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Ballasted Bridge Floors

A recent discussion at a meeting of the Western Society of Engineers in Chicago brought out some of the advantages of a type of bridge construction which is becoming more and more common in high-class steam railroad work, namely, bridges built with floors to receive the regular ballast of the road instead of having the ties rest directly on the steel structure of the bridge, as has been common for so many years. The placing of a layer of ballast between the ties and the bridge structure serves several important purposes. One of the most important is that if high-speed trains are run, the impact of the train on

the bridge structure is cushioned. Another point of equal importance is that the roadbed upon which the ties rest is the same on the bridge as on the approaches. Whenever a settling of ballast occurs on the approaches, it may also take place on the bridge structure, and this prevents the many difficulties of keeping the track in proper surface, which arise when the ties rest solidly on the steel structure of a bridge, while on the approaches they rest on ballast, which is somewhat yielding. Of course, there will inevitably be a little difference in the settlement of the track on a ballast bridge and on its approaches, but since the ballast at the ends of the bridge is itself somewhat flexible, there is not the sudden transition from yielding to a rigid support that there is in the old style bridge. Ballasted bridges seem to have found great favor among the steam railroads which have tried them. They are, however, said to be somewhat more expensive in first cost than the old style bridges. This is due mainly to the fact that a floor or trough for the ballast must be provided in addition to the supporting structure of the bridge. There is also naturally some tendency for the floor to rust under the ballast, but in spite of these objections the ballasted bridge seems to have more points in its favor than against it where the highest class of construction is desired. The lessening of the impact of trains on the bridge structure, with its accompanying detrimental effects, and the superiority of the roadbed due to better surfacing, to say nothing of the noiseless qualities, seem to overbalance the minor points urged against it.

Heating the Motorman's Vestibule

Vestibules for protecting the motorman have been generally adopted where cold winters prevail, partly at first because of legislation and in latter years because of the general recognition of the necessity for vestibules. In city service an entirely closed vestibule without any means of heating it is about all that the management can provide under existing conditions in many places. Where single-ender cars are used, with a permanent cab for the motorman on the front end of the car, it is possible to protect the motorman better than he can be where the front platform is used for passengers. Nevertheless, the front platform is so used in a number of cities, and in such cities the number of passengers which make it a habit to stand on the front platform shows that it is not altogether an uncomfortable place. In a few cities the hot-water heater or a hot-air heater discharging warm air into the car and taking its cold air from along the car floor is placed in the motorman's vestibule, thus keeping the dirt of the heater out of the car and warming the cab. The plan has much in its favor.

When we get into interurban practice, the necessity for artificial heat in the motorman's cab is much more apparent than in any city practice, as the tightest of vestibules will let in considerable cold air when cutting the breeze at a 50-mile clip. In order to keep the motorman's compartment on an interurban car at a temperature which will not drive away desirable employees, and which will be conducive to good service and good

temper on the part of the motorman, it is necessary to provide an abundance of heating service of some kind in the motorman's cab. Where electric heaters are used it is simply a question of putting one of sufficient capacity in the cab. Where hot-water heaters are used, the mistake is likely to be made of not putting a sufficient heating surface of hot-water pipes in the cab. If the heater is located elsewhere in the car, it must not be forgotten that much more heating surface is needed near the front end of the car than at the rear end. The location of the hot-water heater in the motorman's cab of an interurban car appears to take care of the heating problem about as well as any plan that has been devised. It has been objected to by some managers on the ground that the motorman will run the hot-water heater to suit his own comfort rather than that of the passengers in the car. It is probably true that some hot-water heaters when run at a sufficient temperature to heat the car will make it uncomfortable in the cab, but if the heater is well jacketed this will not be the case. The motorman has plenty of opportunities to keep cool, especially if he has to open the windows occasionally to plug in at telephone boxes or throw switches and receive mail pouches. The practice of putting the rheostats in the cab can hardly be commended, as it is a direct temptation to the motorman to run on resistance points to the detriment of both the coal pile and the rheostats. Then, too, in warm weather they are a source of discomfort or must be moved to a place under the car.

Care of the Junk

The separate pieces of old material, or junk, from a street railway repair shop are generally regarded as having served their period of usefulness. Frequently the larger pieces, such as the worn out or broken parts of motors and trucks, are allowed to lie about the shops and yards until their presence is not noticed. Even when the scrap is collected in a heap, the whole pile is often neglected and is permitted to accumulate until it takes up much needed space. The maintenance expense of many shops could be substantially decreased by proper attention to the junk. By allowing it to lie scattered around the yards much of it is lost or carried away, and, in addition, the effect on the men is not conducive to promoting general neatness and pride in their work. The appearance of a shop is always indicative of the class of work done in it, and nothing detracts so much from the looks as scattered pieces of broken machinery lying in every corner and in out of the way places.

This old material should be disposed of as rapidly as possible. A junk pile represents idle capital which is unnecessarily idle. Disposing of the junk at six months' intervals may mean that on an average, even in a small shop, one or two thousand dollars is idle. The junk dealer usually pays the same rate per pound whether the quantity be large or small, and it is therefore to the interest of the railway company to turn the junk into cash at the earliest opportunity. In some shops, brass and copper junk is given no more respect than the old iron, and they are thrown out in an open pile together. A dinner pail will carry several pounds of copper, and the habit of never allowing the dinner bucket to be carried home empty has often been acquired by unscrupulous employees. The losses by this method take place so gradually as to not be easily noticeable, but in the aggregate they may be considerable. The brass and copper junk should by all means be kept under lock and key. In many shops, it must be admitted, the importance of attention to the junk pile is appreciated; in others, especially the smaller ones, a glance at the general appearance of the shop and yards shows

that the junk in general is neglected. The loss of interest on the money value of the scrap should alone be sufficient inducement to the superintendents of these latter shops to change their methods.

The Newspaper and the Interurban Road

We have in times passed called the attention of city railway managers to the wisdom of offering to the local newspapers opportunities for getting accurate information from the officers of the road on matters of news, which are of interest to the public. In fact, the good will of the newspaper men in a city should be cultivated even more than that of other members of the community, because their utterances influence the sentiments of so many readers daily. When we get into the field of interurban railroading, the cultivation of the newspapers is in some respects even more important than in the city. It is recognized by the general passenger agents of steam railroads that the advertising afforded by the mention of a railroad company's train service, excursions and the like in the columns of the daily newspapers is an excellent means of reaching the public. While an interurban road is not as dependent as the city railway on the good will of the people of any one town, its traffic is affected by the good will of the people all along its line and by the amount of interest that can be aroused in travel between points along its line. It is, therefore, desirable not only to cultivate newspaper publicity, but in fact actually to invite it in a proper way.

Some managers are no doubt inclined to suppress all newspaper articles concerning their roads. This feeling has probably been brought about by the tendency of newspapers to be careless as to the accuracy of their statements and to put ordinary happenings on the road into as sensational form as possible. Of course, it is not desirable from the standpoint of the company to have accidents given much space in the daily press, but inasmuch as the more important accidents will surely be given publicity in the newspapers, it is certainly nothing more than good sense on the part of the management of the company to be on such terms with the newspaper reporters that fair and accurate reports be published instead of exaggerated and garbled ones.

There is another class of news which at first glance may not appear as being of any benefit to the road, but which results in no harm when published, and when mentioned in the news columns of a paper will serve simply as a free advertisement for the road. The late P. T. Barnum hit the nail on the head from an advertising standpoint when he remarked that he did not care what the newspapers said about him providing only they said something. In other words, indifference is more to be feared than anything else. Among the news items which may serve to keep an interurban company before the public there are many that have no direct bearing on the inducement of travel, but which would be read by readers who might skip advertisements of the company's train service or formal announcements. For example, a fast run may be made over the line, or an unusual consignment of freight may be handled. Some little incident, amusing or otherwise, might occur in the operation of the road which in the mind of the management is not enough out of the ordinary to deserve special mention. These things, when served up by the enterprising newspaper reporter with an eye for news, may make very good reading and good advertising for the company as well. It is true that some reporters have a faculty for mixing up facts most wonderfully, but they are far more likely to confuse them if left to

their own devices than if the management takes an interest in the matter and aids instead of hinders the newspaper man's work.

The value of the publicity gained by the publication of news items about a road cannot be overestimated. Its existence is brought to the attention of many strangers in the locality, some of whom may have immediate occasion to use it. Even to those who are familiar with the road, these items bring its existence prominently to mind and prevent its being forgotten. These articles are likely to attract more attention than the regular advertisements of the company, and a little sensationalism or exaggeration can be overlooked by the management, as the average newspaper reader is aware that the average newspaper reporter is given to such things and makes due allowances. The question of the harm or benefit resulting from the publication of any article should be decided by whether or not it would create or tend to decrease traffic. With the exception of critical articles and news regarding accidents, almost any mention of a road in the newspapers will tend to increase traffic rather than decrease it. The encouragement of such newspaper publicity always puts the manager on good terms with the reporter. Reporters are only human, and no reporter is so inclined to write damaging statements regarding the management of the company when he knows the principal officers individually as he would be if entirely unacquainted personally with the management.

The Field For Alternating-Current Railway Motors

The abstracts published in this and a recent issue of the lectures by Messrs. Armstrong and Renshaw on the present status of the single-phase motor are interesting in bringing up to date the knowledge of the adaptation of this machine to railway work. The engineering public has had to depend so far almost entirely for this information upon the representatives of manufacturing companies, but the discussions of the past year have defined our knowledge of the future field of the single-phase motor in a much clearer manner than was possible a year ago. During the development of any new type of apparatus, especially one that holds forth considerable promise, it is perhaps the natural assumption of many people to take the very broadest view of its possibilities and to consider its effect to be revolutionary. Still others, perhaps, take too conservative a view. At present the weight of evidence is to the effect that the single-phase motor will have a recognized field in railway work, but will also have its limitations. While it is unsafe to predict very definitely as to the future, we confess we are inclined to be optimistic, certainly so far as its application to comparatively light traffic is concerned.

As regards city service, both surface and elevated, the direct-current motor is so strongly entrenched by existing investments and by its inherent suitability for rapid acceleration work, that the friends of the a. c. motor do not predict much use of it in this particular class of work. In the case of interurban roads, however, how many interurban roads are there at the present time supplied from high-tension transmission lines through rotary converter sub-stations which would not be better off if operated with a. c. motors, provided, as we have assumed, that the a. c. motor is all that its friends now believe it to be? If this is the case, is it not reasonable to suppose that, since as the new a. c. single-phase motors can be worked on d. c. circuits, extensions are likely to be made with the use of a. c. motors, and that in course of time alternating current may gradually displace direct current on the majority of existing interurban lines? If this change comes it will not be by whole-

sale throwing out and scrapping of the present direct-current apparatus, as that would involve a senseless waste of good material, but as present equipments wear out and as the possibility of doing away with much of the expense of sub-station maintenance presents itself, there is every likelihood that if only the a. c. motor is satisfactory, it will gradually displace the d. c. for that interurban work for which it is especially suited. The street railway business has already experienced a change very similar to this. Electric traction, as conducted a few years ago, was not so immensely superior to the cable as to make it apparent that there would be any great object in a change from cable to electric traction, and few who were familiar with cable roads thought such a change probable. But the same elements came into the problem that will enter into the question of putting a. c. motors on interurban lines, namely, the desirability of a cheap system for outlying lines and extensions, and the desirability of operating an entire road by the same system of distribution. With the old cable roads, it was not so much a question of the economy of a certain cable line compared with that of the same line operated electrically, as it was of having a uniform motive power for an entire street railway system, which would permit a flexibility and consequent economy of operation not otherwise obtainable. While the hopes as to the success of the a. c. motor may not be entirely realized, the fact that the motor is now before the public and may occupy a large field is something to be very seriously considered in planning all new work.

Much has been said regarding the equipment of steam railroad branches electrically. As a general proposition, a steam railroad branch which has not sufficient earning capacity to pay for its operation by steam, is not an attractive electrical investment, unless by some radical changes in the methods of operating, considerable traffic can be created. The operation of these small branches and feeders of steam roads has bothered steam railroad managers for many years. Numerous attempts at steam dummy cars have been made, and now gasoline motors are being experimented with. It is well to remember in the operation of such branch lines that the requirements are entirely different from those of steam trunk lines. Both freight and passenger traffic are light; so light, in fact, that the operation and maintenance of one or two steam locomotives and train crews is a heavy drain on the gross receipts. As far as the volume of traffic is concerned on these lines, it could easily be handled by electric motor cars, running at as frequent intervals as might be necessary. If some scheme can be worked out whereby certain of these branch lines can be electrically equipped with a. c. motors supplied from high-tension trolley wires, requiring but little copper investment, and the whole thing operated from some near-by power station in a moderate sized town, used also to supply electric light and power, there might be many places where such roads could be operated. If, as sometimes happens on these branch lines, considerable car-load freight is to be moved at intervals, it would only be a question of running steam locomotives over the line to take care of this heavy freight.

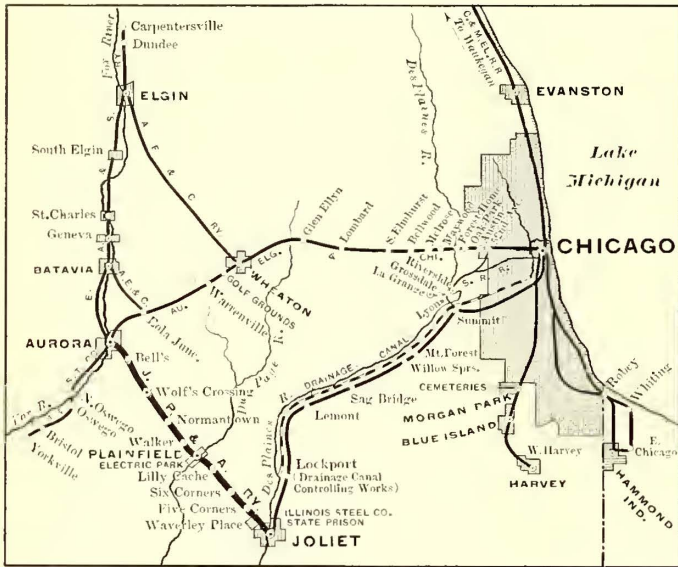
So far we have considered only the conditions of light interurban service, using motors of perhaps up to 125 hp as a maximum. Heavy trunk line service is an entirely different matter. Whether satisfactory single-phase locomotive motors of four times the capacity mentioned above can be developed remains to be determined, and we sincerely hope that any studies along this line, made by any of the large manufacturing companies, will be made public, as it is a subject which vitally affects the railway interests.

THE JOLIET, PLAINFIELD & AURORA RAILROAD

When it is considered how active builders of interurban electric railways have been in the past eight years in constructing interurban lines between nearly all the more important towns in the Central and Western States, it is a matter of surprise that a connecting link of this kind between Joliet and Aurora, Ill., was only completed and put in operation on the 22d day of October, 1904. The conditions are such as to lead one to suppose that a road connecting these two towns would have been

his son, who had been prominently connected with several similar undertakings in Ohio. The Joliet, Plainfield & Aurora Railroad Company has no legal connection with either the Chicago & Joliet or the roads it connects with on the north, although on friendly terms with both.

As to population, the census of 1900 gave Joliet 29,353; Aurora, 24,147, and Plainfield, 920. At Joliet, however, a large part of what is apparently the city of Joliet is in reality outside the city limits and not included in the city census. In certain districts, factories were located some time ago upon the express agreement that these districts should not be annexed to the city and thus caused to pay city taxes. A conservative estimate would give Joliet and its manufacturing suburbs a popu-



MAP SHOWING TERRITORY AND CONNECTIONS OF THE JOLIET, PLAINFIELD & AURORA RAILROAD

complete and put in operation long ago. About 40 miles west from Chicago is a chain of manufacturing cities, of which Elgin, Aurora and Joliet are the largest. Elgin and Aurora have been connected for many years by an interurban line which has long been recognized by electric railway men as one of the best paying interurban properties in the country, and yet the population along the Elgin and Aurora line at the time it was built was considerably less than that at present on the new Joliet-Aurora line. There is this difference, however, that between Aurora and Elgin are a number of moderate sized towns, while between Joliet and Aurora there is only one town of any importance, although the rural population is high. The position occupied by the Joliet, Plainfield & Aurora Railroad can be seen from the accompanying map. At Aurora it connects with a network of electric lines controlled by the Pomeroy-Mandelbaum syndicate of Cleveland. The Elgin, Aurora & Southern Traction operates the line extending from Yorkville through Aurora, Geneva and Elgin to Carpentersville, and the city lines in Elgin and Aurora. The lines connecting Aurora, Batavia and Elgin with Chicago are owned by the Aurora, Elgin & Chicago Railway Company. Joliet has been connected with Chicago since 1901 by a double-track electric railway owned by the Chicago & Joliet Electric Railway Company, which also owns the street railway lines in Joliet and its suburbs. The Chicago & Joliet Electric Railway Company is owned by the American Railways Company, of Philadelphia. Several years ago F. E. Fisher, then general manager of the Chicago & Joliet Electric Railway Company, saw the opportunity for a paying interurban line between Joliet and Aurora, and consequently began the work of securing a right of way for the Joliet, Plainfield & Aurora Railroad. Mr. Fisher for some time continued the general management of the Chicago & Joliet, with the understanding that he was to be allowed time to put through independently the Joliet & Aurora line. He resigned later to give his entire attention to this enterprise, and was joined by his brother, H. A. Fisher, and L. D. Fisher,



CAR LEAVING SIX CORNERS

lation of 40,000. Assuming this, and allowing for the probable growth since the 1900 census in the other towns, will give a summary of population about as follows:

Joliet and suburbs	40,000
Plainfield	1,400
Aurora	30,000
Rural population	5,000
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Total	76,400

As the interurban road is 20 miles long, not including its city

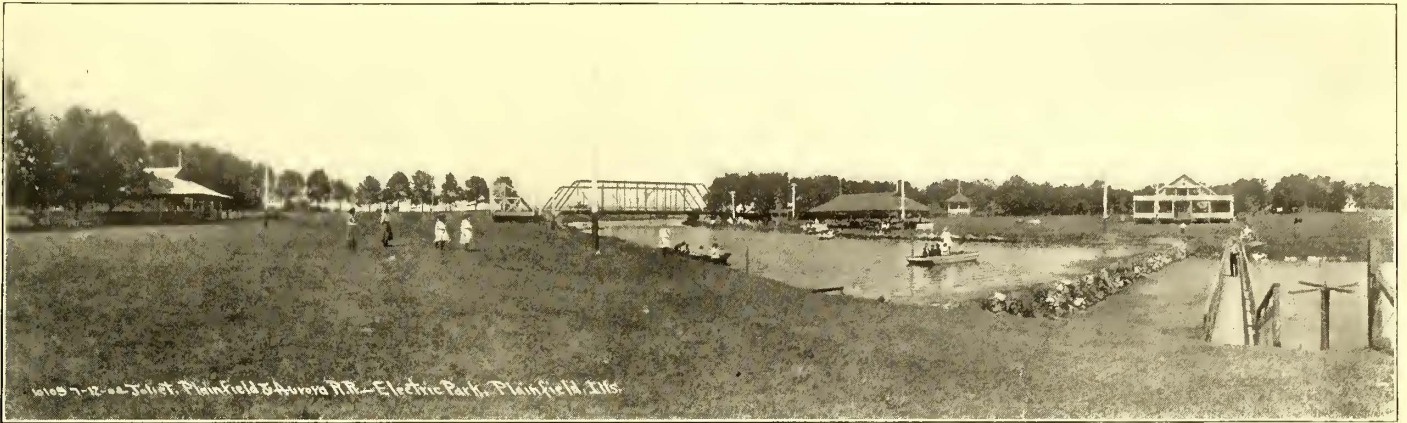


STANDARD ROADBED AND OVERHEAD CONSTRUCTION BETWEEN JOLIET AND PLAINFIELD

terminals over the tracks of other companies, the population per mile of interurban road, according to these figures, is 3820. Even assuming that this is not a conservative estimate, this population is large, as considered in the light of present ex-

perience with interurban properties, and it would seem sufficient to insure a good future for the road without taking into consideration one very important element, namely, the certain growth of Joliet due to the development of water-power from the drainage canal waters by the sanitary district of Chicago. The famous Chicago drainage canal discharges a large volume of water into the Des Plaines River a few miles above Joliet, and along this stream for a number of miles, both above and below the city, valuable water-power plants are being constructed by the drainage canal trustees. While some of this power may be transmitted to Chicago, it is more than likely that most of it will be utilized as at Niagara by industries lo-

The new road occupies the rather unique position of paralleling a steam road without the slightest opposition on the part of the steam road. In fact, the electric line has been welcomed by the steam road, and accommodated by the steam road company in every way possible during construction. The steam road referred to is the Elgin, Joliet & Eastern, commonly known as the outer belt line around Chicago. Its chief business is that of transferring freight between the great trunk lines entering Chicago. It forms a belt around the entire city at a distance of about 40 miles and connects with practically all the steam trunk lines entering Chicago. As can well be imagined, the carrying on of belt line freight traffic and local passenger



A VIEW IN ELECTRIC PARK, PLAINFIELD, ILL., OWNED BY THE JOLIET, PLAINFIELD & AURORA RAILROAD

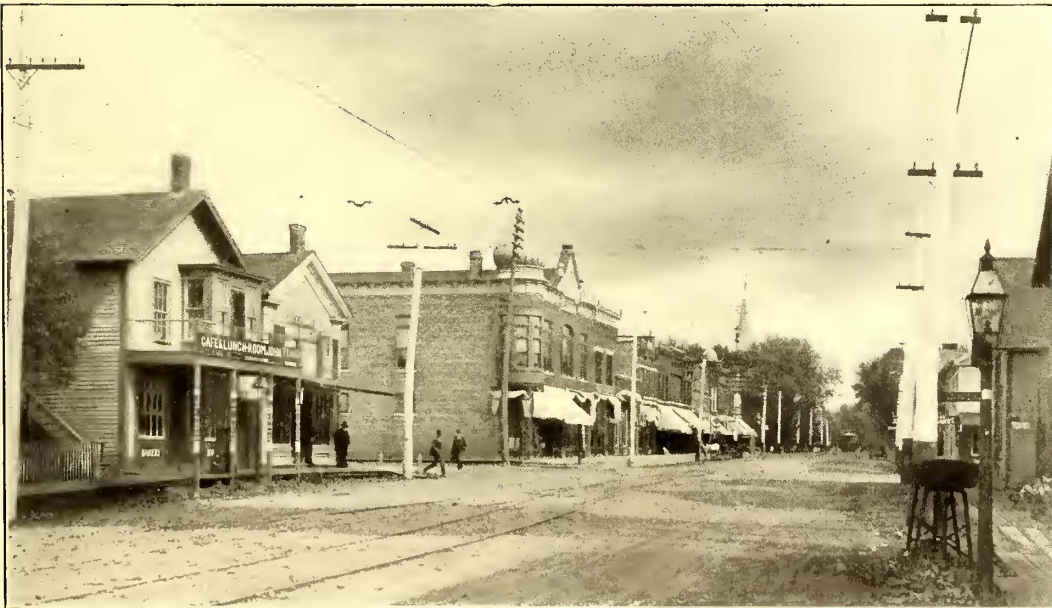
cated near the generating stations. This would make it appear that a large increase of population at Joliet within the next ten years is practically as certain as the flow of water from Lake Michigan into the drainage canal. This will, of course, have an important bearing on the electric roads centering at Joliet, not only by increasing the tributary population, but also by making a source of cheap power supply certain.

The earning capacity of electric roads connecting these outer

and express traffic do not go well together, consequently the Elgin, Joliet & Eastern has considered local passenger traffic in the light of a necessary nuisance, which it was obliged by law to take care of when no other road was giving passenger service in its territory. The passenger service given by the steam road heretofore has been next to nothing, consisting of one mixed train a day each way.

Besides forming a link for regular commercial travel between

the manufacturing districts of the Des Plaines River near Joliet, and the manufacturing districts of the Fox River between Elgin and Yorkville, it is expected that considerable tourist through traffic from Chicago and elsewhere will find its way over this road, as a very pleasant and interesting trip can be made from Chicago over the electric lines without covering the same ground twice, as can be seen from the accompanying map. Such a trip would include a ride over the famous high-speed line from Chicago to Elgin, Batavia or Aurora, and, possibly, a trip down the beautiful Fox River valley between Elgin and Aurora; a visit to the drainage



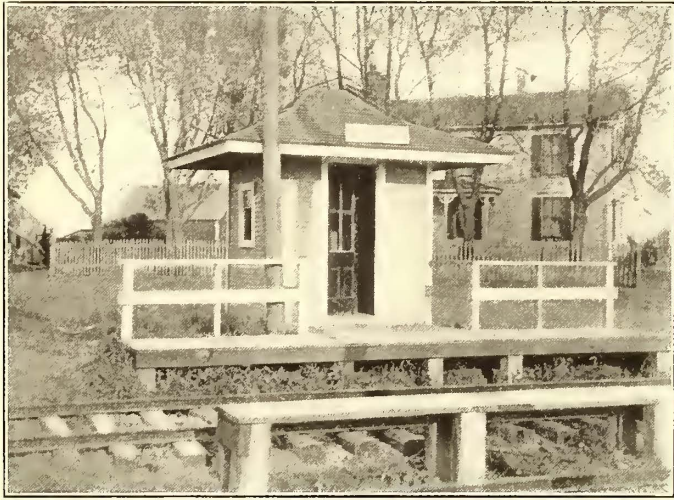
A SCENE ON LOCKPORT STREET, PLAINFIELD

belt-line towns around Chicago is already demonstrated by the Elgin, Aurora & Southern line. The Aurora & Joliet line offers a short cut from points west of Chicago to the three important steam roads running from Chicago to Joliet and to points south and west, thus travel to St. Louis, instead of going to Chicago as heretofore, would naturally take a short cut from Aurora to Joliet, where the Chicago & Alton Railroad and other steam roads running southwest can be taken.

canal, State penitentiary and other points of interest in the vicinity of Joliet, and back to Chicago over the Chicago & Joliet double-track electric line.

The company owns a park in Plainfield, having a beautiful location on both banks of the Du Page River. This is a very attractive spot even as it stands, as can be seen from the accompanying view of the park property, but it is intended to make it more attractive the coming season by planting about 200 forest

trees and a large number of flowering shrubs, and putting in gravel walks. Adjoining the park pleasure ground is a baseball park. Fishing is good all along this river. The company has constructed a dam which gives sufficient depth of water for row boats and electric launches. It is intended to make it a quiet resort which will attract the best class of traffic and will avoid the necessity of expensive attractions. The company



WAITING ROOM AT SIX CORNERS

also owns a large building at Plainfield which will be converted into a summer and winter dance hall for trolley parties.

RIGHT OF WAY AND TERMINALS

The company owns 20 miles of track and operates over the city tracks of other companies about 3 miles. Of the 20 miles of track, 12 miles are on a private right of way of sufficient width to permit the building of two tracks should traffic demand it. Eight miles is on one side of a highway. For this latter portion a fifty-year franchise has been obtained. The franchise in the city of Plainfield is also for fifty years.

The company's cars enter the cities of Aurora and Joliet under what is commonly known as the Dayton form of contract. The interurban company pays the city company 2½ cents for each through passenger brought in over the city tracks, and 5 cents for each passenger carried within the city only. The interurban company's crew operates the car. A record of the through passengers and of the city passengers is kept by a double register of the International Register Company's make, the through passengers being rung up on one dial, and the local passengers paying fare on the interurban car being rung up on another dial. Employees and others traveling on passes sign a slip carried by the conductor, receipting for the fare between the points they travel. The conductor must show a ticket, a fare receipt or the cash for each passenger hauled within the city limits as rung up on the fare register.

ROADBED AND OVERHEAD LINE

The typical track and overhead construction of the line is shown in an accompanying engraving. The track is 60-lb. standard T-rail, laid on standard 6-in. x 8-in. x 8-ft. ties, spaced 2 ft. between centers. The ties are of white oak and chestnut. A liberal amount of gravel ballast has been used, as the gravel on one flat car was plowed off and placed under a corresponding amount of track, giving about 18 cu. yds. for each 30 lineal ft. of track. The Weber rail-joints are used. They are bonded with No. 0000 General Electric solid terminal ribbon bonds 9 ins. long, applied with a screw compressor, though Atkinson

bonds were used on a part of the line. The trolley line is supported on brackets. The brackets and overhead material were supplied by Mayer & Englund, of Philadelphia. The poles are of cedar and chestnut, and, together with the ties, were furnished by the Standard Tie Company, of Detroit. The trolley wire is No. 000 grooved, made by the National Conduit & Cable Company. The feed-wires are the Pittsburg Reduction Company's aluminum cables, with weather-proof covering, equal to 400,000 circ. mil cross-section of copper. One of these feeders runs the full length of the line, and a second feeder supplements it for 4 miles at each end. The road is supplied with direct current at each end, purchased from the neighboring companies.

To prevent poles being pulled out of line by the weight of the bracket, every pole is keyed by using one-half of a tie laid in the ground parallel with the track on the side away from the track at the bottom of the pole, and another half of a tie a short distance below the surface of the ground between the pole and the track. The ties used for these were culls sawed in two. The top cross arms seen on the poles are for the feeders. The lower cross arms, which have four pins, are for the telephone and block signal wires. Two of the pins will be devoted to telephone and two to block signal wires. The telephone wires connect to jack boxes located on the poles every mile and at turn-outs. Each car carries a Stromberg-Carlson car telephone which can be connected with the jack boxes by reaching out of the car or vestibule window by a heavy flexible cord with a plug on the end. Besides a telephone despatching system, the road is to be protected with the United States Electric Signal Company's latest type of block signal, which employs not only the colored lights formerly used, but also semaphores. These will be placed at each turn-out, so that trains will be required to see a clear signal before entering a block between turn-outs.



THE JOLIET, PLAINFIELD & AURORA COMPANY'S STEEL BRIDGE OVER THE DU PAGE RIVER AT PLAINFIELD, ILL.

