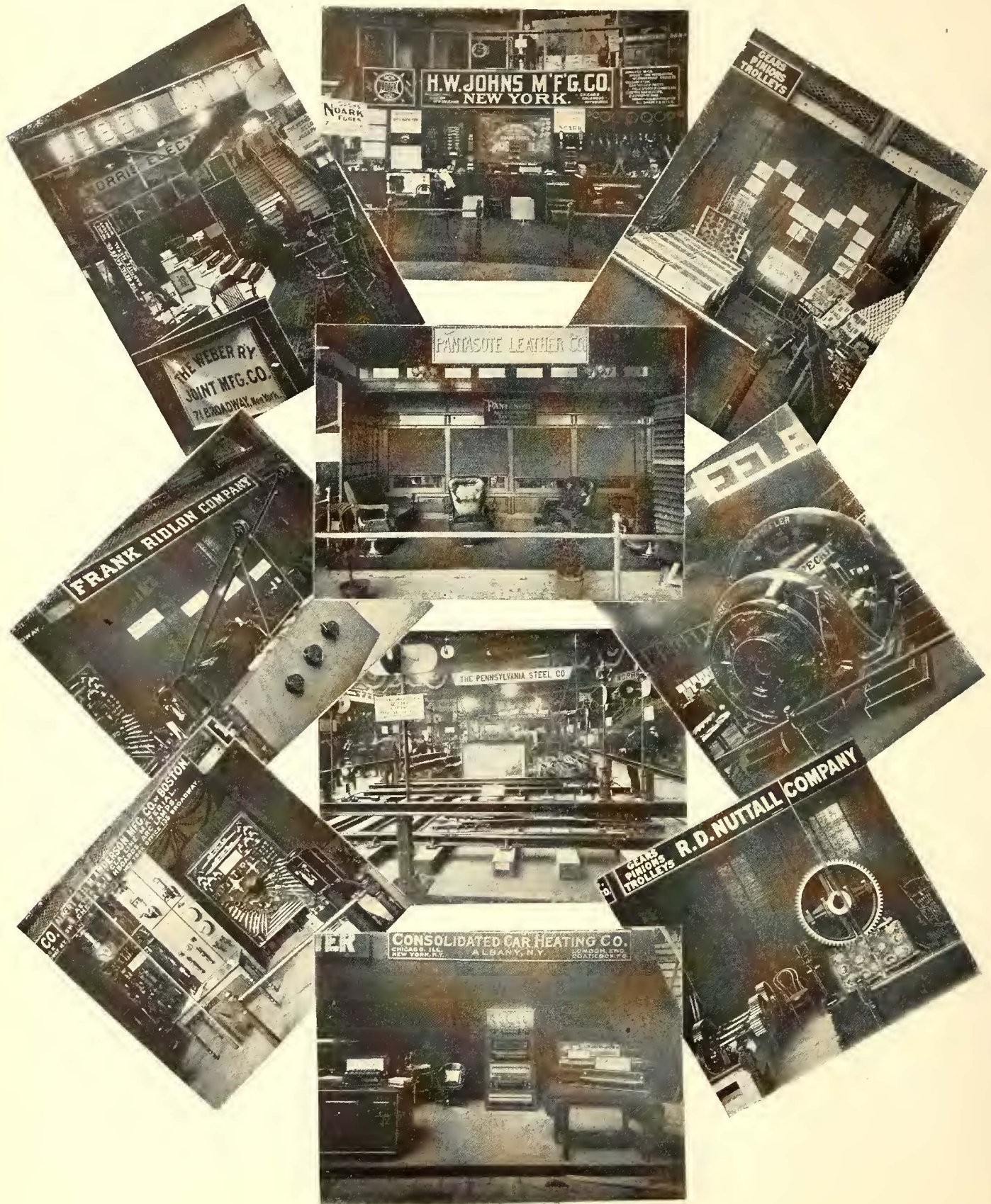
EXHIBITS OF THE STERLING VARNISH CO. AND AMERICAN CAR SEAT CO.

lowing representatives: Otis H. Cutler, Arthur Gemunder and W. W. Gardner.

THE PAIGE IRON WORKS, Chicago, had their exhibit delayed, but was able to present some photographs of their special track work, and was represented by F. A. Ingalls, vice-president, and E. S. Nethercut, engineer. These gentlemen also represented the Buda Foundry & Machine Company, of Chicago, which is closely allied to the Paige Iron Works.

PETER SMITH, president of the Peter Smith Heater Company, of Detroit, Mich., was at the convention, looking after the interests of his heater company.

gentlemen showed their usual activity in discussing wires and cables with the delegates and others. Samples of wires and cables of the company's manufacture were exhibited at the New York



A GROUP OF ATTRACTIVE EXHIBITS

THE W. H. COE MANUFACTURING COMPANY, of Providence, manufacturer of gilding wheels for car painters' use, was represented by C. H. Bowers.

THE STANDARD UNDERGROUND CABLE COMPANY was represented by General Manager C. J. Marsh, Eastern and Northeastern division; Manager T. E. Hughes, Southeastern sales department, Manager A. B. Saurman, Northeastern sales department, and Manager G. L. Wiley, Eastern sales department. These

office, 56 Liberty Street, and included all its many forms of underground, aerial and submarine cables and insulated wires.

THE WHEEL TRUING BRAKE-SHOE COMPANY, of Detroit, Mich., made its first exhibit at the Boston convention three years ago, at which time the representative of the company was kept busy telling street railway officers what the wheel truing brake-shoe would do. At the New York convention J. M. Griffin, president and general manager, says that he was kept busy

listening to reports of the satisfactory performance of this brake-shoe from numerous street railway managers. The shoe is now an article of regular consumption on some of the largest roads, including the Boston Elevated system, and the Milwaukee system. The company is also beginning to supply steam railroads with shoes for truing locomotive drivers. The shoe is in regular use

in steam railroad materials, rails, locomotives and scrap, purchasing largely from the Pennsylvania, Lehigh Valley, Philadelphia, Reading, Erie and other roads. For a long time they were sales agents for the Coplay pig iron, E. P. Wilbur, president. The lines now include trolley equipments, cars, motors and generators. They exhibited sample second-hand motors, as follows: G. E. 800, 1200, and Westinghouse 3, 12-A and 38-B. Their exhibit was one of the heaviest in the Annex, and created a large amount of comment.

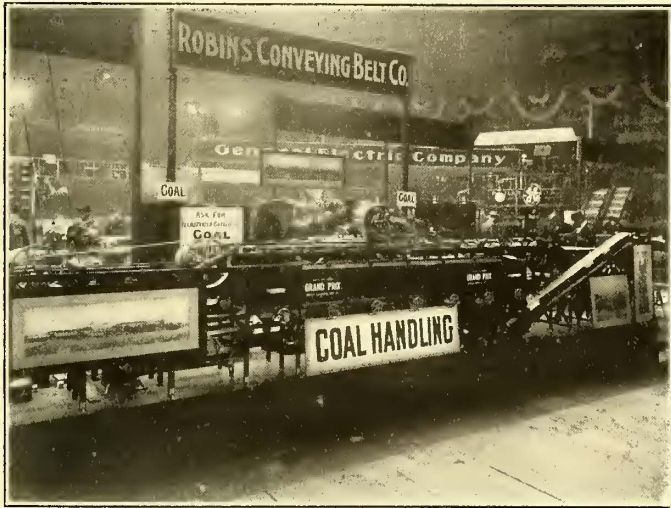


EXHIBIT OF ROBINS CONVEYING BELT CO.

on 200 railroads in the United States, and an increasing foreign business is being handled. What may have been considered defects in the earlier forms have been remedied, so that it acts to true up wheels under all conditions, whether the track is wet or dry.

VAN DORN & DUTTON COMPANY, of Cleveland, Ohio, made an exhibit of gears and pinions, and also showed its armature lift for use in power-house pits. This lift operates with a ball-bearing screw. W. H. Elliott and W. A. Dutton received visitors at this company's space.

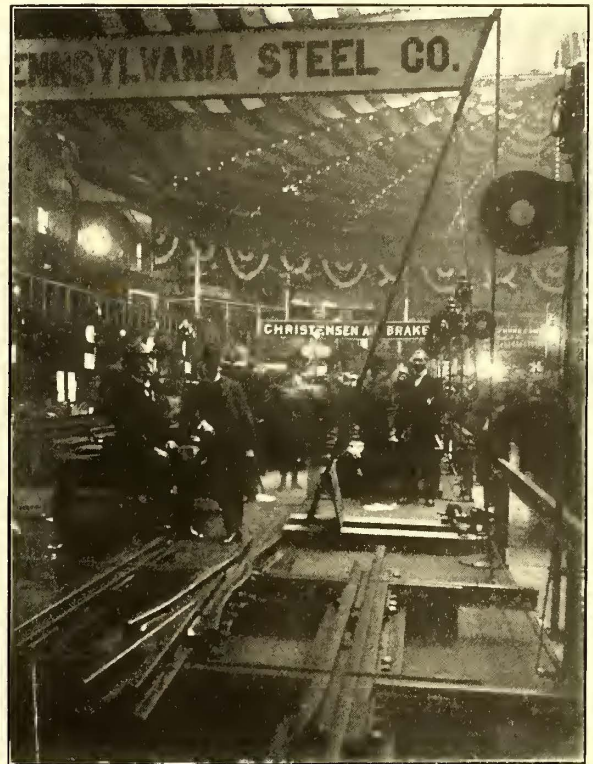


EXHIBIT OF PENNSYLVANIA STEEL CO.

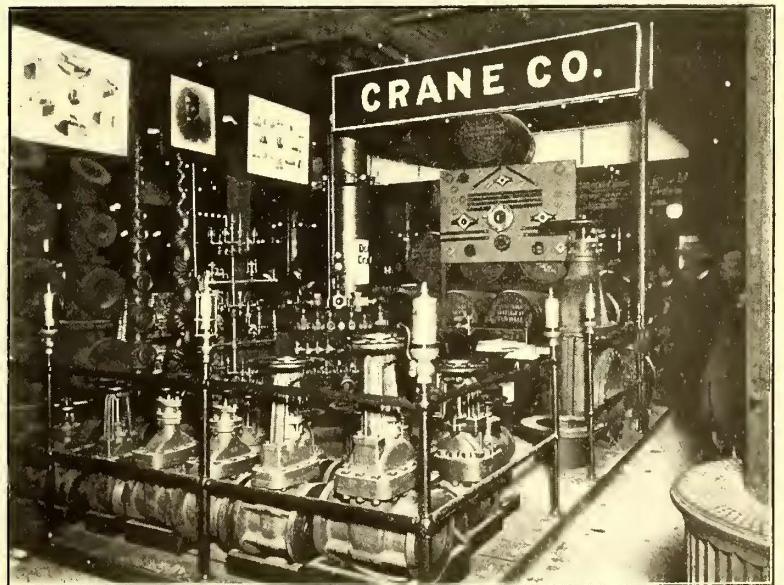
THE PARTRIDGE CARBON WORKS, of Sandusky, Ohio, had its usual desk full of carbon brushes, presided over by James T. Partridge, assisted by A. C. Henry.

THE SIMPLEX ELECTRICAL COMPANY, of Cambridge-



EXHIBIT OF COMPO BRAKE SHOES

DALLETT & COMPANY, of Philadelphia, were represented by Frank Dallett, senior member of the firm, and also by Charles F. Johnson, whose face is familiar to managers and purchasing agents in many parts of the United States. The house of Dallett is a prominent one in the commercial world, and the name for nearly a century has been identified with the business interests of New York and Philadelphia. They have for many years dealt



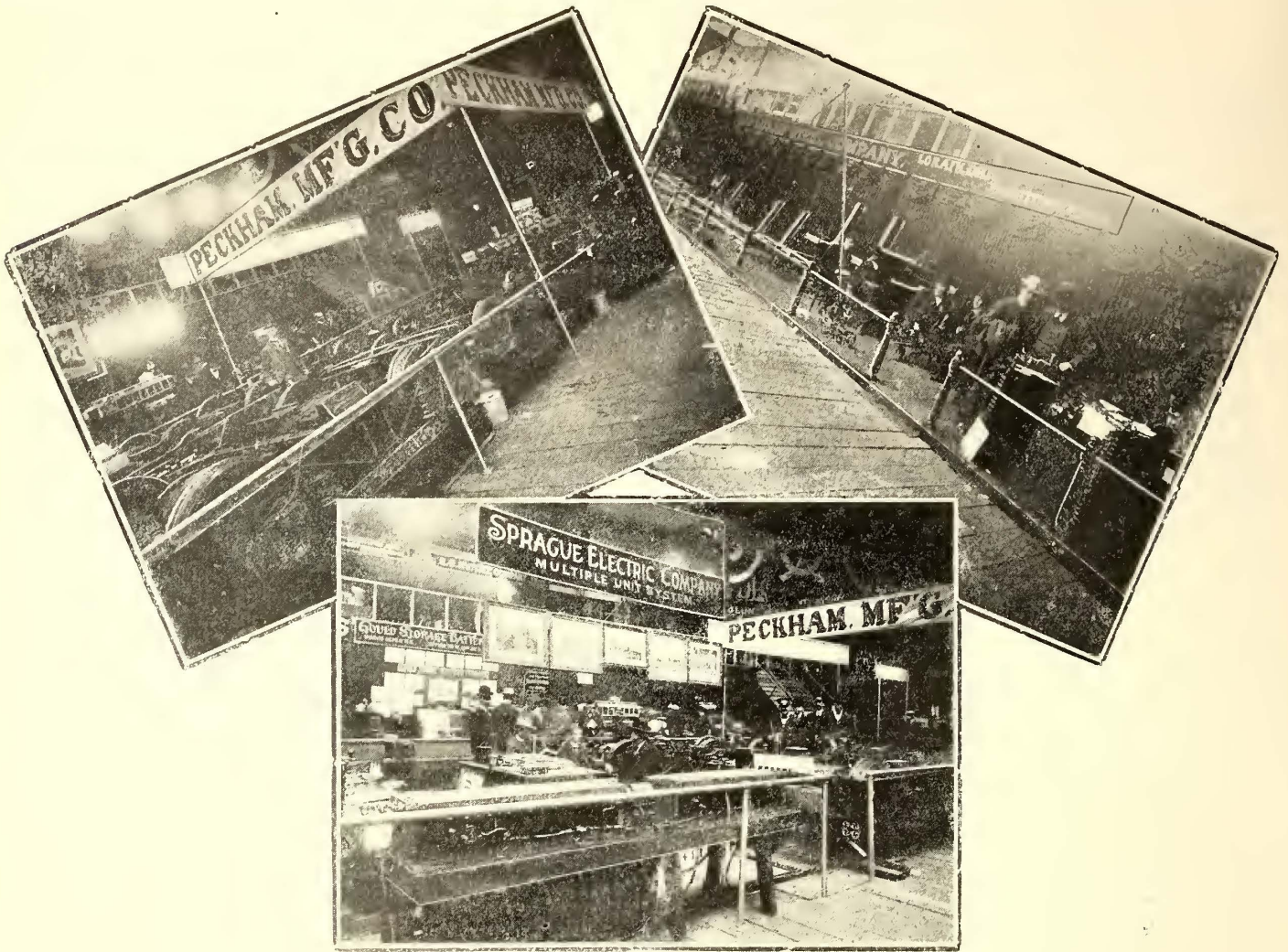
THE CRANE CO'S EXHIBIT

port, Mass., which makes the "American" car heaters, had a very attractive line of heaters, both for cars and general purposes, in the space of the Mayer & Englund Company. Roger Williams, who is exclusive New York agent for the American heaters, had charge of the display.

THE BRIDGEPORT BRASS COMPANY, of Bridgeport, Conn., had a very handsome exhibit of its well-known "Phono-

Electric" trolley wire. This wire combines high-tensile strength, high-elastic limit and great toughness, with remarkable wearing qualities. The "Phono-Electric" wire is being used extensively by the trolley roads in this country and Europe. This wire is homo-

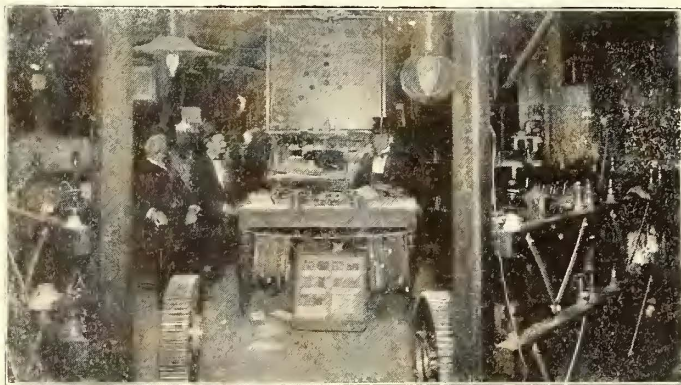
F. H. NEWCOMB, the well-known manufacturer of uniform caps, with office and factory in the borough of Brooklyn, exhibited a full line of caps for conductors, motormen, station agents, etc. Among those exhibited were the types in use by the New York



THE PECKHAM, LORAIN AND SPRAGUE EXHIBITS

geneous throughout, and does not depend upon a hardened skin for its strength, as does hard-drawn copper wire. "Phono-Electric" wire gives a security and permanence to the trolley line that is a source of much comfort to the linemen. A neat "Red Booklet," giving data on wire, was distributed by this company. H. G. Madden and Wylie Brown represented the company.

Central & Hudson River Railroad Company, New York, New Haven & Hartford Railroad Company, Metropolitan Street Railway Company, Brooklyn Heights Railroad Company, American District Telegraph Company, American Express Company, and many other leading and representative street railways, etc. Mr. Newcomb reports that the New York convention was the



THE STUART-HOWLAND EXHIBIT



THE MAGANN AIR BRAKE EXHIBIT

BALTIMORE CAR WHEEL COMPANY, of Baltimore, was represented by J. Paul Baker. Two trucks of this company's manufactures were in the neatly fitted-up space. One of these trucks was the "Lord Baltimore," a maximum-traction truck for city lines; the other a swivel truck for heavy work. Mr. Baker had a dusky gentleman of ten always on hand to see that no one carried off either of these trucks for souvenirs, so ravenous did the souvenir hunters become before the close of the convention.

most profitable one for his business at which he has ever had an exhibit. He was assisted in explaining the merits of the contents of his space by C. Murguinaldo and Edward Martin.

THE G. P. MAGANN AIR BRAKE COMPANY, LTD., of Detroit, Mich., known as the only company which makes a storage air brake, had its regular straight air-storage system for single cars laid out in operation on the floor of its space. It also had the new

train-control system, which is applicable not only to ordinary trains, but to those operating on the multiple-unit system. In this system each car is equipped with storage and auxiliary tanks, and the application of the brakes on each car is controlled by a valve

while at the same time each car is entirely independent of the others for its supply of air. The company was represented by E. C. Rutherford, J. C. Grace, W. K. Omick and H. Y. Harrison.

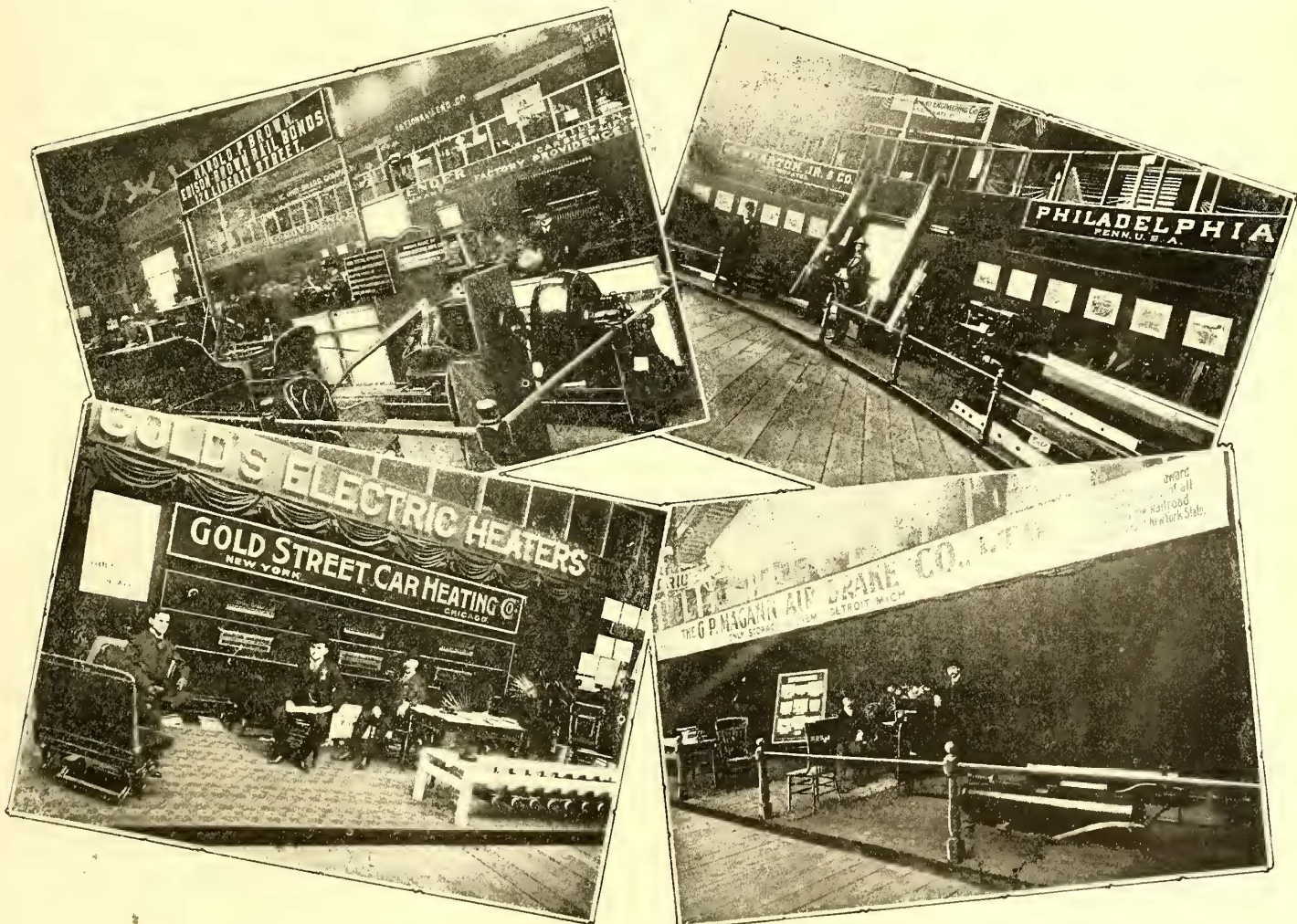
THE INTERNATIONAL FIRE APPLIANCE COMPANY, of New York, made a display of "Fyricide," a dry powder chemical



TWO VIEWS OF THE EXHIBIT OF THE CONSOLIDATED CAR FENDER CO.

operated by a slight reduction of air pressure in the train line. The air used in the train line is, therefore, only that sufficient to operate this small valve, and the economy over a system of straight

fire extinguisher especially applicable to buildings containing electric wires, where the application of water to extinguish fire might be dangerous. Max Elser explained its workings to the delegates.



