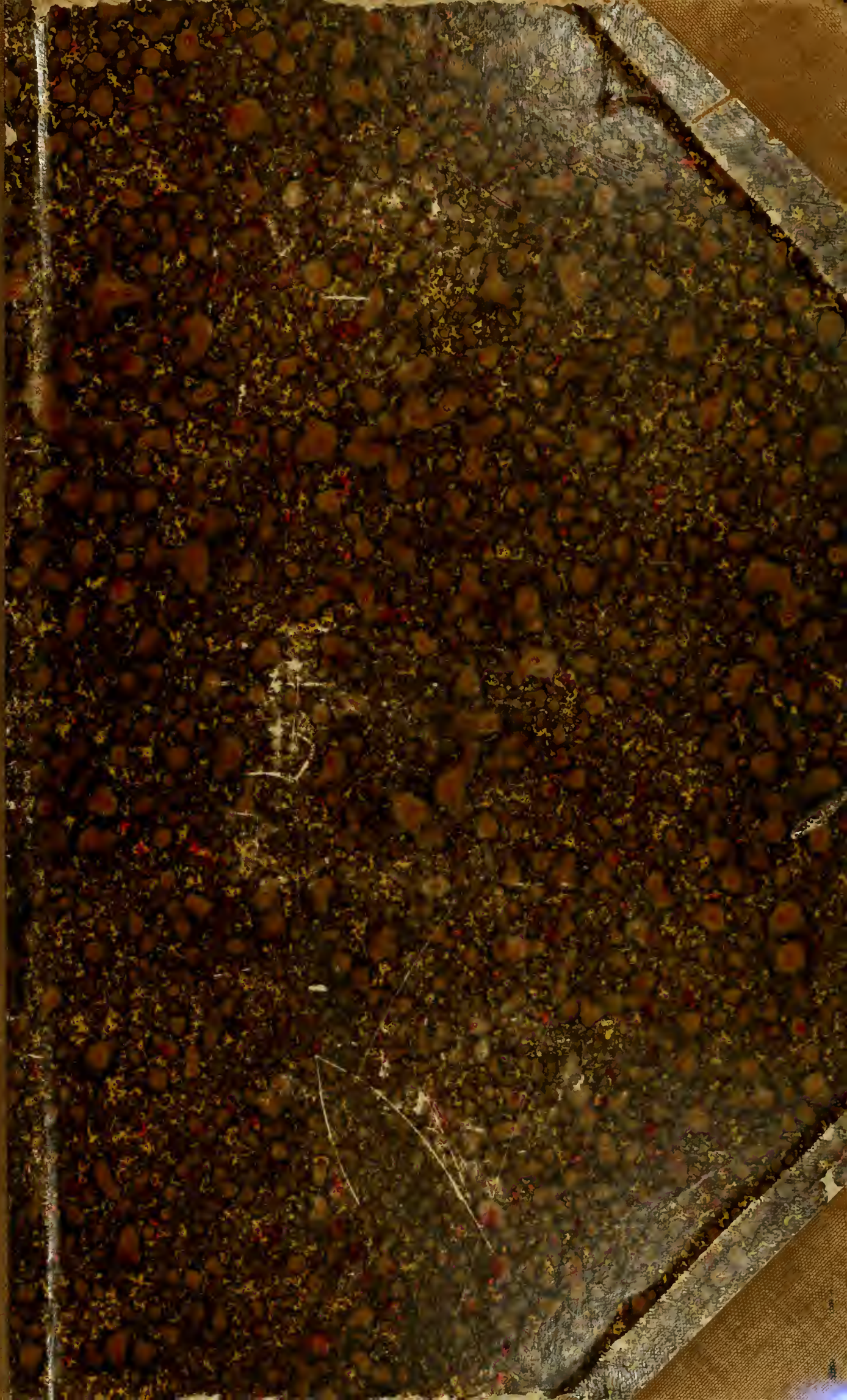

THE STREET RAILWAY REVIEW

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1896

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WINDSOR & KENFIELD PUBLISHING COMPANY
OLD COLONY BUILDING

PAGING BY MONTHS.

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THE Street Railway Review

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H. H. WINDSOR, Editor. F. S. KENFIELD, Business Manager.

CORRESPONDENCE

We cordially invite correspondence on all subjects of interest to those engaged in any branch of street railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers.

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VOL. 6. JANUARY 15, 1896 NO. 1.

OUR review of the progress of the year, in another column, points to the steady advance being made along the lines of solid improvement. With each additional year the ability for comparison, and the strengthening of the weak points becomes more and more possible. Managers, too, are more than ever coming to realize the necessity for the keeping of records which will enable a positive knowledge of actual cost in all branches of operation.

THERE is a growing tendency also toward the purchase of a better quality, as the fact becomes apparent that interest on extra investment in first cost is far less than repairs on cheaper goods of short life.

THE year has been unusually free from labor complications, and a more harmonious relation than ever before exists between companies and their men. This is due to a better understanding as well as the selection of a better class of men.

ALTOGETHER the next twelve months seems full of promise for street railway interests.

MUNICIPAL ownership is already being questioned in English cities. Newcastle has just abandoned the scheme and given a franchise for twenty-one years to a company to build a cable.

THE Ontario, Canada, Court of Appeals has decided that street railways are common carriers, and that their passengers are "travelers" in the legal sense of the word. The result is a big victory for the street railways, and a correspondingly severe defeat for the Lord's Day Alliance, which has waged a relentless warfare upon the companies, even in some instances to the extent of persecution.

THE Brooklyn City Court has awarded $5,000 personal injury damages to a man hurt by a repair wagon driven at high speed in a public thoroughfare. The judge rules such wagons are amenable to the law which prohibits fast driving. The case is under decision in appeal. Companies will do well to use care in sending out hurry wagons, as the crew in their enthusiasm to make a record for quick work are inclined to become careless and drive at a speed dangerous to pedestrians. Its a good thing to make quick repairs, and appreciated by delayed passengers; but unfortunately there is no hurry wagon which one can send to mend up a big verdict for the damages, which may be awarded in case of running over somebody.

THE energetic and business-like manner in which the executive committee of the American Street Railway Association, has set about making the arrangements for the October meeting, is highly gratifying. Details are now as far progressed as they usually have been by July or August. The selection of subjects for papers, and the assignment to writers could not be better. We commend the wisdom of having but six papers which will permit of their careful attention and full discussion. All meetings will be held in the morning, and the afternoon and evening definitely arranged for. We can assure exhibitors that their displays will receive deserved inspection, and the exhibits already promised are more than ever shown before. The St. Louis meeting will be a big record breaker, and should bring together at least 1,500 street railway men.

THERE is room for vast improvement in the matter of drawbars on a very large number of roads. The excuse can not be put forward that there are no good street railway drawbars because there are. If there is anything that knocks rolling stock to pieces and makes dissatisfied passengers it is crude drawbars. Good drawbars require careful workmanship, but they will soon more than save their cost. It is a common mistake to make drawbars so that not only is there slack due to play at the links but also on account of the drawbars being allowed to hang below a horizontal position when not under strain, so that every time the motor car starts the drawbars fly up with a jerk. A ride on the trailers of some roads is a very strong reminder of a ride on a way freight on a steam road. Freight methods are out of place on a passenger equipment.

AS THE volume of current technical literature increases, we regret to note that many periodicals in this field are falling into bad habits as regards the reliability and accuracy of the news published. It was once a generally accepted fact that while daily paper news was not to be depended on, technical papers were as reliable in

regard to news as in technical matters. Lately, however, we regret to note a deterioration in this respect, due, no doubt, to too much of a tendency to copy without verification the announcements made in the daily newspapers. It has always been the policy of the REVIEW to use great care in verifying all news and it will continue to be so in the future though such a policy involves vastly more labor in proportion to the visible results produced than that of sitting in the office and clipping matter from the daily papers. Mistakes will occur, even with the utmost care but they should be few and far between in a technical paper, and when such papers do make errors they are vastly less excusable and more annoying to readers than in a daily paper because the readers of a technical paper expect, and have a right to expect, reliability. It will be our constant endeavor to make the information in the pages of this paper as nearly accurate as money can make it. Better no news than inaccurate news.

AN inquiry among various roads reveals a great diversity in the mileage obtained from trolley wheels before they are worn out, and it is a very difficult matter to account for these differences. One road running through a certain territory with a certain kind of trolley and bushing, gets only one-half the life out of both wheels and bushings that its neighbor does with the same kind of wheel, operating under identical conditions. Still another road under nearly the same conditions, but with a wheel of supposedly tougher material than the two previously mentioned, thinks it is doing well with a mileage one-half as great as the lowest of the other two. All of these roads have superintendents that give attention to mechanical details and slipshod management cannot be to blame for the differences. There must be some reason for such different trolley wheel records that is not generally understood, or so many good men working under identical conditions would not get such widely varying results. The item of trolley wheels and bushings is not a very large one, but we think managers would not be averse to making a saving even in this small item if they knew how to do it.

THE attitude into which Professor Barrett's paper, the Electrical Journal of this city, has been forced by the recent turn of events, would be amusing were it not that it is liable to do great harm by misleading what small portion of the general public may peruse its columns. We have the spectacle of an electrical paper, a publication which ought, above all else, to use conservative and honest technical judgment, ranting against the trolley system in the idiotic and unreasoning manner which has heretofore been found in the columns of the notoriously prejudiced and unreliable daily press. It is the first engineering publication that has ever come out in bitter opposition to the overhead trolley. It was forced to this position in defense of its patron saint (?) Professor Barrett, who for years, in the face of the most stubborn facts and figures, has opposed the overhead trolley. His opposition has taken the senseless forms, such as usually come from the daily press never such as would come from an honest, intelligent electrical engineer. It was but natural that he should order his paper to his aid in consideration of the roasting he and his statements have been receiving lately. Electric railway people will be specially glad to support a paper which, under the guise of a technical authority, arouses as much opposition as possible to their interests by lying about and misrepresenting the overhead trolley system. It is very pleasant for both advertisers and readers to come across five anti-trolley articles in the course of an issue, especially when they can read the same things in the daily papers.

