



SATURDAY, OCTOBER 18, 1902.

PUBLISHED WEEKLY BY THE STREET RAILWAY PUBLISHING COMPANY

MAIN OFFICE: NEW YORK, ENGINEERING BUILDING, 114 LIBERTY STREET.

BRANCH OFFICES:

- CHICAGOMonadnock Block
PHILADELPHIA929 Chestnut Street
LONDON.....Hastings House, Norfolk Street, Strand

Correspondents in other Principal Cities of the World.

Long Distance Telephone, "New York, 4044 Cortlandt." Cable Address, "Stryjourn, New York,"—Lieber's Code used.

TERMS OF SUBSCRIPTION.

In the United States and Canada.....\$4.00 per annum Single copies, first issue of each month, 35 cents; other issues, 5 cents.

In all Foreign Countries, per annum..... \$6.00 258 31fr

Subscriptions payable always in advance, by check (preferred), money order or postal note, to order of C. E. WHITTLESEY, Treasurer.

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The Detroit Convention

According to all indications, the Detroit convention was the most largely attended of any in the history of the association, and the local committee is to be congratulated upon the success which attended its efforts in the way of providing entertainment and facilities for the meetings of the association. The conditions which surround a convention of this association are more formidable than ever before, and in spite of the fact that Detroit is used to conventions of all kinds, from the G. A. R. to coal conferences, we imagine that the demand for accommodations on the hotels of that city were never greater than during the past week. As a consequence, those who applied for rooms late had considerable difficulty in getting what they wanted, but there was no real discomfort and the incident simply showed that the meetings of the association have now become so popular that only the largest cities must be considered in the future in the selection of a place for the annual meetings. The treatment of the guests at Detroit by the local company was most hospitable, and Mr. Hutchins and his associates were the recipients of many complimentary remarks, not only for the numerous courtesies which they extended to the visitors, but also for the fine transportation system which they have developed in the city of Detroit. The attractive appearance of the rolling stock was particularly remarked, and the sentiment was expressed that the cars all looked as if they had just been put on the road. The weather was propitious and many delegates improved the opportunity to ride over some of the long interurban lines which have made Detroit famous, and those who did so were well repaid for the time expended. The nomination of Mr. Hutchins for the new president of the association received popular approval and was a well deserved tribute to one of the ablest and most popular members of the association.

President Vreeland's address was one of the strongest documents which has ever been presented to the association and outlines a policy upon which all companies can unite with satisfaction. The position taken by Mr. Vreeland on the rights of corporations peaceably to conduct their business and to be regarded by the municipalities in the same light as other corporations doing an important work was stated with great clearness and force. Mr. Vreeland touched upon this same subject about a year ago in a memorable address which he delivered at a dinner in Boston of the New England Street Railway Club, and the idea which he brought out so clearly at that time that railway companies were not "bandits," but were important business enterprises anxious to make only legitimate profits and ready to co-operate intelligently with the city authorities in all efforts to promote the transportation facilities and hence the prosperity of the city in which they operate, created at that time wide comment in the Boston papers. Mr. Vreeland followed up this demand for just treatment by referring to the importance which interurban electric railroading has acquired during the past few years and the possibilities before the American Street Railway Association as representing the broad industry of electric transportation in all its phases. There are several reasons why all electric railway engineers, whether they are connected with city roads or trunk lines, must and naturally will look to the American Street Railway Association for a long time to come as the natural exponent of all branches of electric railroading. Although the work on the trunk lines may be such as to require heavier motors, the engineers to take up this heavier class of equipment will for some time to come be necessarily those who have learned the business on street railway systems, the apparatus used will be largely the same and the manufacturers will be those who cater to "street railways" proper. As a result, the engineers will be men whose past affiliations have been largely with the association and no other body in the country will be able to afford, as Mr. Vreeland pointed out, anywhere near the same opportunity for instruction to those interested in electric transportation in its various phases.

Mr. Vreeland's long experience as an executive head and president of various deliberative bodies, such as the New

York Street Railroad Club, of which he has been president for a number of years, made him an ideal chairman and chief executive officer of the association. The business of the meetings was directed by him with despatch, the speakers were held closely to the topics under debate, and valuable points were brought out in the discussion in a way possible only through an experienced chairman. Mr. Vreeland's company set a good example by being represented at the convention by a large number of delegates, and both he and his associates received many compliments upon the success of the convention in New York last year.

Mr. Penington performed the services of secretary of the association in the efficient manner which has characterized his administration of this office for the last seven years, and his re-election to the office of secretary elicited great popular satisfaction. The plan of publishing the papers in advance, as inaugurated last year, added greatly to the facility with which these topics were taken up for discussion. Mr. Penington is to be complimented on the early date at which these papers were issued to the members as well as upon the excellence with which all the details of the convention were carried out.

The Registration of Transfers

The topic, which was treated by Mr. Meneely, of the Brooklyn Heights Railroad Company, has been a subject upon which there has been a diversity of opinion ever since transfers and registers were invented, and as much a bone of contention as the subject of opposite or broken joints in track construction. Both methods have been adopted on roads of the highest standing, and each has its advocates, who have no difficulty in pointing out very serious defects in the other method. As an actual matter of fact, both the method of registering the transfer as a cash fare and that of not registering it at all, have serious drawbacks, and it is interesting to note that the author of the paper recommends what is practically the issue of a receipt for every fare paid; in other words, the European system of fare collection, which has its advantages, but is cumbersome as well as wasteful of material and time. The fact of the matter is that there is no ideal method with anything connected with transfers. Transfers are themselves an anomaly, as they are practically the presentation of a free ride to any passenger who desires it, and the auditing or checking of the transfers is only one of the evils which accompanies their use. The most desirable plan is that followed in Philadelphia, where a charge of 3 cents is made for a transfer, and while this does not completely eradicate the problem, it reduces the number of transfers asked for, and makes the margin between the cash value of the transfer and the nickel considerably less than five cents, which is the value of the transfer when it is given away. As, however, it is a condition and not a theory which confronts us, and free transfers are the almost universal rule, we believe that in most cases fewer evils will follow where a single register is used in not registering the transfers than in registering them. While this opens the doors for free rides to the friends of conductors, the number who can participate in any fraud of this kind must be large; that is, there must be a considerable number of *participes criminis* if a fraud of any considerable magnitude is committed, and this of itself will tend to expose the evil, for where there is a large number engaged in a crime some one will be apt to be detected. Again the raid is in the direction of free transportation rather than on fares received, and the theft must be premeditated, rather than decided upon at the close of a day's run after the conditions have shown that the chances of immunity against detection are good. Probably a better plan than either is the use of a double register, and it is interesting to note in the discussion that a number of the companies have introduced devices of this character with satisfactory results. It is needless to say that this system, as well as any other involving the issue of fare receipts, requires a frequent checking up of transfers and the practice mentioned by Mr. Beggs of having the transfers received for passage deposited at the end of the trip rather than at

the end of the day's run seems advantageous. In conclusion, we derived the impression from the discussion on Mr. Meneely's paper, as well as from that by Mr. Sampson before the Accountants' Association, that suburban and interurban roads require a method of definitely recording each kind of fare received, that this can be advantageously done either by the use of multiplex registers or the zone system of fares, and that many city roads are tending in the same direction through the use of duplicate registers.

The Adjustment of Damage Claims

This subject is ever present, though never welcome, and its importance is increasing with advancing years in spite of the efforts made to minimize the causes for such litigation. The paper presented at the convention by Mr. Starring along those lines is a very interesting contribution, and contains some excellent suggestions as to the manner of handling cases of this kind. In general, the writer advocates a firm and conservative policy on the part of operating companies, but he advises discrimination in the matter of settlements where the interests of the company can best be served by reaching an amicable agreement. He believes, too, that while it is wise to establish a reputation for fighting unjust claims, it is not necessary to oppose every demand that is presented, but advisable rather to make a fair settlement where actual damage has been inflicted and reasonable compensation is sought. The author also recognizes the importance of making a favorable impression upon the jury when it is necessary to oppose even the most unreasonable demands, and his experience teaches him that to do this successfully it is necessary to accord fair treatment to the claimant and to his witnesses. Otherwise there is danger that jurors may believe that the company's case is weak, and that it is resorting to brow beating and other tactics which really amount to a persecution of the plaintiff. Naturally they resent being made a party to such proceedings, and there is always danger of the jurors' sympathies being enlisted in behalf of the weaker party in such cases. Many cases may be cited where judgments have been given against railway companies merely out of sentimental consideration. It may fairly be assumed, too, that many jurors—some of them unconsciously, no doubt—have a natural antipathy to corporations. This point was touched upon by Mr. Vreeland in his annual address, in which he said: "Even in the courts the standing of a corporation is prejudiced and before a jury sworn to render an impartial verdict upon the facts, its first and constant care is to remove from the minds of the jurymen a frankly admitted antagonism."

Of course, under these conditions, the successful handling of litigation of this character requires great tact and diplomacy as well as legal ability, and Mr. Starring urges that great care should be taken in selecting the men to be placed in charge of the department entrusted with the settlement of these claims. The importance of this work is constantly growing with the expansion of the railway field, and the adoption of higher speeds and heavier trains. The paper read by the expert of the New York State Railway Commissioners upon this subject before the last meeting of the Street Railway Association of New York, to which we have already referred, shows that there is a constant increase in the number of accidents due to the operation of electric railways, and it is only fair to assume, therefore, that there is a corresponding increase in the claims for damages. No doubt many of the claims that are presented against the companies have little real merit, and in many places it has been proven that organized attempts have been made to swindle operating companies by men who have made a profession, if such it might be called, of this business. There is another class against which the companies are obliged to guard, namely, the medical and legal sharks who have earned the title of ambulance chasers. These men are really more despicable than the class who risk life and limb by taking chances on receiving real and serious injuries in the so-called "accidents" which they bring upon themselves. The latter form a desperate class, but they are not so dangerous as the others, and Mr. Star-

ring's note of warning not to deal with either under any circumstances does not exaggerate in the least the danger of lending any semblance of encouragement to their operations.

Discipline

The discipline of employees by the merit system and street railway mutual benefit associations were the subjects of interesting papers by W. A. Satterlee, of Kansas City, and Oren Root, Jr., of New York City. It is unfortunate that the time of the association available for the discussion of these papers was not greater, as there is perhaps no department of street railway work in which more radical progress has been made during the last ten years than in the relations of the companies to the employees. The old ideas that no incentive for good work is necessary other than stipulated wages paid to all employees alike, and that the relations between the employees and the company terminate upon the payment of these wages, have almost passed away, although the equally erroneous view still held by some employees that their interests and those of the company are naturally antagonistic seems to survive in too many localities.

Taking up the question of discipline first, it should be understood that a company in dealing with an employee who breaks its rules occupies a different position than civic or State authorities in a like position, and whose object, at least theoretically, is to reform the offender as well as prevent a repetition of the act. The object sought by the railway company is solely to get good service, and to secure this its obvious policy is to advance the more efficient employees and get rid of those who show no aptitude to railroad work. Whatever system of discipline is followed, therefore, should be based on these two fundamental considerations; it should reward efficient service and it should gradually eliminate from the ranks those who have shown themselves incapable of maintaining the standard of the service required. As we have said before, we believe that some system of rating furnishes the most accurate method available for gaging the capabilities of different men, but coupled with this should be some incentive for securing and maintaining a good rating. Occasionally prizes for the most efficient service are offered to secure this result, but this plan is imperfect in that it can affect one man or a few men only, while the majority of employees are no better off under the prize system than those whose work has been no where near so satisfactory. For this reason we believe that the demotion system, described by Mr. Harrington, affords certainly an interesting attempt to graduate the rewards of the service to all employees according to their deserts, and his testimony as to the practical working of the system is worthy of careful consideration. It might be argued that an effort of this kind to draw fine distinctions between the value of the performance of the different men will create considerable dissatisfaction, and will be contrary to the American democratic spirit. The men should realize, however, that their relative standing is changed so often that a man who through ill luck has been dropped in the scale can regain a higher position. They should also understand that individually the company has the most cordial sentiments towards each one of them, and this feeling can best be developed through the mutual benefit association idea, which Mr. Root discussed in his paper.

Mutual Benefit Associations

The principle that these associations should be democratic in their character is the secret of the success which Mr. Root points out on his paper on the subject. When conducted on a proper basis they afford an opportunity not only for social enjoyment but also for strengthening the spirit of interest in the work in which they are all engaged. This is a benefit to employees and the employer, but if the democratic spirit is absent and there is a sentiment on the part of the men, either real or fancied, that they are being patronized, the good effects of the association are often lost. Mr. Root's paper will bear most careful reading from the fact that the Metropolitan Street Railway Association is

not only one of the oldest and largest associations of the kind, but because it has gone further in many ways than any other body of the same kind. Mr. Connettc, of Syracuse, was the only speaker who described a similar system on his own road, but there are many others in practical operation and their number is constantly growing. To many of the old school of workmen, the idea of an organization of employees which works in harmony with the employers is anomalous, for their sole idea of association is one whose principal object is to secure concessions from the employer through threats of organized revolt, and they cannot understand how their interests and those of the employer can be harmonized. All this goes to show the truth of Mr. Root's remark that the relations of capital and labor, as represented in street railway properties, have undergone a radical change during the last ten years. The true interests of both lie in mutual cooperation, and it is not unfair to say that as a whole the employers have learned this truth and have put it in application to a greater extent than the laboring man. The latter has been too often in the past governed by the old idea of antagonism toward his employer, and it is this feeling which the "benefit associations," with their opportunities for intercourse and acquaintance, will do more than anything else to destroy. As President Vreeland said last week in his annual address to the Metropolitan Street Railway Association: "How can men, whether they are capitalists or laborers, expect to understand each other if they are not acquainted? Without acquaintanceship there must be as much ignorant suspicion on one side as on the other. Nothing inspires more fear and distrust than half understood and wholly unseen things." If this truth had been wider realized in the past, a great deal of industrial waste would have been avoided.

Signals for Interurban Railways

In the paper on signals for urban and interurban railways, G. W. Palmer, Jr., gives utterance to a very important truth in railway operation, when he says that "even a perfect signal system cannot, after its adoption and installation, operate a road. Careful management and good discipline on the part of the men are still vitally necessary." Statistics from accidents in New York State seem to show that on electric interurban railways more disastrous collisions have been caused by lack of discipline and disobedience to rules than by defects in signal apparatus or mistakes of train despatchers. However, it is highly important that there should be, as a ground work for the safe operation of the road, the best and safest systems of despatching and block signals available. That the condition of the art of block signals on electric railways is not entirely satisfactory at the present time is not strange considering the short time there has been to perfect these appliances. There is one difficulty which has stood in the way of block signals on interurban roads, which it seems to us is due largely to a misconception of what it is possible to accomplish with this system. We refer to a demand, commonly made, that the block signal system shall permit several cars to move in the same direction in a block at the same time, operating as different sections of the same train, while at the same time demanding complete protection to all the cars. "One cannot have his cake and eat it too," according to the old saying, and if several cars are to be allowed in a block going in the same direction, it is useless to talk of protection from rear end collisions by means of block signals. The fundamental idea of the block signal is to keep a definite space interval between the cars to be protected, whether they are traveling in the same direction or opposite directions. Recent statistics seem to show that more life and property is lost by rear end collisions on electric roads than by head-on collisions. We are not prepared to argue that it is never necessary to operate several cars going in the same direction as different sections of the same train, following each other closely with no signal protection save that afforded by the vigilance of the train crews, but it is perfectly safe to say that no block signal system can ever be devised that will afford protection to trains under such circum-

stances. The only way to get around this inherent limitation of all block signal systems is to lengthen the intervals between cars and shorten the block sections so that cars can follow within a few minutes of each other without having more than one occupy a block at the same time. When once the point is conceded that but one train is to be allowed in a block at the same time, the problem of a block signal system for electric railways is much simplified. This will mean much more frequent turn-outs for meeting points than are at present common, but such turn-outs should be considered simply as part of the cost of a truly efficient block signal system. It is certainly not logical to consider seriously putting block signals on a double-track high-speed road to keep definite space intervals between cars where the service is frequent, and at the same time permitting trains to be operated closely following each other on single track roads without any block signal protection. A fundamental principle of signaling recognized by the steam roads is that all signal apparatus must be so designed that when failures in apparatus occur they will always be on the side of safety. That is, the signals should always show danger except when held positively in a safety position by some artificial force. This principle has not been as fully recognized by many designers of electrical railway signal apparatus as it should be. Mr. Palmer advocates automatically operated signals rather than those operated manually by the trainmen. The automatic signals are, of course, most desirable from a theoretical standpoint, and if reliable are preferable to those manually operated. However, we are inclined to think, without saying anything against the merit of automatic systems, that there is much more merit in the manually operated electric light signals than is commonly thought, if only these signals are installed and operated on correct principles, as they frequently are not. The manually operated signal is so simple and involves so little apparatus that is likely to get out of order that it has great attractions for the practical electric railway man. We agree entirely with Mr. Palmer when he advocates placing the switch governing the signals at the entrance of a block far enough in advance of the signals so that motormen, conductors and passengers can look ahead and see the indication of the signal before the car reaches it. We fail to see, however, that lamp signal circuits are peculiarly susceptible to trouble from lightning. Circuits in which magnets are included are far more liable to such trouble, and the incandescent lamp is about as little likely to be injured by lightning as any kind of a signal device that can be placed in a circuit, even if it is not wholly exempt. Signal systems are frequently used in which the lighting of lamps indicates danger and their absence safety. Such a plan is fundamentally wrong and likely to be worse than no block signal system whatever, giving misleading signals. Although the use of a position signal, such as a semaphore, is desirable in many respects, its use involves greater complications than the use of lamps alone, and it is a question for profitable discussion whether the semaphore is worth this additional cost and trouble. The discussion on the subject of block signal systems was more extended than any other topic, although part of this discussion was contributed in writing, and hence was not read at the meeting. Mr. McCormack, who is now with the New York Central & Hudson River Railroad Company, but who has had long experience in both steam and electric railroad operation, presented a very complete communication on the subject, and we commend its perusal to our readers.

The Master Mechanics' Association

Steps were taken at the Detroit convention by a number of master mechanics and electrical engineers to form a separate association somewhat after the plan of the Accountants' Association, and a committee was appointed consisting of six prominent engineers to learn the sentiment of the engineers connected with the different companies throughout the country, and to complete the preliminary work of organization. The step, in our opinion, is an excellent one for many reasons. The broadening nature

of the association, as outlined in the president's address this year, is certain to add greatly to the number of important problems which are facing the members and which require careful study and discussion. At the same time, the time available for business meetings at the annual conventions is limited and the main association cannot and should not attempt to take up problems of a purely technical character which can just as well be settled by the heads of the different mechanical departments. The latter, on the other hand, by having all the time of a convention meeting at their disposal can take up more subjects and, being a smaller body, the discussions will undoubtedly be more free than in a large assemblage. We assume that all matters relating to standards and similar subjects, which will be binding on the different companies, will be settled by the American Street Railway Association, and that the master mechanics will not attempt to operate independently from that body. They will rather be in the nature of an auxiliary to it, and will devote their attention to working out the details of mechanical construction, maintenance and repairs. In this respect the organization will necessarily differ somewhat from the associations of master car builders and master mechanics of the steam railroads, but this will not necessarily affect the usefulness of the body. It will, in fact, rather add to it as their suggestions would naturally receive the greatest consideration at the hands of the national association. The meeting of the master mechanics at Detroit was not a large one, but was representative and the preliminary action taken was entirely satisfactory.

The Paper on Steam Turbines

Judging from the attendance at the different meetings, the paper by Mr. Sniffen on steam turbines attracted more attention than any other report presented at the convention. Whether the existing coal famine has made the average steam railway manager more acute to the possibilities of the economical generation of electric power or not, we are unable to say, but the paper was received with the greatest attention and the discussion indicated that the railway companies of the country are alive to the possibilities presented by the turbine of a reduction in their coal bills. The statement that one manufacturer alone has on hand unfilled orders for machines of this type having an aggregate capacity of 44,000 kw, or roughly speaking, 60,000 hp, gives us a forcible and somewhat startling impression of the important position as a prime mover in large power plants rapidly being assumed by this form of motor, which but a few years ago was regarded as little more than a mechanical curiosity. Nevertheless, as Mr. Sniffen remarked, the turbine is not new. It is an old idea that has lain dormant for years, awaiting an opportunity for its practical application. The records of the British Patent Office show that at the close of the year 1899, a total of over 350 patents had been issued relating to steam turbines, the first dating back as far as 1784. It is the immense developments in alternating current work which seems to have furnished the steam turbine with its long-needed opportunity.

Being essentially a high-speed machine, the electrical generator seems to be the best medium for absorbing and distributing the power of the turbine without the intervention of speed reducing devices which uselessly absorb a considerable part of the available power. In direct-current generators, grave difficulties are encountered in commutation, and the construction of an armature that would withstand the enormous strains due to centrifugal force at the high speeds that were necessary, presented mechanical problems that were far from being easily solved. The alternating current generator is almost ideal in its adaptability to the conditions of speed imposed by the motor; the troublesome feature of commutation is entirely eliminated and the problem of the mechanical construction of the rotating element—especially in the stationary field machine—is greatly simplified. Now that the steam turbine has found a suitable opportunity to utilize the inherent merits that have been recognized and understood for over

half a century, it is only reasonable to expect that its practical application will be extended with almost phenomenal rapidity.

Types of Turbines

The three types of turbines which have been put into commercial service in this country are the Parsons, as manufactured by the Westinghouse Company, and described by Mr. Sniffen, the DeLaval and the Curtis, as manufactured by the General Electric Company. The Parsons design is analogous to that form of hydraulic turbine in which the fluid is directed by guide blades against the vanes of the wheel, giving the impulse partly by the impact of the water against the moving vanes, and partly by the reaction due to the relative velocity imparted to the water as it is discharged from the moving wheel. The available "head," i. e., the fall in steam pressure, is divided into a number of stages, and a set of guiding and moving vanes is placed at each stage of the fall so as to reduce the velocity of the fluid and consequently the speed corresponding to the best efficiency. In the Parsons turbine, as built for the Rapid Transit subway station in New York, the plans indicate some very slight modifications in the pattern as described by Mr. Sniffen, notably in the separation of the high pressure and low pressure cylinders and the introduction between them of a reheater.

The DeLaval turbine corresponds to the well-known Pelton water-wheel, in which a high velocity is imparted to the fluid by passing it through a properly shaped nozzle, and the impulse is due solely to impact against the vanes or buckets on the wheel. In the De Laval turbine the conversion of pressure into velocity has generally been made in one step which has necessitated rotative speeds of from 10,000 to 20,000 or more revolutions per minute. To reduce these enormous speeds sufficiently to permit of driving any existing mechanisms, a very ingenious system of helical gears has been devised, which has worked out excellently well in moderate powers, say up to 200 or 300 hp. Three hundred hp has become, however, in modern power plant practice to be regarded as a very small unit, and the engineering profession will await with much interest a demonstration as to the sufficiency with which this arrangement will operate in units ten times as powerful, which, judged by modern standards, would be only of ordinary size.

Details of the General Electric turbine have not been made public, but several contracts for turbines of this type of 500 kw and 1500 kw have been taken and at least one 5000-hp machine has been built. It is generally understood that in a number of important points this turbine differs from the other two mentioned. It has, for instance, a vertical shaft, the effect of which is greatly to reduce the floor space occupied and to take all strain off the bearings, and, as the shaft is short, to produce also a very compact machine and make the question of alignment easy. The construction is said to be extremely simple, and to involve only very few rows of buckets. The governing is accomplished by a method which it is claimed gives a very flat efficiency curve and one which bears a striking resemblance to that of a standard large generator. The machine also runs at a greatly reduced speed.

The Theory of the Turbine

The theory of the steam turbine in no wise conflicts with our present theory of thermodynamics as applied to other heat engines. The same expression for the ultimate ideal efficiency holds

good, i. e., $\frac{T_1 - T_2}{T_1}$ in which T_1 and T_2 represent the absolute initial

and final temperatures of the working fluid, expansion being carried out to the exhaust temperature. In the ideal engine increasing the initial temperature or decreasing the final temperature increases the possible efficiency. In the ordinary reciprocating engine the cylinder walls and the pistons are exposed alternately to the initial and exhaust temperatures, causing a partial condensation of each charge of incoming steam. This is the most serious loss in the steam engine, and grows worse as we increase the

temperature limits, so that our efforts to improve the theoretical conditions are met with a constantly increasing practical difficulty, which limits the point to which expansion may be carried with useful effect, and in a measure also the height of the initial pressure that may be advantageously employed. In the steam turbine the parts in contact with the steam are not subjected to any cyclical variations in temperature, but the temperature and pressure at any given point in the machine remain constant, at least as long as the load does not change. In the turbine, therefore, this most important loss, which is inseparable from the reciprocating engine, is entirely eliminated, and there is apparently no reason why there should be any practical limit to the initial pressure, or to the degree of expansion that may be used to good effect. The use of superheated steam in the turbine as well as in the reciprocating engine improves the efficiency in a very marked degree, but probably for an entirely different reason. In the reciprocating engine the superheating is primarily useful in counteracting cylinder condensation, while in the turbine it can have no such office. The presence of water in the turbine seems to create a purely mechanical resistance corresponding to friction. With saturated steam a certain amount of moisture is inevitable even in an ideally perfect engine, as a part of the steam condenses during adiabatic expansion without any loss of heat. By superheating the initial steam we can prevent this normal condensation, and while, perhaps, not greatly improving the theoretical conditions, we can succeed in removing or preventing a mechanical obstruction. Although not yet fully determined by actual experiment, it would seem that the practical limit to which superheating should be carried would be the degree that would just suffice to keep the steam dry during expansion, and allow it to escape into the condenser at saturation temperature. This would also seem to be indicated by the fact that the increase in economy, that is, the reduction in steam consumption per unit of output, is greater with the earlier stages of superheat than with steam at higher temperature. Thus, foreign tests seem to show that while the gain of about 8 per cent results from a superheat of 50 degs. F., the gain from a superheat of 100 degs. F. would be only about 12 per cent, and that from 150 degs. F. about 15 per cent.

In comparing the economy of the turbine with that of the reciprocating engine it must be remembered that there is no such thing as indicated horse-power in a turbine. The most usual and convenient measure of the power is in electrical units. The economy of reciprocating engines is ordinarily stated in pounds of steam per indicated horse-power per hour, and there is very little available information as to the economy of such engines referred to electrical measurements. The Hartford turbine, cited by Mr. Sniffen, is the largest for which tests have been published, and, as stated in the paper, indicate a consumption of 19.1 lbs. of steam per hour with steam at 155 lbs. pressure and 45 degs. superheat and with 27 ins. of vacuum. The importance of good vacuum is shown by the fact that it has been found that a gain of about 4 per cent in economy is secured for every inch of vacuum above 25 ins. to 26 ins.

Economy of Large Machines

With the large machines which are now being built, such, for instance, as the 5500-kw turbines, which the Westinghouse Machine Company is now building for the Metropolitan & District Railways, of London, and which are to operate with 165 lbs. steam pressure and 27 ins. vacuum, reliable figures on steam consumption will be available. It is believed, however, that the reduction in steam consumption over that shown by the smaller sizes will be considerable, even in view of the fact that these figures compare most favorably with the results from reciprocating engines. For instance, Brown, Boveri & Co., of Baden, Switzerland, are installing a 5000-kw turbine at Frankfort, with which a consumption of 10.78 lbs. per indicated horse-power are guaranteed with steam at 202.9 lbs. and a superheat of 175 degs. F. From the guarantees which have been given on some of the large machines

in this country and from the results derived from the smaller machines, it seems not improbable to expect the production in these large machines at full load, with 28 ins. vacuum and with 100 degs. superheat of an electrical horse-power with 13.2 lbs. of steam. With 180 degs. superheat the consumption should be reduced to 12.9 lbs. per electrical horse-power. As compared with a generating set, consisting of a reciprocating engine, direct-connected to a generator, the combined efficiency being 83 per cent, which is about what is met with in ordinary practice. This would correspond to 10.95 lbs. and 10.77 lbs. of steam respectively per indicated horse-power per hour. With dry steam the figure for turbine performance would probably be in the neighborhood of 14.8 lbs. of steam per electrical horse-power.

America in the Lead

It may be asked why the turbine is so slow of adoption in this country as compared with Europe. We are prone to boast of our own progressiveness, and to talk about the conservatism of European nations. As a matter of fact, the American nation is perhaps the most conservative of all as regards taking the initiative with new and untried devices. Our enterprise consists more in the magnitude of our operations when we have determined that a certain line of practice is sound in principle and satisfactory in its application. In high-speed engines our practice is exceedingly conservative as compared with English practice. Our large slow-speed engines are strikingly uniform in design as compared with the multiplicity of valve gears and special features exhibited by Continental builders. Superheated steam has as yet had hardly more than a passing consideration with us, while it is extensively used abroad. Instances might be multiplied almost without end to show that in some respects we are exceedingly conservative. When the Westinghouse company, which was the first in this country to undertake the manufacture of large machines, took up the steam turbine seven years ago, it was hopelessly impossible to interest steam users in such a machine. But by installing a plant of 1600-kw capacity in the power house of the Westinghouse Air Brake Company a commercial demonstration was made of the advantages of the machine, which was convincing to the most skeptical. It took four or five years to fully establish confidence, and it is only now that the results of this pioneer work are beginning to show. The peculiar quality of our American enterprise will exhibit itself not in doing the newest thing but in doing a good thing on the biggest possible scale. We have already the largest steam turbine yet built, and American brains and capital are already engaged in building, and an American management has ordered and will install the largest steam turbine that has so far ever been contemplated.

The Accountants' Association

The space at our disposal in this issue will prevent us from publishing the papers presented at the meeting of the Street Railway Accountants' Association of America, as well as our comments on the papers, and action taken by the association on the topics discussed. Some of the decisions made at the meeting of the accountants, especially in the matter of classification, were of quite a radical character, and brought out a very animated debate. Whether the classification finally adopted was in all cases the most desirable is a question we expect to take up in an early issue. We shall, in our next issue, publish all of the papers and reports presented at the Accountants' Association on both Wednesday and Friday.

It will also be impossible in this issue to discuss the general features of the exhibits made at Detroit. In spite of the somewhat limited facilities available at the Light Guard Armory, the exhibit as a whole was a very fine one, and the past record of the association in securing annually the finest exhibit of electrical apparatus made before and for the benefit of any technical body, was amply fulfilled this year. The exhibits individually are described at length elsewhere in this issue, and views are given of some of the more important of them.

J. C. Hutchins

Mr. J. C. Hutchins, the new president of the American Street Railway Association, has been identified with the Detroit street railway system since 1894. It has been under his management that the various interurban railways terminating in that city have been brought under one control. Eight years ago, or at the time at which Mr. Hutchins went to Detroit, the city system was distinct from all of the interurban lines which now form a very important part of the entire system owned by the Detroit United Railway Company. Mr. Hutchins realized the importance of uniting all of these different systems, and owing largely to his initiative, the capitalists interested in the city system acquired gradually first one and then another of the outlying interurban lines until the present magnificent system owned by the Detroit United Railway has been built up.



J. C. HUTCHINS

Mr. Hutchins was born in Carroll Parish, La., Oct. 13, 1853. He engaged in active business first as a constructing and civil engineer and took an active part in the early railroad construction in Texas, Missouri and throughout the Southwest. Later, for a short time, he engaged in newspaper work in Waco, Tex. Mr. Hutchins moved to Detroit in 1894, at which time he was elected secretary and treasurer of the Detroit Citizens' Street Railway Company, and when the Detroit Railway Company was acquired was elected to the same positions in that company. Later, upon the organization of the Detroit United Railway, Mr. Hutchins was elected vice-president and general manager of the company, and on Jan. 21, 1902, he was elected president of the company.

Mr. Hutchins' administration of the Detroit system has been marked by the introduction of a number of radical improvements in all directions of the service. One of the policies followed by Mr. Hutchins has been that of improving the conditions of the employees, and in this direction the company adopted the system of merit and demerit marks for employees, already described in these pages, as well as a number of other steps toward the betterment of the condition of the men on the road. The unification of the city system with the interurban lines required many changes in the organization of the system which Mr. Hutchins has built up to be a very strong organization. He is recognized as a broad and far-sighted railroad manager, and his election to the office of president of the American Street Railway Association is a well deserved tribute to his ability as a street railway manager.

The progress that has been made in developing the interurban freight and express business in Ohio has attracted the attention of many railroad men in the East, who as a rule do not take much interest in matters outside their own particular territory. One of these authorities says: "The Lake Shore Railroad's freight traffic through Ohio is being cut into by the aggressive competition of the Cleveland & Eastern Electric road, which operates about 100 miles of trolley line. This electric road has always secured a large proportion of the local freight traffic in its territory. Its rates are lower than those of the steam railroad and in most instances deliveries of consignments are quicker. Milk and farm produce form the great part of the business given to the electric line."

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

The Steam Turbine—Its Commercial Aspect

BY EDWARD H. SNIFFIN,
Westinghouse, Church, Kerr & Co., New York.

The steam turbine is not as young as it looks. Although its application to commercial power generation in its present several forms is the achievement of recent years, its principle is neither new nor novel, and it may be wondered that a century of effort should have been applied to the reciprocating engine—which became, indeed, more complicated as it grew, before the primal theories of the heat motor assumed corporate, practical form. It is true that later knowledge of materials, and how to work them, has made the way clearer, and the wider use of the steam turbine has in a measure depended upon the development of electrical practice, with which latter it is now so intimately identified.

Much interest has for some time been centered in this type of prime mover and the possibilities of its application. The history of its development is quite generally known, and up to this time attention has been more particularly directed to its engineering and mechanical characteristics. It now seems appropriate to inquire into the controlling features of its commercial utility, and determine, if we may, whether the steam turbine, subjected to a somewhat careful analysis, is a machine still to be developed, though of

blade is about 1 oz. A complete description of the mechanism is not needed here.* It is sufficient to note its general character and to contrast its obvious simplicity and freedom from complication, with the recognized complexity of the piston engine. The inference is clear that in constructive opportunity, at least, the turbine should be the more reliable.

The steam turbine, before it had obtained any considerable recognition here, was not entirely without success abroad. Parsons and others had done much to prove its reliability. For instance, in 1897 the Newcastle & District Electric Lighting Company, operating eleven turbines of 75 kw to 150 kw each, showed the cost of repairs and renewals on the entire plant, including turbines, generators, boilers, condensers, pumps, fittings, cables, etc., to be .25 of a cent per kilowatt per annum.

In this country the steam turbine is now operating in several plants. The first prominent installation was at the Westinghouse Air Brake Company's works, at Wilmerding, Pa., where the first unit was started in August, 1899, two more shortly after, and the fourth unit in April, 1901. Thus the plant has been in service, for the most part, more than three years, and the fourth unit about eighteen months. The plant operates regularly eleven hours a day, the service being electric power and lighting. With the iron foundry running at night, one turbine is run twenty-two to twenty-three hours per day. In general, the units have run quite to their

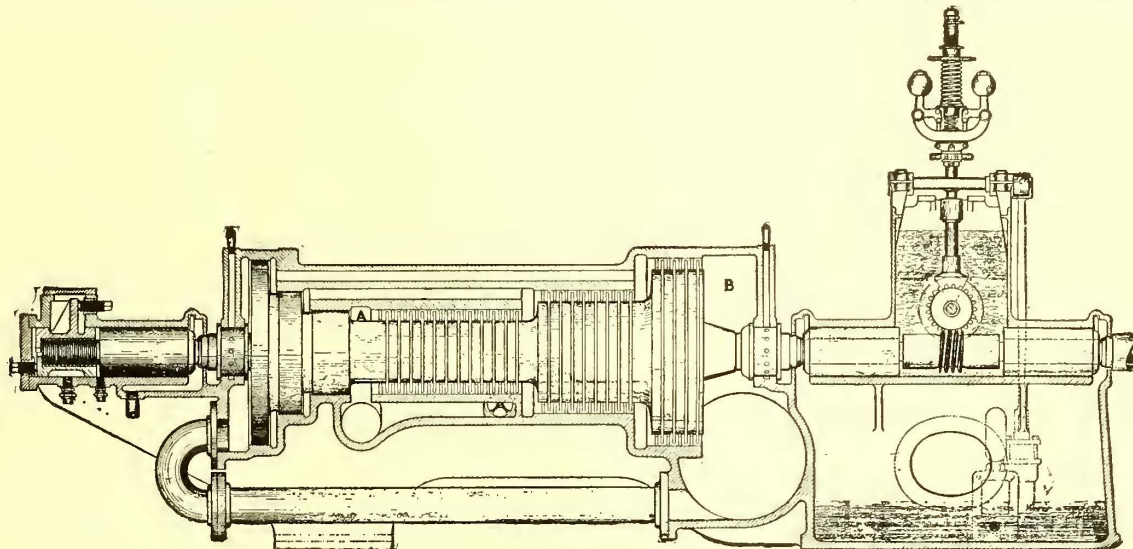


FIG. 1.—LONGITUDINAL SECTION OF WESTINGHOUSE TURBINE

ultimate promise, or whether it has been well tried and its advantages proved. What has it accomplished? What justifies its use? What otherwise unattainable results will it produce? What are its limitations? It is this aspect of the case on which the light is needed.

It is of little moment what the direct or contingent advantages of the turbine may be, if its reliability remain in doubt. Offered, as it is, in large units, and being apparently more related to the classes of service which impose the most exacting requirements, the demand is imperative that in this one vital respect there be little left to chance.

Before recurring to actual experience it may be instructive to consider for a moment the general character of the turbine as a type of motor, contrasted with the piston engine. Fig. 1 shows the longitudinal section of the Westinghouse turbine. The steam entering the governor valve arrives at the chamber *A*, then turns to the right, passing first a set of stationary blades, then impinging on the moving blades, driving them around, and so on, until it arrives at exhaust chamber *B*. And here is an interesting lesson in physics, a demonstration of the conversion of heat into energy; for while the temperature of the inlet end is that of the entering live steam, the exhaust end, but 3 ft. or 4 ft. distant, is not so hot (about 126 degs. F.), but that one may bear the hand. The cut will show that the only real moving part is the spindle, revolving in its bearings, the governor mechanism and oiling arrangement being comparatively insignificant. The blades do not wear, as the steam velocity, some 500 ft. or 600 ft. per second, is not sufficient to affect them. The blades are made of a special material, and are calked in such manner that the force required to pull them out would exceed the elastic limit of the material in the blades. They are subjected in regular practice to a strain of about one-fortieth of this amount. The actual pressure exerted on each

rated capacity—perhaps within 20 per cent of it—as a minimum. An interesting comparison has been made elsewhere of the efficiency of this turbine plant with the installation it supplanted, the latter comprising simple and compound engines, scattered about the works. After the three turbine units had been placed in operation they were shut down, and the steam engines previously in use (not yet disconnected from service) were again started up and a test made. A test was then made of the turbine plant. These were based upon a week's run, careful measurements being taken of fuel and water. The saving of coal in favor of the turbine plant averaged 35.7 per cent during the day, and 36.4 per cent during the night. The saving in feed-water averaged 29.8 per cent during the day and 41.4 per cent during the night. In round numbers this meant a saving of about 40,000 lbs. of coal per twenty-four hours. This improvement, of course, was attributable not entirely to the turbine itself, but also to the more efficient method of electric power transmission in comparison with the previous scattered arrangement of steam engines, with long runs of steam piping, use of belts, etc. It is, however, instructive as indicating the results accomplished in a specific and prominent case, as between an old and still commonly used system of power transmission and a modern method.

This plant at Wilmerding was the first of its kind. It naturally was not without its minor difficulties. The turbines themselves, from the time of starting, have been practically free from trouble of any kind. Some armature difficulties were at first experienced, but not of enough moment to interfere with operation, and were readily corrected. Summing up the experience had with this first installation, undertaken somewhat experimentally at the time, the net result is that the plant has operated about three years in heavy

* See paper read by Francis Hodgkinson before Engineers' Society of West-ern Pennsylvania, November, 1900.

daily service; that the work has not suffered interruption, and that the plant is to-day running with sustained satisfaction and with no visible signs of wear in any of its parts. Fig. 2 shows this installation, comprising four 400-kw units located within a space 45 ft. x 61 ft., the height of the engine room being 20 ft. 6 ins.

The Yale & Towne Manufacturing Company, at Stamford, Conn., has a 400-kw steam turbine furnishing 240-volt, two-phase current at 7200 alternations. This outfit was started in operation Feb. 1, 1902. Since that time it has been in regular daily service, carrying about its rated load, operating ten hours per day, furnishing current for electric motors and some lighting. Up to this time, therefore, it has been in service about eight months, and its mechanical operation has been most satisfactory. No quantitative tests have yet been made of steam performance, but there is general evidence of its economical operation. Fig. 3 shows the appearance of this outfit.

The Hartford Electric Light Company, at Hartford, Conn., have a 1500-kw, two-phase, 2400-volt, 60 cycle, turbo-generator outfit,

perature under superheated steam, and means were taken to make the temperature at all points more uniform. Having in due time overcome these local defects, which partook in no sense of functional fault, the turbine was then in serviceable condition, and its operation has since been most satisfactory. The Hartford Company, notably alert to adopt the newer thing if there seemed advantage in it, found when their water supply ran short that it paid to run the turbine and allow their Corliss engines to remain idle. This turbine is seen in Fig. 4.

Is the steam turbine efficient? And what, if it may be so termed, is the character of its efficiency? Is it, like the various types of piston engines, peculiarly fitted to certain conditions which permit of little change if economical performance be retained, or is there evidence that the turbine has a greater inherent efficiency that is less affected by attending circumstances?

The interest of engineers in the turbine has, perhaps, been drawn chiefly to the evident possibilities of its steam economy, and to the data already acquired, with the discussion it has provoked.

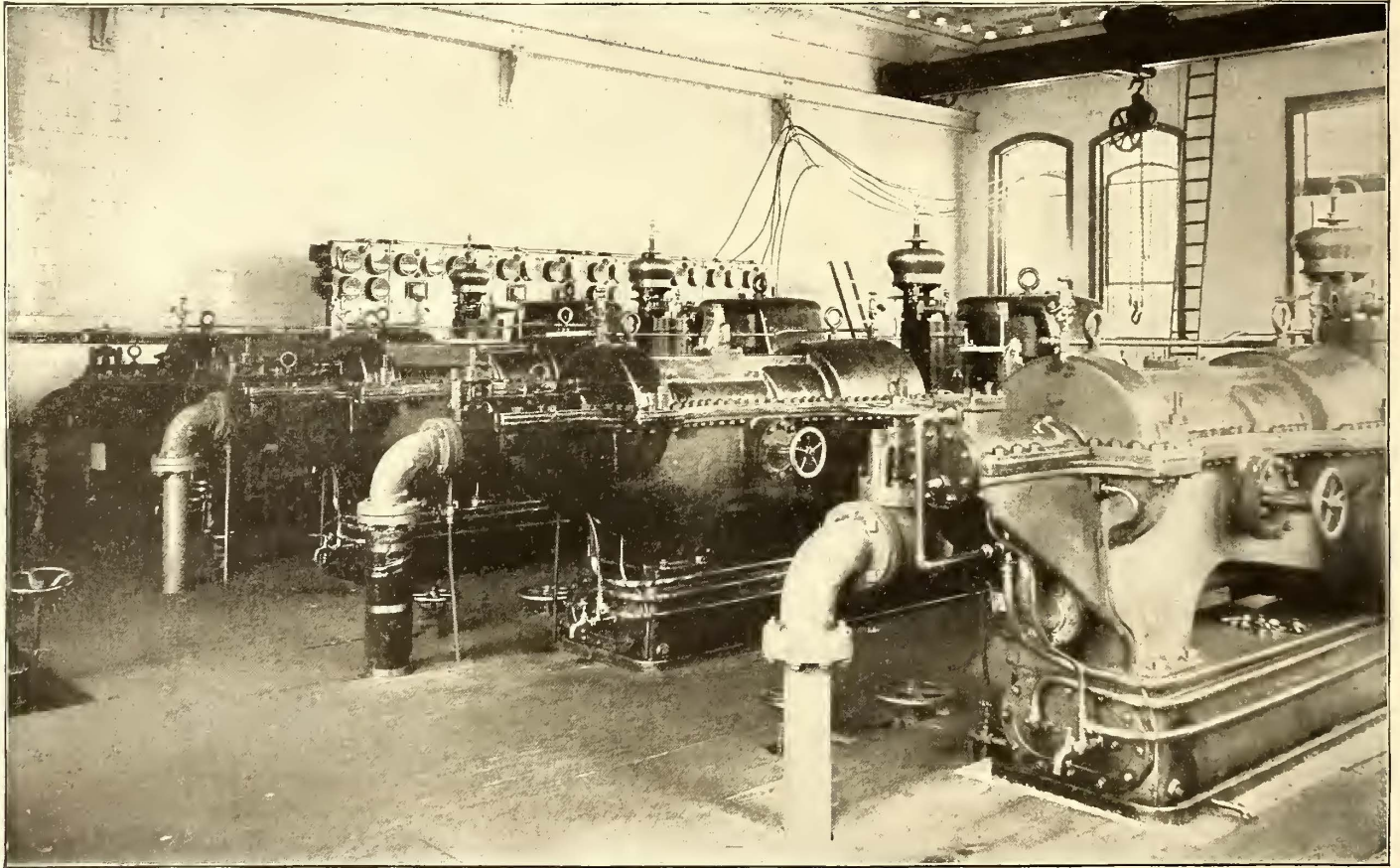


FIG. 2.—TURBINE PLANT AT WESTINGHOUSE AIR BRAKE WORKS, WILMERSDING, PA.

which was started in April, 1901. This, at present, is the largest turbine yet installed in this country. Put in, as it was, to relay their water power, it has not been in constant service, but has usually been required only one or two days a week. At such times, however, it has carried the full station load of some 1800 kw or 1900 kw. Reference will hereafter be made to its striking economy.

A great deal of interest has centered in this early installation of a good sized outfit in a prominent location, and its excellent performance is now generally well known. Some difficulties were at first experienced; nor were they entirely unexpected, for there had been no facilities, as there are now, for testing the outfit before shipment, and it was merely run at the shop without load. Before the machine was successfully in operation one trouble that developed was with lubrication. The packing glands around the turbine shaft leaked somewhat, and the construction of the oil passages with reference to these glands enabled the oil to come into contact with the steam, impairing its lubricating quality. This was easily overcome by modifying the vents and employing glands of different construction.

Some time was also required after erection to make necessary adjustments to relieve the turbine of longitudinal end thrust. This would have been corrected at the shop had the opportunity then been present for making complete test. It was found, too, that the shaft, which had been designed to afford the utmost ease of dismantling, was subjected to a considerable unevenness of tem-

perature under superheated steam, and means were taken to make the temperature at all points more uniform. Having in due time overcome these local defects, which partook in no sense of functional fault, the turbine was then in serviceable condition, and its operation has since been most satisfactory. The Hartford Company, notably alert to adopt the newer thing if there seemed advantage in it, found when their water supply ran short that it paid to run the turbine and allow their Corliss engines to remain idle. This turbine is seen in Fig. 4.

Is it well that the makers of the turbo-generator have been compelled to adopt the practice of basing the steam consumption on the unit of output, so that their guarantees are given on the electrical horse-power or kilowatts delivered on the switchboard, and not on the indicated horse-power developed. This at once eliminates the factors of engine friction and generator loss, and thus more definitely establishes a measure of performance.

One is impressed with two distinguishing features of the turbine's steam efficiency, namely, that it seems to vary but little over wide ranges of load, and, further, that the size of the unit has comparatively little bearing. It follows, then, that if good results are possible at all, they are neither restricted to the larger plants nor to the requirement of steady load.

Fig. 5 illustrates this. Herein are given the results of tests on a 400-kw turbine made at the builders' works before shipment, the machine having since been in daily operation eight months. These tests were conducted under brake load, so that the figures are based on the brake horse-power developed. The rated load would be about 600 B. H. P. The steam consumption is seen to be very flat, graduating from 14.47 lbs. at full load to 16 lbs. at half rating, and to less than 19 lbs. at one-quarter capacity. The

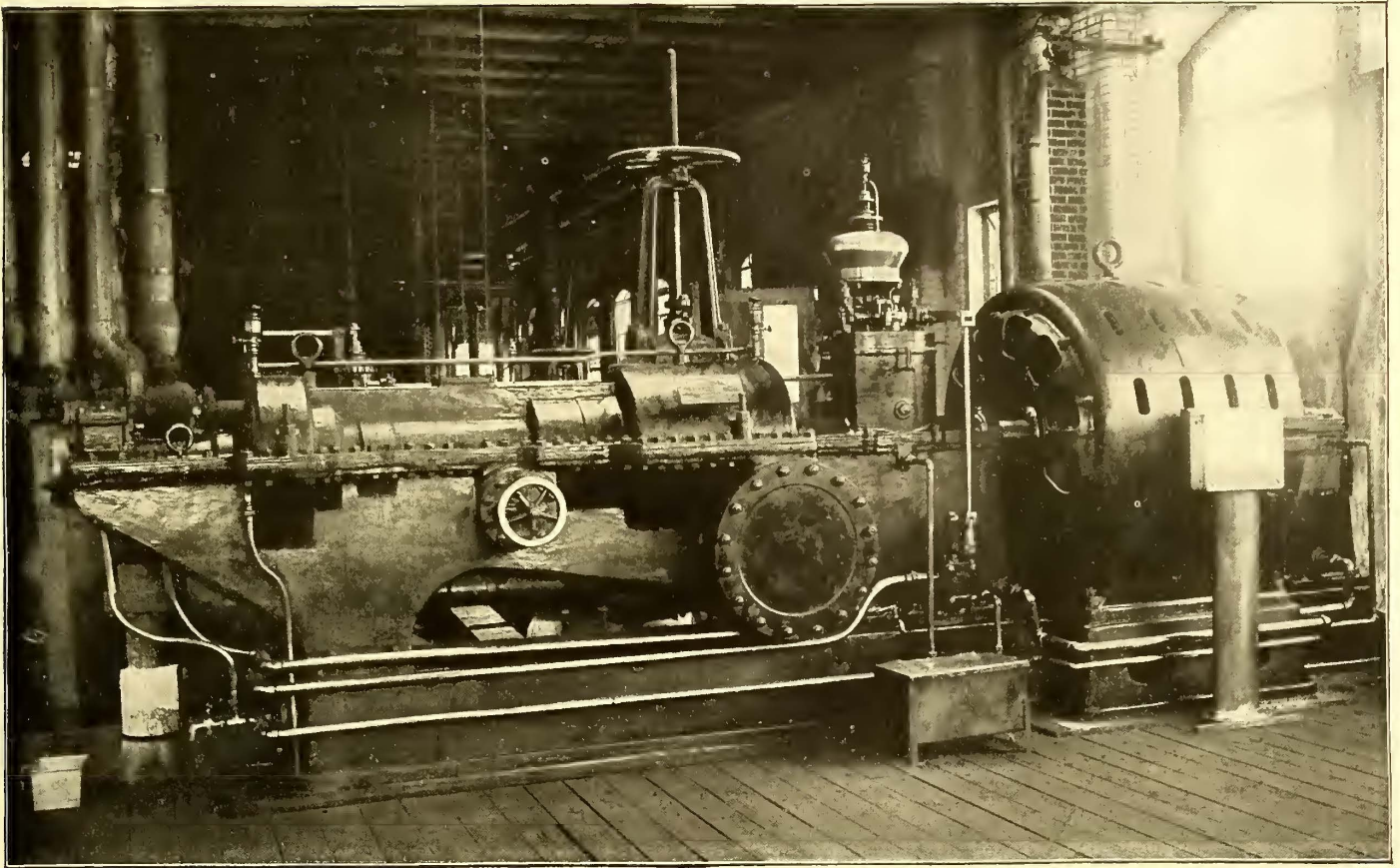


FIG. 3.—NEW 400-KW STEAM TURBINE AT YALE & TOWNE MANUFACTURING WORKS, STAMFORD, CONN.