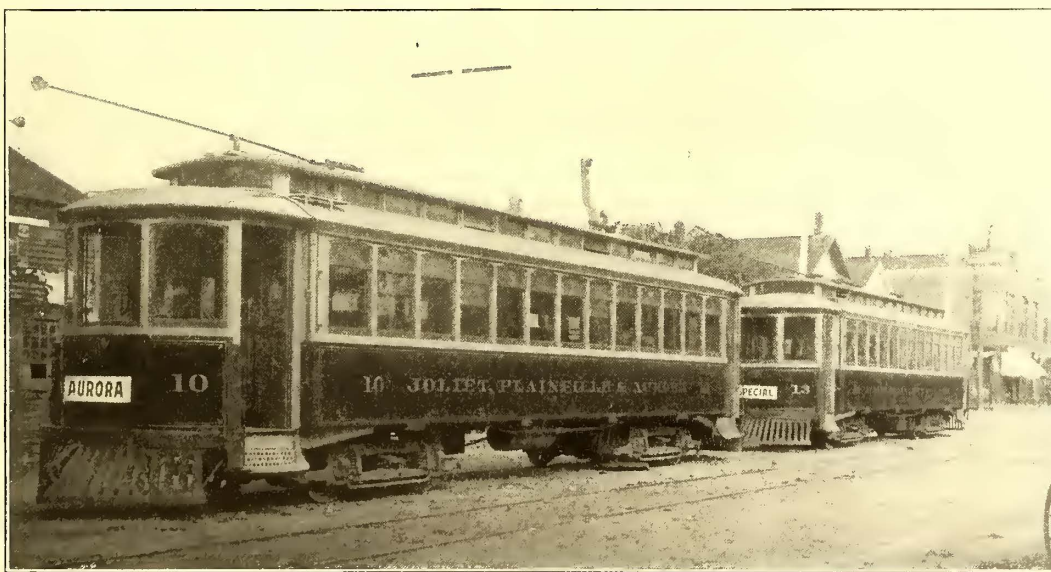
There are two grade crossings on the line. For both of these, interlocking signals and derails have been received from the Union Switch & Signal Company, and are now being installed. The lever operating switches and derails will be located close beside the steam railroad track, and will be operated by the conductor of the electric car. Derails will be placed in the electric tracks 75 ft. from the crossing, which derails will be normally open and can be closed only after the conductor of the electric car has thrown a lever which will cause semaphores on the steam railroad to assume danger position and which will clear a signal placed opposite the electric derails. Besides the automatic block signals and interlocking plants at crossings, safety and economy in operation is further promoted by

the fact that no sharp curves occur on the interurban track at the bottoms of grades, and the only curve on the line which the motorman cannot see beyond is protected by being made double track, with spring-point switches, and is also a meeting point. As this is also a place where a highway crosses the track on a diagonal, a slow speed necessary at turn-outs in passing over switch points is conducive to safety at the highway crossing. In this case, as in a number of others, the road has the appearance of having been built to operate economically and safely rather than to sell without regard to economy in operation and maintenance.

One very creditable provision for the comfort of rural passengers which has been made is the erection of small waiting rooms at all the principal stopping platforms in the country. One of these waiting rooms is seen in the accompanying engravings. They are electrically lighted and heated. It is considered good policy by the management to provide these waiting rooms because of the great discomfort to rural passengers in winter where no waiting room is provided at a platform. It is believed that increased receipts due to their presence in bad weather will more than pay for the maintenance of these stations. The platforms will be lighted sufficiently so that motormen can see passengers standing upon them at night. These waiting rooms usually have some farm house near by, and the neighboring farmers would naturally take some pride in seeing that the station nearest them is not disfigured by tramps and hoodlums. Ten dollars reward is offered for the arrest of any person found disfiguring these waiting stations. Turn-outs are equipped with spring-point switches. All the special work on the road was supplied by the Paige Iron Works and the Lorain Steel Company.

ROLLING STOCK

For regular passenger service the company has six cars, built by the American Car Company and mounted on Brill 27-E trucks, equipped with four GE 67 motors. These cars have a seating capacity of fifty-two. They are 51 ft. over all, with



SPECIAL TRAIN AT PLAINFIELD ON THE OPENING DAY OF THE JOLIET, PLAINFIELD & AURORA RAILROAD

36-ft. bodies. The regular passenger compartment has high back leather seats, and the smoking compartment similar seats, with rattan covering. The seats at each end of the car are longitudinal, and can be made to fold up against the side of the car, thus making it possible to put trunks at the forward end of the car. There is a K-6 controller on each end of the car, so that the car can be operated from either end. The cars are heated with the Consolidated Car Heating Company's electric heaters, and are provided with toilet rooms and water coolers. Besides this, the company has purchased for special service

the parlor car "Louisiana," exhibited by the American Car Company at the Louisiana Purchase Exposition. This car is to be used for special parties, and the management is convinced it will be a good investment, as the people of Aurora and Joliet who would be likely to charter special cars will probably, in the majority of cases, be willing to pay the extra price charged for the parlor car, and, furthermore, the fact that such a parlor car can be obtained for special parties will be conducive to the giving of trolley parties as a form of entertainment. Christen-



CAR SHOP AND STORAGE IN COURSE OF ERECTION AT PLAINFIELD

sen air brakes, made by the National Electric Company, are used on all cars. The seven cars enumerated, together with one single-truck work car and one McGuire-Cummings snow sweeper, comprise the road's equipment. The express and freight that is being offered will make necessary the purchase at once of a special express car.

SHOPS AND CAR STORAGE

The company is constructing at the edge of Plainfield, near its park, a building for car storage and repairs. This will be the operating headquarters of the road, although the general offices will remain in Joliet. Preparations are being made for much better shop equipment than is usual with an interurban road of this size. The carrying out of these plans ought to be conducive to the maintenance of the rolling stock in good shape and economy of operation. In the accompanying engravings, this shop building is shown under construction. One-half the building is given to car storage tracks; the other half to pit tracks and a machine shop. The pit construction is interesting and very substantial. There is a basement under the pit tracks, and the tracks and concrete arch floor will be supported by concrete piers. These piers are seen in one of the accompanying engravings. This arrangement will give ample room for working under cars. At the rear of the pit tracks is a space for a machine shop. It is intended to put in a lathe, drill press, wheel press and planer. It is also intended to fit up the shop for doing some work on car bodies and for the construction of necessary work cars. Adjoining the machine shop on the left is an addition which will contain a boiler room and blacksmith shop. The boiler will be used for heating the building. In one of the accompanying views showing the pit under construction, the steam pipes which are to be located immediately under the concrete arch floor between the tracks can be seen. In front

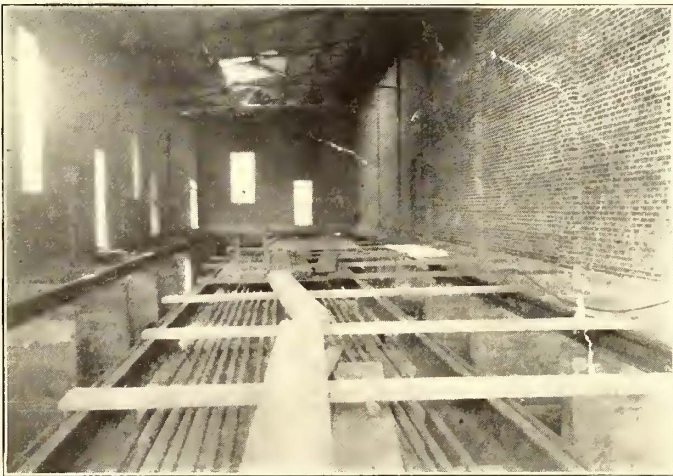
of the boiler room and blacksmith shop in the addition will be a store room and office for the foreman and master mechanic.

POWER SUPPLY

As the road is only 20 miles long and is located between two friendly companies, both of which had economical sources of power and were willing to sell power at a reasonable figure, it was decided that it would be wisdom not to build a power house for this road, as a station of the small capacity needed to supply it could not be operated economically. Furthermore, the development of extensive water-power from the drainage canal waters near Joliet apparently assures a cheap power supply for many years to come, and it is likely that the price will be less, if anything, than it is now. The company is supplied with direct current from the sub-station of the Aurora, Elgin & Chicago Railway Company at Aurora, and with direct current from the sub-station of the Chicago & Joliet Electric Railway Company in Joliet. The price paid is 2 cents per kw-hour at the switchboard.

SERVICE AND FARES

The present service is a car once an hour, and the run between terminals is made in an hour and twenty minutes, giving ten minutes lay-over time. When the final surfacing of the



STEAM PIPING UNDER CONCRETE ARCH FLOOR

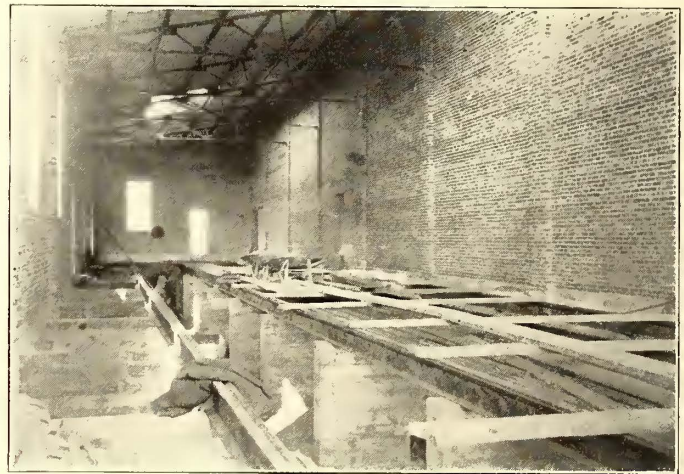
track is completed it will be an easy matter to make the trip in one hour, thus performing the service with two cars instead of the three now necessary. The fare is 2 cents a mile, with reductions for round trip and mileage tickets. The record of cash fares received by conductors is kept with duplicate cash fare receipts. The rate is 1½ cents per mile for 500-mile books. The round trip rate between Joliet and Aurora is 70 cents. For the convenience of travelers it is intended soon to start a system of coupon tickets in connection with other electric routes with which this company connects at Joliet and Aurora. This will be especially for the benefit of through traffic making the circuit from Chicago to Aurora, Joliet and return.

FINANCES AND MANAGEMENT

The road when fully completed will have outstanding \$400,000 in 5 per cent, thirty-five-year bonds, and an equal amount of stock, thus making the bond issue \$20,000 per mile of track. The road was built by the Fisher Construction Company, which is the company organized to fulfil the legal requirements of the work of construction. The officers of the Fisher Construction Company are also the officers of the Joliet, Plainfield & Aurora Railroad Company, who are: F. E. Fisher, president; H. A. Fisher, vice-president and general manager; L. D. Fisher, treasurer and chief engineer; F. E. Stoddard, secretary; G. G. Crane, master mechanic; E. Mears, general counsel. F. E. Fisher, who inaugurated the enterprise, was formerly, as before explained, general manager of the Chicago & Joliet Electric Railway Company. He is a man whose life experience has been in the steam and electric railway business. H. A. Fisher,

his brother, the general manager, is also an old steam and electric railroad man, having been at one time assistant general passenger and ticket agent for the Wabash & Missouri Pacific, and later became very prominently identified with electric railway interurban building around Columbus, Ohio. Just before coming to Joliet, he was general manager and one of the owners of the Columbus, Delaware & Marion Railway, and was also prominently identified with the Columbus, London & Springfield and the Columbus, Grove City & Southwestern. L. D. Fisher, chief engineer and treasurer, was formerly chief engineer of the Columbus, Delaware & Marion, and assistant engineer in charge of the construction of three other interurbans out of Columbus. These gentlemen have concentrated their finances and executive ability in the construction of the Joliet-Aurora line, and have the entire ownership and control of the property at present, believing it to be one of great possibilities.

As the road has been in operation such a short time, it is impossible to draw conclusions of value as to the probable yearly earnings. The location of the road and the population tributary to it are probably better indications of the business that may be expected than the gross receipts so far during operation. It can be said, however, that during the first twenty-one days the



PITS UNDER CONSTRUCTION

road was in operation from Joliet to Aurora, the road has earned over \$47 per day in excess of operating expenses and interest on the entire bond issue, and the earnings are on the increase. From Dec. 7, 1903, to Oct. 21, 1904, the road was operated between Joliet and Plainfield only. It would hardly be expected that 8 miles of road between a town the size of Plainfield and Joliet would pay operating expenses, and the management did not expect that it would do this. The earnings, however, not only paid operating expenses, but interest on \$200,000 of the bond issue, which was the amount required to build that part of the road and purchase rolling stock. This was done with a one-car service every hour and a half.

THE SMITH TRAIN RESISTANCE FORMULA

The advance copy of the paper before the American Institute of Electrical Engineers on "Heavy Electric Traction," by Messrs. Lyford and Smith, from which the abstract published in the Dec. 3 issue of this paper was taken, contained a typographical error, which was repeated on page 904 of the Dec. 3 issue. The second term of the traction formula proposed by Mr. Smith was incorrectly stated as $1.67 I^2$, when it should have been $.167 I^2$. The proper correction has been made in the paper as it appears in the December number of the "Transactions," which is now in the hands of the membership. The entire formula is then as follows:

$$R = 3 + .167 V + 0.0025 \frac{A}{7} V^2$$

THE BONDING OF THE BROOKLYN ELEVATED RAILWAY SYSTEM

BY F. H. PARKE

The question of bonding an elevated railway structure after it has been some time completed and in use is one which, although seemingly easy to deal with, is found to embody many troublesome points. The positions where it is necessary to place the bonds are generally difficult of access and expose to considerable risk the employee who has the work in hand. The manner in which this work is carried out in particular instances is therefore worthy of note.

How the bonding of the Brooklyn Elevated system is being accomplished can best be explained by reference to the accompanying cuts. The girder *A*, Fig. 1, is the top member of the transverse truss connecting two columns on opposite sides of

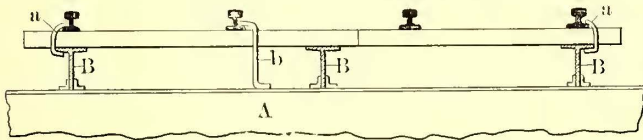


FIG. 1.—TOP MEMBER OF TRANSVERSE TRUSS ON BROOKLYN ELEVATED LINE

the street. Girders *B* are the top members of the three longitudinal trusses of the system upon which are placed the ties and rails, as shown. Nine bonds are placed at each pair of columns, as follows: The outside rail of each track is connected directly to the girder *B* nearly under it by the bond *a*. The inner rails of each track are connected by the bond *b* to the girder *A*, but only one inner rail is so connected at each pair of columns, this connection being made alternately to each track. These three bonds are each 300,000 circ. mils in section.

Besides the bonding of the rails to the structure, the latter is also bonded at each pair of columns as follows: The girders *B* where they join over the girder *A* are bonded together, as shown in Fig. 2, by bond *c*. Also, the angle iron which fastens girders *B* to girder *A* is bonded to the latter by the bond *d*. As there are three of girders *B* in the system, there must be six of these bonds at each pair of columns. These six have each a section of 500,000 circ. mils.

To any one acquainted with elevated railway structures, it

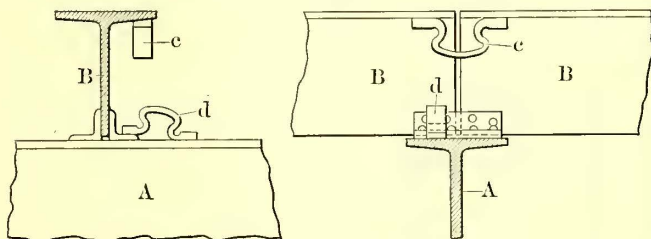


FIG. 2.—BONDING GIRDERS AT THEIR PLACE OF JUNCTURE

will be noted from the cuts that the problem of attaching bonds to the members indicated is not an easy one—the use of a ratchet and drill is prohibited owing to the lack of room, as well as the length of time required. The use of a portable grindstone is also impracticable for most of the positions indicated, and very expensive. To scrape by hand the surface of the girders and remove several coats of hard dried paint would require a large force of men and a long time in execution. The use of acids or other solutions is practically forbidden because of the danger of damage to traffic in the street. Consequently the proposition narrows down to the use of a sand blast and a soldered joint. The contract for the Brooklyn system was made by George B. Blanchard, of New York, who is carrying on this work with the following apparatus:

Fig. 3 is a view of one of the two portable sand-blast outfits now at work in the streets of Brooklyn. It consists of one D-4-FG Westinghouse motor-driven air compressor on a platform wagon between two 24½-in. x 48-in. reservoirs. This compressor is one of the well-known type in general use with



FIG. 3.—PORTABLE SAND-BLAST OUTFIT

the Westinghouse air brakes when installed on electric traction systems, and consists of a duplex, horizontal, single-acting pump mounted on a common bed-plate with a direct-current series railway type motor. It develops approximately 9½ mechanical hp when pumping against 100 lbs. air pressure, and has a capacity of 50 cu. ft. of free air per minute with 600 volts line current. The positive lead to the motor is connected with the trolley wire of the surface traction road, this wire being hung from the elevated structure by suitable brackets. The wooden pole shown in Fig. 3 as resting upon the wagon

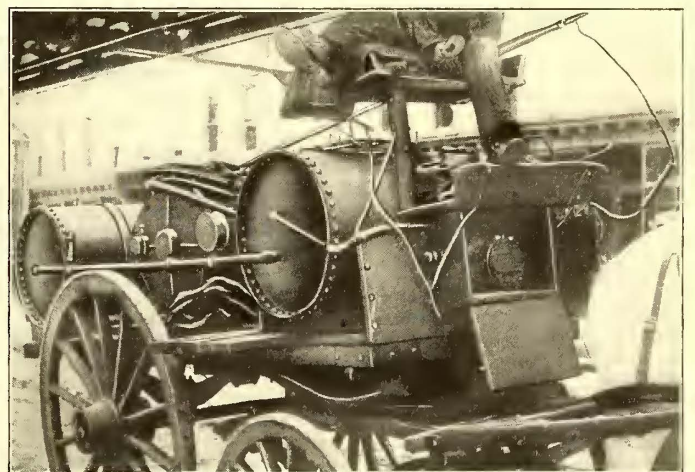


FIG. 4.—ELECTRIC PUMP GOVERNOR PLACED ON FRONT-BOARD OF WAGON

seat, has a copper wire hook at the upper end which is hooked about the trolley-wire bracket so that there is live contact to the trolley current without interfering in any way with the running of the surface cars. The wire to the motor from the copper hook is bound to the side of the wooden pole. The negative lead from the motor is connected directly to the base of one of the columns by inserting the end of the wire in a small drainage hole.

A Westinghouse form E electric-pump governor is placed on the front board of the wagon, as shown in Fig. 4, and connected in the positive lead to the motor so that at given maximum and minimum pressures in the reservoirs, the motor compressor will be stopped and started. The connection from the reservoirs to the governor is shown in Fig. 4 by a small pipe and

flexible hose running from the front reservoir to the governor under the foot-board. The lid of the box in which the governor is installed, which is shown open in Fig. 4, is usually closed.

Fig. 5 gives a view of this outfit from the other side of the wagon, showing the manner in which the compressor is connected to the reservoirs, and also how the sand-blast apparatus is connected. Fig. 6 is a nearer view of the sand-blast apparatus, and by reference to it and Fig. 7, an outline section of it, the operation may readily be understood.

Air enters from the reservoir at C, Fig. 7, the two upright

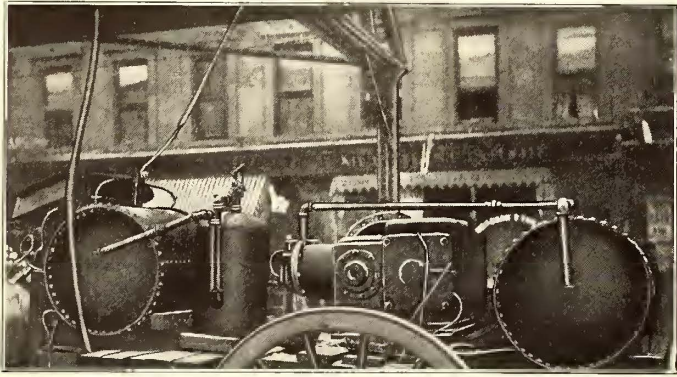


FIG. 5.—SHOWING THE MANNER OF CONNECTING THE COMPRESSOR TO THE AIR RESERVOIRS

pieces *E* being merely a trap to gather entrained moisture. The valve *D* regulates the supply of air, and the plunger *J* regulates the supply of sand. The plunger rod connects with the lever on the top, and by raising this lever the plunger opens one or more of the series of holes *S* in the bottom of the tube *G*, which passes vertically through the apparatus. The particular feature of the device is that, as the supply of air and sand can be regulated independently, the character of the sand used is not at all limited. In fact, the sand being used at the present time is plain beach sand, which is often not dried.

The plant in operation is shown in Fig. 8. The hose from the bottom of the sanding device is carried up into the elevated

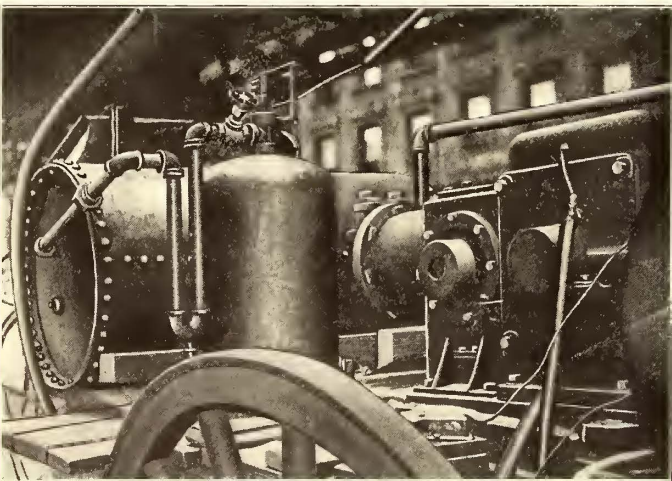


FIG. 6.—ANOTHER VIEW OF THE SAND-BLAST APPARATUS

structure and the blast applied through a suitable nozzle to the locality to be cleaned. The nozzles are plain soft cast iron, having circular orifices about $\frac{3}{8}$ in. in diameter. As is to be expected, the life of these nozzles is very short, but they are correspondingly cheap, having no machine work of any kind expended upon them. The trolley current varies according to the locality where the work is progressing, but is generally about 500 volts. The governor is set to cut the compressor out of action at 102 lbs., and to cut it into action at 87 lbs. The total weight of this wagon and apparatus is 4200 lbs.

Fig. 9 is a view of the other sand-blast outfit used in connection with this work. It is similar in a general way to the one just described, except that it has three reservoirs instead of

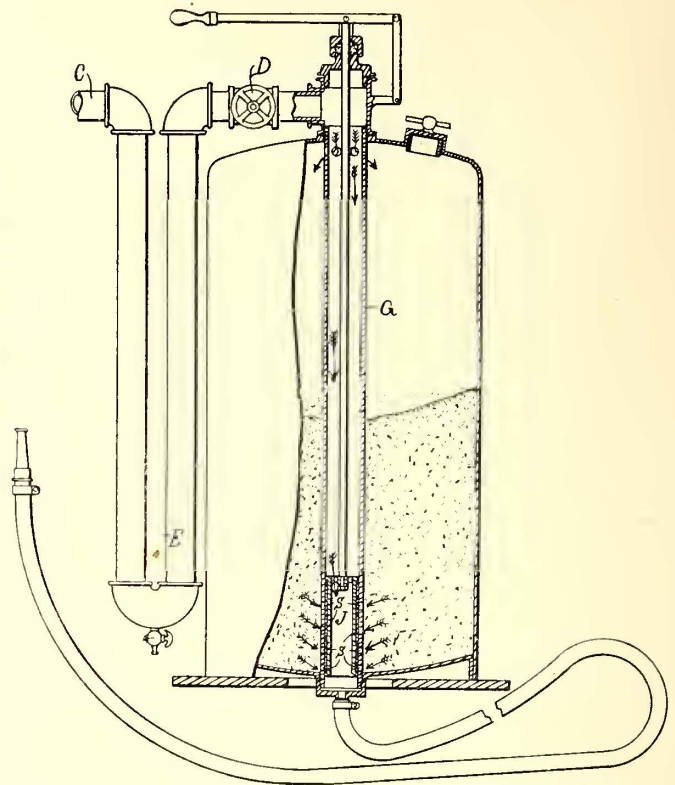


FIG. 7.—OUTLINE SECTION OF SAND-BLAST

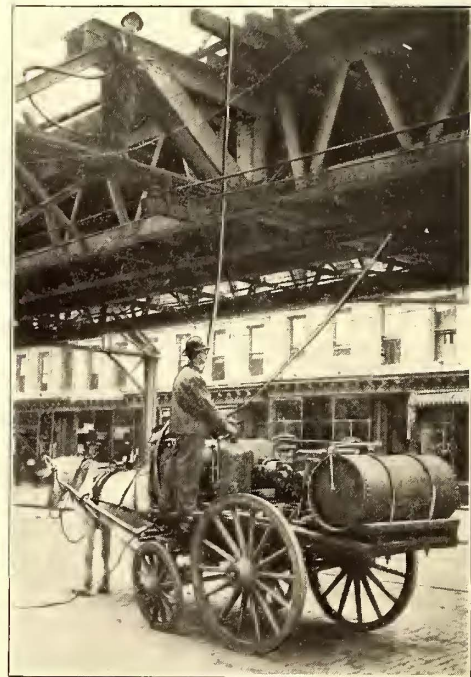


FIG. 8.—THE SAND-BLAST CONNECTED FOR OPERATION

two, and that the compressor is one size smaller, but of the same make and controlled by a similar electric-pump governor; the sanding device is also the same. Two men are employed with each of these wagons—one on the wagon to regulate the blast, and the other to climb around the structure and apply it. These men have nothing further to do with the placing of the bonds.

The Chase-Shawmut 300,000-circ. mil bond used is illustrated in Fig. 10. The novel feature of this bond is that it is made of a single piece of copper bent backward and forward

over itself until the required number of layers are obtained; the ends are then dipped into solder, and a thickness of solder placed on the contact surface, so that by simply heating the end of the bond to the proper temperature enough solder is already in place effectively to complete the joint. This method of manufacture insures that every layer of the bond is of equal excellence.

Some tests on this make of bond were made at the Niagara

These results indicate that the current necessary to injure one of these bonds is very much in excess of that likely to be met with in practice.

The cost of placing this bond on elevated structures is extremely difficult to determine at the present writing, as the plant has not been in use long enough to give reliable information; the local conditions determining the cost are so various that it will require an extended field of operation to determine

Reservoir Pressure at Start, Lbs.	Time Before Compressor Starts, Sec.	Time Nozzle Operates, Sec.	Reservoir Pressure when Nozzle Starts, Lbs.	Total Time Pump Operates, Sec.	Voltage	Amperes	Watts	Number of Revolutions of Pump	Speed Pump R. P. M.	Cu. Ft. Pumped During Test	Approximate Area Cleaned sq. ins.	Kw Hrs. per sq. ft. Cleaned
100	5.8	17.8	82	66	513	17.2	8,830	201	183	48.24	8	2.91
102	5.5	135.	60	224	488	16.7	8,150	665	178	159.7	32	2.28
96	?	54	74	132.5	488	16.9	8,250	391	177	93.9	16	2.73
101	5.3	52.6	70	122.5	485	16.8	8,150	361	177	86.7	16	2.50
99	5.3	127.8	55	238.5	510	16.6	8,470	724	182	178.5	32	2.52
98	4.4	94.4	55	213	500	16.5	8,250	640	180	153.7	24	2.93
98	4.6	..	..	72.5	508	17.1	8,700	220	182	52.8	8	3.16
99	5.0	116.4	55	232	493	16.5	8,130	692	179	166.1	32	2.36
101	7.4	92	56	198.5	500	16.5	8,250	595	180	142.9	28	2.34
98	5.0	30	76	86	508	17.1	8,700	261	182	62.7	12	2.50
96	3.2	33.8	73	94	503	17.1	8,600	284	181	68.2	12	2.69
100	6.2	73	61	168	510	16.8	8,570	510	182	122.5	24	2.40
102	7.7	51	72	125	480	16.9	8,120	366	176	87.9	16	2.54
100	5.8	68.8	67	153	490	16.7	8,190	454	178	109.0	20	2.50
99	....	44.3	72	109	515	17.0	8,760	332	183	79.7	16	2.39
99	....	59	69	137	505	17.0	8,580	414	181	99.2	20	2.35
96	....	34.2	75	101	490	16.9	8,290	300	178	72.0	12	2.79
99	....	40	70	112	488	16.8	8,200	332	178	79.2	16	2.30

Research Laboratory in April of this year, which showed it to be very efficient. Two rails connected by a 225,000-circ. mil bond were submitted to 1000 amps. direct current, noting temperatures and drops. The results after three hours and twenty minutes continuous application were:

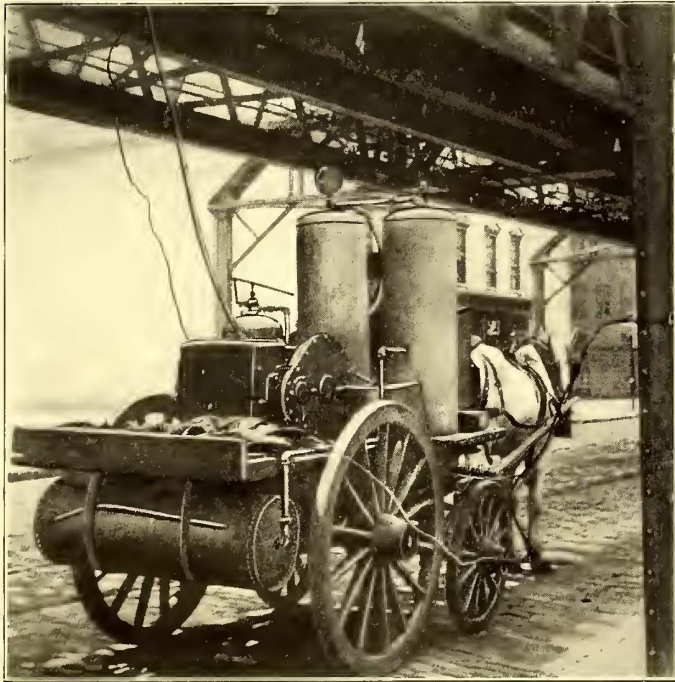


FIG. 9.—VIEW OF THE SECOND SAND-BLAST OUTFIT

Rise in temperature of rails, 16 degs. C.
 Rise in temperature of bond, 20 degs. C.
 Drop, center to center of bond terminals, 26.5 millivolts.
 Drop, rail to rail, 30.6 millivolts.
 A 370,000-circ. mil bond submitted to 1600 amps. direct current for one hour and forty minutes gave the following results:
 Rise in temperature of rails, 33 degs. C.
 Rise in temperature of bond, 37 degs. C.
 Drop, center to center of bond terminals, 33.3 millivolts.
 Drop, rail to rail, 39.8 millivolts.

what average figure is correct, but the following observations made on the larger outfit above described during a six-hour run will give some idea of the power consumed in cleaning the structure before applying the bonds. The observations were made as follows:

After each application of the blast the compressor was allowed to pump up full pressure and stop before another application. The pressures in the reservoirs were noted at the beginning of the application, at the moment when the governor cut the compressor into action, at the moment when the application ceased, and at the moment when the compressor stopped operating. The time was taken after the application started, till the compressor started, till the application ceased, and till the compressor stopped. The total number of revolutions of the compressor were obtained by an indicator. The voltage of the compressor circuit was measured by a voltmeter connected across the motor brushes. The volume of the two reservoirs and piping was found to be approximately 41,000

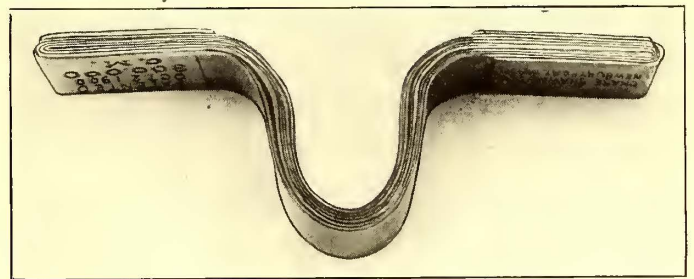


FIG. 10.—300,000 CM. SINGLE-PIECE BOND USED ON THE BROOKLYN ELEVATED LINES

cu. ins (23.7 cu. ft.). The leakage in a given time was also carefully noted.