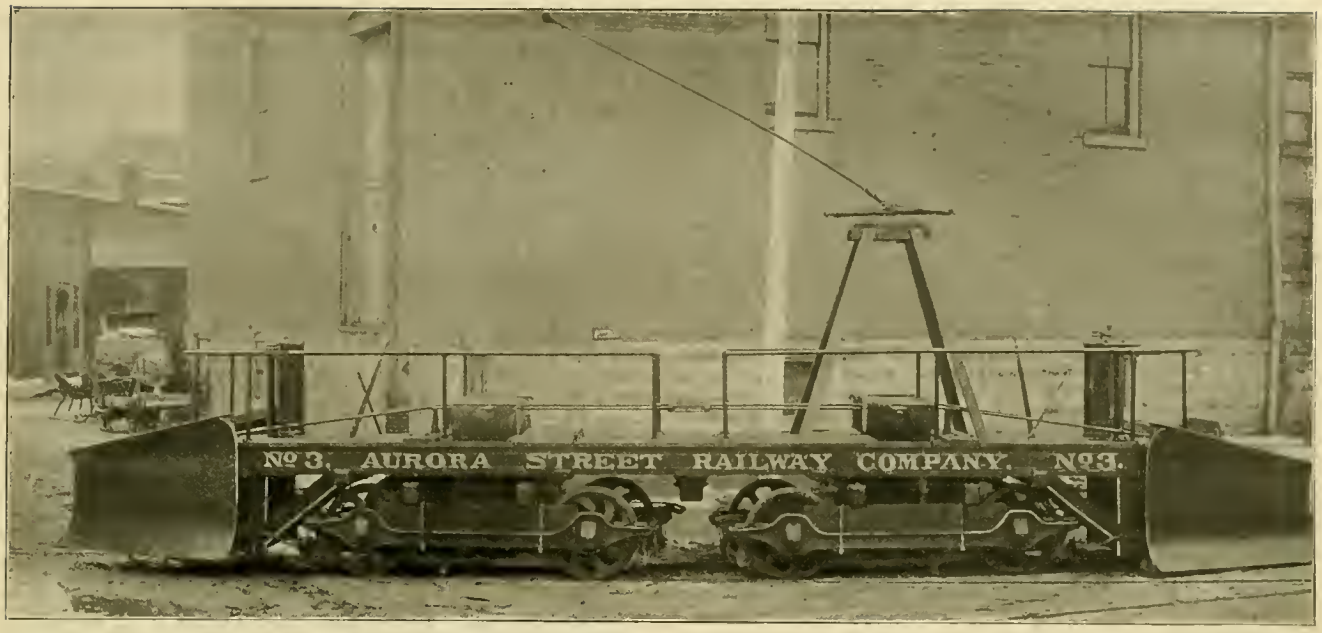
AND still there are some roads that do not believe in spending much care on the education of motormen. They believe that if the motormen are taught to twist the controller handle, the electrical inspectors and repair men will look after the rest. True they will, and they will have plenty to look after, too, where things are run in that way. We recently mentioned this policy to an English tramway manager of note who was in this country to learn as much as possible about our electric railways. His experience with electric railways had been rather limited, but when the policy mentioned was outlined to him he immediately broke out with, "that's all wrong. I know very well that the more a man knows about a horse the more value he is as a driver. We have found that by experience. It stands to reason that the same thing is true of a motorman. The more he knows of his machine the better care he will take of it." In connection with the education of motormen, we want to call attention again to the matter of using an ammeter on the front platform when teaching a new man. This recommendation, made in our December issue, has been endorsed by some of the best electric railway men, and in view of its importance we want to emphasize it by mentioning it again. The ammeter has never been used in this way to any such extent as it ought to be, but its use is such an immense advantage that no intelligent electric railway manager can overlook it.

OFFICIAL REPORT A. S. R. A.

For the first time in its fourteen years of existence the members of the American Street Railway Association have received the official report in the same calendar year in which the meeting occurred. The report covers the proceedings of the convention held at Montreal last October, and is the largest ever issued. It reflects great credit on Secretary Penington, who thus early fulfills our predictions as to promptness and exactness.

PHILADELPHIA STRIKE.

This strike lasting seven days was terminated by concessions on both sides, on December 24. No effort was made to force the mail service, which was temporarily withdrawn. A second attempt on January 3, to renew the strike fell flat.



SIXTEEN-TON HOME MADE SNOW PLOW AT AURORA.

HOME MADE SNOW PLOW AT AURORA.

D. A. Belden, manager of the Aurora Street Railway, has been able to provide his road with an efficient snow plow at a very nominal cost. A pair of noses with lifting mechanism was purchased from the Taunton Locomotive Manufacturing Company. These noses are such as are used on that company's heavy plows. The frame of the plow was then built so as to be adapted to them. In order to gain weight and power two discarded 40-horse-power Detroit bevel gear motor equipments were selected and a separate framework of heavy timber was built for each. Each motor and truck was connected with the main frame by heavy king bolts and turning plates. Each truck thus swivels and takes curves without difficulty. The motors are operated by series-parallel controllers, and by reason of both axles being geared to a single motor good traction is obtained. The entire length of the plow is forty feet, and the weight something over 16 tons. The noses alone weigh 2,000 pounds each. The noses are raised and lowered with a crank and gear movement operated by wheel and staff, and are connected to each other with equalizing rods running the full length of the plow, so that the weight of one plow helps to raise the other. Otherwise the noses could hardly be operated by one man. Heavy cast iron diggers are used provided with raising and lowering mechanism and heavy springs to permit of passing bad joints, and special work with safety. The upper frame work is made very heavy and strong, two 8 by 10 inch outside timbers being used, 29 feet long, and two 6 by 8 inch timbers, 31 feet long. Truss rods prevent the weight of the noses sagging the frame work. Four detachable wings, two to each nose, are used when required, but are not shown in the photograph. The plow has been found very effective, the two 40-horse-power motors furnishing ample power to move any quantity of snow that it has ever been called on to handle. In double track districts the nose plow is, of course, not as desirable as a shear plow, but where there are double tracks the "Walkaway" horse-plow follows the electric and moves the snow from the inside. Everything about the plow is built for strength and any likely obstruction would probably give way before the plow was injured. Being a nose plow there is of course no tendency to leave the track as with a shear plow and it can be run at a higher speed, consequently covering more territory in a shorter space of time. As a great deal of the Aurora system is single track the plow is well adapted to the service it is used in and is a credit to its builders. Its cost complete, not including motors, was $600.

ANNUAL REPORT, CHICAGO GENERAL.

The Chicago General Railway Company, which sells six tickets for a quarter, presents the following report.

RECEIPTS.

From Passengers	$	81,221
Miscellaneous		860
Total	$	82,082

DISBURSEMENTS.

Operating expenses and fixed charges	$	64,333
Surplus		17,741
Total	$	82,082

Passengers carried in 1893	28,550
Passengers carried in 1894	955,229
Passengers carried in 1895	1,746,112
Increase of 1895 over 1894, per cent	83
Miles of single track in operation	16

While the longest haul on this company's lines is about four miles, the great bulk of the riding is short and will average probably less than two miles. At this writing, (January 11.) the three cent fare has not yet materialized.

MOTOR CARE AND REPAIR AT INDIANAPOLIS.

Scientific Testing Methods in Daily Practice—Great Reduction in Armature Trouble—Small Investment Saves Much Money.

In our issue of January, 1895, the ammeter and voltmeter methods of testing motors for insulation, resistance and conductivity were fully described as to technical details, and it will not, therefore, be necessary to outline, except briefly, the principles of those methods, which have been put in very practical shape for every day use by H. B. Niles, electrician of the Citizens Street Railroad, Indianapolis. The methods themselves are not new, but they have never before been put in as convenient a form for repair shop work or used as extensively as there. Mr. Niles has made a very thorough study of motor troubles, and this together with his experience, dating from the first Sprague road at Richmond, has enabled him to evolve a system of caring for motors which probably has few equals in the electric railway practice in this country.

When the fact is stated that the testing system in vogue now has reduced the expense from armature troubles over one-half it is seen that there certainly must be something about the system which is worthy of investigation. Since being put in by Mr. Niles at Indianapolis it has been adopted by the Louisville Railway.