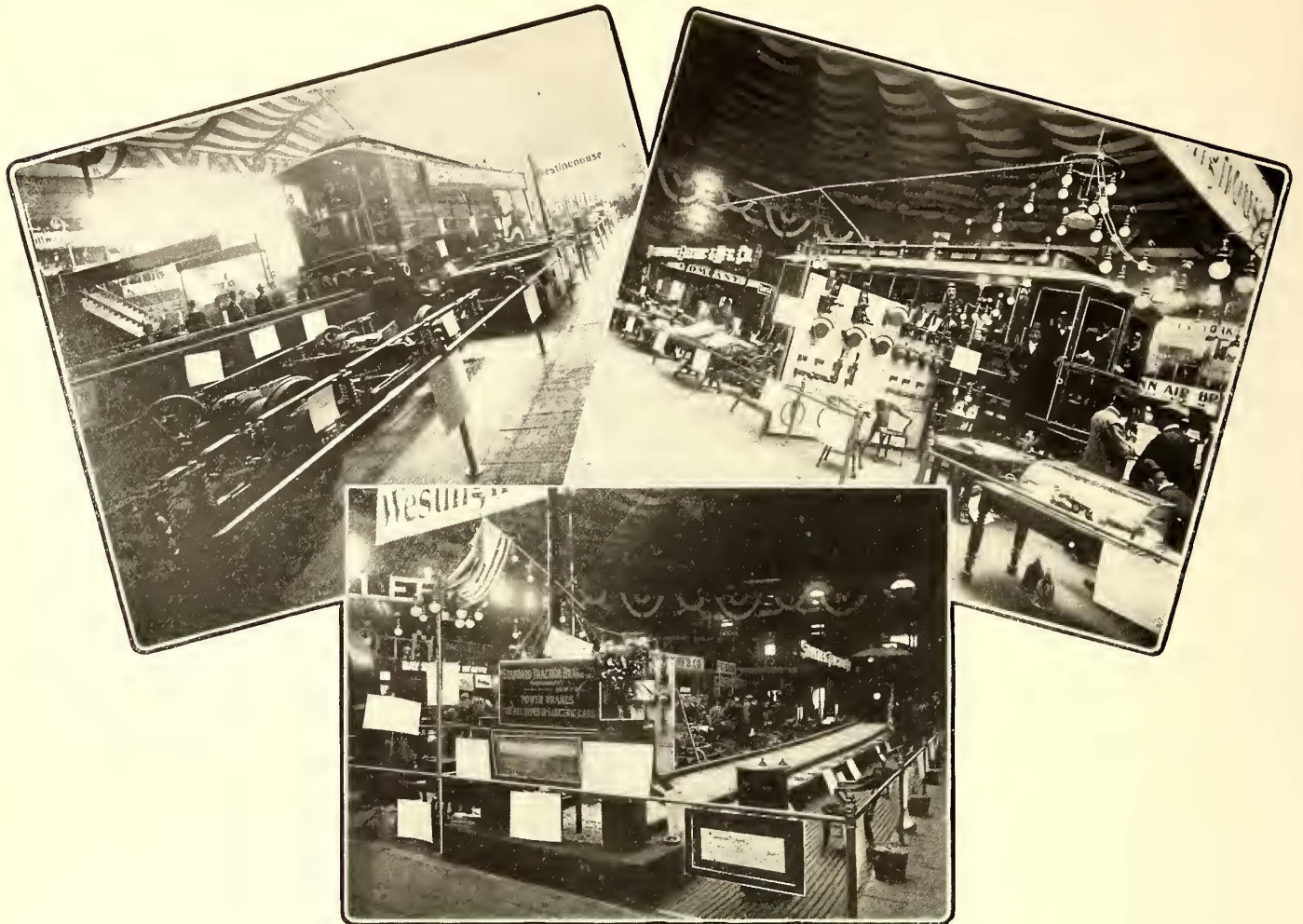
FOUR OF THE PROMINENT EXHIBITS AT THE CONVENTION.]

air brakes, where the pressure in the whole train line must be greatly reduced after each application, is claimed to be quite marked on short trains. This system also has the advantage that the air is stored under each car, and it is therefore possible to carry enough stored air for a much longer run than would be possible if all the cars in the train were supplied from one car,

THE NATIONAL CARBON COMPANY, of Cleveland, Ohio, had an exhibit of carbon brushes of all sizes and for all kinds of electric motors and generators, headlight carbons, "Columbia" dry batteries, etc. The company was represented by R. K. Mickey, of Cleveland, A. E. Carrier, its New York agent, and H. J. Davies, its secretary.

THE GARTON-DANIELS COMPANY, Keokuk, Ia, was at last able to present the "Automotoneer" in its perfected form.

ready to equip controllers with this apparatus in the belief that it will be thoroughly satisfactory. Indeed, it is hard to see how it

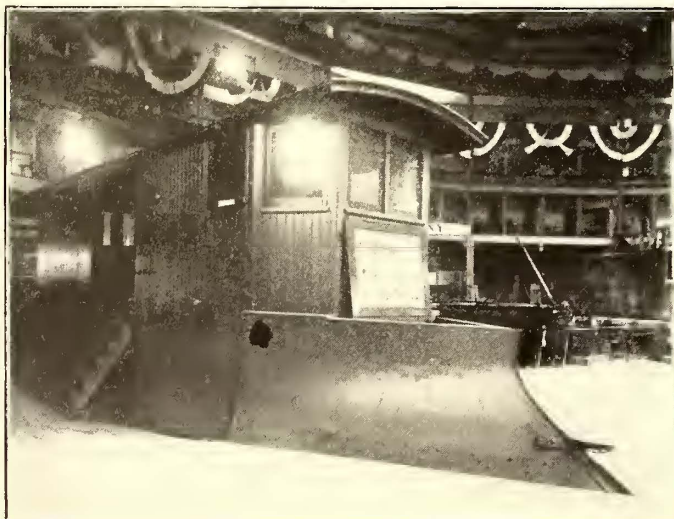


THREE SNAPSHOTS OF THE WESTINGHOUSE EXHIBIT

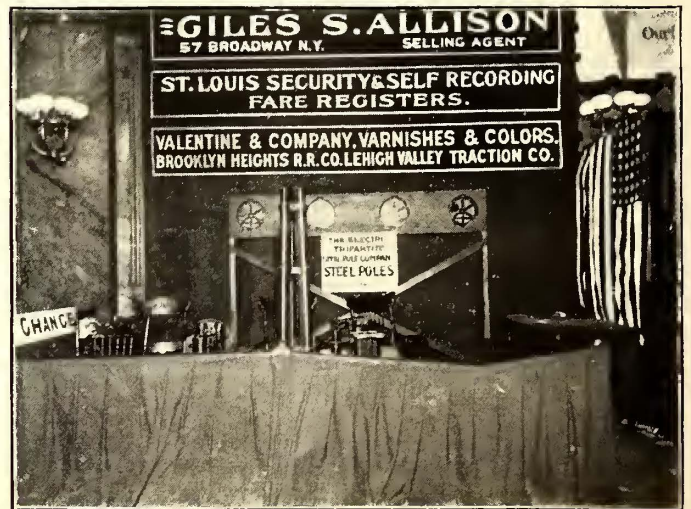
This company has done a large amount of experimenting in order to get this device into a simple practical form which would insure a minimum amount of attention and repairs. As most of the readers of this journal are probably aware, the "Automotoneer" has for its object the regulation of the rate at which current is turned on in accelerating a car. It was invented by G. W. Knox while

could be much simpler, consisting, as it does, of two gear wheels, a plunger and a wheel with four pins in its periphery.

THE CONTINUOUS RAIL JOINT COMPANY OF AMERICA, Newark, N. J., occupied a good position near the center of the Garden, where a full line of girder and T-rail joints was shown.



SNOW PLOW OF THE TAUNTON LOCOMOTIVE WORKS



COLLECTIVE EXHIBIT OF GILES S. ALLISON

with the Chicago City Railway, and the Garton-Daniels Company has been perfecting it under Mr. Knox's patents. J. V. E. Titus, general manager of the company, had the device at the convention, and was kept busy explaining it to interested street railway men. The company has heretofore hesitated to put this device on the market, because it was not satisfied that the design was the simplest and most practical one that could be used, but it now is

The girder-rail joints were in all sizes from 9 ins. Trilby rail to 4½-in girder. This company had a very full representation, as follows: Robert Gray, Jr., president; F. C. Runyon, secretary; Frederick T. Fearey, treasurer; L. F. Braine, general manager; H. M. Montgomery, of Chicago; W. C. Chapman, of Boston; B. M. Barr, of New York; W. C. Clark, of Chicago, and J. H. Brothers, of Newark

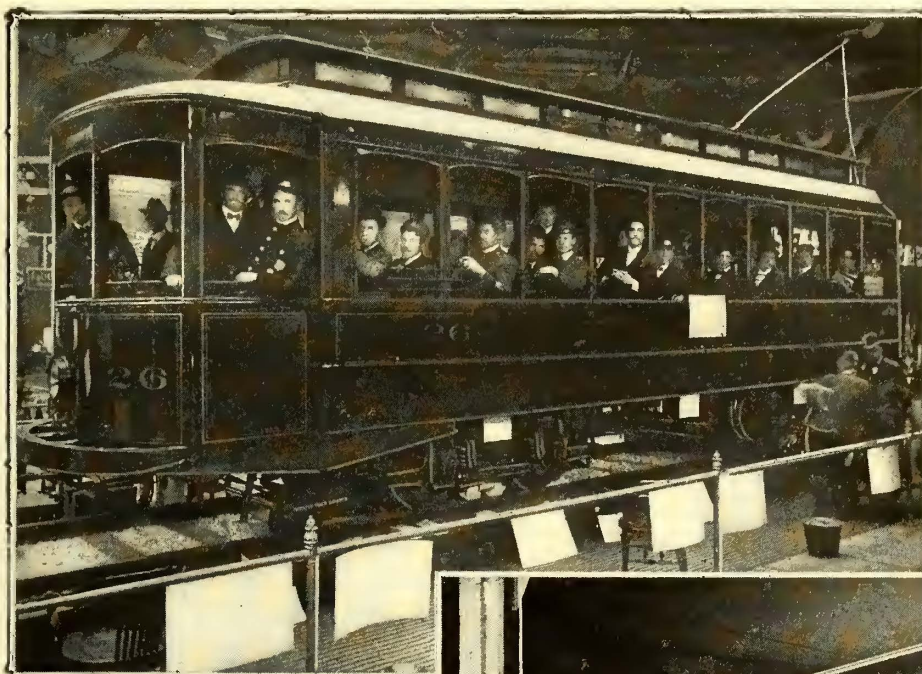
THE COMPRESSED AIR COMPANY, of New York, as mentioned last week, extended an invitation to visit the company's works at Rome. The invitation, of course, still holds good, and the company will be pleased to receive the names of delegates wishing to take advantage of this opportunity to investigate a most successful type of self-contained motive power. Tickets can be had at the company's office, 621 Broadway.

THE COLUMBIA MACHINE WORKS, of Brooklyn, N. Y., showed a most complete line of commutators and other of their specialties. The company was represented by J. G. Buehler,

the shape of representative samples of the well-known "Compo" brake-shoes, pulleys and clutch faces. W. W. Whitcomb, president of the company, and W. S. Sandborn were in attendance, and explained the merits of these novel devices to the delegates. The "Compo" shoe will retard the motion of a car, it is claimed, quicker, more effectively, and more smoothly than was formerly thought possible, in this way not only adding greatly to the comfort of passengers, but preventing collision and accidents. It is applicable to every system of electric, air and power brake mechanism, and is in use on many roads in New England and elsewhere. The novel feature of construction in this shoe is a series of cork

insets with which its face is studded, and which, from their tenacity and greater friction, give special advantages both in mileage and braking qualities. The interesting fact was told the delegates by Mr. Whitcomb that after several trials of various kinds of clutches on the immense traveling jib crane used in the construction of the Brooklyn approach of the new East River bridge, the "Compo" friction clutch was finally adopted, and is now working with perfect satisfaction.

THE TUCKER & CARTER ROPE COMPANY was represented at the convention by President W. A. Tucker, Treasurer H. E. Pierrepont, Jr., and Secretary J. G. Healy. Although the company had no exhibit, its products were shown in the spaces of several of the exhibitors who are the company's agents, and the members of the firm on hand did a large amount of work among



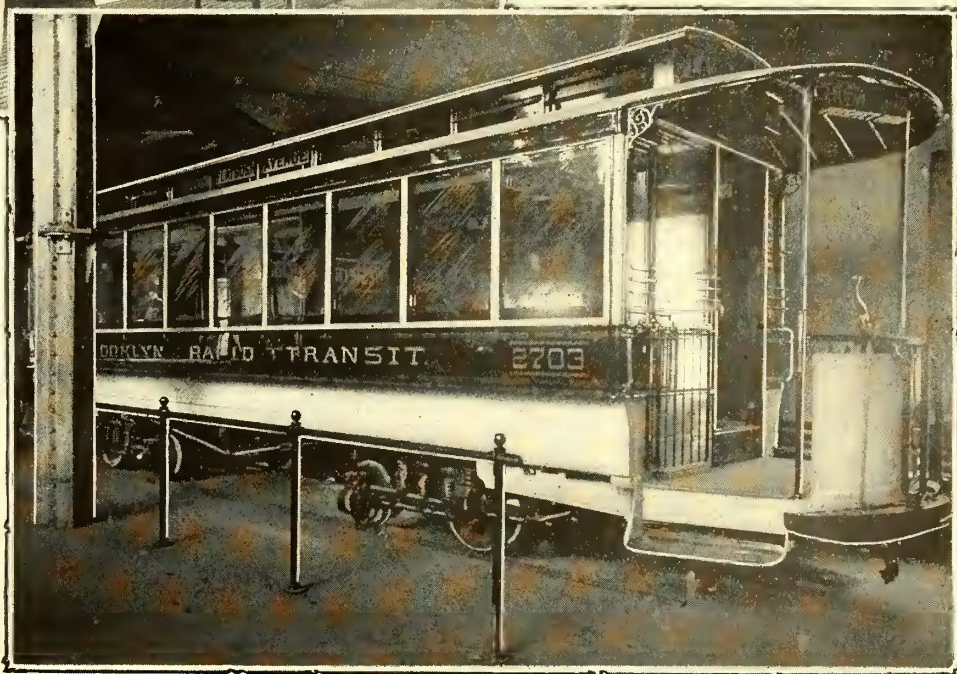
James Grady and W. R. Kerschner. At the back of the booth an elevated stand gave access to three Millen signs, similar to those used on the Metropolitan Street Railway system, which were supported on a frame placed at a considerable height above the floor. In front of this platform was placed a table containing numerous brass novelties in the way of grab handles, gongs, brake handles, trolley ears, car fittings and general brass work.

ARTHUR KOPPEL had an interesting space containing a section of full-sized track for industrial railways and a glass case in which models of many of his types of cars were exhibited. The track, although it was necessarily confined to somewhat small dimensions in length on account of the limitations of the space, contained a great variety of the special work in the way of switches, turntables, etc., for which Arthur Koppel is noted. The exhibit was in charge of Ernst Wiener, manager of the New York office, and C. R. Gier, Jr., of the purchasing department.

HENRY PELS & CO., of New York, had an exhibit on the right-hand main aisle of convention hall, wherein were shown examples of Johns' patent punching machine and Werner's hand punching and cutting machine for rails. Henry Pels, president of the company, was in attendance.

THE CHAPMAN DOUBLE BALL BEARING COMPANY, of Boston, had an interesting exhibit, in which were shown wrecking wagon wheels equipped with its ball bearings. Some recent tests have been made on these bearings applied to electric cars, with most gratifying results, and the representatives of the company did considerable during the convention to increase the popularity of this friction saving device. C. H. Chapman, W. E. Putney, W. H. Hollahan and H. C. Wilson were in attendance.

THE ALLSTON FOUNDRY COMPANY, of Boston, had one of the most interesting and scientific exhibits at the convention in



THE WESTINGHOUSE (BRILL) AND BROOKLYN HEIGHTS RAILROAD CARS

the attending delegates. One of the most interesting railway specialties made by this company is the new bell-rope cord with flexible steel-wire center, of which the representatives were supplied with many samples. This cord, having a steel cable center, will not stretch or shrink, and is always in just the right position for the conductor's hand, at the same time saving considerable friction against the fixtures of a car by giving a direct and unstretching pull, as the part nearest the conductor's hand travels no further than is necessary for the operation of the bell at the further end of the car. The samples of cord distributed were of a rich mahogany color, and would have a handsome appearance when placed along the roof of the car. Another specialty which was being pushed by this concern and which has been largely introduced on a number of roads is a waterproof trolley cord, which is thoroughly impregnated with waterproofing material before being woven. This cord has stood the severest tests, and the company invited the delegates present

to submerge in a pail of water a piece of the Tucker & Carter cord with a sample of any other make when they got home.

THE HEYWOOD BROTHERS & WAKEFIELD COMPANY, of Wakefield, Mass., was represented by C. H. Lang, Jr., C. W. H. Frederick, F. H. Henry, P. G. Shaw and Bertram Berry, all of whom reported before the convention closed the most prosperous three days in their business careers. Besides the fine exhibit which this company had in the gallery, it made the new revolving,



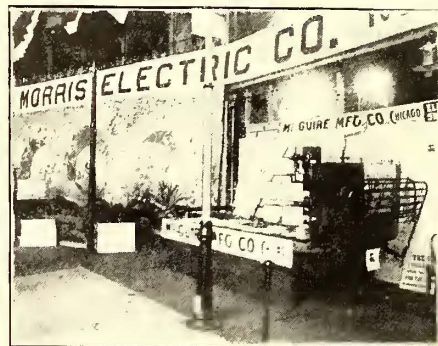
EXHIBIT OF THE STANDARD VARNISH WORKS

individual chair seats in the Brooklyn Heights Railroad Company's new car, and its Wheeler seats were in the Brill car used by the Standard Traction Brake Company in its exhibit and in the sections of Brill cars shown.

THE METAL SALES COMPANY, of Cleveland, Ohio, exhibited its special brands of babbitt metal, including "Renown" anti-friction, "Nicolite," "Challenge" rolling-mill metal and "Special No. 1." The Easty mandrel made by this company was also on exhibition. Many Ohio and Michigan roads are users of this metal. Frank R. Marks, secretary and treasurer, did the honors.



PART OF MORRIS EXHIBIT



MC GUIRE EXHIBIT

THE AMERICAN CAR SEAT COMPANY, of Brooklyn, N. Y., exhibited its "push over" car seat with its patent hold-on handle. A special feature was also made of the seating with patent interlocking non-breakable steel spring plate. The rattan, which is of the highest quality, was shown in rolls for examination. This company was represented by J. Salomon, William M. Adle and Miss M. Callahan.

W. H. PRITCHARD, of Indianapolis, had on display a model of the American wrecking frog for replacing derailed cars on the track. A pair of these frogs should be able to replace a car after any ordinary derailment, as they have 12½-in. reach on each side of the rail. The frog is 25 ins. long, and bears on the rail and on one tie. Each frog weighs 65 lbs. Mr. Pritchard states that he is overwhelmed with orders.

THE AMERICAN MASON SAFETY TREAD COMPANY, of Boston, had its interests looked after by W. S. Lamson, of Boston, president; H. C. King, treasurer; F. R. Morrell, R. D. Weeks and C. H. Forsaith, and Herman Pfeffer, of New York.

THE STREETER BRAKE-SHOE COMPANY, of Chicago, which had its exhibit in the space of the Morris Electric Company, was represented by George C. Evans.