With this information, the speed of the pump and cubic feet of air consumed for each application was obtained; also the amperes and watts delivered to the motor. The most essential item, and one most difficult to obtain, was the area cleaned by the sand; this was almost never twice alike, and the time required to remove the paint and grease varied continually for approximately the same surface cleaned. For this reason the observations taken cannot be relied upon as anything more than

an indication. Accurate results can only be secured by a long series of tests covering many different conditions and arrangements of structure.

The curve in Fig. 11 illustrates the manner in which the above-mentioned applications were made. The ordinates indicate pressures in pounds and the abscissæ time in minutes and seconds from start of application. The pressure at first falls rapidly until the governor cuts the compressor into action;

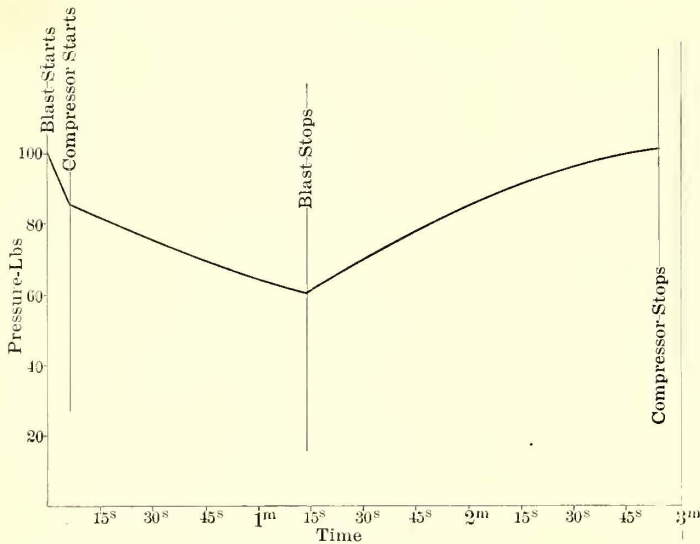


FIG. 11.—CURVE SHOWING TIME AND PRESSURE REQUIRED FOR VARIOUS APPLICATIONS OF SAND BLAST

it then falls less rapidly, due to the supply of air from the compressor, until the application ceases, when the compressor at once starts to charge up the reservoirs, and continues to do so until the governor cuts it out of action.

The table on page 1105 shows the results noted in eighteen different applications. The approximate area cleaned in square inches was obtained by measuring a number of spots where the bonds were to be applied. They were found to measure from 3½ ins. to 4 ins. long and from 2 ins. to 2½ ins. wide, and were

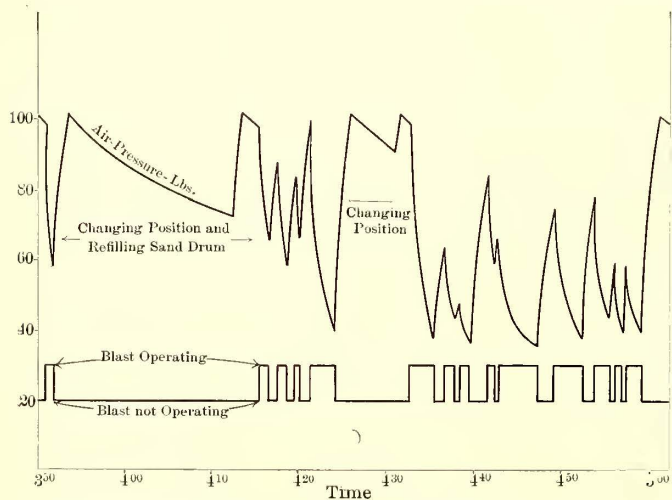


FIG. 12.—LENGTH OF TIME REQUIRED PER APPLICATION AND CHANGE IN PRESSURE FOR ONE HOUR'S RUN OF THE SAND-BLAST

not quite elliptical in form. From these eighteen applications the average number of kw-hours per square foot cleaned is about 2.565. As each bond requires the cleaning of about 20 sq. ins., 1 sq. ft. will cover the requirements for seven bonds; so that at this rate the kw-hour per bond would be about 0.366.

Of course, this figure would vary according to conditions and localities, and the extent of such variations can be determined only by actual practice, but the above amount readily indicates

that for this and similar classes of work, the portable sand-blast outfit is undoubtedly the cheapest to operate, while at the same time it is most easily adaptable to positions difficult of access.

In ordinary operation, the time elapsing between the end of one application and the beginning of another is often too short to allow the compressor to pump up reservoir pressure to the cutting-out point. In fact, it is quite usual for the compressor to operate continually after the first application until all the spots for bonds have been cleaned at one pair of columns. The length of time of each application and the change in pressure for an hour's run under ordinary conditions of operation are shown in Fig. 12. It will be noted that although the reduced air pressures require a little longer to clean the same space, the time required to clean a number of spots is considerably less, owing to the fact that the time necessary to pump the reservoir volume up to cutting-out pressure is considerably greater than the length of time required by the application itself (see Fig. 11), and by cutting out part of the former and thereby slightly increasing the latter, the total length of time is much shortened, while the total amount of work expended is the same. Thus, from Fig. 12, the average air pressure decreases considerably, but the nature of the work will not permit these rapidly recurring applications to continue for very long at a time, so the compressor always gets an opportunity to re-instate the initial air pressure often enough to keep the average from getting too low to properly clean the girders. The amount of sand used, as figured from several weeks' supply, averages about 10 lbs. per bond.

SECURING THE BOND

The gang of men placing the bonds follow closely those doing the cleaning. The bonds are applied by heating the cleaned surface with an ordinary gasoline blow torch of large size, the mixed air and gasoline being carried to the burner by a rubber hose about 10 ft. long. A piece of pipe about 2 ft. long is placed between the end of the hose and the burner so as to prevent the heating of the former.

After the cleaned surface is heated it is tinned and the bond clamped in position; the torch is then again applied, heating to the proper temperature for soldering; this causes the prepared layer of solder on the bond to take firm hold, and, while it is still hot, the bonder runs solder around the edges of the bond terminal, thus thoroughly completing the joint.

With each torch is employed a workman and a helper, the latter handling the torch and assisting the bonder throughout the entire process. The number of torches employed is sufficient to enable the bonders to keep pace with the cleaners; in the present instance the sand blast will clean, on an average, space for ten torches.

The number of bonds applied per day varies greatly, due to the degree of accessibility of the location of the bond, consequently it is impossible to make any definite statement as to the number that can be applied in a given length of time. But the apparatus required for the process is certainly simple in design and small in quantity; there is little of it likely to go wrong, so that the bonding operation proceeds with regularity and precision. Traffic is not delayed in any way, and the danger to the bonders is the least possible.

It is said that the Brooklyn Rapid Transit Company has already noticed an improvement in its return circuit due to the small portion of the system already bonded. If the saving increases in proportion as the work is completed, the expense of applying the bonds will be amply repaid. It would seem likely therefore that, as with this system of bonding, the annoyance and danger, both to the traction company and the bonding contractor, is so largely eliminated and the bonds placed so effectively, at an expense which is at least as small as any other method, other companies which have not already done so cannot do better than follow in the track of the Brooklyn Rapid Transit

Company and take up the question of bonding their return circuits along the lines described above.

In this connection may be mentioned the growing field of usefulness for the motor-driven air compressor in connection with electric traction equipment. Portable and stationary plants of various descriptions are used to supply air for cleaning cars and motors, charging air brakes, paint spraying, air lifts, water pumping, conveying of liquids, and many other labor-saving devices which tend to diminish the cost of operation. Special water-jacketed compressors with water-cooling devices for continuous operation, and the ordinary air-brake type for intermittent use, are pressed into daily service in multitudinous ways, and because of their small size and weight, their compact design and great durability, they are eminently fitted and easily adaptable to almost any kind of work requiring the aid of compressed air. It seems quite certain that the field of usefulness of these compressors will increase continually and embrace all manner of industrial establishments, the requirements being so neatly filled by machines of this character.

THE EFFICIENCY OF POWER BRAKING IN STREET RAILWAY SERVICE WITH TESTS OF POWER CONSUMPTION OF THE AIR BRAKE

BY EDWARD TAYLOR

Inasmuch as there is at present very little data or literature available in regard to the problems of power braking for electric railways, the writer has thought it might be of interest to the readers of the STREET RAILWAY JOURNAL to make public the contents of his note book upon this subject, together with an analysis of the peculiar conditions met with in the application of power brakes to electric equipment. It may be well to state, at the outset, that the author of this article has at no time been connected with any power braking concern, nor was this paper written to promote any particular make of car brakes; it was suggested by a previous article in the STREET RAILWAY JOURNAL, and all data presented embody the actual results of tests made by the writer himself.

A brief summary of the present status of the power brake and of the braking situation in general, may render what follows more intelligible to those not familiar with the subject. In the past few years rapid strides have been made in the perfection of both hand and power brakes, as a result of the remarkable advance and development of city and interurban traction under electrical operation. Heavier cars, faster schedules and higher speeds have come, and have necessitated a vast change from the crude methods of braking in vogue only a few years ago.

In the same period there has also been a great development and improvement in the efficiency and accuracy of automatic recording apparatus, and, it may be also said, in the methods of testing, which have greatly facilitated further and more complete tests of the efficiency of braking systems. In 1878 Westinghouse and Galton conducted the basic series of tests on railway braking that are historic for their completeness and for the value of results obtained. Their results and conclusions were far-reaching, and are of the greatest importance, as they established at the outset curves of the coefficients of friction between a steel-tired wheel and iron brake-shoe at various speeds, and authoritatively established the laws of brake friction upon which the designing of all brake systems are based.

Some of the more important of the results obtained from their data are the facts that the coefficient of adhesion is independent of the velocity of the surfaces in contact and dependent only upon the character of the contacts; and that the coefficient of friction between the wheel and the shoe varies both with the speed and with the length of time of application. From these

two laws it is easily deduced that the extent to which all braking of cars may be carried is limited by the adhesion of the wheels to the rail—i. e., the braking pressure must never be carried up to a point where the coefficient of brake-shoe friction will exceed the coefficient of rail adhesion—in other words, the pressure must be kept below the point where the wheels will skid.

Referring to Fig. 1, which illustrates the friction curves that were developed by the Westinghouse-Galton tests, it will be seen that the coefficient of friction is much greater at slow speeds than at high speeds. It will also be seen that with a given speed the coefficient of friction diminishes slightly as the shoe and wheel remain longer in contact. The change in speed, however, influences the coefficient of friction more proportionally than does the time of contact between the shoe and wheel. The coefficient of adhesion between the rail and wheel, on the other hand, on dry rails, remains almost constant at a point between .20 and .25. If, then, a given pressure be applied to the brake-shoes, and maintained throughout the stop, the retarding effect will depend entirely upon the coefficient of

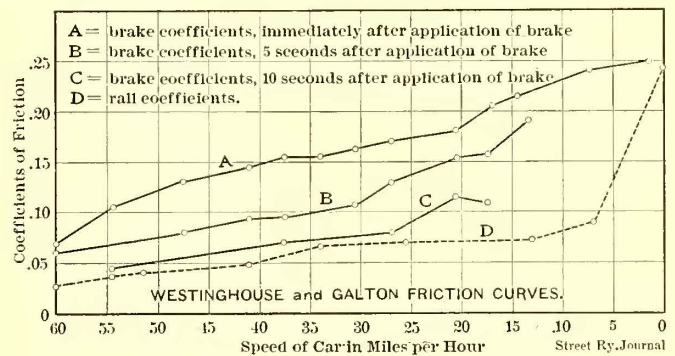


FIG. 1

friction, and a constantly increasing rate of retardation will result owing to the increase in the coefficient of friction—in other words, the retarding effort is greater at slow speeds than at high.

Under the above conditions it necessitates the pressure delivered to the brake-shoes being limited to such a point that at slow speeds the coefficient of friction will be within the limits of the coefficient of adhesion; otherwise skidding of the wheels, flattened wheel treads and slower stops will be the result. If it were possible to secure a high pressure on the brake-shoes at high speeds, and automatically decrease this proportionally to the retardation of the car during a stop, the ideal stop could be secured in point of time and distance.

It having been the very nature of the American people to desire rapid locomotion, the use of higher speed service has practically been forced upon the electric railway companies, in common with the steam roads of this country. With the growing use of high-speed cars, naturally followed the question of power brakes. In this connection, however, there were several points to be considered. The hand brake commonly used upon all light-weight, slow-speed cars had given very fair average service, but there is a vital weakness inherent in this type of brake—the quickness of stop possible with this brake is limited by the personal equation of the motorman. With a power brake, the maximum thrust or pull is obtainable instantly, while with a hand brake it takes from three to five seconds to secure this maximum pressure, depending on the strength, agility and willingness of the motorman; the higher the ratio of leverage the longer it takes to arrive at the maximum point.

With former light-weight equipments and slow schedules, this shortcoming of the hand brake did not counterbalance its many good features. But higher speeds and heavier weights of cars, necessitating an increase in brake leverage ratios,

brought directly to the front the question of advantages and disadvantages of the power brake. These may be summarized as follows:

REASONS FAVORING POWER BRAKE

- Quicker stops obtainable.
- Shorter running time with present equipment.
- Higher speed allowed where traffic would otherwise reduce same for safety.
- Decrease in number of accidents.
- Decrease in claim department expenses.
- Less effort for motorman, who can give his full attention to other duties.

REASONS AGAINST

- Initial cost high.
- Cost of maintenance above hand brake.
- Cost of power consumed.
- Increased wear on brake-shoes.
- Increased wear on wheels.

In view of these facts the decision, as a rule, has been to supplant the hand brakes with the more efficient power brake. This step having been decided upon, the question as to what style of power brake would prove most reliable, simple and economical under service conditions of handling and maintenance followed.

The air brake on steam roads had given such eminent satisfaction that its use was naturally suggested for the electric equipment, and with certain modifications, improvements, etc., to adapt it to the peculiar conditions met with in such service, the air brake companies were able to offer the transit companies braking systems that are commonly used on street cars to-day, and the performance of which I shall in this article describe.

We have mentioned before the desirability of a brake with an automatic reducer of the pressure to correspond with the decreasing velocity of a car during deceleration. This is not found on any of the present air brake systems, and as yet there is no satisfactory appliance for accomplishing this purpose. For this reason, and owing to the danger of improper handling of the brake apparatus, it is usually the custom to use only from 60 lbs. to 80 lbs. pressure per square inch in the reservoir, which is utilized for braking, and to have the leverage so arranged as to brake with but 70 per cent to 80 per cent of the weight on the wheels. Under these conditions, on a dry rail, it has been found that the coefficient of friction will never rise above the coefficient of adhesion—in other words, the wheels will never skid.

The writer has found that where a class of motormen are employed who are not specially instructed, and who do not understand the proper handling of the air brake, this pressure is the safest and most economical. But where the intelligence of the class of motormen permit, it is possible to use efficiently and economically a pressure of 100 lbs. per square inch in the reservoir with the same leverage, which will give a much higher rate of retardation, as the accompanying curves will show.

In Fig. 2, curve 1 represents the distance curve and time, as determined recently under test, of an emergency stop on a 15-ton car with an initial velocity of 23 miles per hour, using a brake-cylinder pressure of 70 lbs. to the square inch. It will be seen that the stop was made in 7.73 seconds and 150.75 ft. This is equivalent to an average rate of retardation of 2.98 miles per hour per second. In curve 2, the same car, at the same initial velocity, 23 miles per hour, was stopped in 122 ft. and in 6.58 seconds, equivalent to an average retardation of 3.5 miles per hour per second, by the use of 100 lbs. pressure at the reservoir. In general, it may be stated that with proper handling, the 100-lb. pressure will give a stop from 15 per cent to 20 per cent shorter than will a 70-lb. reservoir pressure with the same brake leverage.

The employment of so high a reservoir pressure is not advised for general use, however, because if improperly handled, skidding of the wheels will occur, causing flattened wheel treads and inefficient stops. Furthermore, it may be remarked

that when the wheels skid a slower stop is obtained than when the car is properly braked, as the coefficient of sliding friction between the track and the wheel, when the wheel is locked fast, is always lower than the coefficient of brake friction.

The proper handling of the brake implies, of course, the application of the highest pressure while the car is moving at a comparatively high speed and a gradual reduction of the pressure till the stop, which, if graduated in a correct manner by the motorman, will give the maximum rate of retardation and the quickest stop. This is important for several reasons: In case of danger, a quick stop is imperative; where time is gained in stopping, a faster schedule is possible; where an efficient high-speed brake is employed, it is possible to operate cars at a greater speed in districts where traffic conditions would otherwise limit the car velocity.

In considering the application of air brakes to electric equipment, it must be borne in mind that certain difficulties are en-

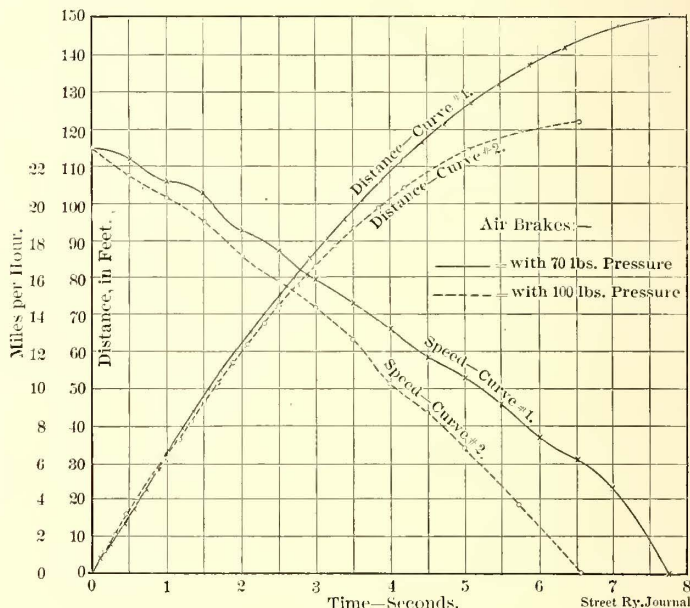


FIG. 2

countered not met with in steam railroad practice. Not only is there a difference of weight distribution upon the motor car as compared with a steam road passenger coach, owing to the weight of the motors, but there is with the use of the maximum traction truck a peculiar condition that is difficult to meet. Owing to the difference in weight upon the large and small wheels, different pressures must be applied to their respective brake-shoes, and because of the lack of room between the wheels, the leverage and connections at this point are necessarily designed and installed under no small difficulties. In fact, this proportionment cannot be declared to be satisfactorily worked out as yet, and with the increase in speed of the present day cars, it has become imperative that improvements in this line be supplied.

Besides the above point, there must be an allowance made for the gyratory momentum of the motor armature. This necessitates an increase in the brake-shoe pressure of from 2 per cent to 5 per cent upon the motor-driving wheels.

Upon flat or freight cars there is still another factor to be considered—this is the vast difference between the weight upon the rails of a light and of a loaded car. For instance, a 23-ton car may carry a load of 20 tons, making its weight, loaded, 43 tons. If now the leverage and pressure be adjusted for the light weight, 23 tons upon the rails, the stop made by the car, when loaded to its maximum capacity, will be practically 90 per cent longer both in distance and time. It is evident that with a momentum 90 per cent greater than that of the light car, a proportionally greater retarding effort is required to secure

the same rate of deceleration. Yet, if the pressure or leverage be permanently changed to accommodate the loaded weight, the car will skid when the brakes are applied on the light car. Brake companies should seek a solution of this difficulty.

The following data were obtained from an exhaustive test of a car in regular service. The car was in no way made ready for the test, but was taken at random from equipment in regular service. It was inspected and found to be in good average operating condition, none of the adjustments being changed in any respect, as it was desired to ascertain the actual performance of the car under ordinary conditions of operation. The test was in no sense an experimental one, but was made on an equipment that had been in service some three years, with only the ordinary shop care and attention, and was intended to develop facts as to the power consumption and efficiency of such equipment under regular service conditions.

The trip taken was a short line run, through the most densely populated portion of a large city, and the data include figures both upon rush-hour and mid-day conditions. The car used was a semi-convertible, double-truck passenger car, with a seating capacity of twenty-eight and a standing capacity of seventy passengers. The system used was the straight air, with a single-cylinder pump. The motormen operating the car during the runs had handled air brakes for two years, and received no instructions whatever in regard to their handling upon the car during these tests.

Besides using wattmeters in both motor and pump circuits, ammeter, voltmeter and stop-watch readings were also taken, which, together with the other data given below, furnished a basis for calculations of the power required, etc. The accompanying drawing shows isometrically the brake leverages of the car under test, and graphically illustrates the system whereby the several leverages are obtained:

EQUIPMENT UNDER TEST

Car length over platforms.....	32 ft. 6 1/2 in.
Car weight, complete.....	29,115 lbs.
Weight, No. 1 end, on large wheels.....	9,850 lbs.
Weight, No. 1 end, on small wheels.....	4,760 lbs.
Weight, No. 2 end, on large wheels.....	9,424 lbs.
Weight, No. 2 end, on small wheels.....	5,081 lbs.
Car weight with average number of passengers.....	31,990 lbs.
Kind of trucks.....	Brill double, maximum-traction
Number and kind of motors.....	2—type 81 (60-hp)
Gear ratio.....	Pinion 19, gear 67
Air brakes.....	Straight air
Quality of brake-shoes.....	Hard cast iron
Ratio of piston pressure to pressure on:	
Each 33-in. wheel, No. 1 end.....	1: 1.492
Each 20-in. wheel, No. 1 end.....	1: 7305
Each 33-in. wheel, No. 2 end.....	1: 1.547
Each 20-in. wheel, No. 2 end.....	1: .598
Pump cut in at, pounds pressure.....	.58
Pump cut out at, pounds pressure.....	.75
Average cubic feet air stored in reservoir.....	17.7
Average pressure on piston per square inch.....	66.5 lbs.
Diameter of piston.....	7 in.
Total pressure on piston.....	2,559.25 lbs.
Length of piston stroke.....	3 in.
Average retarding pounds on each 33-in. wheel, No. 1 end.....	3,817.7
Average retarding pounds on each 20-in. wheel, No. 1 end.....	1,869.8
Average retarding pounds on each 33-in. wheels, No. 2 end.....	3,962.
Average retarding pounds on each 20-in. wheel, No. 2 end.....	1,527.6
Per cent of armatures' gyrotary momentum to car momentum.....	3.6

CONDITIONS OF TEST

Weather.....	Good
Rail.....	Side-bearing tram, and grooved girder, averaging 95 lbs. per yard
Track.....	Level
Headway.....	.20 ft. apart to 3 minutes
Densely settled locality, heavy traffic.	

RESULTS—AVERAGES FROM FOUR ROUND TRIPS

Distance covered in round trip.....	11.33 miles
Average number of passengers on car at all times.....	23
Actual time car was in motion.....	1 hour, 17 minutes, 25 seconds
Average speed in miles per hour.....	8.78
Maximum speed attained.....	23.0 miles per hour
Average rate of deceleration throughout a stop, with equipment in ideal condition.....	2.98 miles per hour per stop
Highest rate of deceleration obtained.....	6.02 miles per hour per stop
At 23 miles per hour car stopped in.....	150.75 ft.
At 23 miles per hour car stopped in.....	7.73 seconds
Total power taken by car.....	20,043 watt-hours
Total power taken by motors.....	19,625 watt-hours
Total power taken by air compressor.....	418 watt-hours
Per cent of total power taken by compressor.....	2.09
Total time pump was operating.....	12 minutes, 34 seconds
Per cent of running time pump was operating.....	16.2
Number of times pump cut in.....	23
Average time in seconds for each pumping.....	.33
Average amperes taken by compressor.....	3.711
Average line voltage at car.....	.538
Average voltage at power house.....	.575
Power for pump at power house.....	.447 watt-hours
Power for car at power house.....	21,422 watt-hours
Watt-hours for compressor per cut in at car.....	18.17
Total number of brake applications.....	519
Number full stops made.....	.60
Average full stops per mile.....	5.3

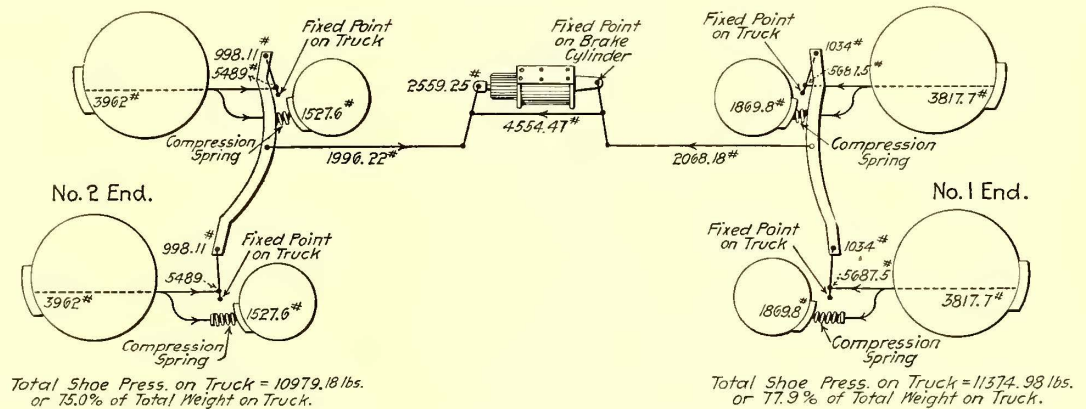


FIG. 3.—BRAKE LEVERAGE OF CAR UNDER TEST

Average watt-hours per stop, including power taken for slow downs between stops.....	6.97
Cubic feet of air used per trip.....	85.8
Cubic feet of air used per stop, including all used in slow-downs.....	1.43
Minimum cubic feet air required for stop at maximum deceleration (exclusive of slow-downs).....	.594
Total watt-hours taken per car-mile.....	1.769
Watt-hours used in braking per car-mile.....	36.89
Cost of kilowatt-hour (conservative figure).....	\$.015
Cost per stop, including power used in slow-downs.....	.00010455
Cost per stop, excluding power used in slow-downs.....	.00004342
Total cost of braking car trip.....	.00627

In the above data, mention is made of the number of applications of air, as differentiated from the actual number of full stops made. This item is important, inasmuch as in crowded city service slow-downs must constantly be made on account of traffic conditions and, in a great number of cases, passengers swing on or off the car before a stop is actually arrived at. Under these conditions a summary of merely the full stops is evidently incomplete, and does not accurately represent all the factors in the case as they existed. The amount of air used per application varies widely, however, so no average can be determined from their total. For this reason the total number of applications of the brake is specified, but the power used in making slow-downs is included in the power taken per stop; the minimum power required for a single stop at the maximum rate of retardation is stated for comparison.

The statement is made in the foregoing data that the highest rate of retardation obtained was 6.02 miles per hour per second. It is fully appreciated that this apparently high rate of retardation is open to criticism. In this connection I will say that this abnormal rate was maintained during only the last one-quarter second of the stop where the coefficient of friction is at its maximum, and where, even should the wheels

skid, the sliding coefficient of friction between the rail and wheel is also at so high a point as to maintain a very high rate of retardation, regardless of whether the wheels are locked or not. Curve D, in Fig. 1, illustrates this point, as at low rates of speed from 1.5 m.p.h. to 0, it closely approaches the brake coefficient at the same speeds.

In Fig. 4, which presents similar curves for the operation of the hand brake, the same high rate is shown, and the same remarks are applicable. These results may appear abnormal, but the fact that the data from which these extremely high rates of retardation were figured were taken by an automatic electric recording apparatus, and the figures and curves carefully gone over and checked, justifies their insertion in the face of possible criticism.

In reviewing the foregoing test data, the extremely small cost of power consumed for braking, as compared with the total, will be apparent. This emphasizes the fact that when the adoption of power brakes is under consideration, the cost of power for their operation is so small as to be almost negligible, and need hardly be considered a function of the problem. When it is remembered that the distance of the round trip on

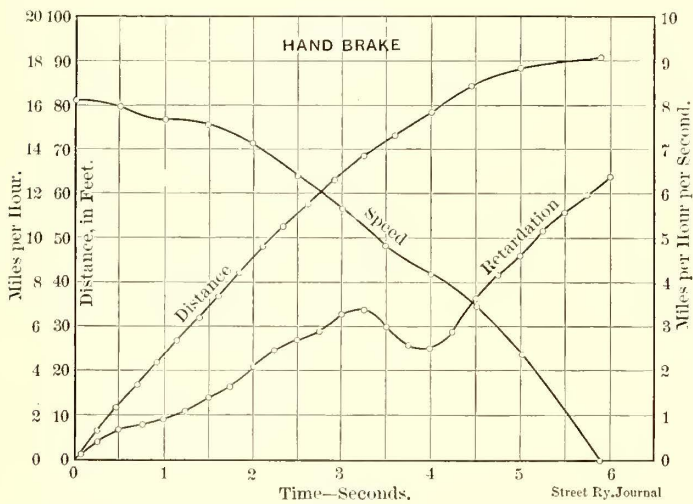


FIG. 4

A comparison of the two retardation curves in Figs. 4 and 5 shows a marked difference in their characteristics, attention to which was called in the preceding paragraph. As the initial velocity of the cars was the same in each instance, their performance under the influence of the two brake systems is of interest. From Fig. 4 it will be noticed that the car using a hand brake ran a distance of 91.5 ft. before stopping, and that the time required for the stop was 5.9 seconds after the application of the brake. In Fig. 5 it is shown that a car equipped with an air brake stopped from the same initial speed in 73 ft., 5.2 seconds after the brake was applied. In other words, the air brake stop required but 79.8 per cent of the distance, and 88.1 per cent of the time of the hand brake stop.