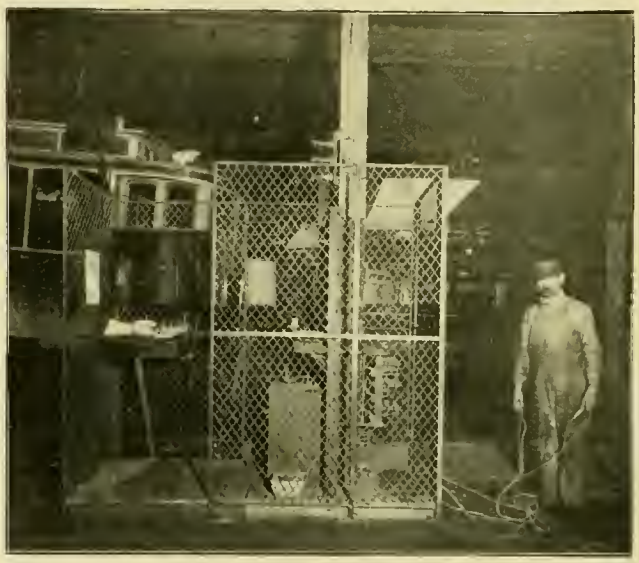
The principle of the voltmeter test for insulation resistance is as follows. The voltmeter is first connected across between the trolley and the rails and the full voltage reading taken. Then it is connected in series with the insulation of the motors. That is, one pole is connected to the trolley and the other to the windings of the motor to be tested. Whatever current flows through the voltmeter in the latter case must leak through the insulation of the motor windings. To figure out the insulation resistance in ohms the following formula is employed:

Let X be the insulation resistance to be determined in ohms; E the full voltage between trolley and track; R the resistance of the voltmeter in ohms; V the reading when connected through the insulation. Then:

$$X = \frac{E\ R}{V} - R$$

The voltmeter suitable for this work is the ordinary Weston portable (such as every railway has) of about 80,000 ohms resistance, and reading up to 600 volts. In actual practice at the Indianapolis shops the men who do the testing do not stop to figure out the formula, as it is not necessary with a fairly constant trolley voltage. The instructions to the men are that when they get a test reading of over 200 volts (V) the car must receive further attention. A reading of 200 volts represents (with an instrument of 80,000 ohms resistance and 500 volts on the trolley line) an insulation resistance of 120,000 ohms. When the reading is more than 200 volts the men proceed to definitely locate the weak places in the insulation by disconnecting the motor leads and testing the armature and field coils individually. It is needless to say that incipient troubles are found by this test where they would not be found with the magneto.

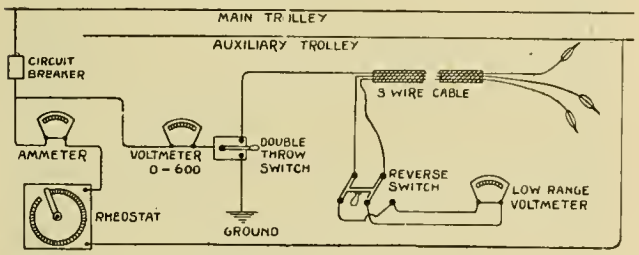
But a more valuable test still, is that to determine the internal resistance of the motors. For this test a rheostat capable of passing safely 75 amperes at 500 volts and a low reading voltmeter are the only appliances necessary. In the whole testing outfit the only thing that most roads would have to buy would be the low reading voltmeter. To test the resistance of any one of the coils of a motor a current is passed through it (the quantity being measured by the ammeter) and the difference of potential between the terminals of the coil is noted with the low reading voltmeter. Then, according to Ohm's law the resistance of the coil is equal to the voltage at the terminals of the coil divided by the current in amperes. This being a simple case of division in arithmetic the resistance in ohms is calculated by the shop men for each



CAGE FOR INSTRUMENTS—INDIANAPOLIS SHOPS.

test and put on the records. The great importance of this resistance test lies in the fact that it discloses burned-out and short-circuited field coils which are apparently all right on the exterior and which are not grounded on the frame. Short-circuited field coils are a prolific source of burned-out armatures, and hence, by striking a blow at the field troubles, a very considerable portion of the armature trouble begins to disappear. To better illustrate this, suppose we take as an example the experience at Indianapolis at the time the new system of testing was put in service. Previous to the inauguration of the system there were certain cars on the road that came in frequently with armature troubles. No sooner would they be put in service after being repaired, than back they would come to the shop for more attention. Indeed there was a certain ring of them that seemed to have a monopoly of the repair shop. Mr. Niles' experience and knowledge told him that there must be something wrong with the fields, and so insisted to the men. They, on the other hand, protested that the fields

appeared perfectly sound, and they, on their side, were right. When the testing was begun the whole truth was revealed. Some of the field coils that looked perfectly sound tested up with too low a resistance and were taken out and examined. At the core they were burned out. The only way to have discovered them without the resistance test would have been to begin and tear apart one field of a motor after another until the bad one was discovered. The chances are with such a method of discovering the faulty coil, several good coils would have to be torn out before it was discovered, and at any rate without the testing arrangements the fact that there was a faulty coil would not be discovered until it had made itself known by burning out several armatures. When a field coil is short-circuited it is weak in magnetizing effect and consequently exerts little influence on its armature either in the way of torque or counter electro motive force. The result is that an enormous current passes in proportion to the work that is being done and the armature suffers.



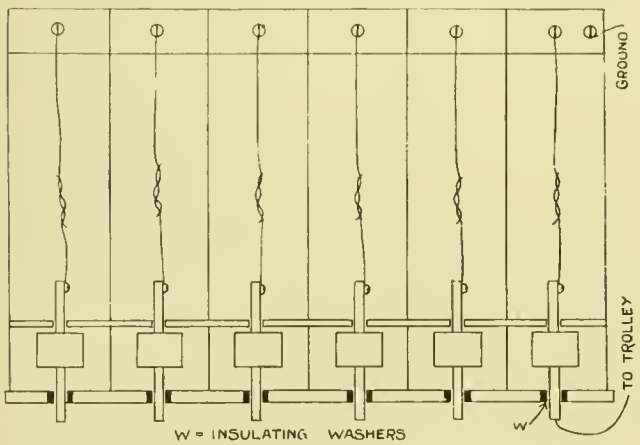
CONNECTIONS FOR TEST INSTRUMENTS.

Having discussed the principles of the testing arrangements we will look at their practical application in the Indianapolis shops. All the instruments are put in a cage in the middle of the room, where is also a desk and the necessary record books. The connections of the instruments are shown in the accompanying diagram. Over all parts of the shop where cars are to be tested is run an auxiliary trolley for test purposes. It is connected in series with the ammeter and rheostat in the testing cage. From the instruments in the cage there is also run, to whatever part of the shop it is needed, a flexible cable having three conductors insulated from each other and terminating in contact points on handles. They are marked so that the workmen can distinguish them from each other. Where the wire from the main trolley enters the cage a circuit breaker is put in to cut out all the testing circuits in case of accident. The voltmeter, reading from 0 to 600 volts, for the insulation resistance tests has one pole connected to the trolley wire permanently, and the other to a double throw switch so that it can either be connected to the ground to take the full voltage between the trolley and ground, or by throwing the switch the other way can be connected to one lead of the car tester's cable. To test the insulation of a motor, for example, the cable is taken into a car and the point put against commutator or brush holder. The voltmeter deflection is noted, and if it is more than 200 volts the fields and armature are tested separately to find where the excessive leak is. The same method is applied to testing the insulation of the car resistance, controller wiring, etc. To test the internal resistance of motors, car resistances, etc., the trolley is put on the auxiliary wire which is put close beside the regular trolley. The armatures are cut out by taking out the brushes and connecting jumpers across the brush holders. A current of from 10 to 50 amperes is then turned on at the rheostat in the test cage, the car controller having been put on the first point. The man in the car makes contact with points B and C at the terminals of the coil he is testing. If there is a deflection on the low reading voltmeter it is known that the current is flowing the right way through the instrument. If there is no deflection a reverse switch is thrown by the man at the instrument so that the connections are made right and the deflection noted without delay. This voltage reading, divided by the current flowing at the time it was taken, gives the resistance in ohms of the circuit tested. For convenience in calculating, unless the resistance to be determined is very low, the current used is generally 10 amperes, so that the voltage reading has simply to be divided by 10. For low resistance tests the current must, of course, be higher in order to get an appreciable voltmeter deflection. As the insulation becomes old and charred the resistance falls off by an appreciable amount, and when it gets too low must receive attention.

CRYSTALLIZATION AND INSULATION.

There are two things that limit the electrical life of a motor armature, viz.:—(1) Crystallization and breaking of wires due to jar; (2) weakening of the insulation, due to heat. Now Mr. Niles reasons that the life of an armature ought to be limited only by the former. No cure has ever been found for crystallization, and when it once sets in and armature conductors get brittle and break, there is nothing to do but to rewind the armatures. The point then is to get the armature insulation to stand up until crystallization of the wires begins. If this can be done the maximum possible usefulness of an armature has been obtained, and toward this goal we should all strive. The crystallization period is about two years at Indianapolis, where all cars make a high daily mileage and there are plenty of grade crossings. It will, of course, vary greatly with conditions. The testing arrangements already described are helping armatures to live up to the crystallization limit, and other new methods to be described later in this article will make still further improvement, but just at this place it will be in order to describe an appliance which, in a way of its own, has helped weak amatures to hold out until of no further use. When an armature gets old and its insulation weak, its worst enemy is lightning. When there are a lot of armatures on a road which are about the same age, and that age is within a few months of what would be their life in winter service with no lightning, one thunder-storm may disable a large number at once. Having a lot of armatures of this kind, and feeling greatly the need of a more sensitive arrester than could be obtained on the market, he designed the arrester

shown in the accompanying sketch. Two No. 20 single cotton covered copper wires daubed with shellac, are twisted loosely together. One wire is connected to ground, the other to trolley. The lightning easily jumps through the two cotton coverings and starts a flow of



LIGHTNING ARRESTER.

current to ground through the No. 20 wires of such volume that they are melted and the circuit broken. There are six of these fuses. As fast as one is burned out another is cut into circuit automatically. Each fuse is in an air-tight chamber of its own. The mode of action is apparent from the sketch.

IMPROVEMENTS IN ARAMATURE COILS.

No less important than the changes heretofore mentioned are those now being inaugurated by Mr. Niles, in the methods of winding armature coils and testing material used in their construction. As the greater part of the equipment on the Citizens' road is now old enough so that many armatures will probably soon have to be rewound, it became important to investigate methods, and after consideration it has been arranged that the road is to adopt practically the same methods as are now in use at the Westinghouse shops at Pittsburg. This will be the first electric road to adopt such complete testing arrangements, and great credit is due the management in being the first to make a move that all large electric railways must come to in time. The attention of Mr. Niles was called to the Westinghouse shop methods first by the excellent character of some of the armature work recently furnished to the road by that company.