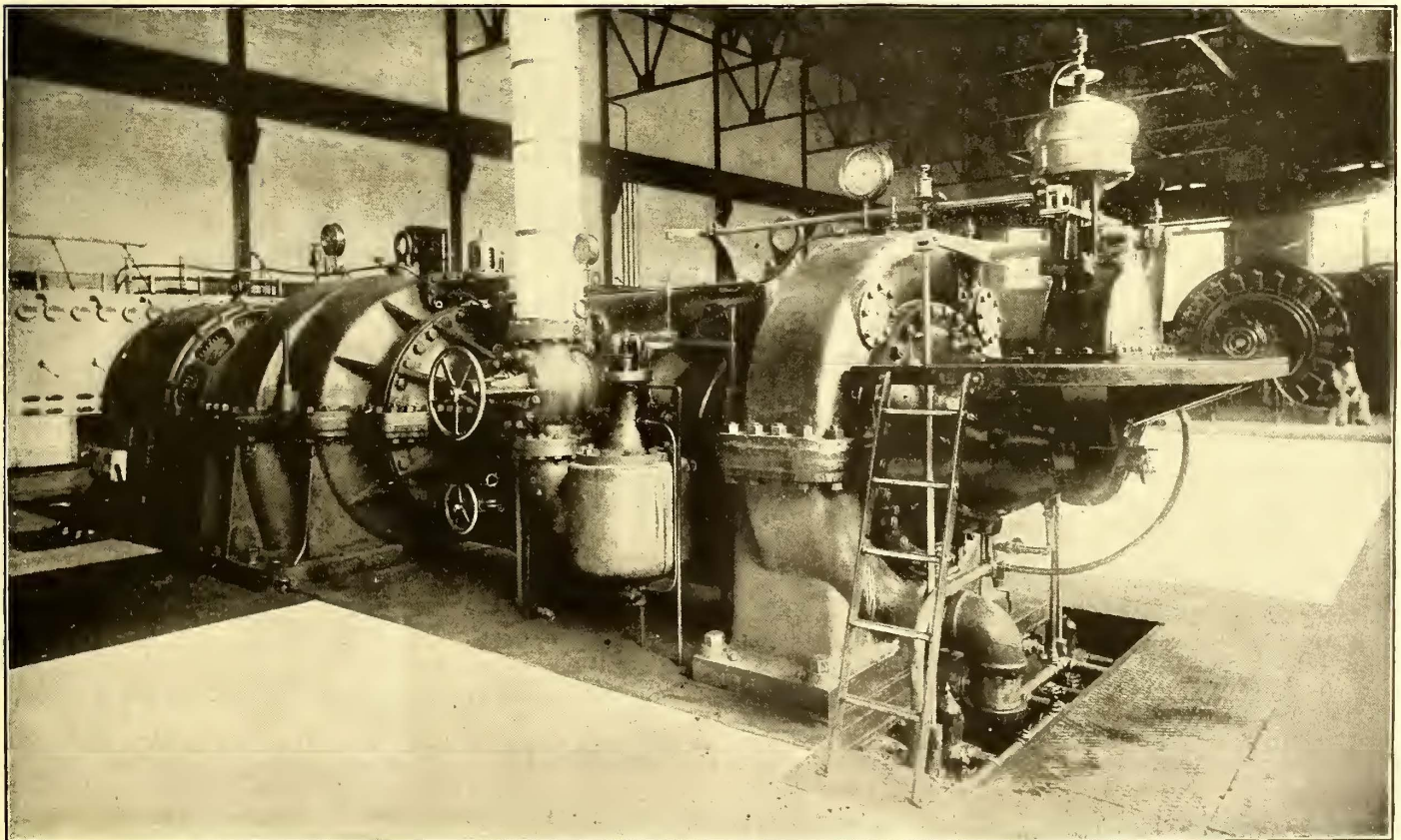


FIG. 4.—1500-KW WESTINGHOUSE TURBINE AT HARTFORD ELECTRIC LIGHT COMPANY'S CENTRAL STATION

relation of the consumption of steam in pounds per hour to the brake horse-power developed is also shown, this line being almost straight. In the tabulation may be observed the interesting comparative effect of vacuum and superheat.

If it is thus shown that with a unit as small as 400 kw we may obtain a result of 14.47 lbs. of steam per brake horse-power per hour, corresponding to less than 13¾ lbs. per ihp, it is evident that moderate sized plants may with the turbine be sufficiently subdivided to give the maximum flexibility of service, with insurance of relay, and yet possess an efficiency heretofore identified only with very large units. Further than this, a fluctuating load is not incompatible with high economical performance.

As the units become larger the turbine is then brought into comparison with the best steam-engine practice, where it still preserves its uniform efficiency, and where its practical advantages are no less evident. In a recent instance, a result of 11.7 lbs. of steam per electrical horse-power per hour was guaranteed on a turbine of 750-kw capacity, corresponding to about 10.17 lbs. per ihp, which, though the size is moderate, is perhaps within the ability of but few engines of any size or type that have ever been built.

At the Elberfeld Municipal Electricity Supply Works, in Germany, two 1500-hp Parsons turbines, which are run in parallel with two Sulzer horizontal engines, were tested by Prof. Schrotar, Dr. Weber and Mr. Lindley. With steam pressure averaging 95 lbs., running condensing, and with 18.3 degs. of superheat, the result obtained at maximum load was 19 lbs. per kw-hour, or about 11.4 lbs. per ihp-hour.

Many other results have been recorded, but those given will probably be sufficient to show that under service conditions the turbine has demonstrated its high efficiency.

But is its efficiency maintained? A question often asked, and a very important one, too. Looking at the turbine casually, it seems as though there would be little opportunity for any change in its mechanical functions. There is no complicated valve gear to get out of adjustment; no pistons to leak; no rubbing surfaces to set up excessive friction; little chance of misalignment, and altogether there seems to be no good reason why its original condition should ever be very much disturbed. The blades appear to be the vulnerable point, for they do the work, and there are a good many of them. Their number, though, is in their favor, and,

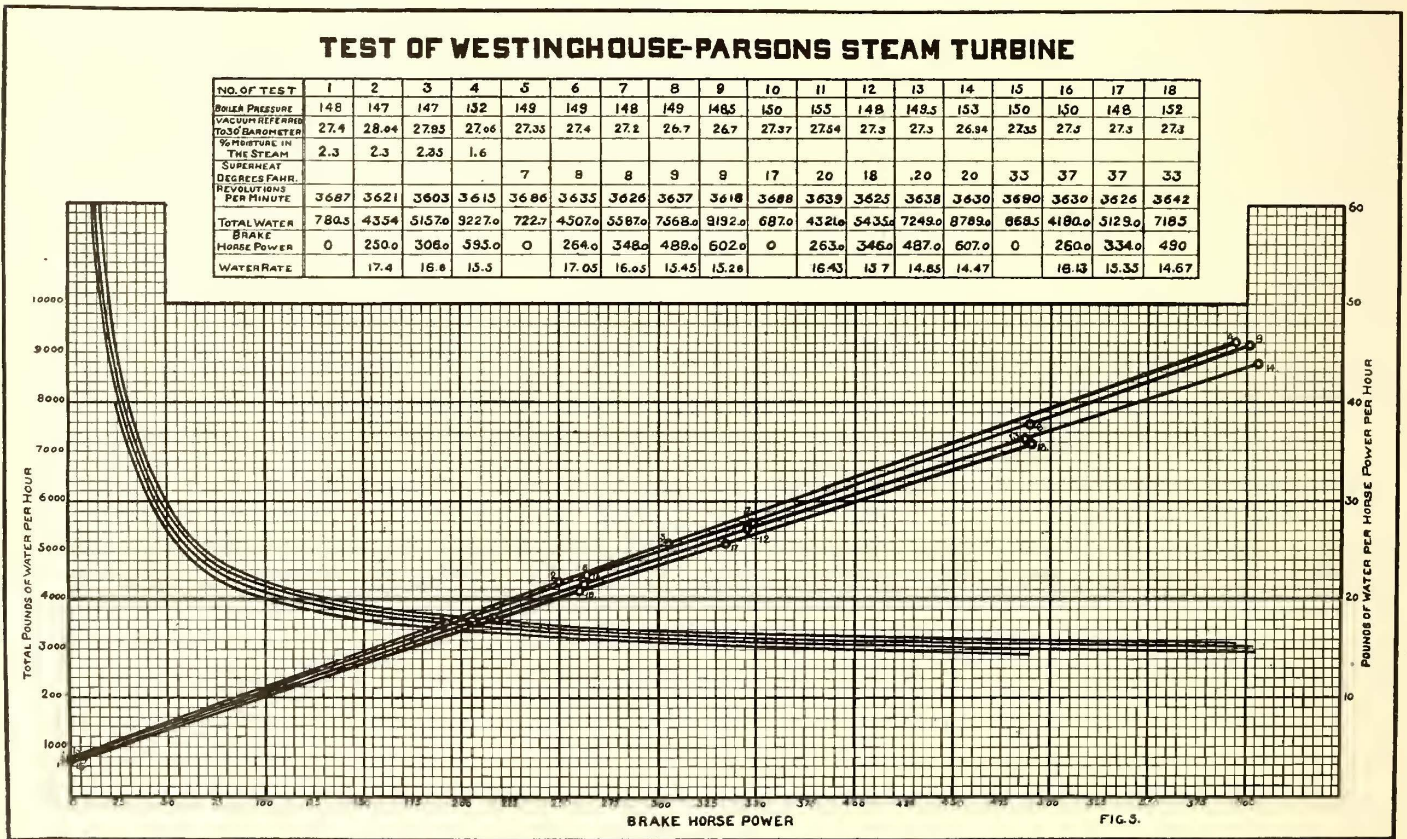


FIG. 5.—RESULTS OF TESTS ON 400-KW TURBINE

It may be pertinent to cite a few results obtained in regular service. The turbine at Hartford, under test conducted by Prof. Robb, at an average load of 1800 kw, with 155 lbs. steam pressure, 27 ins. vacuum and 45 degs. superheat, gave a result of 19.1 lbs. of steam per kw-hour, or an equivalent of about 11.46 lbs. per ihp-hour. An interesting comparison has been made at this plant of the relative efficiency under regular operating conditions of the turbine and their Corliss engines. They have one 18-in. and 34-in. x 48-in. and one 24-in. and 44-in. x 60-in. cross-compound horizontal Corliss engine. These engines drive direct by belt one 400-kw and one 600-kw generator. The turbine is, of course, direct-connected to its generator. They have made comparisons of operation based in each case on rather extended runs. It has been found that the turbine requires in delivering 1900 kw on the board about the same amount of coal that is used with the Corliss engines to deliver 925 kw, the steam pressure and vacuum being identical in both cases, and this with the engines running at about their point of best efficiency and known to be in excellent condition. Comparisons of this kind, while not scientifically exact, are, perhaps, of greater interest as a measure of commercial performance.

The data at hand of test on one of the 400-kw turbines at Wilmerding shows a result of 16.4 lbs. per chp-hour at full load, with 125 lbs. steam pressure and 26-in. to 27-in. vacuum. At half load it is 18.2 lbs.

being loaded as they are to only about 2½ per cent of the pressure they are built for, they possess an abnormally large factor of safety. The experience has been that the turbine is less liable to depart from its original standard of performance than any other type of prime mover, and there seems little reason to suppose that it is capable of much deterioration.

A recent interesting investigation along this line was made at the plant of the Cambridge Electric Supply Company, Ltd., in England, where they have a 500-kw Parsons turbine. The outfit was erected in January, 1900, and during the past year has been doing constant work. After it had operated about eight months a second one was installed. The first outfit had been tested at the maker's works before shipment, and showed a result of 24.1 lbs. of steam per kw-hour at 526.4 kw. And it was for the purpose of noting its performance after a year's operation that Prof. Ewing conducted a second test.* In this latter test the turbine at 518 kw, under nearly equal conditions of steam pressure and vacuum, gave a result of 25.0 lbs., and at 586 kw. 24.4 lbs. In the second instance, the turbine, beside trouble experienced with wet steam, was driving its own air and circulating pump (a surface condenser being used), and the steam required to drive these auxiliaries was charged to it. In the test at the builders' works the turbine did not drive its pumps. The results, to use Prof. Ewing's

* London Engineering, June 14, 1901.

words, give most satisfactory evidence that the turbine retains its character as a highly efficient generator.

It remains to be said in this general connection that there will be found in steam-turbine practice a more satisfactory treatment of the economy question than has heretofore prevailed. There will exist not only a truer basis of measurement than the indicated horse-power, but there will be opportunity for more thorough demonstration. It is now generally recognized that efficiency guarantees on large engines have little significance. The builder is physically unable to completely assemble and test such engines before shipment, and the user is seldom able or disposed to incur the distraction and expense which a field test involves. It is in the exceptional case, therefore, that actual tests are made, and there is still much to be known concerning the economy performance of large engines. It might be said, too, that while builders and engineers generally recognize the elements of design

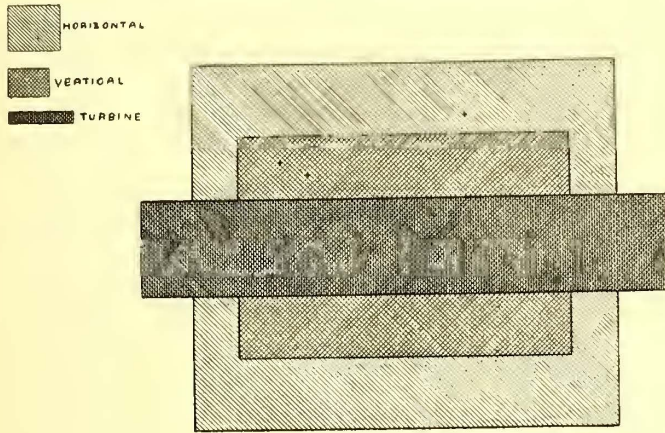


FIG. 6.—COMPARISON OF FLOOR SPACE OCCUPIED BY HORIZONTAL, VERTICAL AND TURBINE ENGINES

that conduce to efficiency, there is no unanimity of opinion as to what those elements will actually produce.

It is, therefore, gratifying to know that one builder, the Westinghouse Company, is now erecting a new testing room in which a complete plant of boilers, condensing and superheating apparatus will afford facilities for testing turbines up to 3000 hp at

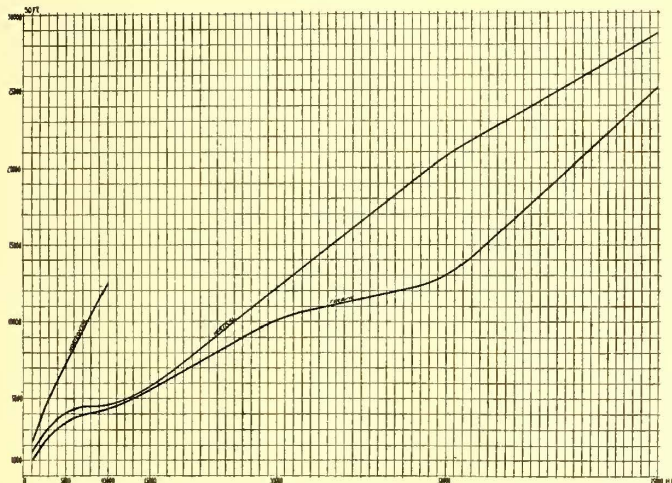


FIG. 7.—FLOOR SPACE, SQUARE FEET PER HORSE-POWER

all loads up to full capacity, and larger units up to this point, with practically any steam pressure and wide ranges of vacuum and superheat. Thus, the conditions to be met in practice may be approximated in the shop, and the information acquired will be of the highest value.

Turning now to one notable feature of the turbine, its compactness, Fig. 6, is a graphic illustration of the floor space it occupies, compared with the vertical and horizontal cross-compound Corliss engines, the basis of comparison being a 1000-kw unit, including the direct-connected generator, the engine cylinders being 28 ins. and 56-in. x 48-in. stroke, which, at 95 revolutions, with 25 lbs. mean effective pressure referred to low-pressure cylinder, gives about 1400 ihp. It will be seen that the floor area of the turbine is about two-thirds that of the vertical engine and about two-fifths of the horizontal. Such comparison, of course, is limited in its application. With each set of conditions requiring special treat-

ment no standardization of space requirements can be established. Still, with the limitation of isolated experiences, it is possible, without attempting to establish any universal laws, to make some reasonably close comparisons of the space required for the turbine as against the conventional types of engines. It has been thought desirable, then, to take a number of different sized plants, each composed of several appropriate sized units, the selections being as follows:

- 1,000 hp in 2 400-kw units.
- 8,000 hp in 3 750-kw units
- 5,000 hp in 4 1,000-kw units.
- †10,000 hp in 3 2,500-kw units.
- 15,000 hp in 4 2,500-kw units.
- 30,000 hp in 4 5,000-kw units.
- 50,000 hp in 7 5,000-kw units.
- 75,000 hp in 10 5,000-kw units.

These combinations were laid out for the turbines and for the vertical and horizontal cross-compound Corliss engines, all with their direct-connected generators. A clearance space of 7 ft. in all directions was allowed, and is probably a fair average. The computations were confined to the units themselves, with the clearance stated, the disposition of the balance of the plant being assumed to be unaffected by the type of motive power.

Fig. 7 shows the comparison of floor space. The curves show the turbine to require about 80 per cent of the space needed for the vertical, and not over 40 per cent of that wanted for the hori-

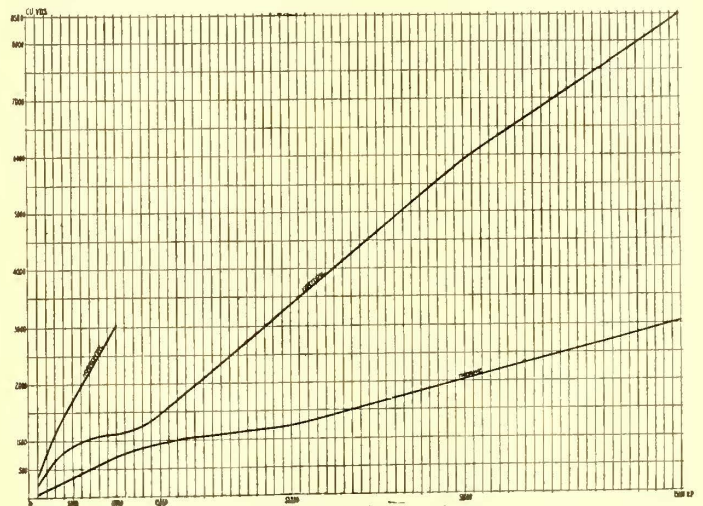


FIG. 8.—FOUNDATION, CUBIC YARDS PER HORSE-POWER

zontal. In this diagram the vertical engine compares less unfavorably with the turbine than might generally be supposed, while the horizontal engine curve is about where one would expect to find it. The latter is not carried beyond 10,000 hp, this type of engine being practically limited in size to that required for the 1500-kw generator.

Fig. 8, showing the cubic yards of foundation material required, is at the same time a more exact and striking comparison. The turbine would appear more advantageously still, if the actual foundations needed for stability had been computed. Instead, the foundations in all three cases were figured at 15 ft. depth to give space underneath the engine room floor for condensers, etc., though for large engines this depth is usually inadequate. The only foundation needed for the turbine is that necessary to hold its weight, as if it were a tank, or some other stationary affair. It does not even require foundation bolts, there being no vertical or horizontal thrusts to be resisted. Comparing again the 1000-kw units, it is found that in actual foundation volume required the ratio of the turbine to the vertical and horizontal engine is that of 1 to 9 and 15, respectively.

In Fig. 9 will be observed the comparison of engine-room building space, in which the turbine appears to hardly less advantage, though in this diagram the horizontal engine, gaining in head-room what it lost in floor space, compares more favorably with the vertical. In plotting these curves sufficient head-room was allowed to accommodate a crane, leaving adequate clearance for handling any part.

Having noted, then, the marked advantage which the turbine appears to offer by virtue of its compactness, it would seem that the comparison might be carried a little farther, and with assumed valuations of masonry work and building construction, as well as

† In this size the horizontal engine is figured on five 1500-kw units.

of land, the money saving to be effected in these important features of initial cost be defined.

Still adhering to the same plant size and combinations of units, in Fig. 10 is found the comparative cost of foundations, the basis assumed being \$7 per cubic yard for concrete, laid. It will be seen that while the turbine seems to average a foundation cost of about 50 cents per horse-power, the vertical engine in the more frequent sizes is approximately \$1.50, while the horizontal is not far from \$2.50. Not forgetting that all three foundations are figured of equal depth—15 ft.—to provide space below, as before

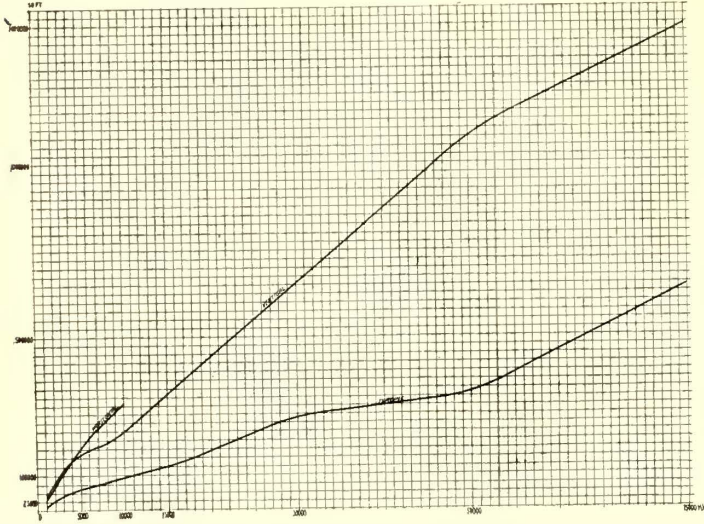


FIG. 9.—ENGINE ROOM, CUBIC FEET PER HORSE-POWER

stated. In the instances where special foundation work is required, such as piling or otherwise preparing suitable bottom, or shoring up building walls to enable sufficient depth of excavation, the expense avoided by the use of turbines is obvious.

In Fig. 11, showing comparative engine-room building cost, the basis assumed is 15 cents per cubic foot of space inside of walls. Building construction necessarily varies widely with the size, design and materials employed, but the figure taken is perhaps not far from a fair average for building built of brick, with steel trusses and fireproof covering. The curves show that the building

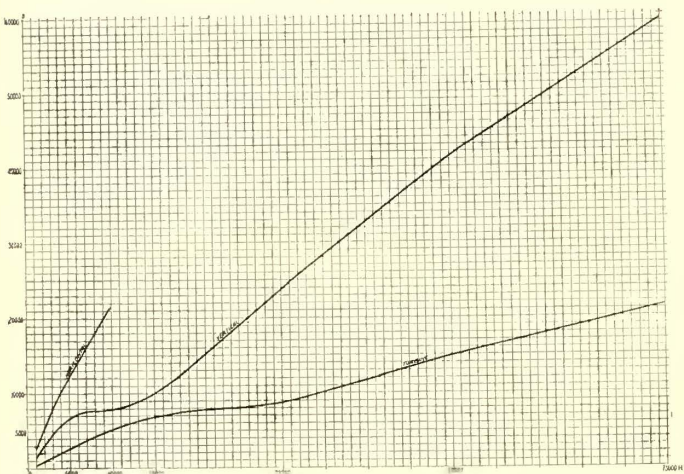


FIG. 10.—FOUNDATION, COST PER HORSE-POWER

cost for the turbine is about one-half of what is required for the horizontal or vertical engine, the latter two apparently not being far apart. In this comparison of building cost experience would differ widely. Architectural considerations and local conditions would produce varying results. Exigencies would, however, favor the turbine, because of its smaller size and rectangular proportion, and it not infrequently happens that increased power may be supplied by locating the turbine in existing space, whereas an engine would necessitate building extension, and, perhaps, the purchase of additional land. An instance of this kind arose at Akron, Ohio, where in the existing space no arrangement could be devised to accommodate additional engine power. It was found possible, however, by rearranging auxiliary apparatus, to provide space for one 750-kw and one 400-kw turbo-generator outfit, which will shortly be in operation,

Fig. 12 gives the comparative cost of land to accommodate the engine-room space, the land valuation being placed at \$3 per square foot. Whatever may be the value of land, the relative comparison would remain unaffected. Land value, however, is never of minor importance, for desirable power-house sites, with transportation and water facilities, usually cost a good deal. And, allotting about 1/2 sq. ft. of floor space to the horse-power of generating unit, it takes but little figuring, where plants are located on expensive ground, to show that the turbine in this respect alone may save a considerable part of its first cost.

The last diagram of the sequence, Fig. 13, summarizes the preceding curves and shows, with foundations, building and land at

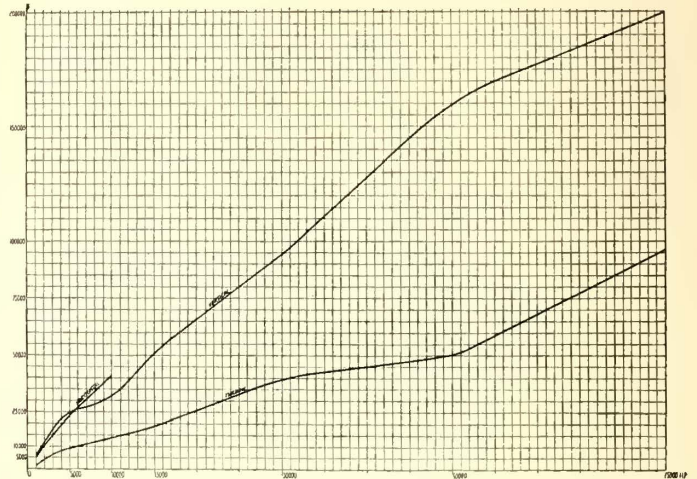


FIG. 11.—ENGINE ROOM, BUILDING COST PER HORSE-POWER

the valuations given, how these factors of cost compare. The data will have served its purpose if it show that in a properly designed plant employing the steam turbine far more money may be saved in these particulars than is ever represented by the difference in cost between machinery of high grade and that of inferior quality.

A case or two may be to the point. A plant was recently laid out to contain three 1000-kw units, with vertical cross-compound Corliss engines. Subsequently three more 1000-kw units were contracted for, steam turbines being ordered. It was found that

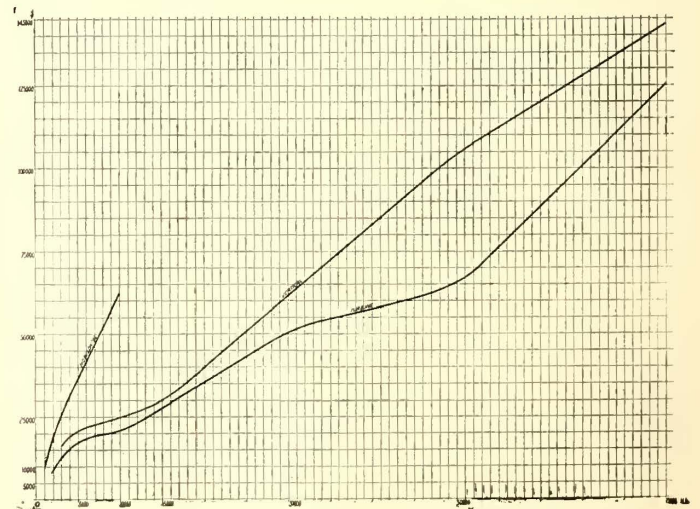


FIG. 12.—ENGINE ROOM, LAND COST PER HORSE-POWER

the turbine saved 900 sq. ft. of engine-room floor space and about 38,000 cu. ft. Had the whole plant been originally designed for turbines the saving of space would have been double these amounts, and the cost of land, building and foundations been reduced at out \$50,000.

An electric railroad plant in Ohio was some time ago installed, in which there are 500-kw generators direct-connected to cross-compound Corliss engines. Space was provided for two more units of the same size. For the increased power two 1000-kw turbine outfits were purchased, which will go in the space left, and leave room for another turbine of 2000 kw. Thus, the engine-room space planned for 2000 kw is found sufficient for 5000 kw. It is estimated that the boiler-plant extension will be reduced about one-third because of improved efficiency. It is figured, too, that a saving of \$2,900 was effected on each 1000-kw foundation.

One other case, of perhaps greater interest, recently came to notice, that of a plant of 8000-kw capacity, laid out on modern lines, employing vertical cross-compound condensing engines. There is no space for additional engine power, and any increase would require building extension and encroachment upon valuable land. It was shown that without going beyond the present building walls, and without disturbing the existing machinery, the plant might be doubled in capacity by installing turbines in the space available below the present engine-room level and adding another deck of boilers. And it has been figured that this arrangement would effect a reduction of over \$3 per kilowatt per annum in the present interest charge.

With some measure thus obtained of the comparative indirect expenses of installation we may turn to consider the cost of the turbo-generator outfit itself. Is it high in price, or is its cost, if not an attractive feature, still within our common idea of value? The answer is that its price is reasonable; that, indeed, where the comparison is fair, the turbine will require the lesser first investment. It is, unhappily, quite as difficult to compare the costs of the turbine and piston engine as to compare the costs of engines themselves. A thing is, of course, high or low in price by comparison, but where the steam engine is concerned, to measure values were a hopeless task so long as there are held divergent views of design

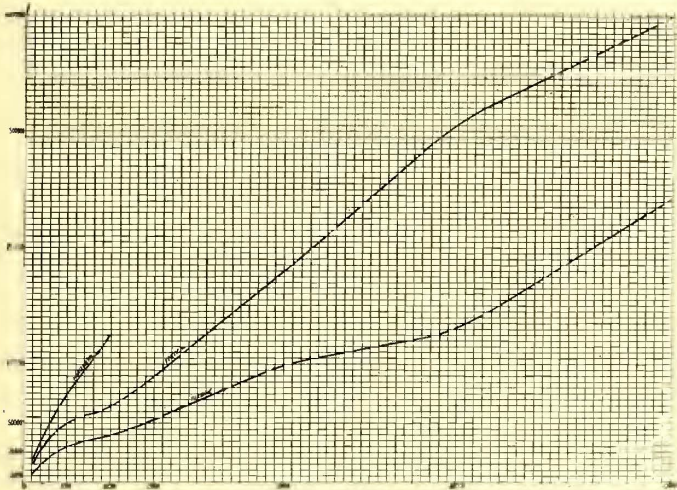


FIG. 13.—TOTAL ENGINE ROOM COST PER HORSE-POWER

and construction and of engineering adaptation, with the builders themselves wide apart in their practice.

There are engines of good workmanship and of poor, of heavy proportions and light, and generous and scant proportioning of cylinder size and ratio, and of piston speed, to the work to be done. Perhaps, too, the voice of experience may protest that the buyer's insistence on his bargain is not always in keeping with the quality he would have, or should have, and it is not surprising that commercial necessity should sometimes affect engineering ideals. While the reliable builder will adhere to his high standards, there still will be found those whose more flexible practice will suffer impairment of quality to fit the price.

Proceeding with the comparison, however, it may be assumed that the larger field for the turbine begins about where the high-speed engine leaves off. Its steam economy at once identifies it with the most efficient engine practice, and it therefore applies more appropriately to the classes of service where medium and large-size units are used. The comparison, then, lies generally between the turbine and the slow-speed engine. It remains merely to take an engine and generator of good construction, bring the engine efficiency as nearly as possible into parity with that of the turbine, also having it possess the same overload capacity, to find that the turbine is reasonable in price. And when we add the possible saving in foundations, buildings, etc., the first cost of installation is usually much in its favor.

There remain still one or two important features of electric power plant operation wherein the use of the reciprocating engine is attended with difficulty, and with respect to which the steam turbine offers unquestioned improvement.

One of these, the running of direct-connected alternating current generators in parallel, has come to be a frequent requirement, but frequent as it is, and essential as it is, its accomplishment has been anything but an exact science. There has, in fact, been so little synchronism of method as to justify some wonder at the results that have really been obtained. There is no need here to particularize the complications of the problem. It obviously is not the work of the tyro to introduce into two or more units the

identical conditions that will convert reciprocating motion into synchronous rotating motion, co-relating, as he must, the features of governing functions, inertia of reciprocating parts, fly-wheel weight and radius and the like. And it becomes evident that where successful parallel running is achieved it is the triumph of skill not only in design, but in the handling of the machinery itself.

These difficulties cease with the turbine. In it there is no fluctuation of angular velocity. There is but one direction of motion, with no element to detract from even turning moment, and due to its speed there is stored up more fly-wheel effect than is present in the piston engine.

It is, therefore, found that not only do steam turbines easily run together in parallel, as hydraulic turbines have always done, but it may be expected that they will operate with piston engines and the performance of the latter in this respect be much improved. In electric railroad work especially is this feature of the steam turbine of much interest, for it is well known how irregular loads accentuate the difficulties of regulation. Furthermore, the question of operating high-frequency apparatus in combination electric railroad and lighting service may be more satisfactorily approached.

The feature next in importance, perhaps, is that of superheated steam. It is now quite generally recognized that superheating is of advantage, though there is still much about it to be learned. Future investigation, however, in which the turbine will take important part, will reveal more precisely its economical status, and it may be hoped that before long the net advantages derivable from different high-steam temperatures will be known. Meanwhile, superheaters are being installed, and collaterally the problem of handling superheated steam has assumed importance. Engine builders themselves are feeling their way, for while some appear unrestrictedly to offer the Corliss valve for superheat work, others seem prone to confine it to the more conservative temperatures, and others still reject it altogether, and hold to the poppet valve, where superheat is employed.

The turbine may be used unreservedly with superheat of any feasible temperature. It has no internal rubbing surfaces, and there are no glands to become injured. Also, as no cylinder oil is required, there is no opportunity for lubricating trouble. Furthermore, there seems to be with the turbine rather more proportionate benefit from superheat than with the piston engine, because of diminished skin friction.

Having said that the turbine requires no cylinder lubrication, the inference follows that the steam is therefore uncontaminated with oil, and that the exhaust, when condensed, is pure distilled water. This is true, and while it is of little consequence where water supply is abundant and good and cheap, it becomes, where conditions are otherwise, of exceeding importance. In many sections of the country, where the water contains either mud or scale-making impurities, the cost of repairs to boilers, with the expense in labor and interruptions of service entailed by constant cleaning, is a besetting evil, and to alleviate this trouble large surplus boiler plants are often installed. As a usual thing, too, difficulty is experienced in attempting to extract oil from exhaust steam.

To recur once more to this feature of lubrication in the turbine, it may be remarked that it is an item of very little expense. The bearings are the only points requiring oil, the lubricant being circulated around under pressure. The reservoir being once charged, very little is needed to maintain the supply.

Finally, in this commercial consideration of the turbine, one other question should perhaps not be omitted, one, in fact, which sometimes seems to outweigh almost every other, namely: How long does it take to get it? While the demand has, in truth, for some time exceeded the capacity for production (there being now under construction at East Pittsburgh some 44,000 kw on order), so that the turbine has required about as much time to build as everything else, the extended facilities now nearing completion will better this considerably. Certainly, under normal conditions, these outfits, made of comparatively small parts, with no enormous pieces to be handled, ought to be quickly built, and what is quite evident, they can, when delivered in assembled condition, be so readily installed that the months sometimes required to erect large engines will be reduced to weeks.

If it is, then, seen that the steam turbine in all the essential aspects of its commercial utility appears to stand on solid ground, there cannot be yet attributed to it the virtue of universal application. It has its field chiefly in electric lighting and power work, though in small sizes it has been extensively used for driving blowers, pumps and other devices. Its speed, of course, prohibits belt drive.

But the direct-connected electrical generating unit has been the sine qua non of modern power development, and the reciprocating steam engine, under the stimulus of opportunity, has been brought

nearly to its mechanical and thermal limit. With all the ingenuity and skill and patient effort that have marked its growth; with its notable achievement, symbolizing as it does the march of industrial progress, it still remains, even in its most advanced form, a wasteful and complicated means for converting heat into energy. If we are to exact further tribute from the agency of steam; if we would hope to reduce complexity, and by a more simple, reliable and durable method of operation reduce the interest and maintenance charge; if, in a word, we would improve the standard of existing practice and surmount many of its limitations, we must then change the character of our medium, employ different principles and give to the generation of power a new and greater significance. The steam turbine seems destined to mark the way.

Signals for Urban and Interurban Railways

BY G. W. PALMER, JR.

The many recent disastrous collisions on street railways must have convinced operators and managers that the use of an efficient and reliable signal system would add to the safety and facility of the handling of their traffic. As faster schedules and heavier cars come into use, there is imperative need of a system of operation which will guarantee freedom from accidents caused by cars meeting head on, or by one car overtaking another.

There is only one way to prevent these accidents, namely, to adopt such rules and methods of operation as will insure that but a single car will occupy any block or section of track at any one time; any signal system which will aid in accomplishing this result is worthy of consideration.

We believe that the steam roads in their early days were confronted with precisely the same problem in relation to signals as the electric roads are now contending with. The steam signals are now probably as nearly perfect as human skill and ingenuity can make them. They did not, however, spring into existence in their present perfected condition, which has been reached only after years of work and effort to eliminate the defects shown up in practical work.

Electric roads should not, therefore, say "show us a perfect system and we will adopt it." It is decidedly to our interest to encourage the efforts of those who are endeavoring to work out something which will be accurate and reliable and to contribute whatever we can to this end.

It is obvious, however, that even a perfect signal system cannot, after its adoption and installation, operate a road. Careful management, and good discipline on the part of the men are still vitally necessary. We believe that no man should be given a second opportunity to disregard a signal set against him or to break any rule which it has been found necessary to make to insure safe operation. The employment of such a man involves a risk which should not be disregarded.

When electricity was adopted as a motive power on street railways, and especially when lines were built between cities, in some cases paralleling steam roads, and invading a field hitherto occupied solely by the latter, many saw that methods which prevailed during horse car operation would not do under conditions of higher speed, heavier cars and greater volume of traffic.

The need of something which would show that a car was approaching from the opposite direction, or was a short distance ahead going in the same direction, was quickly perceived and the problem attacked by a number, on various lines, but all having a common end in view. Several systems of block signals were put upon the market, and have since their early adoption and use undergone a process of development to get rid of the faults which became apparent by their continued use.

We believe that all single track suburban and interurban roads should adopt the best obtainable block system, together with a telephone system which will enable a despatcher to reach any car crew at regularly established stations.

A signal to be reliable and efficient should be quick and positive in action; it should be impossible to set the cautionary or permissive signal at the near end of the block before setting the danger indication at the far end; incandescent lamps should not form a part of the main signal circuit, nor should the lighting and extinguishing of lamps be the only visual indication of the signal. This should be supplemented by the movement of an arm or semaphore blade which will move each time the signal is operated whether the lamps burn or not. The device will then be operative if the lamps burn out, as sometimes will happen. Manual control affords unauthorized persons a chance to interfere with the signal, and should not be depended upon; the setting and clearing circuits should be closed automatically, and when the signal has been set at danger it should lock so that it cannot be cleared until all cars have passed out of the block. It should be possible to set the signal only one

way by two cars entering a block from both ends at the same time.

Special attention should be given to freedom from damage by lightning. As the pressure is liable to fall considerably at the ends of long lines, and also on parts of the system when heavy local loads are carried, the signal should be able to operate through a wide range of voltage, and should not be liable to damage through crossing of the signal circuit with the lines.

There are several systems now in use on electric roads, one using simply a circuit of lamps operated by a two-way hand switch at either end of the block, part of the lamps being lit as a permissive signal at the near end, while the balance indicates danger to an approaching car at the far end; this system is peculiarly susceptible to trouble from lightning, and also fails when any lamp burns out. As commonly used the switch and lamps are in the same box, and generally the car is run into a position where the conductor can easily reach the switch. In most cases the motorman then cannot see the lamps and depends on the bell signal from the conductor.

The proper method would be for the car to be stopped at a point far enough to the rear of the box for the motorman and passengers to observe the character of the signal, the conductor going ahead and throwing the switch; where the blocks are many, this will cause an annoying delay, which could be avoided by having the switch separate from the signal box, at a point about a hundred feet to the rear of it, and at such a height that the switch cannot be reached from the ground. When permission to proceed has been obtained, the motorman should not enter the block until the conductor has struck two bells, thus making the men jointly responsible.

An improved method of operating the signal is by means of a circuit closer hung overhead and at a point sufficiently in the rear of the box, the circuit being closed by the passage of the trolley wheel; there are devices of this kind now obtainable which are reliable and effective in action.

A better system is one which uses a setting and clearing circuit separate from the lamp or semaphore circuit; most of these, however, can be cleared by the passage of any one car out of the block, and in case of running several cars together, all trolleys but the one on the rear car must be pulled down when passing the switch, or if the leading car clears the block the car proceeding in the other direction must be notified of the number of cars following; this is an element of danger, as it should be absolutely impossible to clear a block while any car remains.

Some device should be used which will record the number of cars entering the block from either end, and hold the setting circuit closed until all cars have passed off the block. It should also be possible to clear the danger signal from both ends of the block, as it is often necessary for a car to leave a block from the same end at which it entered.

There are certain single track blocks on the Old Colony system which are operated by means of what is locally known as the "red stick." This is a small club or billet of wood painted red, which controls the block to which it belongs, and no car is allowed to enter the block unless it carries the "red stick," it being replaced by a red lantern at night. This is a safe but not very flexible system, the absence of the stick showing one that there is a car on the block, but not the direction in which it is going. Nor does it show when the block is cleared from the other end. In case of delay or blockade of cars going in the opposite direction the stick could not be carried back and all cars going in the same direction as the one which first entered the block would be held up. It does prevent effectually the "bunching" of cars at one end of the line.

Double track roads are also feeling the need of some system which will prevent rear end collisions. Where cars are operated on quick headway and a direct view of the track ahead cannot be had, there is always danger of a car overtaking the preceding one. This is particularly the case at night, and all cars operated on suburban lines should carry a rear end red lantern. This simple precaution is so obvious that it would seem as though it must have been adopted by every one. Such, however, is not the case.

There has been some work done along the line of cutting off the trolley current from a car which has not the right of way, thereby making it impossible for the car to proceed. This scheme seems to us to be a very attractive one, and it is possible that it may be effectively developed.

Too much stress cannot be laid on the necessity of giving careful attention to the proper erection and maintenance of the signal lines and devices. In regard to the lines, their maintenance is more difficult with us than with the steam roads. We are forced to carry many of our wires in streets lined with thick and heavy trees, through which it seems almost impossible to obtain good and reliable construction. In all cases special attention should be paid to keeping the wires clear from the limbs and a tough and impervious insulation should be used.

Regular and careful inspections of all parts of the system should

be made, and everything done which may be necessary to keep it at all times in the best of condition. No devices should be left without care until they fail to work, which they may do at a time when there is the greatest need of their reliable action. Efficient maintenance may be expensive, but one accident which might have been prevented may result in a loss far greater than the combined cost and maintenance of a good signal system.

The Adjustment of Damage Claims

BY MASON B. STARRING,
Chicago City Railway Company

Not many years ago the caption of this paper was a subject which managers regarded in much the same light as that in which the modern horse first looked upon the automobile: It seemed sure enough an invention of the evil one, and dead certain to hurt something or somebody, but with the growth of the street railway and the community it supplies with means of transportation, that cancerous growth, yclept, damage claims, which had already fastened itself upon the steam roads, began to develop in the street railway body corporate, and as it grew so grew the study and care bestowed upon its treatment, and all careful managements have long since commenced to place experts in charge thereof. The successful adjustment of damage claims depends largely upon the personal equation; the personality and mental characteristics of claimant and adjuster are the prime factors in all settlements. No matter how fair a corporation may be, may its adjuster be never so able, yet if the claimant is so constituted as not to know fairness when he meets it, or so determined to bilk the company that no reasonable amount will appeal to his sense of right, then an adjustment must fail and resort be had to law; then, too, the question of locality must be taken into consideration. Some cities are pest ridden with the itch for personal-injury litigation; in Chicago, for instance, there seems to be from five to fifty "drummers" for personal-injury suits to every personal injury, or person willing to claim one, to be drummed; and its taxpayers are even now being asked to add a large number of judges to the already large bench of the county in order to secure the trial of cases within a reasonable period of time after their commencement. What that city needs is not more judges, but an enforcement of the laws against champerty, barratry and maintenance. If I am rightly informed, my own fair city is not by any means the only one suffering from such necessity.

To further the proper adjustment of claims of this class, a proper foundation must be laid at their very inception; preparation for a lawsuit must go hand in hand with preparation for adjustment; the knowledge the claimant has that the adjuster is fully cognizant of all the details, not only of the accident which gave rise to the claim in question, but also of the surgical side of the case, and the etiology of those special ailments which the claimant alleges to have resulted therefrom, goes a long way toward making an unreasonable claimant reasonable. In preparing for the adjustment of a claim of this nature it is always wise to ascertain as much as possible of the antecedent history of the claimant, for, since the growth of the personal injury claimant business into an industry, it is no unusual thing to find one person with a record of several antecedent injury claims, some of them settled amicably and others adjusted at the end of litigation. I have in mind at this writing the case of one woman who, starting in Philadelphia, had, as westward she took her way, accumulated injuries and suits until the one which she prosecuted against the company I have the honor to represent numbered seven upon her list, and it was her lucky number, too. It is very frequently found, especially in the claims of women, that prior to the occurrence of an accident there had existed certain obscure troubles which sooner or later must, by the progress of nature, force themselves upon the notice of their unfortunate possessor and his or her physician or physicians, but which had not aroused in the sufferer, up to the time of the happening of a street railway accident, sufficient attention to cause medical attendance to be secured; but when an accident happens which presages the recovery of damages, every ache and pain is then watched with interest; one might also say with desire, and each and every grunt, whether caused by an actual twinge or by auto-suggestion, is attributed to the "awful" accident and to the wicked conductor who started the car at the supreme moment when an old lady had her foot firmly planted upon the car step and the other deftly poised in the air. Some physicians find it to their interest to humor their patients and having a natural distaste for antagonizing their patients by telling them that the complaints made by the patient and the conditions found by the physician have no reference whatever to the probable conse-

quences of such an accident as that under consideration, leave them firm in the belief that all their troubles are due solely to the violence applied at the time of the alleged accident. This is especially true of pelvic and nervous disturbances of the fair sex; many a woman directs her doctor's attention for the first time to pelvic troubles subsequent to an accident, when her comfort, and possibly her health for a life-time, might have been subserved by consulting him promptly relative thereto when the first manifestations of disturbance made their appearance. Occasionally instances are met with where the courage to undergo voluntary torture for the sake of the few dollars that can be secured out of a claim, attains so abnormal a development as to amount practically to insanity. Of these strange phenomena an extreme example which came under my personal observation is so abnormal as almost to pass beyond belief by any person not confronted with proof. Shortly stated, it was as follows: A woman physician related to a fine family and of independent means, brought suit for damages. The only injury that she was able to show she sustained at the time the accident occurred was a slight sprain of one ankle. She was exceedingly heavy, and in the course of the trial it developed she had both breasts, weighing some 28 lbs., excised, and upon being asked the relation this operation had to the accident to her ankle or why she had it performed, she replied that it was done in order to lessen the burden of weight which her "poor sore ankle" was compelled to sustain. It afterward appeared that at some time antedating the accident she had undergone an operation known as oophorectomy for the purpose of bringing on an artificial menopause, in order that the conditions which nature had imposed upon her sex should not interfere with her attendance upon her duties as a physician. Subsequently to the trial and disposal of the case it was said that, having learned of an operation performed in France for the removal of flesh from the thighs she hid herself to Paris to try this operation.

Science has come mightily to the aid of the adjuster in throwing the tell-tale searchlight of the X-ray machine upon the human anatomy. This marvelous discovery is effecting great and good results in all personal injury departments of those corporations which have had the good fortune to come in contact with, and secure the service of, an expert in its use; many and many are the cases of fraud and imposition which it has exposed, and a great, great many (how many I never have gone into the details to carefully ascertain) of the claims that bones have been broken or fractured in steam or street railway accidents have thereby been shown to be mere frauds, and that no fracture or fractures existed. Previous to the invention of the X-ray instrument it was much more difficult for the adjuster to ascertain the truth in regard to this point. A limb placed in a plaster cast is thereby put beyond the close inspection of a physician, and it is manifestly impossible to compel the removal of the cast for the direct inspection of the wound; this afforded an easy and successful mask for deceit. Now, however, the X-ray reveals, almost at a glance, the real condition of the hidden bone. Could an instrument be invented which would as indisputably and as accurately determine the extent of injuries to nerves and muscles as this machine does to bones, the task of adjusting personal injuries would be greatly lightened and the uncertainty which prevents an always accurate decision would be very largely removed.

Not all the experiences met in the adjustment of personal injury claims are of the depressing order; some, either in or out of court, are relieved with touches of humor which serve to lighten the dreary routine of fighting frauds and imposters. For example: A homeopathic physician of the female persuasion brought suit against a surface road, claiming that a fall received from one of its cars had caused her to suffer so severe a brain and nerve injury that her ability to discharge her professional duties had been seriously impaired. In the course of cross-examination she was asked if she had not fallen down a full flight of stairs in a certain department store. Without hesitation she replied:

"I did, sir, but this fall partially restored me to health. I have had no headaches since." With great suavity in modo she said to her tormentor: "If you were familiar with the great principle upon which my school of medicine rests you would easily understand why this was a natural result."

Knowing the familiar motto of the homeopathic school, "similia similibus curantur," the company's attorney remarked:

"I believe your motto is—"

And before he could finish his sentence she interrupted him: "Simile similibus, similiter." Bench and bar had hardly smothered their laughter when, in reply to a question concerning the whereabouts of a certain patient of hers, she said: "He has passed beyond my jurisprudence." Certainly the originator of Mrs. Malaprop need not have searched beyond this good lady for a prototype. It may interest you to know that the verdict indicated that the jury thought that the practice of this physician had not been

seriously damaged by the great and severe injuries she claimed to have sustained.

In making investigations leading up to physical disabilities, antedating accidents, with a view to ascertaining whether ailments complained of are a result of traumatism and are properly attributable to that cause or are due to other and pre-existing causes, much delicacy should be displayed so as not to annoy unnecessarily either the claimant or his or her friends or family—and in the trial of damage suits, however solid an array of testimony it may be possible to present reflecting upon the character of a man or a woman, a party to a contention of this kind, it must always be borne in mind that the natural chivalry of our race is prone to resent what may seem to the auditors of such testimony an unnecessary, or to some, mayhap, a malicious attack upon some person for or because of the presentation by that person of a damage claim. The arousing of such prejudices should be avoided, as, in most cases should the introduction of evidence as to intoxication, because, while it is true most of American mankind take a drink occasionally, few like to be charged with taking so much as to cause the enemy in the stomach to take away the wisdom in the head.