The hand brake curve here presented represents an emergency stop, under favorable conditions, and as the air brake stop was similarly made, the comparison here indicated can be considered representative of the performance of the two brake systems under the most favorable circumstances. But, whereas such stops as the one represented by Fig. 5 could be made indefinitely with an air brake equipment, stops as efficient as that of Fig. 4 could not be maintained as an average with the hand brake, or even secured for any considerable length of time, as

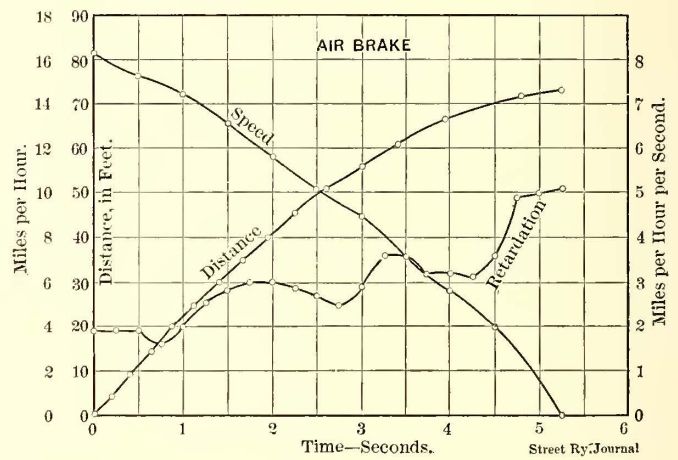


FIG. 5

the test was 11.33 miles, through a district of heavy traffic, and that the cost for brake power for such a trip was considerably less than 1 cent, it must be agreed that the above deduction is conservative.

In this connection there is a particularly interesting and important feature to be noticed in regard to the total power consumption of cars equipped with hand or power brakes. It is, of course, well known that, where a car is operated with brakes partly set, much power is wasted in the grinding down of brake-shoes and wheel-tires. This is a common, though regrettable, practice in the larger cities, being especially noticeable in the crowded business portions, where the danger of collision is always present. The reason that the motorman upon a hand brake car will, under such circumstances, operate continuously with brakes partially applied is not so much to make his car proceed slowly, but rather to have them, at all times, under immediate control, thereby obviating the loss of valuable time in bringing the pull to its maximum strain. Here is especially to be noted that with a power brake it is unnecessary, even where the traffic is most dense, to operate with partial brake pressure, as with this type of brake the maximum thrust is obtained immediately after the brake is applied.

Figs. 4 and 5 illustrate this point, showing clearly that, while the hand brake starts with a very low rate of retardation, and increases constantly for the first three seconds, with the power brake, on the other hand, the high rate of retardation of 2 miles per hour per second is obtained at the outset.

the force exerted by a motorman to secure such rate of retardation with a hand brake is too exhaustive for continuous service—the stop shown was made with especial effort, in an endeavor to bring out the highest rate of hand braking.

In concluding the discussion as to the advantages and disadvantages of the two types of brakes, it is seen that the initial cost and the cost of maintenance are the only important factors to be considered in an argument against the power brake. The former item is usually 8 per cent of the entire cost of a car, while the maintenance charge runs in the neighborhood of 50 per cent in excess of that required for a hand brake equipment. This higher maintenance cost is accounted for by the occasional repairs and renewals of the compressor armature, field and governor coils, and the yearly overhauling of the pumps, together with the necessity for more frequent renewals of brake-shoes and wheel-tires, owing to the increased wear to which they are subjected.

The question now arises as to whether a traction company is justified in installing the power brake upon its cars, but as the local conditions which govern the application of new apparatus, and which effect the relative importance of the arguments for and against power brakes, vary so widely, it is not within the scope of the author to make a general statement upon the subject.

In conclusion, it may be stated that the ideal stop is agreed to be one at a constant rate of deceleration, that on a curve sheet could be represented by a straight line. Any deviation from the straight line on the part of distance, speed or retarda-

tion curves represent faults in the present systems of brakes, which it should be the purpose of brake companies to do away with to as great an extent as possible. A straight line stop represents the ideal condition not only on the points of distance, time and efficiency, but also in the comfort of the passengers, as any change in the rate of retardation during a stop will cause an appreciable difference in the equilibrium of those upon the car.

Certain kinds of electric brakes more closely approach the above desideratum than does the air brake. It is well known, and to be regretted, that the air brake has remained, in its essential features, practically stationary for a long time past. In all other details of car equipments, particularly in the motors, controllers and other electrical apparatus, as well as in the cars themselves, there have been great changes and improvements constantly going on. The air brake at the time of its adoption by electric railways was, of course, a vast improvement over the hand brake, and even yet represents a most valuable and efficient piece of apparatus, but further improvements are greatly to be desired and are expected. The traction companies demand that the brake equipment be brought to a point of the highest efficiency and safety to correspond with the improvements in other apparatus. Other manufacturers using different methods of power braking are gradually bringing the art of braking to a more advanced state, and their striving for a brake which will produce the ideal retardation should be met with a like progressiveness on the part of the air brake companies.

THE DEVELOPMENT OF THE ALTERNATING-CURRENT RAILWAY MOTOR

At the meeting of the Electrical Engineering Society of the Worcester Polytechnic Institute, held on the evening of Dec. 9, Albert H. Armstrong, of the railway engineering department of the General Electric Company, gave an illustrated lecture on the single-phase alternating-current railway motor.

His remarks were especially interesting, as he took a conservative view of the a. c. motor situation, outlining the disadvantages as well as the advantages of superseding the d. c. motor and rotary converter with a straight alternating system from generators to motors. The meeting was well attended; Prof. H. B. Smith introduced the speaker, who is a graduate of the institute of the class of '91.

Mr. Armstrong first outlined the early studies and experiments made with the idea of adapting alternating motors to the requirements of electric traction. As far back as 1895, the General Electric Company satisfied itself of the feasibility of applying the three-phase induction motor to certain classes of railway work, but the apparatus developed offered no inherent advantages over the rotary converter and direct-current motor system then being placed upon the market. The latter provided a commercial means of distributing current over long distances for heavy cars. About three years ago the General Electric Company shipped a set of three-phase 50-hp induction motors for railway service in Italy, but this is the only instance of the company's selling three-phase motor equipment for such work. Two or three years ago the single-phase motor began to be investigated. Mr. Armstrong described the experiments made with Prof. Elihu Thomson's repulsion type of motor, and then passed on to a description of the compensated type of alternating motor which is now in commercial operation on the Schenectady-Ballston line. These motors have now been in service since August last, and thus far have given practically no trouble whatever. The general design of the motors was discussed, with special reference to the prevention of sparking at the commutator, feasible voltage, etc. The adaptability of the General Electric equipment to either a. c.

or d. c. trolley voltages by the simple throwing of a commutating switch was also brought out. The alternating current compensated motor, when running with a. c. current has proved to be a thoroughly practical and commercial piece of apparatus, and when running d. c. is a better motor than even the present standard d. c. motor.

The cooling of the step-down transformer on the car presents several new features, as the method of cooling must provide for a supply of dry, clean air, in order to afford assurance of satisfactory operation under all conditions of weather. The method adopted by the General Electric Company for cooling transformers has this object in view.

Mr. Armstrong next described the line construction used on the Schenectady-Ballston route, and which has proved very desirable. Undoubtedly, the catenary suspension installed on this line will be quite generally used on suburban lines using high-tension trolley wires.

The characteristics of the motors were next discussed, and attention drawn to the fact that recent improvements in the compensated motor have brought its commercial efficiency up to within 2 per cent or 3 per cent of that of the d. c. railway motor of the same capacity. Special attention has been given to the speed characteristics of the motor, with the result that the natural high-speed characteristics of the alternating commutator motor have been so qualified that the a. c. compensated motor now operates at practically the same rotative speed as standard d. c. motors. The advisability of developing a low-speed a. c. motor was dwelt upon as very important, partly in order to eliminate bearing trouble and partly to prevent high brush friction losses, which would be the result of the operation of a high-speed low-voltage motor having a multiplicity of brushes.

An acceleration of 1 mile per hour per second is readily obtained with a four-motor alternating-current equipment. In starting, the direct-current motor requires from 15 per cent to 20 per cent of the full potential, but on account of inductance, the alternating motor needs between 60 per cent and 70 per cent of the full potential, thus rendering series paralleling almost a superfluous refinement with a. c. motors.

At least 150,000 kw of three-phase, twenty-five-cycle alternators have been sold by the General Electric Company. The question of obtaining single-phase current on the trolley is therefore an important one, and it has been satisfactorily solved by employing three-phase transmission, transforming to two-phase current at the sub-stations and distributing single-phase from the transformer secondaries, insulating the trolley sections from each other where it is necessary. In this way the greater output of three-phase alternators can be secured and the system remain balanced.

The speaker then pointed out the importance of carrying the development work along lines which would prove of great commercial value later on, and cited an instance where considerable time and money had been expended in experimenting with a type of overhead construction and trolley well adapted to high-speed service, but which could not be adopted for steam lines, due to the impossibility of its conforming to the clearance diagram imposed by tunnels and bridges of our steam lines.

Lest the audience should overlook the development which has been carried on of late in high-powered direct-current motors, Mr. Armstrong presented some lantern slides of the 6000 type of locomotive, which he described in considerable detail.

After reviewing the apparatus installed and now under construction for alternating-current railway-motor work, the probable field of this type of apparatus was touched upon and its comparative advantages and disadvantages over the a. c. converter system was briefly outlined.

Electric railroad engineers have waited for some years for the development of a single-phase motor having the available

speed characteristics demanded in general railroad work. The development of the single-phase commutating motor seems to provide the proper basis for future development in this line. Owing to the tremendous capital and talent employed in studying this motor, its development has been very rapid and its characteristics fairly well approximated.

While the alternating-current motor is a commercial success, it does not hold out any promise of superseding the direct-current motor to any great extent, except in suburban electric railway field and in special cases of high-speed motor-car service, where stops are infrequent. One of the reasons why the induction railway motor failed in its general application was that it demanded its own distributing and trolley system, and could not operate over city lines. The single-phase commutating motor offering good operation with d. c. current has opened up possibilities in suburban railroading which seem to warrant its success in this class of work.

The a. c. motor is inherently heavier than a d. c. equipment of corresponding capacity, and with the addition of step-down transformers, the entire equipment weighs considerably more than d. c. equipment. The disadvantages of increased weight are offset by the increased efficiency due to elimination of the rotary converter, and hence the increased weight of the a. c. equipment cannot be brought forward as of vital importance.

As long as the a. c. motor projects are confined to passenger or express service, using single-motor cars or trains of such cars, it is possible to make a creditable showing in favor of alternating-current motors for suburban work, where these motors are of considerable capacity and operate on their own private right of way. For locomotive work, however, the a. c. motor seems to suffer in comparison with its d. c. competitor, due to a number of limitations inherent in the a. c. motor itself. If it were possible to construct gearless a. c. motors with the armature mounted directly on the axle, as in the case of the New York Central 6000 type of d. c. locomotive, it would be found that the maximum coefficient of traction available would be in the vicinity of 15 per cent of the weight upon the drivers, as compared with 25 per cent to 30 per cent for d. c. motors. In other words, the pulsating torque of the single-phase alternating-current motor, if transmitted directly to the drivers, is only one-half of the maximum. With a spring-suspended geared motor, this difference in the slipping point is minimized, and the a. c. motor can utilize perhaps 80 per cent of the torque of the d. c. motor for the same weight upon the drivers. This constitutes a serious handicap for the a. c. motor in the class of work where weight upon drivers is limited, due to restriction of bridges, etc., and where the wheel-base is also limited in order to accommodate curves of rather sharp radius in the yards of some of our steam railroad termini.

The success attending the preliminary trials of the New York Central gearless locomotive has seemed to justify the high expectations of the possibilities of the gearless type of electric locomotive. There is no possibility in sight as yet for an a. c. gearless locomotive and to reproduce a machine equal in capacity to the New York Central 6000 type would call for probably two units equipped with a. c. motors and having a combined weight and cost very much in excess of the d. c. gearless locomotive.

The problem of the a. c. locomotive will undoubtedly be more fully worked out as the demand for such a piece of apparatus develops. The a. c. motor car has come with us to stay, and in suburban work a certain amount of displacing of the larger type of d. c. motor equipment may be looked for. Small roads using 50-hp motors or less, especially those running upon the public highway, have little to look for in the a. c. motor system, whose present objective seems to be the heavier type of suburban work and the movement of the main-line passenger motor cars, with the possible development later on of the a. c. locomotive of the heavier type.

THE STAFF BLOCK-SIGNAL SYSTEM

The use of the staff system in block signaling on steam and electric railways was advocated in a paper read by H. D. Emerson before the New York Railroad Club on Dec. 16. After a review of the history of block signals an account was given of the staff system as employed in England on single-track roads. Originally an actual staff or rod was used. It was given to the engineer as he entered the block and was left by him with the station agent at the end of the block. No train was allowed in the block without the staff. This system required the passage of trains through the block alternately in opposite directions. To obviate this difficulty, a box with a simple mechanical device was used at each end of the block, the two being electrically connected. Each box contains from ten to twenty tablets or staffs. When one tablet or staff is removed from either box, both boxes are locked and no other tablet can be removed until the one in hand has been returned.

The system, although originally designed for steam roads, is equally adapted to electric railways, and almost any electrical engineer or telegraph superintendent can design and construct in his own shops a tablet machine which will answer all the requirements of the ordinary railroad with moderate traffic. For example: A wooden box, the size of the ordinary long-distance telephone box, containing two dry batteries, with a spring plunger mechanism and negative and positive contacts, large enough to contain twenty brass plates, with an outwardly opening door locked by a small double-pole telegraph relay coil, connected with its mate by a single No. 9 wire, will make a very satisfactory blocking device, and one that can be installed on many of the minor trunk lines or electric roads to great advantage.

One advantage of the staff system is that it substitutes for a written order an entity which the engineer or motorman carries with him, and which not only determines that he has a right to be where he is, but which he can also show to others if called upon to prove his position. This the speaker considered a matter of great importance. Engineers and motormen are not usually literary, but are always more or less skilful mechanics; they deal with "things" and are trained to their use, and with the staff system they have the ever ready physical evidence of their right to a track. Some particulars were given of the use of the staff system on the Cincinnati, New Orleans & Texas Pacific Railway and on the Southern division of the Chicago, Milwaukee & St. Paul Railway. On the former the system has increased the capacity of the track four times over the old method of telegraphic block. The blocks have an average length of $1\frac{5}{8}$ miles, and the cost of installation per mile is from \$700 to \$800.

CONVICTION OF TRAINMEN FOR PARIS SUBWAY ACCIDENT

The Criminal Court of the Seine, Paris, France, convicted on Dec. 17 the four trainmen who were responsible for the catastrophe on the Metropolitan Electric Underground Railroad in August, 1903, resulting in the loss of sixty-five lives. Jouffroy, the conductor of the train, was sentenced to a month in prison and a \$400 fine. Renaud, superintendent of the station, whose lack of calmness precipitated the panic, was sentenced to a month's imprisonment and \$400 fine. Chauvin and Cavayle, motormen, were released with fines of \$600 and \$400, respectively, as they suffered permanent injuries.

A pocket schedule of all the lines in the coke region has been prepared and is now being distributed by the West Penn Railway & Light Company. It is a complete time table, and beside giving time at terminals gives the time at nearly all intermediate stations. A valuable feature is the schedule of connections at Connellsville with trains on the Baltimore & Ohio, and at Greensburg with trains on the Pennsylvania Railroad.

IMPROVEMENTS IN MACHINE TOOLS

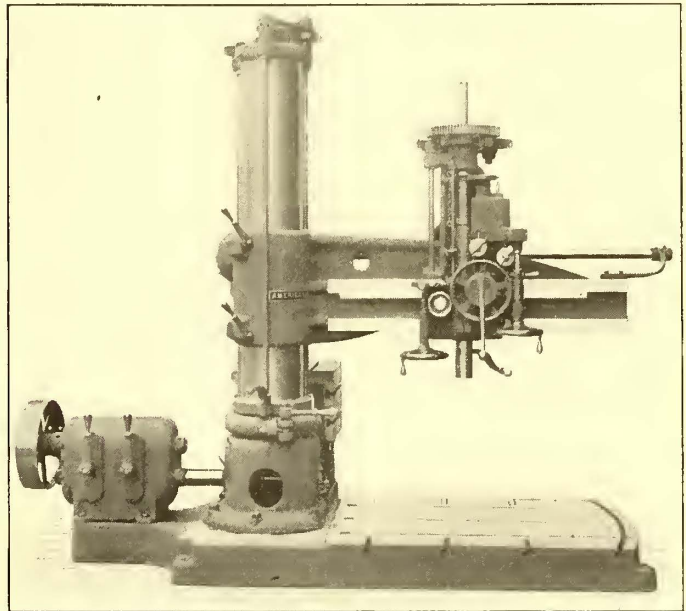
The accompanying illustrations represent two interesting developments in the line of machine tools which will be of interest to those involved in railway repair shop problems or in machine shop practice in general. The many improvements that are being made in shop practice demand that the tool equipment shall be of the highest efficiency in order to produce results commensurate with the remarkable progress that has been made in shop methods. The tool builders have fortunately met these requirements in a very commendable manner, and a study of their new developments is interesting and valuable.

The tools here illustrated represent the latest practice of the American Tool Works Company, Cincinnati, Ohio, which has devoted particular attention to the requirements of the new high-speed tool steel and the advances in shop practice resulting therefrom. In addition to having practically redesigned its entire line of machine tools recently to meet these new requirements, the company is still adding improvements wherever it is found possible. Among its latest developments may be noted the accompanying improved radial drill and the modified design of their "American" lathe to include a turret-head boring attachment.

The lathe is especially adapted to the work in many of the larger street railway shops, inasmuch as it is intended for specialized classes of work—embracing mainly the roughing and boring of castings in duplicate. It resembles the 22-in. "American" lathe of this company with the new all-gear head, except that, as it was intended primarily for roughing and boring work, the entire screw-cutting mechanism has been omitted. The feeding mechanism is of the same improved type as used upon the other types of lathes of this company, but involves special features in this case to accommodate the turret travel. There are seven carriage feeds provided, ranging from .2 to .015, with the steps graded for the maximum efficiency in

power delivered to the machine by a 6-in. double belt. The speeds obtainable through the head and countershaft are twelve in number, ranging from 5 r. p. m. to 322 r. p. m.

The carriage is fitted with plain block rest, which is provided with an interesting new design of calipering attachment. The

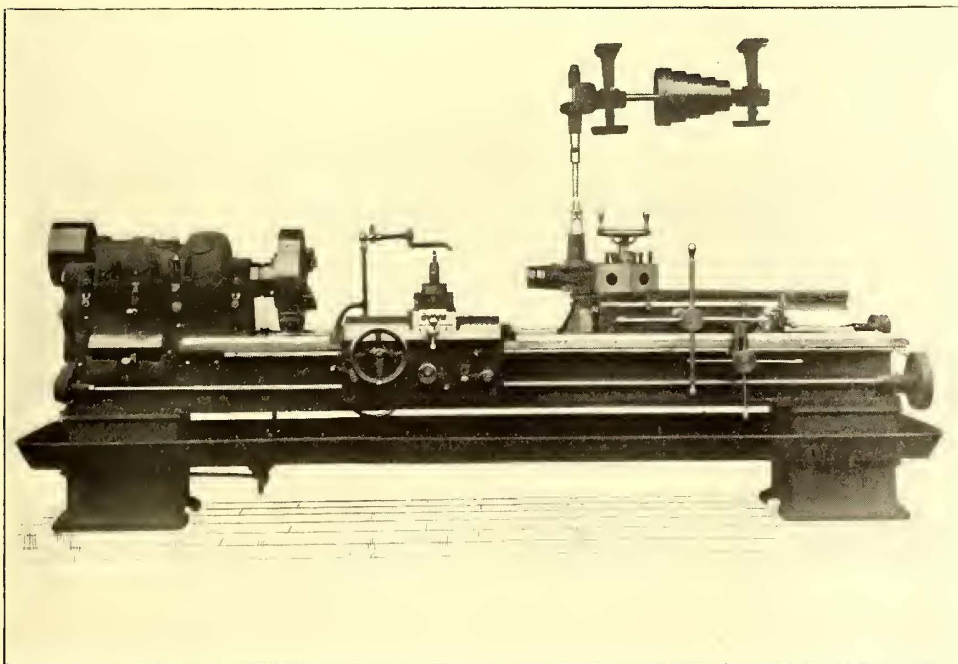


THE IMPROVED "AMERICAN" PLAIN RADIAL DRILL, WITH NEW DESIGN OF FEED MECHANISM

latter consists of a set of four adjusting screws, attached to the plain block rest after the manner of eye-bolts, each one falling, when desired, over into corresponding slots in the yoke piece over the front carriage dovetail. By adjusting knurled lock-nuts on any of the four screws and dropping same into the slot, the travel of the cutting tool toward the center, and hence the diameter to be turned, is limited at pleasure. This attachment is very valuable in duplicate work, as adjustments can be made for the duplicate turning of pieces with as many as four shoulders.

The hexagon automatic turret is of an improved design, with rapid and easy adjustments. It is provided with power feed, driven by a sprocket chain from the feed-roll, thus giving fourteen feeds to the turret, ranging from .16 to .007. The turret slide has extra long bearing on the bed, the top slide having a 24-in. movement, controlled by the pilot wheel; the upper slide is supported on the front end by an improved rest or shoe, which is firmly bolted to the end of the turret slide directly under the cutting tool, so as to slide out on the ways. It insures accurate alignment in boring, and, having a gibbed bearing both at the top and bottom of ways, prevents spring in any direction. The drill-

ing attachment, which is affixed on one of the faces of the turret, is extremely valuable in boring operations. It consists of a set of miter gears in a symmetrical housing, which actuate a spindle with ball-bearing thrust, carrying the boring bar. The spindle is made to revolve from a separate overhead countershaft, as shown in the illustration, by means of a telescopic rod, operating through universal joints, which thus compensates for any movement of the turret slide. The turret may



THE NEW TYPE OF "AMERICAN" LATHE, WITH SPECIAL BORING ATTACHMENT UPON THE TURRET

the character of roughing and boring for which the lathe is designed.

The geared head upon this lathe is an extremely simple and powerfully constructed mechanism. Only six gears are required to obtain the four speeds, through levers shown on the front. This simplicity of construction enables the gears to be made of very wide face and large diameters, this giving the entire mechanism sufficient strength to transmit the maximum

also be revolved without disturbing the drilling attachment, due to the telescopic rod. The boring spindle revolves in the opposite direction to the main spindle on the head—an obvious advantage. The boring spindle has available five rates of speed, through the cone pulley on the countershaft, giving thus a proper gradation to obtain the best results in the boring for which the lathe is intended.

The drilling machine illustrated herewith embraces many improvements which have recently been devised to meet the changed conditions and greatly increased duties now imposed upon machine tools. It embodies many features of distinct advantage in operation and which commend the tool for general use, particularly the new arrangement of the feeds.

The feeding mechanism is mounted on the head at the right of the spindle and provides eight distinct rates of feed covering a carefully chosen range, in geometrical progression, from .007 in. to .063 in. These feeds are all readily obtained by the simple turning of a dial on the feed box until the desired feed, indexed thereon, comes opposite a fixed pointer. This method of feed change is by far the simplest yet devised, as it requires no reference to index plates and subsequent handling of levers. The all-gear feeds, when supplied instead of belted feeds, insure vastly increased productive capacity, rapidity of change, and positive action. The feeds operate through a friction, which permits a drill being crowded to its limit without strain upon the driving mechanism.

A plate is provided indicating twist drill sizes, from $\frac{1}{2}$ in. to $3\frac{1}{2}$ ins. inclusive, and their respective proper feeds, which, in connection with the dial described above, permits the operator to immediately secure the proper feed for the drill he is using. Thus, the operator, without any guessing, simply refers to the plate, places the drill in spindle, and by revolving the dial so that the pointer comes opposite the feed desired, automatically provides the most suitable feed for the twist drill in use—this not only saves time, but it insures the drill being used to its full capacity. The feeds can be automatically tripped at any position of spindle by an adjustable trip dog and pointer, acting on the worm clutch. The trip acts automatically at full depth of spindle, preventing breakage of feed mechanism.

The speed box used upon this drill is of the geared friction type providing four changes of speed, each being instantly available by use of the two levers shown. The frictions are of a patent double-band type, employing very few parts in their construction, which can thus be made of such large proportions as to be free from slippage under the severest cuts, and obviating the use of loose delicate parts. The speed box can be easily interchanged with a cone by simply breaking a coupling connection on the lower driving shaft of the machine—an improved feature of unusual importance. Likewise, a motor drive, using any type of motor whatever, may easily be attached in connection with the speed box, by replacing the pulley wheel thereupon by the necessary gear or silent chain.

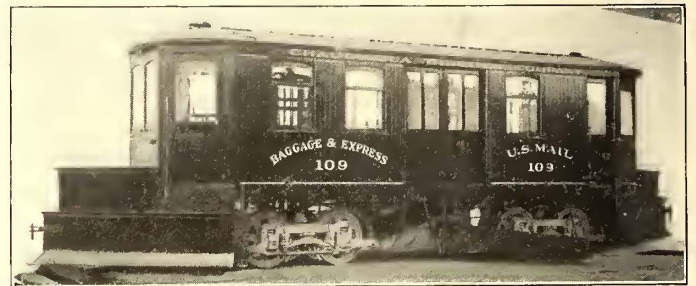
The spindle has, in connection with a double-back gear, sixteen changes of speed, ranging from 16 to 267 in geometrical progression, all immediately available without stopping the machine. This wide range of spindle speeds, combined with the strong driving power of the machine, renders it equally efficient with either ordinary or high-speed twist drills.

The column is of a double-tubular type. The sleeve or outer column revolves on conical roller bearings, hardened and ground, being clamped in any position by a patent V-clamping ring. This makes the outer column practically integral with the inner column, which extends the entire height and has full bearing for the outer column at both top and bottom. This gives the equivalent of a double column, affording exceptional rigidity. The arm is of a combined parabolic beam and tube section, giving great resistance to bending and torsional strain. Its design holds the lower line parallel with the base, and thus permits work being operated upon in close proximity to the

column without the necessity of an extreme reach of spindle. The arm is clamped to column by three binder levers, obviating loose wrenches, and is raised and lowered rapidly by a double-thread coarse pitch screw, hung on ball bearings and controlled by a convenient lever.

HEAVY COMBINATION SNOW-PLOW AND EXPRESS CAR FOR CHAUTAUQUA TRACTION COMPANY

An interesting type of combination snow and express car was recently delivered to the Chautauqua Traction Company by the J. G. Brill Company. The plows are removable, and in a short time the car can be made ready for locomotive service, heavy couplers being provided at either end for the latter. The car is equipped with four 55-hp motors, and the weight of the car and trucks without motors is 25,000 lbs., making it one of the most powerful snow-fighting machines ever put on the rails. The railway runs around the southern shores of Lake Chautauqua, in the western part of New York, a region of heavy snows and bad drifts in winter. Much trouble was experienced last winter in keeping up the schedules, but it is confidently believed that by the use of the new snow-plow the lines will be kept open in the worst weather. The railway company operates large high-speed cars of the Brill semi-convertible



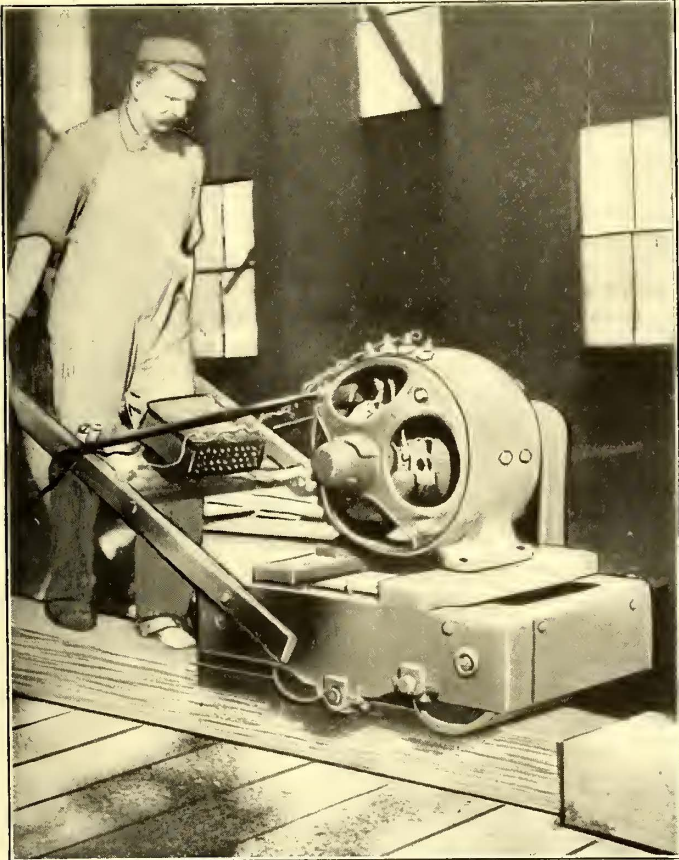
COMBINED BAGGAGE AND EXPRESS CAR AND SNOW PLOW

type, which were described in the *STREET RAILWAY JOURNAL* of Oct. 3, 1903.