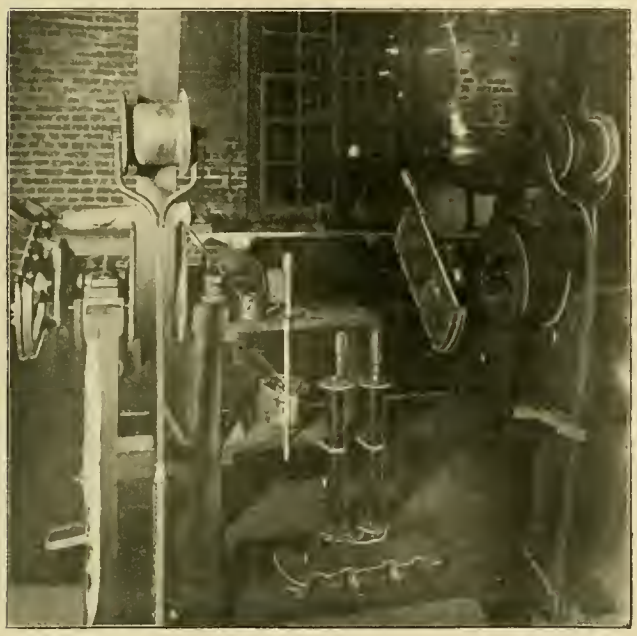
One of the most essential features of the system is the thorough testing of all the insulating material that goes into the construction of an armature. For this purpose a two and one-half horse-power rotary transformer has been ordered. The 500-volt direct current is fed in at one end of the armature and at the other end collecting rings take off an alternating current of about 350 volts. This alternating current is taken to a stationary step up transformer, which can be regulated to give anything from 10,000 volts down for testing purposes. Every bit of fuller board, every piece of tape and every completed coil that goes into an armature will be tested under a high voltage before it is used. It has been found that material which comes in the same lot and has the same outside appearance varies greatly in its actual insulating properties. In other words, unless all the material is tested a manager is absolutely in the dark as to the materials he is putting in his armatures, and can have no assurance as to their life. If the same lot of material from the same maker varies so greatly, how must it be with the material from different factories? A salesman comes to the manager of a road and says: "Here, I have an insulating material better than what you are now using and at a lower price." How does the manager know whether he tells the truth? Has he any means of knowing? Ordinarily he does not. With the high voltage testing outfit he has protection against poor material and some assurance that when an armature is put on the road it will stay out for some good proportion of its natural life. In testing the fuller board, a sheet of it is put on an iron plate the plate being connected to one pole of the high pressure transformer. To the other pole is connected a steel hand roller. This is passed over the board while the pressure is at 2,000 volts, and if there is not a breakdown of the insulation, the sheet is passed as good. The tape and the finished coils ready to go on the armature are also put to a high voltage test as is also the armature when it is completed.

Another valuable use to which the rotary transformer can be put is in detecting short circuited coils in an armature. The alternating end of the machine is connected to a portable pole piece having a coil about the size of the regular railway motor field coil. This pole piece is mounted on a truck the same height as the armature racks in use in the shop. The pole piece is then wheeled up to the armature to be tested and brought in the same position in reference to it as if in the motor. Then the alternating current is turned through the pole piece. Whenever a short circuited armature coil is brought in front of the pole piece, a secondary current will be induced in it so that a magnetic attraction will be noticeable in a piece of iron held at right angles to the coil. Accordingly the workman slowly turns the armature on the rack while holding a piece of iron in the proper position and when the short circuited coil comes around it is easily detected by the attraction.

The high voltage step up transformer, giving a maximum of 10,000 volts can by no means be considered a safe thing to have where all the shop men can get at it, although no serious accidents have resulted from its use in the Westinghouse shops. At Indianapolis, it will be locked up in a place by itself and only one or two men allowed to use it.

The system of winding armature coils used by the Westinghouse company has been already put in practice by Mr. Niles, with the exception of the material testing, the apparatus for which has not arrived yet. The coils are wound on a form in a lathe, the sides being wound over strips of fuller board which are folded over and glued with fish glue. The glue having been put on, two long hot irons are clamped down on the sides and left

there until the glue is set. Those irons are kept hot in electric heaters made of coils of german silver wire. The irons, heaters, and the forms on the special winding lathes are shown in the accompanying engraving. One iron is shown clamped in place. After the glue is set, comes a most important but simple operation, whereby the insulation of the coil has been found by tests to be increased five times. It consists in coating the coil with a good copal varnish, such as can be obtained from almost any varnish maker. The coil is then baked at 185 degrees until dry. The insulating properties of this copal varnish are truly remarkable. If two coats of it are spread on a sheet of thin paper, and an



WINDING LATHES, FORMS, DRYING IRONS AND IRONS IN ELECTRIC HEATER COILS.

attempt is made to break through the insulation by putting the poles of a 10,000 volt circuit on each side, the current will jump around an inch and a half to go over the edges of the paper rather than pierce directly through. Each lot of varnish used is to be tested in a manner similar to this. This varnish has the important quality of elasticity. After the coils have been baked, they are taped and put on the armature as usual. One armature winder, an assistant and three boys now take care of all the armatures on the 115-car road. All the skilled labor is practically performed by one man.

USELESS INSPECTION EXPENSE.

Within the past few years, Mr. Niles has become convinced that there is now a tendency to spend too much on inspection, and that sometimes it is a case of spending $25 on inspection to save $5 on repairs. He was formerly a believer in the practice of taking motors out and thoroughly overhauling them every six weeks. This time has been lengthened by him now to six months and the general plan of inspection and repair materially changed. He reasons that if the details are looked after every night there is nothing which should require special attention in a less time than six months; that period being the life of that part of the equipment which wears out the most quickly, viz.:—the bearings. The electrical part of the motor has an indefinite life, and taking a motor apart every six weeks will not add to its life. When a car comes in for its regular repairs or because of any trouble it is tested for electrical faults, but otherwise it is allowed to run until trouble shows up, as it is believed that this is cheaper than spending a lot of money hunting for trouble and not finding it.

NEW YORK AND BROOKLYN RAILWAY SUPPLY COMPANY.

A Strong Company—Experienced Men With a New Plant Works at Elizabethport, N. J.

The New York and Brooklyn Railway Supply Company is the corporate name of the consolidation growing out of the union of the forces of the Lewis & Fowler Manufacturing Company and Lewis & Fowler Girder Rail Company, both of which companies were taken out of receiver's hands early this month, and the interests of J. A. Trimble. The company has purchased the extensive and finely equipped plant of the Fowler Car Company at Elizabethport, N. J., and already has started in active operation. The names of the officers are already well and most favorably known to the trade. J. A. Trimble, as president, has for years been an extensive manufacturer of car trimmings and parts, and in more recent years, of cars. His ability as a manager, and the high quality which has always characterized his output, need no comment. W. L. Brownell, who for several years past was secretary of the Lewis & Fowler Manufacturing Company, takes the same position in the new concern. C. L. Cammann, Jr., son of the New York banker, is treasurer. Frank A. Morrell, whose genial countenance is ever welcome, and who, for years represented the L. & F. on the road, has already started in on his former work. W. C. Wood, who is vice-president of the new company, will have charge of the rail and special track work. He is well-known as formerly manager of the L. & F. Girder Rail Company.

In the factory, some additional improvements have been made in machinery and buildings, although the plant was admirably planned for street car work. Lumber leaves the cars to enter the drier, and by a continuous progression passes from one building to another to emerge in the shape of completed cars. The work contemplated will be large and varied, including cars, sweepers, snow plows, registers, special track work and a full line car trimming fixtures and appurtenances.

With so many men of long practical experience in the work, and so well acquainted with the trade, together with a strictly modern plant, favorably located as to raw materials and the shipping by rail or water; the new enterprise has everything to make it the success we gladly predict for it.

CAN RUN CARS ON SUNDAY.

Cars can be operated on Sunday in the Province of Ontario, Canada, the Court of Appeals having decided against the Lord's Day Alliance, which endeavored to secure an injunction restraining the Hamilton street railway from operating its cars on the Sabbath. The attorney for the street railway argued that as the street railway conveyed travelers it came under the exception of the act. His opponent maintained that a street car passenger was not a traveler, because a traveler must travel from one jurisdiction to another before he could be legally looked on as a traveller. The judge said a man became a traveler instantly from the time he set out, no matter what might be his destination or the object of his trip. He ruled that street railways were bona fide common carriers and were empowered to run on Sunday.

The Alliance attorney held that the act of Charles II was in force. The judge said if it was it worked rather against the plaintiff, for under it people could be compelled to go to church, and therefore, if weak in body, the street railway was a work of necessity to carry them to church.

It so happens that the Toronto Railway Company is prevented from taking advantage of the decision on account of a clause in its franchise requiring it to run no cars on Sunday. Samuel Blake, the attorney, who drew up the franchise for the city, is a pronounced Sabbatarian, and thought he would compel the company to cease operating on Sunday in that way. Now efforts are being made on the part of citizens to have the authorities rescind the clause.

DISHONEST EMPLOYES POCKET FARES.

Officials of the Third Avenue Railroad, New York, had their suspicions aroused when some of the conductors habitually turned in an alarming number of transfers, while the cash fares correspondingly decreased. As frauds had formerly been detected on the part of transfer agents, the latter were watched with the assistance of city detectives. After four weeks Robert E. Maguire, a gripman, was arrested, with 800 transfers and a punch on his person. With this damaging evidence he confessed that he was regularly buying transfers from William H. Klien, the agent at Grand street, at $1 per 100, and selling them at $2 per 100 to conductors, one of whom he named. The others when arrested admitted their guilt. It is estimated that the company for months had been defrauded of $15 to $30 per day. The men were indicted by the grand jury.