I think we will all arrive at the deduction that there is no department in the entire management of street or steam railway properties into which the personal equation more strongly enters, and that personality of the right stamp in the head of that department charged with the adjustment of claims, whatever his title may be—even when dubbed "claim agent," that title now so thoroughly despised more by reason of its adoption by that vast body of ghouls sometimes called "ambulance chasers," which preys alike upon the injured and the railways, than for any other cause—is the most essential requisite to the proper handling of this unfortunate part of our street railway machinery. My first precept, therefore, is "seek the man." Get a combination of absolute honesty and industry, with a moderate supply of brains, and you have a good man; let any one of this trinity be absent and the settlements he makes will be mostly unsatisfactory, if he succeeds in making any at all. If the claimant possesses these same sterling attributes the result will be an adjustment satisfactory to both parties, for in that event there must of necessity be merit to both sides of the case or no claim would be made, and no adjustment sought. If all claims were just and all claimants fair, the matter of adjustment would be simple, but as a rule comparatively few claims are just and fewer yet of the claimants are fair, so that the faculties and perceptions of whoever represents the company's interests must be ever alert not to be duped by dissimulation, exaggeration and guile, and to discover actual and intentional fraud whenever and wherever it exists. Some claimants possess honesty, but not enough to leaven the lump; many possess industry to some degree, and all possess a certain species of brain; most of them possess what might be justly termed a low order of cunning; the doctrine of our homeopathic friend, that like cures like must not be applied to an adjustment.

Precept number two is "get facts." Facts are what win! He who can incontrovertibly and openly place facts before a malingerer puts him at a disadvantage from which he can never recover. Facts, too, are the enemies of some physicians. Look out for the doctor who puts the plaster cast upon the unbroken limb. He is a stumbling-block in the path, but employ to meet him not one who has a beam to pluck from his own eye. Rarely should the attending physician, if honorable and a fair practitioner, be ousted from the care of his patient. Be the recovery of the patient never so good, if the company furnishes the surgeon who attends the injured person, by some perversion of mental vision it is claimed alike by patient, relatives and friends that he is, and has been, sent to the bedside of the patient to injure him in some occult way, and by so doing affect detriment to his interests and protection to those of the street railway company, sight being lost of the fact that the complete and early convalescence and recovery of health of the patient is best for all.

A little book lying on my desk as I write says very appropriately of this theme: "Pettifoggers in law and empirics in medicine, whether their patients lose or save their property or their lives, take care to be, in either case, equally remunerated; they seize both horns of the dilemma and press defeat, no less than success, into their service. They hold from time immemorial the fee simple of a vast estate, subject to no alienation, diminution, revolution or tax; the folly and ignorance of mankind. Over this extensive domain they have long had, by undisputed usage, the sole management and control, inasmuch as the real owners must strenuously and sturdily disclaim all right, title and proprietorship therein."

Meet fairness with fairness; fraud with firmness. "Fighting fire with fire," avoid as you would his satanic majesty himself. Fire cannot be handled without burns, and burns are at least painful.

Avoid a reputation for settling everything; it hurts stockholders' pockets; equally avoid a reputation for fighting, but when you do fight, win. Settle all the grave cases that presage loss; litigate all those that possess little or no merit. It is a juster as well as a wiser policy—for once, at least, justice and expediency run hand in hand.

Very often I am asked to furnish copies of the form of release which is used in concluding an adjustment, and willingly comply, but one form of release is about as much like another as peas in the same pod, and in the event that a settlement is contested in court by an ignorant person, and especially by one having no knowledge of the English language, the more technical in its terms and the more involved in its legal phraseology a release is, the more apt a jury is to say that the person who signed it was totally ignorant of its contents and that the execution of the document was obtained by fraud.

Some time ago the writer had occasion to cause a release to be obtained from a German girl who had stepped from a moving car as it was coming to a stop for her to alight, while the car still had sufficient motion to disturb her equilibrium. The girl lost her leg, and an adjustment was made very shortly after the accident, while she was still in the hospital, and was not made because of any liability, but merely to avoid litigation. After she got out and around she was very easily persuaded by somebody—we can all suspect whom—that she had been imposed upon, and the foolish woman went upon the witness stand and testified, under her solemn oath not only to a state of facts which created a liability on the part of the defendant company, but also that she did not know the contents of the paper she had signed; that she could not read English, and that even if the paper had been translated to her in German (which, by the way, it was, although she denied the fact), she would have been unable to comprehend it and understand what it meant, but unfortunately for her and her attorneys, who had a large fee contingent upon the result of her story, she had written in the German language in her own handwriting, over her own signature, on a portion of the hospital record which hung by her bedside, "I got \$100 from the railroad company, and I know I can get no more for my leg." Certainly not a very artificially drawn legal document, but without it there is no doubt but what the very perfect release which was properly and understandingly executed by her would have been set aside. It is, therefore, fair to draw the conclusion that in settling with ignorant people it is wise to have them express in their own way their understanding of the purport and effect of documents which they sign, and I have always cautioned adjusters to be particularly careful in this respect—never to make any misrepresentations; never to allow a person who has been drinking to sign a release, and wherever it seems wise to the adjuster, owing to the circumstances surrounding the settlement, to obtain from the claimant in claimant's own handwriting such a statement as that referred to above; and, in the event that claimant signs by mark, to obtain disinterested and reliable witnesses to the mark. Perhaps this little suggestion may seem to many discursive and entirely unnecessary, but to others it may exemplify, as it did to me, the need of the utmost care and precaution in concluding matters of this kind, for, generally speaking, the public maintains a double standard of morals—one for dealing with corporations, another for transactions with individuals. The man who holds himself bound to govern his relations with a corporation by the same rule of morals and ethics which regulates his relation with the natural instead of the artificial citizen, is fast becoming as extinct as the dodo. Almost the universal attitude is that a corporation is not entitled to receive that strict application of the law of good morals and common honesty which is shown to individuals acting in private capacities. Put into common parlance, the public code in dealing with a corporation seems to be that "a man is entitled to all he can get out of a corporation."

The atmosphere of such a feeling is typical of a very large share of the cases which come for adjustment before the metropolitan law or claim department. There is no escaping from the conclusion, enforced by careful observation, that men who could not be induced to deal dishonorably with private individuals, acting as such, do not scruple to make false representations as to the nature and value of any old claim against a corporation. This practice is so common that it may be classed as almost universal. And the men, or a decided majority of them, who justify and indulge in this kind of "sharp practice" in dealing with a railroad corporation, might safely be trusted with a private loan, unsecured and amounting to more than the sum involved in their suits for damages.

Previous to a very few years ago the steam and street railway companies of every kind and the "common carriers" of various descriptions have been the main sufferers from this deplorable attitude of the public conscience which decrees one moral standard for dealings with the private individual and another and a

much lower one for transactions with a corporation. Now the application of this double standard is being made to many other kinds of corporations. The municipality is the worst sufferer of all; but the manufacturer, even the smaller and the private industrial concern, is being brought under the application of this sentiment and practice.

Possibly, of all the varied classes of claims with which the adjuster of damage claims meets, the most dreaded and difficult for him to handle are those which bring to bear the subtle influence of "pull." Not infrequently a conscientious adjuster finds that this influence has reached "above his head," and that the discharge of his duty brings him into opposition with others more easily influenced and of higher rank on the company's roster. Quite generally claims pressed with this kind of backing are either fraudulent or extortionate. Of course, there are exceptions to this rule, but the very fact that the claimant feels called upon to exert a personal or social or political pressure, or add to his claim the weight of some powerful financial interest in the institution in question, is a strong presumption that the claim for which this influence is solicited is too weak to stand upon its own merits. In this connection it might be stated that corporate officers, and particularly those engaged in passenger transportation, are not unmindful of the public attitude of sensitiveness and quasi-hostility toward them, and are, therefore, willing to make a just and liberal settlement without any undue influence exerted upon them, and for that reason adjust rather than contest even doubtfully meritorious claims. But, to go back a little ways, let us always consider an adjuster's trials and tribulations, and not make his pathway too hard, for if he learns that claims which he declines are subsequently increased by reason of the so-called "pull" he soon gets to thinking that if somebody is to be a "good fellow," why should not he be that somebody? And if his superior officers are so willing to give away the company's money to please their friends or to make friends for other departments of the company's service, why is it not perfectly proper for him to do those self-same things? Thus the company soon finds itself with a vastly increasing damage account. It is a good rule for any company to adopt to reverse rarely, if ever, a decision of its adjuster. If upon consultation with an adjuster it would seem that on the merits of the case in question some action different from that already taken by him should be had, let the adjuster attend to that in his own way; do not have him feel disgruntled and overridden. There is no excuse for inflicting personal humiliation upon a man who possesses your confidence, who has your money in his pocket and your best interests at heart. Many and many a good man has been spoiled, I fear, by the unfortunate proclivity on the part of his managers to yield to the so-called "pull." If a company has any friends to make or debts to pay, let them be paid through some other department and in some other manner. Debts paid in this manner are never considered liquidated, and a person who has obtained something for nothing for someone by reason of his influence, nevertheless, thereafter boasts of the amount he has saved the company and the obligation under which it has been placed to him by his getting this or that case settled for them. This brings to my mind the subject of "go-betweens." There is in every community a class of people which seeks its livelihood by preying upon both sides of personal-injury claims. It seeks the individual and impresses upon him how much can be obtained through the go-between, and how little without such influence, embellishing the yarn with wonderful stories concerning that influence, often to the detriment of honest officers, trying to make the claimant believe he has some hold upon them and that they are corrupt, and trying to persuade the claimant to see that the sun of success rises and sets in the great and only negotiator and his Svengali-like "infloence." And should this creature be treated with any consideration he swells himself larger and larger, and as he himself swells, so swells he the head of the claimant, and at last, if he succeeds in bringing the opposing parties together, his grandiloquent attitude dwindles to the proposition tritely expressed in the words: "How much is there in it for me?" while he assumes all the time the attitude that without his invaluable services claimant and claimee, if I may coin the word, never could have come together or have reasonably disposed of their differences. There is one claim department of which I know into which such an individual is not allowed to enter. Some things in the human race are more despicable than this creature, but he is sufficiently low in the scale to make it unwise, unsafe and, to every fair-minded person, disgusting, to have any dealings with him. Perhaps it is not fair to our sex to use the pronoun he so often in this connection—many and many such a creature masquerades in petticoats. Much success depends upon the care and discrimination shown in selecting cases for trial, and while this paper should mayhap deal only with the "adjustment of damage claims," a word or two upon the corollary thereof, the litigation of damage

claims, may not fall amiss. To illustrate, given a company which employs and enjoys the reputation of employing only the ablest counsel obtainable and prosecuting its every defense vigorously and uprightly, and which wins a great majority of the cases which it tries, 90 per cent of the bar will seek settlements in terms not unfavorable to that company rather than meet it in court. Right here let me say another word about trials and their results. Never compromise the verdicts when results are unfavorable. If they ripen into judgments, make the best you can of them after they have been affirmed by a court of last resort, not before. The fact soon becomes known as to who will and who will not compromise for 50 per cent, or some other per cent, of the amount of a verdict, after one is rendered, and that company or person having such contingencies to contemplate, and compromising upon verdicts in the manner heretofore suggested, will soon be confronted with the necessity of trying each and every case brought against it. The results are so much more satisfactory to the practitioner, who gets 50 per cent of the amount recovered by suit and only 33 1-3 per cent or less, in the event of settlement. Then, too, think of the disappointment this same gentleman feels when he cannot add mention of such compromises to his scrapbook of newspaper clippings reciting his recovery of a \$10,000 verdict against this company and a \$25,000 verdict against that one, which volume he so proudly displays when luring to employ him some unsophisticated, but possibly injured, person whose clientage he seeks, but who never saw or heard of him before his call. The sadness is appalling; weep with me, my hearers! Never, as the expression goes, settle "behind the back" of a reputable lawyer. If in rare instances circumstances compel such action, see that he receives a reasonable fee. On the other hand, never settle with the "ambulance chaser;" it is far better to pay the client of such an one \$100 than to pay him \$10. Try it and see.

In writing concerning the adjustment of damage claims, I have confined myself to those arising from injuries to persons and omitted referring to those relating to damage to personal property, realty, etc. I have also intentionally refrained from going into the details of the different means of procedure advisable to be followed from the moment an accident happens down to the time at which any claim or claims arising therefrom are finally laid at rest. Every company, I take it, whose claims are sufficiently numerous and whose damages are sufficiently large to invite any special attention thereto has adopted careful, and one may say, almost scientific, methods of caring for the injured person or persons, preventing fraud and starting immediately upon the happening of any occurrence which might give rise to a claim—the rolling of that ball of investigation which as it moves along grows and grows until it assumes and becomes a perfect and symmetrical globe of defense.

The temptation to overstep the bounds of time and space allotted for this disquisition is so strong that it now becomes me to say, with the old dominie, lest, like him, I might fail to hold the interest of my auditors, "I can make this paper longer, but I won't." To which comes surging back on the tide of courteously restrained impatience a reply requiring no straining of the ear to hear: "We don't want it any longer; its present length suits us very well."

Discipline of Employees by the Merit System

BY W. A. SATTERLEE,

General Superintendent Metropolitan St. Ry. Co., Kansas City, Mo.

The merit system of discipline, as applied by managers of steam railways throughout the country, has recently been brought to the attention of street railway managers, through able articles in the *STREET RAILWAY JOURNAL* and *Review*, in such a way that the system is now receiving much attention. It has been adopted by a number of roads, and their experience with it has been such that it is surely worthy of deep thought and attention on the part of all street railway officials. It seems to fill a long-felt want in street railway discipline, and, in importance, is second to none of the recent improvements and betterments constantly being adopted and in successful operation.

I know of no single change made in the old methods of operation, unless it be the adoption of the Standard System of Street Railway Accounting, that should receive a more hearty support from all. Certainly no system has been adopted that is fairer to the trainmen, or is more likely to produce in them a desire to keep their record clean, and as many demerits marks from appearing against them as possible.

There are many trivial acts, small in themselves, committed by trainmen in handling passengers, that as a whole tend to produce a feeling on the part of the traveling public either favorable or un-

favorable to the company, which once formed is hard to offset. Small acts of courtesy toward passengers by trainmen are felt by the management in ways unknown to the men who perform these acts, and are as far-reaching for the good of the company as small acts of discourtesy are damaging.

To teach employees to be guarded in their talk, their acts, and their deportment on duty toward those with whom they come in contact, is a problem nearer solved in the merit system than in any other way.

The value of courteous, accommodating and careful trainmen to any street railway system is of such importance, and so eagerly sought for, that any method of discipline which will accomplish that end will be of so great worth as to make management of street railway property a pleasure instead of care and worry that breaks down the health of any but robust men.

As a rule, men who seek employment in the train service of street railway lines are inexperienced in the art of handling the public in the way an exacting public expect, and acquire the tact only by continuous contact and experience, after training under some system of discipline worked out by those who, for years, have watched the needs and exactions of a people who expect the same attention from an inexperienced street car conductor, who may have been in the service only a few weeks, that they get from a steam railway conductor who has been under a system of training with his company for from eight to ten years before he has acquired the position where he comes in contact with the traveler.

To give the street railway public the service which they expect, and which they exact, is the aim and desire of all managers, but is a well-nigh impossible thing to do. To come as near the goal as human ingenuity can, may be done through the different experiences and methods used by well-managed roads, and by discussions and friendly criticisms brought about through the several papers written by different parties for this convention, and it would appear to me that the subject assigned to my company is one that should call forth from all representatives present a most interesting and instructive debate.

In brief, the system consists of a debit and credit account with each trainman, kept in a book ruled for that purpose, or in alphabetical files, his violation of rules being charged against him by a certain number of demerit marks, the number for any one offense depending upon the seriousness of same. As an offset against these demerit marks, he is entitled to receive a certain number of merit marks for acts performed which would be considered by the company worthy and deserving of recognition.

If at any time within one year the demerit marks exceed the merit marks by a certain number fixed upon by the company, then the party receiving them is liable to discharge.

The detail of the working of the system as practiced by the company with which I am connected, but which can be varied to suit the ideas of different operators, is as follows:

A list of violation of rules with the number of demerits imposed for each is posted in frames at each reporting place, that trainmen may know in advance the penalty, and also a list of acts considered worthy of merit with number of merits given for each.

A blank notice, made in carbon copy, which is filed in office, reading as follows, is sent to each trainman, with his name filled in blank space, whenever he gets demerits or merits:

METROPOLITAN STREET RAILWAY COMPANY.
Kansas City, Mo. 190...
DEMERIT MARKS.

Mr. ...
You have to-day been given ... DEMERIT MARKS on charge No. ... contained in the merit system of discipline.
Date.
Time.
Place.

Assistant Superintendent.

METROPOLITAN STREET RAILWAY COMPANY.
Kansas City, Mo. 190...
MERIT MARKS.

Mr. ...
You have this day been given ... merit marks on No. ... contained in merit system of discipline.

Time.
Date.
Place.

Assistant Superintendent.

Another notice, without trainman's name, is posted on board at reporting place, as notice to all other men that a conductor or motorman has been disciplined, with the charge, and number of demerit or merit marks he has received.

METROPOLITAN STREET RAILWAY COMPANY.

Kansas City, Mo. 190...

A. ... on ... line has this day been given ... marks on charge No. ... in merit system of discipline.

Assistant Superintendent.

Whenever a man's demerits exceed his merits by 100 he is liable to discharge.

The old system of lay-offs and fines has been done away with and the service much improved in the short time the new system has been in vogue, since June 1, 1902.

Merit No. 10 for conductors (No. 9 for motormen) is broad enough to cover many things coming under the observation of inspectors, that show good judgment and interest in handling the public, and in such cases a liberal giving of merit marks will be appreciated by trainmen, and will redound to the profit of the company. A little praise given any employee by an employer is worth more and is more productive of good work tenfold than any reprimand. We all, no matter what position we hold, are pleased with notice taken of our work by those who are our immediate superiors, and a word of praise coming from a superintendent or manager to any employee working under the merit system will certainly not be lost.

The trainman who takes off his coat and gets to work first in a lay-out caused by a broken-down car or a wire down, etc., marks himself right then and there as a man the company needs, and he should get merit marks. If he takes an interest in clearing up such trouble, it is safe to say he will take the same interest in other matters. Too many men wait for some other man to take the lead and in that way much valuable time is lost in blockades, when there is no incentive or reward to spur them on. Those with demerit marks wait for an opportunity to reduce the number by getting enough merits to offset their demerits, and come to the front in case of trouble, showing by their desire to render assistance an interest in company matters not shown before. Whenever men can be taught to take the same interest in their employer's business they would in their own business, then that employer will get the most perfect service possible, and when the employer succeeds in getting a system of discipline that will bring about that result, then he has what has long been sought for, and until some system has been discovered better than the merit system, the latter should receive the hearty support and assistance of all managers of street railway property. Good train service is the vital cord in operation, and trainmen make it good or bad according to their training.

METROPOLITAN STREET RAILWAY COMPANY.
MOTORMEN AND GRIPMEN—DEMERITS.

Immediate Discharge.

- 1. Disloyalty to company.
2. False statements.
3. Intoxication.
4. Dishonesty.
5. Gross ungentlemanly conduct. Demerits.
6. Failing to report accidents. 10 to 100
7. Missing—
First time 10
Second time in one month 20
Third time in one month 30
8. Smoking on duty 30
9. Failure to make safety stop at crossings where required 30
10. Incomplete and poor accident reports. 1 to 5
11. Untidy condition of dress. 2
12. Recommending unworthy men for employment. 5
13. Neglecting to pick up passengers. 10
14. Running over circuit breakers and overhead crossings without throwing off current.
15. Allowing unauthorized persons in front vestibule. 5
16. Fast running. 5
17. Front headlight not burning. 8
18. Entering saloons in uniform without good excuse. 10
19. Frequenting saloons at any time. 50
20. Gambling. 50
21. Drinking on duty or before going on duty. 20
22. Disobedience of orders (if flagrant—discharge). 10
23. Profanity on duty. 5
24. Accidents when avoidable in opinion of superintendent. 10 to 100

25. Unnecessary conversation with passengers.....	10
26. Talking to conductors on duty.....	5
27. Failing to report trouble with car.....	5
28. Not answering signals promptly.....	1
29. Feeding current too fast.....	3
30. Running away from passengers at transfer points..	10
31. Not ringing bell in passing car.....	2
32. Running ahead of schedule time.....	3
33. Not slowing up in passing car.....	5
34. Skinning the cable.....	25
35. Starting car without proper signal, except to avoid collision	20
36. Following car in front too close.....	10
37. Starting electric car before closing gates.....	10
38. Opening electric gates before car stops.....	10
39. Running too close to wagons upon track before getting car completely under control.....	10
40. Bad judgment on special occasions.....	1 to 10
41. Leaving car without taking reverse lever.....	10
42. Flattening wheels.....	10 to 20
43. Injury to car equipment that could be avoided by proper care and judgment.....	10 to 20
44. Not stopping for passengers to get on (if at proper place)	10
45. Not obeying conductor's signal.....	5
46. Running crossings without proper flagman's signal where required.....	20
47. Cutting rope.....	25 to 50
48. Trouble with passengers when gripman or motorman is to blame.....	10
49. Garnishee—	
First time.....	10
Second time.....	10 to 50
Third time.....	50 to 100
50. Assignment of wages or security deposit.....	25
51. Talking to others than proper officers of company about accidents.....	20
52. Careless and indifferent operating of car.....	3 to 10
53. Criticising management of road in presence of passengers	3
54. Failing to report delays.....	2
55. Not having proper tools.....	3
56. Plugging car except to avoid accidents.....	5
57. Running without sand in sand box.....	3
58. Acts detrimental to good service in opinion of superintendent	3 to 20
59. Incompetency	25 to 100
60. Holding train with cable.....	10

MOTORMAN AND GRIPMEN—MERITS.

1. Warning persons in act of jumping on or off moving car to wait for car to come to stop.....	2
2. Securing names and addresses of witnesses who saw accident, other than those on accident report	2 to 5
3. Politeness and attention to passengers noticed by inspectors	3
4. Assistance rendered in case of accident, such as to bring commendation from passengers.....	3
5. Informing company of matters in the interest of good service, etc.....	3 to 10
6. Complete and perfect accident reports.....	2
7. Good stop in avoiding accident.....	5
8. Good judgment and work in handling lay-out or blockade	2 to 5
9. Special meritorious act calling for recognition from company	10 to 50
10. Careful handling of car.....	5

CONDUCTORS—DEMERITS.

Immediate Discharge.	
1. Disloyalty to company.	
2. False statements.	
3. Intoxication.	
4. Dishonesty.	
5. Gross ungentlemanly conduct.	Demerits.
6. Failing to report accidents.....	10 to 100
7. Giving bells too quick.....	5
8. Smoking on duty.....	30
9. Error on trip sheets.....	1 to 5
10. Shortage	}
11. Overage (except when pay check is turned in) }	
Over six in one month, each.....	2 to 5
12. Missing fares.....	3 to 10

13. Failing to ring fares.....	5 to 20
14. Failing to properly flag crossings when required..	10
15. Incomplete and poor accident reports.....	1 to 5
16. Inattention to passengers.....	2
17. Trouble with passengers when conductor is to blame	10
18. Missing—	
First time.....	10
Second time in one month.....	20
Third time in one month.....	30
19. Dirty car.....	5
20. Untidy condition of dress.....	2
21. Recommending unworthy men for employment....	5
22. Back headlight burning except in case of fog.....	1
23. Reading on duty.....	10
24. Sitting down in car on duty (when running).....	5
25. Talking to motorman or gripman on duty.....	5
26. Letting boys change trolley.....	5
27. Entering saloon in uniform without good excuse..	10
28. Frequenting saloons at any time.....	50
29. Unnecessary conversation with passengers.....	10
30. Accident when avoidable in opinion of superintendent	10 to 100
31. Failure to announce streets.....	1 to 5
32. Profanity on duty.....	5
33. Disobedience to orders (if flagrant—discharge)....	10
34. Error in punching transfers.....	2
35. Deliberate punching of transfers to permit passengers to lay over.....	20
36. Gambling	50
37. Drinking on duty or before going on duty.....	20
38. Running away from passengers at transfer points..	10
39. Bad judgment on special occasions.....	1 to 10
40. Bad judgment or carelessness in regulating heat on cars	2
41. Criticising management of road in presence of passengers	3
42. Neglecting to get transfers enough at barn to avoid borrowing	2
43. Talking about accidents to others than proper officers of company.....	20
44. Register not turned at end of line.....	10
45. Not in proper place on car.....	3
46. Careless and indifferent operating of car.....	3 to 10
47. Giving bells when not in proper place.....	5
48. Impolite remarks to passengers.....	5 to 25
49. Garnishee—	
First time.....	10
Second time.....	10 to 50
Third time.....	50 to 100
50. Assignment of wages or security deposit... ..	25
51. Failing to report register when out of order.....	3
52. Not going ahead and trying to locate cut rope or broken trolley when same is cut or down.....	5
53. Failing to report delays.....	2
54. Acts detrimental to good service in opinion of superintendent	3 to 20
55. Incompetency	25 to 100
56. Bunching fares.....	5
57. Carrying people free.....	5 to 10

CONDUCTORS—MERITS.

Merits.

1. Warning persons in act of jumping on or off moving car to wait for car to stop.....	2
2. Securing names and addresses of witnesses who saw accident, other than those on accident report	2 to 5
3. Politeness and attention to passengers noticed by inspectors	3
4. Assistance rendered in case of accident such as to bring commendation from passenger.....	3
5. Adjustment of shades and windows to please passengers	1
6. Informing company of matters in the interest of good service, etc.....	3 to 10
7. Reports as to defects in equipment while operating car	1
8. Complete and perfect accident reports.....	2
9. Good judgment and work in handling lay-out or blockade	2 to 5
10. Special meritorious act calling for recognition from company	10 to 50
11. Turning in passes or badges ordered up by company	5

Report of Committee on Standard Rules for the Government of Employees

The committee on Standard Rules for the Government of Employees, comprising J. C. Brackenridge, E. C. Foster, T. E. Mitten and W. E. Harrington, submitted the following form of rules as its report:

RULES FOR THE GOVERNMENT AND INFORMATION OF CAR SERVICE DEPARTMENT EMPLOYEES OF THE RAILROAD COMPANY.

In effect 12:01 a. m., (Modeled on the standard code of the American Street Railway Association.)

GENERAL NOTICE

The rules herein set forth apply to and govern on all lines operated by the Railroad Company.

They shall take effect, and shall supersede all prior rules and instructions in whatsoever form issued which are inconsistent therewith.

In addition to these rules, special instructions will be issued from time to time, as may be found necessary, and such instructions posted on the various bulletin boards, whether in conflict with these rules or not, which are given by proper authority, shall be fully observed while in force. Bulletin boards are located at the following points and must be consulted daily by each employee of the transportation department:

-
.....
.....

Every employee whose duty is in any way prescribed by these rules must always have a copy of them at hand while on duty and must be familiar with every rule.

The head of each department will supply copies of these books to his subordinates, see that they are thoroughly understood, enforce obedience to the rules and report all violations to the proper officer.

All employees are required to be polite and considerate in their dealings or intercourse with the public; the reputation and prosperity of the company depend upon the promptness with which its business is conducted and the manner in which its patrons are treated by its employees.

All employees will be regarded in line for promotion, advancement depending upon the faithful discharge of duty and capacity for increased responsibility.

While for the effective management of a large system the observance of stringent rules and the maintenance of strict discipline are necessary, that enforcement must be impartial as between employees.

Employees may be charged with and required to pay for any damage done to the property of this company for which they are responsible, or for any loss or expense incurred by the company by reason of carelessness, neglect or disobedience of these rules.

Employees must refrain from the use of profane or indecent language and from improper or ungentlemanly conduct; politeness and courtesy must be observed in their dealings with one another as well as with every one with whom they come in contact in the performance of their duties.

In the absence of the proper officials to whom they may apply for advice, assistance or authority all employees are expected to use good judgment and discretion in dealing with matters not covered in these rules.

Chief Executive Officer.

GENERAL RULES

1. The safety of passengers is of the first importance; all work must be entirely subordinated to safety, first, and then to the regularity and punctuality of the service and the comfort and convenience of the passengers. Line repair men, emergency crews and track men will be required to subordinate their work in accordance with this rule to the requirements of the operation of the road.

2. Employees of any grade will be considered as accepting or continuing in employment subject to the dangers incident to this hazardous occupation.

(a) The fact that any person enters or remains in the service of the company will be considered as an assurance of his willingness to obey its rules. No one will be excused for a violation of them even though such rules are not included in those applicable to his department.

(b) Employees of this company will not be identified with or

engage in any other business except with the specific permission of the head of the department in which employed.

(c) Employees shall not make assignments of pay; such assignments will not be recognized or honored by the company.

3. If in doubt as to the meaning of any rule or special instructions, application must at once be made to the proper authority for an explanation; ignorance is no excuse for neglect or omission of duty.

4. If an employee become incapacitated from sickness or any other cause, the right to claim compensation will not be recognized; an allowance, if made, will be a gratuity justified by the circumstances of the case and the previous good conduct of the employee.

5. When an employee is discharged from the company's service, he will not be re-employed without the consent of the head of the department from which he was discharged.

6. Employees, when leaving the service of the company, must sign receipt for their final pay and return to the company all of its property with which they have been entrusted; in default of such return they will be charged in final settlement for all such articles short.

7. No employee will be allowed to absent himself from duty without special permission from the proper officer, nor will any employee be allowed to engage a substitute to perform his duties while he is absent.

8. The use of intoxicating drink on the road or about the premises of the company is strictly forbidden; no one will be employed or continued in employment who is known to be in the habit of using intoxicating liquor; smoking by an employee while on duty is forbidden.

9. In the event of any of the company's apparatus, breakage of the overhead line, charging a pole in the public street, unsafe settlement of building or structures, etc., whereby imminent danger of personal injury is caused, the first employee discovering the fact must arrange to protect the danger point, advising the proper authorities by the first available means of the character and location of the trouble; he must not relinquish such responsibility until properly relieved.

10. All medical examinations in behalf of this company of injured persons will be conducted by the regularly appointed medical examiner. Medical attendance to injured persons, whether employees or other persons, will not be supplied by this company except in unusual emergencies.

(a) Whenever, in emergency, any authorized official deems it advisable to call an outside physician such official must immediately notify the claim department, giving the name of the physician called and the reason therefor.

(b) In ordinary cases of personal injury, if proper attention to the injuries cannot be given by an employee using the "emergency cases" provided for rendering first aid to the injured an ambulance call is usually sufficient, accompanied by prompt notice to the claim department.

(c) In case of an accident wherein the question may be raised as to the condition of the car, either motor or trailer, such car must be "run in" at once to either the home or nearest depot, passengers thereon transferred and the car immediately and thoroughly inspected by the shop foreman who will promptly make special report thereon to the superintendent.

11. Information concerning the affairs of this company must not be given to any one except its authorized representatives, who, if unknown, shall in all cases show proper credentials before information is given.

12. Each employee of the transportation service must have a reliable watch, maximum variation allowed — seconds daily, which shall be kept in good and accurate condition and compared daily with the standard time of the road.

13. The collection or solicitation of money by employees of this company from other employees or any other persons in the nature of fees, gifts, etc., is forbidden.

(a) The solicitation of advertisements or contributions for entertainments or similar purposes by or on behalf of any employee or employees of this company is also prohibited.

14. Intoxicated, disorderly or otherwise obnoxious persons are not allowed on the cars operated by this company; conductors are authorized to refuse to carry any such person.

15. Large, bulky packages will not be carried in the passenger cars of this company—passengers will be accepted with only such bundle or packages as can conveniently be carried on the lap or satchel or valise of reasonable size. Freight will be carried only under the conditions of the tariff as bulletined.

16. Under no circumstances shall any article be hung on any brake handle of any car nor shall any obstruction be so placed or allowed to remain as to hinder access to and use of any brake.

17. Dogs or small animals will be transported in the passenger cars of this company only under the conditions bulletined.

INSPECTORS

18. Inspectors report to and receive instructions from their superintendent, daily, before they are due to go on duty.

19. They will be expected to set an example to the other uniformed employees in the neatness of their attire, the excellence of their department and their loyalty and devotion to the company's interests.

(a) Each inspector will be supplied with the following equipment:

- One pair rubber-handled pliers.
- One pair rubber gloves.
- Small roll adhesive insulating tape.
- Ten feet insulated wire.
- Supply of fuses—where used.
- Light switch plugs.

20. Inspectors must be thoroughly conversant with all rules and instructions issued, render all assistance in their power in carrying them out and report all violations to their superior officer.

(a) They will be responsible for all time tables, running times and time points; they will see that cars are operated on schedule time and properly spaced; when blockades occur the movement of cars will be under their direction.

(b) They will also satisfy themselves that all new men under instruction within their territory by regular motormen or conductors are properly instructed.

21. Inspectors will arrange for any extra service needed and withdraw unnecessary service on their lines in accordance with the requirements of the traffic, keeping their superintendent advised thereof; at all times their effort will be to improve the service.

(a) They will facilitate the movement of cars or trains carrying mail and give special attention to chartered cars.

22. Inspectors must be familiar with the different types of motors and controllers and be able to remedy slight defects occurring on the road.

23. Inspectors have authority to relieve conductors and motormen on duty while on the road on account of sickness or any other cause that would prevent them from properly doing their duty.

(a) They must remain on that part of the line or division assigned to them unless it is absolutely necessary to take a car in charge.

(b) They will see that line repair and track men and emergency crews while at work do not unnecessarily interfere with the regular operation of the road.

(c) When a fire occurs to interfere with the operation of the cars they must notify terminal depots of the lines affected, order out the emergency crews of that district and see that hose jumpers or other appliances are procured as promptly as possible.

(d) During the winter season they will see that heaters in cars are regulated in accordance with outstanding instructions; electric heaters must be turned off to one notch in case the power runs low; if necessary they will be cut out altogether.

24. Inspectors will note in detail the condition of the cars, whether properly cleaned, heated, ventilated, lighted and equipped, and that all signs are properly displayed.

(a) When a car becomes disabled so that it cannot be repaired on the road they will have the following car push it to the first turnout and transfer the passengers to the next car of the same line; after the delayed cars shall have passed, such car will be hauled to the nearest depot. When a car is being pushed a drawbar must be used to connect the two, movement must be slow, proper care exercised and the reversing switch set on the disabled car in the direction in which the car is moving.

(b) They will carefully check the load with the register on every car they board; in case of discrepancy they will take up immediately with the conductor, reporting the occurrence to the superintendent.

(c) When transferring passengers from one car to another (Sec. A) they will require the conductor to whom transferred to ring up the number in their presence and will then note on that conductor's day card the number transferred, with statement of cause, signing the memorandum.

(d) They will be familiar with the transfer points of all lines and be able intelligently to direct the traveling public.

25. Inspectors will promptly report all defects in track or overhead work to the proper officer at once and take necessary precautions to avoid accidents.

(a) In case of break in the overhead line or serious derailment of cars they will at once notify the nearest emergency station, stating cause and location of trouble, which must be promptly repaired; for this purpose the nearest telephone will be used—if charge therefore be made the superintendent will refund the amount.

(b) Should the armature, terminal wires, brush-holders, brush or any part of a motor break that motor must be cut out.

(c) They must see that the track is properly sanded when necessary, especially on grades, approaching junction points, terminals and crossings; they must see that switches and guard rails on curves are kept clean and properly lubricated.

(d) If any buildings are to be moved across the track or any excavation under or alongside the track, the fact must be reported to their superior officer at once.

(c) In the event of a snow storm they will report to their superintendent promptly for duty and assignment as required.

(f) They will render every assistance possible upon arrival at the scene of an accident, secure the names and addresses of as many witnesses as may be possible and make written report to the claim department, giving in detail all the information obtainable. Their aim will, however, be to so thoroughly train car crews that no accident occurring could have been avoided.

26. They must arrange to be notified in case of fire, blockade or severe storms, and must at once take charge of the operation of the line or lines until properly relieved.

(a) In case of snow storms they must arrange for snow plows and sweepers to be run and the lines kept open. They must arrange to sand and salt the rail when necessary, giving special attention to grades, junction points and railway crossings.

RECEIVERS OF THE COMPANY'S MONEY.

27. Receivers will report to and receive their instructions from the superintendent; they will comply with instructions from the accounting or treasury department.

DEPOT MASTERS

28. Depot masters report to and receive their instructions from the superintendent or the inspector.

29. The depot master will have charge of the depot, barn or terminal and the company's property at which they are located, and will see that all worn-out, broken or defective articles are returned for new; they will have charge of all persons employed thereat, unless otherwise instructed, and will see that every employee reads the bulletin board at least once daily.

30. They must attend to the proper arrangement of cars, see that they leave promptly on time and that all cars are properly cleaned, heated, lighted, inspected and equipped.

31. They must see that all employees reporting at that depot, terminal, line or division are prompt and efficient in the discharge of the various duties.

32. They must see that conductors and motormen are ready for duty at the time required and are provided with all the appliances necessary for the safety and proper management of the cars.

33. They must preserve order about the depots, preventing confusion, delays, lounging, drinking of liquor, gambling, etc., eating in cars is permitted only at those termini having no other facilities.

34. They must not allow conductors and motormen to go on duty unless they present a neat and cleanly appearance, are properly uniformed and are physically fit for duty.

35. They must require all articles found in the cars or on the company's property to be promptly delivered to the designated office or person, all such articles to be plainly marked with the name of the finder, time and date when found, together with place or car in which found; persons inquiring for lost property will be directed to the lost property clerk.

36. No transfer of cars or property shall be made from the depot without an order from proper authorities, and they must immediately notify their superintendent of the transfer desired or made.

37. They must see that all the blank forms and reports used in the transaction of the company's business are properly filled out and forwarded—especially accident reports, which must be given utmost despatch.

38. They must see that conductors and all others handling the company's money turn in the money, transfer and other tickets, etc., to the designated persons promptly in accordance with the requirements of the treasurer—they must promptly call to account any one failing to do so.

39. In case of snow storms they must report promptly at their depots to assist in getting out plows, sweepers, sand and salt cars, etc., and assisting in so far as they may in keeping the road open.

GENERAL RULES FOR CONDUCTORS AND MOTORMEN

40. Conductors and motormen report to and receive their instructions from the superintendent or his authorized representative; conductors will also be governed by the instructions of the accounting departments which may be issued relative to the handling of transfers or receipts.

(a) The bulletin board must be consulted before starting and at the end of each day's work.

41. The conductor has charge of the car; the motorman is under his direction and will obey his orders (so far as reasonable). The motorman is directly responsible for the handling and condition of the equipment.

(a) Under no circumstances shall both motorman and conductor be away from the car at the same time, unless properly relieved; in the absence of the conductor the motorman is held responsible for the car and its management and must notify the conductor the number of passengers who have entered in his absence.

42. Conductors and motormen must be neat and clean in appearance and wear the uniform and badge prescribed by the company—the badge must be kept in good condition and worn on the front of the cap, the uniform must be clean and in good repair.

(a) A deposit will be required for the small property of the company entrusted to conductors and motormen; this deposit will be returned at termination of service, when such property must be returned; in default of such return deduction from the deposit will be made in accordance with the bulletined penalties.

(b) Under no circumstances shall employees exchange badges with each other; the official badge must never be worn by another than the person to whom issued.

43. Before leaving the car house or starting from a terminal or after relieving a crew, motorman and conductor will see that all signs are properly adjusted and displayed—each will be held responsible for his end of the car.

(a) While on the road all safety devices must be in place and the different articles of car equipment fully operative; for this the motorman and conductor will be held severally responsible.

44. It is the duty of both motorman and conductor to be on the lookout for passengers; motormen must never run by or pass passengers unless instructed so to do by the conductor or an inspector, when they must either point to the rear or call out "Take the next car."

(a) When approaching passengers on a street on which several lines of cars are operated or on which the cars run to different destinations conductors and motormen must announce to intending passengers the route and destination of their cars.

(b) Should a motorman at any time attempt to diminish the receipts of his car by running ahead of time or too near his leader or by not promptly stopping car for passengers, or shall directly or indirectly harass a conductor or be guilty of any misconduct, the conductor must report the fact at once to the inspector or the superintendent.

45. When any fire department vehicle, ambulance or this company's emergency wagon is running on the street, cars must be promptly stopped until such vehicle has passed, avoiding as far as possible stopping on a cross street or alongside standing cars or wagons.

(a) Motormen will receive and carry on their platforms, in lieu of a baggage compartment on the car or train, all mail sacks with which they may be entrusted, either United States or company mail. They will stow securely and handle carefully all such mail matter.

46. Conductors and motormen must conform to time table in running their cars, be particular in making time points as laid out on the time cards and avoid loitering on the line.

(a) When unavoidably delayed on the line the time lost is not to be made up by fast running as soon as the fact is noted, but by running slightly faster over the entire remaining length of the trip, and then only when this can be done with safety.

(b) When running through dark spots on the road or through fog banks or at any other time when the clear view of the tracks is limited, the motorman shall, except on private right of way, check the speed of his car and run at only such rate as will enable him to stop within the limit of his vision. Conductors for permitting a violation of this rule will be held equally responsible with the motorman.

(c) Crews of all special, express, chartered, mail, supply or other cars while on the road are subject to and must be familiar with the rules, regulations and requirements of the lines on which they are to run; all cars running on the road are subject to the jurisdiction of the superintendent.

(d) When, in case of blockade, a car is run around such obstruction and on tracks not usually used by cars of that line, or in handling mail, express, chartered, official or special cars, the crew must see that all switches used are left in the same condition as when found. When under these circumstances a motorman has occasion to turn a switch he shall, after passing over it, stop, give the conductor the proper bell signal notice and the latter will then reverse the switch, making sure it is fully and properly thrown before boarding his car and giving the signal to start.

(e) In case of blockade it may be that several cars of one line will be bunched; upon the block being lifted such cars will spread again and not crowd together to destination. For the observance of this rule conductors will be held equally responsible with motormen.

(f) When either on or off their time a crew will not switch a

car back or turn short of its signed destination without specific authority from an inspector or authorized representative of the superintendent, excepting in the single case of an accident occurring and the car being disabled or required, under these rules for inspection.

47. Conductors and motormen on duty are not allowed to sit down while the car is in motion except seats are provided for that particular purpose by the company, and then only on specified sections of the line as bulletined.

(a) Conductors and motormen on duty must not shout, signal or telegraph to motormen or conductors on passing cars or on the street nor carry on any unnecessary conversation with each other or any other person.

(b) The reading of newspapers, books or any other matter that pertains to the immediate conduct of the company's business, while on duty, is prohibited.

48. No one but the duly authorized officers of the company will be allowed to stand on the front platforms of passenger cars or ride on any other cars run over these lines. Exception can be made only in favor of policemen on duty and then only in emergency cases.

49. When passengers attempt to get off the car while it is in motion the motorman or conductor must call out to them, "Wait till the car stops." When passengers are alighting and a car is approaching in an opposite direction notify them to look out for the car on the other track.

50. Employees while riding free must not occupy seats to the exclusion of paying passengers or hold any conversation with motorman or conductor of the car. This rule applies generally to all free passengers.

51. When cars are run in the house in the day or night the conductor will see that the lights are turned off and the seats in closed cars turned up; the motorman must see that the controller is on the "off" position, the brakes are set, the power circuit is broken from the car (by removing the trolley from the wire, securing the shoe up from the rail, throwing off the main motor or overhead switch) and the power handles (also air when used) are deposited with the proper custodian or in the proper place, together with switch iron and all other tools or implements as required by bulletin.

52. On double track when a car or train is standing still, receiving or discharging passengers, any car or train approaching in the opposite direction must make a full stop directly opposite the front of the standing car or train; on single track when a car or train is approaching a car or train standing on a siding the motorman of the oncoming car or train will have as car or train under absolute control and run with extreme caution.

53. No car or train shall under any circumstances be backed up more than — feet without the pole (in overhead construction) being changed, and then only with the conductor on the last or rear platform to give the back-up signal when the way is clear and to protect the rear against accident.

54. The motorman must bring the car to a full stop at steam railroad crossings, not nearer than one hundred (100) feet to the nearest track. He will not proceed until the conductor has gone ahead to the track to be crossed, looked both way and from that point given his signal by hand, flag or lantern to start. The motorman will also observe the utmost watchfulness for approaching trains and should, in his judgment, danger be imminent from any source he will refuse to start until the crossing is clear and free from all danger. When the conductor has gone ahead of car the motorman before starting will look back and see that no one is about to get on or off the car. This rule can only be abrogated by bulletin notice covering such crossings as are protected by gatemen or flagmen or tower-switchmen at points where the crossings are protected by interlocking signals and derail switches; in such cases the conductor will remain on the car or train, holding the trolley rope over the crossing.

55. The motorman must bring the car to a full stop at all trolley or electric road crossings and junction points, and must not proceed until he receives the proper signal from the conductor. (This rule can be abrogated only as the preceding and only at similar points.) The conductor must not give the signal to go ahead until a full stop has been made. Conductors and motormen will be held jointly responsible for a violation of this rule.

56. If for any cause the motorman has stopped the car without a signal and a passenger should want to get on or off, the conductor will give the signal to stop the same as if the car were in motion. The motorman must wait for the conductor's signal before starting the car, whether he has received the signal to stop or not.

57. Cars must not pass on curves unless the motormen know there is ample clearance.

(a) Speed must be reduced on all curves and switches; on pub-

lic thoroughfares the speed at such points must not exceed — miles per hour.

(b) The car must not be stopped on a curve except to avoid accident.

(c) When running on public streets the conductor on any trolley line will signal the motorman to go ahead if he has the trolley rope in his hand when approaching a curve; should the motorman fail to receive the signal he will signal the conductor, and, failing response, should stop before reaching the curve. The conductor must hold the trolley rope around curves and under special overhead work.

58. Time tables of the different lines will be posted at — for the government and information of employees. They will show the assignment of crews to the different runs and the starting time from the terminal of the several trips of each run.

(a) Employees will receive notice of temporary changes (or patches) of time tables by the posting at — of a sign reading "new table" or "table changed." They will be expected to keep themselves posted concerning current time tables and all changes thereof.

(b) New time tables will be posted not later than — o'clock p. m. of the day previous to their becoming effective. Temporary changes (or patches) of time tables on account of weather or other variable conditions are likely to occur at any time.

59. There shall be a seniority list at each depot which shall show the names of all conductors and motormen in consecutive order according to the date of their assignment to that depot, excepting that for purposes of discipline a man shall have lost any numbers in his chronological standing. When vacancies occur conductors and motormen, each on their own list, will be advanced in seniority in accordance with their then standing on the list.

(a) When changes are necessary in the assignment of crews and runs on time tables (old or new) they will be made according to the seniority listing of the men, to take effect as far as possible on Mondays only.

60. Compensation will be a certain rate per hour or per trip, according to the line where employed; the rate will be the same for conductors and motormen.

(a) In assigning men for duty on regular runs or week-day time tables it shall be done in accordance with the seniority list and the runs given away in the following manner:

1—Full pay straight runs (early and late and night cars in sequence).

2—Full pay swing runs (early and late in sequence).

3—Straight trippers (early and late in sequence according to pay).

4—Swing trippers (early and late in sequence according to pay).

61. All conductors and motormen shall be considered as either regular or extra men; regular men are those that have regular runs on the week-day tables; extra men are those that are not assigned to regular runs on the week-day tables. When first appointed conductors and motormen will serve as extras, working up gradually to regular runs.

62. There shall be at each depot a daily working list which shall show the names of all extra men in the order in which they stand for work on the following days.

(a) The daily working list shall be a revolving list; that is, when first for work is assigned for work his name (provided his work for that day shall have amounted in value to at least \$—) shall be dropped to the bottom of the working list and work shall not fall to him again until every man whose name followed his on the working list of that day shall have been excused, jumped, suspended, discharged or put to work.

63. There shall be a daily excused list at each depot which shall show the name of all men, regular and extra, who have been excused, suspended or discharged, and the names of those who will fill their places for the day.

(a) When an extra man is excused for but one day his name shall be dropped to the bottom of the working list for that day, irrespective of whether work would have fallen to him or not.

(b) No conductor or motorman will be excused from duty until he sees his name posted on the excused list, except in case of sickness, when his written statement of the fact must be sent to the agent to whom he reports at the depot by at least such time as he would personally report for duty were he going to work; no telegraph or telephone message will be accepted.

(c) It shall be understood that conductors and motormen excused on account of sickness and so marked on the excused sheet are off for an indefinite time, which shall be not less than two days nor more than thirty days. At the end of thirty days, unless the sick leave shall have been extended upon proper application, the absentee may be dropped for non-attendance.

(d) When an extra or regular man who has been marked off sick desires to return to work he must report to the designated agent before — o'clock p. m. of the day previous to the one on

which he wishes to return to work so he may be marked up for work the next day.

(e) Any conductor or motorman absenting himself for ten days or more without having been excused, and without being heard from, shall, in the discretion of the superintendent, have his name dropped from the seniority list and be discharged for non-attendance. Should he return within ten days he shall give satisfactory explanation of his absence to the superintendent before resuming work.

64. The working and excused lists shall be posted at each depot daily not later than — o'clock p. m.

(a) The names of conductors and motormen not shown on the time tables as in charge of regular runs will be shown on the excused list or the working list.

(b) Unless otherwise marked on the excused list or the working list, extras must be in attendance at the depot at least — minutes before starting time of the first car out in the morning and be prompt in attendance on all changes during the day thereafter until assigned for work.

65. Regular men shall be assigned, in so far as possible, on Sunday, holiday or special day time tables according to the seniority list; extra men shall be assigned on such tables after the last regular man desiring it has been assigned, according to their standing on the daily working list—that is, the extra standing first for work on Sunday morning, for instance, shall be given the first run following the regular men, and so on. An exception may be made to this when necessary to insure to certain men their proper amount of rest between the time of their week-day and Sunday assignment.

66. Conductors and motormen having regular runs must report verbally to the designated agent not less than — minutes nor more than — minutes before their starting time from the depot. If he is not at his post they will await his return and then report.

(a) When a crew is to relieve another crew at a distant point from the depot the conductor and motorman must report to the above designated agent not less than — minutes nor more than — minutes plus the running time before the starting time from the point of relief.

(b) No compensation will be allowed for reporting as required in the above rules.

(c) The above rules apply as well to the latter part of swing runs.

(d) Extras when assigned temporarily for regular runs are subject to the above rules.

67. A conductor or motorman shall be considered to have been "jumped" when he has been superseded for work by another for the following reasons:

1—Failure to report to the designated agent in accordance with the requirements of rules 63 to 66 inclusive.

2—Failure of conductor or motorman to be on his car at the starting time, even though he had reported to the proper agent at the proper time. This is applicable to all trips, unless the conductor has been excused by the same agent or authority.

3—Failure of extra men to report in accordance with the rules governing regular men when they are assigned for regular runs.

4—Failure of extra men to respond to call for work during changes.

5—Failure to respond to call for work or to report at the expiration of time for which they have been excused or at time marked on the working list.

(a) When necessary to assign conductors and motormen from one depot for temporary service at another depot, their names shall be shown on the working or excused list at their own depot with the time they are expected to report at the depot where they are to work; and failure to so report in accordance with these rules will result in being jumped.