As will be seen by reference to the engraving, the car has doors in the ends at diagonally opposite corners for the admission of long articles, and is well arranged in every particular for baggage and express service. The plows are heavily backed with oak, and are attached to the body by four stout guide posts, upon which they have a vertical adjustment of 9 ins. by means of chains passing over sheaves upon shafts which are revolved by large horizontal hand-wheels geared to the shafts. The levelers are attached to the centers of the body by stout posts securely braced, and these levelers are raised vertically instead of at an angle, as was formerly the method of construction, the purpose being to avoid obstacles close to the truck. Ice scrapers or diggers are a part of the equipment of the car. They are stayed to the body with $\frac{3}{4}$ -in. rods which pass through springs, allowing sufficient play to prevent injury by catching obstructions other than ice or packed snow. Ice scrapers are operated by foot pedals in the cam, and when lowered retain a position about $\frac{1}{4}$ in. from the crown and inside of the rail. The sand boxes are located near the center of the car, and have extra large hoppers. The bottom framing is unusually substantial, and includes long leaf yellow pine side sills $5\frac{3}{4}$ ins. x $7\frac{7}{8}$ ins., with sill plates on the outside 7 ins. x $\frac{5}{8}$ in. Heavy under-trusses are anchored at the ends of the open style body bolsters. The length over the body is 30 ft., and over all, 40 ft. $5\frac{1}{2}$ ins. The width over the sills is 8 ft. 4 ins. The length from the point to the side of the adjustable plow is 8 ft., and the width, 2 ft. 6 ins. The length from the point to the side of the upper plows is 7 ft., and the width, 1 ft. 6 ins. The length of the levelers is 7 ft. The car is mounted on Brill No. 27-G trucks, having a 4-ft. wheel base, 33-in. wheels and $4\frac{1}{2}$ -in. axles.

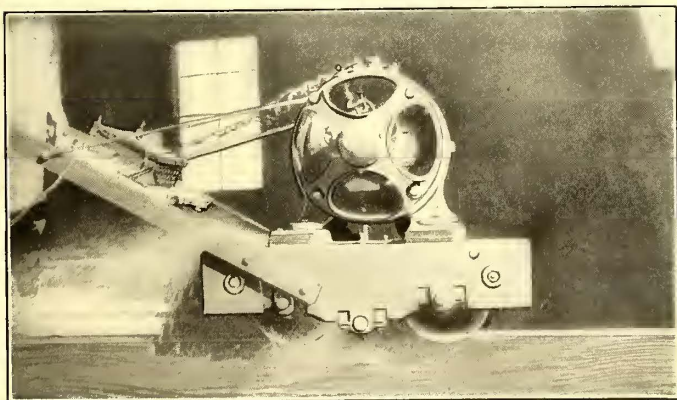
PORTABLE TROLLEY POLE PLANER

The accompanying illustrations show a very ingenious arrangement devised in California for planing trolley poles. The California Gas & Electric Corporation had purchased some 300 square sawed redwood poles for use on its electric railway



TROLLEY POLE BEING PLANED BY MOTOR PLANER

system in Sacramento. It was impracticable to take the poles to a mill to be planed, so it was decided to have them planed by hand. However, the contractor who bid on the job estimated that it would cost over a dollar per pole. As this figure seemed exorbitant, Mr. Snyder, foreman of the railway shops, "got busy," and devised the portable planer illustrated. This



ELECTRIC POLE PLANER IN ACTION

consisted of a planer head mounted on a substantial wooden truck and belt-driven by a 5-hp 500-volt direct-current General Electric motor. The rollers were made of two sections of 10-in. wrought-iron pipe, castings being fitted in the ends for the axle bearings. A pair of plow handles were used to push and guide the planer, the starting box for the motor being mounted between the handles, as shown. The entire outfit cost but \$60 outside of the motor, which the company had in stock. The

poles were 35 ft. in length, with 8-in. tops, and it took about one minute to plane down one of the four sides of a pole. The poles were planed as they were unloaded from the cars, at the rate of six poles an hour. There was not only a considerable saving in time, but also a great saving in expense, as it cost but 10 cents per pole as against \$1.15, the price estimated for doing it by hand. This illustrates one of the many instances in which a little ingenuity on the part of the mechanical department of a railway system may affect a considerable saving in operation or maintenance.

THE CONSOLIDATED RAILWAY COMPANY, OF NEW HAVEN, CONN.

This organization is of such a comparatively recent date that it might be of interest to give a statement in regard to the company and the lines which it controls. The Consolidated Railway Company was organized to own or lease and operate the trolley lines in Massachusetts and Connecticut controlled by the New York, New Haven & Hartford Railway Company. The trolley lines which have sold their property, rights and franchise directly to the Consolidated Railway Company, and which, in consequence, have been absorbed by it, are as follows: The Worcester & Connecticut Eastern Railway Company, the Fair Haven & Westville Railroad Company, the Winchester Avenue Railroad Company, the Meriden Electric Railroad Company, the Wallingford Tramway Company, the New London Street Railway Company, the Norwich Street Railway Company, the Montville Street Railway Company and the Middletown Street Railway Company. The following companies are operated by the Consolidated Railways Company under lease: The West Shore Railway Company, the Worcester & Webster Street Railway Company and the Webster & Dudley Street Railway Company. The following companies in Massachusetts are also controlled by the Consolidated system and are operated separately under their own names: The Southbridge & Sturbridge Street Railway Company, the Worcester & Southbridge Street Railway Company, the Worcester & Blackstone Valley Street Railway Company and the Worcester, Rochdale & Charlton Depot Street Railway Company.

The lines owned directly by the company or operated under lease aggregate 366 miles of track, with 591 cars. The president of the company is C. S. Mellen, president of the New York, New Haven & Hartford Railway Company, and his assistant is Calvert Townley, recently of the Westinghouse Electric & Manufacturing Company. The first vice-president of the Consolidated Railway Company is E. H. McHenry, who is also fourth vice-president of the New York, New Haven & Hartford Railway Company; the purchasing agent is E. L. Pollock, of New Haven. For convenience in operation, the lines are divided into two divisions, viz.: the New Haven lines, which are under the management of J. H. Punderford, and the Putnam lines, which are under the management of S. Anderson. The following are the names of the local superintendents: New Haven, T. R. Hull; Putnam, J. B. Potter; Meriden, W. P. Bristol; Middletown, C. H. Chapman; New London, L. Bentley; Norwich, H. Bigelow; Worcester, Webster and Southbridge, L. Wheeler.

The Metropolitan Street Railway Company, of Kansas City, Mo., has bought of the St. Louis Car Company, of St. Louis, Mo., forty-two double-truck cars used on the Intramural Railway at the Louisiana Purchase Exposition. Each of these cars has a seating capacity of fifty-four, and during the busy hours will be able to accommodate comfortably 100 persons.

LEGAL DEPARTMENT*

SCOPE OF SERVANT'S CAPACITY TO RENDER MASTER LIABLE

It is a well settled principle that if a servant on his own responsibility and without his master's consent, although using the master's tools, appliances or other property, is guilty of negligence resulting in injury, the master is not liable. A common illustration is that where a coachman takes his master's carriage and team without the latter's knowledge and, entirely independent of any errand or business for the master, takes friends of his (the servant's) for a ride, it is held that he is acting beyond the scope of his employment and the master is not obliged to father the consequence of negligent conduct. Another principle equally well established is that the general servant of one may become the temporary servant—servant *pro hac vice*, as it is termed—of another master. In that event the temporary, and not the permanent, master is the responsible person during the temporary employment. Where the status of servant *pro hac vice* has been established, the temporary master steps into the shoes of the general master as regards legal obligations to the servant himself, as well as to third persons for the servant's acts. The determinative circumstance upon the creation of the new relation is whether a mutual understanding actually existed among the parties for the transfer of allegiance.

These principles are stated preliminarily to calling attention to a recent decision by a New York court, in which it was held that where a policeman directed a street car motorman to use his car to push a coal truck blocking street car traffic, the railway company was not liable for injuries sustained by the officer because of the motorman's negligence in so operating the car. (*Connelly vs. Met. St. Ry. Co.*, 84 N. Y. Supp., 305.) The Appellate Term of the Supreme Court in rendering this decision correctly stated the legal bearings of the matter as follows:

"Whatever was necessary or proper for the service of the defendant was within the motorman's authority, but that was limited to its appropriate use. He was not authorized to depart from his defined function in order to operate the car in a manner foreign to the purpose of his employer. Pushing the coal truck up the grade was work which the motorman did primarily for the policeman, and in so doing he used the power and vehicle of the defendant for what was not contemplated either in its construction or operation or in his own employment. The motorman, it is true, denies that he was negligent, or that he in any wise disobeyed the instructions given by his incidental employer, the policeman. That matters not here, however, as his negligence, if any, was not the negligence of the defendant."

Such is the law according to general principles and without statutory intervention. In the particular case under consideration it was sought to render the company liable because of a provision of the city charter:

"It is hereby made the duty of the police department and force, at all times of day and night, and the members of such force are hereby thereunto empowered to * * * regulate the movement of the teams and vehicles in street."

The court very properly held that the duty to regulate public traffic did not authorize police officers to appropriate other persons' servants or apparatus and, diverting them from their regular employment, render their owners responsible. In this case the policeman himself brought the action for his own injuries. This made the case particularly strong for the defense; indeed, there is a certain amusing naivete in the officer's presuming to sue for his own injuries under the circumstances. But, under the usual rules of law, the same result doubtless would have been reached if the injury had been to a third person. It is unnecessary to go deeply into the question who would be liable if a third person had been injured. Possibly, the policeman and the motorman would have been held as joint tort-feasors. In any event, it is believed that the gen-

eral master—that is, the railway car company—could not be called upon to respond in damages.

If a motorman were directed by a superintendent, or other officer of executive powers, of the company to push an obstruction out of the way the legal situation would be different. So also, if cases similar to the reported case should happen so frequently that it could be shown that a custom existed with the knowledge of which the company was chargeable, liability to third persons might be sustained on the ground that the servant was acting within the scope of his employment. It is not improbable that cases somewhat similar do not infrequently occur, and the safer policy would be to prohibit motormen by a definite rule from using cars as "push-behinds."

CHARTERS, ORDINANCES, FRANCHISES.

PENNSYLVANIA.—Street Railways—Rights of Abutting Owners—Consent to Use of Street—Railway Crossing.

1. A land owner is entitled to an injunction to protect his own land to the center line of the road from the burden of street railway tracks, though his neighbors on the opposite side have consented to the use of their lands by such company.

2. A street railway company obtained the consent of a turnpike company and of the township authorities to use the turnpike road and of the abutting owners on one side of the road. Held, that an owner on the other side of the road, who had not consented, and whose property was not touched, could not enjoin the construction of the railroad.

3. Where the tracks of a railway company are crossed by an overhead bridge, such company has no standing to enjoin the construction of a street railway, where the street railway company offers to rebuild the bridge so as to make it strong enough for the passage of its cars, though the railway company owns the land on which the foundations of the bridge rest, and originally erected the bridge.

4. A railway company cannot enjoin the construction of a street railway on a public road which crosses its track and on which lands owned by it abut, under the provisions of act June 19, 1871 (P. L. 1360), where none of the rights or franchises of the railway company are injured or invaded.—(*North Pennsylvania Railway Company et al. vs. Inland Traction Company et al.*, 55 Atlantic Rep., 774.)

PENNSYLVANIA.—Bill in Equity—Misjoinder of Causes—Extension of Street Railway—Use of Streets.

1. Causes of complaint, though similar in tendency and result, set out in a bill in behalf of parties complainant, not appearing to be the same, or founded on any joint right, should have been put into separate bills.

2. Under acts May 14, 1889 (P. L. 211), and June 7, 1901 (P. L. 518), it is a condition precedent to the extension by a street railway company that it file in the office of the Secretary of State an exemplification of the record of the adoption of the extension.

3. Where a street railway company was incorporated subsequent to Act June 7, 1901 (P. L. 516), providing that the consent of local authorities to the use of the streets of a town shall be promptly applied for and obtained within two years from the date of the charter, a street railway company incorporated under such act cannot be disturbed in its exclusive privilege of the highways named in its charters for the two years allowed by the act.—(*Coatesville & D. Street Railway Company et al. vs. West Chester Street Railway Company et al.*, 55 Atlantic Rep., 844.)

PENNSYLVANIA.—Street Railroads—Contract to Build—Breach—Impossibility as a Defense.

1. It is no defense to an action for breach of contract to build a street railway on a certain street that for a distance of 75 ft. the highway was only 11 ft. in width, the evidence not being conclusive that such width was insufficient for the purposes of the road.

2. Where a street railway company contracted to build a road on a certain street, the fact that, because of the narrowness of the street, it was impossible to build such railway, is no defense to an action for breach of the contract.

3. Evidence in an action against a railway company for failure to build its line on a certain street in accordance with its contract. Held, insufficient to show that the contract was impossible of performance.—(*Borough of Montooth vs. Brownsville Avenue Street Railway Company et al.*, 55 Atlantic Rep., 1036.)

PENNSYLVANIA.—Elevated Road—Construction—Appeal—Review.

1. Where a passenger railway company is incorporated under act June 7, 1901 (P. L. 523), giving a right of eminent domain to construct an elevated railway on a public highway for a distance

* Conducted by Wilbur Larremore, of the New York Bar, 132 Nassau Street, New York, to whom all correspondence concerning this department should be addressed.

of 1 mile, and has obtained the consent of the local authorities, and filed a bond to secure a nonconsenting land owner, it may build such road, though other street railway companies, at the instance of the land owner, have restrained from building a surface street railway on the designated mile.

2. Questions which were not raised below, nor made the subject of any exceptions, nor set forth in any specifications of error, will not be considered on appeal.—(Philadelphia & T. R. Company et al. vs. Neshaminy Elevated Railway Company, 55 Atlantic Rep. 1034.)

PENNSYLVANIA.—Eminent Domain—Witnesses—Value—Competency—Damages.

1. In an action to recover for damages to land, caused by a trolley road on a highway running through it, a witness who did not know the property prior to the construction of the trolley line was not competent to estimate the damages sustained by reason of its construction.

2. In an action by a landowner for damages caused by the construction of a trolley road on a highway, the jury cannot charge him, in diminution of his damages, with the general appreciation of property caused by such construction.—(Shimer vs. Easton & N. Street Railway Company, 55 Atlantic Rep., 769.)

TEXAS.—Railroads—Obstructing Entrance to Place of Business—Measure of Damages—Right of Lessee.

1. Where one occupied premises during the time for which he sought to recover damages from a railway company occasioned by its unnecessarily and negligently obstructing for several months the only entrance to his yard by the construction and operation of its track in the street in front of his premises, the question whether he was a lessee for a year or from month to month was immaterial.

2. Where a railroad company wrongfully obstructed the entrance to one's place of business, thereby preventing the patrons of the business from entering the premises, the measure of damages was the loss of profits thereby occasioned, and not the difference in the rental value of the premises.

3. Where a railway company wrongfully obstructed the entrance to a tenant's place of business by the construction and operation of tracks in the street in front of his premises, the tenant was entitled to recover the damages sustained, though he might have declined to rent the premises, as he knew that the tracks were to be built, and though he could have terminated his lease at any time.—(International & G. N. Railway Company vs. Capers et al., 77 Southwestern Rep., 40.)

WISCONSIN.—Street Railroads — Contracts — Steam Railroad Crossing—Flagman's Wages—Sale of Property—"Successor"—Use of Crossing—Burdens Attached to Fee.

1. Where defendant street railway company purchased from the owner of a previously existing railway all the equipment of such railway, but stipulated that the sale did not include the franchise, leases, contracts or power house machinery of the seller, the buyer did not thereby become the seller's "successor," within a contract obligating the seller and his successors to pay for the maintenance of a flagman at a steam railroad crossing.

2. When a street railway company contracted to pay the wages of a flagman at a point where its line crossed the tracks of a steam railroad, the subsequent purchase of the street railroad's personal property by another company, which thereafter operated the same under an independent franchise, did not render the latter liable for the payment of such wages.

3. The obligation to pay such flagman's wages did not attach to the fee of the land at the crossing over which the street railway was constructed, so as to impose the burden thereof on the railway using the same.—(Chicago & N. W. Railway Company vs. Fox River Electric Railway & Power Company, 96 N. W. Rep., 541.)

WISCONSIN.—Taxation — Exemptions — Street Railway Companies—Property Licensed—Statutes—Construction.

1. Under Rev. St. 1898, section 1038, subd. 14, subjecting street railway crossings to a charge on their gross revenues in lieu of other taxation, and exempting from taxation on the payment of such license fee all real estate owned and actually and necessarily used by the company in the operation of its business, real property leased by a street railway company, which has paid the license tax, for five years, and actually and necessarily used by it in the operation of its business, is exempt from general taxation.

2. Under Rev. St. 1898, section 1038, subd. 14, exempting from taxation property owned and actually used by a street railway company, where the company has leased realty which it is actually using in the operation of its business, the exemption cannot be treated as affecting merely the leasehold interest and subjecting the other interest to taxation.—(Merrill Railway & Lighting Company et al. vs. City of Merrill et al., 96 N. W. Rep., 686.)

WISCONSIN.—Street Railways—Highways—Additional Servitude — Interurban Operation — Eminent Domain — Equitable Remedy.

1. An electric street railway in a street is not an additional burden on the fee.

2. An electric street railway operating passenger cars from one city through the streets of another city and to a point beyond is an additional burden on the lands of abutting owners on the streets of the second city through which the line passes.

3. Inasmuch as prior to Laws 1901, p. 686, c. 465, making the statutes relative to eminent domain applicable to street and electric railways, a street railway company had no right to condemn land in the streets of a city, the remedy of the owners of land abutting on a street in which a street railway was unlawfully being operated was to restrain the operation, and not by instituting condemnation proceedings.

4. Where, in a suit by owners of property abutting on a street against a street railway company, the relief sought was the abatement of such use of the street, and the removal of all tracks, etc., but it appeared that the operation of the road was lawful save in so far as it cast an additional burden on the fee because of the operation of an interurban service, plaintiffs were entitled to an abatement of such additional servitude, notwithstanding that they had prayed for an abatement of the road in its entirety.—(Younkinton et al. vs. Milwaukee, Light, Heat & Traction Company, 98 Northwestern Reporter, 215.)

MISCELLANEOUS NOTES.

CONNECTICUT.—Street Railways — Mortgages — Foreclosure — Distribution of Proceeds—Supply Creditors—Expenses of Trustee.

1. Persons furnishing a street railway company supplies essential to operation of its road, and money to pay wages of employees and other pressing claims, after default in payment of interest on the bonds secured by mortgage on all its property, which default, under the mortgage, authorized the trustee to take possession of and operate the road, but before he did so, are not entitled to preference over the bondholders in the distribution of the proceeds of the sale of the mortgaged property; there having been no diversion of income for the benefit of the bondholders, but the income being inadequate to meet current expenses.

2. Under a mortgage of a street railway company's property to secure its bonds, authorizing the trustee on default to take possession and operate the business of the company, and providing that he shall be entitled to be reimbursed for all outlays to be incurred in the trust, and that his disbursements shall constitute a first lien on the mortgaged property, a claim for money advanced by a third person at the request of the trustee, and paid for wages of employees while the trustee was in possession and to striking employees for wages earned during the three months before the trustee took possession (it being practically impossible to resume the operation of the road without first paying such striking employees the wages then due), and a claim for rent accruing after the trustee took possession of a road operated by him in connection with and for the benefit of the mortgaged property, under a contract to pay such rent, are entitled to priority as expenses properly incurred by the trustee.

3. One who at the request of a street railway company pays taxes on its mortgaged property does not have a lien on the property superior to the mortgage, though the company agrees he shall have.—(Mersick vs. Hartford & W. H. Horse Railway Company, 55 Atlantic Rep., 664.)

DISTRICT OF COLUMBIA.—Damages—Breach of Contract—Prevented gains.

The difference between the market value of land with street-car service and the expectation that cars will continue always to run, and such value without the operation of the cars, and with no expectation that they will run in the future, is too uncertain to be made the measure of damages for the breach by a street railway company of its covenant to run its cars over an extension, contained in the agreement by which it secured its rights of way.—(Eckington & Soldiers' Home Railway Company vs. Florence McDevitt, 24 Supreme Court Rep., 36.)

IOWA.—Attorney and Client—Services—Lien—Notice—Sufficiency —Extent—Employment of Other Attorney.

1. A notice of lien on money to be recovered in a personal injury action, signed by an attorney for his client instead of for himself, is sufficient to appraise defendant of a claim to a lien as attorney.

2. Code, section 321, giving an attorney a lien on money due his client in the hands of the adverse party in the action or proceeding in which the attorney claiming the lien was employed, gives an attorney a lien for services rendered on money due by the adverse party, and not on the judgment recovered, nor for the pro-

portion of the recovery stipulated in a contract between attorney and client.

3. A client cannot, by dismissing an action and employing another attorney, defeat the lien of an attorney duly employed, for services rendered under his contract of employment; but, if the proper notice has been given, the attorney has a lien for services actually rendered, even though recovery is secured as the result of another action, brought by other attorneys, and in a different court.

4. The employment of an attorney and giving of notice of lien by him entitles him only to compensation for services rendered by himself, and does not authorize him to employ another attorney, who, if so employed, has no lien for services rendered, where the client does not assent to the employment, and, without availing himself of such other attorney's services, dismisses the action.—(Gibson et al. vs. Chicago M. & St. P. Railway Company, 98 Northwestern Rep., 474.)

MICHIGAN.—Carriers of Passengers—Tickets—Controversy Between Conductor and Passenger—Duty of Passenger.

1. As between the conductor of a railway train and the passenger, it is incumbent on the latter to produce as a ticket one apparently good on its face, or pay the fare in cash, and on failing so to do he may be ejected from the train by the conductor.—(Brown vs. Rapid Railway Company, 96 Nor. Rep., 925.)

MISSOURI.—Street Railroads—Passengers—Assault and Battery by Servant—Exemplary Damages—Malice—Erroneous Definition.

1. The carrier is liable to a passenger in an action for damages for assault and battery, who, for bad conduct, justifying his expulsion, is expelled from a street car by the conductor, using more force than necessary for the purpose.

2. The carrier is not liable to a passenger for assault and battery, who, from having assaulted the conductor, and using a crowbar in a threatening manner, is injured in a street car by the conductor, using such force only as necessary to repel the assault.

3. The carrier is not liable to a passenger for assault and battery, who, from having used violent, boisterous or profane language, or having been guilty of disorderly conduct in the presence of other passengers, is ejected from a street car by the conductor, using only such force as necessary for the purpose.

4. A charge on exemplary damages, when requested, is proper in an action against the carrier for assault and battery on a passenger in a street car who is maliciously assaulted by the conductor.

5. Malice is the intentional doing of a wrong act without just cause or excuse, and a definition that by the term "malice" "is not meant mere spite, hatred or dislike, but it means that condition of the mind which makes a person disregard the rights of others by doing an act without just cause or provocation," is erroneous.

6. In an action for assault and battery punitive damages are allowed if the assault is of a wanton, malicious or brutal nature.—(Ickenroth vs. St. Louis Transit Company, 77 Southwestern Rep., 162.)

MISSOURI.—Carriers—Injury to Passenger—Self Defense—Damages—Humiliation and Disgrace—Evidence—Question of Jury—Appeal—Damages Under Statute.

1. In an action against a street car company for injuries, an instruction that, if a conductor assaulted a passenger without cause, the company is liable, is not erroneous, as ignoring the conductor's right of self-defense claimed by the answer, when other instructions fully defined that right.

2. In an action for injuries, an instruction as to assessing exemplary damages against appellant will not be considered on appeal, where the jury awarded none.

3. Evidence held to warrant the submission to the jury of the question of actual damages resulting from humiliation and disgrace caused by an assault.

4. Though an appeal is made without merit, 10 per cent damages against the appellant, under the statute, will not be allowed where it does not appear that it was taken solely for vexation or delay.—(Sonnen vs. St. Louis Traction Company, 76 Southwestern Rep., 692.)

NEW YORK.—Carriers—Assault on Passenger—Damages—Mitigation—Instructions.

1. In an action against a street railway for an assault by a conductor, where the court instructed in the main charge that provocation by plaintiff might be considered in mitigation of damages, but subsequently refused to charge, at defendant's instance, that the jury might render nominal damages if plaintiff aggravated the conductor into an assault, and on the contrary stated that the plaintiff was entitled to recover actual compensation, however much the conductor might have been irritated by plaintiff, the subsequent language of the charge being controlling on the jury, the charge was error.—(Freedman vs. Metropolitan Street Railway Company, 85 New York Supplement, 986.)

NEW YORK.—Carriers—Duty of Conductor—Right of Passenger—Ejection of Passenger—Damages.

1. Where it was a street car conductor's duty under the railway law (Laws 1890, c. 565, p. 1082, and amendments) to have given a certain transfer, a passenger had a right to assume, without examination, that he would receive the proper transfer.

2. Where, in an action for ejection from a street car, it appeared that the plaintiff had returned to the same car and paid his fare, and his counsel on the trial stated that he limited his claim to recover for breach of contract, he is not entitled to recover exemplary damages.—(Moon vs. Interurban Street Railway Company, 85 New York Supplement, 363.)

NEW YORK.—Carriers—Injury to Passenger—Opinion Evidence—Evidence—Cause of Injury—Pleading—Variance—Tort of Motorman—Willful Assault.

1. Where, in an action against a street railway for injuries sustained by a passenger owing to defendant's motorman having struck him in the chest, a physician testified that he found plaintiff's heart affected, and that his trouble could have been caused by the accident, but that it might have come from other causes, it was proper to refuse to strike the evidence as too uncertain.

2. In an action against a street railway, plaintiff testified that while standing on the platform of a car the motorman struck him on the chest violently, that he felt faint and had pains in his chest for two or three hours afterwards, and that he had dreams at night of being struck and falling from a car, which sensations apparently continue from the time of the accident. A physician testified that he found plaintiff's heart weak, and that such blows might have caused the injuries. Held, that the evidence warranted a finding that the blows caused the injuries.

3. In an action against a street railway the complaint detailed the striking of plaintiff by defendant motorman, and alleged a cause of action founded not only on negligence, but upon violence, on the part of defendant's servant. The evidence showed that, as plaintiff stepped on the car, the motorman, without cause, struck plaintiff violently, saying, "You get off." Held that, though the proofs showed a willful assault, the variance was immaterial, as it could not have misled defendant.

4. Where, as a passenger stepped on the front step of a street car, the motorman said, "You get off," and, without cause, struck him, the carrier was liable for injuries sustained by the passenger.—(Moritz vs. Interurban Street Railway Company, 84 New York Supplement, 162.)

NEW YORK.—Carriers—Assault on Passenger—Nature of Action—Jurisdiction—Bill of Particulars.

1. Where a passenger on a street car is thrown from the car by the conductor on the ground that he has not paid his fare, an action for damages is for the neglect of duty by the carrier, of which the Municipal Court has jurisdiction; and it is not a mere action for personal assault, beyond such jurisdiction.

2. In an action against a street railway to recover for personal injuries inflicted upon a passenger, an objection that plaintiff had filed no bill of particulars is without merit, where no order therefor was procured by the defendant.—(Kearns vs. New York & Q. C. Railway Company, 86 New York Supplement, 180.)

RHODE ISLAND.—Street Railway Employees—Hours of Employment—Limitation—Constitutionality—Construction of Statute.

1. Pub. Laws, c. 1004, enacted April 4, 1902, limiting the hours of labor of certain employees of street railway corporations to ten hours a day, is within the police power of Legislature.

2. The act is not unconstitutional, as infringing the right of contract.

3. The act is not unconstitutional, though it exempts from its operation cases of existing written contracts.

4. Pub. Laws, c. 1004, enacted April 4, 1902. Section 1, forbids an officer of a street railway company to "exact" more than ten hours' work from certain employees. Section 2 provides that "the true intent and purpose of this act is to limit the usual hours of labor of the employees of street railway corporations, as aforesaid, to ten hours actual work a day, to be performed within a period of twelve consecutive hours." Held, illegal for a street railway company to make a contract with its employees to labor more than ten hours a day, even if they make no objection.—(In re Ten-hour Law for Street Railway Corporations, 54 Atlantic Rep., 602.)

TENNESSEE.—Interpleader—Objection Not Made Below—Bill by Trustee for Instructions—Estoppel—Pleading—Corporations—Consolidation—Agreement as to Disposition of Property—Rights of Stockholders.

1. Objection to a bill of interpleader that it cannot be maintained because complainant asserts an interest in the fund to the extent of compensation for his services cannot be made for the first time on appeal.

2. A bill by a trustee for instructions may propound questions

involving not only his duty, but also the determination as to the title of him and others.

3. An estoppel, to be available, must be pleaded.

The stockholders of two corporations agreed to a consolidation, one to take over all the property of the other, to issue stocks and bonds in payment thereof, to assume all the debts of the other, and to issue and set aside \$100,000 of bonds for the purpose of retiring \$96,000 of outstanding bonds of the absorbed corporation, any surplus of the \$100,000 to be divided between the then stockholders of the two corporations. Held, that there was a valuable consideration for such disposition of the surplus, incorporated in a resolution of the absorbing corporation pursuant to the agreement.

5. A disposition of property of a corporation, not objected to by any stockholder or creditor, cannot be objected to by any, unless by the State in a proper proceeding.

6. A transfer of all the stock of a corporation formed by the consolidation of two corporations pursuant to an agreement of the stockholders, embodied in a resolution of the absorbing corporation, that it should issue and set aside \$100,000 of bonds to retire \$96,000 of bonds of the absorbed corporation, any surplus of the \$100,000 to be divided between the then stockholders of the two corporations, does not, by implication, pass the interest of the stockholders in the surplus as an incident to the stock, the right to participate in which was reserved to them as individuals.

7. The right of stockholders to a surplus under a resolution of a corporation purchasing the property of another that it should issue and set aside \$100,000 of bonds to retire \$96,000 of bonds of the other, any surplus of the \$100,000 to be divided between the then stockholders of the two corporations, was not abandoned because the mortgage executed by the absorbing corporation to secure its bonds, and which was approved and confirmed by the stockholders of both corporations, made no mention of the surplus.

8. The term "surplus" in the resolution of a corporation, on purchasing the property of another, that it should issue and set aside \$100,000 of bonds to retire \$96,000 of bonds of the absorbed corporations, refers only to the excess of four bonds, and does not include the subsequent appreciation in value of the other bonds before the old bonds were retired.—(Read vs. Citizens' Street Railway Company et al., 75 S. W. Rep., 1056).