COLLECTIVE EXHIBIT OF ELMER P. MORRIS

THE WATERBURY TOOL COMPANY, of Waterbury, Conn., exhibited the Williams Universal ratchet for drilling holes in close places where no other ratchet will work for lack of handle room. H. G. Hoadley and J. M. Warner represented this company.

THE ERIE EXPLORATION COMPANY, of New York, exhibited for the first time at a street railway convention the Eric Rheocrat, which does away with the use of the rheostat, and which it claims to be a successful substitute for a rheostat for electric railway cars. An ingenious form of car heater was also shown, and samples of the porcelain bobbins given away as souvenirs. The company was represented by W. H. Miller, manager, who explained his novelties to a great many delegates.

PALM, FECHTELER & COMPANY, of New York, exhibitors of car decorations and translucent signs, were represented by Frank Fechteler, P. E. Moeller and J. V. May.

THE POWELL & TURNER COMPANY, of Troy, N. Y., exhibited its new Century truck, and was represented by C. W. Powell, president.

THE MONARCH FIRE APPLIANCE COMPANY, of New York, made an exhibit of its dry powder fire extinguisher, known as Killyre. This company was receiving congratulations during the convention on the award just made at the Pan-American Exposition, at Buffalo, in which it received the only gold medal awarded to dry powder fire extinguishers. George H. Carpenter, C. H. Barney, P. L. Wilbur and Capt. Martin Cook could be found at this exhibit as representatives of the company.

AUGUST KLEIN, of Utica, N. Y., manufacturer of wagons, and also of a car replacer, was among the convention visitors.

H. M. SHAW & CO., of New York, although not making an exhibit, were ably represented by H. M. Shaw, C. J. Harrington and B. J. Hunter.

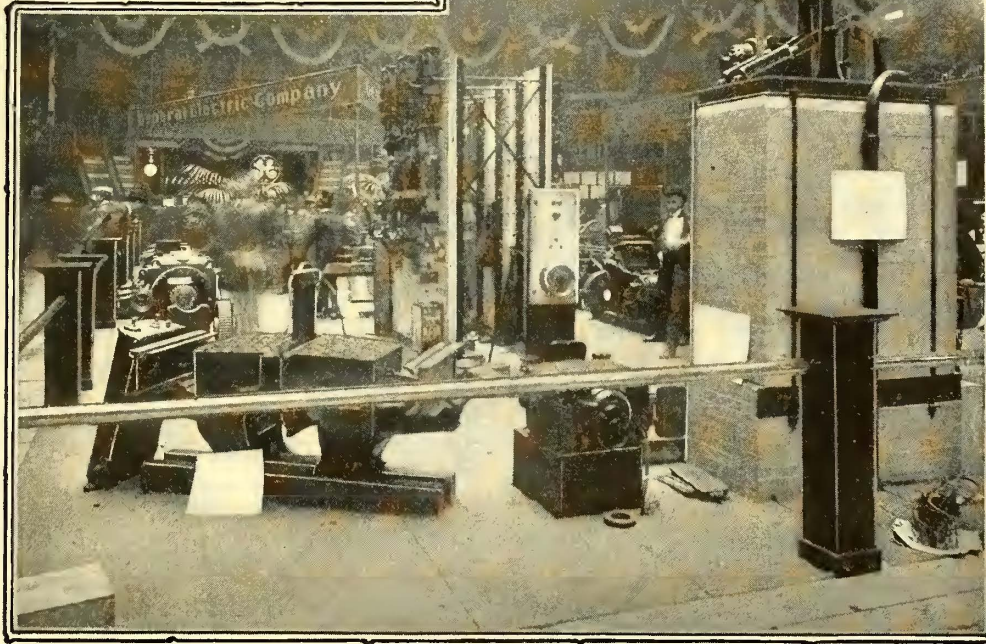
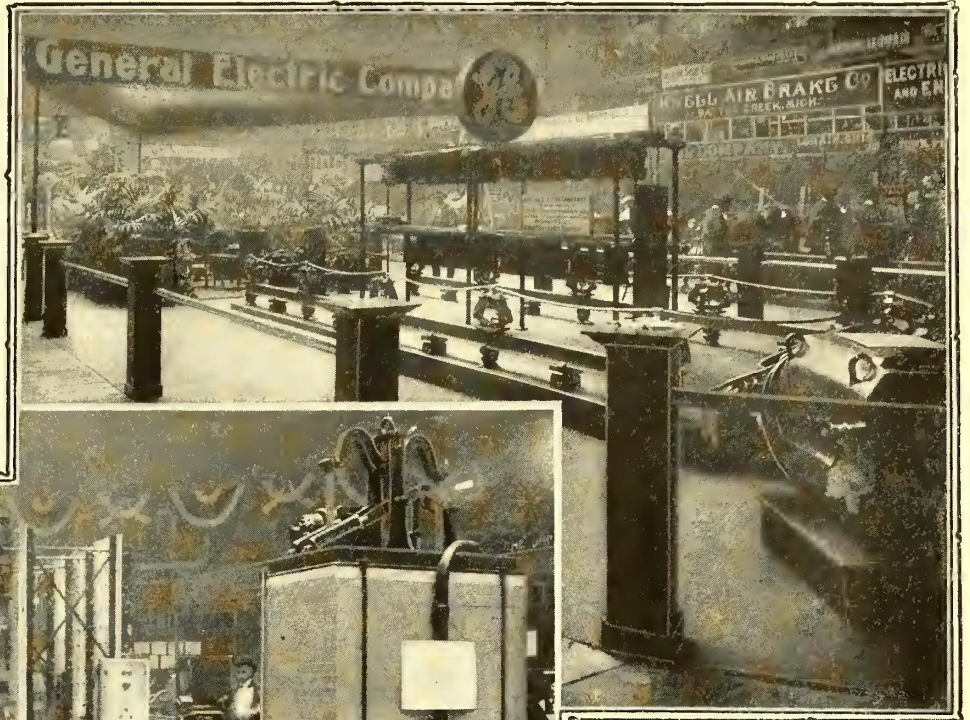
THE NATIONAL LOCK WASHER COMPANY, of Newark, N. J., made an exhibit of the track-nut lock washers which are the standard on so many steam and electric roads of the United States.

It also manufactures lock washers for steam and interurban cars, which were shown in the exhibit, together with its curtain fixtures. A new shade holder was exhibited, in which the heads of the curtain rod which run in the guides are rigid, and the clamping is accomplished by a shoe in each head. The company was represented by William C. Dodds, secretary, and Daniel Hoyt.

THE WEBER RAILWAY JOINT MANUFACTURING COMPANY, of New York, had an artistically-arranged exhibit, showing various types of its joints in place on short lengths of rails and a large collection of photographs giving a good idea of work done on various roads. A puzzling souvenir was distributed, but the delegates were not puzzled by the popularity which Weber joints have attained. Among the representatives present were J. C. Barr, George L. Hall, F. A. Poor, E. F. Schermerhorn, H. F. Chapman and William Thruelsen.

THE LE VALLEY VITAE CARBON BRUSH COMPANY, of New York, had on exhibition a frame containing carbon brushes which had been used by various street railway companies. Over each was a statement of the number of miles the carbon had been used and the wear it showed at the end of that time. Among the samples on exhibition was a Westinghouse No. 49 brush, the original length of which was $2\frac{3}{4}$ ins.; after it had run 16,836 miles on the Tarrytown, White Plains & Mamaroneck road it showed a wear of only $\frac{1}{2}$ in. Another Westinghouse No. 38 brush, used on

THE ROBINS CONVEYING BELT COMPANY, of New York, exhibited two model belt conveyors on a scale of 3 ins. to the foot, equipped with an automatic self-reversing tripper. The metal parts of the exhibit were nickel-plated, and the whole exhibit was very handsomely gotten up. The conveyors were in operation continuously during the three days, noiselessly elevating and distributing material. These conveyors are largely used in boiler and power houses for distributing coal in storage bins and piles, and also for taking it out of the storage. In fact, the company a short time ago issued an illustrated book devoted entirely to descriptions of its conveyors in coal-handling plants, and has just gotten out a new edition of its general catalogue, containing seventy-six half-tone views of typical installations.



TWO VIEWS IN THE SPACE OF THE GENERAL ELECTRIC CO.

THE SPRAGUE ELECTRIC COMPANY had a very interesting exhibit, consisting of the multiple-unit apparatus, which attracted considerable attention by reason of its simplicity, economy and perfect control of train operation. The exhibit was near the central portion of the hall, and showed a complete train equipment of two motor cars and intermediate train-line cars, with means for connecting up in various sequential and end-to-end relations. The controllers were of the type recently introduced on the Boston Elevated Railway, and of a capacity of 300 hp each. One was connected to

the same road, original length $3\frac{3}{4}$ ins., ran 4253 miles, and showed a wear of only 1-16 in. One brush used on a Lorain Steel Company motor, No. 14, original length $2\frac{1}{2}$ ins., after running 1400 miles, showed a wear of only 7-16 in. This latter test was made by the Lorain Steel Company at Johnstown, Pa. There was also a brush exhibited which had been used on the Brooklyn Rapid Transit on a 2-A Westinghouse motor, original length of brush $2\frac{3}{4}$ ins., after running 5783 miles, showed a wear of only $\frac{3}{8}$ in. In other words, the brushes which had run from 14,000 miles to 16,000 miles showed a maximum wear of only $\frac{1}{2}$ in., and would have run many thousand miles longer before being worn out. The companion pieces of the brushes mentioned above were also exhibited. They all showed a smooth commutator surface, and would seem to prove the claim of this company that its brushes will not only last four times longer than the ordinary carbon brush, but that commutators equipped with these brushes will last five times longer than when they are equipped with the ordinary carbon brushes. This company also had on exhibition a fine display of generator and motor brushes of various sizes and patterns. It also makes a specialty of brushes for special and pigtail attachments.

four Lorain steel motors mounted on the floor, and the other to four motors loaned by the Brooklyn Heights Railway Company, mounted on two of the latest Peckham trucks. The extreme flexibility of the system in accommodating itself to any train makeup and any emergency of service was illustrated by practical operation. The multiple-unit system has already become an essential factor in handling the congested traffic on heavy urban and interurban electric railways. Its adoption and successful operation on elevated roads in Chicago, where Mr. Sprague first reduced it to practice on a large scale: in Brooklyn and in Boston, and on the Versailles division of the Western Railway of France, has demonstrated the practicability of substituting electricity for steam for all classes of congested railway service. The system was invented and named by Frank J. Sprague, who is well known in the electric railway field, and a pioneer inventor of the trolley system, and is well covered by patents. The Sprague Electric Company was represented at the exhibit by Mr. Sprague, Francis H. Shepard, George H. Hill, Henry G. Issertel, Alexander Henderson, S. H. Libby and H. M. Davis, and the apparatus was often operated by the young son of Mr. Sprague, who takes a great interest in his father's work. Through the courtesy of the Peckham

Truck Company, the Lorain Steel Company, and the Brooklyn Heights Railway Company, the Sprague Company was enabled to

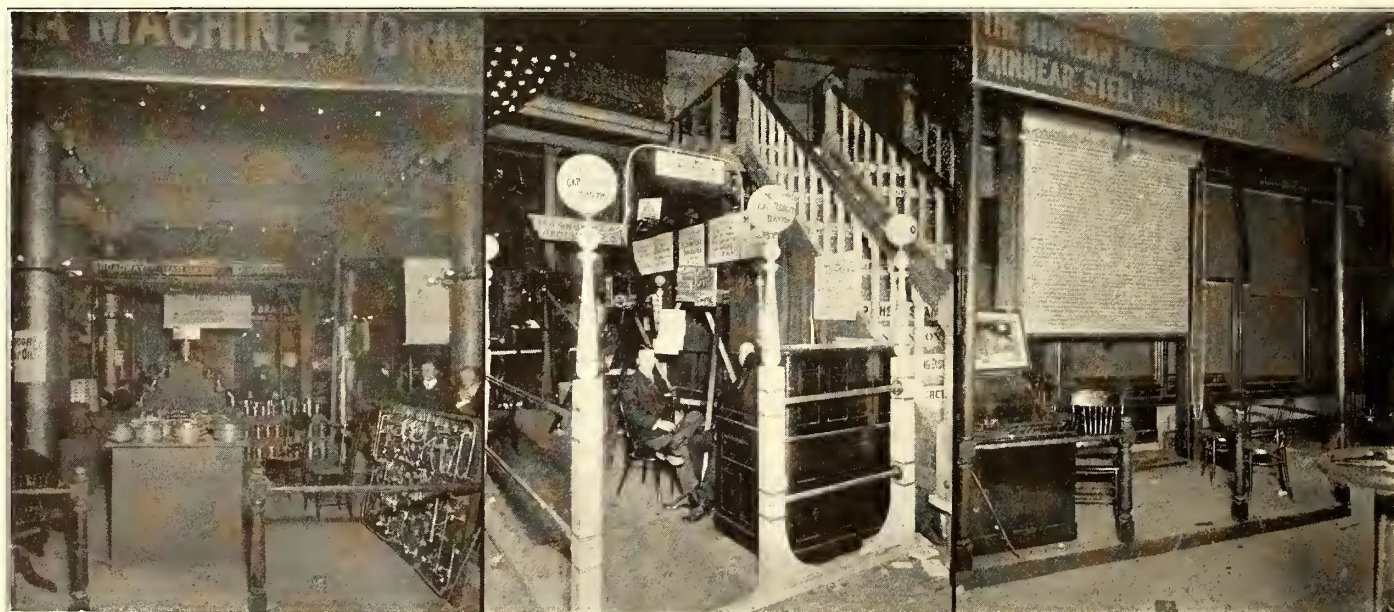
at Chicago, and W. H. Fulton. The most prominent feature of the exhibit, and one in which these gentlemen probably took the



EXHIBITS OF ROCHESTER CAR WHEEL WORKS, KNELL AIR BRAKE CO. AND HENRY PELS & CO.

arrange its exhibit at a late hour in the most satisfactory manner. THE CONSOLIDATED CAR HEATING COMPANY, of

greatest pride, was the sample heater which is to be supplied to the Manhattan (elevated) Railway, of New York, for which the



EXHIBITS OF COLUMBIA MACHINE WORKS, OHMER CAR REGISTER CO. AND KINNEAR MANUFACTURING CO.

Albany, N. Y., had in attendance Richmond P. Seales, general manager; James F. McElroy, consulting engineer; Cornell S. Hawley, general agent at New York; W. P. Cosper, general agent

company recently received an order for 21,600. These heaters are fastened to the under side of each seat. There are to be eighteen in each car. When running at full capacity, each takes 750 watts.

The new heater designed for the Boston Elevated cars, for which an order for fifty has been received, is another leading feature. To show the lasting qualities of these heaters, the company procured from the Niagara Falls, Park & River Railway, Niagara Falls, Ontario, a heater which had been in use eight years. The energy consumption of this heater was shown to be practically the same as that of a new heater, demonstrating that there was no deterioration in the coils.

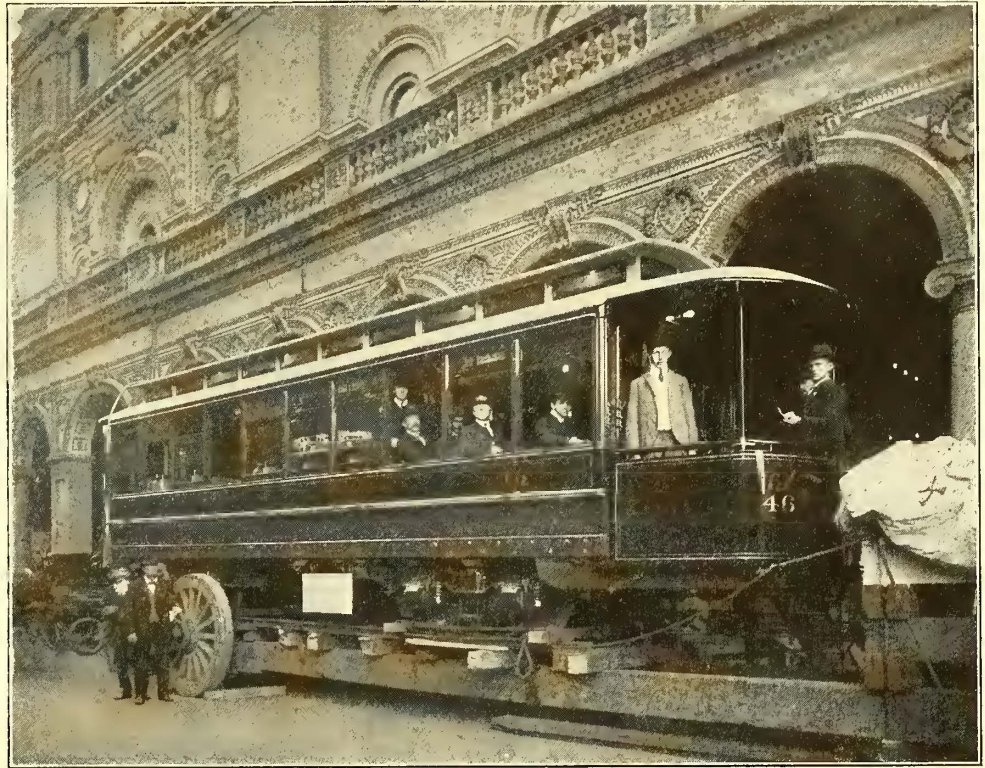
THE UNIVERSAL SAFETY TREAD COMPANY had its safety tread on most of the staircases around the convention hall, so that its exhibit was very prominent and its merits were tested every little while by every delegate. Mr. Works and others of this company circulated among the convention delegates.

C. B. FAIRCHILD, of Philadelphia, had on exhibition on one of the trucks in the Peckham space, his emergency pavement brake for very steep grades, upon which he has been working for a number of years. He is now putting this brake on some of the cars of the United Power & Transportation Company, of Philadelphia, on a line containing very steep grades. This brake, exhibited for the first time, brings a large bearing surface down on the pavement by the release of a row of heavy springs, which take part of the weight of the car and by their pressure on the pavement are sure to bring a car under control when running away on a grade.

S. B. CONDIT, JR., of Boston, Mass., was on hand, talking switches and circuit breakers for alternating, high potential circuits.

GEORGE F. BRANDAU and C. W. BRANDAU, of Utica, N. Y., exhibited a model of their combination life guard and brake,

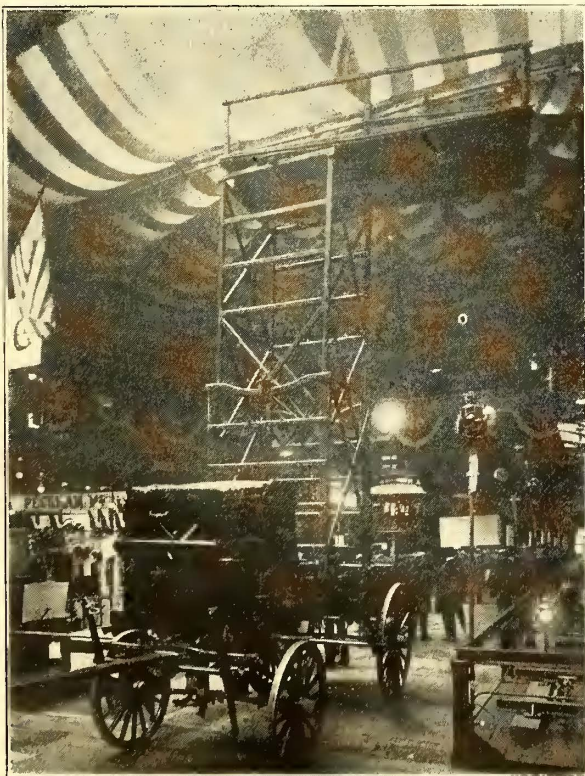
in Greater New York. It has been remarked by visitors to distant parts of the United States that the familiar name of Hale & Kilburn on the car seats gave them a home-like feeling. Visitors to the convention must have shared this feeling when they saw around them the evidence of the popularity of the Hale & Kilburn



THE STEPHENSON CAR, NEAR THE MAIN ENTRANCE TO THE GARDEN

seating devices. The exhibit made was fairly representative of the different street railway seats which this company manufactures. Among other representatives which this company had at the convention were H. T. Bigelow, of Chicago; B. F. Pilson, of Richmond, and S. A. Walker, of the New York office.

THE DE WITT SAND BOX COMPANY, of Troy, N. Y., exhibited the reconstructed sand box, which is now sold at a less price than formerly, while still retaining all its features of merit. President E. F. De Witt showed to the satisfaction of those ex-



THE MC CARDELL TOWER WAGON

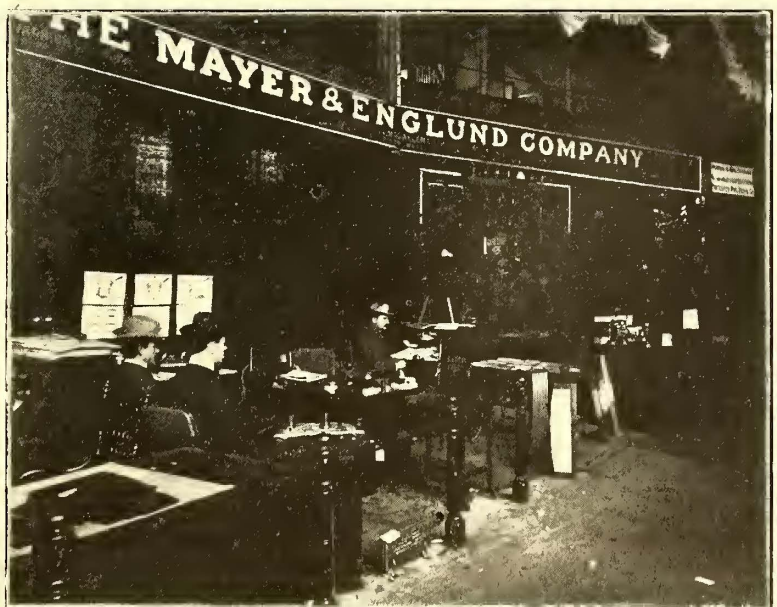


EXHIBIT OF THE MAYER & ENGLUND COMPANY

which is a combination truck and wheel brake, operating in case of emergencies without the application of power.