(b) In case of delay from blockade, especially at hours of the day when headway is long, should it be clearly proven that a conductor or motorman was prevented by such blockade from reaching his depot previous to his reporting time, and providing there was no other way for him to reach the depot, the jump shall not be counted.

(c) In the matter of discipline for being jumped, regular and extra men shall be upon the same footing and so far as possible they shall be treated alike. An accurate record of each and every jump will be kept.

(d) Penalties for jumps shall be as follows:

68. Bell signal rules:

Conductors to motormen—

CONDUCTORS MUST KEEP THEIR HANDS OFF THE BELL SIGNAL CORD OR ROPE EXCEPT WHEN IN THE IMMEDIATE ACT OF TRANSMITTING A SIGNAL.

One signal, car standing at transfer point, motorman will then signal the number of passengers boarding the car by the front platform.

Two signals, car standing, go ahead—all clear.
 Three signals, car standing, back the car slowly—all clear.

One signal, car in motion, stop at the next street, station or other designated point.

Two signals, car in motion, conductor has hold of trolley rope and is on the rear platform ready to take the curve; or, on answer to the motorman's signal of a possible obstruction standing or moving alongside the track near the car, that the car can pass slowly.

Three signals, car in motion, danger—stop immediately, emergency.

Four signals, car in motion, passengers to be transferred to the intersecting line—motorman will so signal.

Conductors will be careful to give each signal clearly and distinctly.

Motormen to conductors—

Motorman must not assume any signal is INTENDED—they must require a clear and distinct stroke of the bell for each.

One signal, car standing, one passenger has boarded car by front platform this is to be repeated after the conductor's signal for the information as often as necessary to cover the case.

Two signals, car standing, conductor will reverse switch over which car has just passed.

Three signals, car standing, car must be backed. Is all clear?

Four signals, car standing, conductor is needed forward.

One signal, car in motion, approaching a curve, conductor will hold rope; or, on approaching a possible obstruction standing or moving alongside the track near the car, on receiving this conductor will promptly respond after taking proper action, as above.

Two signals, car in motion, conductor will immediately set the rear brake and stop the car.

A succession of quick signals is notice to conductor that trolley has left the wire.

(a) Air, gong or whistle signals—

One signal,

Two signals, to be sounded on approaching a cross street or any danger or to give notice of approach.

Three signals, another car is following on the same time and rights, a headway behind. **ON SINGLE TRACK LINES THIS SIGNAL MUST BE REPEATED IN ACKNOWLEDGMENT BY THE MOTORMAN OF THE CAR OR TRAIN PASSED.**

Four signals, approaching an intersecting line is notice to the crew of the car on that line that passengers are to be transferred to them.

(b) Classification signals—

These are conveyed to all concerned by a lamp or flag on the forward end of the car, carried in the bracket provided for the purpose. Their significance is as follows: **WHITE** light or flag signifies the car or train is an extra and running on no scheduled time.

GREEN light signifies another car or train is following a space distance behind and running on the same time and rights. Motorman on any car carrying this signal must notify the motorman on each car passed (on single track lines) by the signal (Rule 68a), as provided, and the motorman so notified will repeat the signal in acknowledgment; in case a reply is not promptly made the motorman giving the signal will stop and verbally notify the other, reporting the occurrence to the superintendent on reaching the end of the run.

(c) Color signal rules—

RED invariably signifies danger, and a red flag by day or a red light at night is the order to stop. Under **NO** circumstances will such a signal be passed without a full stop having been made within not less than ten nor more than one hundred feet **BEFORE** the signal is reached, and the conductor must make certain that any further order or instructions intended are received and thoroughly understood before he gives the signal to start.

GREEN signifies the necessity for caution, and a green flag by day or a green light at night is the order to proceed with the car or train under absolute control.

WHITE, when used for signaling, indicates safety; but the swinging of a white lantern at night over or alongside the track is a signal to stop. A white lantern is also used at night hung over the gates protecting a railroad crossing to indicate the position of the gate.

(d) Fixed signal rules—

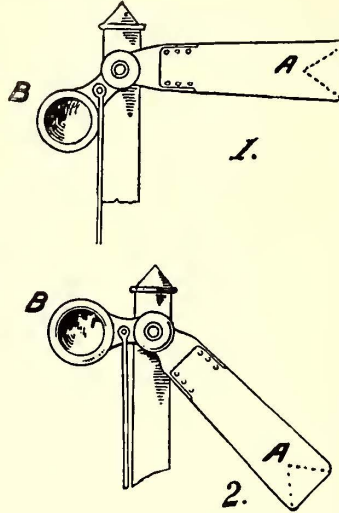
SIGN signals, such as "stop," "slow" or "breaker" signs, are placed at points requiring special protection; special instructions will be issued covering their position and use.

SEMAPHORE signals, as shown in Figs. 1 and 2, are of two classes, "HOME" and "DISTANT."

The home signal is supplied with a red lens, *B*, and the blade, *A*, if the signal is painted red and is square-ended, as shown by the full lines in the illustration. When in the position shown in Fig. 1 this signal will show a red light at night and the signal in this position is an absolute order to stop (see Section C above). Such

stop must be made not less than 10 ft. nor more than 100 ft. distant from and **BEFORE** reaching the signal, and the car or train must not proceed, when so stopped, until the signal is "cleared." The clear or safety position of the home signal is shown in Fig. 2 by the blade being in an inclined position which will show white light at night, and when in this position gives permission to the car or train to proceed.

The distant signal is supplied with a green lens, *B*, and blade, *A*, is painted green and is "fish-tailed," as shown by the dotted lines on Figs. 1 and 2. When in position shown on Fig. 1 this signal will show a green light at night and the signal in this position is an order to proceed only with the car or train under perfect control, this order to remain in force until the next signal



FIGS. 1 AND 2—SEMAPHORE SIGNALS

is reached or the point or obstruction to be protected by slow speed has been passed. The clear or safety position of the distant signal is shown in Fig. 2 by the blade being in an inclined position, which will show a white light at night, and when in this position gives permission to the car or train to proceed without slackening speed.

When two or more semaphore signals of the same class are located on the same post the top blade (and light) governs the right-hand track or route; the next lower signal governs the next track or route to the left of the first, etc.

A SIGNAL IMPERFECTLY DISPLAYED OR THE ABSENCE OF A SIGNAL AT A PLACE WHERE A SIGNAL IS USUALLY DISPLAYED must be regarded as a danger signal and the fact reported at the first opportunity to an inspector or the superintendent.

SPECIAL INSTRUCTIONS FOR CONDUCTORS

69. Conductors must be civil and attentive to all passengers, especially ladies, children and elderly persons. They will endeavor to provide seats for all, when necessary requesting passengers to sit closer together.

(a) Conductors must announce distinctly the names of streets and stations, in each case calling the following street or station immediately on leaving or passing any street or station. They will also announce the approach to any point of considerable travel and at transfer stations or points will announce the lines to which transfer is made and their destinations.

(b) Conductors must keep the rear platform, doorway and brake free from obstruction as far as possible and not allow passengers to stand in front of the controller box. When the platform becomes crowded they will request passengers standing there to step inside the car.

(c) On closed cars when passengers crowd inside the rear door the conductor must request them to move forward and make room for others. Under no circumstances will conductors allow passengers to ride on the bumpers, roof or side step (especially when crossing a bridge) except _____

(d) Conductors must see that passengers do not place their feet upon the seats.

(e) Conductors must give particular attention to the ventilation of closed cars. No set rules can be issued to cover; good judgment must be employed to secure the comfort of passengers.

(f) Conductors will be governed in the handling of heaters in the cars by the instructions as bulletined.

(g) Smoking will be permitted _____

70. Conductors must never under **ANY** circumstances operate the controlling mechanism of the car or train; should the controller on the head end of the car or motor car prove defective and inoperative the conductor will take position at the head end of the car or train and transmit signals to the motorman, who will then

run the car or motor car from the rear end of the car or from the rear end of the forward motor car of the train. In this event only half speed shall be used in such movement and the conductor have protected the rear end of his car or train from any following car or train as per detailed bulletin instructions. While in this position the motorman will look out for any passengers desiring to leave the car. Should the motorman become incapacitated the conductor will at once stop the car or train and protect it.

(a) On double-track lines the in-track gates front and rear must be kept closed and the in-track side steps securely fastened up. Should such appliances become out of order on the road the conductor will be particular to guard against accidents occurring therefrom and will turn the car in upon reaching the end of trip or depot.

(b) When possible to avoid it conductors must not give the go-ahead signal from any point other than the rear platform of the car or forward car of the train, and then only after being careful to see that all is safe.

(c) The conductor shall never leave the car for any purpose while on the road without first notifying the motorman, who will then be in responsible charge of car and passengers.

(d) In case of thunder storms the conductor will turn on the light circuit and keep lights burning until all signs of lightning are past; in case any considerable stop is made the conductor will remove the trolley wheel from the wire until ready to proceed.

(e) When another equipped car is being towed its pole must be drawn down and tied to the dash rail.

(f) When two cars are coupled for running or a trailer is used the signal for starting must be given by the conductor on the rear car first, after each stop, and promptly repeated by the conductor on the forward car, each conductor being careful to know that passengers are safely on or off his car. Should the two cars be under the charge of a single conductor he must not give the starting signal unless standing on one of the platforms between the cars, and then only after satisfying himself that all is safe.

(g) Except in case of absolute necessity to avert accident, the conductor must never remove the trolley from the wire until after the power has been shut off and the car stopped.

(h) When not other wise engaged the conductor must be on the rear platform of the car, or if a trailer is used on the front platform of the trailer on the lookout for passengers who wish to board or leave the car; while on the stand the conductor must be near the rear platform of the car or train to solicit passengers and give information; when on a grade the conductor must be on the rear platform of the car or the front platform of the trailer used, ready to apply the brake if necessary; when passing any transfer point the conductor as well as the motorman must be on the lookout for the transfer signal from an approaching car on the other line, in order that passengers may make the transfer without undue delay.

(i) The conductor will see that the light circuit of the car is in good order before leaving the depot and will turn the lights on and off as needed; in case other than electric lights are used he will be sure to see that they are always ready for use and light them when necessary, but will not fill kerosene lamps. He must, with the motorman, make sure the headlight is burning brightly on the head end of the car after nightfall.

(j) Where tail lamps are used the conductor must see that they are in proper condition for use and at sunset he will see that they are lighted and kept burning on their proper position of the car.

71. Conductors must not take charge of or become responsible for any article not paying transportation charges as per freight tariff posted, except only articles used in the company's service and placed on their car by an authorized employee of the company.

(a) Conductors must promptly turn in to the authorized receivers of such property all articles found in their car or on the company's property, noting on a tag attached to each article their name, trip, date, time and place of finding.

(b) Conductors will prohibit all begging, peddling or vending on their car or train except by the agents of the company authorized by this company to so sell; in no case, however, should any attempt be made to remove such vendor, etc., from the car while it is in motion, and no threat or intimidation should be used to such persons.

72. A day card or train card will be furnished the conductor upon reporting for work by the agent to whom he reports, such card calling for information which must be filled out in detail and in accordance with bulletined instructions for each half-trip. Conductors will make up this card at the end of every half-trip and will be held strictly responsible for the accuracy of each and every statement made thereon. On the back of this card conductor will note any occurrence on each trip of which memorandum should be made; such card shall be turned in with the transfers and money collected to the receiver of moneys at the end of each day's work or at the end of any number of consecutive trips.

(a) Conductors will receive transfer pads and a punch from

_____ before starting work each day or swing and will return the unused transfers with the punch to _____ after each swing or day's work; when making such return they will be given a properly numbered check which will serve as a receipt for the punch.

(b) Each conductor must provide himself with \$_____ in change before going on duty.

(c) Before taking car out of house or from terminal when beginning work, conductor must see and know that the register is securely bolted and locked to the register block; for the condition of the register the conductor will be held strictly responsible.

(d) The conductor will see that the register is set in the proper direction in which he is about to move and will turn the direction only as instructed by bulletin notice.

(e) The conductor must promptly collect and register the fare of each passenger on the car, if possible within a block after boarding it, except at such points where an agent of the company shall have made the collection—as shown in bulletined orders—and excepting in such cases as scheduled herewith where the passengers are entitled to free transportation:

(f) Conductors must not collect fares when approaching railroad crossings, transfer points, curves or switches.

(g) After making collection of fares conductor shall count the number of passengers on the car or cars and know that, excepting for the free, collection has been made from each and registration properly made. Fares must be registered singly as collected and not in bunches. When compelled to make change he will face the rear of the car, or, if on a trailer and working the train alone, face forward.

(h) If, after his fare has been collected and registered, the passenger discovers he is on the wrong car, the conductor will exercise his judgment as to the return of the fare; if refunded, the conductor must not fail to ring up each other fare collected thereafter, but will make a note of the occurrence on the back of his day card and deduct the amount from the amount thereof called for to be turned in to the company's receiver. Also, when a conductor registers more fares than he collects such mistake can be corrected only by reporting it to the office.

(i) When passengers are transferred from one car to another at any place other than a regular transfer point the number of persons transferred, cause of such transfer and number of each car will be noted on the back of each day card and signed by each conductor engaged in the transaction; such persons will be registered on the car they board, but no further fares will be collected from them. If an inspector be present his signature must be secured on each day card as authorizing the transfer. The conductor must remain in charge of the disabled car until relieved.

(j) Should a conductor for any reason change his car after commencing his day's work he must not only note the number of the new car on the face of his day card opposite the half-trip on which the change occurred, but as well note on the back of the card the reason for the change and any damaged or filthy condition in which the new car or its equipment may be found.

73. When any conductor has any personal knowledge of an accident occurring in which any property may be damaged or any person or animal is likely to or may have been injured he will make prompt report of all the facts in the case to his depot immediately upon arrival at that point, and as soon as possible fill out in exact and full detail a blank form provided for his use in such cases headed "Conductor's Accident Report." If the conductor was a passenger on a car involved in the accident or a nearby eyewitness of the occurrence or reaches the spot in time to do so, he will render every possible assistance to the conductor of the car and secure the names of as many witnesses not on the car as he can. If in charge of a car involved in any disturbance or accident he will secure the names and addresses of all possible witnesses, whether they actually saw the occurrence or not; in any event securing the name and address of every lady on the car. It is much preferred to have a witness write his own name and address if he can be induced to do so. Soon as the accident report is filled out it must be delivered, with the name slips of witnesses, as promptly as possible to the authorized representative of the superintendent.

(a) In case of serious accident the conductor or, if he so delegate, the motorman must immediately report the case by nearest telephone or telegraph to the nearest operating depot, despatcher or division point, stating briefly the nature and probable extent of the trouble, so that adequate assistance can be sent.

(b) The conductor must never eject a person from the car for disorderly conduct or non-payment of fare unless they get the

names and addresses of witnesses. They will use no more force than is necessary in making the ejection, first bringing the car to a full stop at a traveled road, street or highway, a regular stopping point for passengers or a station.

(c) For each light of glass maliciously or wantonly broken by a passenger or bystander the conductor will collect from the offender the sum of \$— and turn in such collection with his fare returns for the day or swing; a note must be made on the back of the day card to cover the occurrence and refer to the remittance.

SPECIAL RULES FOR MOTORMEN

74. While the car or train is in motion responsibility for safe running and its safe handling lies with the motorman; he must never attempt at such time to do anything but handle the controlling mechanism and watch the road ahead, being prompt to give warning of his approach to danger points or on the appearance of danger.

(a) Under NO circumstances will any motorman permit another motorman or any person, other than a student placed by proper authority with him for instruction, to run the car or train of which he is in charge while he is on duty.

(b) Upon leaving the operating position, box or platform for any reason whatsoever when the train or car is standing, the motorman must remove and carry with him the controller and reverse handles (together with the power brake handle where power brake is used), and must in all cases have shut off the current through the controller, broken the circuit through the car (by throwing the overhead circuit breaker, main motor or cut-out switch) and fully set the brake.

(c) Under no circumstances and for no cause whatsoever shall the motorman leave the operating position, box or platform of any motor while the car or train is in motion, except in the single case that an accident endangering himself is imminent and he shall have done all he can to stop and reduce to a minimum the impending damage to person or property.

75. Motormen are expected to become familiar with the electrical and mechanical construction of the cars in order to be able to meet emergencies arising on the road; they will be held directly responsible for the condition of that equipment.

(a) They must make it their special business to carefully examine all parts of the car before leaving the barn, depot or terminal or taking charge of the car to see that all safety devices, signal gong, foot gong, air whistle, fender, controller reverse, sand boxes, etc., are in place and in good and fully operative condition, headlight glass and reflector clean and after sunset the light on the forward end of the car or train is burning properly and brightly.

(b) They will see that all tools required to be carried are on the car or motor; where fuses are used they will be sure to have a sufficient supply of the proper design and amperage and shall never use heavy wire or any substitute therefor for a fuse. They must have at all times an ample supply of sand to cover any possible demand.

(c) Motormen must apply to the shop foreman in charge of cars for any specific information regarding operation which they do not thoroughly understand or regarding any part or parts of machinery or electrical apparatus or wiring which is liable to get out of order on the road or during service.

(d) They will never attempt to do any work on motors unless the circuit through the car has previously been broken by throwing the main motor switch, the overhead circuit breaker or withdrawing the trolley from the wire; they will never do such work with any loose metal article in an upper pocket, which is liable to fall out and cause ultimate if not immediate damage.

(e) They will examine motor and journal bearings as often as may be possible, and if too warm the fact must be promptly reported; the armature, field coils, diverter coils and commutator should never get so hot that it is impossible to hold the hand on them. Motormen must never try to run a motor that is seriously out of order, but shall promptly cut out the motor at fault.

76. When current is cut off between the power house and the motors the motorman shall throw the controller handle to the "Off" position and come to a stop to ascertain the cause; if in the day time he will turn on the light circuit to determine if the power is on the line. If the rail be dead or dirty and power is on the line, connection must be established with the nearest live rail and the wheel by the conductor, contact being broken with the wheel first to avoid a shock. Both controllers should be tried; if one works the trouble is in the other; if neither works, with power on the line, a fuse has probably been blown. In that event the conductor will remove the trolley from the wire or the motorman will break the circuit through the car before anything else is done, and then if on examination a new fuse is found to be necessary the motorman will remove and retain to be turned in the stubs or ends of the former fuse and, after placing the new fuse in position, set up the

binding screws, holding it tightly in place, being very careful to secure a good contact at each end. Should the new fuse be blown the motor at fault, as designated by the position of the controller handle at which the blowing occurred, should be cut out. If both motors prove disabled so as to prevent the self-movement of the car the circuit must be broken through the car and assistance called for; in the case of a multiple-unit train, if the other motors in the train can propel it, the train will be moved in accordance with Rule 70.

(a) In case the power is cut off and the brake is found to be defective, the motorman before signaling the conductor to set the rear brake will set the reverse handle opposite from the direction in which the car is moving, throw the controller handle to the last position and allow it to so remain until the effect takes place, then, being careful to throw the handle to the "Off" position. Should this for any reason prove inoperative the motorman will promptly signal the conductor to apply the rear brake.

(b) The motorman must not reverse the power under usual running conditions; reversing is a severe strain upon the apparatus, especially when the car is under high speed. When necessary to reverse, and the car has been brought to a full stop, the motorman will return the handle to the "Off" position and apply the brake fully.

(c) When tracks are covered with water or slush motormen will run slowly and carefully, with power off where possible in order that the splash of the water may not cause a short-circuit in the motors or wiring of the car. They must never try to run through water so high as to touch the bottom of the motor-shell.

77. Before completing the circuit through the car on starting to work the motorman will see that the controller handle or cylinder indicator points to the "Off" position; main motor switch or overhead circuit breaker will then be closed and the brakes released before the power is applied to start the car. In starting at any time power should be applied gradually and fed with only proper speed in order that no damage may be done the equipment or injury caused to passengers by the sudden jolt. The controller handle must never be thrown on the last point if the car does not start on the preceding points.

(a) Motormen must conform to time table requirements as closely as possible, regulating speed in accordance therewith and with the limits of the time point cards. If a motorman should be delayed he will not undertake to recover the time lost in the minimum distance, but, IF IT BE ENTIRELY SAFE TO DO SO, he will run slightly faster during the entire run, aiming to reach destination or end of trip as nearly on time as may be possible.

(b) Motormen shall never run ahead of time unless directed to do so by an authorized officer of the company.

(c) On descending grades the motorman shall allow the car to coast as much as possible with power thrown off, always being careful to keep the car under control and never allowing it to run down hill faster than the motors will take it up the same hill. Coasting being good and economical practice, will be done wherever possible.

(d) In stopping, brakes will be applied gradually to reduce the deleterious effect of a sudden retardation of motion in all service stops; just before the car or train comes to rest the brakes will be released slightly or partially kicked off so as to obviate the recoil that would otherwise ensue.

(e) Brakes must never be applied while the current is being used, nor current applied while the brakes are on; serious consequences are liable to follow disregard of this rule.

(f) When, on applying brakes, the wheels are felt to be slipping, the motorman will release the brakes partially, start sand to running and again set up the brakes.

78. Motormen will sound the gong with a double signal when approaching a station, standing car (see rule 68a) or at any other times when necessary to call attention to the movement of the car; where air whistle is used this signal will be given thereon.

(a) Motormen will use particular care when approaching or passing school houses or any other places where children are wont to congregate, having speed materially slackened and cars under control.

(b) Where streets are dug up or excavations are made under, alongside or near the tracks, motormen will observe particular care in running, taking no risks. In passing men at work in the streets or along the tracks particular care will be used.

79. Motormen will observe the minimum spacing distances as bulletined allowed between any two cars moving in the same direction on the same track.

(a) On limited curves (where two cars cannot pass) when two cars arrive at the same time the car on the outer track has the right of way.

(b) On double-track lines a car will be run slowly approaching and passing a car in slow motion in the opposite direction.

(c) Motormen must throw off power immediately before

striking a curve, or before passing over or under any circuit breaker, special work, insulated joint, slip joint, frog or any similar mechanical contrivance.

(d) When any vehicle is seen in the track ahead or so close thereto that a car may not pass it the motorman shall slacken speed and not approach nearer than — ft. until he has received the conductor's signal that the car will pass.

(e) Motormen will not run over any sticks, stones or other small obstructions on the rail, but will see that the track is at all times clear.

80. Motormen must never run against a facing switch point when meeting a car without first coming to a full stop and then proceeding only with the car under perfect control. This rule refers particularly to all crossovers and curves having switch points facing opposite to that in which the car is going.

(a) Motormen must not pass over any switch until they KNOW that the tongue is properly and fully turned, and then only at reduced speed. Particular care must be taken when switches are covered with snow or water.

81. Every motorman, after having run any car, whether for a day or but a single trip, will, upon being relieved and before leaving the depot, report the condition of the car or cars he has handled on the shop sheets provided; these sheets will show the run number, and the motorman will enter thereon opposite his run number (or below the regular runs if he has been on an extra car) the number of the car he had on that run or any part thereof on that day, any defect of the car or its equipment, and sign his name thereto. No excuse will be accepted for failure to so report.

(a) When any motorman has any personal knowledge of an accident occurring in which any property may be damaged or any person or animal is likely to or may have been injured he will make prompt report of all the facts in the case to his depot immediately upon arrival at that point and soon as possible fill out in full and exact detail a blank form provided for his use in such cases headed "motorman's accident report." If the motorman was a passenger on a car involved in the accident or a nearby witness of the occurrence or reaches the spot in time to do so, he will render every possible assistance to the crew of the car. If running a car that becomes involved in any disturbance or accident, he will see to securing as many names from witnesses to the occurrence from the sidewalk or adjacent stores as may be possible, giving such names to his conductor.

Current assets	3,326,459
Cash on hand.....\$	1,589,756.03
Due from companies and individuals.....	336,605.61
Materials and supplies on hand.....	536,732.51
Prepaid accounts	79,084.08
Accounts receivable	529,052.40
Bonds and stock in treasury.....	255,228.00

Accounts to be adjusted.....	4,374
Total assets	\$103,797,181

LIABILITIES.

Capital stock	\$ 47,717,305
Brooklyn Rapid Transit Company.....	\$45,000,000.00
Outstanding capital stock underlying companies	2,717,305.05

Bonded debt and real estate mortgages.....	52,666,100
Brooklyn Rapid Transit Company.....	7,000,000.00
Bonded debt of constituent companies..	45,524,000.00
Real estate mortgages.....	142,100.00

Total capital stock, bonded debt and real estate mortgages	\$100,383,405
Current liabilities	2,422,382
Audited vouchers	\$ 376,684.27
Due companies and individuals.....	28,056.54
Taxes accrued and not due.....	1,070,479.63
Interest and rentals accrued and not due.	866,415.76
Interest accrued on real estate mortgages and not due.....	741.14
Sundry charges accrued.....	39,955.13
Insurance	40,000.00

Surplus account—Balance June 30, 1902.....	991,444
Total liabilities.....	\$103,797,181

The New Orleans Strike Settled

The strike of the employees of the New Orleans Railway Company, which has been on since Sept. 28, was settled on Oct. 12 by compromise and mutual concessions made by the company and the men. As has previously been stated in the STREET RAILWAY JOURNAL, the original demands of the men, made when the strike was declared, were modified on Oct. 2 to 25 cents an hour and an eight-hour day. Settlement was finally made on a basis of 20 cents an hour, which is an increase of 10 per cent, and an eight-hour day.

Before a settlement was reached, however, it was found necessary to make a most formidable show of force, the militia being called upon to suppress rioting. Mayor Capdevielle, when the strike was called, asked the company not to attempt to operate cars for a few days, believing that the difference could be settled. But he soon became disgusted with the arrogance of the strikers in rejecting the propositions that were made for a settlement of the controversy, and, convinced that a firm stand was the one thing necessary, on Oct. 9 called on Governor Heard for military protection. The Governor made himself thoroughly familiar with the situation, and as a result he proposed a basis of settlement which was accepted with reservations and qualifications by the company, but was absolutely rejected by the men. The flat and unconditional rejection of the Governor's good offices left him no other course but to issue his proclamation announcing the intention of using all the force of the State to maintain order and enforce the laws. Orders for the State troops in other parishes were then given, and for the first time in the history of Louisiana all the State troops were assembled in the city. This array of force on the side of right had the desired effect, for a settlement was speedily effected.

Annual Report of the Brooklyn Rapid Transit Company

The official statement of the Brooklyn Rapid Transit Company for the year ended June 30, 1902, has just been issued. It shows that the receipts from all sources of \$12,788,168, or an increase of \$652,609 over the previous year. The increase in the cost of operation was \$993,389, of which \$457,272 was expended in maintenance of way, structure and equipment. Net earnings as a consequence decreased \$382,591. The surplus after fixed charges was \$18,893, a decrease of \$330,232.

Following are the figures with comparisons for years ending June 30, 1902 and 1901:

	1902.	1901.
Total earnings	\$12,510,622	\$11,899,824
Operating expenses	8,209,397	7,216,008
Earnings from operation.....	\$4,301,225	\$4,683,816
Gross income	\$4,578,771	\$4,919,551
Total deductions	4,475,450	4,341,748
Net income	\$103,321	\$577,803
Special appropriations	84,428	228,678
Surplus	\$18,893	349,125

The consolidated general balance sheet shows:

ASSETS.

Cost of road, equipment, etc., of properties owned in whole or in part by the Brooklyn Rapid Transit Company	\$ 88,299,310
Advances account construction for leased companies	8,161,283
Guarantee fund—Securities and cash.....	4,005,755
Total permanent investments.....	\$100,466,348

Pressed Steel Car Replacer

In the description of the car replacer that is being put on the market by the Heitzman Tool & Supply Company, of Hoboken, N. J., which appeared in this journal on Oct. 4, the weight should have been given as 55 pounds and the guarantee of the amount it would hold as made by the company at 50 tons. These replacers are being recognized as a very essential part of the equipment of electric railways, and they are receiving very favorable consideration wherever they have been used.

PROCEEDINGS OF THE A. S. R. A. CONVENTION

President Vreeland called the Friday morning session to order at 10:40 o'clock, and announced that the first business would be the report of the committee on standard rules for the government of street railway employees.

STANDARD RULES.

Mr. Harrington, Camden.—Mr. Brackenridge, the chairman of the committee, is not here, and it seems to be the sense of the committee that the rules which have been submitted express only the preliminary work of the committee on this subject, and we would therefore request that either the committee be continued, if it is your pleasure, or that a new committee be appointed.

President Vreeland.—It seems advisable that the work of this committee should be done in a very thorough way, before any set of rules is adopted. The matter of framing a standard set of rules has taken a great deal of attention in connection with the work of other associations. The New York State Street Railway Association has a committee now working on this subject, which made a preliminary report at the meeting of that association last month. It has been suggested that inasmuch as Mr. Brackenridge, of the Brooklyn Rapid Transit Company, has given up the operating department, there be a substitution in his place, and that another gentleman be added to the committee so that the committee can go forward with the work during the next year. It seems advisable, to my mind, that the same members of the committee, with additional appointments, should go ahead with the work next year so that we will not lose the value of the work which has already been done. It has been suggested that Mr. Connette, of Syracuse, be appointed in place of Mr. Brackenridge, and this will give us the advantage of having two members of the committee, Mr. Mitten, of Buffalo, and Mr. Connette, of Syracuse, who are now also members of the committee on standard rules appointed by the New York State Street Railway Association. This will undoubtedly facilitate the work, and the chair will therefore appoint as the committee on standard rules for the ensuing year, T. E. Mitten, of Buffalo; E. C. Foster, of Lynn; W. E. Harrington, of Camden, and E. G. Connette, of Syracuse, Mr. Connette to be the chairman of the committee.

Mr. Beggs.—There are a number of roads throughout the United States, including the road with which I am associated, that have been waiting for two or three years for this association to give the stamp of its approval to a set of rules that might ensure greater uniformity in the conditions under which our employees throughout the country work. I, for one, will feel compelled to take this report as a basis—or the report of the committee of the New York State association, which I think is much better. You will find on page 11 of the rules as submitted a set of conditions to conform to which would, in my judgment, make it absolutely impracticable to operate a street railway in any metropolitan city. These rules may be very well for an interurban line, but are absolutely impractical of application in any city of any considerable size. I furthermore think that there should be some representative on this committee from a large city, like Chicago or St. Louis. We know that in different sections of the country there are different conditions confronting the operators of street railways, and this committee, as organized, is largely confined to the East. I am perfectly satisfied with the committee as it is now constituted, but I think there should be some one from a great city like Chicago or one of the Western cities, to give expression to their views in the formation of these rules. I have read the rules very carefully. The rules on page 11, Sec. 52 to Sec. 55, inclusive, require a car to come to a full stop every time it passes another car; to come to a full stop before it crosses any other intersecting street railway, etc. In a large city that would be absurd. It is absolutely impractical to conform to these rules. I would like to suggest, Mr. President, that the committee be increased by at least one member, who should come from, say, the city of Chicago. This would more nearly represent the practice throughout the West.

President Vreeland.—The chair will very gladly do what Mr. Beggs suggested. It has been my experience in dealing with this subject, and other subjects handled by committees, that it is wiser in appointing a committee, to select members from one section of the country where the members can get together and hold a meeting. Questions connected with other cities, as a rule, can generally be covered in a satisfactory manner by correspondence; but inasmuch as the appointment of an additional member will not make any difference to the committee, the chair will follow the suggestion made by Mr. Beggs and appoint Mr. Robert McCulloch, of Chicago, as an additional member of the committee.

On motion the report of the committee on standard rules, as presented at this meeting, was accepted.

REPORT OF COMMITTEE ON STANDARDS.

President Vreeland.—In order to dispose of the reports of the committees, as some of the members find it necessary to leave the city rather early to-day, we will have the report of the committee on standards, of which N. H. Heft, of Meriden, Conn., is chairman.

Mr. Heft presented the report of the committee on standards, but owing to numerous changes that were made at the last meeting of the committee it was impossible to give the report out for publication. It will, however, be presented at an early day.

President Vreeland.—There is no member of the association who has to do with the larger questions connected with the present electric systems of operation, whether in city, interurban or suburban traffic, that does not appreciate the fact that the standardizing proposition is an important one at the present time. In the light of the experience of the last half-century of steam railroad operation, it is hardly worth the while of the members of this association to go ahead spending money in as many different directions as there are managers represented. The era of consolidation is at hand, not approaching, and we will find ourselves, through consolidations with many interurban roads, having as many different standards as the ideas of the managers handling the property. You have heard the recommendation of the committee, and inasmuch as the chairman stated that the standards selected by the committee are the established standards of the United States through the M. C. B. rules, it is hardly worth while to take up much time in the discussion of the report. If there is no one present who desires to discuss the subject, a motion is in order that the report be received and the recommendations be accepted, and that the full report on standards, as recommended by the committee, be printed in the proceedings of the association. The chair will be glad to entertain such a motion.

Mr. Dickinson, Seattle.—I move that the report be accepted and printed for the information of the members of the association.

Mr. Heft.—I think it is in order that the matter should be disposed of in some way. If the association wishes to bind itself to the M. C. B. standard, it would be necessary to adopt the recommendations of the committee. The committee asks to be discharged and have a new committee appointed.

Mr. Dickinson.—I add that to my motion.

Mr. Dickinson's motion was carried.

Mr. Lang.—I move that the incoming officers and the executive committee be empowered to appoint a committee on standards.

The motion was carried.

COMMITTEE ON RESOLUTIONS.

President Vreeland appointed as a committee on resolutions William Worth Bean, of St. Joseph, Mich., and G. W. Dickinson, of Seattle, Wash., with instructions to report at the afternoon session.

STEAM TURBINES.

Upon invitation of the chairman, Mr. Sniffen, the author of the paper on steam turbines, briefly stated what points he wished to bring out for discussion. Mr. Sniffen explained that while a good deal has been written on the subject of the steam turbine, it has been almost entirely confined to the engineering aspect of the machine, dealing with its economical features and questions of design and construction; consequently, he thought that at this meeting it would be more interesting if a paper was prepared upon the commercial aspects of the steam turbine, dealing with such things as its reliability, its economy, and also such features as the comparative costs of foundations, buildings, space occupied, and treating of the subject of its cost.

Mr. Beggs.—There is one point which has not been touched upon as fully as many others, and that is the relative cost of the generator by itself to be connected to the steam turbine; in other words, you have left out apparently the differentiating cost of the turbine itself and the generator to be connected to it.

Mr. Sniffen.—That question is not so material when you consider that these companies are either offering or expect to offer turbine units as complete outfits. It makes no difference what the steam or electrical end costs individually, so far as we have the comparison of the cost of the complete unit. In a general way it may be said that the electrical end of the unit is lower in cost of manufacture than the large revolving generator that goes with a reciprocating engine, while the steam end itself is, perhaps, comparatively expensive. The price of the complete unit, however, compared with the cost of the reciprocating unit, including its generator, is the comparison I made in my paper. It is not the purpose

of the Westinghouse Company to furnish the steam turbine alone, but to furnish the generator with it as a complete unit.

Mr. Beggs.—This is really a manufacturers' paper, and Mr. Sniffen has proceeded with the conclusions urged in that paper as a maximum cost upon lines which it is hardly possible can be followed by those who are going to pay for these units. There are two or three concerns in the United States at the present time which are developing the steam turbine in connection with generators, but I do not think that those of us who are spending millions of money in the construction of power plants, are going to be satisfied to depend upon two electrical manufacturing concerns for the construction of the steam turbine, which is a mechanical device and entirely independent of the electric generator. For instance, the largest manufacturers of steam engines in the world are located in the city of Milwaukee, the Allis-Chalmers Company, and I do not suppose for one moment—I know as a matter of fact—that they would permit their business to be taken from them by the Westinghouse or General Electric Company. They are to-day experimenting on a large steam turbine. Therefore, it is important that we know what the differential cost is, and know how the varying elements are reached in considering the expense of constructing a power plant, including that of the generator. One of the important points, which is entirely ignored in the paper before us, is the effect of the greatly reduced cost of the generator to be attached to the steam turbine, because of the high speed at which it must necessarily run. I believe the lowest speed at which it is considered you can make a large turbine operate successfully is about 750 r. p. m. Is that correct?

Mr. Sniffen.—Yes; that is about the minimum speed.

Mr. Beggs.—Those gentlemen who know the difficulty we have had of getting the electrical manufacturers to build a generator of sufficiently low speed to operate satisfactorily with the larger types of Corliss engines that are now being built, know how much they have had to pay for slow speed. I thoroughly understand the great wish of the two or three large electrical concerns to compel the purchase of the entire unit; but where there are now only about two electrical manufacturers that we might feel safe in, there may be a third in the future, and very likely a fourth, who can build a 5000-kw generator which we would be justified in making a contract for—there are almost a score of concerns in this country that can build a turbine to run at 750 r. p. m., because of the greatly reduced size and weight of the parts to be used. If Mr. Sniffen has any data on that point, I would like to have him give it to us, because, when I go into the market to buy a steam turbine, I want to buy it as a piece of mechanical apparatus and not as a piece of electrical apparatus. It becomes a very different proposition whether you buy it in two parts from two concerns, or buy it as a complete unit from one concern; the saving in the generator may be absorbed in an excessive profit on the turbine.

Mr. Heft.—I would ask Mr. Sniffen what history the steam turbine manufacturer has behind him, and what he proposes to give to the purchaser in the way of a guarantee as to the cost of maintenance if we buy this steam turbine?

Mr. Sniffen.—In my paper I believe that I said something about the cost of the maintenance that was found in a station in England, where something like a dozen turbines have been used. It is true the steam turbine has not behind it as many years of history as the reciprocating engine. It has, however, sufficient to show that there is no reason why a steam turbine, properly built, should not cost less in maintenance than a reciprocating engine. I do not know what to say about a guarantee of repairs. You could hardly get such a guarantee on a reciprocating engine or other piece of moving machinery. That feature is gaged not only by the excellence of design and construction, but by the way in which it is handled. I think I can best answer that question by saying that the Westinghouse Company is willing to make for the turbine the same guarantee as to maintenance which it will make for any other piece of machinery it produces. It will be responsible for its sufficiency of design and construction, and it will make good any defects that appear in it within any reasonable time after its installation. What more can you ask?

Mr. Heft.—It depends entirely on how the contract was drawn.

Mr. Sniffen.—Nevertheless, that in substance is about all you can ask of any manufacturer in regard to his machinery. I might say further that there is no hesitation on the part of the manufacturer of the turbine in making guarantees of economy that are a great deal more valuable as guarantees than those made on reciprocating engines. We all know that it is common to ask and obtain guarantees on reciprocating engines, but they are almost a dead letter. The value of the guarantee is practically never demonstrated as far as the engines are concerned; the engines are constructed, and partly assembled in the shop, but it is a physical impossibility to test large engines at the works. The engine is shipped and put into service, and it is only once in a blue moon

that we find efforts to make tests on these engines, and when we do there are always many questions introduced affecting the actual results we get in such tests. Now, in the case of the steam turbine, a guarantee is not only made, but it is demonstrated. If you purchase a 1000-kw turbine on the guarantees of efficiency, based upon different conditions involving so many degrees of superheating, so many inches of vacuum, and so much steam pressure, it is a fact that that turbine will be tested for efficiency under those conditions. At the particular works I know most about, there are facilities for making such tests, large boiler plant, superheating and condensing apparatus, and it will be found quite advisable and possible, and will be the regular practice, to put these turbines under service condition tests. I think, therefore, that the assurance had in that way is much greater than we have ever had on reciprocating engines, and I think it is a great step forward in the engine-building practice.

Referring to the question of sub-dividing the cost of the steam turbine, I can only say that the turbo-generator unit itself is to be developed as a complete machine. You cannot have a good turbine and a good generator, and put them together and conclude they are going to make a good unit, unless they have been developed with the view of working together. As our friend has said, there are not many concerns in the turbine business at the present time. There will doubtless be many more. There are a good many generator builders, and doubtless many of them are expecting to build generators for steam turbine use. If any engine builder can build a good steam end, and any generator builder can build a good electrical end, and if they can put them together and make them run, that is all we want.

Mr. Heft.—I think Mr. Sniffen should be commended for his frankness, but I think it would have been a great satisfaction to the members if he had brought some data here with some history behind it, so that we could look upon the question from the commercial side and not from the engineering side. I have been trying to get some data as to steam turbines for a year. I have gone to Hartford three times to see the plant that was erected there, but have never found it running. It was always shut down because they were changing something. I asked the General Electric people to direct me to a plant in operation. They replied that they had one at Schenectady that they were experimenting with, and that they were taking many orders for steam turbines. That won't go with me. I have got to know what you are going to do before I will buy one.

Mr. Beggs.—One of the claims made for the steam turbine is the greater reliability in its regulation; its ability to accommodate itself to varying loads. What the steam turbine will do when it comes to large units is as much a matter of conjecture on the part of the manufacturers of to-day as on the part of those who are considering buying steam turbines. We do know what a reciprocating engine will do, because large machines have been built and are in practical operation. Now, if the steam turbine is going to simplify the matter of regulation, and make it possible to run generators in parallel with a greater degree of success and a reduction of all the contingencies likely to arise which cause trouble, it seems a much simpler matter to build a generator to operate with that piece of apparatus, than it is to build a generator to operate with a reciprocating engine, the governing of which is such a delicate matter. Therefore, I take it that instead of there being one or two concerns in this country, which will build steam turbines, there will be a score of them.

Mr. Heft.—I want to say to the members that I am not opposed in any way to steam turbines, but am a believer in them. I believe a manufacturer coming before this body, should have some data to present, some history regarding the turbine, so that we might know under what conditions we were buying the machines.

Mr. Bean.—If I had the money I don't know that I would buy a steam turbine, but I think the members who have spoken are in the same position as the association was before we adopted electricity. Where did we have any experience before we put our money in? The steam turbine, like the electric motor and generator, is a new thing, and we should not be afraid to put our money in as we were obliged to before. That is the way we developed the other industry. Let us do that now with the turbine.

Col. Heft.—That is all very well if you have the money, but I have had a little experience developing the street railway motor up to its present standard. If I had not been in a position to contract with the electric companies in such a way as to bind them to exploit these machines at their own expense, they would have put the New Haven road into bankruptcy. When I buy a machine to-day I want to know something about it. I want it as good as it can be made, and I want the fellow that made it to pay for the experiment.

Mr. Wyman.—I cannot speak from a technical point of view, but our company has made some investigation into this matter, both

for the larger units and the smaller ones. I want simply to say that we have been treated with the utmost courtesy by the Westinghouse people and the General Electric people, and I think they have been good enough to give us whatever information they themselves possess.

S. A. Palmer, Fall River.—I would like to ask the gentleman whether or not the cost of the condensing plant for use of the turbines is greater than it is with engines.

Mr. Katté.—I want to ask Mr. Sniffen if a central condenser plant could be used in connection with a turbo-generator instead of independent condensers for each unit. For instance, in a small size, up to 750 kw, or in a plant of two or three or less units an independent condenser would be necessary for each unit that is installed.

C. O. Mailloux, New York.—I can answer the question of the gentleman who just spoke from my own information. I am now about installing a plant containing two turbine units, which we intend to operate by the same condensing plant. I see no reason why it would not be possible to operate any number of units with the same condensing plant, though it might be desirable in very large units to have a condenser for each unit. The cost of the condensing apparatus, as far as my investigations have disclosed, is somewhat larger than the cost with an ordinary steam engine. This is due to many reasons. It is also a fact that the exhaust piping has to be done more carefully, and should be of larger diameter. That, however, is offset by many other advantages, one being the ability to use superheated steam of almost any temperature without mechanical detriment to the engine. I have had occasion to design large plants in which I have seriously considered the question of using superheated steam, and found, much to my sorrow, that in many of the engines, as at present constructed, there is a limit to the temperature that can be allowed in high-pressure steam. When you reach very high temperatures lubrication becomes almost impossible. With a steam turbine, on the contrary, there is no limit to the temperature of superheating that you may attain. Its only limit is the melting point of the material of which the engine is made. I see no reason why you could not run a steam turbine at a point where it would be cherry red, and glow in the dark, if there was any advantage in it. Of course, we all know there is a great advantage in superheating steam. I believe that the steam turbine, in that respect, is bound to be a very important element in a new way of using steam. I have observed it carefully for the last five or six years. I first met it abroad and was surprised to see the extent to which it was used, although in smaller units. Until two years ago, I think, no units had been attempted which were of greater capacity than 200 kw. The two units which I have ordered are 400 kw each. My own observations lead me to believe that instead of there being difficulties in the large units, the larger turbines will really be much simpler machines, more practical, as well as a more economical. The reciprocating engine is in a high state of perfection. It is not a machine to be despised, but I believe at the same time that the turbine is the coming machine. I am not prepared to say that I believe that it has arrived, but I believe in a very few years, perhaps in a year, it will be possible for us to say conscientiously that it has arrived and is going to stay. The difficulties of steam turbines to-day are not so much mechanical as electrical. The turbine is admitted by its best friends to-day to require alternating generators, and these machines make considerable noise. You must remember that the first generators which were made, had, in addition to other imperfections, the fault of making a great deal of noise. That fault has been greatly remedied, until to-day we are not complaining on that score. I believe the turbine will doubtless be developed in the same manner. I do not think that there need be any apprehension on the part of regulation. I have myself watched carefully, both here and abroad, and find that the direct regulation of the machine will compare at least favorably with any of the existing reciprocating steam engines, and it is my opinion that on the score of economy we should use it to-day.

President Vreeland.—I will ask Mr. Sniffen briefly to close this discussion and answer the questions that have been asked.

Mr. Sniffen.—The last question, in regard to the character of the condensing apparatus, seems to have been answered. I would only add that we like to have the exhaust pipe large, and leading off in such a way as to get the steam away from the turbine readily, and so long as the pipe is tight and the vacuum maintained, I don't see that it makes much difference which method is employed. I think that the questions that have been asked, and the answers made to them may leave in the minds of the association generally a feeling that the turbine is still something of an experiment. I think I can disprove that. Col. Heft mentioned his visit at Hartford on two or three occasions when he found the turbine shut down for changes. In my paper I very frankly explained the troubles we had at Hartford. That turbine now has been running

for some months, whenever they wanted it. I think if Col. Heft were to interview the people who bought that turbine, and who paid for it, and have operated it for several months, he could probably get an assuring answer. I may say that that turbine was sold as a 1500-kw machine, and that it carries from 1800 kw to 2000 kw right along, and it has carried, without any apparent trouble, 2800 kw. I think you have all seen the results of test made by Prof. Robb on this turbine carrying about 1900 kw, running with 150 lbs. steam pressure, about 27 ins. of vacuum and some 50 degs. of superheat, and consuming 19.1 lbs. of steam per kilowatt-hour. That I believe would be admitted to be well within the line of the very best engine efficiency. There is a turbine at Stamford, Conn., of 400 kw which has run since the first of February ten hours a day, carrying its full load, for factory power and lighting. The Westinghouse Air Brake Company has four 400-kw machines that have been running for about three years. That plant is running to-day, and it is doing all the work of the manufactory. Its economy is very high, and its repairs are practically nothing. Now there is some history. History grows quickly, and my friend who has stated that we did not know whether a 5000-kw turbine will operate, should remember that up to three months ago, we did not know that same thing about the piston engine. So far as I am aware, there was not a 5000-kw generator driven by piston engine in this country until those in New York in the Manhattan power house were started up. Prof. Thurston, acting as engineer for the DeBeers' Company, will conduct a series of tests on the two 1000-kw turbines which are now about ready to be shipped, before they go forward, and I believe the data thus secured will be very valuable. We are rapidly adding to our information, and it will not be long before we shall know more about the steam turbine than we do about the piston engine. A large number of these turbines are being built; they are building for people who have investigated them, witnessed their operation, visited the works, seen how they were put together, and in the most careful way formed their own conclusions on which to act. I think that answers the two questions.

HANDLING DAMAGE CLAIMS

President Vreeland.—The next paper is upon damage claims, but the writer is not here. I requested Mr. Beggs to make a few remarks as an opening to this paper. It will not be necessary for me to refer to the paper in any way, or have it read, as Mr. Beggs will discuss some of the points in his remarks on it.

Mr. Beggs.—If I could take issue with some of the points embodied in this admirable paper, I could talk upon it very much better, but there is not a single line in Mr. Starring's paper with which I can take issue. It outlines, in a very general way, the practice we pursue in our own company. Mr. Starring has brought out here the fact that the personal element enters into the adjustment of injuries and damage claims to such an extent that it is almost impossible to realize the difficulties that there can be in the case of adjusting claims for damage between the various companies where that personality is observed. There are one or two points in Mr. Starring's paper that I particularly desire to lay stress upon, and that is the maintenance of an absolutely rigid policy as to dealing with all classes of claims regardless of who may be affected or what influences may be brought to bear to compel or induce the company to make more liberal settlements. It is not an unusual thing to have influential directors of the company, influential politicians, and sometimes directors influenced by politicians attempting to prevail upon the agent to adjust some claim or to allow something in a case of some injury for which there is no legal liability. I may say as far as that is concerned, if the entire board of directors, if all of the officers and all the politicians of the city in which I am located, were to enter into a petition to make some adjustment more favorable than the conditions would warrant, I would not permit it to be done. But when that policy is known throughout the city, it has much to do with deterring the pettifogging lawyers from instituting suits against the company. I might say that in the history of the company I represent, my orders are that in every case where there is a fair belief that the company is liable, to make a settlement if it can be done on any fair basis, and to make it as quickly as possible. As an indication of that I may state that during the year 1890 we had eleven cases tried in court, of which we obtained a verdict in nine of them. One of the two that went against us was afterward reversed by the court of highest jurisdiction in the State. Last year we won nine out of ten cases which was all we had go to the courts. That is the best way of preventing pettifogging lawyers from sandbagging our companies. One of the great difficulties to contend with in dealing with accident cases is to know exactly what the facts are. This is sometimes rendered more difficult, because of the inclination of the employees who may be responsible for the accident to attempt to shield themselves even under a sworn statement. I might say that the practice of our own company

is that we require a sworn statement from both the motorman and conductor in every case. We prepare every case, no matter how trivial, as though it were to go to court, and we require a sworn statement, and we obtain as many sworn statements in the fewest possible hours, as is possible, and as is practicable, from as many witnesses as possible. A great mistake is often made in looking only for evidence for the company. We always look for all the evidence, even the worst that can be said by the adverse party, in order that we may be in possession of all the information that will enable us to determine whether we shall contest that case. My policy, in the treatment of accident claims, is that if we could settle a claim for \$10, which would require \$100 to defend it, we would far rather spend \$100 than to give \$10 to any pettifogging lawyer. I will not permit the purchase of any pettifogging lawyer. That policy has been persistently pursued for two years with very beneficial results. There are companies, unfortunately, that will, if they can, pay one of these lawyers to avoid litigation. They say it may cost \$100 or more if it be contested. I say, if it cost \$500 go into court and beat them by going into court. In this way you will stop it. I have taken issue with our attorneys and have won out on it, that I would either settle or would not settle. At times I have argued, let us settle that case. Well, they would say, we can win out. I would not consent to this because it was not fair. I may say that in the last year our accident cost was reduced to a fraction over 2 per cent of our gross receipts. We carry 4 per cent of our gross receipts every month to the injury and damage reserve. Year before last it was about 29-10, I think. Last year, we reduced it to 21-8 per cent. This year it is less than that, and it is largely due to this persistent pursuit of the policy of the application of fair common sense to the settlement of every case and permitting no case to be settled simply to get rid of it, if you do not feel that you are justly liable. Therefore, I say, gentlemen, do not permit the influence of boards of directors, nor of politicians to affect the settlement of any injury or damage case. Cross-examine your own investigators and employees to find out the real facts in connection with it. We are very often confronted with the evidence of the attorney for the plaintiff and dumfounded to learn that we didn't know what was going on in our own cars. As I said before, we have only lost on an average one case out of ten in the last two years. That we consider is phenomenal, considering the juries before whom these cases are tried.