LIABILITY FOR NEGLIGENCE

ALABAMA.—Street Railroads—Negligence—Pleading—Instructions—Evidence—Res Gestæ—Speed of Car—Opinion.

1. A complaint in an action against a street railroad company alleged, in substance, that a horse harnessed to a buggy in which plaintiff was sitting backed the vehicle on or near to defendant's track in front of an approaching car, and that while the motorman was more than 100 ft. away from the plaintiff he observed or could have observed her situation, and that he negligently continued on his course without stopping or checking the car, and negligently came into collision with plaintiff's said horse and buggy, whereby she was thrown to the ground and injured. Held, that the complaint stated a cause of action grounded on simple negligence.

2. Plaintiff's horse, standing in a street, became frightened at an approaching car and backed the buggy upon the street railroad track, and in a collision between the car and buggy plaintiff was injured. In an action for the injuries a plea alleged that plaintiff was negligent in that she allowed the buggy in which she was sitting with a horse attached thereto to remain standing in the street, diagonally across the street, with the hind wheel of the buggy within a few feet of the defendant's track, so that any backward movement of the horse would put the buggy wheel directly onto the defendant's track. Held, that the plea was demurrable as stating facts that might or might not have been negligent, without any allegation of negligence save as a conclusion of law.

3. For the same reason it was proper to sustain a demurrer to a plea alleging that plaintiff was guilty of negligence which contributed proximately to the injury, in that the horse was afraid or skittish about street cars, and yet plaintiff allowed him to remain on the street, which was very narrow, and that the horse became frightened at the car and backed the buggy onto the track in such close proximity to the car that the motorman in charge thereof was unable to stop the car before it struck the buggy.

4. For the same reason it was proper to sustain a demurrer to a plea alleging that plaintiff was guilty of negligence which proximately contributed to the injury, in that she allowed the horse and buggy to stand or remain in dangerous proximity to the track of defendant, without having in charge thereof a competent driver, and in consequence whereof the horse moved or backed the buggy upon the track in front of an approaching car and was struck.

5. Plaintiff's horse, standing in a street, became frightened at an approaching car and backed the buggy onto the street railroad

track, and in a collision between the car and buggy plaintiff was injured, and in an action for the injuries a plea alleged that plaintiff was negligent in that the horse which she was holding became frightened and backed the buggy onto the track in such close proximity to defendant's approaching car that the motorman in charge of said car was unable to stop the same before it struck the buggy. Held, that the plea was bad in that it did not with certainty impute to plaintiff the omission of any duty or the commission of any act, negligent or otherwise.

6. For a like reason it was proper to sustain a demurrer to a plea alleging that plaintiff was guilty of negligence which contributed proximately to the injury, in that, had plaintiff urged or driven the horse forward, as she could have done, she could have avoided the injury.

7. In an action for injuries, evidence that plaintiff cried all the afternoon in connection with evidence of actual hurts was admissible as a part of the *res gestæ*.

8. In an action for injuries to plaintiff in a collision between her buggy and a street car, it was not error to permit plaintiff to testify as to the speed of the car—"it looked very fast to me"—it not being an opinion.

9. In an action for injuries to plaintiff in a collision between her buggy and a street car, held, that the question of her negligence was for the jury.

10. In an action for injuries to plaintiff in a collision between her buggy and a street car, held, that the question of defendant's negligence was for the jury.

11. Plaintiff's horse, standing in a street, became frightened at an approaching street car and backed the buggy upon the track, and in a collision between the car and buggy plaintiff was injured. Held, that it was proper to refuse to charge that plaintiff could not recover unless the motorman knew at a distance of 100 ft. that if he proceeded with his car there would be a collision.

12. In an action for personal injuries, requested instructions which assume either that defendant was not negligent or that plaintiff was guilty of contributory negligence, were properly refused as invading the province of the jury.—(Montgomery Street Railway Company vs. Shanks, 37 Southern Rep., 166.)

CALIFORNIA.—Street Railroads—Collisions—Personal Injuries—Findings of Fact—Conclusiveness—Sufficiency to Support Judgment—Injury to Wife—Judgment.

1. In determining whether the findings of fact support the judgment, the findings must receive such a construction as will uphold rather than defeat the judgment; and if, from the facts found, other facts may be inferred which support the judgment, it will be assumed that the trial court made the inferences.

2. Where a street car, as it approached a crossing 200 ft. away, was running at the rate of 25 miles an hour, and the motorman made no effort to slacken its speed until he reached the crossing, and the street car collided with a buggy at the crossing and injured its occupant, it is reasonable to infer that the collision was the result of the mode of operating the car, and, in the absence of any other fact from which the collision could have been caused, the finding of the court that the company was negligent in its management of the car involves the inference that the collision resulted from this negligence, so as to sustain a judgment for plaintiff.

3. Where the injury to plaintiff resulted directly from a collision of a street car with a buggy in which she was riding, and where the collision was caused by the negligence of the company, the finding of the court that plaintiff was injured by reason of the company's negligent act, and that it is liable therefor, is not rendered insufficient to support plaintiff's judgment by the statement in the finding that plaintiff sustained the injury by reason of the collision.

4. In the absence of a bill of exceptions, it will be presumed that the evidence was sufficient to support the findings of the court.

5. As damages resulting from a personal injury to the wife are community property, and the husband is a necessary party to an action therefor, a judgment for such damages is properly rendered in favor of both.—(Paine et al. vs. San Bernardino Valley Traction Company. (L. A. 1443.), 77 Pacific Rep., 659.)

ILLINOIS.—Trial—Instructions—Reiteration of Points.

1. The refusal of instructions, the material points of which are contained in instructions given, is not error.

2. It was not prejudicial error to refuse a charge that the happening of an accident raises no presumption of negligence, and that the burden of establishing defendant's negligence is on plaintiff, where, by instructions given, the jury were told that, in order to recover, plaintiff must establish by positive and preponderating evidence the negligence of defendant; and that defendant was not guilty if the sole cause of the injury was the negligence of a third party, or if the injury was the result of an accident without any negligence, or if defendant's gripman did everything practicable to prevent the collision, or unless defendant negligently operated its cars so as to cause the injury.

3. An instruction that, to recover, plaintiff must show by the greater weight of the evidence that defendant's gripman, by the exercise of the highest degree of care practicable, had time and opportunity to realize his opportunity to avoid danger, and to do so after the grip car was placed in a position of danger, was sufficiently covered by instructions given to the effect that defendant was not guilty if the gripman could not have prevented the collision by the highest degree of care practicable, or if the gripman brought the cable train to a standstill as soon as he could do so by the highest degree of care consistent with the practical operation of the road.

4. Where the court had limited the number of instructions to be given by each side to fifteen, and nevertheless permitted a number of instructions to be given by defendant in excess of the limitation, and denied no proper instruction because of the limitation, it was proper to refuse an instruction offered by defendant, compressing into a single instruction points contained in a number of others.—(Chicago Union Traction Company vs. Reuter, 71, N. E. Rep., 323.)

INDIANA.—Street Railways—Children on Streets—Negligence—Contributory Negligence—Persons Non-Sui Juris—Presumptions—Burden of Proof—Trial—Overruling Challenges—Harmless Error.

1. An infant 2½ years old is too young to be negligent himself, or have the negligence of others imputed to him.

2. In an action against a street railroad for injuries to a child on the street, the burden of showing negligence is on plaintiff.

3. Negligence, like any other fact, may be proven by direct or circumstantial evidence, and reasonable inferences may be drawn by the jury from the facts proven.

4. The fact that a street car was not stopped until its rear end had reached a point beyond the place of collision, variously estimated to have been from 3 rods to 160 ft., is evidence tending to show a high rate of speed.

5. Servants in charge of a street car have no right to assume, as in case of an adult, that a child 2½ years of age, approaching the car, will turn back from impending peril.

6. The question whether or not a motorman on a street car sounded the gong before the car struck plaintiff is for the jury, though the conflicting evidence is direct on the one hand and merely negative on the other.

7. In an action against a street railway for injuries to a child 2½ years of age, who collided with a car, evidence held sufficient to support a finding of defendant's negligence.

8. Where a party in a civil as well as in a criminal case accepts the jury without having exhausted his peremptory challenges, error, if any, in forcing him to use peremptory challenges, is harmless.—(Indianapolis Street Railway Company vs. Bordenchecker, 70 N. E. Rep., 995.)

INDIANA.—Street Railroads—Collisions—Negligence—Contributory Negligence—Look and Listen—Proximate Cause—Intervening Agents—Discovered Peril.

1. In an action against a street railroad for injuries to a driver of a team, evidence held to support a finding that the danger to plaintiff was evident to the motorman, in the exercise of his faculties, in time to have avoided the collision.

2. The look and listen rule is not applicable to persons passing over car tracks laid in a city street.

3. Negligence, to preclude a recovery by plaintiff, must contribute to the injury complained of, as the proximate cause thereof.

4. The question of proximate cause is the same, whether it relates to the negligence of plaintiff or of defendant, and in either case is primarily a question of fact for the jury.

5. Where an approaching street car is in such proximity to one who turns across the track that his act in so doing amounts to a casting of himself in front of the car, such act on his part is the proximate cause of injury to him, and precludes a recovery.

6. Where, at the time one turns to cross a street car track, an approaching car is 200 ft. away from the place where he is crossing, and the motorman of the car has, or should have, full knowledge of the situation, but nevertheless runs the car against the person so crossing the track, his negligence in so doing is that of an independent intervening agent, and is the proximate cause of the accident.

7. The negligence of plaintiff ceases to be the proximate cause of injury to him when defendant has opportunity to prevent such injury, and, with knowledge of plaintiff's exposed condition, negligently refuses to do so.—(Indianapolis Street Railway Company vs. Schmidt, 71 N. E. Rep., 663.)

INDIANA.—Street Railways—Negligence—Evidence—Failure to Look and Listen.

1. In an action for injuries, though the defendant was guilty of negligence, plaintiff cannot recover if it be shown that he was himself at fault.

2. In an action against a street railway company for the death of one killed by being run into by a car, evidence considered, and held

to show that deceased could have seen if he had looked, and heard, if he had listened, the approach of the car in time to have avoided the collision.

3. Where, in an action against a street railway company for the death of one run into by a car, it appears that he could have seen if he had looked, and heard, if he had listened, the approaching car in time to have avoided the collision, the facts show contributory negligence per se.—(Indianapolis Street Railway Company vs. Zaring, 71 N. E. Rep., 270.)

IOWA.—Street Railways—Injury to One Boarding Car—Negligence—Contributory Negligence—Release—Fraud—Offer to Return Money.

1. The question of a motorman's negligence is for the jury, there being evidence that plaintiff signaled him when he was looking at her, and that, while the car was stopped at a switch where passengers were customarily taken on the car, she started to get on, whereupon the car was backed, throwing her to the ground.

2. It is not negligence, as matter of law, for a woman with her arms full of packages to attempt to board a standing street car.

3. Plaintiff in an action for injuries, pleading that a release was obtained by fraud, need not offer to return the money received.—(Jacques vs. Sioux City Traction Company, 99 N. W. Rep., 1069.)

IOWA.—Street Railroads—Bicycle Riders—Injuries—Negligence—of the Third Person—Damages.

1. In an action for injuries to a bicycle rider in a collision with a street car, evidence held to require the submission of defendant's negligence and plaintiff's contributory negligence to the jury.

2. Where, in an action for injuries to a bicycle rider in a collision with a street car, there was evidence that he was compelled to turn out near to the car track by reason of the negligence of the driver of a team in taking the extreme left side of the street, it was not error for the court to charge that such negligence of the driver of the team, if any, though it contributed to the injury, would not relieve the street railway company from liability for the consequences of its own negligence.

3. Plaintiff's hand was badly torn and crushed in a collision with a street car, the muscles of his arm were torn, and he sustained a scalp wound and a bruise on the shoulder. Plaintiff was 40 years old, and had been engaged in running a billiard hall, unlawfully keeping a liquor nuisance, and at the time of the injury was a curbsto- ne hay broker, with no regular vocation, and it was doubtful whether the injury received would materially diminish the amount of work plaintiff would be likely to perform in the future, though his fingers were stiff and the motion of his wrist was impaired. His physician's bill was \$100, for which the jury on a previous trial rendered a verdict in plaintiff's favor. Held, that a verdict for \$500 was not so inadequate as to require reversal on appeal.—(Palmer vs. Cedar Rapids & M. C. Railway Company, 100 N. W. Rep., 336.)

IOWA.—Street Railroads—Injuries to Passengers—Contributory Negligence.

Where a passenger on a street car, while standing on the platform, leaned over a railing for the purpose of seeing where certain smoke came from, to such an extent that he was struck by a trolley pole located from 14 ins. to 17 ins. from the side of the car, and from 19 ins. to 24 ins. from the railing, he was guilty of contributory negligence, as a matter of law.—(Huber vs. Cedar Rapids & M. C. Railway Company, 100 N. W. Rep., 478.)

IOWA.—Carriers—Negligence—Res Ipsa Loquitur—Evidence—Admissibility—Witnesses—Instructions.

1. If a witness is not present in the court room at the time his testimony is offered, a translation of his evidence given on a former trial may, under the statutes, be read in evidence.

2. In an action for injuries to a passenger on an electric train, who was thrown from his seat and out of the car when the car rounded a curve, testimony that other persons had previously ridden on the seat on which plaintiff was sitting was admissible for the purpose of showing that plaintiff was on a seat provided for passengers.

3. The order of introduction of testimony is a matter within the discretion of the trial court.

4. In an action against a carrier for injuries to a passenger, the court instructed that if plaintiff was injured substantially as claimed by him, and the accident would not have happened, had defendant exercised the utmost care, a presumption of negligence against defendant was raised. Held, that the instruction was not erroneous on the theory that it was uncertain as to what claims were referred to—whether those stated in the petition or in the evidence—plaintiff's claim having been stated in his petition, and his testimony having tended to support such claim.

5. In an action against a carrier for injuries to a passenger, the court charged that if the jury found plaintiff was injured substantially as claimed, and that the accident could not have happened under ordinary circumstances, had defendant exercised the utmost

care, a presumption of negligence was raised, and that the burden was on defendant to rebut it, and, to that end, that defendant must prove that, as to the matters which the circumstances indicated were the cause of the accident, defendant and its employees exercised that high degree of care which the law required of them. Held, that the instruction was not erroneous on the theory that it was left uncertain as to what circumstances the jury might consider, since the word "circumstances" merely had reference to the claim made by plaintiff as to the manner in which the accident happened, and in other instructions the jury was plainly told that, in order to recover, plaintiff must establish the negligence charged.

6. In an action against a carrier for injuries to a passenger, the court charged that if the jury found that plaintiff was not guilty of contributory negligence, and that he was thrown from the car as claimed, and that such accident would not have happened under ordinary circumstances, had defendant exercised the utmost care, a presumption of negligence against defendant was raised, casting the burden on it to rebut such presumption. Held, that the instruction was not erroneous on the ground that it justified the jury in presuming negligence from the mere fact that plaintiff was injured while a passenger.

7. Where the circumstances attending an injury to a passenger are so unusual and of such a nature that the accident could not well have happened without the defendant being negligent, or when it is caused by something connected with the equipment or operation of the train, a presumption of negligence on the part of the carrier arises.

8. Where a passenger is thrown from the car in which he is riding, out of his seat and upon the ground, and such accident would not have happened under ordinary circumstances, had the carrier's servants used the required degree of care, and the passenger shows his freedom from contributory negligence, a presumption of negligence on the part of the carrier arises.

9. In an action against a carrier for injuries to a passenger, the court charged that it was the duty of defendant not to expose its passengers to danger which human foresight could anticipate, and if the jury believed that plaintiff, while a passenger, received an injury resulting from negligence in providing a seat without any guards, or in running the car or in constructing its track at the place alleged, they should find for plaintiff. Held, that the instruction was not erroneous on the theory that it assumed that defendant was negligent in not providing a guard for the seat.

10. A passenger on an electric train was thrown out of his seat and to the ground as the car rounded a curve, and, in an action by him for the injury, the court charged that a high rate of speed of a train does not prove negligence; that railroad companies may run their cars at such speed as shall comport with the rule of law requiring them to exercise the utmost care; and that whether a given rate of speed comports with such rule depends on the circumstances, the condition of the track, the danger to passengers, and all the facts and circumstances. Held, that the instruction correctly stated the law.

11. In an action against a carrier for injuries to a passenger, instructions referring to the fact that it was defendant's duty to use the highest degree of care were not erroneous.

12. A passenger on an electric train was thrown from his seat and out of the car as it rounded a curve, and there was evidence that plaintiff said after the accident that he was leaning out of the car to spit when the car struck the curve. The court charged that plaintiff must show that he did not contribute by his negligence to the accident, and that if the jury believed that the injury to plaintiff happened to him by mere accident, and without fault on the part of defendant, plaintiff could not recover. The court refused to charge that if plaintiff was sitting next to an open space, without any barrier to protect him, and carelessly leaned out to spit, and, by reason of such leaning, fell out, such leaning was the proximate cause of the injury, and that plaintiff could not recover. Held, that the refusal of such instruction was not error.—(Fitch vs. Mason City & C. L. Traction Company, 100 N. W. Rep., 118.)

KANSAS.—Street Railroads—Injury to Person on Track—Evidence.

Where, upon the trial, plaintiff testified she alighted from an east-bound street car, and passed back of it and to the northward upon a parallel track 4 ft. distant, on which cars traveled in an opposite direction, without looking for an approaching car, and sustained injury, and, to have looked eastward along the space between the parallel tracks after passing by the end of the standing car, an approaching car could have been seen a distance of two blocks, held, error to overrule a demurrer to plaintiff's evidence.—(Metropolitan Street Railway Company vs. Ryan, 77 Pacific Rep., 267.)

MASSACHUSETTS.—Street Railroads—Injuries at Crossings—Contributory Negligence.

A driver, with knowledge that street cars ran in both directions on a street, who drove on the street without looking, except in one

direction, when about 50 ft. away, and who knew nothing of the approach of a car from the other direction until a companion informed him of it, was guilty of contributory negligence.—(Dunn vs. Old Colony Street Railroad Company, 71 N. E. Rep., 557.)

MASSACHUSETTS.—Carriers—Injury to Passenger—Collision—Presumption of Negligence—Pleading—Defects—Waiver—Exceptions.

1. In an action against a carrier for injuries to a passenger, a charge that the plaintiff started with the undertaking upon him to prove negligence sufficiently included a request to charge that, if the collision which injured plaintiff was not due to negligence of the defendant, plaintiff could not recover.

2. In an action against a carrier for injuries to a passenger, caused by a collision, in which defendant offered no explanation of the accident, a requested instruction that the mere fact of the collision was not evidence of negligence was properly refused.

3. In an action against a carrier for injuries to a passenger, in which there was no demurrer to the declaration, nor any specific objection at trial that the declaration did not allege negligence or intentional harm, the refusal of an instruction that under the pleadings and evidence plaintiff was not entitled to recover, such instruction being based on the alleged failure of the declaration to allege negligence, was not error.

4. No exception lies to the charge as a whole.—(Savage vs. Marlborough Street Railway Company, 71 N. E. Rep., 531.)

MASSACHUSETTS.—Carriers—Street Railway Passenger—Injury in Collision—Negligence—Extent of Injury—Admissibility of Evidence—Injury to Other Passengers—Plaintiff's Family History—Harmless Error.

1. In an action by a street car passenger for injuries received in a collision, the court, sitting without a jury, found on sufficient evidence that the tracks were wet and slippery, by reason of which, and notwithstanding all reasonable and proper efforts by the motorman of the colliding car, in applying brakes, etc., the car slid on the rails, and the fender came in contact with that of the car in which plaintiff was; and that the force of the impact did not injure the fender or woodwork of either car, nor were other passengers affected beyond the sensation of a jar. Held, that a judgment for defendant, based on an absence of negligence, was proper, notwithstanding the motorman on cross-examination had testified that he "took the risk;" it being for the court to say what the motorman meant by that statement, and whether, under the circumstances, it was negligence for him to take the risk.

2. In an action for personal injuries, which plaintiff testified had resulted in fainting fits, which she had never before had, evidence for defendant that three years before the accident she was subject to fainting spells, was competent.

3. In an action by a street car passenger for injuries in a collision, evidence as to whether other passengers were injured was competent, as tending to establish the force of the impact, which bore on the question of the motorman's negligence.

4. In an action for personal injuries engendering nervous troubles, allowing questions to be put to plaintiff's attending physician as to whether he had got from her or others any of her family history as to nervous disorders, was not ground for reversal where the witness answered that he never did.—(Mullin vs. Boston Elevated Railway Company, 70 N. E. Rep., 1021.)

MASSACHUSETTS.—Street Railroads—Injury at Crossing—Contributory Negligence.

Where the street car by which plaintiff was injured was well lighted, so it could be seen 150 ft. to 300 ft., and was only 10 ft. away when she stepped on the track, and made sufficient noise in the setting of brakes to attract attention, she was guilty of contributory negligence, barring recovery for her injury.—(Donovan vs. Lynn & B. R. Company, 70 N. E. Rep., 1029.)

MASSACHUSETTS.—Municipal Corporations—Streets—Duty to Repair—Extent—Injuries to Traveler—Questions for the Jury—Street Railroads—Duty to Repair Street.

1. In an action for injuries to a traveler on a city street while passing around an obstruction, whether plaintiff was in the exercise of due care held, under the evidence, a question for the jury.

2. Where excavations are being made and obstructions being placed in a city street, it is the duty of the city, so far as the street is permitted to remain open for travel, to take proper precautions to guard against accidents, and to render it safe.

3. While a city is not bound to keep in repair that portion of a street occupied by the tracks of a steam railroad, and it is not liable to one injured by defects therein, it is bound to keep safe and in repair a portion of the streets occupied by the tracks of a street railroad.

4. In an action for injuries to a traveler in a city street, the questions whether the city took reasonable precautions for the safety of travelers, whether the matter complained of constituted a defect, and whether it caused the injuries, were for the jury.

5. Under Pub. St. 1882, c. 113, section 32, which makes it the duty of a street railroad to keep in repair the paving, upper planking and other surface materials of the portions of the street occupied by its tracks, if the street is paved, and if unpaved, an additional space of 18 ins. on each side of its tracks, it is not the duty of a street railroad to keep the street in repair generally, or to see that a trench dug therein is guarded or lighted, or that reasonable precautions are taken for the safety of travelers, but its duty to repair, when a trench is dug in the street, does not begin until the trench has been filled up to the surface.

6. In an action against a street railroad for injuries to a traveler in the street, caused by a trench having been dug therein, whether the trench had been filled to the surface of the street so that the railroad was in duty bound to make repairs under its responsibility for the condition of the street occupied by its tracks. Held, under the evidence, a question for the jury.

7. If a trench had been so filled up, whether the railroad was negligent in attending to the duty of repair thus imposed upon it, and, if so, whether its negligence contributed to plaintiff's injury, were also questions for the jury.—(Hyde vs. City of Boston; Same vs. Boston Elevated Ry. Co., 71 N. E. Rep., 118.)

MASSACHUSETTS.—Street Railroads—Repairs of Streets—Injuries from Defects—Portion of Street Occupied.

Under Pub. St. 1882, c. 113, sections 32, 33, requiring every street railway company to keep in repair the paving of the portions of the streets occupied by its tracks, and making the company liable to the city if any damages are recovered against it for any defects in such portion of the streets, a street railway company is not liable for an injury caused by a defect in the pavement between its tracks, but outside the rails, as the phrase "occupied by its tracks" refers to the rails and the space between them over which the cars pass.—(City of Boston vs. Boston Elevated Ry. Co., 71 N. E. Rep., 295.)

MASSACHUSETTS.—Parties—Substitution—Limitations.

1. Where plaintiff sued for personal injuries, and, pending suit, defendant corporation leased its property to another corporation, which assumed all obligations and liabilities of defendant, plaintiff was properly allowed to amend her writ by substituting the lessee corporation, under Rev. Laws, c. 173, section 48, allowing any amendment which may enable plaintiff to sustain the action for the cause for which it was intended to be brought.

2. The fact that at the time of the amendment the action would have been barred by limitations if no suit had been brought did not prevent the allowance of the amendment.—(McLaughlin vs. West End St. Ry. Co., 71 N. E. Rep., 317.)

MICHIGAN.—Street Railroads—Persons on Track—Death—Children—Negligence.

Plaintiff's intestate, a child three and a half year of age, was killed in a collision with a street car. The child was in the street at the time it was first observed by the motorman and conductor, when she started to run toward the track, and after that time the car was so close that the motorman was unable to stop the car in time to prevent the collision, though he immediately shut off the power and put on the air. Held, that since the motorman was under no obligation to act until he saw the child start to run toward the track, the evidence was insufficient to establish negligence on his part.—(Coessens vs. Rapid Ry. Co., 99 N. W. Rep., 751.)

MICHIGAN.—Street Railroads—Collision with Teams—Look and Listen Rule—Applicability—Instructions—Verdict—Special Findings—Effect.

1. In an action against a street railroad for injuries to one who was struck from the rear by one of defendant's cars while driving on the highway alongside defendant's tracks, a charge that railway tracks are places of danger, and that one who goes upon them without looking and listening for cars does so at his peril, was, as applied to the facts, erroneous.

2. In an action against a street railroad for injuries to one who was struck from the rear by one of defendant's cars while driving on the highway alongside defendant's tracks, the court erroneously charged that railway tracks are places of danger, and that one who goes upon them without looking and listening for cars does so at his peril. The jury, in answer to a special interrogatory, found that plaintiff's intestate did not keep a careful lookout for the car. Held, that this did not conclusively show that plaintiff's intestate was guilty of contributory negligence, as it would be presumed that the jury tested his conduct by the standard of care laid down in the erroneous charge.—(Rouse vs. Detroit Electric Ry., 100 N. W. Rep., 404.)

MICHIGAN.—Trial—Misconduct of Counsel—Argument of Jury—Cure of Impropriety—Admonition by Court.

1. In an action against a street railroad for injuries, plaintiff's counsel, though admonished by the court, asked the jury in his argument whether they would defeat the honest claim of a poor man, who came before them for justice by a corporation which would resort to lies and perjury to maintain its cause, and stated

that the jury should stand between plaintiff and injustice, and referred to defendant's motion to withdraw the case from the jury as a wish on its part that the jury should not consider it, while, on the other hand, plaintiff wanted the case to go before the jury. Held, that the argument was improper, and ground for reversal.

2. The action of the court in admonishing counsel, and telling him that he was jeopardizing his case, allowing exceptions, and stating in reference to the withdrawal of the case from the jury that defendant had the same right to make that motion that plaintiff had to request instructions, did not cure the improper argument.—(Hillman vs. Detroit United Ry., 100 N. W. Rep., 399.)

MICHIGAN.—Carriers—Injury to Passenger—Negligence—Burden of Proof—Jury Question.

1. In an action by a passenger against a carrier for personal injuries, the burden of proof rests on plaintiff to show negligence.

2. In an action by a passenger against a carrier for personal injuries sustained as the result of a collision of a car with an ice wagon, evidence examined, and held that the question of defendant's negligence was for the jury.—(Thurston vs. Detroit United Ry. Co., 100 N. W. Rep., 395.)

MICHIGAN.—Servant's Injuries—Assumed Risk—Evidence.

A motorman killed by an electric shock while trying to fix a trolley pole, owing to the pole, when it was raised from its socket, coming into contact with a high-tension wire, or so near it that the current arced, and who knew the danger of the high potential current, assumed the risk, though he had not been instructed as to the danger, and the fact that if the pole came within a half inch of the wire the current would arc, since the conditions were obvious.—(Harrison vs. Detroit, Y., A. A. & J. Ry., 100 N. W. Rep., 451.)

MICHIGAN.—Carriers—Street Railways—Injuries to Passengers—Premature Start—Actions—Misleading Instructions—Curing Error.

1. Where, in an action for injuries to a passenger by the alleged premature starting of a street car while he was attempting to alight, defendant claimed that plaintiff attempted to alight while the car was in motion, and before it was brought to a stop, defendant was entitled to an instruction that, while it was defendant's duty to stop the car to afford plaintiff an opportunity to alight, yet its failure to do so would not give plaintiff the right to jump from the moving car.

2. In an action for injuries to a passenger while alighting from a street car, the court charged that, while it was the duty of the defendant to stop its car at the point where plaintiff requested to be let off, if he did so, notwithstanding the fact that defendant carried him past that point, this would not give plaintiff the right to jump off a rapidly moving car, and that, if the jury found that plaintiff jumped from a car moving at a rate of speed that would restrain men of ordinary care and prudence from alighting from the car under such circumstances, plaintiff could not recover. The court also added that it was the duty of defendant's employees in charge of the car to bring it to a full stop, and allow plaintiff sufficient time to alight, but, if it failed to bring the car to a stop, and allow plaintiff sufficient time to alight and get away from it, while he was trying to do so in a careful and prudent manner, but, instead, started the car suddenly, while he was in the act of alighting, and thus injured plaintiff, defendant was liable. Held, that such instructions were erroneous, as calculated to mislead the jury.

3. Such error was not cured by a subsequent conflicting instruction that, if plaintiff alighted from the car when in motion, he would be guilty of contributory negligence, which would prevent his recovery.—(McDonald vs. City Electric Ry. Co., 100 N. W. Rep., 592.)

MINNESOTA.—Street Railroads—Negligence—Injury to Cyclist on Track—Contributory Negligence—Discovered Peril.

1. A cyclist was negligently riding on the tracks of defendant, absorbed in an occupation which distracted his attention from an approaching street car, running at a high and unlawful rate of speed, whereby he was in danger of being run upon. Held, under facts tending to show that the motorman in control of the car might have known that the rider would remain on the tracks, and did not appreciate his danger, that it was the duty of such motorman to avoid running upon the cyclist; and whether he could have done so by the exercise of ordinary care should have been submitted to the jury.

2. The negligence of one person, whereby he is placed in a perilous situation, does not excuse a reckless disregard of his safety by another. Under such conditions a trespasser, even, is entitled to protection from wanton or wilful acts; and when the danger he has incurred is apparent the duty exists to exercise ordinary care to avoid injuring him.—(Rawitzer vs. St. Paul City Ry. Co., 100 N. W. Rep. 664.)

MISSOURI.—Carriers—Injury to Passenger—Negligence—Contributory Negligence—Jury Questions—Instructions—Evidence Admissibility—Sufficiency—Appeal and Error.