THE HALE & KILBURN MANUFACTURING COMPANY, of Philadelphia, had an attractive exhibit of its seats at the convention hall, and also a very extensive operating exhibit on the cars

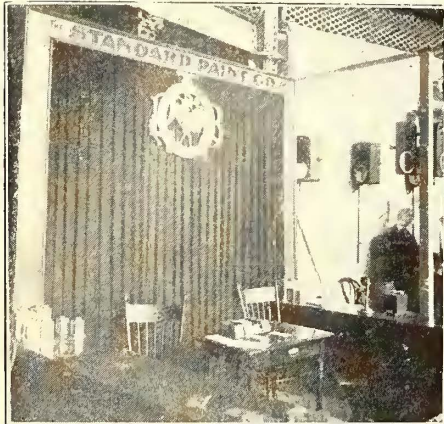
amining its operation that stones in the sand box would not affect the operation of the box and that it would even discharge pebbles without blocking it up. Charles Parks was also in attendance.

THE ELECTRIC TRIPARTITE STEEL POLE COMPANY, of New York, furnished the two poles which supported the trolley

wire over the Westinghouse and Standard Traction Brake companies' operative exhibits. A closer and better inspection of the construction could be had, however, at the booth of Giles S. Allison, where a short section formed a part of the exhibit. Charles W. Mackey, president; G. V. A. Conger, vice-president and manager, and M. E. Miller, secretary and treasurer, were, of course, in attendance at the convention, and made many new friends for this increasingly popular pole.

THE PANTASOTE COMPANY, of New York, made an elegant display of car seats with Pantasote covering, presided over

and smaller sizes which are designed for city work proper. The different services especially adapted to the various motors were pointed out by the representatives in charge, and many of the motors were shown open to better facilitate inspection. An interesting feature was a Baldwin-Westinghouse mine locomotive, shown complete, similar to those used in a number of coal mines in Pennsylvania and West Virginia. Connected with the Westinghouse exhibit was that of the Standard Traction Brake Company, in which a large Brill car was operated on 100 feet of track. This operative exhibit was supplied by current from a standard West-



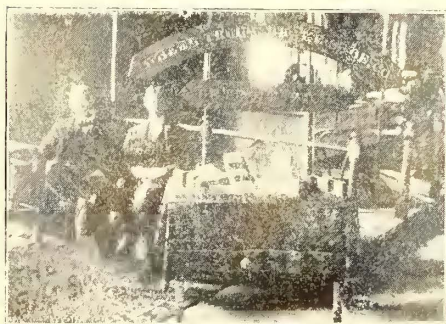
EXHIBITS OF STANDARD PAINT CO., AMERICAN BRAKE SHOE CO. AND NEW HAVEN CAR REGISTER CO.

by J. H. High and H. M. Grier. The design and finish of these seats made them fit for the highest class of special car work.

SIXTY TELEPHONES WERE INSTALLED in the different exhibits and free service furnished to exhibitors and visitors by the New York Telephone Company, and the American Telephone & Telegraph Company allowed the use of its lines for long distance service in connection with the temporary switchboard at the Garden. Messenger service was given to the delegates and exhibitors by the American District Telegraph Company.

THE WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY was represented by an army of the company's

inghouse railway switchboard, which was placed in the company's space, and to which a large amount of attention was directed. This switchboard consisted of two generator panels of 2000 amps. each, with equalizer switches on pedestals, one load panel of 5000 amps. capacity, and two double feeder panels of 1000 amps. each. The board represented the latest standard railway practice, being made of blue Vermont marble and containing the most up-to-date instruments. The circuit breakers each had separate marble bases to facilitate substitution and repairs, and the illuminated-dial, dead-beat voltmeters and other instruments were of the latest Westinghouse type, while each feeder panel was protected from lightning discharge by Wurts' station lightning arresters. Many other



EXHIBITS OF WHEEL TRUING BRAKE SHOE, VALENTINE SIGNALS AND HUNTER SIGNS

officials, and made one of the most interesting exhibits from almost every standpoint of electric railway operation that was found in the Garden. Everything that was exhibited was of the highest order, as is customary with this company, and in the immense space which was occupied opportunity was provided to show a large quantity of products. Six railway motors were placed in the exhibit for inspection, and three extra motors were seen mounted on trucks. These were in various styles, and consisted of motors Nos. 61 and 50, which each had heavy motors designed for high-speed elevated and suburban work; motors Nos. 56, 68 and 76, which are used for heavy city work and for interurban service, and although designed particularly to carry average loads, will operate economically and efficiently under large overloads; and the No. 49 motor

specialties made by the Westinghouse Company were shown, and were ably described to the delegates by the following well-known men, who were in attendance and who represented the Westinghouse Electric & Manufacturing Company, the Nernst Lamp Company and the Sawyer-Man Electric Company: B. H. Warren, F. H. Taylor, Arthur Warren, N. W. Stone, L. A. Osborn and A. M. Mattice, of Pittsburgh, Pa.; C. A. Bragg, of Philadelphia, Pa.; W. K. Dunlap, F. N. Kollock, C. W. Underwood, W. M. Probasco and C. P. Baxter, of Pittsburgh, Pa.; C. W. Register, of Chicago, Ill.; Paul T. Brady, of Syracuse, N. Y.; T. C. Frenyear, of Buffalo, N. Y.; R. L. Warner and R. S. Brown, of Boston, Mass.; Calvert Townley, E. W. Gray, D. E. Drake, F. C. Crosby, J. N. Duncan, Greeg Curtin and C. P. Fowler, of New

York City, all of the Westinghouse Electric & Manufacturing Company; A. J. Wurts, H. N. Potter and Dr. Recklinghausen, of the Nernst Lamp Company, and C. J. Jennings, W. F. Martins and G. D. Prentiss, of New York City, of the Sawyer-Man Electric Company.

THE STANDARD TRACTION BRAKE COMPANY had one of the most novel and popular exhibits in convention hall. It

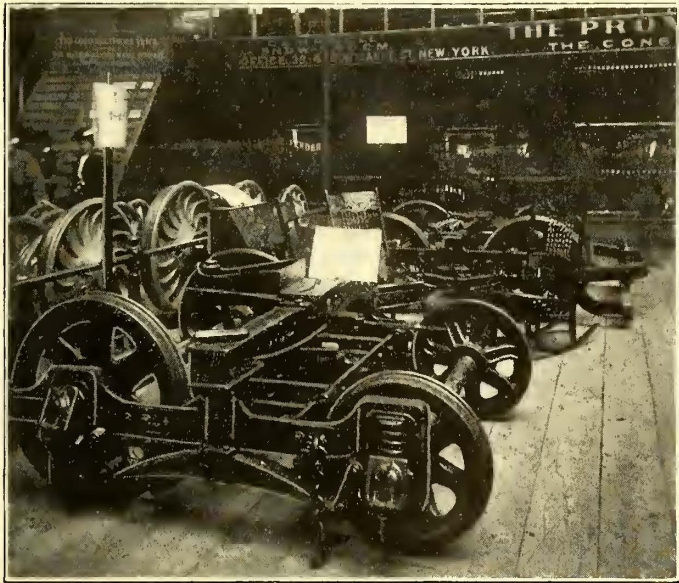


EXHIBIT OF BALTIMORE CAR WHEEL WORKS

consisted of a large Brill car operated on a track over 120 ft. long, which extended down the center of the Garden within the limits of the space occupied by the Westinghouse Electric & Manufacturing Company. The car was equipped with the latest development in brakes, namely, the lately perfected Newell electric track and wheel brake, and also contained heaters for utilizing the same current as the brake magnets. This brake, as was described in this paper a few months ago, is operated by current from the motors after the trolley current has been shut off, and thus requires no energy from the line for its application. The track brake is made magnetic by a magnet winding, to which it is attached and firmly grips the rail when current is supplied to it, the dragging motion thus produced setting the wheel brakes. In this way two distinct braking actions are effected—one from the magnetic pull of the track brake on the rail, and the other from the ordinary action of the wheel brake-shoe. Unlike all other track brakes, instead of having a tendency to relieve the pressure on the wheels by lifting the car body, this brake, if anything, acts the same as if weight were added to the car, and makes the tractive effect of the wheels even greater. The delegates were greatly interested in examining the operation both from outside and inside the car, and the easy arresting of the motion observed in service stops and remarkable quickness of the emergency stops created much favorable comment. The car was kept running through the three days of the convention, being not only notable for its novelty, but showing marked development in a subject which is at present one of the most closely studied of any by railway men. A "timetable" had been made out describing the different demonstrations given of the brake's operation. These were five in number, and included emergency stops on grade, service stops, coasting, quick stops immediately after starting, and slowing down without stopping. Besides the magnetic brake the company exhibited several examples of its axle-driven compressor air brakes, of which a description was given in the STREET RAILWAY JOURNAL Oct. 5. The automatic slack adjuster, which was shown with a 10-in. diameter brake cylinder was of particular interest. The object of this device is to maintain constant and uniform piston travel and compensate for the varying conditions of leverage and brake-shoe adjustment. Uniform cylinder pressure is thus obtained without hand adjustment, a futile method of getting accurate results. The duplex check valve exhibited has also been an important factor in the brake's success. The representatives were kept busy explaining the merits of the air and Newell brake and escorting the numerous new-made friends of the latter device to the interior of the car. Among these gentlemen who represented the Standard Traction Brake Company's interests were H. H. Westinghouse, John F. Miller and E. M. Herr, of Pittsburgh, Pa.; Joseph R. Ellicott, Andrew J. Brislin, John Brislin, Jr., George E. Baker, Edward E. Pettee and John J. McCutchan, of New York City; William R.

Hurd and H. S. Kolseth, of Boston, Mass.; Robert Burgess, of Richmond, Va.; R. W. Davies, Edward H. Dewson, John G. Carroll, C. C. Farmer and J. A. Hughes, of Pittsburgh, Pa., and S. D. Hutchins and C. W. Townsend, of Buffalo, N. Y.

THE BROOKLYN HEIGHTS RAILROAD COMPANY had an innovation at the convention in the shape of one of its new

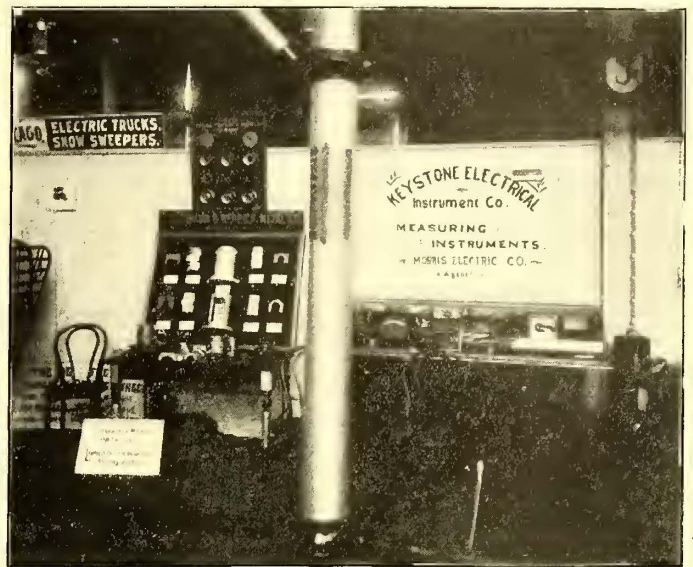


EXHIBIT OF KEYSTONE ELECTRICAL INSTRUMENT CO

type of cars, which has already been thoroughly described in these pages. This car is the first one in the history of the American Street Railway Association to be exhibited by a railroad company, and Eugene Chamberlin, superintendent of equipment of the company, is to be congratulated on the great amount of favorable

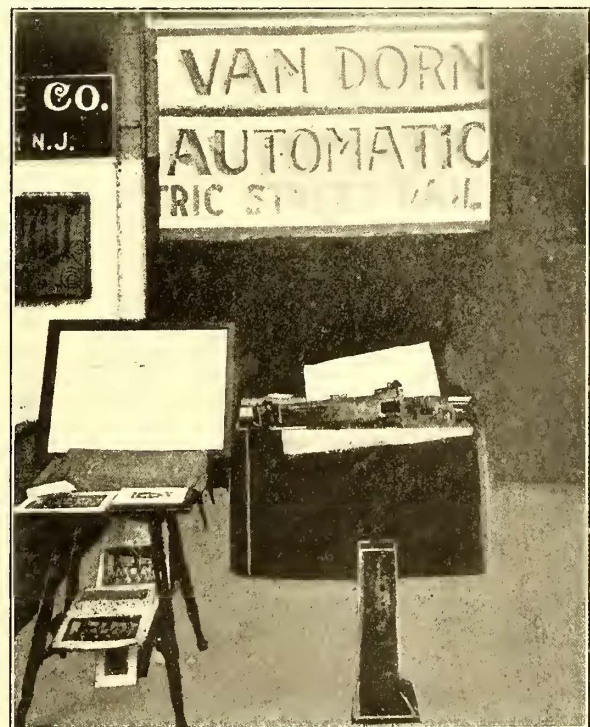


EXHIBIT OF W. T. VAN DORN CO.

comment which his car received from many of the delegates. It formed a supplement to the paper which Mr. Chamberlin read at the convention on the subject of the best type of car, and interest in it was thus naturally greatly enhanced. The peculiar arrangement of the seats was the most notable feature of the car, and their construction was examined in every detail. The car was heated by single-coil heaters made by the Consolidated Car Heating Company, which were placed around the sides. At the end of the car on a pedestal was a modified design of the double-chair ar-

arrangement, which contained a new type of heater on the frame beneath the seats, made by the H. W. Johns Manufacturing Company. The seats themselves were made by the Heywood Bros. & Wakefield Company, of Wakefield, Mass. The car was in charge of C. Lamberson and Thomas Mulford, of Mr. Chamberlin's staff.

CHARLES I. EARLL, of New York, had on exhibition with the Sterling-Meaker Company the Earll trolley retriever, which attracted considerable attention.

THE PEARSON JACK COMPANY, of Boston, Mass., which makes the car-replacing jacks which are so well known and extensively used over the country, had a full line of these jacks of various sizes on display, and also exhibited a new pulling jack oper-



EXHIBIT OF ARTHUR KOPPEL

ated on somewhat the same principle as the car-replacing jack and having hooks at each end. A. H. Richardson, William W. Borman and M. S. Friede represented the company. The Mogul spike-puller, which was brought out at this convention, seemed to be a remarkable success, as a number of orders were given for it at first sight.

THE STANDARD AUTOMATIC LUBRICATOR COMPANY, of Philadelphia, was represented at the convention by G. B. Kirkbride, president, and A. A. Freeman, superintendent, who distributed circulars, etc., describing the use of their lubricator for trolley cars. This lubricator automatically feeds the oil directly to the journal, and is meeting with considerable success.

THE MAGNUS METAL COMPANY, of Buffalo, N. Y., had a space in the main entrance hall, where it showed its anti-friction journal metal for the bearings of both motors and generators, and the Magnus improved self-oiling trolley wheel. The alloy of which this wheel is composed and the methods of manufacture have created a large demand for it. The company was represented by H. H. Hewitt and Bertram M. Tate.

THE DEARBORN DRUG AND CHEMICAL COMPANY was represented by R. F. Carr, vice-president and general manager, and W. B. McVicker, New York manager. The company showed a stack of polished barrels which well represented their business, and had many examples of its products distributed throughout its booth. The company's business in analyzing waters and eradicating scale in boilers is constantly growing, and some interesting examples of scale formation were shown.

THE KNELL AIR BRAKE COMPANY, of Battle Creek, Mich., exhibited a working brake in the main hall. Through the courtesy of the Coney Island & Brooklyn Railroad Company, a Brill maximum-traction truck equipped with Knell brake owned by the railway company was transferred to the Garden, and formed the principal feature of the exhibit. The truck was jacked up so that the pony wheels cleared the floor and a motor was belted thereto, making an operative exhibit of great interest. The Knell compressor was attached to the axle of the pony wheels and piping was led to a motorman's valve and brake cylinder placed on the floor of the space. There was no brake rod used, but the operation of the brake cylinder and the automatic cut-off valve was clearly illustrated by this arrangement. The company will be pleasantly remembered by the ladies by their happy idea of distributing flowers as souvenirs. The company was represented by Joel C. Hopkins, secretary; P. Hoffmaster, treasurer; W. F. Knell, superintendent of construction; A. H. Metzelaar, sales manager, and J. R. Bunce, engineer.

THE STUART-HOWLAND COMPANY, of Boston, had an

extensive exhibit in the annex, which, although brought together at the last moment by the energetic representatives of the company on account of the loss of the original exhibit sent on from Boston, was admired by all the delegates, and no discrepancies were observed in the arrangement. The space was fenced in by cross-arms, which were supported on what represented the tops of telegraph poles, and two poles at the front of the exhibit carried brackets from which were hung Helios arc lamps. The multitude of railway supplies which were found in this space included a frame of ticket punches and buttons, an illuminated sign composed of Peerless lamps, double and single-fare registers, railway motor gears and pinions, trolley catchers, etc. The company also showed the Valley Vitæ long-life carbon brushes and a special insulated street fixture for incandescent lighting which it has recently perfected. A car-window brush which could be attached to a hose and a continual stream of water forced through the handle to the brush head was also shown. One of the neatest souvenirs in the Garden was distributed from this booth, consisting of a heavy bronze paper weight in the form of a bear. The exhibit was in charge of Herbert W. Smith, manager railway department; William Wampler, Middle States representative, and T. C. White, manager of the factory.

THE JOHN STEPHENSON COMPANY, Elizabeth, N. J., had a handsome example of the products of its factory in front of Madison Square Garden, in charge of Charles Lippincott. The body of the car exhibited was taken out of a lot of ten cars built for Utica, N. Y., and was of the semi-convertible type, with a small upper sash raising into the roof and a lower sash dropping flush with the sash-rail. The car, which is intended to be operated on a belt line only, was single ended, having a vestibule in front and a platform with one side closed at the rear. This body was mounted on the Stephenson No. 20 truck described in these pages two weeks ago, and within the car were shown handsome models of the No. 6, No. 12 and No. 20 trucks. Steps were provided to facilitate access to the interior of the car, which was not removed from the truck on which it had been brought to the Garden, and the delegates were allowed to examine at their leisure the interior arrangement. A long aisle extended through the center, having eighteen cross seats and two longitudinal seats at the end, made by the American Car Seat Company. The interior finish of the car was mahogany with inlaid woodwork. The car was equipped with electric heaters from the Consolidated Car Heating Company, and also with the Consolidated

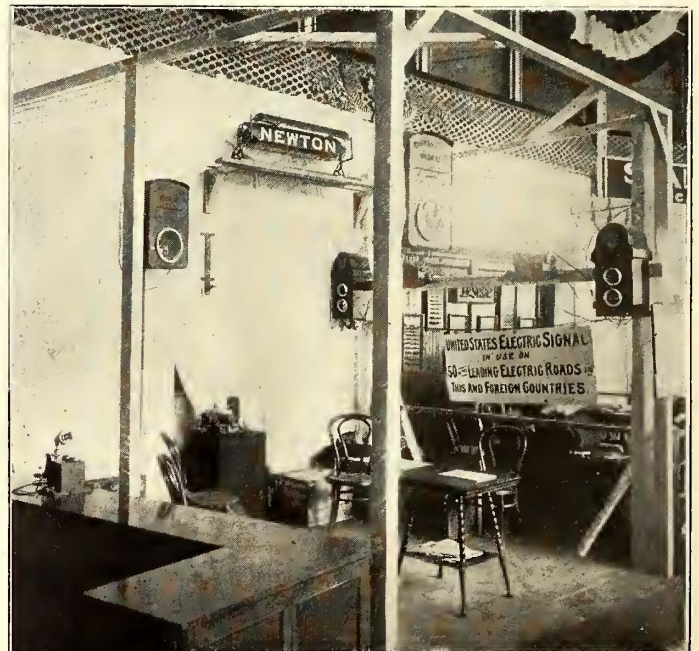


EXHIBIT OF UNITED STATES ELECTRIC SIGNAL CO.

Car Fender Company's Providence fender. P. M. Kling, the general manager, and E. J. Lawless, the general sales agent, were among the Stephenson people present, and did much toward promoting the interests of their company.

THE STERLING-MEAKER COMPANY had a space in the main hall, where its well-known line of registers, fenders, trucks, etc., did not fail to attract a large amount of attention. Three types of Sterling registers and three types of Meaker registers were shown, and their details were explained. A section of a car platform was included in the exhibit, on which was placed a working Sterling-Meaker brake with shortened brake-handle rod,

and the Sterling sand box was shown. An interesting feature of the exhibit was the Earll trolley retriever, which will immediately pull down the trolley wheel rope on the wheel leaving the wire. The exhibit was in charge of J. H. Carson, C. S. Ackley, E. F. Wickwire and J. A. Stow.