Mr. Sloan.—I would like to ask Mr. Beggs whether or not he makes all his investigators notaries, so as to obtain the sworn statements from the witnesses. We find it very difficult in many cases to get statements signed. Witnesses object to it.

Mr. Beggs.—I might say that all our investigators, in fact everybody connected with our claim agency, are notaries. Every motorman and conductor in connection with these cases, who makes a statement, has to swear to it, and sign it.

Mr. Bean.—I would like to ask Mr. Beggs whether, in a majority of the cases, the juries are from the city or from the country?

Mr. Beggs.—They are nearly all city jurors. I might add to what Mr. Sloan said a moment ago that every division foreman, or division superintendent, is likewise a notary, so that the statements when taken are finally submitted to them and sworn to. We employ counsel, and pay them a large compensation to defend all cases of injury or damage of whatever kind, either to person or property. We likewise employ a physician. Furthermore, a policy which we inaugurated two or three years ago was to render no medical attention unless there was a case of liability.

Mr. Robinson.—During the last year, the corporation that I am connected with in New York tried 1145 cases. Out of that number, we were successful in about 650. With this great amount of litigation, of course it is very difficult to handle it as Mr. Beggs has suggested. I insist, generally, on the taking of affidavits of the motorman and conductor, but as far as getting a statement in writing and having it signed or under oath, it was very difficult to obtain from a large number of witnesses. It is very difficult in handling a large number of cases to get these statements. Some days we have a large number of reports come in, and it is very difficult for the claim agent to say from reading the report whether the injury is severe or whether there may not be some elements which make it a case of liability on the part of the company. The number of cases of injury some days runs as high as 110 or 115, so you will see it is impracticable at times to adopt all the methods suggested by Mr. Beggs. The only point that I think Mr. Beggs is mistaken in is that relating to the examination by a physician. It seems to me that in all cases, where the injured party is not known, an examination by a medical man should be made. One of the great difficulties we have to contend with in New York is the unscrupulous character of the doctors who attend the plaintiff. Old injuries of years' standing are palmed off on the company, if possible. Injuries which develop four or five months after the accident are made to relate back to the accident itself. And the greatest ex-

aggeration is promoted on the part of the plaintiff's doctor, unless there has been an examination by a surgeon of the company. We have in the company's employ six physicians, and even with the hard work they do it is not infrequently the case that we have to try suits in court without a medical examination. I think the best method of handling this class of claims which come in in large quantities, is to have an examination made of everyone of them by a medical man.

There is one point in the paper which I think this association should consider, that is to say, the execution of the general release by the injured party. It must be conceded that it is quite ridiculous to put to the ordinary class of man the general release which is the standard in the United States, containing the legal verbiage such as bills, specialties, and judgments of whatsoever demand and nature, etc. A great many lawyers learned in the profession of the law would have some difficulty in explaining it. It seems to me we should formulate a release which would take care of all these propositions without the great use of verbiage, which is used in the present document. I do not know all the decisions in the United States, but we have had in New York cases which went to our Court of Appeals, and which were decided in some very early cases. In one case of Kuhn vs. Knapp, the receipt read as follows: "Received \$40 in full for damages done to us, for all demands, on the 13th of June last." The Supreme Court held this to be a full release, and could not be attacked by the injured party, and the only claim on it was to recover the amount of compensation set forth in the receipt. In another case, I find the following language was used: "Received \$50 as a compromise for the full amount of my claim." The court said in that case the use of the word compromise was sufficient to make this appear as a settlement, and there could not be any demand made except to recover the \$50. It seems to me that this association might do well to draft some form of general release which might be used by all its members. I have no doubt there would be litigation, but I think in most of the States it has been held that some form of release would be upheld for the benefit of the corporations and greatly to facilitate all claim agents in taking care of these matters.

BLOCK SIGNALS

President Vreeland.—We will now take up the next paper, the title of which is, "Signals for Urban and Interurban Railways." The paper was prepared by G. W. Palmer, Jr., and we would like Mr. Palmer briefly to bring out some of the points in his paper.

Mr. W. B. Potter, Providence.—What provision is made in the signal system for the second or third car on the Old Colony system?

Mr. Palmer.—We have several systems in use on the Old Colony road, one of which is the United States system, which is operated by an overhead contact and does not provide for the counting in of the cars after the block. The first car passes over the contact, sets the signal, and the first car out, unless the trolley is removed from the wire, clears it. That feature I regard as a very valuable one. I think for any system to be reliable and safe, that it should be absolutely impossible to clear the block while there is another car on the block from one end to the other. We have also in use the Randall system, which, as you all know, is simply a circuit of incandescent lamps, hard at one end, and hard at the other end of the block, and which, with us, is more efficient as a lightning arrester than as a signal. I do not know that it should be considered a signal.

President Vreeland.—Mr. Wason, whom I asked to say something on this subject, was unexpectedly called home last night. I then asked him if he would not briefly give some of his views on this subject, and he prepared a paper which I will read.

Mr. Vreeland then read the following statement:

Mr. C. W. Wason, Cleveland (contributed).—Any system of signals that will prevent accident is most desirable in street railway work. This is one of the most serious problems the railway manager had to contend with. In trying any new scheme the question at once arises—If the signals fail to work, will the results be more dangerous than at present? I think that is the general feeling among railroad men. They are anxious to find a signal, but do not feel warranted in trying new inventions.

I do not believe any employee should be discharged on the first offence. He may be an old man in the service, and before you are able to educate a new man he has cost the company much money. I think men running urban and interurban cars should be well paid for their services. You cannot get something for nothing. Men with capacity to fill positions on fast-running cars cannot be hired at the old horse-car rates. A signal system, to be satisfactory, must work at all times and in all weathers, and with any number of cars running in either direction. As lightning frequently burns out lamps on the trolley any system depending upon the main line current must be unreliable.

On the double track roads the end-on collision is eliminated, but rear-end collisions occur even under the best management. The red lantern ought always to be carried on the rear of the car. I think it is required by law in some places. When a car follows the regular the green lantern should be carried on the regular. Where an electric headlight is used the throwing of a portion of the rays in a perpendicular direction often shows the motormen the location of other cars. In this connection, it seems to me that too much attention cannot be given to the braking equipment of the car. This, of course, includes the sand-box and contents. Money spent in eliminating the curves of a road is well invested in more ways than one.

President Vreeland.—Ira McCormick, now with the New York Central Railroad Company, promised to make some remarks on this question, but he also found it necessary to leave last night. He promised he would prepare a paper in connection with the subject. He has done so and left the paper with us. His paper is largely of a statistical nature, and he makes quotations from several authorities on this subject. The paper is of considerable value in connection with the proceedings of the association, and we will order the paper printed in the proceedings. It is as follows:

Mr. McCormick (contributed):—At the last meeting of the American Street Railway Association held at New York, a paper entitled: "The Adoption of Electric Signals on Suburban and Interurban Railways of Single or Double Track, and their Economy of Operations," was read by William Pestell, and, after having been discussed at some length, Col. Heft recommended that the executive committee ask the committee on standards to make a report at the next convention of the best signal system. No doubt this committee has looked into the matter very carefully and has some report to offer.

I wish to quote from the address of President G. Tracy Rogers, of the New York State Convention as follows:

"The unfortunate recurrence of some half dozen severe and fatal accidents within the present summer brings to the members of this association, in the most forcible manner, the ever present obligation of ceaseless care and vigilance in the management and operation of their respective roads. It is such a simple matter to lay down a formula for the prevention of such accidents, but so long as human nature is fallible, railway accidents can never be wholly prevented. You all know what elements of care, of prudence, enter into this consideration—substantial construction, complete equipment, good discipline, and last of all, but of the highest importance, constant inspection and accountability. We owe it to the public, as well as to ourselves, and to the reputation of industrial and mechanical intelligence, that every safeguard which experience, caution and liberal expenditure of money affords shall be applied to the carrying on of our several enterprises."

Inasmuch as the president of one of the foremost street railway associations of the United States has brought to the attention of the members of his association not only the number of accidents that have occurred during the last year, but very properly calls their attention to what they owe to the public, as the prosperity of a company depends very largely upon the safety of its patrons.

The accidents that he referred to occurred largely on suburban roads. C. R. Barnes, the electrical expert of the Railroad Commission of the State of New York, read a paper at the convention of the New York Street Railway Association, which was held at Caldwell, N. Y., on Sept. 9, 1902, and as all the accidents are reported to the railroad commission, Mr. Barnes was in a position to talk and speak authoritatively on the matter in question.

In his paper he states that the percentage of passengers injured in proportion to miles of road operated in 1898 was .462, in 1899, .480; in 1900, .450, and in 1901, .559. This shows a steady increase in the percentage of passengers injured in reference to mileage of road except in the year 1900, when the percentage was less than in the year previous. There has been an increase between the years 1898 and 1901 of .097, an increase of about 21 per cent.

These figures include all the accidents on all of the electric railroads in the State of New York, including city and other roads, and are compiled from the annual reports the companies made to the railroad commission. It was the intention of the commission to classify these accidents, and also to have made a percentage comparison based on car mileage, but the investigation of the number of serious accidents which have occurred recently has occupied so much time that the commission was unable to make a detailed statement of accidents.

The accidents referred to include the killed and injured resulting from all classes of accidents. The greatest loss of life and injury to passengers on electric railroads in the last five years has been caused by rear-end collisions. The next largest loss of life and injury to passengers has been caused by head-on collisions,

and in this comparative line of the causes of death and injury to passengers are the collisions at grade crossings of steam and electric railroads.

After an investigation of the methods of operation of railroads in reference to accidents, he states that it can safely be said that in a large majority of these accidents the primary cause of the accident can be traced to inefficient management of the road, and a large number of the rear-end and head-on collisions, resulting in serious injury to passengers, were caused by motormen running past switches where they were due to meet a car. Several were caused by misunderstanding of train orders transmitted over a telephone system, several by conflicting orders being given by different officers of the company, some by crews attempting to "steal" a switch, several by crews taking it for granted that a car due at a junction of two lines had passed that point, others by a failure of the block signal system.

There were two cases where motormen have seen a car approaching them on the same track and they continued at full speed with the intention of making the other car back up to the switch, the speed continuing on both cars for the same purpose until it was impossible to stop either.

Two were caused by running special or work cars over the road without notice being given to regular cars.

One head-on collision was caused by a passenger car being used as a work car and not being placarded as such; a regular car met it on a switch where another car was due, and supposing it was the regular car crew ran out onto main line and the two regular cars met in a head-on collision.

Among the causes of rear-end collisions may be mentioned the 500-ft distance rule in use on a large number of suburban and interurban railroads; cars coming to a stop at points on the road where the view of an approaching car is limited; cars "running away" on grades and on wet and slippery tracks; regular cars running into work cars standing on the main track without protection; broken trolley wheels leaving the car standing upon the main track without lights; trains being run in sections without the rear end of the first sections being properly protected, and a number of other causes.

The STREET RAILWAY JOURNAL of Aug. 16, 1902, in an editorial headed "Block Signal System for Electric Railways," states that several bad accidents which have occurred on electric railways during the past three or four weeks have called attention to the demand for reliable block signals on electric railways, and states justly that the electric railway is at a disadvantage in some respects with a steam railroad when it comes to the introduction of a block signal system, because on the latter the rails can easily be insulated from each other, so far as the voltage of a low primary battery is concerned. This fact can be utilized in a block signal system, so that the passing of a train over the track can be used to short circuit the rails through the car axles and thus operate the block signal apparatus. On the other hand, the electric railway has an advantage over the steam railroad through the fact that a 500-volt circuit is always available and this current can be employed for signalling purposes in a way not possible on the steam railroads.

The editor did not claim by this that any, or all, of the present methods of block signalling in use on electric railways are perfect, but he did believe that the greatest factor in any system of this kind is the carefulness of the employees, and the maintenance of an intelligent set of rules for the manipulation and use of the safety appliances.

In another editorial in the same journal they state another example of the importance of having some reliable system of block signalling on high-speed interurban electric railways was shown last month, by a very bad head-on collision on the new third-rail electric railway extending from Milan, Italy, to Porto Ceresio. This line, which was formerly operated by steam, extends from Milan north to Lake Lugano, and is equipped with the third-rail electric system. The precautions against accidents have seemingly been fairly good, in that the trains were despatched from regular turnouts by employees of the company, and no train was allowed to proceed beyond a turnout without special orders. The accident in question, however, indicates that any system of this kind which depends upon human judgment is fallible. The station master at Porto Ceresio station, finding that the train which was due at that point at a certain time was late, assumed that he could stop it at the preceding turnout, and telegraphed to the station master at that point to hold the train there. Then, without waiting for an answer, he ordered the train at his station to proceed. The north train, however, had left the other station before the receipt of the telegram, and the result was a bad collision between the turnouts, in which two passengers were killed and thirteen badly wounded. Unfortunately it did not occur to either of the dispatchers after the trains had left their stations, and they

knew that an accident was almost inevitable, to switch off the current from the third rail. This, of course, would have brought both trains to a stop, and the engineers of both could have been notified of the condition of affairs. This possibility of the control over a train after it has left the station is one great safeguard in electric operation, although in this particular case no advantage was taken of it.

Mr. H. D. Emerson in an article in the *STREET RAILWAY JOURNAL* of Aug. 16, 1902, on "Block Signal Systems for Electric Railways," states that it would appear that the English "train staff" system, which is operated by nearly all of the single track steam railroads in Great Britain, and which with various modifications is used all over the world, is the best system for operating on single track roads; but he only recommends this until a company is a prosperous one and is earning dividends so that the directors would be willing to have expenditures made for permanent improvements, permitting permanent block signals which can be operated either automatically or by hand. He also states that if operated by hand they should be so arranged that the lever is out of reach of people standing on the ground, so that when it is thrown for the block it cannot be changed until the car has passed the next block. Any block signal system should be so arranged that if any accident happens to it or the line becomes deranged, or the mechanism gets out of order, it will show the danger indication.

He further states that if it is desired to use the block theory and operate by means of permanent signals controlled either by electricity or air at the ends of the block, certain principles thoroughly established by many years of disastrous experience should not be overlooked. The first is that the signal should be simple and should have but two indications; it should say definitely, clear or definitely blocked; that is, it should say "go" or "stop." This can be best accomplished by the semaphore arm. When it is horizontal or extending over the track everyone understands that it means "stop," whereas if it is dropped at an angle it indicates "clear," and the car can proceed. In the same way the lights for night signalling should be position signals; two red lights horizontally placed indicating "stop" and two green lights vertically indicating "clear." This is the result of signal practice the world over, and is understood and is understandable by all concerned in railway operation, and by most of the patrons of railroads. The cost of providing signals as described would not be any greater than the cost of providing the present signals now installed on many lines.

In quoting from the articles as I have, I not only wish to impress upon your minds the importance to you as individuals in managing electric suburban railways, but also the duty that you owe to the public of installing some efficient and safe block signal system on high speed electric roads.

The American Street Railway Association at the last year's convention, held in New York, had a paper on this same subject, and in assigning the subject for the convention this year has realized the importance of block signalling, and from the fact that they have taken this action, in my opinion, no manager who is a member of this association can afford to neglect considering and installing some system of signals which will add to the safety of the patrons of his road.

There are at present two kinds of electric automatic block signals patented. One for overhead trolley lines, whereby the trolley striking a mechanical appliance sets the block signal behind the train, and also sets one ahead of it.

The other is the third-rail system whereby a section of the third rail behind and a section of third rail ahead of the train are used and the power is taken from the third rail setting signals behind and ahead of the train so that it is almost impossible for trains to have head-on or rear-end collisions.

There is, of course, mechanism attached to both of these systems that is liable to get out of order and a collision result therefrom, but the principle, to my mind, to work on, is to adopt something that has some merit of protection. You cannot afford any longer to operate a single or double-track, high-speed railroad without some kind of protection.

For the information of the members I wish to state that the automatic blocking of trains in steam railroad practice within the last year has received more attention from steam railroad managers than it ever has in the past. This is due primarily to the fact that the large trunk lines have acquired larger terminal facilities for the handling of a business which is larger than the capacity of the main tracks under the present manual blocking system. In the past all the manual blocks were placed at considerable distances apart, which was done owing to the large cost of maintenance and help. The traffic handled over lines with such a system was greater than the capacity of the terminals, but, as stated, the terminal facilities have been increased and there must be an increase in the traffic over the main line, and in considering this

the managers have taken up the question of placing automatic signals at short distances apart.

Last year at the New York convention I was asked by the then president, Walton H. Holmes, to open the discussion on the paper read by Mr. Pestell on this subject, and I stated at that time, that the suburban roads must go to steam railroad practice in formulating rules and operating signals on the same principles as the steam roads operate them.

In connection with this there is at present in operation on steam railroads block stations operated manually under the Skyes Lock & Block system; the pneumatic system, whereby the semaphores are thrown by air after being manipulated in the towers by men; the Union Switch & Signal Company's automatic system, which is a rail circuit system, and when a train goes out of a block the circuit is broken and the mechanism sets the signal at danger behind the train, and when it passes the next signal it breaks the circuit and sets the signal at danger, and then after going a certain distance it closes the circuit on the second signal in the rear which puts it at safety or clear.

The Hall Signal Company has two systems for automatic blocking. In one they use a track instrument which breaks the circuit, setting the signals after it at danger or safety as the case may be; and the other is a rail circuit system wherein in breaking or closing the circuit the semaphore is put to danger or safety by the use of gas, which is placed at the signal in a large holder, and which has the capacity for a great many operations.

I was connected with the Hall Signal Company when they installed the disc signals on the Galena, Wisconsin & Milwaukee Division of the Chicago & Northwestern Railroad, and on the Chicago Division of the Illinois Central Railroad, for the handling of the World's Fair business. The system put in on the Chicago & Northwestern was the track instrument, and that on the Illinois Central was the rail circuit system. Both systems worked perfectly and they handled the large business due to the World's Fair without a single accident or failure.

The track instrument used by the Hall Company is a lever which works on a balance and is held down by compressor springs, so that when the tread of a wheel runs over the instrument it either breaks or closes the circuit, whichever the instrument is designed for. This system could be used on interurban roads, and is at present installed on the Metropolitan Underground Railroad of Paris and the Fairmount Park Railway of Philadelphia, both of which are operated by electricity.

The third-rail system that I have mentioned is the Farnham system where the circuit is taken from a section of the third rail ahead of and in the rear of the train. While I made an inspection of this system I cannot speak assuredly of it, as its introduction has not been long enough to give the system a thorough trial, but it has a great many things to recommend it.

The Miller system which we are installing in the tunnel in New York City on the New York Central & Hudson River Railroad is a visible signal in the engine cab, which shows the block signal ahead to be either clear or at danger, and it has a great many things to recommend it.

For instance; the signal is in the cab of the engine in view of the engineer or operator.

As a suggestion I would recommend to the committee on standards that they procure the details of operation of the several signal systems used by steam railroads, and their recommendations. As the price of the different kinds of signals varies, a road could then adopt whichever its circumstances would permit.

Mr. Vreeland.—I will call attention to one point in connection with this paper, and that is the recommendation with reference to the proper signal on the rear of cars. On railroads which I have been asked to investigate during the last two years, they were operating cars under steam railroad conditions that prevailed fifteen years ago. I recommended proper signal systems, but these suggestions were not regarded, as they were considered to be the views of a steam railroad rather than of a street railroad man. Each of the electric railroads in question has had a rear-end collision, the least of which cost \$10,000; now they are carrying the rear lights, and also the other signals that go with them. There are many methods of signals that are open for inspection throughout the country; and as a result of twenty-five years' of operating experience in steam and street railroads, I can say that there is no more important question to you, not even excepting track construction and car construction, than that of proper methods of car despatching and protection of cars on high-speed interurban roads. As I said at the last convention, there is no collision in the transportation world that can compare with a collision between two electric cars in its dire results. I have had any number of collisions and wrecks to clear up, but in all my steam railroad experience I have never seen as bad a collision between steam trains as between two electric cars. There are two enormous bodies of steel—baggage or express cars—interposed between the points of contact and your passengers on

steam trains, but in electric railroad work generally the front ends of the cars are of the flimsiest construction, although that is the point where the motorman rides, and on many roads passengers are allowed to ride on the seat back of the motorman. In two or three collisions which occurred in New York State last year, and in other parts of the country, there were more people killed and injured than in any steam railroad wreck in the properties I have had to do with, simply for the reason that all on the front seats were killed in the collision. I would rather, if I were operating a railroad, have two steam trains come into collision at 50 miles an hour, than two electric cars at 20 miles an hour. I am satisfied the results would not be so disastrous in the case of the steam cars. It is very important in the interests of interurban operation, before you are compelled by State and municipal regulations to do these things, to take them up and consider them and do them yourselves. The history of steam railroading is open to you. It is not the theory of any one. It is a scientific development. It has developed from the staff system up and onward. I operated as a conductor twenty-five years ago under the staff system of signalling spoken of in the paper, and this reference reminded me of something that occurred on the New Haven road. They used the staff system on a single track across one of the bridges, and there were positive orders that no trains should proceed over the bridge unless the engineer had the staff in his possession. It was a brass staff. A train came across the bridge and the fireman handed the staff to an engineer on a train which was about to proceed over the bridge, and the staff fell through the trestle and went into the river. The road was tied up until some method was discovered of getting across the bridge without the particular brass staff that had been used. Col. Heft will undoubtedly defend the New Haven road.

Mr. Heft.—What you say only goes to show what a perfect system we have on the New Haven road.

Mr. Dickinson.—There seems to be a mistaken idea here that the steam roads have a perfect system of signals. They have not; neither have the street railroads. They all depend on human agency, and that will fail sometimes. In the steam practice the desire and the effort have been to reduce the number of chances of misunderstanding by reducing the number of people who control the movement of trains. In Seattle we are doing the same thing. We originally installed our interurban service with a telephone system for signalling, and we are about to take the telephone out and put in the telegraph, because we find it impracticable to protect our train orders by telephone. Persons who have no right to answer the telephone will do so, and the despatcher will send orders and they get mixed up. We are going to run under the standard rules governing train orders, both as to lights and signals; fuses, rear lights—all in accordance with the standard system of train despatching.

DISCIPLINE OF EMPLOYEES

President Vreeland.—We have been fortunate in having sufficient time at our disposal to give each paper and topic presented ample attention. There is only one paper left. It is the paper on "Discipline of Employees by the Merit System," by W. A. Satterlee. There is little in the paper except what is statistical, and as it has been distributed to the members there will be no need for reading it. I ask Mr. Harrington to open the discussion on this paper.

Mr. Harrington, Camden, N. J.—The paper just presented by Mr. Satterlee is a valuable contribution, and is a clear and concise statement, indicating the tendency of recent practice in disciplinary methods. The interest taken in the subject of discipline, the method, the rule of procedure and the relation the employer should bear to the employee has never been greater than at the present time. The individuality of the employer has much to do with the results of any system of discipline. A system is not the panacea. It is conceded by all that the old method of suspension for violation of rule was not fruitful of results. Certain facts have become patent as being essential to any system of discipline, to wit:

The keeping of a thorough history of each employee from the date of his employment, showing clearly all irregularities, violations of rules, relation to complaints, accidents, and secret service.

The employee to receive a hearing, to be treated with consideration, to be given opportunity to explain under proper conditions and surroundings his position, before discipline be ordered.

Any system in which the employee is disciplined conforming to the thirty-two features will conduce to better feeling and be followed generally by better results.

Experience has dictated that in exercising discipline great care must be observed in not passing judgment until all facts have been thoroughly investigated. Experience has furthermore demonstrated that the misdeeds, violations of order, breaches of discipline of the employee, in some way or another, are brought to the attention of the employer. Whereas, the commendable acts, the

little refinements of courtesy, the observance of duties and rules, that may be the practice of the employee are seldom known and are really and legitimately expected. Threats are not conducive to good discipline, nor producing of good results. What good can possibly come from balancing bad against good? Bad is from the very nature of things bound to crop out and be known, while good is less apparent, less known and never as strenuously obtruded upon us. Wherein does the good, conscientious, able, trustworthy employee profit from a system of merits and demerits? It does not seem that the merit and demerit system reaches the core. I have in mind men who would not care in the slightest whether they had ten or one hundred demerits, or merits; they would run the chances of detection in just the same fashion that certain conductors do in the matter of irregularities in fare registration. However, let these men actually lose something, though it be but a little, in their standing in the grade, class or seniority—it need not, and in fact better not, be a threat of discharge—and what is the result? The punishment is immediate, the penalty is paid at once, the evil-doer suffers, and what is more advantageous, the worthy, painstaking employee receives immediately what he is entitled to, recognition and advancement.

I have tried the suspension system, the merit and demerit system, and abandoned them both after careful and persistent trial and effort. The demotion system was first put into effect upon our railway just about two and a half years ago, and has been gradually developed into a thoroughly operative, practical system and conducive to the best results. Under this system an employee for any irregularity is notified that he will be demoted one or more points on the seniority list if proper explanation be not made on or before a specified date. This notice with an account of the irregularity is posted on the bulletin boards at the meeting-places of the men. This usually results in the men whose names are posted arranging to meet the general manager, affording an excellent opportunity to exercise judgment in enforcing discipline. The wholesome effects are most noticeable, and efficient and reliable employees under this system forge gradually and surely ahead, obtaining the best and most profitable runs at the disposal of the company, and in such men the general stability of the working force is maintained against any possible disaffection upon the part of the man suffering from demotion. It can be seen that this system, while not directly taking cognizance of the efficient employee, in fact does take the most pronounced action in his behalf.

President Vreeland.—I will read the following announcements:

ANNOUNCEMENTS

The pronounced success which has characterized the business meetings of this convention has been due to the fact that papers have been presented upon subjects which are of vital importance to every street railway, no matter what its environments may be, and these papers have been actively discussed by a large number of our members. For this reason we hope that all of our members will give thought to the matter of subjects on which papers shall be presented next year. The secretary will issue a request to members, asking for suggestions as to topics for papers, and we hope the members will give the subject careful consideration, and that when they suggest subjects they will also indicate a proper person to write on the subject.

John G. Holmes, of Pittsburgh, one of the past presidents of the association, to whom I extended an invitation to be present at this meeting, sends a letter in which he regrets his inability to be present on account of business engagements, recalls his many pleasant acquaintances among the members and wishes to be remembered to them.

Secretary Penington desires to thank personally the writers of all the papers for their promptness in forwarding copies of their papers so that they might be printed in ample time before this meeting. This helps the work of the secretary very greatly. All of the papers were received about five weeks before the date of this meeting, which enable the secretary to have them in the hands of the members fully two weeks before the convention.

President Vreeland.—We will have the report of the committee on resolutions.

REPORT OF THE COMMITTEE ON RESOLUTIONS

The following report was presented by Messrs. Bean and Dickinson, and was adopted:

Resolved that the thanks of this association be tendered to Jere C. Hutchins and his able assistants for their efforts in our behalf during the convention;

To the exhibit committee, especially its chairman, John H. Fry, for the very complete arrangements made for the exhibit and the satisfactory manner in which they were carried out;

To the supply men for the magnificent manner in which they have conducted their exhibits at this meeting;

To the local press for the very complete and intelligent reports of the transactions of the convention;

To the several passenger associations which have granted the reduced rate of fare and a third to the persons attending this meeting;

To the president and the other officers of the association for the admirable manner in which the affairs of the association have been conducted during the last year, and to all who have in any way contributed to the success of this most interesting convention.

NEW OFFICERS

The committee on nominations then presented the following report:

Your committee on nominations respectfully report recommending the following officers for the ensuing year:

President, Jere C. Hutchins, president Detroit United Railways, Detroit.

First vice-president, W. Caryl Ely, president International Railway Company, Buffalo.

Second vice-president, W. Kelsey Schoeff, president Cincinnati Traction Company, Cincinnati.

Third vice-president, P. S. Arkwright, president Georgia Railway & Light Company, Atlanta.

Executive committee.—H. H. Vreeland, president Metropolitan Street Railway Company, New York; R. T. Laffin, general manager Worcester Consolidated Street Railway Company, Worcester; Andrew Radel, vice-president Middlesex & Summerset Traction Company, Bridgeport; Walter P. Read, vice-president Consolidated Railway & Power Company, Salt Lake City; Willard J. Hield, general manager Twin City Rapid Transit Company, Minneapolis; secretary and treasurer, T. C. Penington, treasurer Chicago City Railway, Chicago.

The committee has received but one invitation for the place for holding its next annual meeting. Mr. J. W. McFarland, superintendent of the Chattanooga Electric Railway Company, Chattanooga, Tenn., appeared before the committee and extended an invitation on behalf of his company and the city. Owing to the limited information in possession of your committee, we do not feel warranted in recommending Chattanooga as the next meeting place, but do recommend that the matter be referred, with full power, to the incoming executive committee.

On motion of Mr. Root, of New York, the secretary was authorized to cast the ballot of the association for the officers named by the nominating committee. The secretary cast the ballot and the gentlemen were declared duly elected.

President Vreeland.—We will adjourn, to meet at the banquet tonight, and in accordance with the usual custom, the installation of the new officers will take place at the close of the banquet.

Officers of the Accountants' Association

At the meeting held Friday morning of the Street Railway Accountants' Association of America, the following were elected officers of the association for the coming year:

President—Henry J. Davies, secretary Cleveland Electric Railway Company, Cleveland, Ohio.

First Vice-President—Irwin Fullerton, general auditor Detroit United Railway, Detroit, Mich.

Second Vice-President—D. Dana Bartlett, general auditor Boston & Northern Railroad Company, Boston, Mass.

Third Vice-President—J. B. Hogarth, auditor Denver City Tramway Company, Denver, Col.

Secretary and Treasurer—W. B. Brockway, consulting accountant, Birmingham Railway, Light & Power Company, 25 Broad Street, New York.

Executive Committee—The officers and H. C. Mackay, comptroller the Milwaukee Electric Railway & Light Company, Milwaukee, Wis.; O. M. Hoffman, treasurer Conestoga Traction Company, Lancaster, Pa., and Elmer M. White, cashier Hartford Street Railway Company, Hartford, Conn.

A fourth member of the executive committee was not elected, but his selection was left to the committee, pending the determination of the next place of meeting.

On Dec. 2, in San Francisco, there is to be held a special election for the purpose of submitting to the people propositions for acquiring the Geary Street Railroad at the expiration of the present franchise on Nov. 6, 1903. All will await with interest the result of this vote.

The Banquet

As usual the banquet was the crowning feature of the meeting, and its most important social event, and on this occasion it was an unusually brilliant assemblage. There were at least 400 in attendance, about one-third of whom were ladies, and the scene presented was unusually attractive. The banquet was given in the large dining-room of the Cadillac, which was decorated for the affair. From the marble pillars which divide the mirrored room into sections, long, drooping streamers of smilax were strung to all sides of the room. The middle of each table was a solid bed of American Beauty roses set in their own foliage, and there were also huge clusters of these flowers on every table.

The tables were placed in four rows, with the president's table at the head, facing the gathering. President Vreeland acted as toastmaster, and at the table beside him sat the newly elected president, Jere C. Hutchins, Mayor Maybury, Gen. Russell A. Alger, Secretary T. C. Penington, W. Caryl Ely, of Buffalo; Michael Brennan and James T. Keena, of Detroit, and others, speakers and officers of the association.

President Vreeland, in opening the proceedings, spoke of the work done by the companies represented in the association, the character and value of the properties operated, and the services performed. He formally installed the new officers of the association and bespoke for them the same hearty co-operation which he has received. The newly elected president, Jere C. Hutchins, received an ovation in which the Detroit representatives joined most heartily. Mr. Hutchins responded, thanking the members of the convention for the great honor which they had conferred upon him, and through him, on his company, the city and the State. He also referred to the work which electric railroading is doing for mankind. Mayor Maybury responded to the toast, "The Growth of Detroit," and thanked the convention for honoring President Hutchins with the highest office in its gift.

Michael Brennan responded to the toast, "How the People Would Run a Street Railway," and spoke particularly of the newspapers. The next speaker, W. Caryl Ely, of Buffalo, spoke on "The Future Electric Railway," and James T. Keena, of Detroit, spoke in a humorous vein on "The Trolley; Its Future State," referring to possibilities in the worlds we know not of. The programme was interspersed with singing by a quartet and soloists.

In conclusion Mr. Brennan moved a vote of thanks to the toastmaster, Mr. Vreeland, and in acknowledging the honor Mr. Vreeland thanked all who had aided in making the convention such an unqualified success.

Master Mechanics' Association

A notice posted near the main entrance to the convention hall at Detroit stated that all master mechanics in attendance at the convention were invited to meet at Station A of the Detroit United Railway at 3 o'clock on Thursday afternoon. In acceptance of this invitation about a dozen or fifteen gentlemen attended the meeting, the purpose of which, as announced by Thomas Farmer, superintendent of motive power, was the organization of an association to be composed of the master mechanics and electrical engineers of the different companies. The proposition met with general approval, and at the meeting a committee of six members was appointed to meet on Friday at the office of Detroit United Railway, 12 Woodward Avenue, and take further action. The name suggested for the association, but not formally adopted, was "The Mechanical and Electrical Association of Electric Railways."

The committee elected at Thursday's meeting consisted of Thomas Farmer, superintendent of motive power of the Detroit United Railway, chairman executive committee; E. W. Olds, superintendent of rolling stock, Milwaukee Electric Railway & Light Company, Milwaukee, Wis.; William Pestell, superintendent of motive power and machinery, Worcester Consolidated Street Railway Company, Worcester, Mass.; G. W. Palmer, Jr., electric engineer, Old Colony Street Railway Company, Brockton, Mass.; C. A. Brown, master mechanic, Toledo Railways & Light Company, Toledo, Ohio; W. O. Mundy, master mechanic, St. Louis Transit Company, St. Louis, Mo.

At the meeting on Friday, it was voted to increase the membership of the committee and to hold another meeting at Cleveland on Jan. 12, 1903.

The Columbus, Delaware & Marion Railway will inaugurate "cold weather" trolley parties to the new hotel at Stratford. A "cold weather" trolley party sounds like an innovation in electric railway business, but it also sounds like a good way to develop new business.

THE EXHIBITION AT DETROIT

THE AMERICAN BLOWER COMPANY made no exhibit at the convention hall, but those of the delegates who visited the company's plant at Detroit were impressed with its magnitude and the excellent facilities there provided for manufacturing the blowers, fans, engines, etc., for which the American Blower Company has established so enviable a reputation. The company will gladly send a handsome booklet containing illustrations of its various departments to any one interested.

THE AMERICAN ELECTRIC SWITCH COMPANY, of Pittsburgh, was represented by W. S. Berry, who made an exhibit in connection with C. J. Harrington

N. A. CHRISTENSEN, of Milwaukee, made a separate exhibit from that of the Christensen Engineering Co., in the annex. Here he showed a Christensen motor-driven air compressor for use in shops, power houses, etc., for furnishing compressed air for cleaning purposes, for pneumatic tools, etc. Mr. Christensen stated that he now had facilities for turning out these self-con-

the joint seems likely to be the most popular one yet devised, since it is so easily made with special machinery and so tight.

THE UNION STOP & SIGNAL COMPANY, of Fall River, Mass., has an apparatus for enabling a despatcher on an interurban road to stop a car by means of a danger signal at any siding. This is done by automatic counting apparatus in the signal. But two wires in addition to the usual despatchers' telephone circuit are required. A time stamp system of triplicate train orders is used in connection with the system, and a record is kept at each telephone booth of the orders. No order can be taken from the booth without being first released by the despatcher. O. W. Hart, general manager, was present explaining the system.

THE G. P. MAGANN AIR BRAKE COMPANY, of Detroit, of course had an excellent exhibit in the form of its system in actual operation on all the interurban lines of the Detroit United Rail-



LOOKING FROM THE GALLERY OF EXHIBIT HALL

tained compressors in sizes up to 175-hp. The motor for driving the compressor is provided with the standard type of automatic cut-in and cut-out control, which throws the load onto the motor direct without resistance control.

THE CLIMAX FENCE POST COMPANY, of Chicago, was represented by H. E. Overstreet, general manager. The patented posts of this company consist of a steel top, for strength, with a clay base to prevent destruction by corrosion.

CRANE COMPANY, of Chicago, had its usual line of high-pressure steam valves and flanges on exhibition, in charge of Captain George A. Hurd. A flange in which the joint between the flange and wrought iron pipe was made by rolling the pipe outwardly into grooves in the flange was shown. This rolling is done by special machinery, developed by Crane Company, and

way. A special car with Magann air brakes was also at the service of all those desiring to make use of it. E. C. Rutherford, general manager, put up a small exhibit in convention hall, consisting of a miniature car equipment, a 1-hp air compressor, and a large storage tank for use where the air is compressed. This tank was 15½ ft. high by 36 ins. diameter, and a smaller tank was also provided for the first storage of the air and as a place for the newly compressed air to drop its moisture. The space was surrounded by a fence of brake cylinders. The company was also represented by Vice-President J. C. Grace.

THE STUART HOWLAND COMPANY, room 320, Cadillac, was ably represented by H. W. Smith from the Boston office and H. De Steese, of the New York branch office. A full line of overhead specialties were shown at the Cadillac, consisting chiefly

of standard types of flexible brackets and their now well-known forms of overhead suspensions, for both single and double trolley, of which 808 miles have been sold and delivered within the past seven months. The parlor was constantly filled with street railway delegates, who were loud in their praise over the "tasty" arrangements. Each guest was appropriately decorated with a unique souvenir, in the form of a medallion, bearing the legend "808, Detroit, 1902," to which was suspended a miniature facsimile of their famous "III rib" trolley wheel, which is now known throughout the country for its excellence in wearing qualities.

THE STANDARD POLE & TIE COMPANY'S exhibit consisted of the corner posts at the space occupied by the Consolidated Car Fender Company, together with sections of their

Ohio tunnel at Baltimore, was also shown. The usual motor generator testing, set with laboratory standard testing instruments, which Mr. Brown has had at several previous conventions for testing conductivity of bonds, was installed and in operation. A novel device, rather out of the previous lines followed by Mr. Brown, was a motorman's mirror, so mounted at the right of the motorman on the front platform as to enable him to see the rear step. The mirror necessarily hangs out further than the car but is mounted on a swivel so that in passing obstructions it will swing back. An iron cross-bond, with plastic plug bonds at each end, was also shown.

THE FEDERAL SUPPLY COMPANY, of Chicago, represented by J. E. Gavitt, showed samples of the Rogers improved journal box packing, which is a mixture of steel wool and cotton



A GENERAL VIEW OF THE EXHIBITS

Southern white cedar or juniper poles. They also had samples of Florida heart pine, the timber of which their cross arms and octagonal poles are manufactured. E. G. Chamberlin, the vice-president of the company, was in charge of the exhibit, and the secretary and treasurer, Fred. L. Merritt, was also in attendance. A neat little souvenir in the shape of an octagonal pen-holder, a fac-simile of its poles, was distributed.

THE ARMSPEAR MANUFACTURING COMPANY, of New York, made an exhibit of "Armspear" steel tail lights, switch-lights and hand lanterns, which served to impress the casual visitor with the importance of interurban work. C. E. Nicol, of New York, and C. K. Freeman, of Freeman & Buckley, Western representatives, Chicago, were in attendance.

HAROLD P. BROWN, of New York, exhibited, for the first time, a new plastic bond called the plastic socket bond, which consists of a flat copper plate with ball-tipped lugs on one edge, which goes inside the fish-plate. The lugs rest in holes drilled into the base of the rail. The plastic plug bond used in the Baltimore &

waste, which tends to prevent hot boxes. The Rogers packing receptacles, a steel netting for holding the packing, enable the packing of a journal with much less waste than would otherwise be required.

MESSRS. PORTER & BERG, of Chicago, were both on hand, and though making no exhibit themselves, the goods they handle were shown by various companies. E. R. Mason, the New York representative, was also there.

THE NEW YORK SWITCH & CROSSING COMPANY, Hoboken, N. J., was represented by M. W. Conway.

THE GREEN ENGINEERING COMPANY, of Chicago, had President P. Albert Poppenhusen looking after its interests.

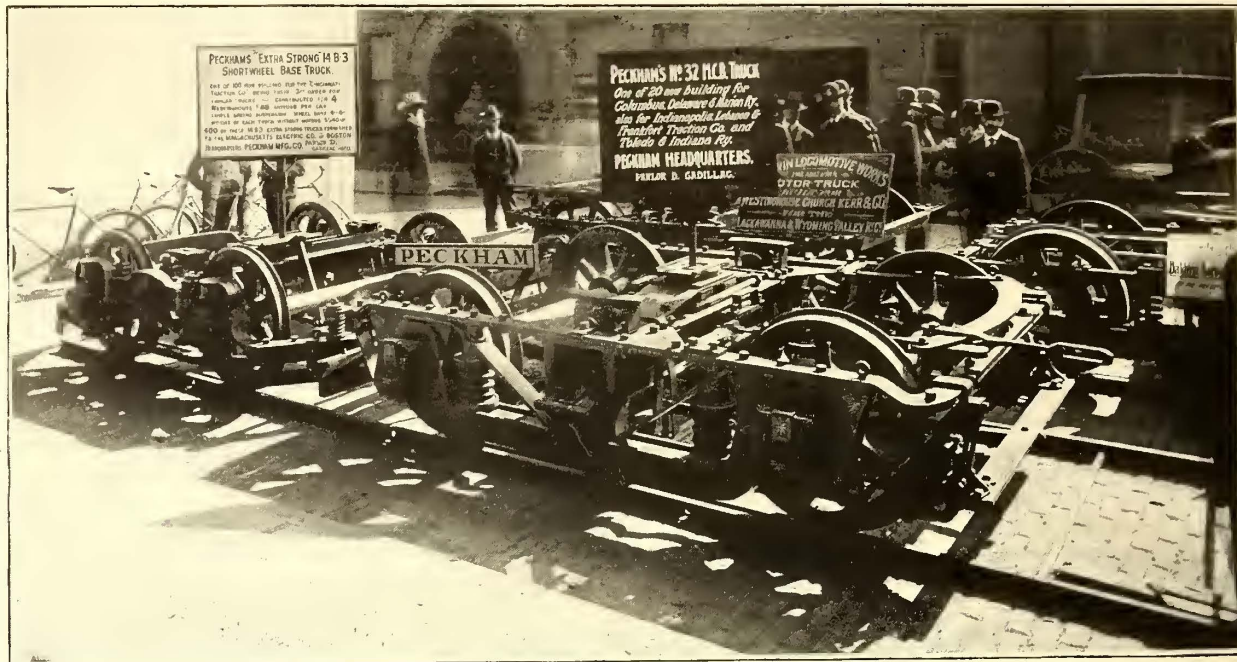
THE CONSOLIDATED CAR FENDER COMPANY, of New York, exhibited all four of its types of fenders, including the one for interurban cars. The Campbell snow broom and the Millen car-step lifter were also included in the exhibit. The extent to which this company controls the successful fender business in this country is shown by the large number of roads

using the Consolidated fenders, and the few good fenders offered by other companies. L. W. Haines and George Hollingsworth explained the fenders and other devices to visitors.

F. H. LOVELL & CO., of New York, were represented by A. Hall Berry, general manager. They had on exhibition all kinds

THE AMERICAN OIL FILTER COMPANY, of Philadelphia, distributed circulars describing its automatic oil filters.

THE R. D. NUTTALL COMPANY, of Pittsburgh, exhibited a full line of gears, pinions, trolley bases and bearings. The company was represented by F. A. Estep, president and treasurer;



THE EXHIBIT OF THE PECKHAM MANUFACTURING COMPANY

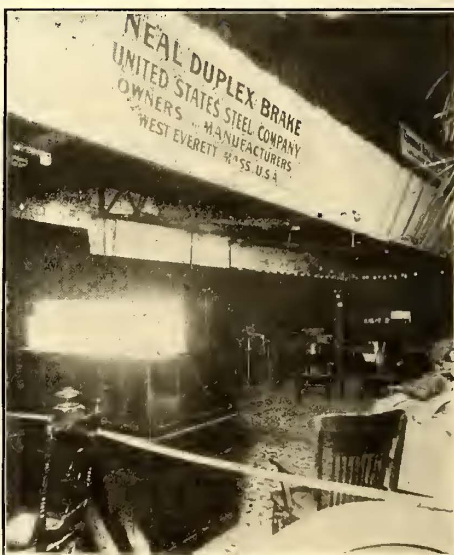
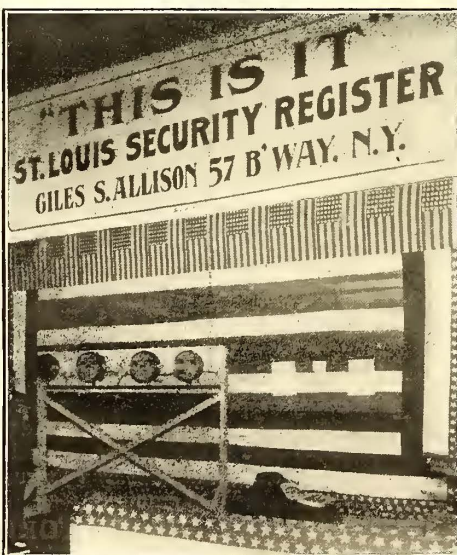
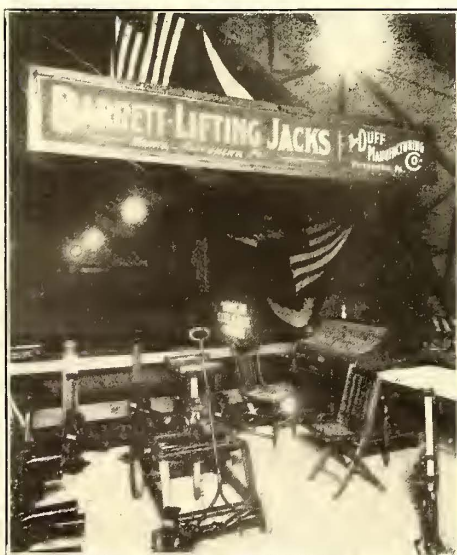
of overhead material manufactured by themselves at their own plant at Arlington, N. J.

THE NILES CAR & MANUFACTURING COMPANY, of Niles, Ohio, was well represented in the person of George E. Pratt, assistant general manager and contracting agent. Mr. Pratt, in addition to his other responsible duties with the company, has just been appointed purchasing agent.

THE PITTSBURGH REDUCTION COMPANY, of Pittsburgh, exhibited a full line of aluminum cables, both bare and insulated, which made this booth one of the brightest in the ex-

hibition hall. The company is publishing contains a great quantity of valuable engineering data.

THE PULLMAN AUTOMATIC VENTILATOR COMPANY, of York, Pa., was represented by William Rufus Reitzell, general manager, and by Lowell Williams, special representative. These gentlemen exhibited their ventilator on the special train from New York, and were awarded for doing so by several orders,



EXHIBITS OF THE DUFF MANUFACTURING COMPANY, GILES S. ALLISON AND THE UNITED STATES STEEL COMPANY

hibition hall. The company was represented by Secretary and General Manager Arthur V. Davis, of Pittsburgh; J. A. Rutherford and C. M. Harris, of Cleveland; Ernest H. Noyes, of Chicago; William Hoopes, electrical engineer; Safford K. Colby, manager New York office; Percy Hodges, Boston, and A. K. Laurie, general sales agent.

THE MAYER & ENGLUND COMPANY, of Philadelphia, was represented by C. J. Mayer, president; W. A. Armstrong, Philadelphia; J. M. Gallagher, of Chicago, and W. A. Cockley, of New York.

received before reaching Detroit. They also equipped with their ventilator system a Detroit car, which was run on tracks near the hall, and attracted much attention from the delegates.

GEORGE S. HASTINGS, the Cleveland sales agent, who handles Smith heaters, St. Louis cars and numerous other lines, was in constant attendance. His tin "cricket," labeled "I chirp for Hastings," was one of the most popular souvenirs of the week.

MERRITT & CO., of Philadelphia, exhibited their expanded metal lockers, and were represented by Stephen Morris. The peculiar advantages of the Merritt lockers are their durability and

neatness; the freedom with which they admit light and air; the ease which they are kept clean and the adequate protection which they furnish. They are already in use in the power stations and car houses of some of the largest electric railway systems of the country.

THE STERLING LUBRICATOR COMPANY, Rochester, N. Y., had several styles of its force feed lubricators in actual operation in a prominent stand on the main floor. The device has a positive feed, it will pump against any pressure and can be regulated to supply any amount of oil to any cylinder. An automobile lubricator was featured. J. Sherry was in charge.

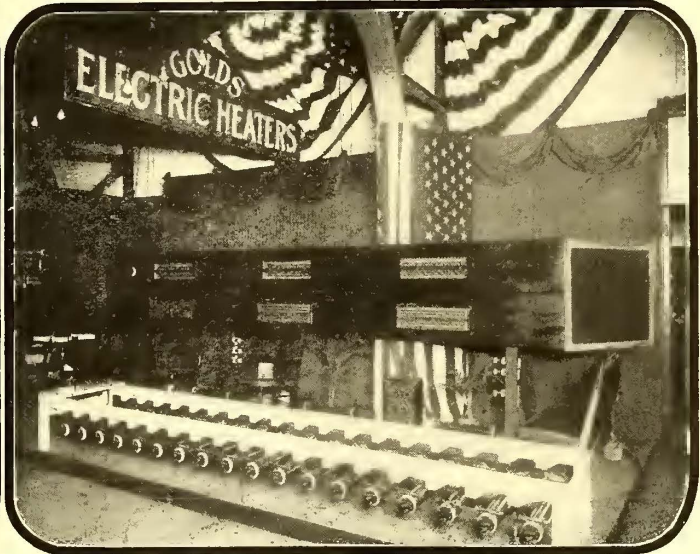
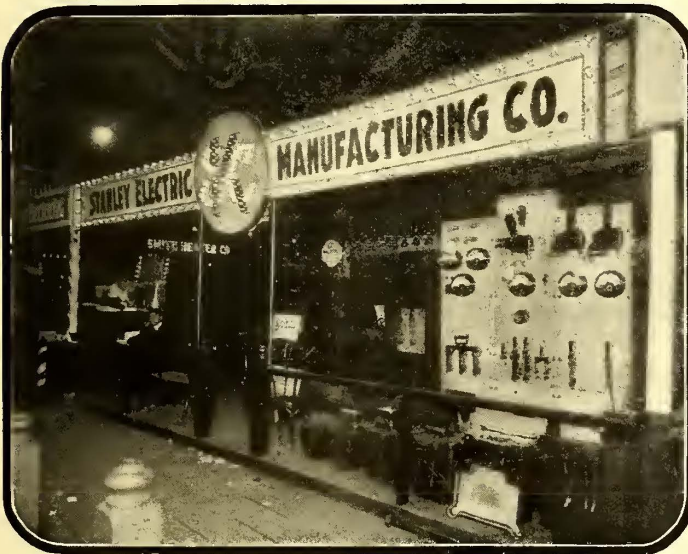
GEORGE F. BRANDAU, of Utica, N. Y., exhibited an automatic life guard and combination car brake. One of the devices was attached to a Detroit United Railway car, and many of the

THE BETHLEHEM STEEL COMPANY, South Bethlehem, Pa., showed several samples of hollow-forged open hearth steel, and distributed a fine pamphlet describing and illustrating its product in detail. Clifford B. Hansen was in charge.