On the Elizabeth, N. J., branch of the Consolidated Traction Company, 5 at least of the conductors have been robbing the company by exchanging transfers. When taken into custody three of them confessed they had thus added $9 per week to their wages. The ones who admitted their guilt were discharged and the others prosecuted.

At Atlanta, Ga., the Consolidated Street Railway Company was victimized by J. E. Foley, a conductor recently imported from Chicago. One night, out in the suburbs with no passengers aboard Foley turned out the lights and rang the register from 1650 all the way around to 1450. Having thus made a difference in his favor of $10, he offered $5 to the motorman, but the latter reported the occurrence next morning to Manager Hurt, and two days later Foley was arrested and held on the charge of embezzlement.

CONDUCTOR'S CHRISTMAS CASH.

Through a suggestion in the daily papers the old English custom of handing the street car conductor an extra fare on Christmas day was mildly observed in this city. One philanthropist passed over six pennies with the following result:

"Der vas a cendt over," said the conductor.

"O, certainly, for Christmas, you know," replied the man.

The conductor looked at him sharply.

"Nodt mudtch, Mr. Spodder," said the conductor in a voice which reverberated through the tunnel. "Tage back your benny," and the man took it back and put it away down in his pocket and tried to make believe he didn't see the people in the car laughing at him. Then he got off the car

The next conductor he tried it on, inquired:

"What's this extra penny fer?"

"Why, it's Christmas, you know."

"Yes. I know what it is, but I don't want your pennies."

Then he made one final attempt and handed over fifteen pennies. A few minutes later the fare collector approached him with.

"Where's the other two?"

"What other two?"

"Didn't you pay two extra fares?"

"No; that was for Christmas."

"Well, Yerke got 'em, fer I rung 'em up."

TO RUN HORSELESS CARRIAGES.

Reports come from Cleveland that a company is being organized to operate horseless carriages in that city. It is the intention to have the line in operation by June, and charge 2½ cents fare. While the new company will magnanimously permit the street railways to operate their cars, there is one thing it will demand, and that is, all the old rails must be taken up and replaced with grooved rails, so that the wheels of the horseless vehicles will not be injured by turning out of the tracks! The carriages will have a capacity for twelve passengers seated and eight standing. It is believed an ordinary hack license will be the only fee required for a permit to operate.

The Binghamton Street Railway, Binghampton, N. Y., has completed its 7-mile extension to Union.

COST OF TRACK LAYING.

We are often asked for figures on the cost of street railway track construction and we, therefore, feel that the following figures will be of interest both to those of our readers who have had limited experience with track laying and to those who may wish to compare their own work with that of others. They are taken from a report of John A. Beeler, constructing engineer of the Denver Tramway Company, made to that company, on the cost of certain sections of track laid according to various specifications. The figures are estimated costs, but as Mr. Beeler has had a very wide experience, and has made street railway track his specialty they are probably nearly as good as actual cost figures. Certainly, if anyone is competent to handle the subject of street railway track it is Mr. Beeler. The designations, section A, B, etc., indicate the different specifications.

The estimates are all for 1.32 miles of track, although there are but 1.25 miles of excavation, grading, concrete work and paving, the remaining .07 mile being on a bridge over the Platte river.

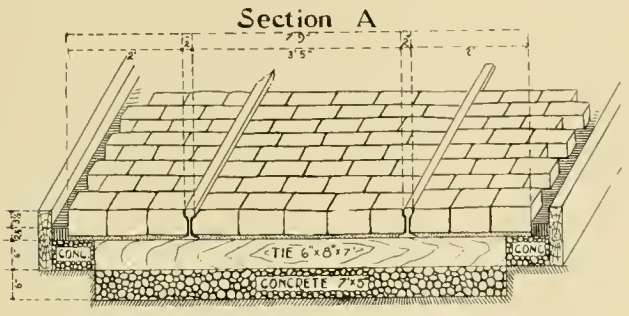
ESTIMATED COST—SECTION "A."

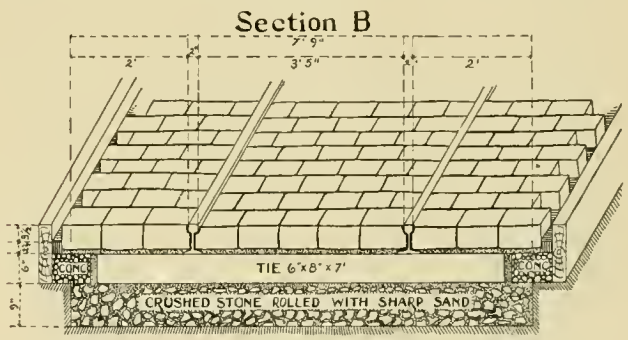
Seventy-two-pound track cast-weld joints—60 foot rail lengths—Burnettized ties—Basalt block pavement—Concrete foundations—Permanent construction—1.25 miles single track including pavement 2 feet outside of rails and between rails.

150 tons 72-lb steel @ $33.00	$4,950.00
240 cast-weld joints @ $3.25	730.00
8,000-lb railroad spikes @ $2.05	164.00
3,300 Burnettized ties 6 inches x 8 inches–7 feet at 60c	1,980.00
13 steam railroad crossings @ $400.00	5,200.00
4-72-lb switches @ $225.00	900.00
2-72-lb curve crossings @ $250.00	500.00
450 feet curve and guard rail, etc., @ $1.00	450.00
500 yards excavation in street (approx.) @ 30c	150.00
Hauling	400.00
	$15,474.00
1.32 miles of track laying and blocking up @ $800	$1,056.00
3,010 cubic yards excavation for track trench @ 30c	903.00
1,568 cubic yards concrete mixed and tamped in place 6 inches below ties—between ties—and 3 inches beyond stone blocks @ $4.25	6,664.000
42,000 feet B. M. 3 inches x 12 inches header in place @ $21.00 M. (This will be saved and taken out)	882.00
Water for flushing and concrete	40.00
Steam roller for trench	150.00
5,303 square yards Basalt block pavement @ $2.25	11,943.50
62 cubic yards K. B. & S. cement grout between blocks and header @ $10.00	620.00
	$37,916.50

SECTION A.

This construction embodies the very best that can be devised, the foundation being a continuous bed of concrete 6 inches deep under the ties, the space between the ties being also filled with concrete and tamped in under the base of the rail, giving each rail a continuous bearing. The concrete being 1 part Louisville cement and 2 parts clean river sand, and 3 parts gravel, will be capable of sustaining the track and pavement indefinitely. It will be noticed in the arrangement of the concrete base that it extends 3 inches each side of the 2 foot limit line of pavement, and that every other row of paving blocks set back 4 inches from the same line; the blocks being held firmly in place by a layer of thin grout of K. B. & S. cement and coarse sharp sand; this grout coming up to within 3½ inches of the surface of the pavement. When the balance of the street is paved, the supporting headers are removed and saved for use again. The concrete base of the asphalt will be brought up flush with the top of the grout and the sheet asphalt, laid and toothed into the stone blocks overlapping the joint in the foundation. Thus is a very effectual bond obtained. At no point does the adjoining of the asphalt and stone pavement occur directly over the seam between the concrete and grout. With burnettized ties, this construction will no doubt last fifteen to twenty years, provided the joints will hold out. The burnettized ties, if properly preserved, thus encased in concrete on bottom ends and sides, and with sand cushion and pavement above, should last thirty years or longer. New rails can be relaid upon the same ties and foundation. This Basalt block pavement will last fifteen to twenty years, and then much of it will be good for relaying.





ESTIMATED COST—SECTION "B."

Seventy-two-pound—cast-weld joints 60-foot rail lengths—burnettized ties, Basalt block pavement—crushed stone and gravel foundation—1.25 miles track.

150 tons 72 lb rails @ $33.00	$ 4,950.00
240 cast-weld joints @ $3.25	780.00
8,000 pounds railroad spikes @ $2.05	164.00
3,300 Burnettized ties @ 60 cents, 6x8 inches, 7 feet	1,980.00
13 steam railroad crossings @ $400 each	5,200.00
4 72-pound switches @ $225.000	900.00
2 72-pound curve crossings @ $250	500.00
450 feet curve and guard rail @ $1	450.00
500 yards excavation in street (approx.) @ 30c	150.00
Hauling	400.00
	$15,474.00
1.32 miles track laying and thorough tamping @ $900	1,188.00
3,620 cubic yards excavation for track trench @ 30c	1,086.00
1,835 cubic yards crushed stone delivered in place in trench and spread in 3-inch layers @ $1.60	2,036.00
1,250 cubic yards sharp sand for voids spread on each layer of stone flushed and rolled @ 60c	750.00
Steam roller for trench	$150.00
Steam roller for two layers of broken stone (12,000 square yards @ 2c)	240.00
	390.00

Water	7500
161 cubic yards concrete 8x6 (at 2-feet line from rail) @ $5.	805.00
50 cubic yards K., B. & S. cement between blocks and headers @ $10.00 (sec. B)	500.00
42,000 feet B. M. header @ $21 in place (to be afterward removed and saved)	882.00
5,540 square yards Basalt block pavement @ $2.25	12,465.00
	$36,551.00

SECTION B.