1. In an action against a street railroad for injuries to a passenger, received while attempting to get a seat in a car by way of a footboard, next to a car line on which cars ran in the opposite direction, one of which struck plaintiff, defendant filed a plea of contributory negligence, asserting that plaintiff unnecessarily went on the side of the car on which he was injured, that he failed to look or listen for an approaching car, and that he leaned out, when by standing erect he could have avoided injury. Held, that the answer meant no more than that plaintiff did not use the appliances provided by defendant with ordinary care, and hence a contention that the plea assumed that the arrangement or plan of the car was a dangerous contrivance, admitting defendant's negligence in putting it into service, was untenable.

2. In an action against a street railroad for injuries to a passenger while attempting to take a seat in a car by way of the inner footboard next to a car line on which cars ran in the opposite direction, one of which struck plaintiff, causing his injuries, evidence examined, and whether plaintiff was guilty of contributory negligence or defendant of negligence, held to be questions for the jury.

3. In an action against a street railroad for injuries, the petition merely charged that plaintiff was a passenger and received the injuries, but did not refer the accident to any failure of defendant to furnish either a safe track, road bed, car or access to the seats in the car. The instructions requested and given for defendant took up and practically withdrew from the consideration of the jury every phase of the case on which negligence could be predicated. Held, that instructions requested and given for plaintiff, which were indefinite in a similar respect to the petition, were erroneous, as failing to define the issues the jury were to try.

4. In an action against a street railroad for injuries to a passenger, received while attempting to take a seat in a car by way of an inner footboard, next to a car line on which cars ran in the opposite direction, plaintiff's instructions, which were given, told the jury that if they found that plaintiff, in going along the board, was exercising such care as ordinarily prudent men would exercise under similar circumstances, and that while so doing he was struck from the car by a car on the other track, then he was entitled to recover. Another instruction stated that, though the defendant failed to observe the high degree of care devolving upon it, that fact did not absolve the passenger from the duty of exercising the care devolving upon him. Held, that the giving of such instructions did not cure the error of refusing to give instructions for defendant to the effect that, when plaintiff stepped on the board, it became his duty to exercise such a degree of care as the position he was in rendered reasonably necessary to prevent his being struck by a passing car, and that if by standing upright, and not leaning out, he would have avoided being struck, yet failed to observe that care, he was not entitled to recover; there being evidence tending to show that plaintiff would not have been struck if he had stood erect on the footboard and not leaned forward.

5. Where a street railroad, operating cars on parallel tracks, uses cars equipped with footboards on both sides for gaining access to the seats, there is no duty devolving on the company to post notices warning passengers to keep off the inner board, and its omission to do so is neither negligence nor evidence of negligence.

6. In an action against a street railroad for injury to a passenger, received while attempting to get a seat in a car by way of an inner footboard, next to a car line on which cars ran in the opposite direction, where the jury saw the plaintiff and there was evidence showing the plan of the car and dimensions and distances between the tracks and cars on the tracks, expert testimony on the question whether it was safe for a person to stand on the board was not admissible.

7. In an action against a street railroad for injuries to a passenger, received while attempting to get a seat in a car by way of the inner footboard, next to a car line on which cars ran in the opposite direction, one of which struck plaintiff, causing his injuries, reports, to an officer of defendant of other accidents to persons riding on the inner footboard, previous to plaintiff's accident, are hearsay.—(Allen vs. St. Louis Transit Co. et al., 81 S. W. Rep., 1142.)

MISSOURI.—Street Railroads—Personal Injuries—Trespasser—License—Ordinary Care—Evidence—Questions for Jury—Instructions—Demurrer to Evidence—Waiver.

1. A defendant offering evidence in its own behalf after the court has overruled its demurrer to plaintiff's evidence waives its demurrer.

2. A demurrer to the whole evidence is not waived by requesting instructions on the theory of the case adopted by the opposing counsel.

3. A person knowing that a street car sometimes made an extra trip for extra pay, who hailed the car on its last trip for the day, and boarded it, after it stopped, for the purpose of negotiating with

the carmen for an extra trip, was not a trespasser, but was there on the implied invitation of the carmen to contract for an extra trip, and hence they were bound to exercise ordinary care and diligence for his safety while on the car.

4. Where it was dangerous to start a car while a person who had boarded it for the purpose of negotiating with the carmen for an extra trip was standing on its platform, it was the duty of the carmen to give him warning of the intention to start the car, and a reasonable time to get into the car or alight.

5. Where a street railway company owed to a person standing on the platform of a car only the duty of exercising ordinary care for his safety, and not the high degree of care required to be exercised for the safety of a passenger, the fact of an injury to him occasioned by the sudden starting of the car and its rounding a curve, causing him to be thrown to the ground, is not evidence of the company's negligence.

6. In an action for injuries sustained by one who had boarded a street car for the purpose of negotiating with the carmen for an extra trip, by reason of the car suddenly starting up while he was on the platform of the car, evidence examined, and held sufficient to require the submission to the jury of the question of defendant's failure to exercise ordinary care.

7. An instruction, in an action for injuries sustained by one boarding a street car for the purpose of negotiating with the carmen for an extra trip, by reason of the car suddenly starting up while he was on the platform, that the motorman was under the direction of the conductor, was not erroneous as not based on the evidence, it being a matter of common knowledge that motormen stop and start the cars in response to signals from the conductors.

8. An instruction assuming the existence of facts contradicted by evidence is properly refused.

9. An instruction in an action for injuries sustained by plaintiff by reason of the sudden starting of a street car while he was standing on its platform, which charged that plaintiff assumed the risk, but left out of view evidence that the motorman was given a signal to go ahead, was properly refused.—(Brock vs. St. Louis Transit Company, 81 S. W. Rep., 219.)

MISSOURI.—Street Railroads—Injury to Passenger—Collision—Instructions.

1. The care which a carrier owes to its passenger is of a very high degree, but is not the utmost care that human imagination can conceive.

2. The term "slightest neglect or negligence" should be avoided in instructions, as there are no degrees of negligence.

3. Where, under the undisputed evidence in an action by a passenger for injuries sustained in a railway collision, the defendant was prima facie guilty of actionable negligence, and there was no evidence tending to overcome it, an instruction that it was the duty of the carrier to carry the passenger safely as far as it was capable by human care, though imposing on the carrier a higher degree of care than the law imposed, was not prejudicial.

4. The fact of a collision resulting from two cars being run in opposite directions on the same track is prima facie evidence of negligence, and the carrier has the burden of proving that the collision occurred by some act beyond its power to avoid.

5. Where, in an action by a passenger for injuries sustained in a railway collision, the evidence showed that, because of the crowded condition of the car, the passenger was standing on the front platform, and that when the danger of a collision was imminent a panic ensued, and he was pushed off by people attempting to escape, and fell to the ground an instant before the collision, an instruction imposing on the carrier the duty of carrying the passenger safely as far as it was capable by human care to do, making it liable for the slightest neglect, and stating that, where a collision results from two cars being run in opposite directions on a single track, the carrier is prima facie negligent, was not erroneous, because based on the theory that the passenger was injured by the collision of the cars.

6. A petition, in an action for personal injuries sustained in a railway collision, which alleged that the servants in charge of the car on which plaintiff was riding ran it at a dangerous rate of speed, and that defendant negligently ran a car in the opposite direction on the same track, thereby causing the collision, sufficiently charged defendant with negligence in allowing the collision, so as to warrant an instruction on that theory.

7. An instruction, in an action for personal injuries sustained in a collision, which ignores the question of plaintiff's contributory negligence, is not erroneous, where there is no evidence that plaintiff was negligent.

8. A passenger standing on the platform of a car is required to exercise the increased care the increased danger entails, and there is imposed on the carrier a corresponding duty to handle the car with increased care in view of his exposed position.

9. An instruction, in an action for personal injuries sustained in a railway collision, that if plaintiff, while acting as an ordinary pru-

dent person under the circumstances, was injured in the manner claimed by him in his petition, defendant could not escape liability, unless it proved that the accident happened from causes beyond its control, though erroneous for referring the jury to the petition for the issues, was not prejudicial, where, under the evidence of both parties, defendant was liable.

10. It is error to submit to the jury questions of negligence, without instructing as to what constitutes negligence.

11. Where, in an action for personal injuries sustained in a railway collision, there was no instruction defining negligence, the question submitted to the jury should be whether defendant observed the degree of care required, and the required degree of care should be stated.—(Magrane vs. St. Louis & S. Ry. Co., 81 S. W. Rep., 1158.)

MISSOURI.—Master and Servant—Street Railroads—Injuries to Motorman—Collision—Defective Cars—Assumed Risk—Knowledge of Danger—Care Required—Fellow Servants—Joint Negligence—Contributory Negligence—Instructions—Refusal of Requests.

1. In an action for injuries to a servant by reason of defective appliances, it is not necessary that plaintiff should have been ignorant of the defect, unless the danger from the use of such defective appliances was so obvious as to render his act in continuing to use them contributory negligence.

2. Where a servant, prior to his employment as a motorman, in which he was injured, had not worked for wages, the admission of evidence that he had been engaged in buying and selling live stock, in which business he sometimes lost money and at other times made from \$2,000 to \$4,000 a year, was not reversible error; there being no claim that the verdict rendered was excessive.

3. Where a motorman complained to two other employees, who had authority to direct a change of cars, that the brake on the car he was directed to use was defective and unsafe, but both such employees assured him that the car could be used in safety, his act in continuing to use the same until he was injured by reason of the defect was not so obviously dangerous as to constitute contributory negligence as a matter of law.

4. Where, in an action for injuries to a motorman by reason of an alleged defect in the brake of his car, it was not contradicted that the person to whom plaintiff complained of the brake prior to the accident had authority to order the car turned in and another car brought out in its place, error of the court in assuming in an instruction that the person to whom plaintiff complained of the defect had such authority, instead of submitting the question to the jury, was harmless.

5. A motorman is not required to use more than ordinary care for his safety by reason of the fact that his employer is a common carrier of passengers, and the motorman, being employed in such work, impliedly contracted to exercise the same degree of care that the law imposed on the carrier.

6. A servant does not assume the risk of injury from the use of unsafe appliances furnished by his master.

7. In an action for injuries to a motorman in a collision with another car, plaintiff was entitled to recover, though the injury was the result of the combined negligence of defendant and plaintiff's fellow servant.

8. Where, in an action for injuries to a motorman by reason of a defective brake, which plaintiff had previously complained of, there was no promise to repair, but an assurance given to plaintiff by his superiors that the car could be used with safety by reason of the fact that others had used it, a requested instruction that, if plaintiff knew of the defect, he could not recover, unless defendant had promised to repair the defect, etc., was properly refused.

9. Requests to charge, covered by the instructions given, may be properly refused.—(Cole vs. St. Louis Transit Co., 81 S. W. Rep., 1138.)

MISSOURI.—Carriers—Injuries to Passengers—Evidence—Sufficiency—Expert Testimony—Competency—Damages—Excessiveness.

1. In an action against a street railway company for injuries to a passenger caused by the falling of a station platform, owing to alleged negligence in permitting the timbers to become rotten, evidence considered, and held to justify submission to the jury of the issue of defendant's negligence.

2. In an action for personal injuries, expert and other evidence considered, and held not to show the cause of plaintiff's nervous prostration to be so conjectural as to render it error to submit to the jury the issue of whether or not it was caused by the injury.

3. In an action for personal injuries, it was proper to allow a medical expert to give his opinion as to whether the injuries caused the neurasthenia from which plaintiff suffered.

4. That plaintiff's expert witness is paid by plaintiff affects only his credibility, not his competency.

5. Where a platform, on which stood a number of people, gave way, causing plaintiff to fall some 16 ft., injuring her head and neck

so as to make her unconscious, and ultimately causing neurasthenia, a verdict for \$5,500 was not excessive.—(Wood vs. Metropolitan St. Ry. Co., 81 S. W. Rep., 152.)

MISSOURI.—Carriers—Street Railways—Injury to Passenger—Alighting—Damages—Married Women—Separate Labor.

1. Where a street car is stopped to allow a passenger to alight, and before she has a reasonable time to do so, and while she is proceeding to the door, it is put in motion with such violence as to throw and injure her, the company is liable.

2. In an action by a married woman for personal injury, recovery may not be had for diminished earning capacity, there being no evidence that she ever did work outside her household duties, which is not within Rev. St. 1899, section 4340, giving her the wages of her separate labor.—(Kroner vs. St. Louis Transit Co., 80 S. W. Rep., 915.)

MISSOURI.—Master and Servant—Street Railroads—Injuries to Servant—Negligence of Motorman—Fellow Servants—Duty of Master—Lighting Track.

1. A street car company maintained lights at a curve, not for the benefit of its employees, but for convenience of passengers, and adopted a rule requiring the lights to be turned out at 2 o'clock a. m. The motorman of a car on which plaintiff was employed as conductor, while approaching the curve between 5 and 6 o'clock a. m., while it was still dark, saw a light further ahead in the same line of vision that the curve lights would be, and mistook such light for the curve lights, believing them to be still burning, and failed to slacken speed for the curve until he struck the same, by reason whereof plaintiff was thrown from the car and injured. Held, that since, under the custom to extinguish the lights at 2 o'clock a. m., the motorman had no right to expect them to be still burning, plaintiff's injury was the proximate result of the negligence of his fellow servant, for which defendant was not liable.

2. A statute providing that every railroad corporation owning or operating a railroad shall be liable for all damages sustained by any servant thereof while engaged in the work of operating such railroad by reason of the negligence of any other agent or servant thereof does not apply to street railroads.

3. A street railway company, in the exercise of reasonable care, was not required to keep a light burning at a curve of the track in order to indicate to motormen where the same was located to enable them to reduce the speed of their cars before turning the curve.—(Godfrey vs. St. Louis Transit Co., 81 S. W. Rep., 1230.)

MISSOURI.—Carriers—Injury to Passenger—Evidence—Contravention of Physical Facts—Instructions—Questions for Jury—Weight of Evidence—Damages—Excessive Verdicts.

1. In an action against a street railroad for injuries to a passenger, expert testimony that, the day being rainy, a street car, as a physical fact, could not be started with a jolt sufficient to throw any one down, as the wheels would slip along the wet rails, together with testimony by the weather observer that, on the day of the occurrence, rain had fallen .06 of an inch, and on the day preceding .37, was insufficient to conclusively refute, as impossible, plaintiff's account of the occurrence, which was that the car was started with an unusual and violent jolt, which precipitated her to the floor, where it was not shown at what hours the rainfall occurred, and it was disclosed that the motorman did not find it necessary to employ sand to prevent the car from slipping.

2. In an action against a street railroad for injuries to a passenger, the weight to be given testimony of street car employees as experts is for the jury.

3. In an action against a street railroad for injuries to a passenger, a charge that the jury in estimating damages might consider all the facts and circumstances, plaintiff's bodily injuries, and whether they were permanent in their nature, was not fatally deficient in its definition of the elements entering into a recovery; and, if defendant desired a more specific instruction, it should have requested it.

4. In an action for injuries to a passenger, where the testimony showed that the plaintiff was 35 years of age, and had been in the habit of performing the household duties of her family, and had, in consequence of the accident, been kept in bed for more than three months, and caused to suffer continuous pain from the time of the accident, in November, until the time of trial, in the following September, a verdict for \$1,000 was not so excessive as to justify an inference of prejudice or passion.—(McNamara vs. St. Louis Transit Co., 80 S. W. Rep., 303.)

MISSOURI.—Street Railroads—Injuries to Child—Speed—Stopping Car—Experts—Qualification—Hypothetical Questions—Contributory Negligence—Instructions.

1. A motorman, who had been engaged in running cars on a street car line for more than a year, and who was familiar with a street crossing, was sufficiently qualified to testify as an expert as to the distance within which a car approaching the crossing at a certain rate could be checked.

2. In an action for injuries to a child on a street crossing, a hypo-

thetical question to an expert as to the checking of a car must embrace the time and space within which a like car could have been stopped by a reasonably skilful motorman after he discovered, or with reasonable care might have discovered, the child in danger, with due regard to the safety of passengers, and was too restrictive where he was asked if he was able to state in about what distance one of the cars carrying certain passengers could be checked in passing down the grade at such crossing at a certain rate.

3. Where, in an action for injuries to a child on a street car crossing, the evidence did not show that the failure to ring the bell was the proximate cause of the injury, but the evidence was conflicting as to speed of the car, a peremptory instruction for defendant was properly refused.

4. In an action for injuries to a 6-year-old child, instructions applying the same rule to plaintiff, in determining her contributory negligence, as to one who had arrived at an age to possess ordinary discretion, were properly refused.

5. Where, in an action for injuries to a child on a street car crossing, the evidence was conflicting as to the speed of the car, and tended to show the motorman was not looking ahead of his car, it was for the jury whether, under the circumstances, the speed was dangerous and the injury occasioned thereby, or whether the motorman by ordinary care could have seen plaintiff's perilous position in time to have avoided the injury.

6. An instruction submitting to the jury the question as to whether plaintiff's next friend was regularly appointed is erroneous.

7. In an action for injuries by a street car, an instruction is defective in referring to the failure to keep the car under control, when no such averment was made in the petition.

8. In an action for injuries to a child by a street car, an instruction is erroneous that the employees were negligent if they failed to give the usual signals, after discovering the danger the child was in, to warn her of the approach, where there was no evidence to warrant it.

9. An instruction relating to the failure of the defendant's motorman to sound his gong to give warning when approaching a street crossing is properly refused, where such failure had no connection with the accident.

10. An instruction that plaintiff's negligence would not prevent a recovery, if the motorman and conductor could have seen the plaintiff by keeping a vigilant watch in time to have prevented the car striking plaintiff, should be modified by omitting the reference to the conductor.

11. Where plaintiff alleges that defendant's servants in charge of a car negligently and wrongfully approached a street crossing at an unusual speed, resulting in plaintiff being injured, it was proper to instruct to find for plaintiff, if she was exercising reasonable care for her own safety, and defendant was running its car at a speed which under the circumstances was negligent and dangerous, and in consequence thereof she was injured, though the speed did not exceed the rate fixed by ordinance.—(Heinze vs. Metropolitan St. Ry. Co., 81 S. W. Rep., 848.)

MISSOURI.—Carriers—Street Cars—Time to Alight—Premature Start—Stopping Places—Knowledge of Employees—Contributory Negligence—Willfulness—Issues and Proof—Instructions.

1. Where, in an action for injuries to a passenger on a street car, the petition alleged negligence in that while the car was at a standstill, and plaintiff was alighting, as defendant's servants well knew, they negligently started the car forward, by reason of which plaintiff was injured, such petition was supported by evidence that the conductor had knowledge that plaintiff was attempting to alight before the car started, and that under defendant's custom of operating its cars the motorman, when a car had been stopped for any purpose, started the same only after signal by the conductor, without proof that the motorman had knowledge that plaintiff was engaged in alighting at the time he started the car.

2. A street car company is liable for injuries to a passenger by a premature starting of the car while she was attempting to alight, though the car had not stopped at that point to permit passengers to alight, and it was not a usual stopping place, provided the conductor had knowledge that the passenger was attempting to alight there.

3. Where in an action for injuries to a passenger the complaint alleged simple negligence only, an instruction that, though plaintiff was guilty of contributory negligence in attempting to alight at a place other than a street crossing or regular stopping place, such negligence would not bar a recovery if the car was started by the carrier's employees under such circumstances as showed a "reckless and willful" disregard for plaintiff's safety, was erroneous.—(Jacobson vs. St. Louis Transit Co., 80 S. W. Rep., 309.)

MISSOURI.—Carriers—Injuries to Passengers—Minors—Acts of Conductor—Willful Injury—Malice—Definition—Instructions—Damages—Excessiveness.

1. Where a street car conductor kicked plaintiff, a messenger boy

13 years of age, over the heart, as he was boarding the car as a passenger, and plaintiff was only prevented from falling from the car while it was moving by the acts of other passengers in drawing him into the car, such facts justified the recovery of exemplary damages in an action against the carrier.

2. In an action against a carrier for the recovery of actual and exemplary damages for the act of one of its conductors in kicking plaintiff, a messenger boy 13 years of age, over the heart, as he was attempting to board the car as a passenger, an instruction that, in assessing plaintiff's damages, the jury were not limited to the physical injuries inflicted, but, in addition, if they found the assault was malicious, they might allow punitive damages, and defining the term "malicious" to mean the intentional doing of a wrongful act without just cause or excuse, though without spite or ill will, sufficiently and properly defined what was necessary to entitle plaintiff to recover exemplary damages.

3. Where a street car conductor kicked plaintiff, a messenger boy 13 years of age, over the heart, as he was attempting to board defendant's street car as a passenger, and it appeared that the kick produced a bruise and caused plaintiff severe pain, a verdict in favor of plaintiff for \$250 actual damages and \$750 punitive damages was not excessive.—(McNamara vs. St. Louis Transit Co., 81 S. W. Rep., 880.)

MISSOURI.—New Trial—Discretion of Trial Judge—Interference by Appellate Court—Grounds—Conduct of Trial—Cross-Examination by Judge.

1. The discretion of the trial court in granting one new trial on the ground that the verdict is against the weight of evidence will not be interfered with, however much the Supreme Court may disagree with the court upon such ruling, unless no verdict in favor of the party to whom the new trial is granted could ever be allowed to stand.

2. In an action against a street railway for injuries to a passenger, where the plaintiff's evidence tended to show that, when the car was approaching plaintiff's destination, the car was stopped in response to a signal, and was started again while plaintiff was in the act of getting off the car and had stepped down onto the running board, and defendant's evidence showed that plaintiff attempted to get off the car while it was in motion, and was thrown down and injured, and both parties claimed that the physical facts and the preponderance of the evidence sustained their theory, the granting of a new trial after verdict for defendant was a legitimate exercise of discretion, which would not be interfered with by the Supreme Court.

3. The trial judge has the right to cross-examine a party's witnesses.

4. The fact that the trial judge was severe in his cross-examination of defendant's witnesses, and that he believed that plaintiff was entitled to recover, and hence granted her a new trial after a verdict for defendant, affords no ground for the Supreme Court to interfere with his exercise of discretion in granting a new trial, where there was substantial evidence to support plaintiff's case.—(Fitzjohn vs. St. Louis Transit Co., 81 S. W. Rep., 907.)

NEW YORK.—Street Railroads—Collision—Negligence—Evidence—Instructions.

In an action against a street railway company for the negligent killing of plaintiff's intestate, the negligence ascribed to defendant was that of the motorman in charge of the car colliding with decedent. On the trial evidence was given showing that just previous to the accident, and at the time of its occurrence, the conductor was talking and laughing with passengers on the car. Held, that, though no claim was made on the trial that decedent was killed through the conductor's negligence, it was reversible error to refuse to charge that there was no evidence warranting a finding that the collision was due to the conductor's negligence, it not appearing that the proof of the action of the conductor was limited to showing that he and the passenger did not know of any danger.—(Palmer et al. vs. Larchmont Horse Ry Co. et al, 88 N. Y. Supp., 447.)

NEW YORK.—Street Railroads—Persons in Street—Injuries—Imputed Negligence.

In an action for injuries to the helper of the driver of a wagon, caused by a collision with a street car, the helper being in the rear of the wagon at the time of the accident, the negligence of the driver, if any, was not imputable to him.—(Le Blanc vs. Interurban St. Ry. Co., 88 N. Y. Supp., 150.)

NEW YORK.—Street Railways—Crossing—Collision with Vehicle.

Where the driver of a vehicle driven in a trot, on arriving at the house line of an intersecting street, saw a car rapidly approaching on the further track of said street, but continued to cross, he was guilty of contributory negligence, and could not recover for injuries from the collision.—(Groening vs. Interurban St. Ry. Co., 88 N. Y. Supp., 355.)

FINANCIAL INTELLIGENCE

WALL STREET, December 21, 1904.

The Money Market

The overshadowing feature of the money market this week was the rapid rise in the rates for sterling exchange, prime demand bills selling as high as 4.87½, the highest price of the year. The strength in this branch of the market was due largely to the unusually heavy demand for remittances in connection with the end-of-the-year settlements abroad, and partly to the falling off in cotton exports, as a result of a partial recovery in the price of the staple. Otherwise the conditions of the market were entirely unchanged from those prevailing at the close of last week. The supply of lendable funds was, if anything, larger than heretofore, at practically lower rates, despite the continued shipments of gold, and the drafts soon to be made upon the local institutions. Up to this time gold amounting to \$1,050,000 has been engaged for export, and the entire output of Assay Office bars for the remainder of the year has been engaged by prospective shippers. In spite of all these unfavorable factors, borrowers have been able to obtain accommodations on practically their own terms. Money on call was in abundant supply at rates ranging from 2 to 3 per cent, while a moderate business has been transacted in time contracts at 3½ per cent on ordinary Stock Exchange collateral. At the close all bids for 3½ per cent time loans have been satisfied, but it is not at all likely that local lenders will allow the rate to fall below that figure. Mercantile paper remained easy at unchanged quotations, all offerings of prime material being readily absorbed at rates ranging from 4 to 4½ per cent, according to the endorsements. At the close indications point to a comparatively easy market for the balance of the year. It is expected that the shifting and calling of loans in connection with the January 1 interest and dividend disbursements, together with the end-of-the-year settlements, may result in a temporary flurry in rates, but otherwise there is nothing in the situation likely to result in any disturbance in the market.

The statement of the Clearing-House banks, published last Saturday, was an extremely favorable exhibit. The decrease of \$22,031,700 in the loan item reflects to a great extent the liquidation in stocks earlier in the week. Cash decreased only \$299,200, while deposits fell off \$21,922,500. The required reserve decreased \$5,480,625, while the surplus reserve increased \$5,181,425. On December 17, the surplus was \$14,546,625, as compared with \$14,025,500 in the corresponding period of 1903, \$8,093,600 in 1902 and \$5,785,325 in 1901. Discounts at the principal European centers displayed a hardening tendency. At Berlin and Amsterdam the rates were unchanged at 4½ and 3 per cent, respectively, while at London and Paris there were slight advances to 3 and 2½ per cent, respectively.

The Stock Market

There was a material falling off in the volume of business on the Stock Exchange this week, but the dealings were accompanied by a decided improvement in values. In the early dealings prices displayed more or less irregularity, due principally to scattered liquidation, but this was followed by a gradual improvement in prices. The absorption of stocks was good, and there was evidence of investment buying of the high-grade issues, and active support from very strong interests. The news of the week was of a highly favorable character. The money market displayed a decidedly easier tendency, and reports of the general business situation were very encouraging. Railway traffic returns showed substantial increases over those for the corresponding period of last year. Gold exports continue, but the shipments were here confined to comparatively small amounts, owing to the limited supply of Assay Office bars. The bond market was active and decidedly stronger than the stock market, the noteworthy feature being Union Pacific 3s, Central of Georgia issues, United States Steel Sinking Fund 5s, and some of the less important industrial issues. The market closed quiet, but the undertone was stronger than at any time during the week.

The local traction issues were irregular, but generally firm. Brooklyn Rapid Transit rose from 58½ at the close of last week, advanced to 61¼ and closed ¼ below the highest. Metropolitan Street Railway and Metropolitan Securities showed pronounced strength, the first-named scoring a net gain of 2¾, closing at 122, while the latter advanced 3¾, closing at 79¾.

Philadelphia

There was a revival of activity in the local traction issues this week, and prices, with few exceptions, scored substantial gains. United Gas and Improvement was conspicuously active and strong, about 5000 shares changing hands at prices ranging from 104 to 106¼, the final sale being made at 106. Philadelphia Rapid Transit was stronger than in the preceding week, about 3000 shares being marketed at 17½ to 18½, and closing at 17¾, an advance of ¾. Consolidated Traction of New Jersey advanced 2 points to 80 on the transfer of 600 shares, and 750 Union Traction sold at from 58½ to 59. Philadelphia Company's stocks were strong, especially the common, of which 4000 shares sold from 41 to 42, and back to 41¾, a net gain of ½. The preferred was quiet, about 400 shares selling at 46½. Philadelphia Traction ruled unchanged, upwards of 900 shares changing hands at 98¼ to 98½. United of New Jersey brought 275¾ to 275½ for small amounts.

Chicago

Interest in the local traction stocks centered largely in the contest for control of the West Chicago and the North Chicago Street Railway Companies, prices for both stocks advancing sharply in consequence. Early in the week the protective committee of the above-named roads sent letters to the stockholders, urging them to send their proxies to members of the committee for use at the annual meeting, but this was followed by the bidding up of prices for both issues in the open market, by interests said to be identified with Eastern stockholders of the Chicago Union Traction Company. As a result, prices advanced sharply, West Chicago selling at from 50 to 60 for about 1500 shares, a gain for the week of 10 points, while North Chicago rose from 75 to 87½ on the purchase of about 1500 shares. It is said in well-informed circles, that the Eastern interests in the Chicago Union Traction Company have practically secured control of the North Chicago Company, and have made a formal offer for additional stock of the West Chicago Company at 60. It is also said that the difference in Chicago traction affairs will soon be settled, and that the Eastern stockholders will become dominant in the management of the Chicago Street Railway lines. Very little interest was manifest in the other issues. Trading in them was extremely light, but prices in all instances ruled firm. Chicago City Railway sold at 186¾, ex the dividend of 2¼ per cent, which was equivalent to an advance of 3⅞ points. Chicago Union Traction sold at 44 and 43 for small lots. Metropolitan Elevated stocks were quiet, sales of the common being made at 23 to 22¾, while the preferred sold at 65¾. Northwestern Elevated brought 24 to 23½, and South Side Elevated sold at 97¾ to 97 for odd lots. Chicago and Oak Park sold at 7½ to 7¼.

Other Traction Securities

Dealings in the Boston market were extremely light, and apart from a break of 5 points in Massachusetts Electric preferred to 57, the price movements were insignificant. The common advanced from 14 to 15 in the early dealings, but subsequently it lost all the improvement. Boston Elevated was practically unchanged, about 250 shares being transferred at between 153 and 154. Odd lots of West End common and preferred sold at 93 and 113½, respectively. The feature of the Baltimore trading was the activity in the United Railway bonds. About \$15,000 of the first 4s sold at 92¾ to 93, while about \$100,000 of the income bonds were dealt in from 53 to 54, which was followed by a decline to 51¾. The stock was fairly active and heavy, upwards of 800 shares selling at from 13¾ up to 14½ and back to 14⅞. Interborough Rapid Transit was considerably less active on the New York curb, but the price scored a sharp gain. From 161 at the opening it dropped back to 158, but later advanced to 164½, and closed at 164, a net advance of 4 points for the week. In all, about 7000 shares were traded in.