THE AMERICAN TRACKBARROW COMPANY, Lowell, Mass., presented a wheelbarrow with flanged wheel for running along track, and a pony car and timber track truck. Edward B. Peirce, manager of the company, demonstrated the articles.

THE VAN DORN & DUTTON COMPANY, of Cleveland, showed a new track cleaner, an automatic lift, and gears and pinions of various kinds. W. A. Dutton, secretary and treasurer, was in charge of the exhibit.

THE VAN DORN-ELLIOTT ELECTRICAL COMPANY, which is affiliated with the above, showed a rewind armature



EXHIBITS OF ELECTRIC STORAGE BATTERY CO., STANDARD PAINT CO., STANLEY ELECTRIC MANUFACTURING CO. AND GOLD CAR HEATING AND LIGHTING CO.

delegates witnessed an actual demonstration as to its advantages on Larned Street Friday afternoon.

DALLETT & CO., Philadelphia, dealers in new and second-hand material, showed a sample of a G. E. 1000 motor, a number of which they have for sale.

THE GREAT WESTERN SMELTING & REFINING COMPANY, Chicago, was represented by Nathan Alper, who exploited the XXXX nickel babbitt and copper hard babbitt.

THE FEDERAL MANUFACTURING COMPANY, Cleveland, represented by A. J. Johnson, showed the Federal trolley pole and the Johnson trolley retractor. The device draws down the trolley pole full 15 ins. below the line whenever the trolley wheel leaves the wire. The device attracted much attention. The Ludlow Supply Company, Cleveland, are agents for the device.

THE GARRY IRON & STEEL COMPANY, Cleveland, was represented by E. C. Powers, secretary, who assisted the Ludlow Supply Company in explaining the features of the Garry pneumatic car jack, pit jack and Dolly bar.

field coils, armature coils and commutators. The stand was nicely decorated. W. A. Dutton and J. N. Elliott were in attendance.

THE UNIVERSAL SANITARY CUSPIDORE COMPANY, Worcester, Mass., was represented by N. R. Thibert and N. J. Beaudin. On exhibition were several styles of their sanitary cuspidores for car and office use. The former are built into the car floor, and covered with grating flush with the floor. They are connected in parallel to a single pipe, and can be flushed at the barns or end of the line by attaching a hose.

THE NATIONAL LEAD COMPANY, New York, was represented by F. B. Pierson, the Detroit manager; Walter H. Baker, St. Louis; Arthur Jones, Cincinnati; Richard L. Weithas, New York; Walter F. Marks, Chicago, and A. G. Marks, Detroit. The exhibit consisted of bar and wire solder, coach and car lead, Phoenix babbitt metal journal bearings, armature bearings and motor-axle bearings. Samples of motor-axle bearings, lined with Phoenix babbitt, which had been in use for many months on Detroit United cars, were shown.

THE STANDARD VARNISH WORKS, New York, showed a number of armature coils insulated with its various varnishes and compounds. J. C. Dolph was in charge.

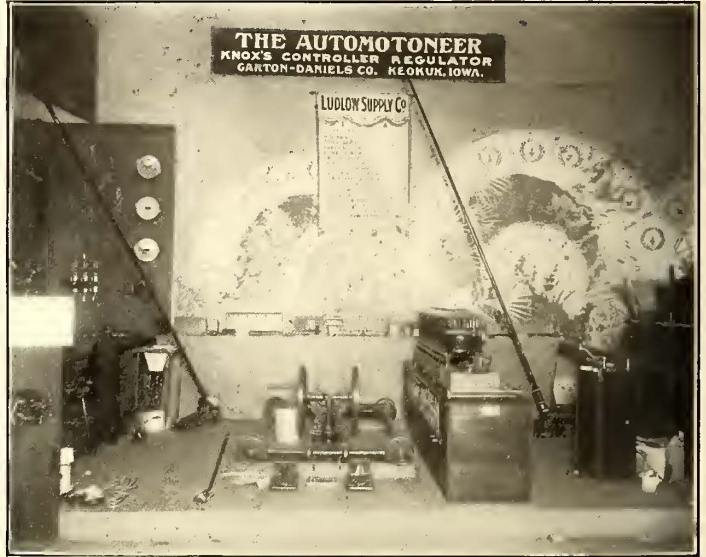
THE PANTASOTE COMPANY, New York, showed its well-known Pantasote and Climax curtains and curtain fixtures for open and closed cars. The stand was handsomely decorated with palms. John M. High represented the company.

THE ADAMS & WESTLAKE COMPANY, Chicago, New York and Philadelphia, made an exhibit of various kinds of oil and electric headlights, lanterns, classification lamps, switch and tail lamps, Adlake and Kling brake handles, and a contratwist

door fixture for double doors. A large electric headlight in operation attracted attention to the stand. E. L. Langworthy and A. S. Anderson, of Chicago, and James A. Foster, of Philadelphia, were present.

THE HALE & KILBURN MANUFACTURING COMPANY, New York, had on exhibition fifteen seats of various kinds. A specialty was made of its canvas-lined rattan seats and a new seat, showing steel construction throughout. H. I. Bigelow entertained customers.

THE CURTAIN SUPPLY COMPANY, Chicago, had a very comprehensive exhibit of curtains, curtain materials and curtain



A GROUP OF ATTRACTIVE EXHIBITS

fixtures for open and closed cars. This company claims to hold important basic fundamental patents on curtain fixtures. It supplies a majority of the leading traction companies of the country, and in many cases furnishes roads with original and exclusive designs of curtains. It has recently opened an office at 2131 Park Row Building, New York city, in charge of A. L. Whipple, sales manager. W. H. Forsyth, general manager of the company, was in charge of the exhibit.

THE STANDARD PAINT COMPANY, New York, showed samples of P. & B. paints, electrical compounds, tape, car roofing and insulating papers. J. C. Shainwald, Western manager, B. C. Beckman and E. R. Willard, of Chicago, were in charge. Favored visitors were presented with a very fine leather card case.

THE NATIONAL CARBON COMPANY, Cleveland, had its usual complete exhibit of various products of the Cleveland and Sandusky plants. Among other goods were shown Partridge, Solar and National brushes in various grades, including Columbia wire gauze and plumbago types; Columbia arc carbons for head-lights and enclosed arc lighting; also auto cells and Columbia

THE LUMEN BEARING COMPANY, of Buffalo, was represented by E. P. Sharp, manager of the street railway department, who explained the advantages of Lumen bronze bearings and trolley wheels, Alpha bronze check plates and Lotus lining metal. Samples of new molds for the G. E. motors on the Manhattan Elevated and Aurora, Elgin & Chicago high-speed cars, were displayed.

THE PITTSBURGH BLUE PRINT PAPER & MANUFACTURING COMPANY, Pittsburgh, represented by S. B. Whinery, general manager, and Robert Gibson, salesman, demonstrated the new Pittsburgh transfer ticket machine. This is secured on the wall on the rear platform, and by turning various thumb screws the conductor sets the machine for the desired streets, time and direction; then by turning a crank the type is inked, impression made on a roll, and transfer clipped off. The transfers are counted and indicated by a dial at the side. The date line may be locked before starting, and the type cannot be turned back. The machine may be set for any predetermined hour, and it is impossible to turn beyond this point. It is claimed that by the use of this device it is impossible to issue a fraudulent transfer, and it is obviously impossible for a conductor to dispose of a package of blanks.

THE PETER SMITH HEATER COMPANY, Detroit, had a handsomely furnished booth at the left of the main entrance. In the center was a large painting of the "King of Car Heaters," illuminated by a frame of incandescents. Three styles of this well-known heater were shown. The heaters on the Detroit United Interurban cars and the heater installed in one of the Brill cars on trackway formed part of the exhibit. Peter Smith, president, and E. W. Smith, superintendent, were in charge and entertained their friends. George S. Hastings, the Cleveland supply man, who is general sales agent for the Smith heater, spent much of his time at this stand.

THE ATLAS RAILWAY SUPPLY COMPANY, Chicago, had a large exhibit, consisting of Atlas rail joints and braces, straight line and compromise or step joints, raised joints for paving purposes, raised braces, tie plates, Atlas primer and surfacer for coaches, paints for trucks, trolley poles, car roofs, etc. A feature was made of the new Atlas trolley sleet cutter, a simple and inexpensive device, which can be attached without removing the trolley wheel. J. G. McMichael, president and treasurer; R. B. Kent, vice-president and secretary, and C.

D. Porterfield, engineer, were in attendance.

THE CLIMAX STOCK GUARD COMPANY, Chicago, had on exhibition samples of its well-known Climax vitrified clay stock guard, which is in use on a number of important interurban lines. H. E. Overstreet was in charge.

THE DORNER TRUCK & FOUNDRY COMPANY, Logansport, Ind., had its exhibit on the trackage on Larned Street. The feature was the new Dornier high-speed truck, which shows several good features. It has large springs on each side of the journal boxes, working in unison with elliptics. The top frame is extremely rigid, there being a truss-steel bolster in the center. It is claimed this is one of the easiest riding trucks in the market. The Burke safety switch lock was also shown. This device is especially advantageous for roads employing double-truck cars, as the switch remains locked in position until turned by the next conductor. The well-known Reliance track cleaner was another feature, demonstrated by H. A. Dornier, sales agent for the company.

THE SPRINGFIELD MANUFACTURING COMPANY, Bridgeport, Conn., exhibited its car-wheel grinding outfit in the annex. Both wheels are ground on the axles at once. In shop practice the wheel turning device and the grinders may be operated from a counter shaft by a single motor, but in the exhibit three motors were used. The wheel head is on a compound swivel and slide, so that the cut may be made at any angle. G. W. Jackman was in charge.

THE LUDLOW SUPPLY COMPANY, Cleveland, exhibited several of the line for which it is sales agent; others were displayed by the manufacturers. The feature was a model car arranged for demonstration of the pneumatic car lift, used for

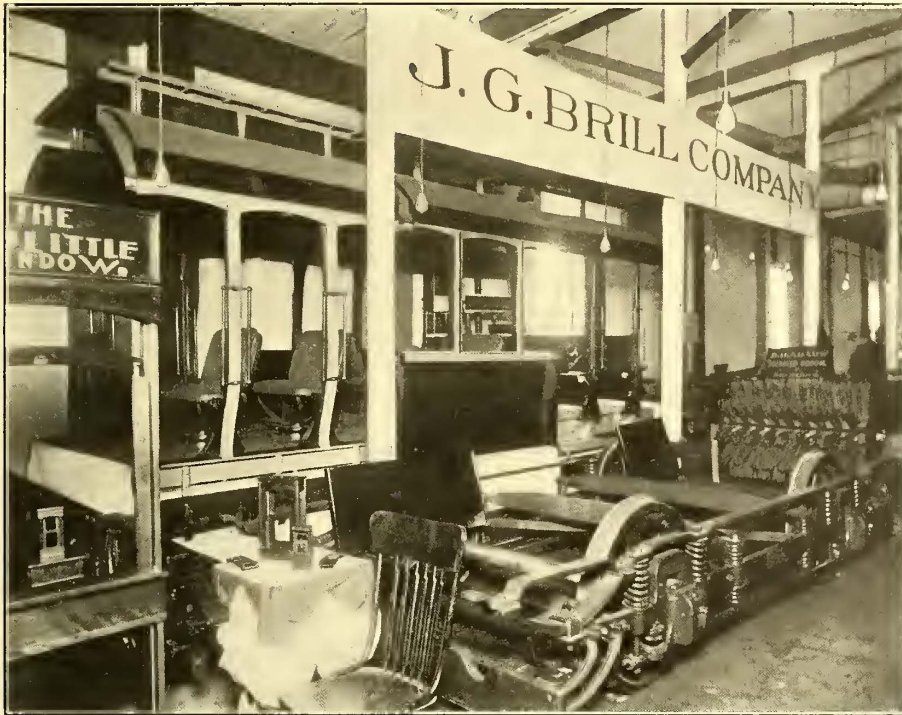


EXHIBIT OF THE J. G. BRILL COMPANY

dry cells for automobile and gasolene engine sparking. James Partridge, manager of the Partridge works, Sandusky, and R. K. Mickey, of Cleveland, were in charge. A useful article in the shape of a letter opener was distributed.

THE D. & W. FUSE COMPANY, of Providence, R. I., was represented in a neat exhibit, made by A. Hall Berry, 100 William Street, New York.

THE KALAMAZOO RAILWAY SUPPLY COMPANY, Kalamazoo, showed samples of the Kalamazoo ratchet and friction jacks, models of the Kalamazoo cattle guard, and the Kalamazoo hand-car wheel, which is built with malleable center and weldless steel tire.

THE ROOT TRACK SCRAPER COMPANY, Kalamazoo, Mich., exhibited the Root track scraper and a flange cleaner. The two devices are separated, the flanger being in front of the scraper. They may be fastened either to the body of the car or to the trucks. The flanger is made for any style of rail, and it may be adjusted and set by means of a lever for any pressure or depth of snow. F. N. Root, manager, was in charge. The company will shortly bring out a new sleet cleaner for the trolley wire.

THE GLOBE TICKET COMPANY, Philadelphia, showed various styles of tickets, transfers and order books. A feature was made of a new form of transfer, on which the hour and minutes may be punched at one time. A souvenir cigar cutter was distributed to the company's friends by W. C. Pope, D. C. Griffiths, P. C. Snow and H. N. Brown.

THE NATIONAL TICKET COMPANY, Cleveland, had samples of tickets and transfers. A. J. Reynolds and C. F. Bates were kept busy distributing small bottles of "ink," which for some reason or other were in great demand.

raising cars and removing motors, built by the Garry Iron & Steel Company, Cleveland. Another center of attraction was the Johnson trolley retractor, which instantly pulls the end of the pole down to 15 ins. below the overhead construction. Chisholm & Moore rail braces, chair braces and joints; Milwaukee reinforced trolley poles, Nichols-Lintern air sanders were also shown. The Simplex Electric Heating Company exhibited various forms of its electric heating apparatus at this stand. Colonel W. E. Ludlow was in charge.

THE BRADY BRASS COMPANY, Jersey City, manufacturer of Cypus bronze specialties, exhibited a complete line of motor bearings, journal bearings, check plates, babbitt metal, solder, trolley wheels, etc. The company makes the statement

THE SCARRITT CAR SEAT WORKS, St. Louis, had five of its seats in a neat display. Two were of the walkover type and the others reversible. Cane, imitation leather and plush upholstery were shown. A recent contract of importance taken by this company was for 1000 seats for the St. Louis Transit Company. R. R. Touhy, assistant superintendent, was in charge. George E. Howard, superintendent, was absent on account of press of business.

THE SPENCER, OTIS COMPANY, Chicago selling agents for the Hart tie plate, made a neat exhibit of this specialty. The top surface of this plate is cambered and corrugated, preventing the accumulation of sand under the rail, thereby minimizing a sand-cutting effect on the plate and rail. It acts as a natural shed



EXHIBITS OF PETER SMITH HEATER COMPANY, HEYWOOD BROTHERS & WAKEFIELD COMPANY, HAROLD P. BROWN AND THE PENNSYLVANIA STEEL COMPANY

that its journal and motor bearings are in use in 20,000 electric cars in this country. Daniel M. Brady, Charles M. Reubens and Clarence P. King were in charge.

THE LE VALLEY VITÆ CARBON BRUSH COMPANY, represented by its president, J. V. Clarke, displayed an assortment of the various shapes, sizes and grades of carbon brushes in its line. Long life, high conductivity and smooth wearing qualities are claimed for this brush. Exhibited in a case were a number of brushes which had been in use on prominent roads for remarkably long periods of time. One sample used on a Westinghouse No. 49, on the Tarrytown, White Plains & Mamaroneck Railway, showed but ½-in. wear in 16,836 miles. Another brush, tested by the Lorain Steel Company on one of its motors, showed 7-16-in. wear in 14,000 miles. Souvenir brushes were distributed.

THE MALTBY LUMBER COMPANY, Bay City, Mich., had an exhibit in the smoking room, consisting of a number of photographs of views in its lumber yards, saw mills, forests, etc. Displayed were sections of cedar poles and cedar ties. A. Maltby and I. A. Maltby were in charge.

for water, brine or other drippings from the car and increases the adhesive qualities of the plate to the tie by minimizing the wave motion on the plate, also prevents buckling. The under surface of plate is provided with longitudinal flanges, designed to compress the fibers of the wood as they penetrate, thereby increasing its density. It is designed for greatest transverse strength. W. L. De Reiner and H. H. Hart were in charge.

F. H. NEWCOMB, of Brooklyn, displayed in a large case a line of uniform caps and badges. Mr. Newcomb makes a specialty of these goods and supplies many of the leading steam and electric roads of this country.

THE HEYWOOD BROTHERS & WAKEFIELD COMPANY, Wakefield, Mass., had an attractive booth in which it showed a full line of its railroad specialties, consisting of car seats, spring seating, rattan webbing, mats, etc. The Wheeler No. 42 was shown in rattan, with backs offset, by which means aisle space is gained at a point where it is desirable. The seat has a brass grab handle on the back for passengers standing. A handsome sample of this seat was shown in plush, with high back, head rest

and spring edge cushion; a most comfortable seat for a long ride. It has a pedestal base, which is convenient when cleaning the car, and a movable foot rest, allowing space under seat for grips and packages. A sample of the double revolving chairs used in Brooklyn and other cities was shown, as were samples of spring seating furnished in rattan, carpet, plush and artificial leather. The company is a very large manufacturer of rattan webbing, and uses selected stock hard-enamel finish rattan for car seat work. Samples of this were shown unlined and with canvas lining. Snow brown rattan and cocoa mats for elevated cars were shown in large quantities. F. H. Henry, of Wakefield, and Bertram Berry, New York office, were present for the company.

THE KINNEAR MANUFACTURING COMPANY, Columbus, Ohio, showed a steel rolling door for car houses. It is composed of flexible steel slats, and when raised rolls into a hood. Around this hood passes the trolley circuit, and when the door is raised a breaker drops flush with the trolley wire, making a clear

THE AMERICAN CIRCULAR LOOM COMPANY had an exhibit of circular loom with especial reference to car wiring and street railway needs. J. L. Kirkland, of New York, and Thomas G. Grier, of Chicago, Western manager, were in attendance.

THE A. & J. M. ANDERSON MFG. CO., of Boston, made a leading feature of a new section insulator, which they have recently devised and which was one of the neatest novelties in overhead material exhibited. The insulating section on which the trolley wheel runs was detachable instantly for renewal, and the ends to which the trolley wire was fastened were so hooked to the main frame that they could be taken off by taking the tension off the wire. The device was very favorably commented on. Ernst Woltmann and H. F. Sanville, of the Philadelphia office, represented this well-known firm of overhead material manufacturers.

THE SHERWIN-WILLIAMS COMPANY, of Cleveland, whose paints are used as standard by a great many electric rail-



SEVERAL ATTRACTIVE EXHIBITS

surface for the trolley wheel. F. B. Billheimer, who was in charge, passed out a pasteboard model of the door, the operation of which puzzled many of the best brains at the convention.

THE AMERICAN CAR SEAT COMPANY, Brooklyn, showed several samples of pushover car seats in rattan, plush and pantesote. The company is a large producer of sweeper rattan, and imports direct from its own plants. It introduced a new feature in mechanical pushover action, embodying so few parts that it is claimed the cost of replacements cannot be considered. Hiram E. Ackerly, sales manager, and Lewis Jansen, superintendent, were in charge.

THE GRIFFIN WHEEL COMPANY, Chicago and Detroit, had a plain but prominent display, consisting simply of four sets of its well-known car wheels. The stand was tastefully decorated with palms. W. S. Harpell and C. K. Knickerbocker were in charge.

THE NUNGESSER ELECTRIC BATTERY COMPANY, of Cleveland, had an exhibit of its dry batteries for use on the call bell on cars.

way lines, made a strong showing at this convention, demonstrating the great amount of attention this great paint company is giving to railway needs. E. M. Williams, manager street railway department; F. A. Elmgvist, special street railway representative, and Thomas Madill, manager of the street railway department in the West, did the honors. Sherwin-Williams paints were used on the Kuhlman car exhibit mentioned elsewhere.

THE UNITED STATES STEEL COMPANY, of West Everett, Mass., made a much stronger showing of the Neal duplex brake than ever before, the exhibit this year being in charge of J. S. Hamlin, manager of sales, who was well known as a master mechanic and brake expert previous to his connection with this company. The Neal duplex brake is so simple that there was little to make an exhibit of impressive size, and it is this simplicity and small number of parts that constitutes one of the numerous strong points of the brake. Three types of axle-driven oil pumps were shown, one of which can be placed on the same axle with a G. E. 57 motor, so little room does it take up. The oil is constantly circulated by the pump, the flow being throttled

to produce pressure for braking. The control valves are under the car and worked by rods from a motorman's handle. The motorman's handle is either independent of the hand brake or in conjunction with it, as the railway company may desire. The company has received a number of large orders the past few months. O. B. Gage, superintendent of works, and C. S. Miller, treasurer, were also present.

THE STERLING-MEAKER COMPANY, of Newark, N. J., represented by C. S. Ackley, president; E. B. McLean and C. F. Wickwire, exhibited all four types of registers, the Sterling brake and the Sterling sand box. The Sterling No. 5 register, just placed on the market, has been redesigned throughout and is remarkable for its simplicity of design, great strength of parts, large wearing surfaces, and other important features. This register could not fail to attract much favorable attention.

THE SPEER CARBON COMPANY, of St. Marys, Pa., exhibited a full line of carbon brushes in three grades. J. S. Speer was in attendance.

THE NEW HAVEN CAR REGISTER COMPANY, of New Haven, Conn., had a large representation both in the way of men and exhibits. Willis M. Anthony, president; F. C. Boyd, vice-president and general manager; John S. Bradley, secretary and treasurer, and representatives, H. E. Beach, M. DeF. Yates and J. M. Hayes. This company exhibited all its types of single,



EXHIBITS OF THE CLIMAX STOCK GUARD COMPANY AND DEARBORN DRUG AND CHEMICAL WORKS

double and triple, round and square registers, and also a new controller device to prevent the motorman from advancing the controller handle more than one notch at a time. There was a full line of badges, punches, trolley and bell cord and various other specialties, including telephone equipment for street railways.

EUGENE MUNSELL & CO. and THE MICA INSULATOR COMPANY were represented at the convention by Charles E. Coleman, manager for both concerns at Chicago. Mr. Coleman had a very prominent location in the center of the hall. In the space selected by William Wharton, Jr., & Co., Philadelphia. "Micanite" and "Empire" insulating materials were exhibited in their various forms, and the company's circular matter was distributed, which included a very neat blotter, which was at the writing rooms of the various hotels. The company reports a heavy demand for all its mica and micanite specialties, and has just completed an addition to its already extensive works at Schenectady, which will give it an increased capacity of 6,000 square feet of floor space, enabling it to execute all orders speedily.

THE GOULD STORAGE BATTERY COMPANY, of New York, had a neat exhibit, which included samples of all sizes of plates, from small 3 x 3 inches to those for large central station batteries. Glass and lead tanks were both shown, with special glass covers for preventing the spraying of acid and to keep down the fumes. Photographs of several railway battery and booster installations formed part of the exhibit. Gould booster systems were treated in Bulletin No. 2, which was distributed. W. W. Donaldson, sales manager, was in charge, and E. L. Draffen, manager of the Chicago office, and A. B. Herrick, electrical engineer, were also present.

ALFRED JOHNSON, electrician for the road at Quincy, Ill., has patented and is manufacturing what he has named the "Reliable Trolley Harp," the peculiar feature of which is that the contact springs are held in by a method which makes them much more easily renewable than riveting, according to the usual practice.

THE AMERICAN UNION ELECTRIC COMPANY, of New York, the recently formed consolidation of interests which

operates the Morris Electric Company and several others, was represented by Elmer P. Morris, E. Packer and J. Fountain, Jr. One corner of the north gallery was artistically decorated with Morris rail-bonds, Morris fare registers, Falcon switches, trolley wheels, trolley harps, pole brackets, overhead line material, signs and other Morris products. Mr. Morris distributed a neat brochure among his friends containing illustrated yarns of salesman life.

THE TAYLOR ELECTRIC TRUCK COMPANY, of Troy, N. Y., represented, as usual, by John Taylor, showed three trucks, all being swivel trucks for long cars. One of these was a short-wheel base truck with swing motion, another a swing-motion truck of a more common size, and a third an extra heavy swing-motion double truck for high-speed interurban service.

THE SAMSON CORDAGE WORKS, of Boston, made an exhibit of trolley and bell cord.

THE REVERSIBLE CAR SIGN COMPANY had its interests looked after by H. S. Kemp and R. H. Lancaster. The novel type of reversible car sign which this company is putting on the market was exhibited to excellent advantage and attracted much favorable comment.

THE DUFF MANUFACTURING COMPANY, Pittsburgh, Pa., exhibited the Barrett track jacks, car jacks, car house jacks, journal jacks and in addition the Barrett armature lift and truck

combined for transferring armatures from the motor frame or replacing them. Barrett jacks are to be found everywhere that electric railways operate, and now are being adopted for automobile work, having been endorsed by the Automobile Club of Paris. George F. Freed, superintendent, and Thomas A. McGinley, treasurer, represented the company.

THE AMERICAN ARITHMOMETER COMPANY, of St. Louis, Mo., exhibited the Burroughs adding machine, under charge of W. E. Weatherly; this exhibit, of course, being especially interesting to accountants, many of whom are now using these machines. It is used where any addition of a large number of items is to be made, especially on trial balance sheets and in checking up conductors' returns. C. N. Duffy, auditor of the Chicago City Railway, has four of these machines in his office, and commended it highly in his remarks before the Accountants' Association.

GEORGE W. WILLEBRANDS & BRO., of Detroit, exhibited a model of the Diamond spring frog crossing, which they are preparing to manufacture. The device is similar to the ordinary spring-frog crossing, but is provided with an additional lug for the wheel to travel over on a smooth surface. The crossing will be made with an interlocker, permitting an entire train to travel over the crossing without the spring frog returning to its former position. George W. Willebrands was in charge.

THE BELLAMY VESTLETTE MANUFACTURING COMPANY, of Cleveland, represented by O. N. McClintock, displayed the Bellamy vestlette for conductors. The device was described in the souvenir number of this paper.

THE C. C. WORMER MACHINERY COMPANY, of Detroit, had a stand where P. H. Biggs passed out the company's literature. This concern claims to carry the most complete line of machine tools in the central West.

THE NATIONAL LOCK WASHER COMPANY, Newark, N. J., had an exhibit of lock washers, sash locks, sash balances and curtain fixtures. R. L. Thomas and W. C. Dodd were in charge.

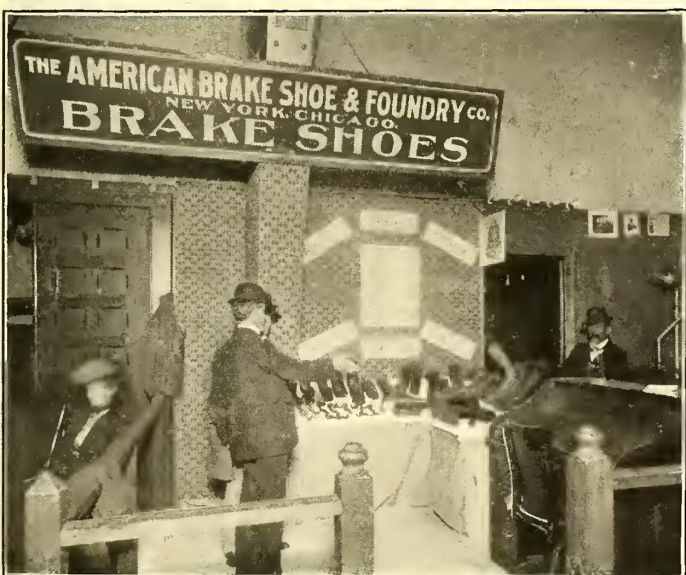
THE AMERICAN MACHINERY COMPANY, Grand Rapids, Mich., displayed, in operation, the Oliver wood trimmer, the Oliver hand joiner, Oliver saw bench, Oliver band saw and Oliver wood lathe. The company manufactures wood working and pattern shop equipment of all kinds. J. W. Oliver, J. H. Armstrong and C. R. Wright explained the features of the machines.

THE AMERICAN RAILWAY SUPPLY COMPANY, 24 Park Place, New York, had a large frame, supported by brass rods, and filled with its various kinds of cap and breast badges and buttons for conductors and motormen. These goods are furnished

advertised around the convention hall, both by its exhibit and by Mr. Mason himself.

THE BULLOCK ELECTRIC MANUFACTURING COMPANY, of Cincinnati, distributed souvenirs through F. G. Bolles, advertising manager.

LORAIN STEEL COMPANY was represented by P. M. Boyd, secretary and treasurer; Mayor H. C. Evans, New York agent; A. S. Littlefield and D. J. Evans, of Chicago; W. W. Kingston, of Atlanta, Ga.; R. Clitz, Lorain, Ohio; S. P. S. Ellis, Pittsburgh; E. B. Entwisle, chief engineer, Johnstown, Pa.; G. H. Parmelee, Johnstown, Pa.; H. F. A. Kleinschmidt, superin-



EXHIBITS OF THE R. D. NUTTALL COMPANY, THE OHIO BRASS COMPANY, THE AMERICAN BRAKE SHOE & FOUNDRY COMPANY AND THE NEW HAVEN CAR REGISTER COMPANY

in exclusive designs in brass, copper, german silver, fiber and aluminum. The display was neat and effective. Walter Chur, general manager, was in charge.

THE GARTON-DANIELS COMPANY, of Keokuk, Ia., the well-known lighting arrester maker, which has been working for several years on the perfection of the Knox "Automotoneer" for limiting the rate at which a motorman can advance his controller handle, exhibited at this convention a device which it is now believed will meet all the requirements. It is simpler and more substantial than the forms presented at any of the four preceding conventions. J. V. E. Titus, secretary of the company, who was in attendance, gave out to those desiring it a new catalogue, not only describing the construction of the device but presenting the technical arguments in favor of its use.

THE HELOIS-UPTON COMPANY, of Chicago, had its storage battery interests looked after by Frank H. Clark.

W. R. GARTON, of the W. R. Garton Company, Chicago, was among the convention supply men.

THE GARRIGUS MECHANICAL BOILER CLEANER, of which W. R. Mason, of Chicago, is Western representative, was

tendent track welding department. The exhibit was lost in a wreck, but everybody was cordially received by the company officials. Large space had been reserved, and a very interesting display of special track work would have been made, embodying some new features.

ELLIOTT BROS.' ELECTRIC COMPANY, of Cleveland, Ohio, electric railway supply dealers and repairers, were represented by W. H. Elliott, manager.

THE MICHIGAN ELECTRIC COMPANY, of Detroit, was, of course, in evidence, though making no exhibit under that name. President Joseph E. Lockwood was prominent in the management of the local affairs in the convention, and should be numbered among the representatives of the Electric Storage Battery Company and the Stanley Electric Manufacturing Company, for both of which companies the Michigan Electric Company is Michigan agent.

THE JEWETT CAR COMPANY, Newark, Ohio, displayed on the trackage one of its latest and finest models of the car builders' art. The car was one of a regular lot built for the Columbus, Delaware & Marion Railway, a new Ohio road. It is 50 ft.

over all, 40 ft. body, 8 ft. 8 ins. wide, and has seating capacity for 58 passengers. Toilet room and water cooler are located between the compartments. Finish is solid mahogany, inlaid with rose-wood and holly, and ceiling is apple green. When in operation the car will be fitted with four G. E. No. 73 motors, with type M.-control, Christensen air brakes, Peckham No. 32 M. C. B. trucks, Hale & Kilburn walkover plush seats with head roll, and Consolidated electric heaters. For the exhibit the car was shipped sans seats and was fitted up as a parlor car, with fine rugs and wicker chairs. Displayed in the car were several frames filled with photographs of the company's plant and numerous types of cars which it has turned out. A. H. Sisson, manager and treasurer; Niel Paulson, superintendent; W. C. Gardner, secretary, and B. E. Rutherford, salesman, received the thousands of visitors.

THE RAILROAD SUPPLY COMPANY, of Chicago and New York, had its interests well taken care of by George Stanton.

THE AMERICAN STEEL & WIRE COMPANY had its customary prominent exhibit, consisting of reels of wire, cable, wire rope, wire fence and bonds and springs. Wire was shown both bare and insulated. The stand was handsomely decorated

Chicago; B. M. Barr, New York; T. J. Dalton, Troy, N. Y., and Clarence Irwin, St. Louis.

THE DETROIT TROLLEY & MANUFACTURING COMPANY, LTD., Detroit, showed its ball-bearing trolley base which has recently been brought out. The base is fitted with fifty 1-in. steel balls in an accurately ground ball race, and the device weighs about 80 lbs. It is claimed that its use will effect a great saving in the cost of trolley wheels and poles and overhead work through the free and easy movement of the trolley stand and the consequent decrease wear and in liability of the trolley flying off.

THE DEARBORN DRUG & CHEMICAL WORKS, of Chicago, had a tastefully arranged booth decorated in white. Robert F. Carr, vice-president and general manager; W. B. McVicker, second vice-president and Eastern manager, of New York; O. L. Fluegel, Detroit, and Grant Spear, Chicago, explained the advantages of the company's scientific treatment of boiler feed water. On a stand there was a model of the company's boiler compound feeder which is attached to the boiler feed-pump rod and distributes any desired quantity of the compound. There were a number of samples of tube sections show-



EXHIBITS OF THE GOULD STORAGE COMPANY, AMERICAN STEEL & WIRE COMPANY AND H. W. JOHNS-MANVILLE COMPANY

with cut flowers and palms. The company was well represented by C. S. Knight, Jr., Chicago; W. C. Bogue, Detroit; J. A. McQuale, Jr., Philadelphia; J. D. Sutherland, Pittsburgh; George Chandler, Dayton; H. F. Pratt, Cleveland, and N. H. Van Sicklen, Chicago.

THE UNITED STATES ELECTRIC RAILWAY SUPPLY COMPANY, Detroit, showed its patent self-oiling trolley base, used in connection with the ordinary Westinghouse trolley stand. The device has been previously described in these columns; sufficient to say it is widely known through its use on many of the most important interurban roads of the country. There was also shown a new trolley wheel and harp. The wheel is provided with a dope packed center and a copper contact spring, which takes the current direct from the flange of the wheel to the harp, preventing the heating of the lubrication by the current passing over the bearing. H. Holland and H. L. Walker were in charge.

THE ALLEN & MORRISON BRAKE-SHOE & MANUFACTURING COMPANY, of Chicago, exhibited a line of its brake-shoes; also a device for reinsulating and retaking wire for field coils, as used by the Detroit United Railway and other roads. The wire runs through one end, where a device strips the burned fabric, and the rewinding device puts on two layers of tape, and completes the work at the other end. It makes available burned field wire, which heretofore has been scrapped. It is claimed that the brake-shoe manufactured by this company combines the life of the hard iron shoe with the friction of the soft gray iron shoe.

THE H. B. CAMP COMPANY, New York and Chicago, had an exhibit in the smoking room, consisting of samples of various kinds of conduits and underground work.

THE CONTINUOUS RAIL-JOINT COMPANY OF AMERICA, Newark, N. J., was disappointed in the division of space, as it could not secure sufficient room to make a thorough exhibit. However, there were displayed a number of its various types of joints which are so well known that they do not need further comment at this time. The company was represented by a large force, in the persons of L. F. Braine, general manager; J. G. Miller, St. Louis; W. H. Chapman, Boston; S. P. McGough,

ing the effect of the scale, pitting and other boiler tube troubles. There were also exhibited samples of the company's line of lubricating oils. The stand was a Mecca for souvenir hunters; among the free offerings being black diamond stick pins, cigar fans, puzzles and cut-glass bottles of perfume for a chosen few.

THE OHMER FARE REGISTER COMPANY, Dayton, Ohio, exhibited samples of its well-known Nos. 2 and 3 registers for city and interurban service, and introduced an improved register to be known as the identification key machine. In addition to the ordinary key, each conductor is provided with a special key bearing a number corresponding with his badge. At the end of each run the conductor inserts the ordinary key and then the special number key. This unlocks the machine and prints the badge number on the same line with the general report of cash fares, transfers, etc. Each conductor is responsible for the amounts shown in connection with his badge number. At the barns, the inspector who is provided with a similar set of keys, makes his impression in duplicate after totaling the record for the day. The record and total are sent to the local office, while the duplicate record of the total goes to the president or foreign office. The device precludes any possibility of tampering with the figures in the local office. Those present for this company were, John F. Ohmer, general manager; J. H. Steadman, secretary; William F. Breidenbach, manager contracting and installation department; W. McDonald, Eastern representative; W. Hinman, Pacific coast representative; A. N. Potse and Ed. Seiverts, mechanical department.

THE HEIL RAIL JOINT WELDING COMPANY, of Milwaukee, was represented in the person of J. P. Heil, president, who made his headquarters at the space of C. J. Harrington, general Eastern sales agent.

THE H. W. JOHNS-MANVILLE COMPANY, of New York, made a neat exhibit of its overhead line supplies of all kinds of rail-bonds, electric car heaters, molded mica, Monarch and vulcabeston insulating materials, and the Sachs "Noark" enclosed fuses. This company was well represented by J. W. Perry and J. E. Meek, of New York; S. H. Finney, of Chicago; W. A. Buddecker, of St. Louis; T. F. Becker, of Milwaukee; T.

D. Diekson, of Philadelphia, and E. B. Hatch and W. A. White, of the Johns Pratt Company, Hartford.

THE UNITED STATES CURTAIN COMPANY, of New York and Newark, represented by Alonzo E. Nutter, had on exhibition a new water-proof curtain for either open or closed ears. One feature of this curtain is a button on the outside and inside of the ear, which, when pressed, raises the curtain immediately. This button can be operated by either the conductor or passengers.

THE UNITED STATES WOOD PRESERVING COMPANY, of New York, exhibited samples of creosote-resinate wood paving blocks, treated by this company's process, which is claimed to be an improvement on the well-known creosoting process. Mr. Alexander Reed was in charge. The company received on Aug. 5 from the Railroad Commissioners of Connecticut, an excellent endorsement for its system of wood block paving by the permission of the commissioners to allow the Hartford Street Railway Company to lay this wooden block between its tracks on Main street.

C. J. HARRINGTON, of New York, had a complete exhibit of the Empire overhead material, which he manufactures himself. Mr. Harrington also carries a full line of other electrical railway supplies of all kinds. He is Eastern agent for the Heil cast-

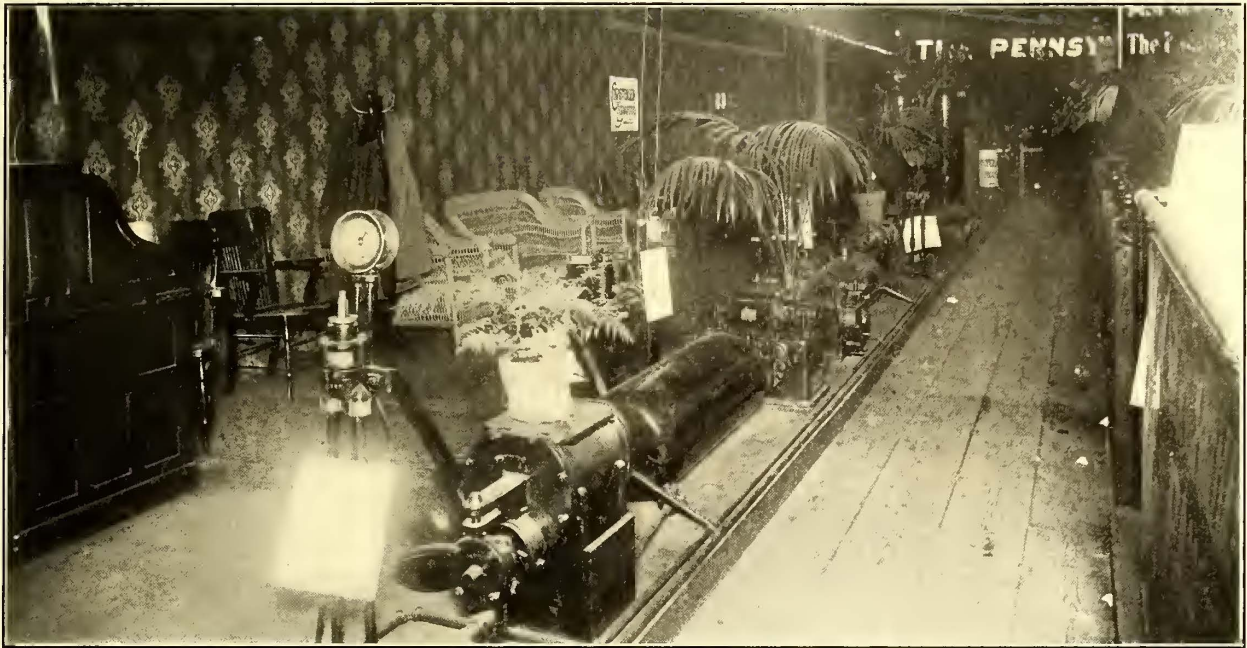
Engineering Company, Chicago, showed the King trolley stand in connection with this exhibit.

H. K. DOOLITTLE, Watertown, N. Y., exhibited a model of a window sash for street cars, which can be taken out and replaced without removing a stop or screw or the use of any tools. It attracted considerable attention.

THE POWELL & TURNER TRUCK COMPANY, of Troy, N. Y., had a model truck at the convention, showing a combination wheel and track brake, in charge of E. J. Knauff.

THE STAR BRASS WORKS, Kalamazoo, Mich., showed the famous "Kalamazoo" trolley wheels and harps in a very unique manner, consisting of a large star made up of small trolley wheels in a frame of the larger sized wheels, each lighted with a small electric globe and arranged on a black background. On either side was a smaller panel of yellow, upon which was shown the improved harps the company is putting out. The claim is set forth that this company is the "largest exclusive trolley wheel makers in the world," and also that "300 roads, operating 30,000 cars, are using the Kalamazoo trolley wheels." Messrs. C. A. Peck, president; O. P. Johnson, secretary and treasurer, and F. P. Crockett, manager, represented the company.

EDWARD G. THOMAS, of Boston, made an exhibit of his new rail-bond, which occupies a place between the rail-ends and



THE CHRISTENSEN ENGINEERING COMPANY'S EXHIBIT

welded rail-joint, and recently closed a contract in Pittsburgh for several thousand 9-in. girder joints. J. P. Heil, president of the Heil Rail-Joint Welding Company, made his headquarters at Mr. Harrington's exhibit, where samples of joints and photographs of work were to be seen. Mr. Harrington called special attention to the "New Yankee" drill grinder, made by the Wilmarth & Marman Company, Grand Rapids, Mich., for which he is agent. This is a valuable acquisition to street railway shop equipment because it will soon repay the investment. It has distinctively valuable features not found in any other machine of the kind, and is entirely new and original. The calipering device employed on other machines, which requires many adjustments to set the drill before grinding, is entirely discarded, and only one adjustment is required to grind any drill within range of the machine. Any clearance can be had by one instantaneous adjustment, and when once set the machine will grind all drills at the same clearance without further adjustment. This makes it a distinct improvement in simplicity and ease of operation. It does not require a skilled mechanic to operate it, as a boy can grind a drill and grind it right with this machine. The enormous saving in time by having drills always fresh and sharp makes investment in a drill grinder a matter worth while in a shop of any size. The drill grinder shown was electrically driven with a 500-volt motor. The manufacturers put out seventeen styles, suited to as many different conditions.

THE GLOBE MACHINERY & STAMPINGS COMPANY, Cleveland, Albert F. Schroeder, secretary-treasurer, showed the well-known Globe electric headlight and an improved trolley harp manufactured for D. A. Petre, of Duluth, Minn. The King

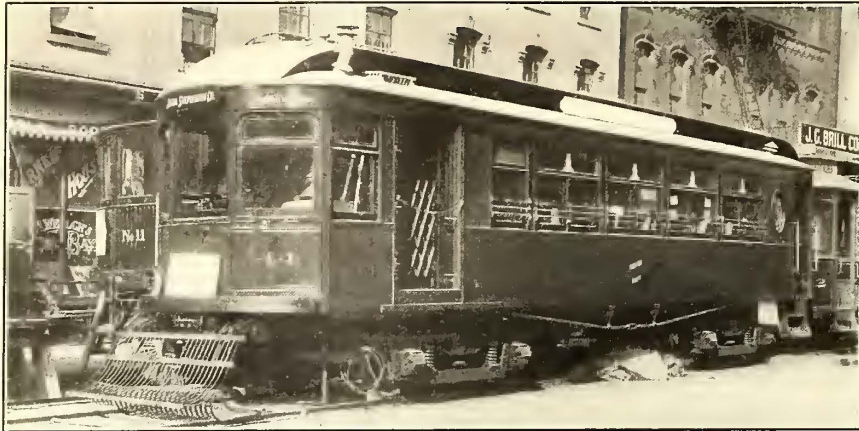
is fastened by cap screws and solder. It is an extremely short bond but has ample allowance for contraction and expansion. The peculiar features of this bond were illustrated and described in the STREET RAILWAY JOURNAL for Oct. 4.

THE OHIO BRASS COMPANY, of Mansfield, Ohio, as usual occupied a large and prominent space, very tastefully arranged. The space was surrounded by different types of mounted flexible pole brackets, and the rail around the space consisted of sections of 100-lb. T-rail, joined with fish-plates and bonded with this company's "all wire" rail-bonds, in which the heads are formed from the bunch of wire itself. These T-rail rails were mounted on different forms of Ohio Brass Company third-rail insulators, including the new Gonzenbach type used on the Aurora, Elgin & Chicago Railway. Inside the space this company's numerous products, in the way of overhead material and bonds, were displayed on circular stands. The exhibit included the Monarch track cleaner. This company's representatives were F. B. Black, president; C. K. King, secretary; W. M. Garland, manager New York office; O. W. Uthoff, manager St. Louis office; G. A. Harwood, general agent; A. L. Wilkinson, H. C. Schwable, G. A. Mead, electrical engineer; Burt Gellatly, manager Pittsburgh office; E. O. McCormick, Toronto office, and C. N. Manfred, advertising manager. This company gave away an attractive souvenir in the form of a cigar ash tray for gentlemen and ping-pong rackets to ladies.

THE J. G. BRILL COMPANY, of Philadelphia, exhibited both inside and outside the building. The exhibit included a fine collection of this company's solid hydraulically-forged wrought truck frames, for which it has put in expensive special machinery. The

trucks shown were the Brill 21-E, maximum traction and 27-G. A 27-E truck was also shown with motors in the General Electric exhibit. Inside the building sections of convertible, semi-convertible and Narragansett cars were shown. On the track outside the building a semi-convertible car, which is one of an order built for the Calumet Electric Street Railway, of Chicago, was shown. The gentlemen from this company in attendance were Samuel M. Curwen, W. H. Heulings, George M. Haskell, D. B. Dean and J. Elwood Brill.

THE WORCESTER STEEL FOUNDRY COMPANY, of Worcester, Mass., exhibited its steel terminal rail-bond, made by fusing a soft steel terminal directly to the copper bond wires. The steel terminals can be applied to the rail by any of the well-



THE JOHN STEPHENSON COMPANY'S EXHIBIT

known screw or hydraulic compressors, and have the same coefficient of expansion as the rail. W. E. Oakley was in charge of the exhibit.

W. J. SHEPHERD & CO., of Denver, Col., showed an illuminated watch and clock holder for use on the front platform by motormen. W. J. Shepherd was in attendance.

THE STANDARD VITRIFIED CONDUIT COMPANY, manufacturers of vitrified salt-glazed underground conduits and third-rail insulators, made a small exhibit and Vice-President B. S. Barnard was in attendance.

THE ELECTRIC RAILWAY SWITCH COMPANY, 814 Chamber of Commerce, Detroit, Mich., exhibited a model of an electric track switch.

THE JOHN STEPHENSON COMPANY, of Elizabeth, N. J., had a fine sample of interurban car construction on the track space near the convention hall. This car was one of a number being built for the Muncie, Hartford & Fort Wayne Railway. It had two compartments, a smoking and baggage compartment in front, with the main compartment and closet in the rear. The seats in the baggage compartment were arranged to fold up, so as to give either a clear, complete compartment for baggage, or seats along all of both sides, including the space opposite the baggage doors. The finish is a mahogany with curly maple ceilings. The car was built after the designs of E. P. Roberts & Co., electrical engineers, of Cleveland, who are the consulting engineers for the road. E. J. Lawless, of New York; Thomas F. Carey, of Boston, and J. A. Hanna, of Cleveland, represented the John Stephenson Company at the convention.

THE PAIGE IRON WORKS, of Chicago, were, as usual, represented by E. S. Nethercut.

THE KNELL AIR BRAKE COMPANY, of Battle Creek, Mich., had a prominent space in which was located a truck with axle-driven compressor connected to a regular car equipment, consisting of storage reservoir brake cylinder and control valves. The compressor was driven by an electric motor belted to the car axle, upon which the compressor was placed. Joel C. Hopkins, secretary; A. H. Metzelaar, manager; A. L. Wisner, J. R. Bunce and O. Cornell did the honors and distributed souvenirs in the shape of American Beauty roses to the ladies.

THE MCGUIRE MANUFACTURING COMPANY, of Chicago, exhibited on the trackage in front of building a rotary snow sweeper, with I-beam steel underframe, which was one of an order of twelve for the Union Railway, of New York. This is a double-end sweeper, weighing, complete with motors, 30,000 lbs. Then, too, there was a McGuire 39-A swivel steel truck and sliding cushion feeder, and the new Columbian car heater. The prominent feature of the exhibit, however, was the immense 4000-gallon steel tank street sprinkler on double trucks. This is one of the

largest ever built. The tank is 6½ ft. in diameter by 8½ ft. long. An air compressor, driven by an electric motor, is located on one platform to maintain air pressure in the tank so that water can be thrown more easily and to a greater distance from the sprinkler nozzles. This sprinkler will wet from 50 ft. to 60 ft. each side of the track. An auxiliary air reservoir, 38 ins. x 78 ins., is used for the storage of air when the tank is nearly full. This sprinkler goes to the Newport News & Old Point Railway, Hampton, Va. W. J. Cooke, vice-president, and B. F. Stewart, sales manager, were on the ground, and Mr. Cooke distributed a neat aluminum memorandum tab to his friends.

W. T. VAN DORN, of Chicago, as usual had the only automatic coupler for electric cars on exhibition at the convention.

Mr. Van Dorn exhibited two of the heavier types of draw bars made by him. One of these was the elevated type and the other a somewhat lighter coupler used on interurban cars. The exhibit included a number of blue prints, showing the Van Dorn draw bars and attachments, as used by various companies, including the Manhattan and Boston Elevated systems.

THE CHASE-SHAWMUT COMPANY, of Boston, made an exhibit of its flexible rail-bond, which is fastened to the rail by soldering, and has been successfully used in a number of cities. The exhibit was in charge of F. D. Masterson.