This construction is similar to that of Section A, except in the following particulars: The base or foundation comprises seven inches of crushed stone, averaging one and one-half-inch cubes. This is placed in the trench in layers of about three inches, thoroughly mixed with sharp sand, to fill all voids, and rolled with a steam roller. Space for two inches of sand is allowed for tamping under the ties. The space between the ties is also filled with crushed stone and sand, thoroughly tamped, rammed and flushed. Where the stone pavement joins the asphalt a perfectly solid foundation must be secured. To obtain this a strip of concrete eight inches wide and six inches deep projecting four inches either side of two-foot limit line is recommended. The stone pavement is alternately projected two inches beyond and two inches inside of this line, making a four inch bond with the asphalt when laid. K. B. & S. cement grout is poured in between the header and blocks, holding them in place same as in section A. Thus, when the pavement is completed, the asphalt laps over the seam as well as bonding into the stone blocks. The strip of concrete serves a double purpose, not only that of supporting the bond of the pavements, but keeping the stone and sand between the ties from working out sideways. All the settling must be down, which, when the foundation is thoroughly rolled and flushed, as is specified, will no doubt be small. The greatest danger to this style of construction is the undermining of the tracks by excavating for the purpose of making connections with or the repairing of water and gas pipes, sewers, conduits or steam heating pipes, of which a great number exist in lower Fifteenth street. With excavations crossing under the tracks or running parallel thereto the crushed stone is very apt to become loosened and settle. At such places the blocks could be removed, track raised and retamped and blocks replaced without disturbing the concrete base under the pavement at all, as will be seen in diagram of section B. These strips of concrete are just outside of the ends of the ties. Raising or settling of the ties will not affect it. If more or less than seven inches of crushed stone is used it will make a difference of about $395 for each inch in depth upon the entire job, as follows:

161 cubic yards excavation in trench	$ 48.30
161 cubic yards crushed stone @ $1.60	257.60
80½ cubic yards sand @ 60c	48.30
Rolling (approx.)	34.00
Water	6.00
Total for each inch in depth of foundation under ties	$394.20

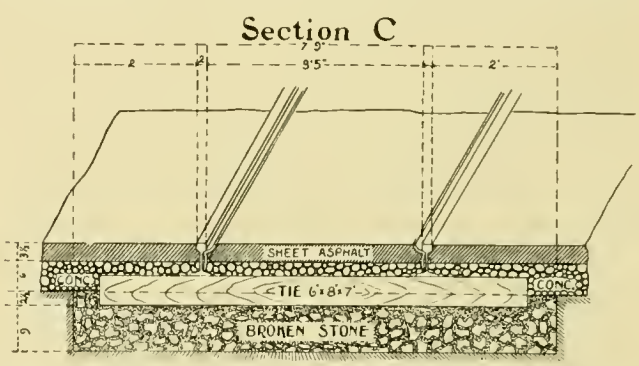
ESTIMATED COST—SECTION "C."

Seventy-two pound track, cast weld joints, 60-foot rail lengths, Burnettized ties, asphalt pavement with crushed stone foundation, 1.25 miles track:

Rails, cast-weld joints, spikes, burnettized ties, railroad crossings, switches, curve crossings, guard rail for curves, hauling and grading	$15,474.00
54 tons (net) steel flange guard @ $40.00 (25 pounds to yard)	2,160.00
5,000-lb machine bolts @ 2½c	125.00
Placing flange rail, $100.00, and drilling 6,500 holes @ 5c	425.00
Rolls for flange	$ 600.00
1.32 miles track laying and thorough tamping @ $900	1,188.00
3,370 cubic yards excavation track trench @ 30c	1,011.00
1,360 cubic yards crushed stone delivered in place in trench and spread in 3-inch layers @ $1.60	2,176.00
1,010 cubic yards clean sharp sand (spread on each layer of stone and rolled) @ 60c	606.00
Steam roller for trench	$150.00
Steam roller for 3 layers of broken stone, 13,000 square yards @ 2c,	$360.00 510.00
Water	75.00
5,540 square yards Blake asphalt pavement @ $2.64	14,625.60
	$38,975.60

SECTION "C."

Track laid in asphalt pavement should have the most solid and substantial base. The almost impreceptible settling of the sand and crushed stone will crack the asphalt and eventually destroy it. Any slight undermining of the tracks for the excavation of service pipes, etc., would have an almost



immediate effect. A concrete base would successfully bridge such inequalities in many cases, and their existence might never be suspected. It is doubtful if this form of construction would prove successful with asphalt for pavement.

ESTIMATED COST—SECTION "D."

Seventy-two-pound track, cast weld joints, 60-foot rail lengths, burnettized ties, sheet asphalt, concrete foundation, 1.25 miles track.

Rails, cast weld joints, spikes, burnettized ties, railroad crossings, switches, curve crossings, guard rails for curves, hauling and grading	$15,474.00
54 tons (net) steel flange guard @ $40.00 (25 pound yard)	2,160.00
5,000 lb machine bolts ¾ inch x 2 inches @ 2½c	125.00
Cost of rolls for steel flange	600.00
Placing and bolting flange $100, drilling 6,500 holes, $325	425.00
1.32 miles track laying and blocking up @ $800.00	1,056.00
2,888 cubic yards excavation @ 30c	866.40
1,031 cubic yards concrete mixed and tamped in place 6 inches below ties and 2½ inches between ties @ $4.25	4,594.25
Water	40.00
Steam roller for trench	150.00
5,540 square yards Blake asphalt @ $2.64	14,625.60
	$40,116.25

SECTION "D."

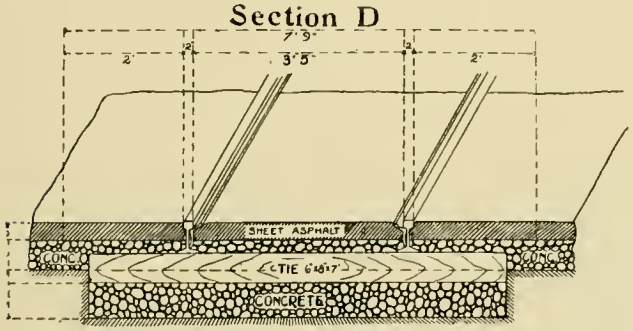
This is the same general construction as section A, with asphalt instead, of stone block pavement, and a light section of steel flange bolted to rail, especially rolled for the purpose. Provided a contract could be let to another company other than the one paving the street, headers would have to be provided for; also allowance made for lapping the asphalt over the seam, which would more than offset the saving in price, unless a very great reduction was obtained. It being supposed that we could obtain the same price as given for the stone blocks, viz: $2.25, the saving would amount to 5,540 square yards at 39c. or $2,160.60 all told.

To which must be added the following:

Header as estimated	$ 882.00
120 cubic yards grading @ 30c	36.00
722 square yards asphalt for 6 inches lap @ $2.25	1,624.50
	$ 2,542.50
Difference in price	2,160.60
Amount in favor of the $2.64 price	$ 381.90

Thus it is seen that the really cheapest price is the seemingly highest figure. The seam, no matter how carefully

Section D



made, is a bad feature, and detrimental to the pavement. Salt is not beneficial to asphalt, and coal oil will utterly destroy it with a very few applications. Asphalt pavement will last from five to eight years. Replacing for any purpose in the tracks means an expenditure equal to the first cost, as practically nothing is saved.

A 60-pound rail with same general construction will save:

14 tons of rail @ $33.00	$ 462.00
10 tons or flange @ $40.00	400.00
200 yards excavation @ 30c	60.00
127 yards concrete @ $4.25	539.75
Water	13.50
	$ 1,474.25

A 60-pound rail, however, would not have the same amount of wear in it, of course, and more subject to vibration and change of temperature. In my opinion, asphalt will not give perfect satisfaction. The first cost is slightly more; repairs when needed 300 per cent more than same repairs in block pavement, and the total life of the pavement much shorter.

ESTIMATED COST—SECTION "E."

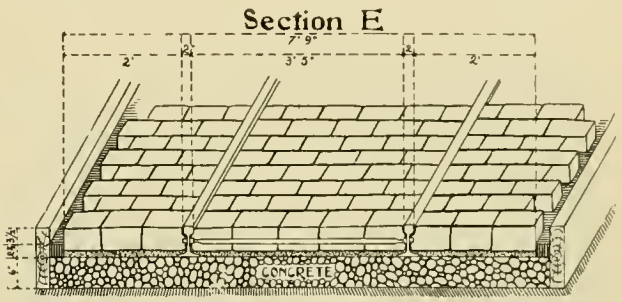
Seventy-two-pound track, cast weld joints, 60-foot rails, no ties, K. B. & S. concrete base, Basalt block pavement, 1.25 miles track.

150 tons 72-pound rail @ $33.00	$ 4,950.00
240 cast weld joints @ $3.25	780.00
13 steam railroad crossings @ $400.00	5,200.00
4 72-pound switches @ $225.00	900.00
2 72-pound curve crossings @ $250	500.00
450-feet curve and guard rail @ $1.00	450.00
400 ties at curves and railroad crossings (only) $1.00	400.00
500 cubic yards excavation in street (approx.) 30c	150.00
8,000 pounds tie bars with nuts @ 2½c	200.00
Hauling	250.00
	$13,780.00
1.32 miles track laying and blocking up @ $900.00	1,188.00
2,150 cubic yards excavation track trench @ 30c	645.00
1,015 cubic yards extra quality K., B. & S. concrete @ $8.00	8,120.00
125 cubic yards concrete where ties are used @ $5	625.00
42,000 feet B. M. 3x12 inches header in place @ $21	882.00
Water for flushing and concrete	35.00
Steam roller for trench	150.00
5,308 square yards Basalt block pavement @ $2.25	11,943.00
62 cubic yards K., B. & S. cement grout between blocks and header @ $10.00	620.00
	$37,988.00

SECTION "E."

This is a new mode of construction for electric track. It is being used to some extent in Toronto, Canada. The ties are done away with altogether, except in special work, the base of the rails resting directly upon the concrete, the gage being held by means of tie rods at intervals of six feet. The concrete is of the very best character imported Portland cement. It should have at least six weeks' time to set before any load is allowed. K., B & S. concrete mixed as about the proportion, of the concrete in an old cable construction would cost about $3.00 per cubic yard. This would make a rigid track.