THE UNITED STATES STEEL COMPANY, of Boston, had a large exhibit in the main hall, where it showed the latest design of Neal duplex brake. The brake is operated on the hydraulic principle, an axle pump forcing the liquid through the brake cylinders and valves and applying the brake by increased pressure in the brake cylinder when the flow of liquid is throttled. The brakes were shown attached to a maximum-traction truck and a large four-wheel truck.

THE READING CAR WHEEL COMPANY, of Reading, Pa., was represented by its president, H. H. Hewitt, who attended the convention and met many old friends among the delegates.

THE NEW HAVEN CAR REGISTER COMPANY, of New Haven, Conn., had a well-situated space, directly opposite the entrance of the annex, where it showed a full line of the many specialties which it manufactures and handles. A line of registers was artistically arranged in the rear, interspersed with frames containing punches, badges, buttons, register fixtures, etc. "Red, white and blue" trade-marked trolley cord and the New Haven trolley pole catcher, which is a recently brought out novelty of the company, attracted considerable attention. The company was represented by W. M. Anthony, president; F. Coleman Boyd, vice-president; John S. Bradley, secretary and treasurer; F. B. Kennedy, assistant secretary; M. D. F. Yates and J. H. Hayes.

THE INTERNATIONAL TRUST COMPANY, of Maryland, was represented by its solicitor, William J. Devon, of Baltimore.

MERRITT & COMPANY, of Philadelphia, manufacturers of ornamental iron and wirework, were represented by Stephen Morris, their secretary. They distributed several thousand handsomely gotten up pamphlets descriptive of their expanded metal lockers that have been found so useful in power houses, car houses and shops. They are also in use by many of the most prominent manufacturers.

THE DARLINGTON ELECTRIC FOUNTAIN & SUPPLY COMPANY, of Philadelphia, was represented by F. W. Darlington, consulting electrical and mechanical engineer, and also by D. Scott Quintin, secretary.

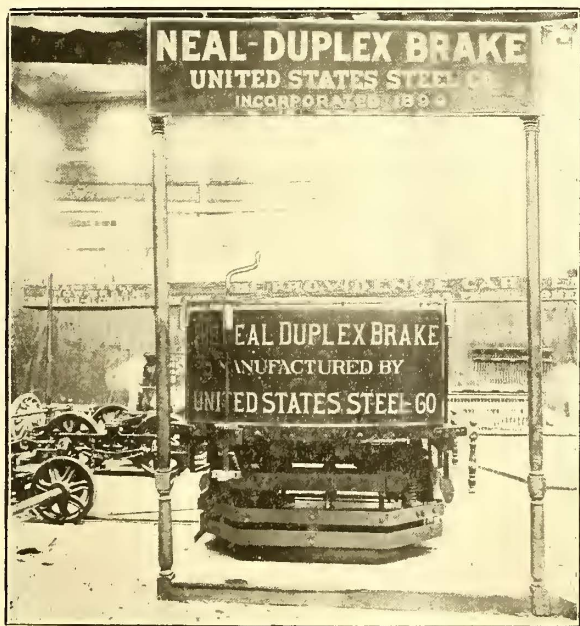


EXHIBIT OF THE NEAL DUPLEX BRAKE

JOHN BLAIR MACAFEE, the well-known street railway and electrical contractor of Philadelphia, was entertaining his many friends in his most characteristic way. Mrs. MacAfee was also in New York with her husband. Mr. MacAfee had additional representation in the person of Louis S. Kite, treasurer, and Charles L. Furbay, superintendent of the Ohio River Electric Railway & Power Company, Pomeroy, Ohio, which is one of the several electric roads controlled by Mr. MacAfee. These gentlemen also report that they have just commenced the construction of a 9-mile road in New Orleans, and have others in contemplation.

THE CHARLES SCOTT SPRING COMPANY, of Philadelphia, was, as usual, represented by D. L. Roche, who distributed among his friends a very useful memorandum book.

THE PENNSYLVANIA ELECTRICAL & RAILWAY SUPPLY COMPANY, of Pittsburgh, Pa., was well represented by its secretary and treasurer, Samuel F. Hammond, and H. M. Laughlin, vice-president. While these two gentlemen were welcomed by the numerous friends of their company, all regretted that



COLLECTIVE EXHIBIT OF FRANCIS GRANGER

they did not have the pleasure of seeing R. R. Hammond, who, on account of pressure of business, was unable to attend.

THE VAN DORN-ELLIOTT ELECTRIC COMPANY, of Cleveland, exhibited commutators, armature and field coils and a rewind armature as a sample of the work that it is able to do in the way of supplying repairs for electric railway companies. W. H. Elliott and W. A. Dutton represented this company and made many friends.

R. D. NUTTALL COMPANY, of Pittsburgh, made no attempt at a large exhibit, but had a few gears and pinions and a Nuttall trolley on hand, and used its space as a place to meet its many friends and new acquaintances. The Nuttall factory, which is now probably the largest factory devoted exclusively to gears in the United States, is being crowded very hard not only with turning out street railway standard gears and pinions, but also with turning out gears for all other purposes, including some of very large size. F. A. Estep, the well-known and popular president of the company, and L. W. O'Brien were on hand to make new friends for the Nuttall products, and succeeded admirably.

THE GLOBE ELECTRIC MANUFACTURING COMPANY, of Cleveland, Ohio, which makes electric headlights and a most efficient multiplex reflector, exhibited its headlights in the Morris Electric booth, and George A. Schroeder represented the company.

THE AUTO-ELECTRIC SHUNT COMPANY, of West New Brighton, N. Y., which manufactures a device for substituting an incandescent lamp for any one in a series of lamps that may burn out, had some of its shunts on exhibition. Their action was explained by F. W. Wise.

THE INTERNATIONAL REGISTER COMPANY, of Chicago, had a booth in the main entrance of the hall, where A. H. Woodward and W. H. Brown received visitors and showed those interested the six styles of registers which were on exhibition, and also two sample registers with glass fronts, through which could be seen the mechanism of the register. The large numbers of conductors present were very much interested in seeing the "insides" of their familiar friend, but it was noticed that the superintendents and purchasing agents were not behind them in this respect.

MCLAUGHLIN CAR COUPLER COMPANY, of Philadelphia, which has recently entered the field of street railway work with automatic couplers fitted for street railway service, had models of full-sized samples and blue prints of its couplers in its space on the south gallery. The type of coupler which it uses is identical with the M. C. B. coupler used on steam railroads, the only difference being that while steam railroad couplers allow for turning curves by a swivel movement in the coupling itself, the McLaughlin couplers being adapted for the extremely short curve

found in street railway practice are entirely rigid at the point of coupling, and allow almost no play. The swiveling of the coupler is back under the car at the point of attachment. Charles H. McLaughlin, president of the company, and James T. Riley were its representatives.

THE ELECTRIC RAILWAY EQUIPMENT COMPANY, of Cincinnati, had an exhibit of its extensive variety of line material and general supplies in the space of the Morris Electric Company, which represents it in the East. Phil Harten was in constant attendance, representing the Electric Railway Equipment Company.

JOHN HOWARD YARDLEY, of Philadelphia, secretary of the Keystone Car Wheel Company, of Pittsburgh, was in attendance, looking after the interests of his company, and, as usual, had something pleasant to say to all of his old friends.

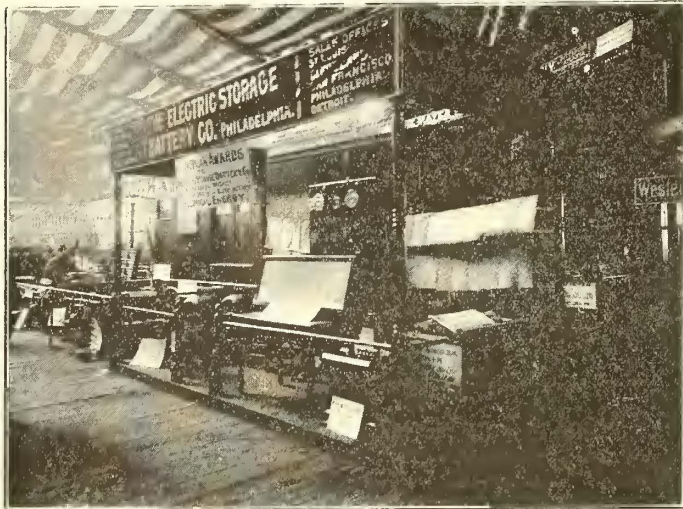


EXHIBIT OF THE ELECTRIC STORAGE BATTERY CO.

J. D. EDWARDS, of 324 Second Street, N. E., Washington, D. C., showed a model of a new automatic switch, of which he is the inventor.

J. P. HEIL, manager of the Heil Rail-Joint Welding Company, of Milwaukee, was among the convention visitors.

THE DIAMOND STATE STEEL COMPANY, of Wilmington, Del., exhibited the Churchill patent rail-joints, the Diamond tie-plate, the Diamond spike and railroad track fastenings of various kinds. J. A. Parker was in attendance.

THE FRANKLIN INCANDESCENT LAMP COMPANY, of Boston, which is making a special "Fcmco" incandescent lamp for railway circuits, was represented by Jonathan Camp, manager, who found many opportunities to present the advantages of his lamp to street railway managers.

DRAKE, BREED & COMPANY, engineers and contractors, of Philadelphia, were represented by F. S. Drake and George Breed, both members of the firm. It was this firm that secured the contract for the construction of the Hamburg Railway. The line is already nearly completed from Buffalo to Hamburg, and the power station and rolling stock will soon be in operation. Plans for the extension to Dunkirk are being prepared, and this much of the road will be built and equipped next summer, as a high-speed interurban road, using high-tension current from a large central power station.

THE MERRITT AIR BRAKE COMPANY, of New York, was represented by Charles M. Englis, president; J. C. Gilbert, vice-president; W. M. Hoagland, secretary and treasurer, and W. Merritt, chief engineer. This company had on display a very complete line of its compact, electrically-driven compressors, which attracted much favorable comment on account of their neat design and small dimensions.

THE CHASE-SHAWMUT COMPANY, of Boston, exhibited the Chase-Shawmut flexible rail-bond, which uses solder for attachment to the rail. This bond, which has been extensively used at Seattle and is being used by other Stone & Webster properties, has made a fine showing as to durability and conductivity, and with the proper facilities is very easily applied. George L. Osborn, E. M. Hamlin, F. D. Masterson and H. P. Moore attended the convention for this company.

FRANK RIDLON COMPANY, of Boston, as usual made an exhibit of its attractive line of specialties, including the Wilson trolley catcher, the Ridlon track drill, the Kilbourn sand box, the Weld babbiting device, and an automatic vestibule trolley shade.

The Weld babbiting device is new apparatus for babbiting split bearings, in which the work is automatically completed by simply pouring the babbitt. It is claimed that skilled labor is not necessary to cast bearings with this device. Frank Ridlon, president; Charles N. Wood, vice-president; N. L. Wood, H. F. Kellogg and Robert Mathias, looked after this company's exhibit.

HAROLD P. BROWN, of New York, who operated in conjunction with the exhibit of the well-known Edison-Brown plastic rail-bonds, a complete testing plant, obtained some remarkable results during the convention, which attracted great interest among railway engineers. One joint of 100-lb. T-rail, of Baltimore & Ohio section, bonded with two 7/8-in. plastic plug bonds, transmitted a current of 2700 amps. with a loss of 0.0432 volts. A reading of a similar length of unbroken rail with the same current gave a drop of 0.0375 volts. Another joint of 70-lb. T-rail, bonded with two No. 00000 solid copper bonds, carried a current of 2678 amps. with a drop of 0.0064 volts. The drop on the unbroken rail of the same length with same current was 0.0078 volts. A current of 3000 amps. was passed through two switches in series, one having the ordinary ground and polished contacts, while the other of the same size had plates and contact jaws amalgamated by the Edison-Brown process. The drop across the contact on the plain switch was 0.01442 volts, while the drop on the switch, with the amalgamated contacts with the same current, was 0.00725 volts.

MENTION SHOULD BE MADE IN A DESCRIPTION OF THE EXHIBITS at convention hall of the numerous courtesies extended to the association by various supply houses and other concerns. The generosity of the companies represented in this manner was very commendable, and the work of Marcus Nathan, the able director of exhibits, was greatly simplified by the assistance thus rendered him. All the switches for electrical installations not supplied by the exhibitors themselves were loaned by the General Electric Company, of Schenectady, N. Y. The entire temporary wiring which was necessary for the lighting and operation of the exhibits was fused with Sachs Noark fuses, both fuses and fuse-blocks being loaned by the H. W. Johns Manufacturing Company. Such small motors as were necessary were loaned by the Crocker-Wheeler Company, of Amper, N. J. The Sterling Electric Manufacturing Company, of Warren, Ohio, furnished a large number of incandescent lamps, the entire annex being lighted by this company. The handsome new caps which were furnished to the ticket attendants were donated by F. H. Newcomb, of Brooklyn, N. Y., and all the circular loom required in the electrical installation was supplied by the American Circular Loom Company, of Chelsea, Mass.

THE ROCHESTER CAR WHEEL WORKS, of Rochester, N. Y., showed in their large space in the main hall twenty-seven different wheels, indicating to some extent the variety of wheels necessary for the conditions of street car service in different parts of the country, although this was but a small part of the number of types which the company is called upon to make. Among some of the interesting wheels shown were the standard wheels used by the Metropolitan Street Railway Company and those used by the Boston Elevated Railway Company. Other wheels in the exhibit were a 40-in., 900-lb., for electric locomotives; a 36-in., 650-lb., and a 33-in., 500-lb., for fast interurban service, these three wheels being based upon the Master Car Builders' steam railroad standard, known as double plate; a 36-in. open-plate wheel, used for snow plow and sweeper work, and in some cases for city cars; a 33-in. electric brake wheel; a 33-in. Price momentum brake wheel; the standard street car, 425-lb., eight-spoke, and 375-lb., seven-spoke motor wheel, the former being competent for fast speed, and several varieties of 30-in. motor wheels. The wheels ranged in size from 14 ins., 135 lbs., to 40 ins., 900 lbs., and included 18 ins., 20 ins. and 22 ins. for maximum-traction trucks. There was also shown a series beginning with a wheel cast in Watertown, N. Y., in 1854, under J. M. Ross' patent of March, 1857, followed by a type of wheel designed by Mr. Hirt, when master mechanic of the West End Road, of Boston, the feature of which was double brackets, and the same in single-plate design. Then a curved-spoke wheel, designed by F. D. Russell in 1894, on which a design patent was not obtainable, in consequence of the Ross patent, above mentioned, and finally the Western double-bracket design of recent date, which resembles very closely the wheel of 1854. This series was shown simply as a matter of interest, and to point out that nearly half a century ago a bracketed wheel was produced almost on the same lines as the other wheel of recent date. The company was well represented, including among the gentlemen who entertained its friends President C. Chapin, Vice-President F. D. Russell and E. H. Chapin. A handsome penknife was distributed as a souvenir, with the company's accustomed generosity.

THE BETHLEHEM STEEL COMPANY, of South Bethlehem, Pa., was represented by H. F. J. Porter, manager of the New

York office. Mr. Porter is a familiar figure at the American Street Railway Association conventions, and this year he had the pleasant duty of extending an invitation from his company to visit the works at South Bethlehem. A large number accepted this generous offer, and an account of the trip is given elsewhere. Mr. Porter was assisted by H. E. Flewellin, also of the New York office.

THE CONSOLIDATED CAR FENDER COMPANY, of New York, sold more "Providence" fenders during the convention than the entire number sold at the six previous ones. Col. A. C. Woodworth, the amiable general manager, has now more friends than ever, and intends to keep them no matter how many times he is compelled to enlarge his factory. The Campbell snow broom and Millen step lifter also proved extremely popular. Full particulars of this exhibit were published last week.

THE CHARLES E. DUSTIN COMPANY, of New York, was represented at the convention by its president, Charles E. Dustin. Although starting hardly a month ago, this firm has already become quite a factor in the steam and electrical machinery trade, and Mr. Dustin was warmly congratulated by his many friends in the railway and electrical field.

THE AMERICAN STOKER COMPANY, of New York, although having no exhibit, had its interests well looked after by President Royal C. Peabody, who held the attention of many of the delegates by the results attained by his well-known automatic stokers. Some interesting competitive tests have recently been made in a large manufacturing plant, which are quite flattering to the company. John MacCormack, chief engineer, was also in attendance.

F. E. HUNTRESS made many new friends for himself and the St. Louis Car Company at the convention. One of the finest souvenirs given this year, a fine pearl-handled pocket knife, was distributed at his exhibit.

J. R. MCCARDELL & COMPANY, of Trenton, N. J., exhibited one of their extensively used trolley wagons. This important feature of street railway equipment was carefully inspected by the delegates, and much favorable comment made on its construction.

THE TAUNTON LOCOMOTIVE MANUFACTURING COMPANY, of Taunton, Mass., did an immense business with its exhibit of a heavy 21-ton snow plow, with pneumatically-operated plows, as described last week. Treasurer W. R. Billings and H. L. Hepburn were in attendance, as were also Jacob Wendell, Jr., R. L. MacDuffie and H. R. Newkirk, of Wendell & MacDuffie, of New York.

THE H. W. JOHNS MANUFACTURING COMPANY, of New York, had an attractive space at the left of the entrance. Joseph Sachs exhibited in a practical manner the relative merits of the Noark fuses and the ordinary open fuse, both on short-circuit and heavy overloads. A stand had been erected containing two fuse boxes—one for open fuses and one for enclosed Noark fuses, and by passing current through the two types the difference was made clearly evident. Three of the large elevated lines and over 6000 surface cars are already equipped with Noark fuses, and two examples of fuse boxes particularly designed, one for elevated and the other for surface lines, were illustrated. The company besides exhibited car heaters and insulating materials and specialties, including overhead line material made of Molded Mica. The Monarch insulation was also shown. In addition to Mr. Sachs there were present in the booth A. Hall Berry, manager of the electrical department, of the New York office; J. Meek, S. G. Meek, E. B. Hatch, D. T. Dixon, J. W. Perry and James Humphreys.

JACOB WENDELL, JR., of Wendell & MacDuffie, of New York, was in attendance, having just arrived from Europe, where he had been on a business trip. He reported having had a most successful visit. Mr. MacDuffie was also at the convention.

WHIPP & SEELEY, of New York, were represented by both members of the firm, who circulated about the Garden talking supply business in general and their own lines of special brass-work, trolley wheels and line material in particular with their numerous friends.

F. W. ROLLER, of Machado & Roller, New York, was present to interest the delegates in the new Whitney rail-bond testing instrument described recently in these pages. Mr. Roller had an exhibit with Harold P. Brown.

THE UNITED STATES PROJECTILE COMPANY, of Brooklyn, N. Y., exhibited gears and pinions. The company's space was handsomely arranged with large polished shells, whose warlike appearance did not keep the delegates from examining the pressed-steel pinions of which it makes a specialty. The representatives were C. E. Porter, secretary; L. E. Robert and B. W. Stone.

THE AMERICAN TELEGRAPHONE COMPANY, of New York, had E. W. Creecy in charge of its recording telephone and phonograph.

THE TROJAN TROLLEY TENDER COMPANY, of Troy, N. Y., was represented by A. W. Ham and R. H. Ham, who had one of the "tenders" on exhibition with Francis Granger.

THE THOMAS H. BIBBER COMPANY, of Boston, Mass., was represented by Thomas H. Bibber.

GEORGE W. KNOX, the well-known Chicago electric railway engineer, met a large number of old friends at the convention.

PORTER & BERG, of Chicago, were represented by both members of the firm, J. W. Porter and M. A. Berg. They reported that the electric railway supply business of the Middle West was never better.

A. A. HILTON, general sales agent of the St. Louis Car Wheel Company, of St. Louis, Mo., was meeting his many friends at the Garden. At a convention remarkable for the handsome souvenirs given out any one attracting particular attention had to be of the highest order, but the handsomely-polished model car-wheel paper weight distributed by Mr. Hilton will long be appreciated by the delegates.

D. W. PHELAN, of New York, who supplied the handsome poles used in connection with Pittsburgh Reduction Company's exhibit, was in attendance interesting the delegates in his most complete line of poles, cross-arms, ties and piling.

THE BRADY BRASS COMPANY exhibited an extensive line of its electric railway motor bearings, including both armature bearings, axle bearings, and the well-known products of this company were ably described by the representatives in attendance, consisting of D. M. Brady, C. P. King, C. M. Reubens, F. C. Cameron and E. F. Wilmerding. A number of trolley wheels, different kinds of solder, etc., were included in the exhibit, and a handsome bronze pencil was given to anyone visiting the booth.

THE DUFF MANUFACTURING COMPANY, of Pittsburgh, Pa., exhibited a large line of Barrett jacks in the north balcony. The representatives present were J. R. McGinley, president; G. F. Freed, superintendent, and J. S. Singer, of New York.

GILES S. ALLISON, of New York, had an interesting collection of registers, etc., in the main entrance hall. He is a most ardent advocate for the St. Louis register, which he represents, and succeeded in making many new friends for this well-known fare recorder. He also showed Tripartite steel poles.

THE JOHN A. ROEBLING'S SONS COMPANY was represented by H. L. Shippy, manager of its New York office, as well as by Messrs. Bailey, Cockey and Harrington.