THE PITTSBURGH SWITCH & SIGNAL COMPANY had on exhibition a very complete system of automatic block signals for single and double-track roads. This system uses both semaphores and lights. It is constructed on the correct principle that all features shall be on the side of safety. For single-truck roads the signals are arranged to show red in front of an approaching train and green in the rear. Any number of successive trains are passed into a block going in the same direction, and a train counting device prevents the signals at the entrance and end of the block from clearing until all cars have passed out.

THE CROCKER-WHEELER COMPANY, of Ampere, N. J., was represented by Putnam A. Bates, assistant secretary, and C. W. Startzman, of the home office; Managers F. B. Degress, Julian



EXHIBIT OF THE CONSOLIDATED CAR HEATING COMPANY

Roe, W. H. Wissing and W. F. Sullivan, of the New York, Chicago, St. Louis and Cleveland offices, respectively, and W. J. Hartwig, local representative for the Detroit territory. The company issued several handsome circulars descriptive of Crocker-Wheeler apparatus in Detroit and elsewhere.

GILES S. ALLISON, of New York, sole sales agent for the St. Louis Register Company, exhibited the St. Louis self-record-

ing registers. Mr. Allison also distributed circulars illustrating a large variety of excellent second-hand cars he is offering for sale.

THE GENERAL SUPPLY COMPANY, of New York, was represented by A. B. Dolby.

THE CLEVELAND FROG & CROSSING COMPANY, of Cleveland, Ohio, had its interests looked after by General Manager George C. Lucas.

THE ALPHADUCT MANUFACTURING COMPANY, of New York, is a new concern making "alphaduct," a product

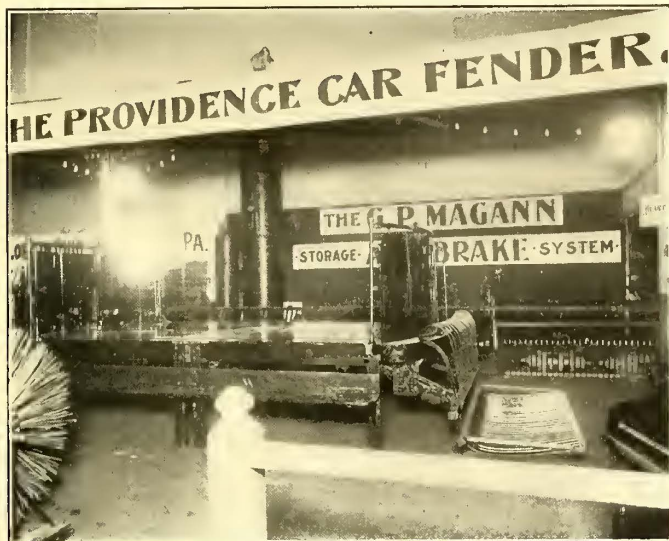


EXHIBIT OF THE CONSOLIDATED CAR FENDER COMPANY

somewhat similar to circular loom, but better adapted to rough handling. William Porter, formerly of the Lea Electric Manufacturing Company, had charge of this exhibit.

SMETHURST & ALLEN, electrical engineers and contractors, of Philadelphia, were represented by W. A. Smethurst.

B. J. ARNOLD, president of the Arnold Electric Power Station Company, of Chicago, was among the convention visitors.

GEORGE A. PARMENTER, of Cambridgeport, Mass., manufacturer of the Parmenter fenders and wheel guards, was looking after his interests.

JOHN BLAIR MacAFEE, contractor and railroad builder, of Philadelphia, was present, and was accompanied by William Harrison MacAfee and W. N. Walmsley, chief engineer.

THE JOHNSON WRECKING FROG COMPANY, of Cleveland, Ohio, exhibited some of its frogs for placing derailed cars upon the track on the track space near the exhibition hall. These frogs are adapted for T-rail on interurban roads and girder rail on city streets as well. O. W. Johnson, general manager, looked after this company's interests.

P. D. MILLOY, of Buffalo, the well-known inventor of the Milloy trolley catcher, had a couple of new devices at this convention, the most promising of which is a resilient gear case, made of canvas, with sheet steel protection on top and bottom to hold the canvas in shape. This gear case yields when struck, instead of breaking, and at the same time tends to deaden the noise of the gears. The trolley base, it is claimed, is the lowest base made, requiring but $6\frac{1}{2}$ ins. clear space above a car roof.

THE UNION SWITCH & SIGNAL COMPANY, of Swissvale, Pa., has recently adapted its train staff system to the use of single-track interurban electric roads. This staff system permits the movement of any number of successive trains each way with absolute safety, but allows only one train in a block at a time between any two staff stations. The steam road staff instruments require a man at each instrument when a staff is released. To adapt it to electric roads changes have been made so that a staff can be obtained from either instrument by a man at an instrument if no other staff is out. Five wires are required between staff stations. T. H. Patenall was the company's representative.

THE HUNTER AUTOMATIC FENDER COMPANY and the HUNTER ILLUMINATED CAR SIGN COMPANY, represented by Lytle J. Hunter, president and general manager, had in the annex the front platform of a car equipped with a Hunter fender, of which 3000 have been ordered by the St. Louis roads. This fender consists of two parts, one part carried on the dash, and designed to throw any person standing on the track to one side. The impact of a body against the fender on the dash trips

the wheel guard fender so that should the person be knocked down the wheel-fender will be down on the pavement to prevent him going under the wheels. The Hunter car sign carries the names of a large number of routes upon a roll of canvas, and any one of these names can be brought into view on the sign by revolving the roll. Incandescent lamps behind the sign illuminate it at night. These are in use on a great many roads.

THE INTERNATIONAL REGISTER COMPANY, of Chicago, manufacturer of stationary and portable fare registers, made its usual exhibit of different types of registers. Delegates were received at the company's space by A. H. Woodward, president; W. H. Brown, secretary and treasurer; E. T. Runge and F. B. Hall.

J. R. McCARDELL & CO., of Trenton, N. J., manufacturers of the well-known Trenton trolley tower wagon, had a novelty running around the streets in the shape of the new Trenton automobile tower wagon, which was equipped with a powerful and reliable gasoline engine, which was capable of propelling the wagon at a rate of 20 miles or 25 miles per hour. The company has long been in search of a satisfactory motor outfit for its purpose, and thinks that now it has found it. The tower of the wagon includes all the patented features common to the Trenton horse-drawn wagons, but the general construction of the wagon was slightly heavier because of the weight of the motor and higher speeds. M. J. McDonald represented the company and took delegates to ride in the wagon whenever they so desired.

THE JENKINS IMPROVED CAR SANDER was found on exhibition. This is the invention of B. B. Jenkins, of Toronto, and particulars can be obtained of B. Madill & Co., bankers, Toronto, Ont.

D. N. MILLER, 501 Sixth Street, Detroit, Mich., exhibited a new sander, in which the sand is fed by a screw operated by chain and sprocket from a crank on the front platform. The feed is positive, being due to the revolution of the screw, and not dependent on gravity.

THE ST. LOUIS CAR COMPANY had Assistant Superintendent G. J. Smith in attendance renewing his acquaintances among operating master mechanics, formed in his years of experience as one of them. William Sutton, formerly president of the American Car Company, is now identified with the St. Louis Car Company, and was in attendance at the convention. George S. Hastings, of Cleveland, also represented this company among others. Some particulars of the company's sample car which was



INTERIOR OF THE JEWETT CAR, AT DETROIT EXHIBITION

in active service carrying excursionists about Detroit are published elsewhere in this issue.

THE F. BISSELL COMPANY, of Toledo, Ohio, represented by M. S. Walker and C. M. Hamilton, made an exhibit of switchboards and general railway supplies. This company is agent for the Nernst lamp.

THE STROMBERG-CARLSON TELEPHONE & MANUFACTURING COMPANY, of Chicago, occupied a space in the annex with a line of telephones suited to the requirements of street railway service. The Milwaukee Electric Railway & Light Company has over 200 Stromberg-Carlson instruments in use. The switchboard shown had visual lamp-line signals and magneto

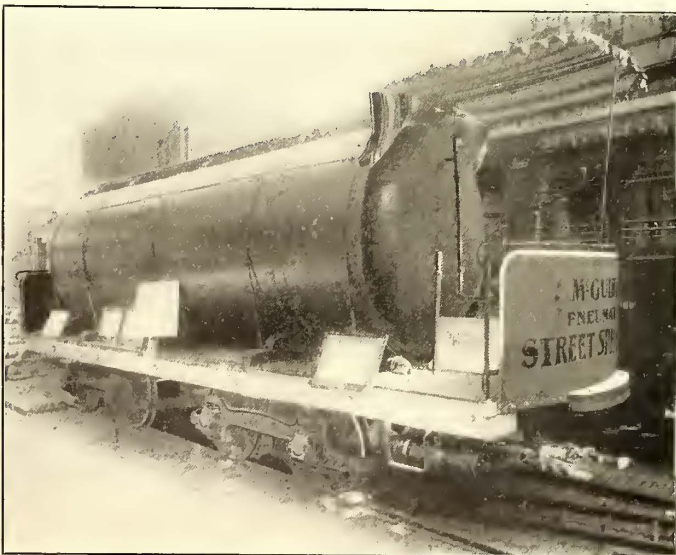
signals, and a combination of connecting cord circuits, adapted for interconnecting the various systems. J. J. Nate and A. J. Rousseau were in attendance.

THE CHRISTENSEN ENGINEERING COMPANY, Milwaukee, had a very large and interesting exhibit across one end of the hall, including a straight air brake-school equipment, and an automatic air-brake multiple unit equipment, both of which were in operation; also a Christensen portable motor-driven air compressor in operation by means of a hook connection to a trolley wire. The company also exhibited some of its new elec-



EXHIBIT OF THE INTERNATIONAL REGISTER COMPANY

trical machinery, which it is just putting out for the first time, including a 250-kw, three-phase, 2200-volt alternator; a 30-hp 500-volt open style motor, and a 4-hp 500-volt enclosed style motor. The company distributed very attractive booklets of their air brake equipments and electrical machinery. The entrance of the concern into the manufacture of large electrical apparatus is an event which is considered of considerable importance. The Christensen Engineering Company's interests were cared for by the following representatives: F. C. Randall, manager sales department, New York; J. T. Cunningham, Eastern sales agent,



MC GUIRE STREET SPRINKLER, AT DETROIT

New York; J. J. Neff, engineer, New York; J. F. Dixon, Jr., secretary, sales department, New York; J. H. Denton, chief engineer sales department, New York; W. W. Power, Pennsylvania sales agent, Philadelphia; William Gobel, Pennsylvania engineer, Philadelphia; H. N. Ransom, sales agent, Cleveland; J. J. Riley, Cleveland; J. E. Eldred, Jr., sales agent, Chicago; C. P. Tolman, assistant chief engineer, sales department, Chicago; N. A. Christensen, consulting engineer, Milwaukee; Charles D. Knight, mechanical engineer, Milwaukee; W. L. Waters, electrical engineer, Milwaukee; J. C. James, Milwaukee; W. J. Rich-

ards, Milwaukee; F. L. Hutchinson, advertising manager, Milwaukee.

THE STANLEY ELECTRIC MANUFACTURING COMPANY, of Pittsfield, Mass., had space in the center of the exhibition hall, including the heaviest and largest piece of machinery in the exhibition hall proper. The machine referred to was one of the standard S. K. C. rotary converters, similar to those in use on the Flint division of the Detroit United Railway, the Oley Valley Railway Company, of Reading, Pa., and the Kansas City & Leavenworth Railway, of Kansas City. Its liberal design at once commands attention, the commutator being 33 ins. in diameter and having three carbon brushes per holder. The shaft is 7 ins. in diameter at the armature, and 5½ ins. at the bearings. The bearings are each 22 ins. long. The exhibit was essentially a complete S. K. C. sub-station equipment, including, besides the rotary, a three-panel switchboard, instruments, circuit breakers and switches. One panel is reserved for the alternating current supplied to the rotary, another for the direct current coming from the rotary, and the third is a double-feeder panel. All direct-current instruments are on the positive side of the circuit, the negative leads from the rotary being mounted upon a separate pedestal arranged for connection to the rail through a special single throw, single-pole quick-break switch. This pedestal also carries the equalizing switch, which is a duplicate of the negative switch. Much of the completeness and success of the Stanley Company's representation at the convention



HEADQUARTERS OF STREET RAILWAY JOURNAL AT THE CONVENTION

was due to its energetic Michigan representative, Joseph E. Lockwood, president of the Michigan Electric Company, who directed the installation. The Stanley Company was represented also by Dr. F. A. C. Perrine, president of the company; Messrs. Van Deventer, Arnold and Bergenthal, of the Chicago office; S. T. Dodd, engineer of the railway department, and D. B. Rushmore, from Pittsfield, also Mr. Hough from the New York office. Ray D. Lillibridge, in charge of publicity details for the Stanley Company and other large manufacturers, was on the ground throughout the convention. The rotary exhibited was sold to the Indianapolis & Eastern Traction Company, of Indianapolis, Ind.

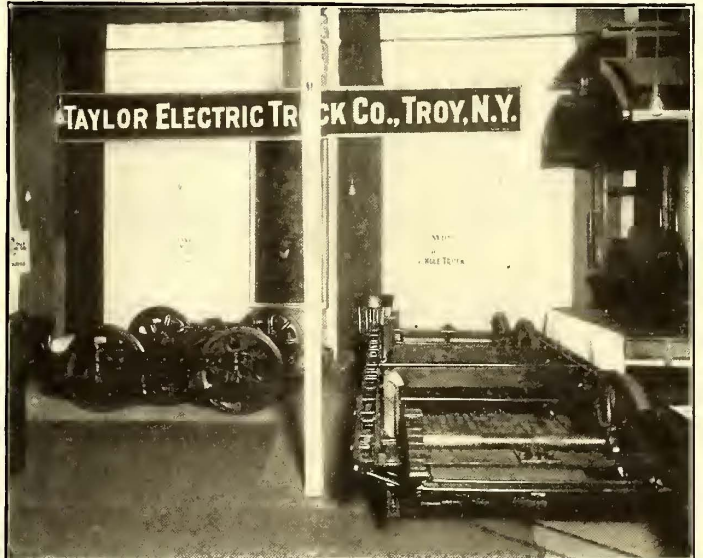
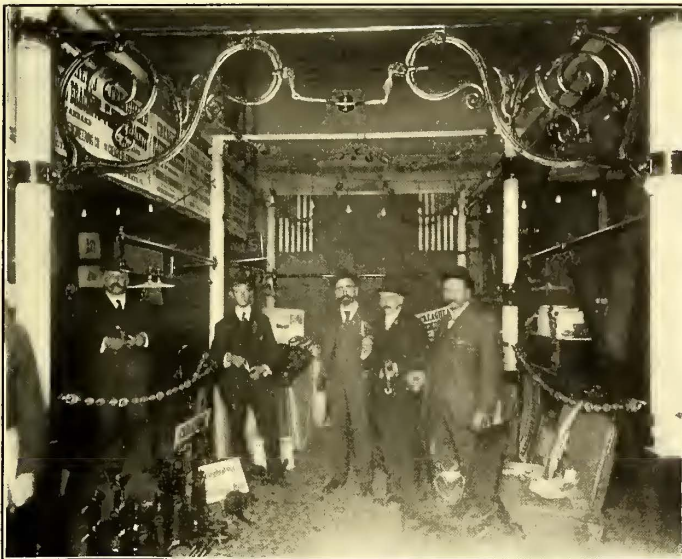
THE ELECTRIC STORAGE BATTERY COMPANY, of Philadelphia, manufacturers of the Chloride accumulator, had on exhibition several standard types of railway cells, ranging from 2600 amps. at the hour rate, to 240 amps. at the hour rate. Several samples of vehicle types of the Exide battery were also on exhibition. Two standard blue Vermont marble switchboards, of the type commonly erected by the Battery Company, were installed, showing the special apparatus used in connection with railway installations. One of the most interesting features of this exhibit was the special differential type railway booster. Besides this exhibit on the floor of the armory the Battery Company used, as part of their display, the three batteries on the system of the Detroit United Railway. The first of these batteries consists of 276 G-67 cells installed opposite the main power house of the system. This battery has been in daily operation for the past two years, and by absorbing fluctuations on the system greatly reduces the daily engine hours. Its capacity is 2500 amp.-hours at the hour rate, which capacity is fully utilized once every day on the peak of the load. The second battery, consisting of 250 G-53 cells,

was located about two miles from the power house, at the corner of Hancock Avenue and Third Street. Its capacity is 2200 amp.-hours at the hour rate. It is operated in connection with a standard differential type booster. It is used on the peak of the load once or twice a day, as conditions demand, to maintain the proper voltage within a radius of a mile from the battery house. Before this installation was made a variation in voltage of over 100 volts occurred, the pressure on the peak dropping as low as 375 volts. After installing this battery a voltage variation of from 480 to 500 was the maximum. The third battery on this system was located about eleven miles from the power house, on the Wyandotte division at Ecourse. It consists of 276 type F-13 cells of a capacity of 240 amp.-hours at the hour rate. This battery is used as a regulating line battery in connection with a booster operated at the power house end of the line, a feeder running direct to the battery and the line being fed by feeders from this point. Before

THE WILSON TROLLEY CATCHER COMPANY, of Boston, Mass., exhibited the Wilson trolley catcher in the hall, but by far the best and most impressive exhibit of this company was on many of the cars of the Detroit United Railway system.

THE SIMPLEX ELECTRIC HEATING COMPANY, of Cambridgeport, Mass., made an exhibit of heaters in the space of the Ludlow Supply Company.

THE PENNSYLVANIA STEEL COMPANY made no heavy exhibits, but showed models of an adjustable split switch with angle-bar reinforcements, the Challenge switch, the Long safety switch stand, the New Century switch stand, the anvil-faced frog and the spring frog. Blue prints of complicated special work done by this company, were shown, and also pictures of the works at Steelton, Pa., the Niagara Bridge and the Goktiak Viaduct, Burma, India. The company was well represented by eight



EXHIBITS OF CREGHEAD ENGINEERING COMPANY, STERLING-MEAKER COMPANY AND UNITED STATES CURTAIN COMPANY, C. J. HARRINGTON AND THE TAYLOR ELECTRIC TRUCK COMPANY

the installation of the battery the pressure of this division varied between 200 volts and 750 volts. The pressure of this division is now maintained between the limits of 550 volts and 600 volts, enabling them to better maintain schedules as well as materially reducing the maintenance cost of the electric equipment of the cars. During the convention the Electric Storage Battery Company was represented by Charles Blizard, manager sales department; J. Lester Woodbridge, engineer sales department; E. Vail Stebbins, manager Cleveland office; G. H. Atkin, manager Chicago sales office; R. H. Klauder, manager St. Louis sales office; R. B. Daggett, manager San Francisco sales office, and J. E. Lockwood, president of the Michigan Electric Company, the Detroit agent. The Electric Storage Battery Company has up to the present time installed 220 Chloride accumulator plants on railway systems. A booklet describing the plants of the Detroit United Railway batteries and several other installations was distributed by the Battery Company during the convention.

gentlemen, as follows: W. C. Kuntz, Philadelphia; C. S. Clark, Boston; J. G. Miller, St. Louis; C. E. Irwin, St. Louis; Clifford J. Ellis, Chicago; R. E. Belknap, Chicago; H. K. Parsons, Chicago; C. A. Alden, Steelton, Pa. The company's representatives distributed to delegates a steel tape of good quality, useful to street railway mechanical engineers.

THE FRANK RIDLON COMPANY, of Boston, as usual, was represented by C. N. Wood, vice-president and general manager, who was assisted by N. L. Wood. Its exhibits were the Kilbourn track sander, the Ridlon track drill and the Weld babbitting device, which finishes babbitt bearings in one operation without turning out.

THE PNEUMATIC RAILWAY EQUIPMENT COMPANY, of Cleveland, had something new in car equipment in the shape of a pneumatic trolley catcher, worked by compressed air from the air brake reservoir. An air cylinder and piston arc

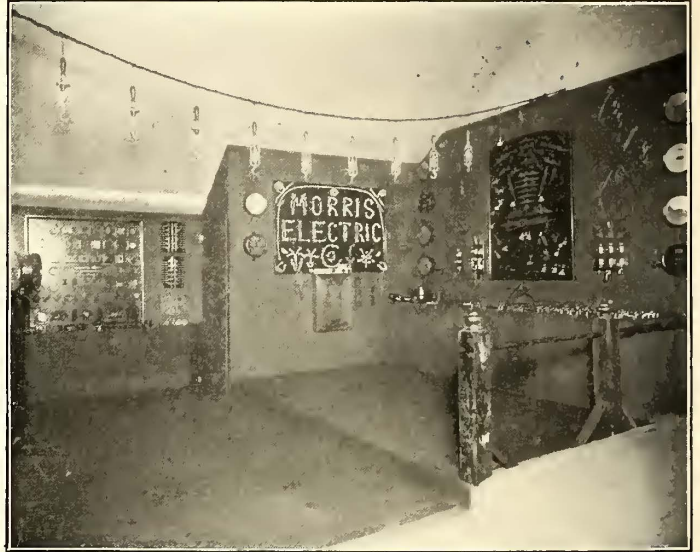
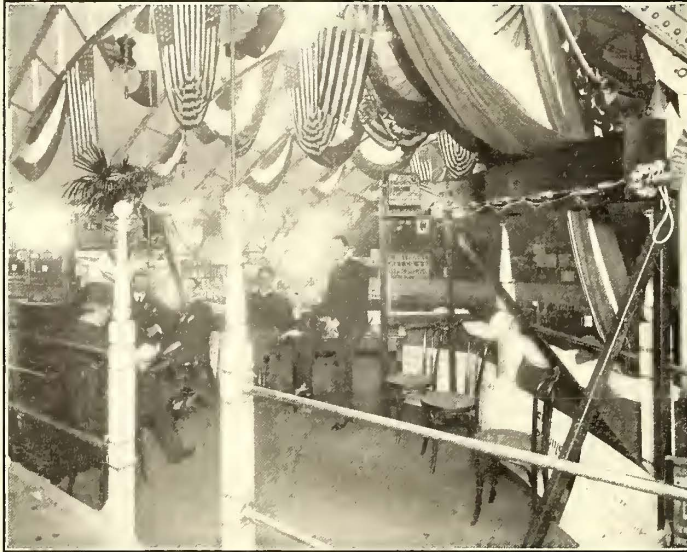
mounted on the trolley base. When the trolley leaves the wire and the current supply is interrupted an electropneumatic valve is opened, which lets air into the cylinder on the trolley base and pulls down the trolley. The electropneumatic valve is in front of the motorman in the vestibule and can be operated by hand in case the motorman wishes to pull the trolley down when the conductor is occupied with other duties. The device is called the air electro-trolley control. The motorman can throw the valve out of action when passing over section insulators or in car houses. The Nichols-Intern pneumatic sander, so popular on interurban lines, was also shown. George R. Tomb, mechanical engineer, and Robert C. Beebe, vice-president, explained the devices to delegates.

THE STANDARD UNDERGROUND CABLE COMPANY made its usual exhibit of samples, showing various cables in use for street railway work. The important announcement was

CHARLES F. JOHNSON, of Buffalo, who carries such a large stock of second-hand electric railway material, was an attendant at the convention.

THE AMERICAN BRAKE-SHOE & FOUNDRY COMPANY, of New York and Chicago, exhibited the Diamond S. Congdon and other types of shoes made by its various branches, and was calling special attention this year to the steel back shoe, in which the cast iron can be cracked transversely without danger of the shoe falling apart. F. W. Sargent, chief engineer; J. S. Thompson, assistant chief engineer; Arthur Gemunde, W. W. Gardner and H. S. Bradfield formed this company's representation.

THE CONSOLIDATED CAR HEATING COMPANY, of Albany, N. Y., represented by Cornell S. Hawley, general agent, New York, showed the types of heaters used on the Manhattan



EXHIBITS OF THE OHMER FARE REGISTER COMPANY, THE MORRIS ELECTRIC COMPANY, THE CRANE COMPANY, THE REVERSIBLE ELECTRIC CAR SIGN COMPANY AND W. J. SHEPHERD & CO.

made that this company is just completing a new copper rod and bare wire mill alongside its present factory at Perth Amboy, N. J., and will be prepared about the last of this year to make not only the bare wire for its own use in making insulated wire, but will be in the market with bare and weatherproof wire in addition to its cables. J. R. Wiley, manager Western sales department, Chicago; H. P. Kimball, of New York; A. A. Anderson and F. S. Viele, of Pittsburgh, were present.

THE BALL BEARING COMPANY, of Baltimore, Md., had the Norwood ball-bearing trolley base on display.

ROSSITER, MACGOVERN & CO., of New York, represented by Frank MacGovern and J. Warren Archer, had headquarters at one of the Cadillac parlors.

THE Q. & C. COMPANY, of Chicago, was represented by A. L. Kalas, and furnished the Stanwood steel steps on the car exhibited by the John Stephenson Company, built for the Muncie, Hartford & Fort Wayne Railway.

Elevated, of which it has delivered 21,000, and the Boston Elevated with a three-point switch for use on elevated cars. In addition to the regular cross-seat heaters a chair-car heater was shown, which are attached to the truss plank in the same relative position as the hot water pipes on steam coaches, and extend the full length of the car. Among the high-speed interurban roads that have adopted this form of heater are the Aurora, Elgin & Chicago, the Canton Akron Railway, the Grand Rapids, Grand Haven & Muskegon, and the Chicago & Joliet Electric Railway, the Detroit, Ypsilanti, Ann Arbor & Jackson Railway.

GEORGE C. EWING, Board of Trade Building, Boston, formerly president of the Morris Electric Company, was in attendance. He is now handling railway material and supplies and the Nernst lamp in Boston territory.

THE GOLD CAR HEATING & LIGHTING COMPANY, of New York, had a neat display of all types of heaters and a bank of heaters arranged under a longitudinal seat, with cushions re-

moved for inspection. A heater switch controlled all these heaters, regulating the degree of heat to a nicety. E. E. Gold, president, and J. E. Ward attended the convention.

THE COLUMBIA MACHINE WORKS, of Brooklyn, was represented by J. G. Buchler, W. R. Kerschner and Colonel Mack.

THE WEBER RAILWAY JOINT MANUFACTURING COMPANY, New York, exhibited all its types of rail joints, which are so well known and extensively used all over the

ing business and has a long list of desirable clients among electric railway companies.

THE PROCESS COPPER & BRASS COMPANY, of Jersey City, N. J., manufacturers of pure copper trolley wheels, had its interests looked after by F. H. Seavey, of the Star Refining Company, Boston, sales agent.

THE CREAGHEAD ENGINEERING COMPANY, Cincinnati, Ohio, represented by T. J. Creaghead, president; A. E.



A GROUP OF ATTRACTIVE EXHIBITS

country. James C. Barr came from the New York office, and Fred. A. Poor, W. T. Smetten and H. C. Holloway from Chicago.

THE MURPHY VARNISH COMPANY, of Chicago, distributed dice-box souvenirs through its representative, William P. Mellon.

THE ARCHBOLD-BRADY COMPANY, Syracuse, N. Y., made no exhibit but was represented by W. K. Archbold and Paul T. Brady.

THE KNOX ENGINEERING COMPANY, of Chicago, recently formed, had both President G. W. Knox and Secretary R. M. Heskett in attendance. This company now has a fine engineer-

ing business and has a long list of desirable clients among electric railway companies. Many photographs of views on roads recently built by this company were also shown. Mr. Creaghead was handicapped in his exhibit by the late arrival of his material, but, nevertheless, made a good showing.

THE STERLING VARNISH COMPANY, of Pittsburgh, was represented by Alvin S. King.

THE HARRISON SAFETY BOILER WORKS, of Philadelphia, Pa., was looked after by Frederick H. Mason, of Detroit.

THE WHEEL TRUING BRAKE-SHOE COMPANY, Detroit, Mich., Dr. J. M. Griffin, exhibited wheel truing brake-shoe and commutator truer. This company bought the parquet at the Temple Theater for Thursday evening and its souvenir was a theater ticket to this entertainment. Some two hundred of the delegates and their friends passed a very enjoyable evening as a result of Mr. Griffin's hospitality.

JOHN F. BLAIR, sales agent, Detroit, Mich. Mr. Blair and E. R. Marks, of the Buckeye Boiler Skimmer Company, Cleve-

eral representative. They distributed at the convention a series of circulars describing a number of open and closed cars that they have for sale; also a circular describing a number of G. E. motors that they now have on hand.

F. S. DRAKE, the well-known electrical contractor of Philadelphia, attended the convention.

CHARLES S. ACKLEY, who was in charge of the exhibit of the Sterling-Meaker Company, mentioned elsewhere, had also a neat exhibit of metal signs, manufactured by the Terry-Ackley



SEVERAL IMPORTANT EXHIBITS

land, Ohio, gave a practical demonstration of the Buckeye Skimmer. They also showed the Jefferson union and flange.

THE NATIONAL BATTERY COMPANY, of Buffalo, N. Y., was represented at the convention by Joseph P. Devin. Mr. Devin reports that the National Battery Company is now in shape to handle installations of any size for electric railway and lighting purposes.

THE KEYSTONE CAR WHEEL COMPANY, of Pittsburgh, was represented by President Chas. V. Slocum.

DALLETT & CO., of Philadelphia, were represented by Frank Dallett, president of the company, and N. H. Mason, gen-

eral representative. These signs are entirely of brass, in which the lettering and designs are etched by a new chemical process and afterward plated, oxidized, or otherwise colored, as desired. The business of the company is the making of general business signs, name plates, clock faces and novelties in metal. The effects brought out in the works are pleasing and artistic, and the signs are said to be much more durable than ordinary enamel signs, since the lettering and the color matter are etched into metal itself. The Terry-Ackley Company, of which Mr. Ackley is president, has already secured a large number of orders for this work. The company's business offices and manufacturing plant are located at 571 Hudson Street, New York.

DUMEE, SON & CO., of Philadelphia, distributed some very attractive circulars at the convention. They would like to open correspondence with parties desiring to buy franchises and rights of way for electric railways, also paying roads that are now in operation.

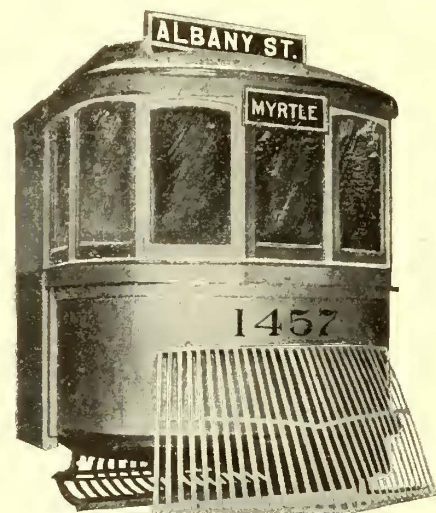
THE PENNSYLVANIA ELECTRICAL & RAILWAY SUPPLY COMPANY, of Pittsburgh, was represented by Samuel F. Hammond.

THE CUTTER ELECTRICAL & MANUFACTURING COMPANY, of Philadelphia, was represented by William M. Scott, general manager, who was accompanied by Mrs. Scott.

WILLIAM WHARTON, JR., & COMPANY, of Philadelphia, in a tastefully arranged exhibit showed a number of examples of special track work for street railways, especially their manganese steel hard-center work, which has proven such a great success in the more than six years that it has been in use under the heaviest traffic in the country. A worn-out frog of girder rail construction with manganese steel center, attracted great attention, and it conclusively proves that the manganese steel centers which the Wharton company uses actually do out-last the adjoining rails. Some of the samples of new work exhibited showed the details of the construction and the peculiar manner of fastening the centers, which is so secure that even under the heaviest traffic the centers remain perfectly tight and never become loose. At the same time, the method of fastening is such that the centers could be renewed should necessity arise, but the Wharton Company states that in all their experience this has been limited to only a very few centers which developed some hidden defect, and that it is not necessary to renew manganese steel centers on account of wear. This is apparently proven by the worn sample above referred to. The Nichols protected heel switch exhibited, while it had been shown before its general features, embodied a number of improvements, one, in particular, being a new method of tightening up the bearing of the tongue pin, and a new simple fastening device for the manganese steel cap which protects the heel of the tongue, and by which this cap can easily be removed should it become necessary to take out the tongue on account of some accident to it. This type of tongue switch has proven a marked success. The construction absolutely prevents the tongue from throwing between wheels or between trucks of cars, and the heel of the tongue does not knock down, as has been found the trouble with most ordinary tongue switches. The standard tongue switch of the Wharton Company, also shown, had already, to a great extent, overcome the two troubles mentioned, but the protected heel switch, although more expensive, is regarded well worth the difference, on account of the greater efficiency in regard to these two points. The manganese steel construction for standard T-rail work, of which samples were included in the exhibit, represents a comparatively new departure, and has been greatly improved by the Wharton Company within the last few years. The special pieces in this track construction are made of solid manganese steel castings. The abutting rails are joined up to these pieces by means of fish-plates and wings extending from the manganese steel casting, making an exceptionally solid joint. This class of work is extensively used where permanency, rather than saving of first cost, is aimed at. Although no samples were shown, the Wharton Company report extensive use of its manganese steel on steam railroad tracks and elevated roads with most phenomenal results, the manganese steel frogs on the Pennsylvania Railroad having out-lived as many as ten ordinary frogs, and being still in use. They also have recently furnished rails cast out of manganese steel, in curves for the Boston Elevated road, which promise to exceed all expectations in regard to their wearing qualities. The representatives at convention were Victor Angerer, vice-president; W. Rodman Wharton, John C. Robinson, New England agent, and Arthur S. Partridge, of St. Louis.

THE PECKHAM MANUFACTURING COMPANY had, as usual, a very attractive exhibit, and although unable to secure space within the convention hall, secured a most desirable position directly adjoining the main entrance to the Light Guard Armory, so that every one who entered the building passed the exhibit. The company showed an attractive line of trucks, but probably the greatest interest was taken in the new Peckham No. 32 M. C. B. truck, equipped with triple elliptic spring bolster. The truck shown was one of twenty now being built for the Columbus, Delaware & Marion Railway, of Columbus, Ohio, although trucks of the same type are used on the Indianapolis, Lebanon & Frankfort Railway and on the Toledo & Indiana Railway. The side frames are of the bridge truss construction with a very strong and deep truss, which is spring-supported on the equalizing bars, and also from the journal boxes to prevent tetering. The truck has a long spring base, which is secured by locating spiral springs on each side of and supported from the journal boxes, thus preventing the tilting of the top frames. The transoms are

bulb angles 10 ins. deep, which extend full size with the side truss frames, to which they are very rigidly secured. Gussets of sheet steel connect the transoms to the side frames and hold the frame rigid and square. The bolsters are all steel and of "bridge shape" top and bottom and the end sections, of the bolsters are supported by triple elliptic springs. Straps secured to the transoms and extending to the bolster prevent its being lifted out. The journal boxes are M. C. B. standard pattern with M. C. B. journals. The truck as exhibited was designed to be equipped with 75-hp motors and weighs about 9000 lbs. Mr. Peckham also showed one of his extra strong, short wheel base No. 14 B3 trucks, as constructed for the Cincinnati Traction Company and also for the Indianapolis Street Railway Company. This truck was designed expressly to reduce the height of the car body and do away with one step by allowing the wheels to radiate between the sills of the car and by its short-wheel base to enable the truck to take a 25-ft. radius curve with minimum power. The ends of the truck are of the "low down" construction, so as to allow the truck to radiate under the steps of open cars. One hundred of these trucks are now being built for the Cincinnati Traction Company, and the company has sold 400 of them to the Massachusetts Electric Companies, of Boston. Mr. Peckham also expected to exhibit the Aurora special truck built for the Aurora, Elgin & Chicago Railway, described in the STREET RAILWAY JOURNAL for Oct. 4,



HUNTER FENDER EXHIBIT

but the truck was delayed in transit. In addition, the company had under the exhibit car of the Jewett Car Company built for the Columbus, Delaware & Marion Railway, a pair of its high-speed No. 32 trucks, as described above, and also under the car equipped by the Kuhlman Car Company a pair of high-speed No. 15 trucks. The Peckham Company was represented by Edgar Peckham, J. A. Hanna and F. A. Richards. After the close of the convention, Mr. Peckham left for a trip through the West. In addition to the trucks on regular exhibition, the Peckham Company was well represented in Detroit, as they sold many equipments in that city. Among the companies using the Peckham 14A XX truck are the Detroit United Railway, the Detroit, Romeo, Rochester & Lake Orion Railway and the Detroit, Lake Orion & Flint Railway.

MESSRS. TOWNSEND, REED & CO., of Chicago and Indianapolis, were represented by W. H. Gray and W. M. Moran.

THE MORDEN FROG & CROSSING WORKS, of Chicago, were represented by M. F. Moore.

THE KINSMAN ELECTRIC & RAILWAY SUPPLY COMPANY was well represented by F. E. Kinsman.

THE MacPHERSON SAFETY SWITCH & FROG COMPANY, of Niagara Falls, had a working model of its appliances on the main floor of the Cadillac Hotel.

THE BEMIS CAR TRUCK COMPANY, of New York, had as representatives at the convention Geo. M. Hoadley and Thos. F. Carey.

THE ROCHESTER CAR WHEEL WORKS had no exhibit, but Edward H. Chapin and F. D. Russell attended the convention in the interests of the company and had as a souvenir an attractive matchbox.

THE NEW YORK SWITCH & CROSSING COMPANY, of Hoboken, N. J., was represented by M. W. Conway. The com-

pany made no exhibit, but a visit to its plant at Hoboken would show a fine variety of switches, crossings and special work under construction for electric railway companies.

THE FORT WAYNE FOUNDRY & MACHINE COMPANY was present in the person of A. A. Hilton, manager. Mr. Hilton renewed many of his acquaintances with street railway men, made during his six years' connection with the St. Louis Car Wheel Company as general sales agent.

THE ELECTRIC RAILWAY EQUIPMENT COMPANY, of Cincinnati, made no exhibit; but its excellent line of tubular poles, brackets, line material, etc., was ably spoken for by J. B. Crankshaw, electrical engineer.

J. G. WHITE & CO. were represented by C. G. Young, who recently returned from Philippines; H. S. Collette, who represented the San Juan Light & Power Company of Puerto Rico; S. G. Averell and E. L. West.

THE WACLARK WIRE COMPANY, of New York, was represented by H. F. Sanville, its Philadelphia representative. The Waclark Wire Company is now making a specialty of trolley and feed wire of every description, including long-distance transmission wire.

THE ELECTRICAL ENGINEERING & DEVELOPMENT COMPANY, of New York, was represented by H. S. Cooper.

MR. W. R. KERSCHNER, of Allentown, Pa., was present in the interests of the Columbia Machine Works & Malleable Iron Company, of Brooklyn. It is needless to add that the company in question profited greatly by Mr. Kerschner's attendance at the convention.

MESSRS. WENDELL & MacDUFFIE, of New York, were represented by Jacob Wendell and J. B. Embick. Much regret was expressed that Mr. MacDuffie was unable to be present also.

THE MULFORD & PETRY COMPANY, of Detroit, New York, Chicago, etc., was represented by A. F. Petry, vice-president. Murford & Petry advertisements are so familiar to the officers of electric railway companies and to the patrons of their cars that no exhibit was required.

THE AMERICAN CAR & FOUNDRY COMPANY was represented by Scott H. Blewett, general agent.

THE NATIONAL CONDUIT & CABLE COMPANY was represented by W. S. Eckard and J. D. Honan, of the New York office, F. S. V. Fraf, of the Boston office, L. D. Beylard, Philadelphia, and Harry F. Tate, of the Chicago office.

THE ST. LOUIS CAR COMPANY was not represented in the exhibition hall, but it had a most effective exhibition in the large car which made regular trips from Detroit to Farmington, out Grand River, a distance of 19 miles. An invitation was extended to the delegates to make this trip, and many of them took advantage of this opportunity. W. A. Boland, who is completing the interurban line between Detroit and Jackson, upon which cars of this type are to be operated, accompanied the party together with representatives of the General Electric Company and the St. Louis Car Company. The car is 58 ft. long, and contains a smoking compartment, which is entirely isolated from the rest of the coach, so that it is not necessary to pass through it to leave the car at the end where it is located. It has seating accommodations for 75 passengers. There is a vestibule in front and rear, the front being divided and one part fitted up as an observation section. The woodwork is mahogany throughout, and the seats of cane with reversible backs. The fittings and furnishings are in keeping with the type of the car and the service for which it is built. The car is equipped with four General Electric 125-hp motors, geared to run 65 miles an hour. Good time was made in the trips at Detroit, but no attempt was made to develop the speed limit. Several trips were made each day through the courtesy of the Detroit United Railway Company. Mr. Boland expects to have his own road running from Jackson to Battle Creek and from Jackson to Ann Arbor by the first of the year, and running the entire distance from Jackson to Detroit by spring.

THE KELLOGG SWITCHBOARD & SUPPLY COMPANY, of Chicago, one of the leading manufacturers of high grade telephones and switchboards, made one of the most extensive telephone exhibits ever offered at a street railway convention. Telephones of special interest to street railway men were shown. There was a standard common battery switchboard with many different types of instruments connected thereto. R.

H. Manson, of the engineering department, and F. L. Martin, advertising manager, looked after the exhibit. This company is now catering to the street railway field in the same excellent manner that it has handled large exchange work.

THE McROY CLAY WORKS, Brazil, Ind., was represented by E. F. Kirkpatrick, western manager, of Chicago.

R. W. CONANT, of Cambridge, Mass., exhibited his portable bond tester and also an instrument for determining whether motor field coils have become short circuited. The latter is an induction instrument in which a pulsating current is sent simultaneously through a perfect field coil and the one to be tested. When the induction is unequal the circuits are out of balance, and a telephone receiver is used to note the fact. The bond tester is similar to previous forms, save that it is now arranged for one man to manipulate the contacts on the rail as well as the instrument. This works on the Wheatstone bridge principle with the telephone receiver and vibrator in place of galvanometer.

THE SIMONDS MANUFACTURING COMPANY, of Pittsburgh, so well known as manufacturer of the Simonds gears and pinions, was represented by H. F. Sanville.

L. C. CHASE & COMPANY, of Boston, was represented by Frank B. Hopewell, manager of the company's leather department, with headquarters at Boston. Messrs. Chase & Company have been making a specialty for years of plush seating for railroad



GENERAL ELECTRIC COMPANY'S EXHIBIT

cars, and have excellent facilities for handling electric railway orders for the same material, as well as for Chase leather.

THE STRONG, CARLISLE & HAMMOND CO., of Cleveland, was represented by F. H. Lovejoy, manager of the Squires' feed-water controller department.

THE WESTERN ELECTRICAL SUPPLY COMPANY, of St. Louis, was represented by H. J. Doyle, manager railway department.

THE JOHN A. ROEBLING'S SONS COMPANY, of New York, and Trenton, N. J., had a large representation present, among whom was noticed H. L. Shippey, treasurer; M. R. Cockey and G. W. Swan, of the New York office, and George C. Bailey and Mr. Conover, of Chicago; W. P. Boreman, Cleveland and W. L. Doyle and N. G. Tingley, Trenton.

THE WESTERN ELECTRIC COMPANY had as representative at the convention, R. H. Harper, of its railway department at Philadelphia.

In his speech at Steubenville, a few days ago, Senator Hanna challenged Mayor Tom L. Johnson to a debate on the tariff, the subject to be discussed from a strictly economic standpoint and with no reference to monopolies. Senator Hanna's challenge was telegraphed to Mayor Johnson at Wooster, and it is said that the latter immediately replied that he would accept the challenge and would debate the subject in any way or at any time Senator Hanna might name.

General Electric Apparatus at Detroit Convention

The General Electric Company's exhibit was located in the corner of the annex and occupied 2000 sq. ft. of space. The principal feature was an installation of the type "M" control now in use on the Manhattan Elevated Railway in New York City. This exhibit was mounted on a frame which permitted free examination of the parts during its operation and shows the rise in voltage which, of course, corresponds to the increase in speed of the motors. To indicate this rise in voltage a number of incandescent lamps are used, grouped in the form of the company's monogram, which start at a dull red and gradually come up to full candle-power. Other General Electric apparatus for electric railway service exhibited consisted of a line of railway motors of various sizes, including the 125-hp GE-66 motor which has been adopted by the Manhattan Railway Company. A Brill 27-E truck was shown with two GE-57 motors mounted upon it and equipped with the General Electric new type of shoe for use on the pro-



A CORNER IN THE GENERAL ELECTRIC COMPANY'S EXHIBIT

tected third-rail system. This latter was exhibited for the first time. There was also exhibited in operation, General Electric air compressors of standard types with automatic governors. These were in operation connected to a standard reservoir.

A type-H electrically controlled oil break switch with a capacity of 300 amps. at 12,000 volts made a very interesting operating exhibit, the switch being substantially installed as in actual service. Direct and alternating current rotary converter switchboard panels of standard types are also shown. Among the small supplies exhibited may be mentioned a 6000-amp. carbon break circuit breaker for railway use beside smaller sizes of the same type. An attractive display stand for rail-bonds, incandescent lamp sockets and other small devices was also shown. The entire exhibit was arranged for convenience of examination by visitors and the attractive reception space at the center of the exhibit made a pleasant resting place for the delegates. A feature of considerable interest which formed a part of the General Electric Company's exhibit at this convention was a 50-ft. interurban car lent by the Jackson and Suburban Traction Company and used by the company in demonstrating the system for operating such cars. This car was equipped with the type "M" control and 4 GE-66 (125 hp) motors. It was located on the Detroit United Railway Company's tracks at a point near the convention hall and was used by the delegates and their friends for rides around the city. The General Electric Company was represented among others by the following: W. B. Potter, J. R. Lovejoy, J. G. Barry, C. C. Pierce, J. J. Mahoney, T. P. Bailey, J. B. Pevear, G. D. Rosenthal, J. H. Livsley, F. H. Gale, L. R. Pomeroy and E. H. Mullin.

"Corporation Counsel Rives proposes to make efforts to collect back taxes from street car companies. He figures that \$17,000,000 is due. Hints are made that unless the companies show a disposition to pay, he may recommend that some of their franchises be revoked; also that license tags be required on cars." This is the "startling" announcement that was made a few days ago in a New York paper. Just how it was arrived at that \$17,000,000 is due the city is not made clear.

Convention Notes and Entertainments

The reception at Hotel Cadillac Wednesday evening, tendered by the local committee to the delegates and visitors, proved a most enjoyable affair. Several hundred members and ladies assembled in the spacious parlors of the hotel and enjoyed the music, dancing and refreshments, provided by the committee.

The courtesy extended the visiting delegates by the board of managers of the Detroit Club in offering the facilities of the club during the sessions of the association were heartily appreciated. A considerable number of the visitors embraced the opportunity thus afforded, and found the club surroundings exceedingly attractive.

Col. Hecker, of Detroit, entertained the executive committee and a small number of invited guests on Thursday, giving them a delightful sail on Lake St. Clair and terminating at the Country Club. Those who were fortunate enough to participate in this excursion reported a delightful time on the palatial yacht belonging to Col. Hecker.

A reception was given the ladies from 10 a. m. until 4 p. m. Wednesday in the Cadillac parlors. It was an informal affair, and proved to be a most delightful incident. The visitors were received by a ladies' committee. The rooms had been decorated with roses and palms, and refreshments were served. The reception was much appreciated by the visiting ladies, as it afforded an opportunity to become acquainted with each other before the excursions which followed during the convention.

On Friday the visiting ladies were tendered a trolley ride to Mount Clemens. The start was made from the Cadillac Hotel about 10 o'clock in the morning in a line of special cars. Mount Clemens was soon reached via the Rapid Railway, and a short stop was made at that point so that the visitors could inspect some of the sanitariums which have made this little resort famous. Cars were then taken by way of the Shore Line to the Country Club, which was reached about 1 o'clock. Here the ladies of the local committee had provided a sumptuous luncheon.

The tables were profusely decorated with flowers, and a most attractive repast was served. The club is delightfully situated on the banks of the river, a view of which was afforded the guests as they sat at luncheon, and afterward from the broad verandas which surround the club house. A number of the delegates who participated in the Friday morning sessions in Detroit, joined the party at the club, where most of the visitors stayed until it was time to return to the city for the banquet.

The Crocker-Wheeler Company, of Ampere, N. J., organized on Thursday afternoon a most interesting trolley trip to the Rochester power house on the Flint division of the United Railway Company of Detroit. Two well-filled cars were despatched under the direction of Putnam A. Bates and F. B. DeGress, of the Crocker-Wheeler Company, and a delightful ride of some 30 miles was taken into the pretty rural region lying back of Detroit, illustrating how the trolley has banished isolation for the farmer and brought all the comforts and conveniences of the city within his reach. Not only were passenger cars flying in every direction up and down rural lanes, but at frequent switches were freight and express cars laden with goods or with farm produce, from fresh milk to the last bushel of husked corn. The Rochester plant, 26 miles out, recently illustrated in these pages, might well be called a Crocker-Wheeler railway power house. It contains a fine 400-kw Crocker-Wheeler generator driven by a Ball & Wood compound condensing engine and two 200-kw Crocker-Wheeler units similarly driven. Circuits radiate widely from this plant, and the sterling stability of the apparatus is evidenced by the continuous overloading to which it has been subjected for months in meeting the demand for current. During the trip cigars and dainty descriptive bulletins were distributed, while at the power house sandwiches, coffee and punch refreshed those who had been enjoying the spin through the crisp autumnal air.

The labor agitators are at it again in New York, they having recently circulated among the employees of the Interurban Street Railway Company and the Brooklyn Rapid Transit Company circulars calling for the organization of a union among the employees of these companies. Of course, the agitators, preaching their doctrine of discontent, will find some who are willing to do their bidding, but the street railway men of New York are too sensible a lot to be fooled by these tricksters. The agitators seem to have forgotten their lesson of 1899.