Sales of Cincinnati Street Railway at Cincinnati last week numbered about 800 shares, with an advance from 144 to 144¾ at the end of the week. Cincinnati, Dayton & Toledo sold at 17½, a decline from 24, the price a week ago. Northern Ohio Traction 4s sold at 65 to 66¼ for \$21,000 worth. Several blocks of Indianapolis Street Railway 4s sold at 86 to 86¾. Cincinnati & Hamilton Traction at 47½.

Cleveland Electric opened the week at 75 and advanced to 76½. Owing to another court decision blocking the 3-cent fare company, the demand for Cleveland Electric is stronger and holders are ask-

ing around 80. Northern Texas Traction declined to 42½. Northern Ohio Traction was active at 17 to 17¼, a slight advance. Western Ohio was active at 8. A sale of Lake Shore Electric preferred was made at 15. Several blocks of Western Ohio 5s sold at 70 to 70½.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Dec. 13	Dec. 20
American Railways	48	48
Aurora, Elgin & Chicago (preferred).....	—	—
Boston Elevated	a153	153
Brooklyn Rapid Transit	57½	60¾
Chicago City	185	181
Chicago Union Traction (common)	11½	10¼
Chicago Union Traction (preferred)	40	40
Cleveland Electric	75	74½
Consolidated Traction of New Jersey.....	77	79
Consolidated Traction of New Jersey 5s.....	108¼	108¼
Detroit United	77½	77¼
Interborough Rapid Transit	161	163½
Lake Street Elevated	22	—
Manhattan Railway	*162¾	163
Massachusetts Electric Cos. (common)	14	14
Massachusetts Electric Cos. (preferred)	61½	56½
Metropolitan Elevated, Chicago (common)	25½	22½
Metropolitan Elevated, Chicago (preferred)	66	65
Metropolitan Street	118¾	121½
Metropolitan Securities	75½	79
New Orleans Railways (common)	4	3
New Orleans Railways (preferred)	20	13¼
New Orleans Railways, 4½s.....	74	72
North American	99¼	101
Northern Ohio Traction & Light	16½	17
Philadelphia Company (common)	41¼	41¼
Philadelphia Rapid Transit	17¼	17¾
Philadelphia Traction	97¾	98
South Side Elevated (Chicago)	96	97
Third Avenue	130	131
Twin City, Minneapolis (common)	103½	106
Union Traction (Philadelphia)	* 58	58½
West End (common)	92	93
West End (preferred)	113	113½

* Ex-div.
a Asked.

Iron and Steel

The "Iron Age" says that the advance of \$2 per ton in bars, plates and shapes is generally satisfactory to the trade, and that it was preceded by the bookings of considerable tonnage. Interest centers on the steel rail trade. It may be frankly acknowledged that the railroads are not coming into the market quite as promptly as has been expected. The Pennsylvania road has been the leader by contracting for a total of 102,700 tons, with the usual privilege of taking 10 per cent less. Some business has been placed in the West. In the South, the Tennessee Company has secured 65,000 tons of the 75,000-ton order from the Southern Railway, the balance going to the Northern mills. The Vanderbilt lines are in the market for 128,000 tons, which are to be placed within the next ten days. The order for 150,000 tons for the Rock Island is not yet settled. Some good orders are pending in structural material. In the lighter lines the volume of business keeps up remarkably well.

CHICAGO TRACTION MATTERS

Of greatest interest in connection with Chicago traction matters the past week has been the opposition to the plan of issuing receiver's certificates by the Chicago Union Traction Company. The idea was to issue these certificates to pay for improvements, and also to pay rentals due to the North and West Chicago Street Railroad Companies. These certificates would be a lien prior to the stock and bonds of the North and West Chicago Street Railroad Companies. The bondholders of these companies appeared before Judge Grosscup in opposition to the plan, and for the first time since the Union Traction receivership, there is open talk of a foreclosure which would eliminate the Chicago Union Traction Company, the property of which would revert to the North and the West Chicago Street Railroad Companies. It is thought by some that the stockholders of the Chicago Union Traction Company already have so much of the stock of the underlying companies that they

would not oppose such a move. Judge Grosscup has announced that the court will not be without money for the carrying on of the business, and that if receiver's certificates are not issued to raise the money, the Chicago Union Traction Company will virtually have to go out of business. A Chicago brokerage house made a sensation by advertising for stock of the West Chicago Street Railroad Company at \$60, a price about \$9 per share above the last quoted price on the Chicago Stock Exchange.

THE SAN FRANCISCO POWER CONTRACT

As briefly mentioned in the STREET RAILWAY JOURNAL last week, the United Railways of San Francisco has entered into a contract with the California Gas & Electric Corporation, which controls the largest and most important water power producing plants in that State, to take from that company power for operating all of its cars, commencing Jan. 1, 1906. The current is to be three-phase, 13,200 volts at 25 cycles, and will be delivered to the several sub-stations of the railroad company. These stations are three in number. They are located at Turk and Fillmore Streets, at San Jose and Geneva Avenues, and at Millbrae, a suburban town 16 miles south of the city. The station at Turk and Fillmore Streets contains six 750-kw General Electric rotaries, which supply current at 600 volts to the section of the city lying north of Market Street from the ferries to the Ocean Beach, including the Park and Ocean line running along the south side of Golden Gate Park. The station at San Jose and Geneva Avenues contains three 500-kw General Electric rotaries, and supplies current to the north end of the San Mateo line, the Ingleside line, and the southern end of Mission Street line. The station at Millbrae contains two 500-kw General Electric rotaries and furnishes current to the southern end of the San Mateo line. This makes a total sub-station capacity of 7000 kw. At present these stations are all supplied with 13,200-volt alternating current from the North Beach power station.

In addition to these sub-stations the railroad company operates a direct-current station at Bryant and Alameda Streets, the total capacity of which is 4400 kw, divided into fourteen units. It is proposed to convert this plant into a sub-station. The four smaller engines and six 2000-kw generators will be taken out, and five 1000-kw rotaries will be installed. It has not yet been decided what disposition will be made of the balance of the equipment of this plant. Just what will be done with the equipment at North Beach is a question to be settled, too.

The daily average power requirements of the company at present amount to about 115,000-kw hours, with a maximum evening peak of 9000 kw. This consumption will be materially increased in the near future when the contemplated change of motive power on several of the cable systems now in operation is consummated and a number of the old type single-truck cars are replaced by the forty-foot double-truck cars.

The stations of the California Gas & Electric Corporation are seven in number, and are located along streams in the Sierra Nevada Mountains. They contain many novel features, not the least of which are the high head under which the water wheels operate, and the high voltage at which current is transmitted. The stations are known as the Electra Station, the De Sabla plant, the Colgate station, the Folsom plant, the Centerville plant, the Yuba plant and the Nevada plant. Of these the Electra station, in Amador County, the total output of which is 20,000 kw; the De Sabla plant, in Butte County, which is being extended to make the output 14,000 kw. and the Colgate station, located on the Yuba River, in Yuba County, the capacity of which is 9420 kw, are the most important. Extended descriptions of the operating features of these plants are to be found in the technical press.

To meet the requirements of the railroad company's sub-station rotaries, cycle-changers will be erected in the California Gas & Electric Corporation's sub-station in San Francisco, where current from the water power plants, transmitted at 55,000 to 60,000 volts pressure as 60 cycles, will be changed to 13,200 volts at 25 cycles.

In order to avoid interruption to the service of the United Railroads by reason of trouble in the water power stations, or on the long-distance transmission lines, the California Gas & Electric Corporation will install in San Francisco a gas engine plant to contain three 6000-hp International Steam Pump Company (Snow Steam Pump Works branch) gas engines, direct connected to 25-cycle, 13,200-volt, 4000-kw Crocker-Wheeler alternators. One of these units will be operated continuously in parallel with the 25-cycle end of the cycle-changers so that the fluctuation due to transmission shall be removed. This plant will be somewhat in the nature of pioneer work, and will, in a way, test the ability of the large gas engine units to operate in synchronism with one another and with the water power plants.

NEW JERSEY TUNNEL GIVEN RIGHTS IN NEW YORK— OTHER MATTERS CONSIDERED

The New York & New Jersey Railroad Company, which is constructing a tunnel under the Hudson River, from Fifteenth Street, Jersey City, to Morton Street, New York, will receive a franchise to build a subway from the tunnel terminal in New York along Morton Street to Greenwich, to Christopher, to Sixth Avenue, to the southerly side of Thirty-third Street, where it will connect directly with the Pennsylvania Railroad terminal, and also a branch subway from Christopher Street and Sixth Avenue eastward along Ninth Street, to Second Avenue, where there will be a loop.

This action was decided upon by the New York Rapid Transit Commission at a meeting held Thursday, December 15, when, without a dissenting voice, the commission ratified a report from its contract committee recommending that the tunnel company be given permission to build these subways. Counsel have been instructed to prepare the contracts and they will be ready for final action Thursday, December 22.

The company will construct the tunnel at its own cost, will pay to the city a nominal compensation during the first ten years, which will be slightly increased during the succeeding fifteen years, at the expiration of which, the first twenty-five-year period of operation having then passed, the franchise will be subject to a new valuation. The crosstown subway from Sixth Avenue through Ninth Street, connecting with the present subway at Astor Place, will be constructed by the New Jersey company under a franchise nominally perpetual, but by stipulation subject to purchase by the city at a valuation after twenty-five years.

Several other important matters beside the New Jersey tunnel grant were considered at the meeting. These were the questions of permitting advertisements to be displayed in the subway, the consideration of Mr. Parsons' resignation as chief engineer of the company, and the plans for future municipal work in the building of underground lines. Mr. Parsons' report on the question of advertising barred the largest signs—the three-sheets, 48x92 inches—entirely. Others should be permitted, he said, on the station walls facing the platforms above the frieze line, and the company had asked him to let it put two signs in each panel of the walls below the frieze, where such placing of signs would not interfere with the name tablets. He also recommended the reconsidering of the resolution barring the slot machines, as many of them were placed where they did not interfere with traffic. Some, he said, were in bad places, and should be removed. No action was taken on this report. A copy of it has been forwarded to the Interborough Rapid Transit Company, operating the subway lines, with the request that an expression of opinion be made by the company at the meeting of the committee to be held Thursday, Dec. 22.

No action was taken as to the appointment of a successor to Mr. Parsons as chief engineer of the commission, but a set of resolutions was passed recording the commission's appreciation of the high quality of the work done by him.

The Municipal Art Society, through its committee on city plan, presented a communication urging that a definite, comprehensive plan for municipal subway work be laid out, in accordance with which any future subways might be constructed. If there were such a plan, and work were proceeding according to its details, there would be no difficulty in deciding on applications for franchises as to whether they would interfere with municipal plans, the committee held.

THE AUTOMOBILE BUSINESS OF THE ST. LOUIS CAR COMPANY

The announcement has already been made that the St. Louis Car Company is planning to engage in the manufacture of automobiles, and it is now said that its plant for this purpose will be the largest in the world. The old Whittaker-Weber tin works at 5300 North Second Street, St. Louis, have been purchased, and the work of remodeling will soon begin. It has been announced the capital of the car company will be increased by \$500,000, but this stock will not be sold in the open market. The proposed industry will have a floor space of 100,000 square feet, and 1500 men will be given employment.

Models of French gasoline cars of 18 hp, 24 hp and 50 hp are to be manufactured, and a smaller and more popular-priced machine besides the \$3000 to \$8000 machines of the larger type will also be placed on the market.

The St. Louis Car Company's managers hope to have the new plant running in thirty days.

ROCHESTER, SYRACUSE & EASTERN AWARDS CONTRACTS

Important contracts for equipment have just been let by the Rochester, Syracuse & Eastern Railroad Company, which proposes to build from Rochester to Syracuse, N. Y. There will be a main power house, located at Lyons, and three sub-stations. The electrical equipment for these plants will be furnished by the Westinghouse Electric & Manufacturing Company, to which contracts have just been given. The Westinghouse Company will also equip all the rolling stock, and will supply the air brake equipment. The contract amounts to about \$300,000. A feature of the contract is the announcement that the principal power units will be two turbo-generators. The cars are to be equipped with four motors, each of 110 hp, and geared for about 60 m. p. h. The multiple-unit system of control has been adopted. The contract for cars has not yet been awarded, nor has the contract for track and overhead material. The latter award, so C. W. Beebe, the general manager of the company, informs the STREET RAILWAY JOURNAL, will not be made before February. The section of road between Rochester and Lyons, a distance of 37 miles, will be the first to be equipped, and is expected to be in operation by Dec. 1, 1905. As announced in the STREET RAILWAY JOURNAL some time ago, the contracts for grading this part of the line are all let. Section 1 was given to Fred T. Lee & Company, of Springfield, Mass.; sections 2 and 3 to the Shields Construction Company, of New York City; sections 4 and 5 to J. G. White & Company, of New York. The road will be built on a private right of way, except in some of the villages.

NEW WORK PLANNED FOR BIRMINGHAM

The Birmingham Railway, Light & Power Company is figuring on new work for next year. Geo. H. Davis and A. H. Ford, of Ford, Bacon & Davis, engineers of New York, who rebuilt the lines of the company, are in the city now and will go over the whole prospect with the local officers and directors. The items of construction considered are a 3000-kw extension to the power plant, additional cars and extensions to the gas, electric and railway distribution systems.

STREET RAILWAY JINGLES IN SAN FRANCISCO

The competition has been closed for prizes offered by the United Railways, of San Francisco, through "Transit Tidings," its official publication, for verses covering the rules of the company about asking for transfers when paying fares, not blocking the rear platform of cars, not leaving the car while in motion, not quarreling with the conductor or motorman. Five prizes of 100 tickets each were offered, one prize to cover each of the rules and one to cover all four. Competitors were not restricted as to the length of the verse, but the suggestion was made that it be kept down to eight lines.

To help the rhymsters to a better understanding of what was wanted, the company published an extract from the well-known poem about the old bell punch. The cue thus given proved to be sufficient. The muse was soon at work, and verse good, bad and indifferent was received in a considerable quantity. In some cases the poet sang of all four rules. In others he sang merely of one, as if by "inspiration." Of the verse received the following is considered as worthy of reproduction here:

Take a seat or take a strap,
If under five, please take a lap,
And never block the door, old chap,
Nor on the platform take a nap.

When you pay your nickel,
Get your transfer then;
If you don't, the chances are,
You'll have to pay again.

REFERENDUM IN OTTAWA ON THE PURCHASE OF STREET RAILWAY PROPERTY

By a vote of 13 to 7, the City Council of Ottawa, Ont., has decided to submit a by-law to the vote of the ratepayers providing for the purchase of the Ottawa Electric Railway for \$3,000,000.

THE RECORD RUN OF THE WESTINGHOUSE WORLD'S FAIR TURBINE

A memorable incident of the morning following the close of the St. Louis Exposition was the formal shut-down and inspection of the 600-hp Westinghouse steam turbine generating unit in the Palace of Machinery after a continuous run of over 3962 hours—a performance which has had no parallel in steam turbine history. This machine was started on its long run at 9:20 o'clock on the morning of Monday, June 20, shortly after its installation at the Fair, and was stopped at 11:32 o'clock on the morning of Friday, Dec. 2. During the five and one-half months that the unit was in operation it supplied current for light and power throughout the Westinghouse exhibits in the Palaces of Machinery, Electricity and Transportation. Charles F. Foster, chief operating engineer of the Exposition, H. M. Holman, supervising engineer at the Government Exposition gas engine tests, formerly president of the St. Louis board of public works, and a number of Westinghouse representatives, including Wallace Franklin, of Detroit, C. C. Chappelle, of Chicago, and W. K. Dunlap, managing director of the Westinghouse exhibits, were present when the engine was stopped. It was found to be in perfect condition, and there were no signs of wear, the bearings still retaining the tool marks as they had come from the shops.

There have been at least two instances on record in America in which piston engines have been run continuously for about the same length of time as that of the record run of the Westinghouse turbine. The remarkable feature of the turbine run, of course, was the maintenance under load of a speed of 3600 r. p. m. for such a long period. From 8:30 o'clock in the morning to 10:30 o'clock in the evening, the load carried throughout the Exposition varied from 25 per cent underload to 25 per cent overload. The total number of revolutions almost touched the billion mark—855,792,000.

ST. LOUIS AWARD NOTES

The Duff Manufacturing Company, Allegheny, Pa., states that its full line of Barrett lifting jacks, for all purposes, has been awarded a gold medal (highest award in its class), by the superior jury at the Louisiana Purchase Exposition, St. Louis. The company's complete line of track, car and other jacks was exhibited in both the Transportation and Machinery Buildings. Included in the exhibits were the Barrett motor armature lift, pipe forcing jack, automobile jack and the differential screw jacks.

"United States" Metal Polish and "Barkeeper's Friend," a powder polish, both made by George William Hoffman, of Indianapolis, Ind., received the highest award granted at the Louisiana Purchase Exposition for polishes. This award is especially pleasing to Mr. Hoffman, as he also received the highest similar award granted at the Chicago World's Fair in 1893.

The National Carbon Company, of Cleveland, Ohio., has been awarded a grand prize by the Louisiana Purchase Exposition for all of its carbon products, including carbon brushes for motors and generators, Columbia dry batteries, Columbia carbons for long-burning enclosed arc lamps, carbon electrodes and telephone specialties.

The Phoenix Iron Works Company, of Meadville, Pa., has received notice from St. Louis that the International Philippine Jury of the Exposition, in its capacity of Associate Board of the Exposition, under the presidency of the Secretary of War, Hon. William H. Taft, has awarded the company a gold medal for the compound engine exhibited in the power plant of the Philippine Government Board.

The C. W. Hunt Company, of West New Brighton, New York, has been particularly successful at the World's Fair, two of its three exhibits securing the highest awards, the third not entered. The Hunt "Industrial" Railway received the gold medal for narrow-gauge railways, and the electric storage battery locomotive built by that company received the silver medal, being the highest award for this type of locomotive.

The Abner Doble Company, of San Francisco, Cal., established 1850, has been awarded the grand prize for its exhibit of a 170-hp tangential water-wheel. This is the highest award given by the experts at the St. Louis World's Fair. The wheel develops 170 hp at a speed of 700 r. p. m., with a water pressure of 300 lbs. per square inch, equivalent to a hydraulic head of nearly 700 ft. It is direct connected to a 100-kw railway generator, and is one of the units of the intramural power plant. The wheel is of the tangential type, with the Doble ellipsoidal buckets, and is provided with a needle regulating nozzle, operated by a governor. The sides of the wheel housing are made of plate glass, so that the action of

the water on the wheel can be observed. The quantity of water delivered to the wheel is measured by a venturi meter with automatic recording instruments, and the pressure of the water is registered by a recording gage. The electrical output is measured by the switchboard instruments.

The Railway Appliances Company, of Chicago, has received the silver medal for its exhibit of the Bonzano rail-joint at the St. Louis Exposition, and received a bronze medal for its Ajax vestibule car diaphragm and the Fewings car and engine replacer. These medals were the highest awards given in their class. The company also received the bronze medal for the Q. and C. Stanwood car and locomotive step. This was the highest award made.

NEW PUBLICATIONS

Hohe Warte; Published semi-monthly by Lux & Lassig, Wallfischgasse 1, Vienna, Austria; annual subscription, M.18 (\$4.50).

This is a new German publication devoted to the advancement of the artistic, intellectual and economic interests of municipal life by disseminating among all classes a better understanding of art that will result in a higher and better form of civic patriotism. Its object may be stated as the desire to attain the city and house beautiful along the lines suggested by Ruskin.

Die Entwicklung der Städtischen Schnellbahnen seit Einführung der Elektrizität (The Development of Urban Rapid Transit Since the Introduction of Electricity). By D. G. Kemman, Government Adviser. 12 pages, 6 plates, published by the author.

This is the title of a paper presented on Sept. 12, 1904, at the sixteenth meeting of the united German Architectural and Engineering Societies at Düsseldorf, Germany. The author says that when animal power was displaced by electricity in city surface railways it was hoped that the latter would approach the high speeds customary on interurban lines, despite the many obstacles encountered in trying to operate on crowded streets. The numerous accidents which resulted in trying to do this, however, soon dispelled this illusion. The writer points out that the first attempt to solve the short-haul and long-haul problem was made in the United States, and cites the practice of the Brooklyn Rapid Transit Company which has been successful in large measure in diverting its long-haul traffic to the elevated lines. A comparison is also made between the cost of subways and elevated lines, and considerable attention is given to the traffic problems of the great European and American cities. The data on this subject are supplemented by a large number of interesting diagrams, including one showing the railway systems of Berlin, Paris, New York, Boston, Liverpool, Chicago and Philadelphia drawn to the same scale.

Report of the twenty-third annual meeting of the American Street Railway Association, 302 pages, published by the secretary of the Association, 2020 State Street, Chicago.

The official reports of the meetings of the American Street Railway Association are always of great interest, even to those who have attended the meetings, or who have read the reports printed in the technical papers. They are necessarily much more complete than the latter, and in the hurry of the meetings those who are present cannot expect to remember all that has been said. The report of the St. Louis meeting is of unusual interest, and besides the papers and discussions, contains the Standard Code of Rules for Conductors and Motormen, which was recommended by the Committee on Rules. The volume contains a handsome steel engraving of President Ely, and the secretary is to be congratulated on the promptness with which the report is issued.

STREET RAILWAY PATENTS

[This department is conducted by Rosenbaum & Stockbridge, patent attorneys, 140 Nassau Street, New York.]

UNITED STATES PATENTS ISSUED DEC. 13, 1904

777,118. Emergency brake; George Macloskie, Schenectady, N. Y. App. filed March 21, 1903. Means for automatically applying the brakes whenever the controlling-handle is released by the motorman, thus making it necessary for him to remain alert even when coasting.

777,124. Magnet Contact for Propulsion of Cars; James M. Morgan, Toledo, Ohio. App. filed July 28, 1904. Magnets carried by a car and used to lift a circuit controller in the roadbed, are mounted upon a frame adapted to adjust itself to curves in the track.

777,152. Car Fender; Earl Sherwood, Honesdale, Pa. App. filed April 1, 1904. The fender is provided with terminal hooks which connect with hangers on the car in such a manner as to allow the fender to fold and also to sustain it in either an operative or folded position.

777,164. Electric Make and Break Mechanism; James C. Waldo, Sharpsburg, Pa. App. filed Oct. 19, 1903. A switch-box mounted above the trolley wire and adapted to be actuated by the trolley wheel of a passing car.

777,304. Trolley Pole; Andrew L. Prentiss, Buffalo, N. Y. App. filed Feb. 23, 1904. Relates to that class of trolley poles which automatically drop to an inoperative position below the conductor when the trolley accidentally leaves the wire.

777,468. Holder for Trolley Wires; Frank M. Zimmerman, Aurora, Ill. App. filed Sept. 16, 1904. The clip is provided with a stem, integral therewith, which is rotarily mounted in the insulator.

777,581. Trolley Pole; John L. Young, Columbus, Ga. App. filed Aug. 26, 1904. Details of a lazy-tong trolley pole.

777,616. Electric Trolley; Theophile Euphrat, Norwalk, Conn. App. filed April 13, 1904. An ice-crushing wheel is carried on the trolley harp in advance of the trolley wheel, and when permitted to engage the wire, the trolley wheel is removed from the wire.

PERSONAL MENTION

MR. WILLIAM ROCKELL has been elected superintendent of the Mauch Chunk, Lehigh & Slatington Electric Railway Company, of Mauch Chunk, Pa.

MR. G. W. ALEXANDER, of Alliance, Ohio, has accepted the position of general manager and assistant secretary and treasurer of the Kanawha Valley Traction Company, of Charleston, W. Va.

MR. HARRO HARSSON has resigned as assistant superintendent of the Toledo Railways & Light Company, of Toledo, Ohio, to become general manager of the International Planters' Company in Vera Cruz, Mex.

MR. C. H. STOCUM, formerly connected with the Brooklyn Rapid Transit Company, of Brooklyn, N. Y., has been appointed general manager of the Westchester Traction Company and the Danbury & Harlem Railway Company, with headquarters at Ossining, N. Y.

MR. JOHN T. NYHAN, who has for a number of years served as superintendent of the Macon Street Railway, of Macon, Ga., has been appointed general manager of the company to succeed Mr. J. H. Hertz, who will in the future serve the company as secretary and treasurer.

MR. CHARLES SEIBERT has been appointed acting master mechanic of the Grand Rapids, Grand Haven & Michigan Railway, of Grand Rapids, Mich., in charge of the mechanical and electrical departments, vice Mr. E. B. Kirk, who resigned to accept a position with another railway company.

MR. ALBERT H. STANLEY, general manager of the railway department of the Public Service Corporation of New Jersey, was recently married in Milwaukee to Miss Grace Lowrey Woodruff, formerly of Detroit. Mr. Stanley, it will be remembered, formerly was general superintendent of the Detroit United Railway Company.

MR. A. B. DUPONT, who is well known in street railway circles through his prominent connection with the electric railway systems in Detroit, Mich., and St. Louis, Mo., has been elected president of the Seamless Steel Bath Tub Company, of Detroit, and it is announced he will give his entire attention to the affairs of this company. It will be remembered that just before the opening of the World's Fair in St. Louis Mr. duPont resigned his position as second vice-president and general manager of the St. Louis Transit Company and returned to his home in Detroit.

MR. C. W. WHITNEY, who for the past nine months has been editorial representative of the McGraw Publishing Company on the Pacific Coast, has resigned from this company and has become associated with the Abner Doble Company, of San Francisco, hydraulic engineers and manufacturers of the Doble tangential water wheel. A number of Mr. Whitney's articles have appeared in these pages since he has been connected with this company, and his associates wish him every success in the new line of work in which he has become engaged.

MR. A. H. HAYWARD has resigned as general superintendent of the Dayton, Springfield & Urbana Railway, of Dayton, Ohio, to become general manager of the York Street Railway Company, of York, Pa., and suburban lines, succeeding Mr. Samuel M. Manifold, resigned. Mr. Hayward's experience in street railway work began with Mr. Leo Daft in Cincinnati in 1882. Subsequently he was connected with the Thomson-Houston Company in the early development of the business, and managed various traction companies in New England, Pennsylvania and the West. His experience has also extended to foreign work, he having supervised construction in the Argentine Republic, Porto Rico and other countries. Mr. Hay-

ward will assume his duties in York just as soon as his successor is appointed in Dayton.

MR. H. M. LITTELL has just resigned his position as general manager of the Rapid Transit Company, of Chattanooga, Tenn., to accept the office of vice-president and general manager of the Southern Light & Traction Company, of San Antonio, Texas, which controls the gas and electric railway and lighting interests in that city. This company represents the McMillan interests in San Antonio, and Mr. Littell will take charge of the property on Jan. 1, 1905. Mr. Littell went to Chattanooga about two years ago as general manager of the Rapid Transit Company, whose property has grown rapidly under his management. As a street railway operator he has had a most distinguished record, and has been the manager of important properties in New York, Brooklyn, New Orleans and elsewhere. He was president of the American Street Railway Association in 1895-96.

MR. O. A. STRANAHAN, whose experience has been entirely with the Westinghouse Companies, has been appointed manager of the power department of the Allis-Chalmers Company, and will have charge of the sales of reciprocating engines, gas engines and steam turbines. Mr. Stranahan has been for the past three or four years in charge of the engine business of the British Westinghouse Electric & Manufacturing Company, and in that work has met with marked success. Mr. Stranahan graduated from Cornell in 1890, and immediately after entered the service of Westinghouse, Church, Kerr & Company, working up through their various departments and becoming chief engineer of their Chicago office. When the British Westinghouse Company was formed Mr. Stranahan was appointed to the charge of its engine business. He began these duties in 1900, and was engaged in them up to the time of his appointment by the Allis-Chalmers Company as manager of its power department.

MR. E. J. DUNNE has assumed his active duties as superintendent of overhead department for the Public Service Corporation of New Jersey, to which position he was recently appointed. Mr. Dunne received his first business training in Cleveland, where in 1882 he was engaged in telephone and electric lighting construction work. In 1888 he became associated with Mr. Tom L. Johnson, and had general charge of construction work on a number of electric roads in which Mr. Johnson was interested, including what is known as the old Brooklyn line in the city of Cleveland, and the electric lines at Canal Dover, East Liverpool, and New Philadelphia, Ohio. In 1893 he took charge of construction work on the Lehigh Valley Traction system, at Allentown, Pa. In 1894 he built several lines for the South Covington, Cincinnati & Newport Electric Railway system. Early in 1895 he went with Mr. Johnson and Mr. A. B. duPont to Detroit, Mich., and was appointed superintendent of overhead construction of all the mileage included in what was afterward known as the "Johnson System" in the city of Detroit, and in 1897 he was given entire charge of both track and overhead work. In 1901, Mr. Dunne resigned his position in Detroit and went to St. Louis, where he was made superintendent of overhead lines on the St. Louis Transit system. When the change in management of the St. Louis Transit Company occurred early in the present year, he tendered his resignation and was engaged in independent work until his appointment to his present position with the Public Service Corporation.

MR. D. F. CARVER has resigned his position as chief engineer of the railway department of the Public Service Corporation of New Jersey, his resignation to take effect Jan. 1 next. Mr. Carver has had an unusually successful career, and his wide experience in steam railroad and electric railway engineering has placed him in foremost ranks of his profession. He graduated from the public schools of Philadelphia in 1887, and in 1889 began his railroad experience as rodman in the construction department of the Pennsylvania Railroad. He soon rose to the position of assistant engineer under the third vice-president of the Pennsylvania Railroad, and in this capacity carried out important work in branch line and "short-cut" construction for the Pennsylvania system. In 1894 he entered the engineering department of the Brooklyn Rapid Transit Company, and later was appointed superintendent of buildings for the entire Brooklyn system. While holding this office Mr. Carver designed and laid out the plans for both the New York and Brooklyn terminals of the Brooklyn Bridge, having full charge of the special work and terminal buildings. In 1900 he severed his connection with the Brooklyn Rapid Transit Company and assumed the position of chief engineer of the Cleveland Electric Railway Company. He held this position for three years, resigning in June, 1903, to accept the position of chief engineer of the Public Service Corporation, in which capacity he has had full charge of cars and car houses, track, roadways, buildings and low-tension distribution system on all of the properties operated by the Public Service Corporation, extending over a large portion of the State of New Jersey.