D. J. EVANS, of Chicago, was present for the North American Railway Construction Company and the American Improved Rail-Joint Company. The exhibit of these companies was made in connection with that of the Lorain Steel Company.

THE BABCOCK & WILCOX COMPANY made one of the most impressive exhibits at the convention—an aggregate of over 120,000 hp of Babcock & Wilcox boilers installed or under contract for the elevated, surface and underground systems of Manhattan Island. This exhibit, for obvious reasons, was not transferred to a booth at Madison Square Garden.

THE CHICAGO TRUCK COMPANY was present in the person of E. A. Curtis, vice-president, who distributed catalogues and explained personally the advantages of the various types of trucks which his company is manufacturing.

THE OHMER CAR REGISTER COMPANY, of Dayton, Ohio, had a most artistically arranged exhibit just at the entrance to Convention Hall. This company showed the various types of Ohmer revenue savers for which it is noted, and was represented by J. F. Ohmer, W. F. Breidenbach and E. S. Atwood. J. H. Stedman, of Rochester, was also present a large part of the time. Through an unfortunate mistake the Ohmer Company was unable to show its space as brilliantly illuminated as had been intended, but as it was it made one of the handsomest showings at the convention.

THE BULLOCK ELECTRIC MANUFACTURING COMPANY, of Cincinnati, and the Wagner Electric Manufacturing Company, of St. Louis, were represented by Frank G. Bolles, manager advance department. Mr. Bolles distributed "gold medals" and lead pencils bearing his companies' imprint, both of which proved exceedingly popular as convention souvenirs.

THE AMERICAN RAILWAY SUPPLY COMPANY exhibited a fine collection of its extensive line of small brass specialties. This company's badges, buttons and number plates are very largely used by the street railways of this country, and General Manager Walter Chur met many old buyers at the convention while creating a host of new ones.

THE STANDARD VARNISH WORKS, of New York, were ably represented by J. C. Dolph and E. L. Phillips, who distributed a handsome souvenir incidentally to describing the various merits and wide use of the Standard varnish.

THE NATIONAL BRIDGE COMPANY, of New York, was represented by C. W. Smith, secretary. Bridges and steel structural work for street railway purposes are a special feature of the National Bridge Company's rapidly growing business.

THE FOWLER & ROBERT MANUFACTURING COMPANY, of New York, had an assortment of registers on exhibition that was well worth examining. The work of the company's factory in Brooklyn is hard to surpass, and the examples shown at the convention were of the best quality and workmanship. The representatives present were J. W. Fowler, president; G. W. Linch, treasurer; F. A. Morrell and Eldridge Packer.

THE WESTERN ELECTRICAL SUPPLY COMPANY, of St. Louis, was ably represented by Charles Scudder, Jr., manager of its railway department.

WILLIAM THOMAS WATSON had ample evidence to present as to the merits of the "Twentieth Century Lifeguard," both in the obvious advantages of the fender itself, and its success in practical operation.

THE G. C. KUHLMAN CAR COMPANY, of Cleveland, Ohio, was represented by its secretary, C. A. Ricks. While the Kuhlman Company made no exhibit at the convention, a much more striking evidence of the company's activity than would have been possible at Madison Square Garden, is furnished by the immense new plant now building at Cleveland.

THE NATIONAL BATTERY COMPANY, of Buffalo, was represented by Joseph P. Devin, vice-president and general manager, and Elmer A. Sperry, expert and electrical engineer. Mr. Sperry was, of course, one of the best known electric railway pioneers at the convention, and substantial success may be predicted for his new battery in the traction field.

THE NEW YORK SWITCH & CROSSING COMPANY, of Hoboken, N. J., was represented, as usual, by W. C. Wood, president.

THE STANDARD POLE & TIE COMPANY, of New York, was represented by E. G. Chamberlin, vice-president, who reports a constantly increasing business in the electric railway field. Mr. Chamberlin's attendance at the convention resulted in a number of inquiries, which will doubtless lead to an even larger number of orders in the near future. The Standard Pole & Tie Company makes a specialty of Southern white cedar poles, and has excellent facilities, also, for furnishing ties, cross-arms, brackets, pins, braces, etc. A large stock is always on hand at the Jersey City storehouse.

The Trip to the Brill Works

This pleasant excursion was participated in by a number of the delegates on Saturday, Oct. 12, on the invitation of the J. G. Brill Company, of Philadelphia. Quite a party left for Philadelphia at 11:55 a. m., on the private car "Grace," to make an inspection of the company's works in Philadelphia. The party contained a large number of ladies, and on the arrival of the special car at the Broad Street station, this portion of the attendance was taken for a drive through Fairmount Park and Wissahickon, while the gentlemen devoted the whole afternoon to going carefully through the works. The inspection of a large manufacturing company is, of course, of great interest to all railway men, but when such a plant as has been built up by the Brill Company, representing as it does the highest type of technical efficiency, and the most perfect system of industrial organization and management, is thrown open to visitors, the interest and pleasure are increased many fold, and the trip was a source of great enjoyment to those who accepted the courtesy extended on last Saturday. Included in the party were: Andrew Radel and Mrs. Radel, of New Brunswick, N. J.; Mrs. Barnett, of Bridgeport, Conn.; W. S. Dimmock and Mrs. Dimmock, of Richmond, Va.; M. S. Hopkins and Mrs. Hopkins, of Columbus, Ohio; T. C. Penington, of Chicago, Ill.; George Yuille, of Chicago, Ill.; Frank L. Fuller, of Philadelphia; N. R. Nothbohn, of Spokane, Wash.; E. L. Huntington, of Spokane, Wash.; H. M. Sloan, of Chicago, Ill.; W. Wamsley, of Chicago, Ill.; W. B. Rae, of Detroit, Mich.; William R. Wood, of Portland, Maine; E. A. Newman, of Portland, Maine; Dr. Wheeler, of Portland, Maine; Mr. Whitney, of Portland, Maine; Charles E. Carpenter, of Philadelphia; George M. Haskell, of New Haven, Conn.; Thomas Walsh, of New Brunswick, N. J.; D. B. Dean and Mrs. Dean, of Chicago, Ill., and W. H. Heulings, Jr., and Mrs. Heulings, of Philadelphia.

Pan-American Awards

The list of the companies which received awards at the Pan-American Exposition has just been made public. The names of those companies who have been prominent in the street railway work, and who received either gold or silver medals, are given below. It should be said in this connection that some of the largest companies exhibiting at the convention did not enter for award, and this explains the absence of several prominent names on the list below:

DIVISION IX.—MACHINERY

GOLD MEDALS

- American Steam Gauge & Valve Manufacturing Company, Boston, steam gages and engine fittings.
- American Tool Works Company, The, Cincinnati, Ohio, radial drill.
- American Tool Works Company, The, Cincinnati, Ohio, lathe.
- American Steel & Wire Company, Chicago, diamond dies for drawing wire.
- Buffalo Forge Company, Buffalo, steam engines.
- Buffalo Forge Company, Buffalo, blowers and fans.
- Bullard Machine Tool Company, The, Bridgeport, Conn., turret and engine lathe.
- Bullard Machine Tool Company, Bridgeport, Conn., boring mill.
- Boston Belting Company, Boston, mechanical rubber goods.
- Bement, Miles & Co., Philadelphia, steam hammer.
- Brown & Sharpe Manufacturing Company, Providence, R. I., No. 6 automatic gear cutting machine.
- Brown & Sharpe Manufacturing Company, Providence, R. I., drilling, reaming, milling and measuring tools.
- Brown & Sharpe Manufacturing Company, Providence, R. I., No. 00 automatic screw machine.
- Carborundum Company, The, Niagara Falls, N. Y., carborundum.
- Chisholm-Moore Manufacturing Company, Cleveland, Ohio, anti-friction differential chain hoist.
- Cincinnati Machine Tool Company, The, Cincinnati, Ohio, upright drill.
- Cincinnati Milling Machine Company, The, Cincinnati, Ohio, universal milling machine.
- Cleveland Twist Drill Company, Cleveland, Ohio, twist drills, reamers and cutters.
- Cleveland Machine Screw Company, Cleveland, Ohio, automatic turret lathe and chucking machine.
- Cleveland Machine Screw Company, Cleveland, Ohio, worm milling machine.
- Dodge Manufacturing Company, Mishawaka, Ind., rope transmission.
- Jenkins Brothers, New York City, steam and water valves.
- Jenkins Brothers, New York City, Jenkins 96 sheet packing.
- Lunkenheimer Company, The, Cincinnati, Ohio, valves, lubricators and engine fittings.
- Long & Allstatter Company, Hamilton, Ohio, power punching and shearing machine.
- Lodge & Shipley Machine Tool Company, The, Cincinnati, Ohio, engine lathes.
- Morse Twist Drill & Machine Company, New Bedford, Mass., machine tools.
- Niles Tool Works Company, The, Hamilton, Ohio, boring and turning machines.
- National Tube Company, Pittsburgh, Pa., tubes and pipes.
- Otto Gas Engine Works, Philadelphia, Pa., gas engines.
- Prentice Bros. Company, Worcester, Mass., drill.
- Pond Machine Tool Company, The, Plainfield, N. J., planer.
- Pratt & Whitney Company, Hartford, Conn., drills, reamers, cutters and measuring tools.
- Pratt & Whitney Company, Hartford, Conn., profiling machine.
- Pratt & Whitney Company, Hartford, Conn., double-head milling machine.
- Robins Conveying Belt Company, New York City, belt conveyor.
- Roebbling's Sons Company, John A., Trenton, N. J., power transmission (wire rope).
- Roebbling's Sons Company, John A., Trenton, N. J., wire.
- Schieren & Co., Charles A., New York City, "Bull's Head" Electric and "Royal Extra" brands leather belting.
- Struthers, Wells & Co., Warren, Pa., 300-hp gas engine.
- Shelby Steel Tool Company, Cleveland, Ohio, seamless steel tubes.
- Wilmarth & Morman Company, Grand Rapids, Mich., drill-grinding machine.
- Worthington, Henry R., Brooklyn, N. Y., jet condenser.
- Walworth Manufacturing Company, Boston, Mass., valves, fittings and tools.

SILVER MEDALS

- American Blower Company, Detroit, Mich., fans and blowers.
- Ames Iron Works, Oswego, N. Y., automatic steam engines.
- American Roller Bearing Company, Boston, Mass., roller bearings.
- Ball Engine Company, Erie, Pa., steam engine.
- Bessemer Gas Engine Company, The, Globe City, Pa., double-cylinder 2-cycle gas engine.
- Buffalo Forge Company, Buffalo, punches, shears and forges; induced draft; blacksmith's drills.
- Burt Manufacturing Company, Akron, Ohio, oil filters.
- Bliss Company, E. W., Brooklyn, N. Y., sheet-metal stamping and drawing machines.
- Bickford Drill Tool Company, Cincinnati, Ohio, radial and multiple drill.
- Chapman Double Ball Bearing Company, New York City, double ball bearing.
- Chicago Pneumatic Tool Company, Chicago, pneumatic tools and appliances.
- Chisholm & Moore Manufacturing Company, Cleveland, Ohio, pneumatic drills.
- Eddy Valve Company, Waterford, N. Y., gate valves.
- Eddy Valve Company, Waterford, N. Y., Eddy fire hydrant.
- Pitchburg Steam Engine Company, Pitchburg, Mass., steam engine.

Green Fuel Economizer Company, The, Matteawan, N. Y., fuel economizer.
 Gisholt Machine Company, Madison, Wis., tool grinders.
 Gisholt Machine Company, Madison, Wis., turret lathes.
 Lane & Bodley Company, The, Cincinnati, Ohio, Corliss steam engine.
 Hazard Manufacturing Company, Wilkesbarre, Pa., wire rope.
 Norton Emery Wheel Company, Worcester, Mass., "Bath" machine indicators.
 Prentiss Tool & Supply Company, New York City, general arrangement of exhibit of machine tools.
 Powell Company, The William, Cincinnati, O., oil cups and valves.
 Philadelphia Pneumatic Tool Company, Philadelphia, pneumatic tools.
 Standard Tool Company, The, Cleveland, Ohio, twist drills, reamers, milling cutters and taps.
 Williams Company, J. H., Brooklyn, N. Y., drop-forged wrenches and chain pipe wrenches.
 Wheeler Condenser & Engineering Company, New York City, Admiralty surface condenser, with combined air and circulating pump.

DIVISION X.—ELECTRICITY

GOLD MEDALS

American Steel & Wire Company, Chicago, New York City, electric wires and cables.
 General Electric Company, Schenectady, N. Y., machinery and apparatus for generating and using electricity.
 General Electric Company, Schenectady, N. Y., electric lighting apparatus.
 General Electric Company, Schenectady, N. Y., electrical measuring instruments.
 National Carbon Company, Cleveland, Ohio, carbon products.
 Niagara Falls Power Company, Niagara Falls, N. Y., electric transmission plant, as illustrated by model.
 Pittsburgh Reduction Company, Niagara Falls, N. Y., electrical conductors of aluminum.
 Roebing's Sons & Co., J., Trenton, N. J., wires and cables.
 Safety Insulating Wire & Cable Company, The, New York City, electric wires and cables.
 Standard Underground Cable Company, Pittsburgh, Pa., electric wires and cables.
 Stanley Electric Manufacturing Company, Pittsfield, Mass., high-tension alternating-current apparatus.
 Stanley Instrument Company, Great Barrington, Mass., electric wattmeters.

SILVER MEDALS

American Vitrified Conduit Company, New York City, vitrified clay conduits.
 Bernard Company, The E. G., Troy, N. Y., motor-generator sets and accessories.
 Bullock Electric Manufacturing Company, Cincinnati, Ohio, dynamos and motors.
 Camp Company, H. B., Akron, Ohio, vitrified conduits.
 Crocker-Wheeler Company, Ampere, N. J., dynamos and motors.
 Cutler-Hammer Manufacturing Company, Milwaukee, Wis., motor starters and controllers.
 D. & W. Fuse Company, Providence, R. I., fuses and fuse fittings.
 Electric Storage Battery Company, Philadelphia, methods and appliances for the distribution of electric energy.
 Electric Storage Battery Company, Philadelphia, storage batteries.
 Eureka Tempered Copper Works, North East, Pa., tempered copper and cast copper.
 Gould Storage Battery Company, New York City, storage battery.
 Hazard Manufacturing Company, Wilkesbarre, Pa., insulated wire and cables.
 McKoy Clay Works, Brazil, Ind., vitrified conduits.
 Queen & Co., Philadelphia, self-regulating X-ray tube.
 Wagner Electric Manufacturing Company, St. Louis, single-phase motors and transformers.

DIVISION XI.—TRANSPORTATION

GOLD MEDALS

Baldwin Locomotive Works, Philadelphia, Pa., steam and electric locomotives.
 Brill Company, J. G., Philadelphia, Pa., cars and trucks for electric roads.
 Electric Vehicle Company, New York City, electric vehicles (variety and completeness).
 Electric Vehicle Company, New York City, electric automobiles.
 General Electric Company, Schenectady, N. Y., electric traction apparatus and system.
 Gas Engine & Power Company and Charles L. Seabury & Co., Morris Heights, New York City, launches, engine models.
 Gould Coupler Company, Depew, N. Y., car light by electric power from axle.
 Mobile Company of America, Tarrytown, N. Y., mobiles.
 New York Car Wheel Works, Buffalo, cast-iron car-wheels.
 Pressed Steel Car Company, Pittsburgh, Pa., pressed steel cars.
 Roebing's Sons Company, John A., Trenton, N. J., general exhibit in transportation.
 Safety Car Heating & Lighting Company, The, New York City, gas lighting for cars and buoys.
 Standard Railroad Signal Company, Troy, N. Y., railroad signal apparatus.
 Studebaker Bros. Manufacturing Company, South Bend, Ind., street and hand sprinklers.
 Studebaker Bros. Manufacturing Company, South Bend, Ind., freight and delivery vehicles.
 Studebaker Bros. Manufacturing Company, South Bend, Ind., vehicles for farm use.
 Union Switch & Signal Company, The, Swissville, Pa., block signaling and interlocking apparatus.

SILVER MEDALS

Bierbaum & Merrick Metal Company, Buffalo, "Ideal" trolley wheel.
 Consolidated Car Heating Company, Albany, N. Y., heating apparatus for steam and electric cars.
 Gold Car Heating Company, New York City, car-heating apparatus.

Gould Coupler Company, Depew, N. Y., car couplers and platforms.
 McGuire Manufacturing Company, Chicago, Ill., car-track sweeper.
 McGuire Manufacturing Company, Chicago, Ill., trucks and appliances for electric cars.
 New York Air Brake Company, The, New York City, New York air brake.
 Standard Steel Works, Philadelphia, steel tires and wheels and frames.
 Safety Car Heating & Lighting Company, The, New York City, steam heating for railway cars.

DIVISION XIII.—MANUFACTURES

GOLD MEDALS

American Steel & Wire Company, The, New York and Chicago, wire nails and miscellaneous springs.
 American Steel & Wire Company, The, New York and Chicago, flat steel springs.
 Berry Brothers, Ltd., Detroit, varnishes.
 Chase & Co., L. C., Boston, plush goods.
 Michigan Stove Company, The, Detroit, stoves and ranges.
 Pantasote Leather Company, The, New York City, "Pantasote."
 Pittsburgh Reduction Company, The, Pittsburgh, aluminum.
 Standard Paint Company, The, New York City, rubberoid roofing and flooring.
 Stewart Hartshorn Company, East Newark, N. J., wood and tin spring rollers.
 Taylor Iron & Steel Company, High Bridge, N. J., manganese steel.
 Williams & Co., J. H., Brooklyn, drop forgings and special designs.

SILVER MEDAL

Standard Paint Company, The, New York City, P. & B. rubberine paints and varnish.

DIVISION XV.—LIBERAL ARTS

GOLD MEDALS

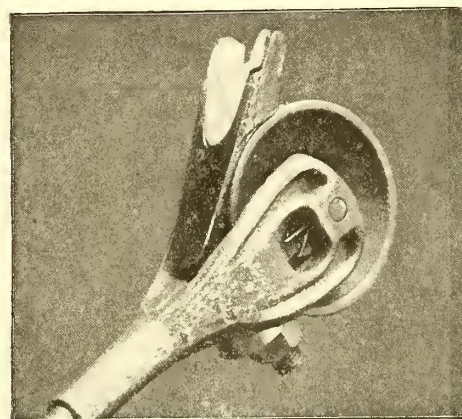
Keuffel & Esser Company, New York City, surveying instruments and drawing materials.
 McGraw Publishing Company, New York City, *Electrical World and Engineer*, *STREET RAILWAY JOURNAL*, *American Electrician* and technical books.
 Roebing's Sons Company, John A., Trenton, N. J., bridge engineering.

SILVER MEDALS

Western Electrician, The, Chicago, publication, *Western Electrician*.
 Wilson, James Godfrey, New York City, rolling partitions.

An Effective Sleet Cutter

The sleet cutter shown in the accompanying illustration is known as the O. K. sleet cutter, and differs materially from all other sleet cutting devices. The cutter is made in two sizes, to fit both 4-in. and 6-in. harps. It consists of a brass lug, or contact piece, which is riveted into a malleable iron elbow shank, the latter being fitted with a nut to hold it secure in place in the harp. The



THE O. K. SLEET CUTTER

brass contact lug is renewable, and can be replaced when worn out, at a small cost. This cutter is an emergency device, as it can be readily carried for emergency use on the car, and can be adjusted by the motorman or conductor at almost a moment's notice. It was given a thorough test in actual use during the sleet storms of last winter, and has proved very effective and entirely satisfactory. Porter & Berg, of Chicago, are the sole agents for this device in the United States.

Street Railway Patents

[This department is conducted by W. A. Rosenbaum, patent attorney, 177 Times Building, New York.]

UNITED STATES PATENTS ISSUED OCT. 8, 1901

683,898. Car Brake; C. H. Beardsley, Brooklyn, N. Y. App. filed March 2, 1896. A passage opens through the working face of the shoe to conduct sand thereto when desired.

683,920. Railway Switch; G. M. Ervin, Johnstown, Pa. App. filed Feb. 12, 1901. A rotary switch member, having the different

track ribs on its faces, is mounted in a box-like structure in the track and is turned on its pivot when necessary to change the switch.

683,927. Trolley Switching Device; F. W. Garrett, Johnstown, Pa. App. filed Dec. 3, 1900. The motorman can swing the trolley laterally slightly to cause the wheel to engage with the different ribs of the switch.

683,934. Track Sanding Attachment for Double-Truck Motor Cars; A. W. Ham, Lansingburg, N. Y. App. filed June 14, 1901. The sand tube is flexible, and has its lower end attached to a part of the truck so that it will be deflected when the truck passes around a curve, and thus always be in position to deliver the sand directly to the rail.

684,114. Switch for Electric Conductors; T. B. Shaffer, West-moor, Pa. App. filed July 23, 1901. Details.

684,122. Trolley; G. H. Spafford, Baltimore, Md. App. filed March 13, 1901. When the wheel runs off the wire, the latter engages a rotary part having a cam surface, which, by the friction of the wire, is lifted against and directs the wire back on to the wheel.

684,124. Car Brake; H. S. Stier, St. Louis, Mo. App. filed June 10, 1901. Details.

684,133. Electric Trolley Construction; E. G. Thomas, Cambridge, Mass. App. filed April 18, 1901. The trolley wire is a ribbon which, at the clip, is twisted to bring the width vertical for engagement with the clip.