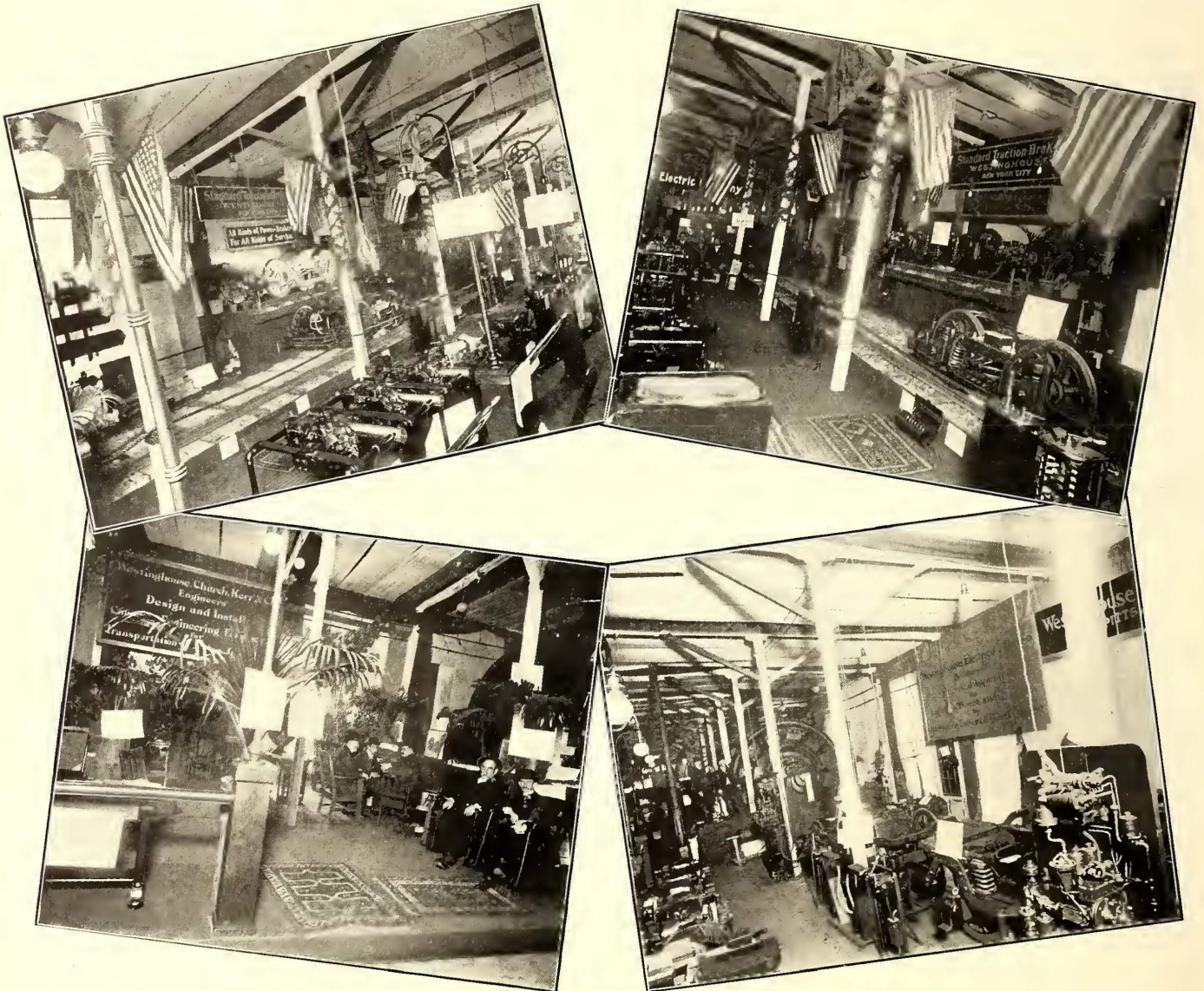
Westinghouse Interests at Detroit

All the Westinghouse interests that are connected with electric railway development were represented in the exhibition hall at Detroit during the convention.

The apparatus exhibited by the Westinghouse Electric & Manufacturing Company included a 1500-kw rotary converter, of the same design as those ordered by the Rapid Transit Subway Construction Company of New York, and is, except for some details of the frame, practically the same as the 1500-kw rotary converters furnished to the Manhattan Railway Company, the largest of their kind ever constructed. They embody several improvements, one of which is the "grid damper" on the pole pieces. This device serves to prevent fluctuations of the total magnetic flux, and at the same time shifting of the field across the pole pieces. The armature is cross connected in the same way

with operating head, two motormen's multiple control switches, one railway type circuit-breaker, one set of connectors, a small storage battery and an auxiliary air reservoir. The controller is of the series-parallel type and is similar in design to the ordinary form of hand controller which has been in successful use for many years. A multiple control switch is placed at one or both ends of each motor-car and by means of the one at the front of the leading car the motorman directs the action of the controllers on all the motor-cars in the train.

Three railway motors were shown. The 50C motor was of the type used on the Union Traction Company's lines in Indiana in two-motor equipments; the No. 76 by the Rapid Railway of Detroit and the Pacific Electric Railway of Los Angeles, Cal., in 4-motor equipments, and by the Toledo, Fremont & Norwalk, of Ohio, in 2-motor equipments, while the No. 81 was similar to those used by the Brooklyn Rapid Transit Company, 1700 motors



VIEWS IN THE EXHIBITS OF THE WESTINGHOUSE COMPANIES

as are all Westinghouse multiple connected direct-current machines. The cross connections are back of the commutator. The brush holders are of the sliding shunt type and leave the commutator easily accessible. These machines run at 25 cycles, 250 r. p. m. and are arranged to be started with direct current. Their efficiency is about 97 per cent. It is a significant fact that 69 of these machines have been built or are on order, the first one having been put out about a year ago.

Multiple control apparatus for two cars with two No. 131 controllers and four No. 50-C motors, were arranged on trucks for operation. These trucks are of the Master Car Builders' standard equalizing-bar type and were built by the Baldwin Locomotive Works, of Philadelphia, Pa. The Westinghouse multiple control system involves the use of compressed air for moving the controlling apparatus, electro-magnetic valves governing the admission of air to the several cylinders and low voltage circuits for controlling the action of the magnet valves. The complete controlling equipment for each motor-car consists of one controller

having been sold to that company. These are all large motors adapted for suburban, interurban and elevated railway service.

Type-N transformers which embody many new features introduced by the Westinghouse Company into American practice, were shown, together with type-C induction motors and a starting device used with this motor which may consist either of a simple switch or a switch in connection with an auto-transformer, occupied a conspicuous position. Among the detail apparatus was the cell-type diverter, a form of resistance used in starting street car motors; a canopy switch for street railway equipments, made of metal and slate, with all exposed parts dead; an automatic car circuit-breaker, which serves the combined purpose of fuse block and canopy switch; an automatic circuit-breaker for direct and alternating current circuits, the essential parts of which are the laminated copper brush, the swinging arm, the contact blocks and the carbon shunts at the top; the iron fuse block for street cars, completely enclosed by an iron casing, except where the vent extends through the bottom; a direct-current illuminated dial volt-

meter and ammeter, made of translucent material, so that it can be illuminated from the rear, thus rendering it easily read from a distance; and the low equivalent lightning arrester, used on high voltage alternating-current circuits.

The Westinghouse Electric & Manufacturing Company's representatives included F. H. Taylor, L. A. Osborne, Arthur Hartwell, W. H. Whiteside, Geo. B. Dusinger, D. D. Pendleton, H. B. Shute, N. W. Storer, S. W. Kier, H. P. Davis, P. N. Lincoln, C. Renshaw, H. N. Cheny, M. Baxter, C. E. Skinner, A.

A Parlor and Sleeping Car

One of the most conspicuous exhibits at the Detroit Convention, as well as one which attracted wide attention, was a private car built for use on the Mandelbaum system of electric railways by the G. C. Kuhlman Car Company, of Collinwood, Ohio. This car, which is illustrated herewith, was located on the track just in front of the entrance to the exhibit hall, and attracted many visitors, not only on account of its novel features but also of its

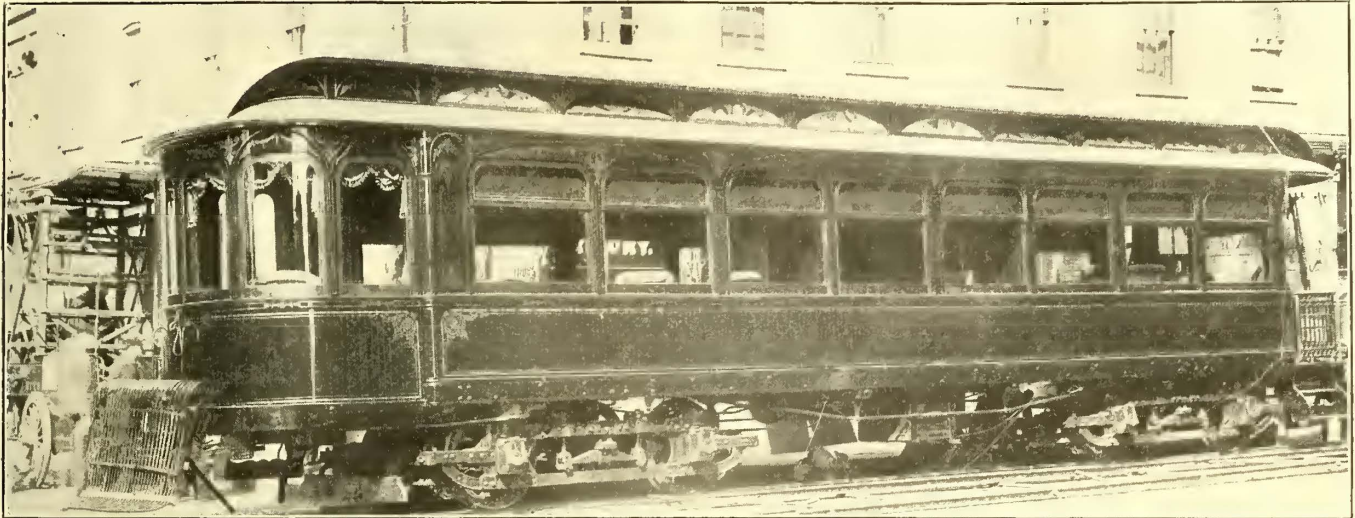
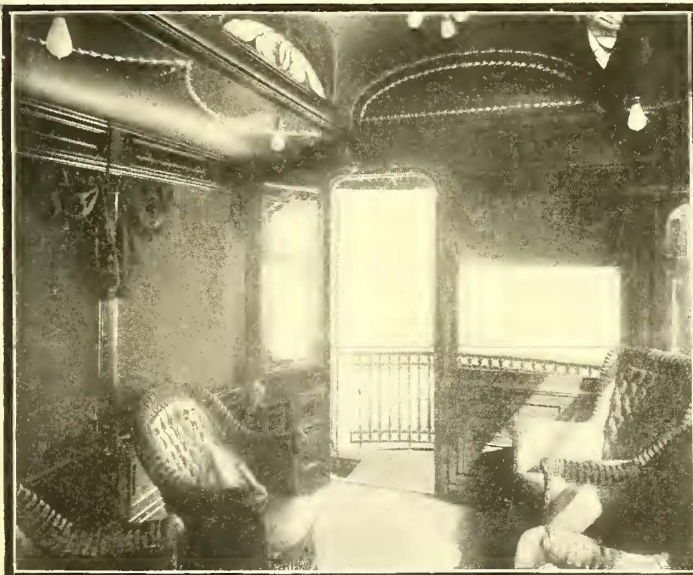


EXHIBIT OF THE G. C. KUHLMAN COMPANY

Whitley, J. M. Duncan, Pittsburgh; T. P. Gaylord, C. W. Regester, Irvin Dryer, Chicago; C. B. Humphrey, Cincinnati; R. E. Drake, B. T. Brady, Syracuse; C. W. Underwood, W. E. Parker, Buffalo; F. B. H. Paine, J. L. Crouse, New York, N. Y.; J. R. Gordon, Atlanta, Ga.; R. S. Brown, Boston, Mass.; N. S. Braden, Cleveland, Ohio; C. F. Medbury, W. B. Wriaks, Detroit.

Westinghouse, Church, Kerr & Company's staff at the convention included E. H. Sniffen, C. M. Vail, New York; H. H. Kerr,

handsome appearance within and without. Private cars for the use of presidents and prominent directors are common in steam railroad service, but cars of this kind for electric railways are certainly novel. The car was fitted with two drawing room compartments, one at each end of the car, a complete sleeping compartment with stationary bed, bath tub, etc., an observation compartment in the front of the car, and an observation platform of the regulation type in the rear. The car measured 46 ft. 6 ins.



INTERIOR VIEWS OF THE KUHLMAN CARS

Chicago; W. Franklin, H. J. Raynor, Detroit; S. A. Jenkins, Boston.

The Nernst Lamp Company was represented by A. E. Fleming, G. J. Stanley, Pittsburg; George C. Ewing, Boston; Walter Floyd, New York.

The Standard Traction Brake Company had a large representation comprising J. R. Ellicott, C. R. Ellicott, F. V. Green, A. J. Brislin, New York; G. A. Hager, C. C. Farmer, Chicago; P. J. Myler, Hamilton, Ont.; A. B. Brown, Buffalo; S. D. Hutchins, Columbus; W. Cummins, Cincinnati; I. B. Clarke, E. H. Dewson, F. C. Newell, Pittsburgh.

over all, and 8 ft. 6 ins. over the side sills. Owing to this width the car was set 2 ins. off of the center of the trucks, away from the devil strip, to allow ample room for passing cars in cities where the tracks are close together. The windows were 54 ins. wide, of ground French plate, and were draped with silk curtains and fitted with silk shades. The interior finish of the car was mahogany throughout, with carved panels curved underneath the window sills. The interior decoration of the car was of the empire style with ceiling finished in pea green with carved gilt mouldings. The curtains, furnishings and upholstery of the car were designed to match with this general effect. The deck lights were of

cathedral glass. The car was lighted with thirty electric lamps, one row being over the windows and the rest being in the electroliers. The fixtures shown at Detroit were temporary, but the car will be finished with electroliers of all gold finish, made in empire style with globes and shades silver edged.

At the center of the car was a private bed room and bath, with a three-quarter mahogany bed, washstand, toilet and bath tub. The water tank for the latter holds 225 gallons. The lamps in the bed room were on a separate circuit from those in the car proper.

The seats used in the drawing room compartments were of cane, with leather and plush cushions. The carpet was the best Wilton velvet, and was selected to harmonize with the color scheme of the interior. The front end of the car was glazed with curved sash, and had a separate motorman's compartment to the right, with observation room at the left, from which the entire track in front of the car can be inspected. The rear drawing room will be fitted with a fine mahogany buffet with leaded glass doors and an ice chest. As the car was sent to Detroit before it had been finally completed, the buffet was not on exhibition, but views of it were shown by the representatives of the Kuhlman Company present. The observation platform in the rear was 4 ft. x 7 ft. 6 ins. wide, and was fitted with the standard observation railing with grilled iron work and brass mountings. The hood was supported by heavy brass posts, and the sides of the car were fitted with large, heavy brass grab handles. The corners of the car are to be provided with embossed bent plate glass. The car was painted throughout with Sherwin-Williams paint and varnished with varnish of the same manufacturers. The car was mounted temporarily on Peckham trucks and was equipped with Christensen air brakes with motor compressor and air whistle.

A Well-Managed Exhibition

It would be out of place to publish a report of the exhibits at the Detroit convention without mentioning the constant conscientious attention given to the exhibitors' needs previous to the opening of the convention by the Detroit United Railway people. That there should be a few delays in railroad shipments of exhibit material, and disappointments in the way of not securing all the space asked for, was inevitable, but it is hard to conceive how the local street railway men could have done more to aid exhibitors in getting their exhibits in place than was done at Detroit. John H. Fry, assistant general passenger agent of the Detroit United Railway, who had charge of exhibit matters, won the hearts of exhibitors early in the game by his considerate treatment of everyone, and his earnest efforts to accommodate in some way those who, for various reasons, did not secure the space desired. But the great point about the whole matter of getting the exhibits in place was that the gentlemen of the Detroit United Railway who looked after these matters were always on hand, and always ready to help out any exhibitor, either in the way of locating exhibits lost in the Detroit freight houses, or facilitating their movement towards the convention hall. Besides Mr. Fry, mention should be made of the work of John Kerwin, superintendent of tracks of the Detroit United Railway, who had in charge the erection of the temporary building, no small task in itself, and the receiving of heavy exhibits. It was by virtue of Mr. Kerwin's portable track and the prompt work of his crews that the large number of heavy exhibits were found on the track space at the opening of the convention, and to him was due the credit of having the temporary building around the armory ready for occupancy within so short a time after the close of a previous convention, which prevented its earlier erection. Mr. Kerwin was always to be found around the convention hall during the few days previous to the convention, as were also E. J. Burdick, superintendent of overhead lines, who had every available kind of electrical current on tap in the hall to meet the desires of any exhibitor, and Albert Eastman, traveling express agent of the Detroit United Railway, who had a marvelous way of getting lost freight and express boxes out of the clutches of his friends in the steam railway freight depots. It seemed to be the universal sentiment among the supply men who had anything to do with placing exhibits that the constant, faithful personal attention given to the matter by officers of the Detroit United Railway was very much appreciated and left little to be desired.

The Worcester Consolidated Street Railway Company, Worcester, Mass., has given the city of Worcester an opportunity to buy 2000 tons of Welsh anthracite coal at \$6 per ton at Boston, and an option on a cargo of 7000 tons at the same price. The company had the opportunity to buy two cargoes of 7000 tons each, but 5000 tons is sufficient to meet its needs. The first cargo is to reach Boston Oct. 20. The city has a committee appointed to procure fuel for those otherwise unable to get it, and the offer was made to this committee.

"Ceco" Electrical Machinery

The Christensen Engineering Company, of Milwaukee, has just placed upon the market a complete new line, including direct-current motors and generators, alternators and transformers, to be known as "Ceco" electrical machinery.

The company is now prepared to build machines up to 1500-kw capacity, suitable for general power, railway or lighting service. Type C. E., ranging in capacity from 2 hp to 50 hp, is illustrated herewith. These motors are made in three styles, open, semi-enclosed and enclosed. The standard styles are belted, but any motor can be geared or direct-connected to the driven machine or shaft. The frame or magnet yoke to which the poles are secured, is cylindrical in shape. It is composed of a single steel casting. The bearing brackets are secured to the frame by bolts. The terminals are mounted on top of the frame where they are not liable to be accidentally touched, but where they are readily accessible in case it is desired to change the connections in order to reverse the direction of the motor. The two bearings are supported by two end brackets, which are identical and interchangeable so that the motor is symmetrical and pleasing in appearance. The semi-enclosed style is the same as the open, with the addition of four perforated malleable iron cover plates. The plates fit into the four open spaces between the arms of the end brackets, and can be quickly and easily removed or replaced. The enclosed style is the same as the semi-enclosed except that the cover plates are solid instead of perforated. Either style of cover will fit into the open style motor, consequently the same motor may be used as open, semi-enclosed or enclosed.

The field poles are built of laminated sheet steel, thereby avoiding eddy current losses. The larger machines have four poles, and the smaller sizes are built with two only, thus permitting the use of a commutator that can be easily insulated. The poles are bolted to the yoke so that a rigid construction is obtained, and the pole is easily removable without disturbing the armature.

The field winding is composed of machine-formed coils accurately wound by automatic machinery. Any field coil can be readily and quickly removed without disturbing the armature by simply withdrawing the pole. The armature core is built up of punched discs of soft sheet steel slotted around the periphery to receive the armature winding. These discs are reannealed and insulated after being punched before assembling.

The shape of the punching is such that when assembled on the steel shaft openings are provided for ventilation parallel to the shaft. Additional ventilation is secured by the use of radial air ducts.

The armature coils are all machine wound. Those for the smaller motors are of wire, while those for the larger sizes are composed of copper bars. The coils are all carefully insulated, then dipped into a bath of special insulating compound, and finally placed in a drying oven until they are thoroughly baked. Surface bands are used to retain the coils in the slots on the smaller sizes, while the same result is secured in larger sizes by the use of retaining wedges placed in specially provided notches near the top of each slot.

The commutator is built up of copper segments insulated from each other by sheets of the highest grade of mica, of hardness corresponding to that of the copper, so that a smooth and even wearing surface is presented to the brushes. Pure-hard drawn lake copper is used. The segments are of generous length and depth, insuring cool running and allowing ample margin for wear. The commutator is easily removable from the armature shaft, tapped holes being provided in the face of the commutator sleeve for that purpose. As the commutator is usually the cause of more trouble than all other parts of a motor combined, unusual care has been given to the design and construction of this important element of "Ceco" motors.

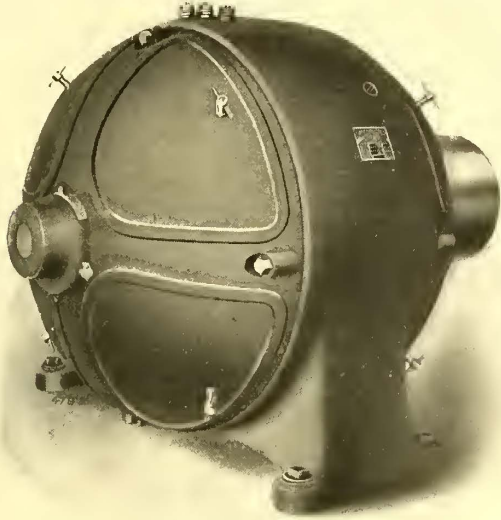
Carbon brushes are used, and the brush holders are of the Christensen Company's coil spring reaction type. The studs to which the holders are secured are mounted upon a yoke, which is fastened to the inner side of the bearing bracket. Each brush can be readily adjusted and any brush can be quickly and easily removed while the motor is running.

The brush contact area is in all cases ample for the current to be commutated, the current density being very low and at the same time consistent with economical design. Wear of the commutator is provided for by radial adjustment of the brush-holder studs. After the brushes are properly set no shifting is required, and the motor operates without noise and without sparking.

The bearing surfaces are generous in area. Self-aligning babbit bearings with self-oiling ring arrangements are provided.

The motors are mounted on a cast iron sub-base, which is composed of a single casting, thus insuring perfect alignment. Belt tension is accomplished by moving the motor upon the sub-base in the usual manner.

The ventilation of the armature and commutator is such that these motors will operate at their rated loads without the temperature of the armatures rising more than 30 degs. C. The rise in temperature of the field coils under these conditions will not exceed 40 degs. C., and of the commutator 45 degs. C. These machines will operate from no load to full load with the brushes in



TYPE C E ENCLOSED "CECO" MOTOR

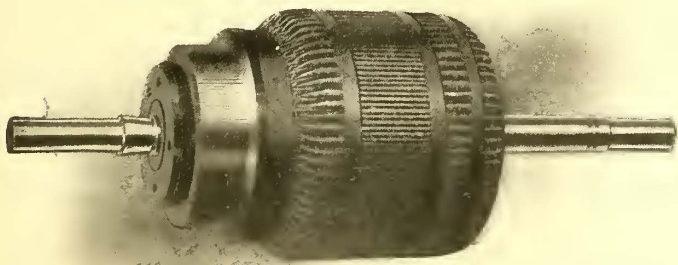
a fixed position without sparking. They will also operate for two hours with 25 per cent overload and for two or three minutes with 50 per cent overload without injurious heating or sparking.

These motors will operate in any position in which the shaft is horizontal. This is accomplished by shifting the bearing brackets on the frame so that the oil chambers remain in the proper position, whether the motor is secured to the floor, the ceiling or the side wall.

A rigid system has been established for the inspection of the parts of each machine while under construction. When completed each machine is given a severe running and high insulation test. Then the frame is rubbed with a good filler and painted. All bright parts are polished.

All the "Ceco" alternators, whether belted, engine-type or direct-couple, are of the revolving field type, thus leaving the armature stationary and easily accessible. By this form of construction the difficulties of properly insulating the armature coils which have caused much trouble in rotating armatures are eliminated.

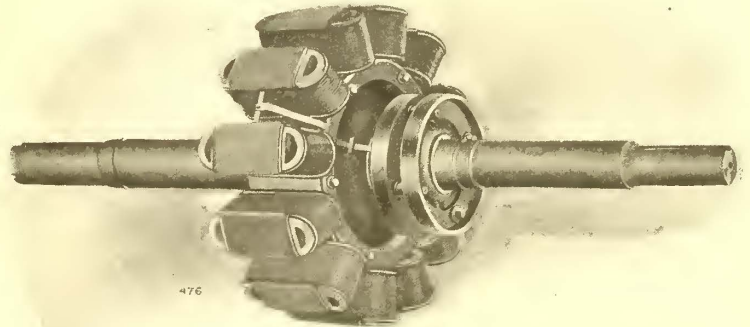
The frame consists of cast iron housings, into which rings of laminated steel with inwardly projecting teeth are assembled, thereby forming slots for receiving the armature windings. The armature is designed with six slots per pole, so that it may be wound or rewound for single, two or three-phase, as required. The armature frames for the belt-driven alternators are cast in one piece, while the frames for the direct-driven machines are divided



5 HP TYPE C E ARMATURE

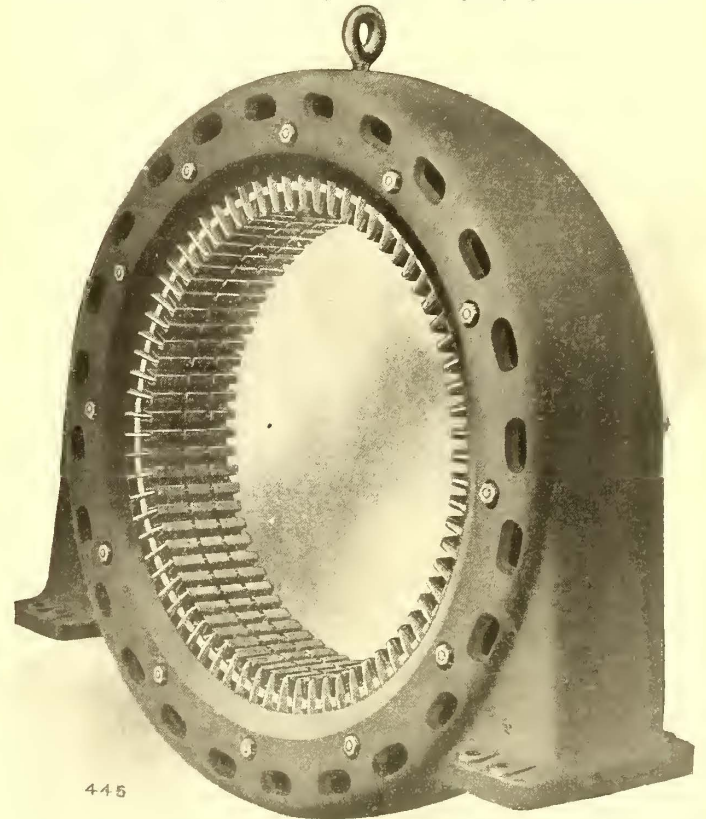
horizontally. Instead of the usual practice of having several coils for the same machine, all the armature coils for each "Ceco" alternator are of the same size and shape, so that they are interchangeable. The coils are specially insulated, so that they will stand, without injury, the highest temperature that will ever be reached in service.

The poles are built up of laminated steel upon a cast iron spider, which is mounted upon a forged steel shaft. In the large sizes the laminated poles are assembled upon a steel ring which is carried on the shaft by means of the cast iron spider. The individual poles are in all cases easily removable with their coils, without dismantling the machine. The field coils are composed of rectangular copper strap bent on edge. The collector rings are made of cast iron, and carbon brushes are used, thus reducing to a minimum the tension required, as well as the wear of the parts. Standard frequencies are 60 cycles and 25 cycles per second. With the exception of the smaller sizes "Ceco" alternators can be



REVOLVING FIELD FOR "CECO" ALTERNATOR

wound for any voltage up to 15,000. The temperature rise when running continuously with full load at any power factor will not exceed 35 degs. C. in the armature, or 40 degs. C. in the fields. At 25 per cent current overload the corresponding temperatures will not exceed 40 degs. C. and 50 degs. C. The machines are all designed so that they will carry satisfactorily a 50 per cent current



ARMATURE FRAME FOR ENGINE TYPE "CECO" ALTERNATOR

overload for two hours at any power factor without injurious heating.

The Christensen Engineering Company has comparatively new works, as they were completed but two years ago, and no expense was spared in providing every facility for the rapid, accurate and economical manufacture of its product. The foundation for a

250-ft. extension to the main machine shop, which is 186 ft. in width, has just been completed. There are three stories, and this extension will provide 88,000 additional square feet of floor space.

Litigation Ended at Nashville

By an agreement entered into a few days ago, litigation between the City of Nashville and the Nashville Street Railway Company which has been pending in the courts for some time, has been settled. The city secured the recognition of the right to purchase the street car system at any time after twenty years; also a guarantee that the company will expend not less than \$1,000,000 in the improvement of the system; also the donation of a park at a cost of \$125,000 and the payment to the city of 2 per cent upon the company's gross income to be used by the park commission for the improvement and maintenance of the city's parks. After the company's gross earnings aggregate \$1,000,000 then the 2 per cent assessment will be increased to 3 per cent and continue perpetual.

Street Railway Patents

UNITED STATES PATENTS ISSUED OCT. 7, 1902

[This department is conducted by W. A. Rosenbaum, patent attorney, Room No. 1203-7 Nassau-Beekman Building, New York.]

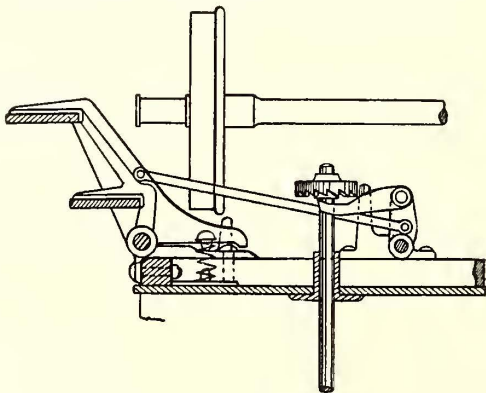
710,422. Automatic Safety Device for Cars; W. H. Caley, Denver, Col. App. filed Feb. 10, 1902. A safety device for preventing accidents to the entering and departing passengers by preventing the starting of the car while any passenger is stepping upon the step and may therefore be partly on the car and partly on the ground.

710,432. Automatic Switch Mechanism for Street Railways; J. D. Cottrell, Providence, R. I. App. filed May 13, 1902. The motorman throws down a projection which engages with mechanism in the track for moving the switch.

710,469. Trolley; J. F. Kerr, Paterson, N. J. App. filed Aug. 8, 1901. A vertical stud is mounted to oscillate at the upper end of the pole and carries a crank upon which the trolley wheel is mounted, affording it sidewise motion.

710,470. Mechanism for Operating Street Railway Switches; W. H. Kirkley, Cranston, R. I. App. filed Jan. 18, 1902. Push rods which can be pressed downward by the motorman to engage and throw the switch mechanism.

710,489. Railway Car Sander; D. N. Miller, Hamilton, Can. App. filed April 10, 1902. A conveyor which feeds out the sand can be rotated, when necessary, manually by the motorman.



PATENT NO. 710,422

710,516. Ice Cleaner for Trolley Wires; F. N. Root, Kalamazoo, Mich. App. filed Jan. 23, 1902. Ice-cutting wheels are mounted adjacent to the trolley wheel.

710,532. Rail-Bond; C. Sprague, Boston, Mass. App. filed Feb. 24, 1902. A laminated bond, the ends of which are made solid by dipping in solder and embracing with a strap of copper.

710,535. Hand Strap for Railway Cars; M. Straus, Denver, Col. App. filed Jan. 21, 1902. The main loop has a number of smaller loops secured to each side.

710,536. Hand Strap for Street Cars; M. Straus, Denver, Col. App. filed Feb. 25, 1902. Several loops pivoted to a single support and having elastic sections.

710,609. Car Side Bearing; W. A. Pungs, Detroit, Mich. App. filed Oct. 22, 1901. The upper bearing plate has a rocking connection with its support.

710,645. Side Bearing for Railway Cars; C. H. Williams, Jr., Chicago, Ill. App. filed May 26, 1902. The rollers are set in openings in an endless flexible belt.

710,673. Roller Side Bearing for Cars; F. K. Fassett, St. Louis, Mo. App. filed Feb. 18, 1902. The rollers are on an endless chain and have their axles confined in endless grooves of the frame.

710,691. Magnetic Traction Wheel; B. B. Hill, St. Petersburg, Russia. App. filed Jan. 28, 1902. The wheel is provided with a hollow movable rim and a magnetizing coil in the rim.

710,709. Car Wheel Flange Lubricator; G. W. Newton, Hubbard, Ohio. App. filed May 23, 1902. A roller charged with lubricating material is arranged to be thrust against the flange of the wheel when necessary.

710,794. Rail-Bond; E. P. Morris, East Orange, N. J. App. filed July 9, 1901. The ends of a flexible bond are passed into and through openings in the head pieces.

ENGINEERING SOCIETY

THE ENGINEERS' CLUB OF PHILADELPHIA.—A regular meeting of the club will be held on Saturday, Oct. 18, at which Mr. Washington Devereux will present a paper entitled: Some Electrical Fire Hazards.

Mr. Carl Hering will make a few remarks, postponed from the last meeting, on "The Latest and Best Value of the Mechanical Equivalent of Heat," and on "Recent Progress in Single Phase Traction."

PERSONAL MENTION

MR. H. S. NEWTON has resigned as general manager of the Beaver Valley Traction Company, of Beaver Falls, Pa., and Mr. S. W. Thomson, of New Castle, Pa., has been elected as his successor.

MR. JAMES P. GILBERT, who has been the general superintendent of the New York & Ohio Company, of Warren, Ohio, has resigned his position and will become general manager of the Standard Electrical Manufacturing Company, of Niles, Ohio, manufacturers of the Standard incandescent lamp.

MR. J. E. TOWNSEND, who was manager of the Lima Railway & Light Company, of Lima, Ohio, for six years, and who has been connected with electric railway interests in Ohio for the past year, has been appointed operating manager of the Kokomo Railway & Light Company, of Kokomo, Ind.

MR. H. E. SAWYER, who has been foreman of construction on the Columbus, London & Springfield Railway, and the Dayton, Springfield & Urbana Railway, of Springfield, Ohio, has been made superintendent of the latter road. He succeeds Mr. C. E. Simonson, who becomes traffic and passenger agent of the company. Mr. William Parker, agent of the company at Dayton, has been made freight agent and auditor.

MR. F. REED WEISNECKER, for many years engineer of roadway for the Cincinnati Traction Company, of Cincinnati, Ohio, has resigned from the company to accept a similar position with another company. A few days ago he was called into the offices of Vice-President Foraker, where the employees of the general offices presented him with a handsome silver snuff box. Mr. Weisnecker has been connected with the company since 1875.

MR. JOHN H. PASCOE, Republican nominee for the Pennsylvania State Senate, who died last week at his home in Allentown, after a comparatively brief illness, aged 51 years, was a member of the firm of Pascoe & Crilly, builders of electric railways. Among the roads this firm constructed are the Hellertown, Philadelphia & Lehigh Valley Street Railway, the Mauch Chunk & Lehigh Street Railway; the Slatington, Whitehall & Egypt Railway and the Perkiomen Valley Railway.

MR. CHARLES H. COX, who has been superintendent of the Middleboro, Wareham & Buzzard's Bay Street Railway Company, of Middleboro, Mass., since its construction, has been appointed general manager of the company. Mr. Cox was connected with the street railways of Boston for 26 years, entering the employ of the Metropolitan Railway of that city when a mere boy. He entered the employ of the Worcester Construction Company after leaving the employ of the Boston company. He resigned from the Worcester Construction Company to become connected with the Easton, Palmer & Bethlehem Street Railway, of Bethlehem, Pa., and resigned from this company to become connected with the Dayton & Xenia Traction Company, of Dayton, Ohio. It was from this company that he resigned to become connected with the Middleboro, Wareham & Buzzard's Bay Street Railway Company. Mr. L. H. Parker, of Newtonville, has been appointed to succeed Mr. Cox as superintendent.

FINANCIAL INTELLIGENCE

THE MARKETS

WALL STREET, Oct. 15, 1902.

The Money Market

Money conditions at New York have continued no less stringent during the past week than they were in the fortnight before. Call money has loaned for the most part around 12 per cent, with occasional advances as high as 18 per cent. Time money at 6 per cent, with a commission added on, is on a basis practically of 7 per cent for the longer dates, and even higher than this in many cases where the loans are made for periods of two and three months. Trust companies and out-of-town banks which were the principal lenders during September, have been the most urgent during the last week or two in recalling their credits from the market. The result is that in spite of very heavy liquidation in the stock market, it has been impossible for the Clearing House institutions to reduce their own accommodations, and the official statement of last Saturday electrified the speculative community by showing an increase of over \$2,300,000 in the loan column. It is apparent, however, that despite the recent failure of the speculative liquidation to produce an immediate increase in bank surplus reserve, the money situation is steadily on the mend. The two particular respects in which conditions have changed for the better are the weakening of the foreign exchange market and the reversal of the Treasury operations from a source of loss to a source of gain for the local banks. Demand sterling, although down nearly a cent in the pound from its recent high point, is not off enough to make gold imports probable. But the reaction has served to relieve apprehension over the abnormal condition of ten days ago, when exchange was advancing in the face of an acute stringency in our money market. The change in the Treasury from creditor to debtor in the daily operations in the market, is chiefly the result of diversion of internal revenues into the national bank holdings of government moneys. Since the outset of the month nearly the whole of the receipts from internal revenue have been intercepted in this way, and doubtless the process will continue so long as the supply of government bonds necessary for security holds out. The chances are, altogether, that we have seen the low point of the season in the New York surplus reserve. Increase from now on will be slow because the demands from the West and South for crop-moving money, will not cease for another month at least. But the prospect seems fairly good for a gradual strengthening of bank resources and a gradual relaxation of money rates.

The Stock Market

The liquidation on the Stock Exchange, which everybody concedes was needed to clear both the speculative and money situations, reached its extremity at the outset of the current week. Prices for the leading stocks on Monday morning showed declines ranging from 15 to 25 points from their highest of September and August. In view of this very extensive reaction, it would be hard to believe that the speculative excesses of the spring and summer in the market have not been pretty thoroughly corrected. So far as the decline was forced by the exigencies of the banking position, the worst is undoubtedly over. With the relief afforded by the wholesale liquidation of speculative accounts, and with the additions to the local cash supply, already noted, through the Treasury operations, the banks should be able to go through the remainder of the autumn without having to squeeze any further their speculative clients. The money question seems for the moment to be subordinate to the question whether or not we are to see an immediate end of the great coal strike. Undoubtedly a large number of people have been impelled to throw over their securities during the last fortnight, who would not have done so if the money stringency had been the only trouble in the situation. They were influenced by fear of the very grave consequences were the coal famine to continue during the winter months, and again by the fear of something even worse were the spirit of socialism and anarchism, which have appeared in the coal strike, encouraged to go on and to spread into other industries. The best judgment, at this writing, is that the striking coal miners cannot do otherwise than accept the concessions offered by the operators who have proposed that President Roosevelt choose a committee to arbitrate all alleged grievances at the mines. On this assumption the stock market on Monday afternoon and Tuesday rallied sharply from its extreme depression of Monday morning, and as money seemed to be working easier, many people were inclined to the view that the turn for the better had come. There will be more or less uncertainty, however, until the miners' answer is made and until relaxation in the money market becomes

a more settled fact. Stock prices are not likely, therefore, to go up all at once. But it is no doubt true that they have seen about their lowest for the season.

Among the local tractions, Manhattan has again been better bought than the others, and has responded more swiftly whenever the general market has rallied. Brooklyn Rapid Transit has been the heaviest of the group. The poor showing made in the recent annual report has caused a good deal of liquidation, and has deprived the stock of outside support.

Philadelphia

The Philadelphia traction shares have again resisted the general downward tendency more successfully than the average run of securities elsewhere. This is particularly true of American Railways, which has remained steadily at 52 and above during the past week, and of Philadelphia Rapid Transit, which, after reaching practically its high record of 18 on Thursday last dropped off later only to 17. The action of the latter stock simply goes to affirm the previous idea that there has been very slight distribution of the shares in the hands of the public. Philadelphia Traction held well around 98, but Union Traction yielded to 46¾ on Monday, and was in fact the weakest of the group. Fairmount Park Transportation, on sales of only 300 shares, broke to 24, an extreme decline of 10 points from its highest price. Other sales for the week included Philadelphia City Passenger (25 shares) at 210, and United Traction of Pittsburgh preferred at 51. In bonds Electric People's Traction 4s between 98 and 98½, Newark Passenger 5s at 116½, People's Passenger 4s at 105, Union Traction of Indiana 5s at 100, American Railways 5s at 108½, and United Railways 4s at 87.

Chicago

The movement of the Chicago traction issues has been governed during the week entirely by general market conditions. Excellent traffic advices continue to be received from the various lines, the Northwestern Elevated, for instance, showing an increase of 20 per cent in earnings of the first week in October, as compared with a year ago. But good earnings have not availed to hold up security prices in face of the general speculative depression. Some of the prices reached this week are the lowest of the present year, notably Northwestern common at 34, and the preferred at 82. City Railway dropped 6 points to 210, and West Chicago sold down from 93 to 91½, and Lake Street from 10½ to 9¾. On the other hand no Union Traction came out during the break, and Metropolitan common and preferred both held well at 41 and 89½, respectively. It is said that the bulk of the Metropolitan's heavy earnings now being recorded are derived from the original line, and that less revenue is coming in from the Aurora-Wheaton extension than was at first reported.

Other Traction Securities

The prevailing unsettlement of market conditions has made itself felt in Boston more in restricting trading than in liquidation, at least so far as the local traction stocks are concerned. Boston Elevated sold down to 153, Massachusetts Electric common to 33¾, and the preferred to 95, but all of them recovered most of the loss later on. Light dealings were the only characteristic of their market. The week in Baltimore has been an extremely dull one, with weakness in the active traction specialties. United Railways incomes sold down to 66⅞ on Monday, and the stock to 13, which are the low prices of the season. Nashville Railway shares were off a fraction at 6, and the 5 per cent certificates a half point, at 75. United Railways 4s sold at 95 and 94¾. Atlanta Street Railway 5s at 106, and Lexington Street Railway stock (34 shares) at 50. This was all the business done. United Railways of San Francisco securities were dealt in for the first time on the New York Stock Exchange. Both common and preferred started off strongly at an advance to 22¾ for the former, and 62¼ for the latter. But the gains were lost during the subsequent reaction in the general market. Twin City Rapid Transit reached its low point of the season during Monday's general break, touching 114½, but it rallied to 116 at Tuesday's close. New York curb transactions for the week include American Light & Traction, at 41½ and 42, Camden & Trenton (50 shares) at 43⅞, New Orleans common from 15½ to 16½, the preferred at 53, St. Louis Transit (500 shares) between 28⅞ and 29, Washington Railway & Electric preferred at 52, Brooklyn Rapid Transit new 5s at 87⅞ and 87¾. San Francisco subscription privileges at 48, United Railways of St. Louis 4s at 86, Washington Railway & Electric 4s at 83, and New Orleans 4½s at 83.

Traction stocks on the Cleveland Stock Exchange were stag-

nant last week. Sales numbered only 1081 shares for the entire week. Nearly the entire board showed slight declines from the week previous. Western Ohio declined from 30½ to 28¾ on sales of 425 shares. The fact that this stock was hit so hard by the uncertainty of the market shows up the anomalies of the situation. The earnings of the property are showing up very well, each month showing an increase. In addition to this a considerable amount of new mileage will soon be placed in operation. The road is a fine earner and it would seem that these securities have less reason to drop at this time than at any time this year. Lake Shore Electric common declined from 19 to 18½ on small sales. Aurora, Elgin & Chicago common sold from 39½ down to 37. Sales were small. Elgin, Aurora & Southern also sold down, the range being between 58 and 59. Small lots of Miami & Erie Canal sold between 27½ and 28, Northern Ohio Traction common held at 67 and 67½, the preferred selling at 96½ and 97. Both small lots. Monday a small lot of Syracuse Rapid Transit common sold at 30½ and a small block of Miami & Erie Canal at 25.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Closing	Bid
	Oct. 7	Oct. 14
American Railways Company.....	52½	52
Aurora, Elgin & Chicago.....	38	(a) 39½
Boston Elevated.....	154	154
Brooklyn R. T.....	61½	62
Chicago City.....	214	210
Chicago Union Tr. (common).....	17	17
Chicago Union Tr. (preferred).....	50	50
Cleveland Electric.....	88	86
Columbus (common).....	60	56
Columbus (preferred).....	108	106
Consolidated Traction of N. J.....	69½	69
Consolidated Traction of N. J. 5s.....	110¼	110¼
Detroit United.....	84¾	85
Electric People's Traction (Philadelphia) 4s.....	98¼	98½
Elgin, Aurora & Southern.....	54	—
Indianapolis Street Railway 4s.....	87	87
Lake Shore Electric.....	16¾	(a) 18½
Lake Street Elevated.....	10	9½
Manhattan Railway.....	132¾	133½
Massachusetts Elec. Cos. (common).....	34½	35
Massachusetts Elec. Cos. (preferred).....	95½	(a) 95
Metropolitan Elevated, Chicago (common).....	40½	40
Metropolitan Elevated, Chicago.....	88½	88½
Metropolitan Street.....	136½	137¾
New Orleans Railways (common).....	16	15½
New Orleans Railways (preferred).....	54	53
North American.....	122	121
Northern Ohio Traction (common).....	66	64
Northern Ohio Traction (preferred).....	96¾	95
North Jersey.....	33¾	33¾
Northwestern Elevated, Chicago (common).....	36	34
Philadelphia Rapid Transit.....	17½	16¾
Philadelphia Traction.....	98	98½
St. Louis Transit (common).....	29½	28
South Side Elevated (Chicago).....	110	108
Syracuse Rapid Transit.....	30	30½
Syracuse Rapid Transit (preferred).....	76	76
Third Avenue.....	—	127
Toledo Railway & Light.....	(a) 35¾	32¼
Twin City Minneapolis (common).....	116½	115½
United Railways, St. Louis (preferred).....	—	—
United Railways, St. Louis 4s.....	—	86
Union Traction (Philadelphia).....	47¾	46¾
Western Ohio Railway.....	28	(a) 33½

(a) Asked.

Iron and Steel

The principal information of the week in the iron market is furnished by the "Iron Age" in its usual monthly compilation of blast furnace statistics. It shows the total output of these furnaces to have been only 60,000 tons less in September than in August, although a heavy decrease might have been expected in view of the increasingly bad effects of the coal strike upon the fuel supply. Nevertheless, the domestic out-turn of both pig iron and steel billets is considerably below the demand, and importations of the foreign product continue freely. This is especially true in foundry iron, the foundrymen being almost entirely dependent upon the foreign markets. The "Iron Age" reports that sales have been made of 100,000 tons of Bessemer pig, for delivery in the first quarter and first half of next year, at \$20.50 to \$21.00 at the furnace. Quotations are unchanged but nominal, as follows: Bessemer pig, \$21.75; steel billets, \$31.50 to \$32.00; steel rails, \$28.00.

Metals

Quotations for the leading metals are as follows: Copper, 11.65 cents; tin, 24.95 cents; lead, 4½ cents; spelter, 5½ cents.

AUGUSTA, GA.—The Augusta Railway & Electric Company, the North Augusta Electric & Improvement Company, the Augusta & Aiken Railway Company, the North Augusta Land Company and the North Augusta Hotel Company, all of which were brought under one management through the recent purchase by the Railway & Light Company of America of the Augusta Railway & Electric Company, will be merged into the Augusta Railway & Light Company.

SACO, MAINE.—The Saco Valley Electric Railway Company has filed for record a mortgage deed for \$300,000 in favor of the Federal Trust Company, of Boston. This is to cover an issue of bonds to that amount, of \$1000 each for 30 years, bearing interest, payable in gold, at 5 per cent.

BOSTON, MASS.—The Boston Stock Exchange has listed \$1,800,000 five per cent. non-cumulative preferred stock and \$5,000,000 common stock of the Georgia Railway & Electric Company.

WORCESTER, MASS.—The Railroad Commissioners have granted approval of an issue of \$80,000 additional stock by the Hampshire & Worcester Street Railway Company to pay floating indebtedness and provide for extensions and equipment.

PITTSFIELD, MASS.—The Railroad Commissioners have approved an issue of \$250,000 original stock by the Berkshire Street Railway Company for part payment of the cost of construction and equipment of the road.

ST. LOUIS, MO.—The statement of the gross earnings of the St. Louis Transit Company for the month of September shows a gain of \$61,435 over the same month last year. The total earnings for the month were \$561,921, as against \$500,486 in September, 1901. This brings the total earnings for the present year to \$4,169,346, a gain of \$435,106 over the same period in 1901. The earning capacity of all the roads in the system is increasing, and the effect of numerous improvements made since the first of the year is being felt.

EXETER, N. H.—The interest of Wallace D. Lovell in the New Hampshire Traction Company, which controls the Exeter, Hampton & Amesbury Street Railway, the Haverhill & Plaistow Street Railway, and the Haverhill, Plaistow & Newton Street Railway, is reported to have been sold to Howard Abel, president of the company. The system comprises about 127 miles of line, with \$1,000,000 of stock and \$6,000,000 of bonds. Mr. Abel, it will be remembered, was an officer of several Chicago properties when the Yerkes interests were operating there, and later was interested with Mr. Yerkes in his London underground ventures.

NEWARK, N. J.—It is now said that the syndicate that has been arranging for the absorption of the North Jersey Street Railway Company, Jersey City, Hoboken & Paterson Street Railway Company, Orange & Passaic Valley Traction Company, and the Elizabeth, Plainfield & Central Jersey Traction Company has secured options on over 50 per cent. of the stock of these companies, and that despite rumors to the contrary, the deal will be consummated within a few weeks.

ALBANY, N. Y.—Justice D. Cady Herrick, on motion of Sheehan & Collin, attorneys for the Colonial Trust Company, of New York, has appointed George T. Blakeslee, of Kinderhook, receiver for the Albany & Hudson Railway & Power Company. The appointment of the receiver, as has been previously mentioned in the STREET RAILWAY JOURNAL, is the first step in a plan for its complete reorganization of the company. The officers of the company are: A. C. Salisbury, president; M. E. Stark, vice-president; G. C. Blakeslee, general manager.

NEW YORK, N. Y.—The governing committee of the New York Stock Exchange has admitted to dealings on the regular list \$15,000,000 United Railroads of San Francisco preferred stock and \$10,000,000 common stock.

ALBANY, N. Y.—The United Traction Company has declared the regular quarterly dividend of 1¼ per cent., payable Nov. 1.

CINCINNATI, OHIO.—The property of the Mill Creek Valley Traction Company and the Hamilton, Glendale & Cincinnati Traction Company has been turned over to the Cincinnati Interurban Company, a company formed by the Cincinnati Traction Company interests to lease the properties in question. The terms of the lease have previously been outlined in the STREET RAILWAY JOURNAL.

CINCINNATI, OHIO.—The Cincinnati, Newport & Covington Light & Traction Company have declared a quarterly dividend of 1 per cent. on preferred stock. A member of the board of directors is quoted as saying that the next quarterly dividend will probably be 1¼ per cent.

PHILADELPHIA, PA.—Press reports say that it is reported that the United Railways & Electric Company has decided to issue first mortgage bonds on the extension of its system now being built from Dundalk to Sparrows Point.

MERCER, PA.—The directors of the East End Street Railway Company have voted to increase the capital stock of the company to \$500,000. The company was recently granted a franchise here.

TITUSVILLE, PA.—The directors of the Titusville Electric Traction Company have voted to increase the capital stock of the company from \$100,000 to \$300,000.

DALLAS, TEX.—The Dallas Electric Corporation, recently organized, which controls through ownership of stocks and bonds the Metropolitan Electric Street Railway, the Dallas Consolidated Electric Street Railway, the Dallas Electric Company and the Dallas Electric Light & Power Company, will be capitalized as follows: Bonds, 5 per cent. 20-year gold, secured by mortgage deed to the City Trust Company, as trustee, \$4,000,000; preferred stock 5 per cent non-cumulative, \$1,500,000; common stock, \$3,000,000. There will be issued at this time \$2,750,000, bonds; \$1,350,000, preferred stock; \$3,000,000, common stock.

MILWAUKEE, WIS.—The Milwaukee Electric Railway & Light Company has declared the regular quarterly dividend of 1½ on the preferred, payable Nov. 1.

TORONTO, ONT.—The stockholders of the Toronto Railway have ratified the plan to increase the capital stock of the company from \$6,000,000 to \$7,000,000 to provide funds for improvements.