Section E



ESTIMATED COST—SECTION "AA."

Seventy-two pound track, cast weld joints, 60-foot rails, special size, light Burnettized ties, concrete base, Basalt block pavement, 1 25-100 miles track:

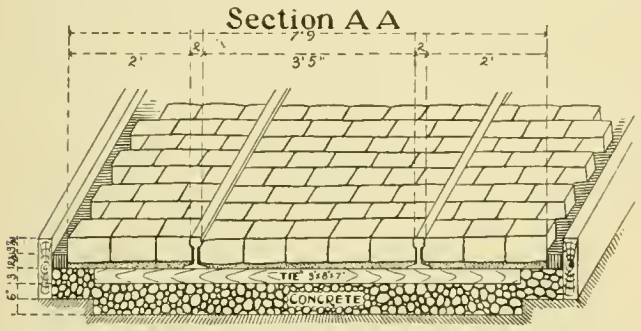
150 tons 72-pound steel at $33.00	$ 4,950.00
240 cast weld joints at $3.25	780.00
4,200 pounds spikes at $2.10	88.20
3,300 small Burnettized ties, 3x8 inches 7 feet at 33c	1,089.00
13 steam railroad crossings at $400.00	5,200.00
4 72-pound switches at $225.00	900.00
2 72-pound curve crossings at $250.00	500.00
450 feet curve and guard rail at $1.00	450.00
500 cubic yards excavation (approx.) at 30c	150.00
Hauling	375.00
	$14,482.20
1.32 miles track laying and blocking up at $800	$ 1,056.00
2,600 cubic yards excavation track trench at 30c	780.00
1,305 cubic yards concrete mixed and tamped in place six inches below ties, between ties and under base of rail and three inches beyond stone blocks at $4.25 cubic yard	5,546.25
42,000 feet B. M. header in place at $21.00	882.00
Water for flushing and concrete	35.00
Steam roller for trench	150.00
5,308 square yards Basalt block pavement at $2.25	11,943.00
62 cubic yards K. B. & S. cement grout between blocks and header at $10.00	620.00
	$35,494.25

SECTION "AA."

In track construction on a paved street the track must have equally as good a foundation as the pavement; in fact, it sustains a heavier load for a given area than does the latter. To make one foundation do for both is the plan embodied in section B. This plan has some objections. The concrete must be very rich in cement in order to support the entire load as distributed by the limited area of the base of the rail, which is only five inches wide, giving but 3,600 square inches area to a 30-foot rail length. Other sections distribute their loads over the ties, amounting to an area of 10,080 square inches in 30 feet of track. The ties necessitate not only a foundation under themselves, but this same foundation must be continued up between them to the top, which seems a waste. To reduce this seeming waste of

foundation to a minimum the result has been the design of this section.

The Burnettized tie is the same in all dimensions, excepting in depth, it being placed in this section at three inches instead of six inches. Thus each six-inch tie makes two of these ties. Three inches of excavation is saved as well as three inches in depth of concrete between ties. This is the greatest item of saving. This has advantages over all con-



crete construction. As we have shown, the bearing of 30 feet of track with ties is distributed over an area of 10,800 square inches, plus the area supported directly by the flange upon the concrete between ties, which is 2,400 square inches additional, making a total of 12,480 square inches. Thus is the load of each 30 feet of track distributed over 12,480 square inches against 3,600 square inches of an all concrete construction, section E having only 28 per cent of the bearing afforded to section A A. Tie rods are also done away with. Their use in no way improves the pavement. Four small spikes take the place of two large ones. An inverted "U bolt," with nuts on both ends, fitted through the tie, may take the place of the spikes. This section would have a certain amount of elasticity not given in all concrete foundation, the wooden tie giving a cushion effect. In order to get the best for the least possible price, I am led to believe that this is the right direction in which to obtain real economy. Provided a four-inch tie should be suggested instead of a three-inch one, the following summary is given showing the cost of each additional inch in depth of tie per entire work on lower Fifteenth street.

1 inch of tie 8x7 inches	$363.00
145 cubic yds. excavation at 30c	43.50
96 yards concrete at 4.25	408.00
Water	3.00
	$817.50

Less than a three inch tie would hardly be practical, although under some circumstances a lighter tie might be used satisfactorily.

BURNETTIZED TIES

Burnettized (or other equally well preserved) ties should of necessity be used. Their cost in quantities of 5,000 should not exceed sixty cents, as estimated. Should the company put in a small plant for the purpose of doing their own preserving, at one of the power houses, the cost ought to be somewhat less. Colorado white spruce ties can be obtained, F. O. B. cars Denver at 33 cents or less. The cost of burnettizing, according to good authority, varies from twelve cents to twenty cents. Thus it will be seen that we ought to be able to obtain a good preserved tie for about fifty cents. With these ties under the pavement, free from exposure, there would practically be no limit to their lasting qualities. Even should the cost of such a tie exceed $1, their use would still be economical in a paved street. For each tie taken out in a paved street, two square yards of pavement are removed or damaged so as to require repairing. With asphalt at $2.25 per yard, this means:

2 yards asphalt repairing at $2.25	$4.50
Labor removing old tie and pavement	75
Cost of ordinary hewn tie and labor placing and tamping	75
Total expenditure for each tie replaced in an asphalt street	$6.00

On a granite or Basalt pavement the cost would be about as follows:

2 yards of blocks relaid with pitch, at 75c	$1.50
Labor removing old tie and pavement	75
Cost of hewn tie and labor placing and tamping	75
Total expenditure for each tie replaced in a block pavement	$3.00

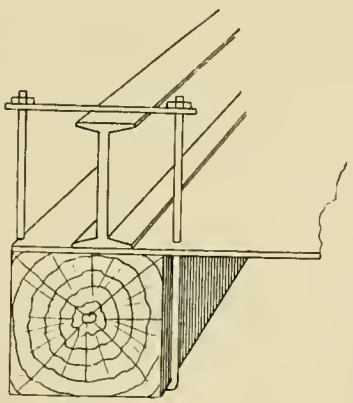
The average life of a good red spruce tie is less than six years.

ABENDROTH & ROOT WIN THEIR SUIT.

Some time ago suit was brought by the Philadelphia Edison Electric Light Company to recover $34,000 on alleged defective boilers furnished to the Edison Company by the Abendroth & Root Manufacturing Company. Between 1889 and 1891 the Root Company furnished the Edison Company with about 3,500 horse-power in boilers. Soon after they were erected a series of troubles began which finally resulted in a fatal accident. This brought the matter before a coroner's court in Philadelphia, where a verdict was rendered acquitting the Abendroth & Root Company and holding the Edison Company responsible. The Edison Company claimed that the trouble was due to bad workmanship and design of the boilers and so afterwards brought suit to recover $34,000, which was claimed to have been spent in remedying defects. Many technical points were, of course, brought up in this suit which resulted in a victory for the Root Company, it being settled in the minds of judge and jury that the misuse of the boilers by the Edison Company was the source of the troubles. It was proved that the workmanship and materials used in the boilers were the best obtainable. As no such troubles were experienced with Root boilers used elsewhere, made of the same material and by the same methods and designs, it stood to reason that the trouble was due to misuse at the Edison station. It was further shown that the feed water was bad and that such poor care had been taken of the boilers that the tubes were scaled to a thickness of from 5-16 to 1 inch, reducing very materially the area of the tube opening. This reduction of the tube area, combined with the tremendous forced draft used, caused water hammer in the boilers, as was shown by experiment in court, and the water hammer caused a breaking of the bolts at the headers. It was evident further that only by such water hammer action could the fracture of the bolts, as they were fractured in this case, be accounted for. They were broken squarely off without any flowing of the metal, whereas flowing would take place if they were broken by steady strain. Dr. C. E. Emery and Prof. R. C. Carpenter were brought in as experts by the Root Company. The case was tried before Judge Wheeler and a jury in the United States Court, in Brooklyn.

SINGLE ENDER MOTOR CARS AT INDIANAPOLIS.

The passage of the vestibule law in several states has resulted in a tendency to put vestibules on one end of a motor car only, leaving the platform unincumbered and making provisions for always running the cars the same way. This plan was adopted at Cincinnati and a similar change has recently been completed at Indianapolis. In spite of its disadvantages it is considered that they are more than balanced by the advantages. When the front vestibule is always occupied by the motorman and never by the public, all the electric appliances except the motors can be kept up in a dry place, instead of under the car. The accompanying engraving shows the interior of one of the motorman's vestibules at Indianapolis. At the right is the diverter and cut out box for the motors. At the left is the fuse box, lightning arrester and choke coil. From the vestibule the cables run under a seat to the middle of the car and then go down to the motors, so that there is no wiring under the car except at the motors. This, of course, is one decided advantage as is also the fact that there is only one controller to maintain. The cab is entered either from the car or from a swing door on the left side. Having the starting resistance in the cab helps to warm it and, taken altogether, the vestibule is much more comfortable and convenient for the motorman than if it were so built as to be occupied by passengers half the time. No controller is put on the rear platform and it is not vestibuled. The motormen on the Indianapolis road are as comfortably fixed as any we have seen. They have a quiet, well protected place to work, and we know of some that would dislike very much to part with their jobs.