684,136. Trolley Wheel Support; C. Tocherman, Brooklyn, N. Y. App. filed March 8, 1901. The wheel has a certain amount of lateral movement controlled by springs.

684,159. Railway Crossing Structure; W. C. Wood, New York, N. Y. App. filed March 30, 1901. A wearing-plate inserted at the crossing is held by keys driven friction-tight into keyways.

684,178. Car Brake; P. Boch, New York, N. Y. App. filed Feb. 20, 1901. Details.

684,195. Side Bearings for Cars; S. A. Crone, New York, N. Y. App. filed May 2, 1901. An elliptical block is placed between upper and lower convex seats and held in place by gear teeth.

684,327. Railway; D. E. Watson, Oronog, Mo. App. filed Nov. 8, 1900. A single-rail structure and car.

684,332. Controller Handle; E. A. Wildt, Scranton, Pa. App. filed Feb. 27, 1901. The step-by-step movement of the handle is controlled by a lock.

684,373. Trolley Guard; R. Inglis and E. Wilks, Jersey City, N. J. App. filed Aug. 3, 1900. Guard levers are pivoted each side of the wheel.

ENGINEERING SOCIETIES

THE NEW YORK RAILROAD CLUB.—The second regular meeting of the club for this season was held at 12 West Thirty-First Street, New York, in the rooms of the American Society of Mechanical Engineers, at 8 o'clock, on Thursday, Oct. 17. The paper by F. M. Nellis on "Brakes in Railroad and Street Car Service" was discussed at greater length than was possible at the last meeting, especial attention being given, during the evening, to a consideration of street car equipment and requirements.

THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—The next regular meeting of the institute will be held on Friday, Oct. 25, at 12 West Thirty-First Street, New York City. A most important paper on the general subject of "The Speed Regulation of Prime Movers," with special reference to the successful operation of alternators in parallel, by P. O. Keilholtz, of Baltimore, will be read and discussed, and short papers on the latter subject will also be presented by C. P. Steinmetz, W. L. R. Emmett and E. J. Berg. The committee on papers, realizing that the problems presented by this question can be better understood, analyzed and solved by intelligent co-operation, or concerted action, between the designers and builders, has invited representatives of the leading electrical steam engine, gas engine and water-wheel manufacturers to take part in the discussion of the subject of the speed regulations in general, and of the control and compensation of variations of angular velocity in particular. All who are interested in the subject are cordially invited to attend.

PERSONAL MENTION

MR. J. B. HANNA, for many years secretary of the Cleveland City Railway Company, of Cleveland, Ohio, has resigned. Mr. Hanna has not announced his intentions.

MR. M. J. LOFTUS, JR., has succeeded Mr. Henry Scheidler as general superintendent of the Newark & Granville Electric Railway, of Newark, Ohio. Mr. Loftus was formerly identified with a Wheeling (W. Va.) company.

MR. F. A. ESTEP, president, R. D. Nuttall Company, Pittsburg, Pa., was accompanied to the convention by Mrs. and Miss Estep. After the convention this little party went down to Washington, and from there returned to Pittsburgh.

MR. ALBERT F. ELKINS, of Hamilton, Ohio, has been appointed to a prominent position with the Havana Electric Company, which controls the local lines at Havana, Cuba. Mr. Elkins was formerly connected with the Cuban Department of Posts.

MR. DANIEL W. JOHNSON, for some time general agent of the Union Pacific Railway at Cleveland, has been appointed traffic manager of the Detroit, Ypsilanti, Ann Arbor & Jackson Railway, at Detroit, Mich., which is building up an extensive system in Michigan.

MR. E. K. RAY, treasurer of the Milford, Attleboro & Woonsocket Street Railway Company, of Milford, Mass., has been presented with an elegant silver loving cup, artistically ornamented and engraved. The cup was presented to Mr. Ray by the employees of the company as a token of their esteem for him.

MR. CALVIN S. CROWELL, one of the original incorporators of the Camden Horse Railway Company, West Jersey Traction Company, and a director of the Camden & Suburban Railway Company, is dead. Mr. Crowell, who was in the sixty-eighth year of his age, was born at Dennis, Mass. His father was a seafaring man, and left his son to follow the same vocation. Mr. Crowell soon tired of this, and embarked in business in New York, where he laid the foundation for his ample fortune. In 1867 he came to Philadelphia, which has been his home since that time.

MR. ANDREW AMBUHL, who has been electrician for the Decatur Traction & Electric Company, of Decatur, Ill., has been elected to succeed Mr. C. N. Wilcoxon, who has recently resigned as manager and superintendent of the company. Mr. Ambuhl has been connected with the street car service of Decatur for a number of years. He was connected with the companies before consolidation, and accepted a position as assistant electrician afterward. After several years he went to Detroit, where he took a position with the Detroit Electrical Works. Then he was employed with the elevated road in Chicago. About three years ago he returned to Decatur to take the position of electrician, and has since been in the service of the local company at Decatur.

MR. G. J. SMITH, who has for a number of years been master mechanic of the St. Louis & Suburban Railway, and was, previous to that, master mechanic of the Cincinnati, Covington & Newport Railway Company, has resigned, to take a responsible position with the St. Louis Car Company. It is understood that the move is an excellent one, financially, for Mr. Smith, and the St. Louis Car Company is certainly to be congratulated on securing the services of one of the best street railway master mechanics in the country. Mr. Smith has for many years worked to bring the standard of street railway shop practice up to, and better, than that of the steam roads, which have shops that are the results of many years of experience, and has always been one with whom an exchange of ideas on shop practice was valuable.

MR. ABRAM S. HEWITT, of New York, has been presented with a handsome gold medal by the Chamber of Commerce, in recognition of his services in the cause of rapid transit in that city. The medal was designed under the supervision of a committee of the Chamber, and executed by the famous medallist, O. Roty, of Paris. It is struck in pure gold, and has on it the following inscription: "Ingenio svo vrbis benefactor et rei pblice conservator. Abram Stevens Hewitt. Ætat svae LXXVIII." Translated it reads: "By his genius, benefactor of the city and conservator of the public property. Age seventy-eight years." On the obverse: "The Chamber of Commerce of State of New York, Rapid Transit, MDCCCC." In presenting the medal to Mr. Hewitt, Mr. Morris K. Jesup, president of the Chamber of Commerce, said in part: "In conformity with the instruction of the Chamber, I have now the great pleasure, Mr. Hewitt, of placing the medal in your hands. In the performance of this agreeable duty I do but give expression to the unanimous voice of the members of the Chamber, who regard you as one of its most conspicuous and honored members. I will say, not only as president, but as your life-long friend, that my heart is full of gratitude, not only for what you have done for our city, but for the great services you have rendered during your long life in promoting public measures that have contributed to make our city and nation great. May God spare your life for many years yet is the sincere prayer of us all. And for you, sir, in the words of Madame de Staël, I would say, 'When a noble life has prepared old age, it is not the decline that it reveals, but the first days of immortality.'"

FINANCIAL INTELLIGENCE

THE MARKETS

The Money Market

WALL STREET, Oct. 16, 1901.

The incidents of the week in the money market have been unexpectedly favorable. A pause occurred in the outflow of money to the interior, so that for the seven days ending last Saturday, arrivals and shipments just about balanced one another. At the same time heavy disbursements by the government for pensions served to check the excess revenue, while delayed payments on bond redemption and the receipts of gold from Pacific coast points created a balance in favor of the banks. This gain in cash was supplemented by a decrease in loans representing the repayment of advances to the New York City Treasury, and, as a result, surplus reserve was enlarged by nearly \$2,000,000. The indications are, however, that this respite from the natural tendency toward depletion of the reserve cannot last beyond another week at most. The falling off in the interior demands is apparently an intermission between the ending of the requirements for the wheat-crop movement and the beginning of the cotton-moving requirements, which reach their maximum ordinarily in the latter half of the current month. The banks accordingly have still to face a further drain from their correspondents in the South, and can expect little help from the return of currency from other domestic quarters until well into November. It is unreasonable, moreover, under present revenue conditions, to expect a further gain at the Treasury; the best to be hoped for is that the loss will be kept down to moderate proportions. Sterling exchange has reacted from the high figures prevailing toward the end of last week, and within the last day or two the freer offerings of cotton bills is an encouraging feature in that direction. But the recent course of the foreign markets has made it very clear that they will resist any American demands for gold, and that to get any gold at all we must bid money rates here up to a much higher level than they are at present. French bankers, during the past fortnight, have been calling in their open credits in the London market rapidly, partly to ease the strain of the copper share liquidation in Paris and partly to prepare for the new Russian loan which, according to expectations, will be floated during the coming winter. Joined to this is the practical certainty that the exigencies of the South African war will demand another heavy issue of British consols, and on still another side the fear of the prolonged industrial crisis in Germany suddenly leading to an urgent requisition on the other European markets. Under such circumstances the chances of the American market getting any substantial help from abroad are rather slight. The outlook still is for a more or less considerable decline in local bank resources, which will not be serious enough to cause a stringency, but which, on the other hand, will enforce caution in extending operations which require the aid of credit.

Call money is quoted at from 3 to 3½ per cent, and time money at 4½ per cent on good collateral for all dates.

The Stock Market

The stock market, after a brief period of activity and advancing prices at the end of last week, has fallen back into a condition where the trading is narrow and the tendency uncertain. Rumors that the long-standing problem occasioned by the Northern Pacific purchases of last May was about to be settled by a merger of the company with the Great Northern were the main impulse to the upward movement, and the lack of any official confirmation for them is the apparent reason why the rise was not sustained. But the best information is that the story of a proprietary company to take over the majority holdings of the Northern Pacific and Great Northern shares has a solid foundation in fact, but that the announcement through speculative channels was altogether premature. The best reason for believing that there is such a scheme on foot lies in the obvious necessity for making some permanent disposition of the immense volume of Northern Pacific stock which was bought in the struggle for control, not as an investment, and in which the parties concerned have tied up an enormous amount of their own private capital. Whether the financing of these undesired holdings is the last end which the capitalist owners in the transcontinental railway field have in mind may fairly be doubted. There are a large number of people who look forward, when the proper time arrives, to developments of larger significance, which will amplify and perfect the vast plans for concentration of control and community of interest already partially revealed in the Western railway field. It is this expectation, chiefly, which caused the rapid rise this week in St.

Paul, Union Pacific and Southern Pacific shares. The rest of the market, after sympathizing to some extent with the advance in these leading stocks, has relapsed into irregularity. The industrial shares continue, as a rule, depressed, and the traction issues are unsteady. In the railroad group, the shares of the corn-carrying lines are moving with great indecision, and buyers are chary of them on account of the uncertainty regarding the effects of the crop failure on their traffic receipts. On the other hand, the group of hard and soft coal road stocks is distinctly strong, on renewed evidence of active business. The market, on the whole, reflects the continued apathy of the public and the more substantial capitalists, and it seems to have accepted the view that the money outlook is too doubtful to permit much of an increase in the speculation.

Pressure on the securities of the local transportation companies has kept up intermittently, but with much less effect than in the case of the preceding week. The unpleasant impression created by the annual statement of Brooklyn Rapid Transit has by no means diminished, but the support given to the stock on the decline was sufficient to hold outside liquidation in check and to induce professional speculators to proceed more cautiously with their sales. Those who are sustaining the market for the shares are trying also to sustain public confidence by the claim that the franchise of the Brooklyn property, apart from its earning capacity, justifies the prevailing level of prices. It is needless to say that this "vindication" is not received with any great enthusiasm in Wall Street. An attempt was made to create apprehension that Metropolitan would have to cut its next dividend, but, aside from explaining the rather obvious manipulation for the decline in the stock, it amounted to nothing. The old bugaboo of the franchise tax decision has also been used as a club against the traction securities, but it is pertinently observed that some time must elapse before the testimony now being made before the referee is all in, and the referee gets ready to make his report. Even then, if the constitutionality of the measure is upheld, the fight will undoubtedly be carried up to the federal Supreme Court.

Philadelphia

Very little deserving notice has happened in the Philadelphia market for traction securities this week. As the time draws near for the deposit of securities under the Philadelphia Company's offer to acquire the Consolidated Traction, of Pittsburgh, criticism of the scheme grows more and more bitter. Under the terms of exchange holders of Consolidated preferred will receive something less than \$62 per share, plus accumulated dividends of 3 per cent. The contention is that a 6 per cent stock like this is worth considerably more than this on a par value of \$50. The proposal to give common shareholders \$25.50 for each share is regarded as liberal enough on the present basis, but it makes no allowance for the growth in the system's earning power which is going on steadily. Nevertheless, the promoters of the enterprise apparently have the majority of the stock pledged for exchange and the adverse criticism has not affected market quotations. Pittsburgh preferred is up from 63 to 63½ on the week, and the common is steady around 23¾. Union Traction has ruled comparatively dull. It went up as high as 28½ last Friday, but fell off again yesterday to 28. Little interest is taken in this security at the moment. Philadelphia Traction is also quiet, but steady around 96. Railways Company General, which was widely tipped a week ago, has not been dealt in at all during the past week. Scattered sales have carried American Railways down from 41 to 40. United Traction, of Pittsburgh, has been dealt in moderately at 50¾. In bonds, Electric-People's Traction 4s have held first place in activity, advancing to 97¼. Indianapolis Railway 4s are down a half-point, from 84 to 83½. Other transactions of less importance have been reported in Consolidated of New Jersey 5s at 109¾ and 109½, Newark Passenger 5s at 118, United Railway and Electric 4s at 95 and Atlantic City Railroad 5s at 113½.

Chicago

The question of franchise renewals has again come into first prominence in Chicago traction circles. Officials of the companies will not give out what their plan of defense will be in case of hostile action; they are evidently awaiting the decision of the committee of the City Council, which is soon to report upon the matter. Meanwhile the market for the various securities reflects less the uncertainty felt about this matter and about the tax increase proposal than the confidence inspired by the eminently satisfactory traffic returns. Earnings this month on all lines are maintaining an equal rate of increase over last year, with the earnings of September, which made such an exceptionally favorable

exhibit. Northwestern common has sold this week above 40—the highest point recorded for it in a long time. Metropolitan is also strong around 39, and the preferred at 91 and better. South Side holds steady at 110, and Lake Street has recovered slightly from the decline of a week ago. Dealings in all these shares have been light, and apart from the traffic results nothing has occurred to affect their position. The proposed extension of the Northwestern Elevated to Evanston has taken on a new phase in the report that the St. Paul Railroad will sell the north end of its Evanston branch to the elevated company outright. Officials do not commit themselves, however, about the truth of this story.

Other Traction Securities

No dealings in the traction issues are reported on the New York curb this week apart from the securities of the St. Louis company. Toward the end of last week sales of St. Louis Transit were reported from St. Louis at as low as 25¼, and the preferred sold at 80. The decline brought out a better demand, which has raised the New York curb price of the common shares to 26 bid, and the bid price of the preferred to 81. The 4 per cent bonds of the company have been actively dealt in between 89 and 89¼. A recovery is reported in Columbus Street Railway, which recently sold as low as 42. The common stock is now 45½ bid, and the preferred 101¼. Asking prices are considerably above these bid quotations. New Orleans is fractionally lower on the week, selling between 29½ and 30. The Louisville City Railway stocks have been firm since the declaration of the regular dividends on the first of the month, but with scarcely any transactions reported from their local market. It is said that although the common stock pays only 4 per cent and is selling around 110, the floating supply is insignificant. The local opinion is that the rapid growth of the city gives the common stock chances of development which fully offset the higher dividends on the preferred, and make it an equally attractive investment proposition.

Stock Quotations

The following table shows present bid quotations for the leading traction stocks, and the active bonds, as compared with a week ago; also the high and low since Jan. 1, 1900:

	Jan. 1, 1900		1901	
	To Date		Closing Bid	
	High	Low	Oct. 8	Oct. 15
American Railways Co.....	48¼	27	40½	40½
Boston Elevated	192	695	170	167½
Brooklyn R. T.....	88%	47½	57%	59%
Chicago City	†285	200	201	201
Chicago Union Tr. (common).....	..	..	17%	17½
Chicago Union Tr. (preferred).....	..	..	58	58
Columbus (common)	48	20	45¼	45½
Columbus (preferred)	104	80	102½	101¼
Consolidated Traction of N. J.....	69½	57	66	67
Consolidated Traction of N. J. 5s.....	110	..	108½	109½
Consolidated Trac. of Pittsburgh (common).....	30¼	20¼	23%	23%
Indianapolis Street Railway.....	48¾	15	45	45
Lake Street Elevated	16¼	6½	11½	11½
Manhattan Ry.	131¾	84	118½	110¼
Massachusetts Elec. Cos. (common).....	43¼	15	36	36
Massachusetts Elec. Cos. (preferred).....	96	70	91	91
Metropolitan Elevated, Chicago (common).....	39½	24½	38%	39½
Metropolitan Elevated, Chicago	98½	70	91½	90
Metropolitan Street	182	143¾	158	157¾
Nassau Electric 4s	97½	..	97½	97½
New Orleans (common).....	33¼	18¼	29	29
New Orleans (preferred)	108	90	102	104½
North American	*106	*74	91¼	98
North Jersey	36	21	23½	22½
Northwestern Elevated, Chicago (common).....	52	..	37	40¾
Northwestern Elevated, Chicago (preferred).....	97½	..	86	86
Rochester	31½	12	30	30
St. Louis Transit Co. (common).....	35	16½	25%	26
South Side Elevated (Chicago).....	119	93	108	108
Syracuse (common)	25	10½	25	25
Syracuse (preferred)	665	25	62	60
Third Ave.	135¼	45¼	117	117
Twin City, Minneapolis (common).....	105¼	58½	98	100
United Railways, St. Louis (preferred).....	82½	..	80	81
United Railways, St. Louis, 4s.....	91½	..	89	89½
Union Traction (Philadelphia).....	40%	24¼	27%	28
United Traction (Providence).....	110	107	109	109

a Asked. b Bid. * Quotation of new stock. † High quotation previous to the issue of new stock.

Iron and Steel

The iron market, as expected, is rushed with the demand to replenish stocks at the mills which were so heavily reduced during the strike. This has been the main reason for the hardening recently observed in prices, but the advance, such as it has been, is

regarded by competent authorities as fictitious and temporary. That the larger dealers take the same view is indicated by the attempts now being made to secure business for 1902 at concessions from the current prices. Yet there is no prospect of any decline yet awhile with the statistical position as strong as it is now. According to the *Iron Age* computation, furnace stocks were further reduced by 20,000 tons during September, and it is doubtful whether there are more than two-weeks' requirements in producers' hands.

Quotations are \$15.75 for Bessemer pig, \$26 for steel billets, and \$28 for steel rails.

Metals

Quotations are as follows: Copper, 16½@16¾ cents; tin, 24.95 cents; lead, 4¾ cents; spelter, 4¼ cents.

Auction Sales

At the last regular auction sale held by Adrian Muller & Son the following was the only sale of street railway securities reported: \$5,000 Brooklyn City Railroad first 5s at 113½.

DENVER, COL.—It is reported that negotiations are now being conducted for the sale of the entire property of the Denver City Tramway Company.

WASHINGTON, D. C.—More than 95 per cent of the first collateral trust mortgage bonds of the Washington Traction & Electric Company has been deposited with the United States Mortgage & Trust Company by the reorganization committee. This makes the plan of Aug. 1 operative. The time for the deposit of bonds and stocks under the agreement has been extended to Oct. 31, after which date no further deposits will be received except upon such terms as the committee may prescribe.

NEW ORLEANS, LA.—The directors of the New Orleans City Railroad Company have accepted the offer of H. H. Pearson, Jr., acting for Brown & Company, of Philadelphia, and representing Philadelphia capitalists, for the lease or purchase of the lines, thirteen in number, with all the cars, machinery, power, etc., and to recommend the stockholders to accept the offer. Mr. Pearson has made a similar offer to the Orleans, Carrollton & St. Charles Railroad Companies.

BALTIMORE, MD.—Judge Morris, of the United States Circuit Court, has appointed Allan L. McDermott receiver pedente lite of the City & Suburban Railway, of Washington, or that portion of it which extends from Laurel to the District of Columbia line. Associate Justice Andrew C. Bartley, of the Supreme Court of the District of Columbia, made Mr. McDermott receiver of all the property of the railway situated within his jurisdiction. The action was taken on petition of the United States Mortgage & Trust Company, United States Electric Lighting Company, Anacostia & Potomac River Railway Company and the Columbia Railway Company, which represent themselves as creditors of the company.

CONCORD, MASS.—The Railroad Commissioners have granted the petition of the Concord, Maynard & Hudson Street Railway Company for the issue of its original stock of \$50,000. The stock is to be issued for the purpose of defraying the cost of building and equipping the road.

CLINTON, MASS.—The Railroad Commissioners have authorized the Concord & Clinton Street Railway Company to issue original stock of \$60,000 for the building and equipping of its road.

NEWTOWN, MASS.—The Railroad Commissioners have authorized the Newton Street Railway Company to issue 5 per cent twenty-year bonds to the amount of \$115,000. The bonds are to be issued for the purpose of funding the company's floating indebtedness.

MIDDLEBORO, MASS.—The Railroad Commissioners have authorized the Middleboro, Wareham & Buzzard's Bay Street Railway Company to issue 5 per cent twenty-year bonds to the amount of \$75,000, for the purpose of funding its floating indebtedness.

FISHKILL, N. Y.—The Citizens' Street Railway Company has absorbed the Carroll Electric Company, of Mattewan. It is said that the company will expend \$20,000 in improving the electric plant.

DUNKIRK, N. Y.—William J. Conners, J. F. Burke, W. J. Callahan and S. F. Drake have arranged for leasing the Dunkirk & Point Gratiot Traction Company for a period of ninety-nine years. The lessees are interested in a plan to construct an electric railway from Buffalo to Jamestown by way of Dunkirk.

ALBANY, N. Y.—The United Traction Company reports earnings as follows:

	1901	1900
Quarter ending Sept. 30		
Gross receipts	\$382,977	\$365,649
Operating expenses	238,970	237,276
Earnings from operation.....	\$144,007	\$128,373
Receipts from other sources.....	1,241	965
Gross income	\$145,248	\$129,338
Fixed charges	59,702	60,127
Net earnings	\$85,546	\$69,211

NEW YORK, N. Y.—The committee on stock list of the New York Stock Exchange has recommended that \$8,355,000 of the \$15,000,000 first and refunding mortgage 4½ per cent fifty-year gold coupon bonds of 1951 of the Connecticut Railway & Lighting Company be admitted to the Stock Exchange list. With its application to the Stock Exchange the Connecticut Railway & Lighting Company submits the following statement for the eight months ended Aug. 31, 1901:

	Railway	Electric Systems	Gas Systems	Total
Gross receipts.....	\$718,961	\$199,644	\$114,509	\$1,033,114
Expenses	435,272	144,232	84,500	664,004
Earnings from operation.....	\$283,688	\$55,412	\$30,009	\$369,108
Interest charges				\$284,323
Net earnings				\$84,785

CLEVELAND, OHIO.—The Pomeroy-Mandelbaum syndicate, which controls the Southern Traction Company, is preparing plans to consolidate with the Hamilton & Lindenwald Transit Company, operating about 12 miles of line in Hamilton and vicinity, and the Miamisburg & Germantown Traction Company, a 5-mile line recently completed, and practically a spur line of the Southern & Ohio Traction Company, both of which lines have recently been absorbed by the syndicate. It is said that the details of the consolidation will be announced in the near future.

CLEVELAND, OHIO.—H. J. Latimer and J. W. Holcomb, promoters of the Columbus, Delaware & Marion Railway, say that the deal for the consolidation of that road with the Columbus, Delaware & Northern Traction Company, a rival road, has finally been consummated. The latter company was organized by A. E. Appleyard, John G. Webb, H. S. Harshman, H. A. Fisher and others, of Columbus. In a recent lawsuit its charter was found to be defective, and the court decided that, as a street railway, it could not condemn private right of way. This decision was touched on at some length in the STREET RAILWAY JOURNAL a short time ago. As a result of the decision, the Columbus, Delaware & Northern was forced to give up the fight, and the consolidation followed.

NEWARK, OHIO.—As the result of a conference held in Newark, the Newark, Zanesville & Coshocton Traction Company, which is promoted by Charles H. Geidel, of Coshocton; W. O. Littick, of Zanesville, and J. M. Ikes, of Newark, is to be consolidated with the line from Zanesville to Wheeling, W. Va., which is promoted by L. F. Taylor and John S. Black, of Cambridge. Traffic arrangements have been made with the Columbus, Buckeye Lake & Newark Traction Company, so that cars will be operated from Columbus through without change to Wheeling. It is claimed the roads have been financed, and that construction work will start this fall.

CLEVELAND, OHIO.—The Everett-Moore syndicate has arranged with Eastern parties to take \$3,000,000 of the Detroit & Toledo Shore Line thirty-year bonds, bearing interest at 4½ per cent. Previous to this transaction the syndicate closed the deal for the purchase of the Toledo & Monroe Railway, and the line was consolidated with the Detroit & Toledo Shore Line. Immediately after, the two lines were transferred to the Detroit United Railway, and in the future will be operated as the Shore Line division of the Detroit District Railway, as the Michigan lines are to be known. Contrary to general impression, the Toledo & Monroe Railway has not been the property of the syndicate, but has been held by it under a lease. Messrs. Black, Fowler and Mulkey, who built the road, are now heavy stockholders in the Detroit United.

LIMA, OHIO.—The Toledo, Columbus, Springfield & Cincinnati Railway Company has filed a mortgage for \$100,000, to guarantee the construction of the section of the road between Lima and West Minister. President Bartholomew, of the company, states that rails will be laid within fifteen days.

JOHNSTOWN, PA.—T. C. Dupont, of Wilmington, Del., acting for a syndicate, is said to have bought the controlling interest in the Johnstown Passenger Railway Company. The stock owned by John B. Hoefgen, W. Horace Rose, James P. Thomas and H. H. Weaver, comprising over 8000 shares, was bought by Mr. Dupont at \$75 a share, the par value being \$50.

PHILADELPHIA, PA.—The property of the Philadelphia & Bristol Passenger Railway Company has been sold at public sale to the Neshaminy Elevated Railway Company, which was incorporated under the new franchise law. The consideration was \$1,000. The sale was made by the trustee, the Security Trust & Life Insurance Company, of Philadelphia, to satisfy a lien of \$896.66 filed because of State taxes against the road. The bondholders were the purchasers.

QUAKERTOWN, PA.—The Quakertown Traction Company has filed for record a mortgage for \$300,000 given in favor of the Commonwealth Trust Company, of Harrisburg, trustee. The mortgage is to run for a period of thirty years, and the bonds are to be 5 per cent gold bearing. The interest and principal are guaranteed by the Philadelphia & Lehigh Valley Traction Company.

GREENSBURG, PA.—The Westmoreland Railway Company has been reorganized as the Pittsburgh, McKeesport & Greensburg Traction Company. The company now operates an electric railway between Greensburg and Irwin. The line will be extended to Trafford Park, and thence to Pitcairn and Wilmerding. The new line will be 5 miles in length, and connections will be made at Wilkesburg with the line to that city.

MILWAUKEE, WIS.—The Milwaukee Electric Railway & Light Company has declared a regular quarterly dividend of 1½ per cent on its preferred stock, payable Nov. 1. The books of the company will be closed on Oct. 21 and reopened on Nov. 2.

Tables of Recent Traction Earnings

NAME	LATEST GROSS EARNINGS		LATEST NET EARNINGS		
	Week or Month	1901	1900	1901	1900
American Rys. Co.....	Sep.	\$82,171	\$78,041	\$.....	\$.....
Binghamton Ry. Co.....	Aug.	21,490	19,539	10,604	9,684
Brooklyn R. T. Co.....	Aug.	1,139,611	1,061,804	379,528	399,606
Chicago & Mil.El.Ry.Co.	Aug.	24,042	20,702	16,563	14,644
Cincinnati, Newport & Covington Ry. Co....	June	72,201	73,965	42,452	42,700
City Elec. (Rome, Ga.)..	July	3,873	.....	e 260	.....
Cleveland & Eastern....	Aug.	10,671	5,363	6,133	3,781
Cleveland El. Ry. Co....	Sep.	231,552	176,108	104,109	83,094
Cleve., Elyria & Western	Aug.	27,307	.....	14,936	.....
Cleveland, Painesville & Eastern.....	Aug.	20,770	16,838	11,154	11,167
Consolid.Tr. (Pittsburgh)	Aug.	289,103	268,919	163,345	159,788
Denver City Tramway...	Aug.	142,390	124,718	64,216	61,949
Detroit United Ry.....	Aug.	288,575	261,810	138,160	125,363
Duluth Superior Tr....	Aug.	41,763	.....	21,873	.....
Elgin, Aurora & So. Tr.	Sept.	34,172	29,486	e16,734	e11,865
Herkimer, Mohawk, Ilion & Frankfort Ry. Co..	May	4,508	4,146	1,935	908
International Tr.....	Aug.	686,826	285,150	434,933	170,518
London St. Ry.....	Sep.	15,034	14,790	7,180	7,365
Montreal Street Ry....	Sep.	182,584	161,526	.....	.....
Northern Ohio Traction..	Aug.	67,693	57,954	33,669	24,064
Olean St. Ry. Co.....	Sep.	4,910	4,188	2,745	1,831
Richmond Traction Co..	Aug.	21,985	18,133	6,757	7,837
Rochester Ry. Co.....	Aug.	89,379	84,272	41,234	35,514
St. Louis Transit Co....	Aug.	509,048	505,728	.....	.....
Scranton Ry. Co.....	Aug.	63,763	57,647	30,019	27,713
Southern Ohio Trac. Co.	Aug.	39,915	30,201	21,465	14,996
Syracuse R. T. Ry. Co...	Aug.	54,943	51,015	24,729	22,639
Toledo Ry. Co.....	Aug.	12,449	108,730	71,134	52,197
Twin City Rapid Transit.	Sep.	308,394	271,652	185,262	165,093
United Tr. Co. (Albany).	Sep.	122,184	117,785	44,023	41,758
United Tr.Co.(Pittsburgh)	Mar.	157,792	148,009	70,741	65,511

NAME	Period Ending	GROSS FROM JULY 1 TO LATEST DATE		NET FROM JULY 1 TO LATEST DATE	
		1901	1900	1901	1900
American Rys. Co..	Sep. 30	\$262,982	\$244,426	\$.....	\$.....
Binghamton St. Ry.	Aug. 31	43,970	39,414	22,932	21,035
Brooklyn R. T. Co.	Aug. 31	2,343,372	2,206,993	e24,794	e874,147
Chicago & Milwaukee El. Ry. Co...	aAug.31	112,962	92,267	63,391	55,472
Cincinnati, Newport & Covington Ry. Co.....	aJune30	384,638	369,938	223,546	220,145
City El. (Rome, Ga.)	aJuly 31	24,138	.....	e 2,970	.....
Cleveland El. Ry. Co	aSep. 30	1,705,634	1,506,701	762,651	684,248
Cleveland, Elyria & Western Ry. Co.	aAug.31	158,563	112,186	70,122	40,349
Cleveland, Painesville & Eastern ..	aAug.31	105,362	91,692	51,768	46,882
Consolid. Tr. Co. (Pittsburg).....	dAug.31	1,448,854	1,379,544	822,662	785,039
Denver City Tram.	aAug.31	980,891	847,019	442,484	366,798
Detroit United Ry..	aAug.31	1,843,510	1,643,786	855,626	729,227
Duluth Superior Tr.	aAug.31	296,085	.....	134,475	.....
Elgin, Aurora & So. Tr.....	aSept.30	275,504	234,125	e122,560	e84,274
Herkimer, Mohawk, Ilion & Frankfort Ry. Co.....	May 31	48,895	47,026	20,247	21,063
International Tr...	Aug. 31	1,215,762	536,149	723,867	297,235
London St. Ry. Ry.	aSep. 30	106,709	88,384	40,791	25,945
Milwaukee El. Ry. & Lt. Co.....	dJune 30	918,104	830,674	426,071	389,333
Montreal Street Ry.	*Sep. 30	1,888,968	1,762,558	.....	.....
Olean St. Ry. Co....	Sep. 30	17,046	15,721	10,159	8,984
Richmond Trac.Co.	*Aug. 31	197,579	182,339	73,705	89,902
Rochester Ry.....	Aug. 31	180,457	167,452	84,025	70,977
St. Louis Transit Co	aAug.31	3,801,409	2,657,716	.....	.....
Scranton Ry. Co...	Aug. 31	127,958	116,843	62,318	55,507
Seattle Elec. Co..	dMay 31	514,386	412,705	193,192	97,253
Southern Ohio Tr.	aAug.31	218,736	188,056	96,257	89,168
Syracuse R.T.Ry.Co	Aug. 31	114,376	99,434	52,542	44,322
Toledo Ry. Co....	Aug. 31	245,504	213,744	138,533	103,442
Twin City R. T. Co.	aSep. 30	2,340,195	2,102,029	1,271,318	1,121,023
United Tr. Co. (Albany).....	Sep. 30	384,218	366,614	145,248	129,338

* Twelve months. † Caused by strike of employees. a From Jan. 1. b Three months. d Five months. e After deducting taxes.

NEWS OF THE WEEK

CONSTRUCTION NOTES

ANNISTON, ALA.—The Woodstock Iron Company has in contemplation the construction of an electric railway from the Louisville & Nashville Railroad tracks to its ore mines at Rocky Hollow. It is highly probable that a franchise will be granted.

BIRMINGHAM, ALA.—The Birmingham Railway, Light & Power Company has been granted franchises for the construction of about 5 miles of additional city lines. President Jemison, of the company, who was before the Council, stated that the company was to spend \$2,500,000 in improvements, and that it would take two and one-half years to complete the work.

ARVADA, COL.—The grade for the Denver & Northwestern Railroad is being rushed very rapidly. The prospect is that it will be completed long before the time limit of six weeks, and that the company will be able to keep its contract to run cars into Arvada Dec. 1.

DENVER, COL.—Mention has previously been made of the proposed intention of the Colorado & Southern Railroad Company to equip its lines with electricity, and now that a representative of the company who was sent to Europe to study the application of electricity to railroading in Europe has returned and made a report, it is stated that the complete plans for installing the system will be drawn at once. The suburban lines on which the change of motive power will be made are five in number, extending from Denver in different directions.

WATERBURY, CONN.—The Connecticut Railway & Lighting Company is purchasing land along the survey of its proposed road from Waterbury to Southington, and it is understood that the construction of the line will be undertaken early in the spring. At Southington connection will be made with the line which runs to Plainville, New Britain and Hartford, thus giving the company a continuous road from Hartford to Waterbury.

ATLANTA, GA.—Work on the extension of the East Point line of the Atlanta Railway & Power Company to College Park, one of Atlanta's most flourishing suburbs, has been begun. This line has been in contemplation for some time. The line from the center of town to College Park will be 9 miles in length, and will be one of the prettiest suburban rides.

HERRIN, ILL.—Read and Underwood, representatives of the Coal Belt Electric Railway Company, propose extending the electric railway from the Crips mine to Herrin immediately, providing the citizens of Herrin will guarantee the right of way. The company proposes to complete the road, and have cars running by Jan. 1, 1902.

BLOOMINGTON, ILL.—Franchises have just been granted to companies to construct interurban electric railways through McLean County. The three cities of Bloomington, Decatur and Springfield will be connected by a triangle or belt line, and eventually the road will be extended to Joliet on the north and to St. Louis on the south, and Peoria on the west. The road north and south will parallel the Chicago & Alton Railroad. Stock is now being subscribed, although most of the capital is being furnished by companies which have similar roads in operation in Ohio and Pennsylvania. The entire right of way has been secured for the 200 miles connecting the three cities, and the promoters guarantee that the work of grading and laying track will commence next spring.

INDIANAPOLIS, IND.—Plans are rapidly being perfected for the construction of two electric railway lines between Indianapolis and Shelbyville. The Indianapolis & Southwestern Traction Company, the contract for the construction of which is held by Townsend, Reed & Company, of Chicago, is to build one line, and the Indiana Southern Traction Company, in which C. D. Myers, of Cleveland, is interested, is to build the other line. The former project, the Indianapolis & Southwestern Traction Company, is well advanced, and mention of the company's plans in detail has already been made. The plans for the construction of the Indiana Southern Traction Company's lines are also well advanced. The latter line will run through Norwood, Beech Grove, Gallaudette, Acton, Brookfield, London, Fairland and Shelbyville, paralleling the Big Four. Three surveys have been made, and it has been decided to locate the power station at Acton. The line will enter the city in Shelby Street, and the grading and laying of rails will begin early next spring. Regular interurban cars will be operated.

CEDAR RAPIDS, IA.—Local capitalists are planning the construction of two interurban electric railways during the coming year, both connecting the cities of Cedar Rapids and Iowa City. Two separate and distinct companies will be formed for the purpose of constructing the lines. Isaac B. Smith and W. G. Dows, of Cedar Rapids, are promoting one line, and H. Bennett and J. W. Conn, of Cedar Rapids, are promoting the other line. The City Council of Cedar Rapids, at the meeting held Oct. 7, passed ordinances granting the promoters of both projects the right to construct lines over certain specified streets within the city of Cedar Rapids, and the right to operate over the same for a period of twenty-five years, provided the said street railway systems be completed within the city, and connected with the interurban lines to Iowa City within a period of three years from the date of the passage of the ordinances. The promoters maintain that both lines will certainly be built.

CENTERVILLE, IA.—At an election held here Oct. 3, the franchise granted to the Citizens' Electric Light & Gas Company by the Council was ratified by the citizens. The Councilmanic ordinance was passed in August, and gives the company permission to construct an electric lighting and power plant, gas works, and street railway system. The franchises are granted for a period of twenty-five years.

SIOUX CITY, IA.—The promoters of the company that proposes to build an electric railway between Sioux City and Le Mars have enlarged their

plans, and the line as now projected will extend from Sioux City to Spirit Lake. The preliminaries have progressed to the securing of right of way stage. H. A. Miller, president of the Sioux City Business College, who is active in the company, says positively that the line will be built from Sioux City to Spirit Lake. Mr. Miller says: "The total length of the line will be about 90 miles. It will be an air line to Le Mars, and almost a direct line from Le Mars to Spirit Lake. The route from Le Mars will be by way of Primghar and Hartley. We are considering two routes between Hartley and Spirit Lake. Practically all the right of way between Sioux City and Le Mars has been secured. We have the money to build the line that far, and construction work will commence early in the spring."

DES MOINES, IA.—J. F. Coffinberry and Mrs. Alice M. Butler appear before the City Council last week and asked that body to make provisions for the holding of an especial election for the people to vote on the proposition of allowing them a franchise to construct and operate a street railway system within the city in connection with an interurban line from Des Moines to Colfax. Mr. Coffinberry and Mrs. Butler claim to represent Cleveland (Ohio) capitalists, and state that the line will surely be constructed if the franchise is granted. The City Council now has the matter under consideration, and a committee has been appointed to consider the question. Before reporting on the project, this committee has demanded the names of the Cleveland capitalists and also definite information as to what use the franchise will be put. J. F. Polk, president of the Des Moines City Railway Company, has appeared before the committee, and states that it is the intention of his company, in connection with the Interurban Railway Company, to construct an electric railway between Des Moines and Colfax, and protests against the submitting to a vote of the people the proposition of granting a second street railway franchise to the syndicate of Cleveland capitalists. The outcome of the fight between the rival lines before the Council is awaited with interest by the citizens.

LAKE CHARLES, LA.—The car houses of the St. Charles Street Railway Company were destroyed by fire a few days ago.

WESTMINSTER, MD.—It is reported that the Baltimore, Westminster & Gettysburg Electric Railway Company is making rapid progress in Pennsylvania with the preliminaries for its lines. The preliminary survey has been completed from Baltimore to Graffenburg and will be rapidly continued on to Harrisburg. The entire right of way has been secured between Gettysburg and Shippensburg.

WORCESTER, MASS.—The Providence & Worcester Street Railway Company is now negotiating with the Worcester Consolidated Street Railway Company regarding the operation of its cars in Worcester.

BOSTON, MASS.—It is said that negotiations are being conducted for the consolidation of the Commonwealth Avenue, Newton & Boston, Lexington & Boston, and several other suburban lines operating west of Boston and within a radius of 20 miles. It is also said that the plans for consolidation include the incorporation of a large company to take over the several properties, one with sufficiently large capital to admit of extensions and improvements to the present properties.

BERKSHIRE, MASS.—The Berkshire Street Railway Company is making active efforts to connect the city of Pittsfield with Albany, passing through Tiltons, Barkersville and Hancock, and petitions have already been made to the Albany City Council, to the town of Hancock, and to the necessary State officials for the right of way. If no unexpected opposition occurs, it is the intention to begin work at once, so that the line may be well along before severe weather. It is also the intention of the company to extend its lines to the northwest part of the city of Pittsfield just as soon as the necessary work can be done.

NORTHFIELD, MASS.—The Greenfield, Bernardston & Northfield Street Railway Company has been organized to construct an electric railway to connect Greenfield, Bernardston and Northfield. The capital stock of the company is \$25,000. The Selectmen of the several towns through which the road will pass will shortly be applied to for franchises. The temporary directors of the company are: E. Herbert Sanderson, Alonzo Alford, of Bernardston; F. Z. Allen, of Northfield; Edward C. Crosby, of Battleboro, Vt.; Marcus A. Coolidge, of Fitchburg; Fred. E. Pierce, of Greenfield; John A. Taggart, of Montague.

DETROIT, MICH.—The Detroit, Rochester, Romeo & Lake Orion Railway, now in operation to Flint, is securing right of way for an extension to Saginaw and Bay City. This will give a line almost across the southern peninsula, and will give direct connection for Detroit to 125,000 people, in these towns and vicinity.

GRAND RAPIDS, MICH.—It is reported that the Grand Rapids, Spring Lake & Grand Haven Rapid Transit Company has interested some new capitalists in its line, and that the same will be built from Grand Rapids to Grand Haven within a short time.

GRAND RAPIDS, MICH.—Engineers have recently gone over the line of the proposed Grand Rapids & Belding Electric Railway, and have submitted their report to the interested parties. It is said the road will certainly be built.

DETROIT, MICH.—The Detroit & Chicago Traction Company has that portion of its line between Marshall and Albion nearly graded, and has commenced the stringing of trolley wires. Work on the grading between Marshall and Battle Creek has also been commenced.

DETROIT, MICH.—The Rapid Railway Company has submitted maps showing a proposed extension of its line from Anchorville to Marine City.