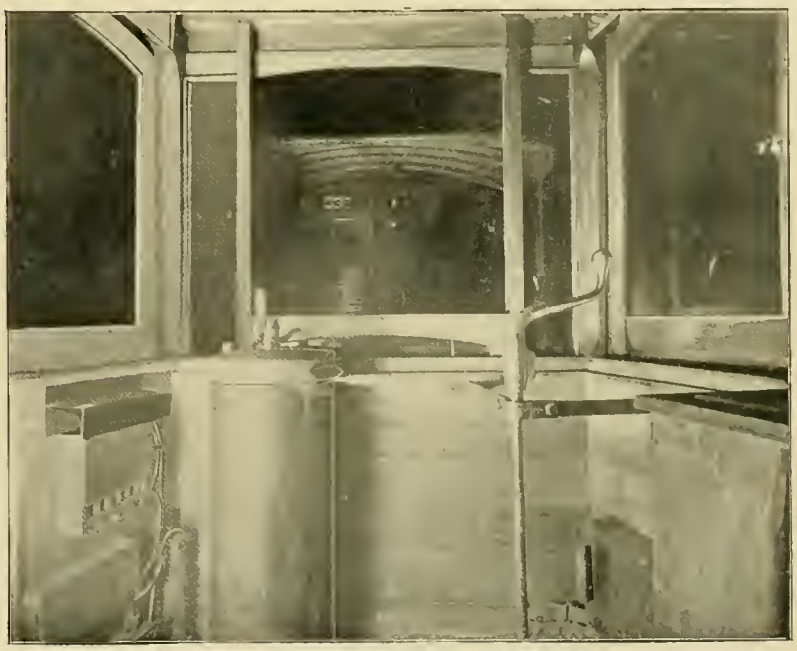


I BEAM —DISPLACING TRUSS.

Another new feature which was introduced on the cars of this road when they were being overhauled and equipped with vestibules was the substitution of I beams for truss rods for supporting the sills. Truss rods, it was found, allowed the cars to sag just at the ends where the rods were tied in the sill. This was very noticeable on some cars. Six inch I beams were then put in, in the manner indicated in the accompanying sketch. They add but little to the weight of a car but add considerable to its strength.

ANTHONY N. BRADY.

The connection of Anthony N. Brady, who is now promoting the consolidation of several Brooklyn roads, with the street railway business, dates back ten years, when, in Albany, where he spent his youth, he got control of the horse lines, reorganized them and installed electricity. Later, he formed a company to build a patent track for street railways. Mr. Brady conceived the idea of the Columbus avenue cable and the new Lexington avenue system, recently opened in New York by the Metropolitan Traction Company. Providence,



VESTIBULE, INDIANAPOLIS.

R. I., owes the consolidation and electrification of its horse lines to the same genius.

Mr. Brady was born August 22, 1843, at Lille, France, whither his parents had fled from Ireland, before settling at Troy, N. Y. Having learned the "three R's" at public school, he went to Albany at the age of 14 and obtained work as cashier in a barber shop. He saved his earnings, and in 1864, established several China tea-stores on his own account. He became a contractor for sewers and granite pavement, but only became prominent when he promoted several gas lighting companies in Albany and elsewhere.

While he has an office at 54 Wall street, New York, Mr. Brady's home is at Albany, where he has lived many years in a modest red brick dwelling. A devoted husband and father, Mr. Brady's chief interest is his wife and children, of whom there are four girls and two boys, the eldest just entering Yale College.

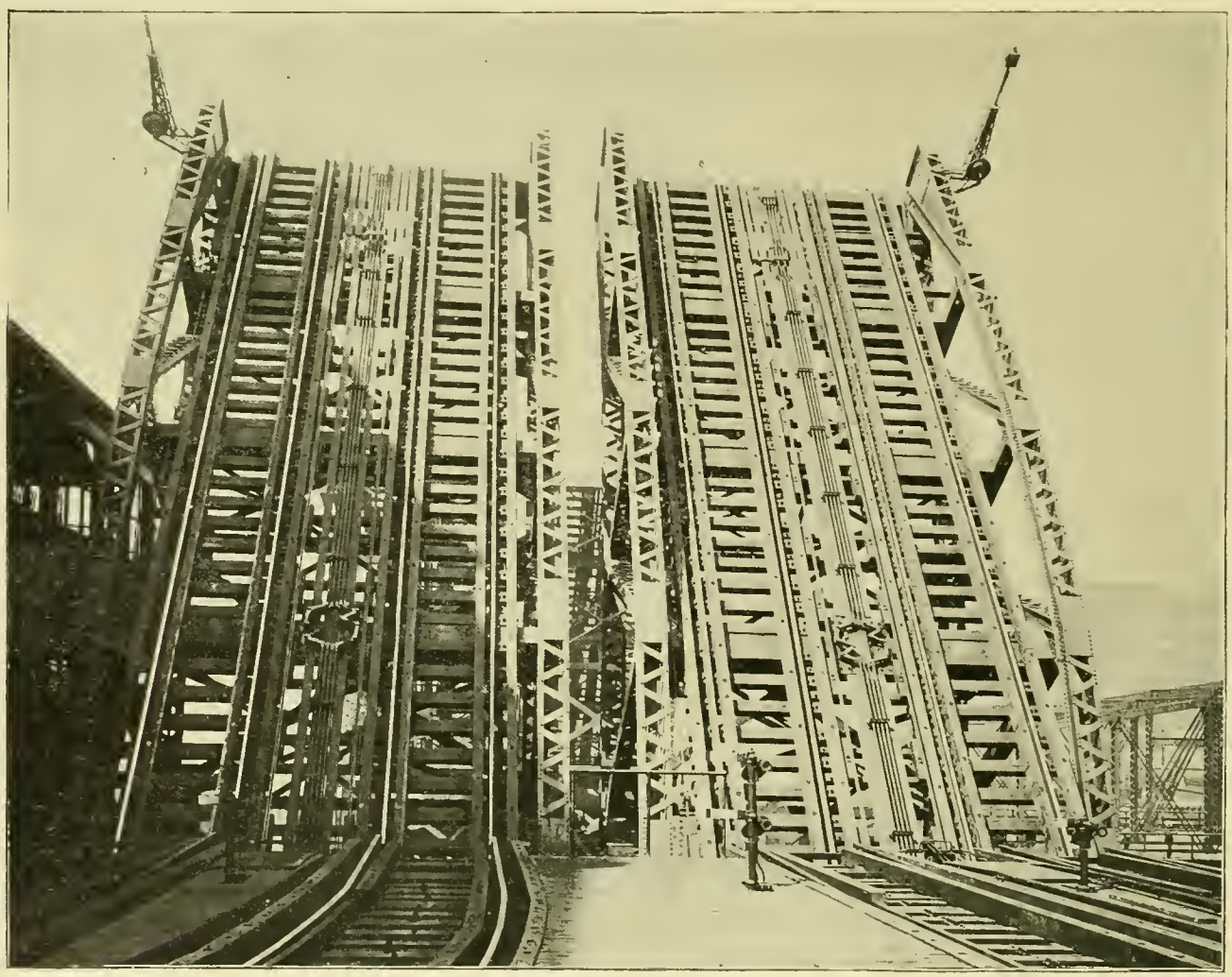
Manager Wyman, of Milwaukee, in his extremely interesting monthly bulletin, to employes has an article on what he terms "Flat Wheeliosis"—and the story is every bit as good as the name.

THE PROTECTION OF DRAWBRIDGES.

Since the last terrible drawbridge accident at Cleveland, Nov. 16, we trust that street railway men have realized as never before the necessity of appliances which will absolutely prevent the recurrence of such disasters. We are certainly not stating the matter too strong, when we say that no manager should rest until he has provided every drawbridge on his lines with some safety device which will make it a physical impossibility for a car to run into an open draw, no matter how careless the motorman or bridge tender. We do not hesitate to pronounce anything that falls short of these specifications a miserable makeshift. As justification of this statement, we have only to point to the fact that the three drawbridge disasters in the last three years have demonstrated that appliances which depend in any degree on human agency will sometimes fail. The only safeguard is absolute mechanical protection. It would be idle to say this, were it not that there are unquestionably some such devices available. Their price, although greater than that of any drawbridge protective devices heretofore used, is still no more than any road should be willing to pay as an insurance against accidents from a financial standpoint alone, to say nothing of the humanitarian view.

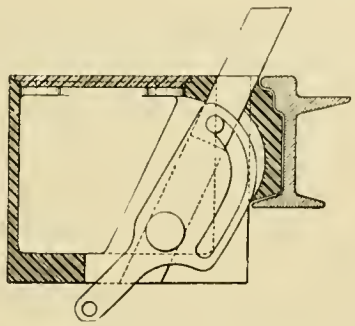
The trouble with the devices heretofore used, is that they only partially solve the problem. The Cleveland draws were probably as well protected as any in the country and yet experience shows that safety was lacking. There is some truth in the statement that safety appliances which do not do their duty, or which leave a chance for accidents are worse than none whatever, because they give a feeling of false security and invite carelessness.

The best place to look for draw safety appliances is in the steam road field where the perfection of signals and interlocking safety appliances has been going on for years. Consequently we will take this class of devices up first as being the most available and afterward discuss whatever novelties may be suggested. The Gibbs system of interlocking grade crossing signals for use at crossings of steam and electric roads, which has been installed at some crossings by the National Switch & Signal Company, and the Union Switch & Signal Company, can be adapted perfectly to use on drawbridges and affords absolute protection. It requires an interlocking tower on the draw so that the bridge tender con-

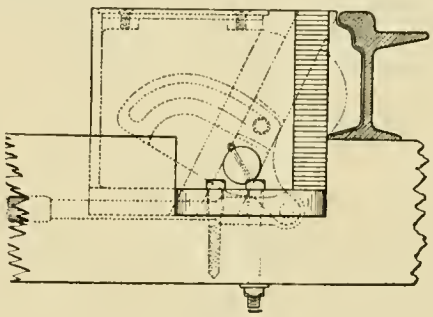


JACK KNIFE BRIDGE—METROPOLITAN ELEVATED.

trols everything. From the tower on the draw the electric railway system is controlled as follows. Current is supplied to the approaches through the tower. That is, for 400 to 800 feet back on each approach are sections of trolley wire controlled by levers in the tower. Operated by the tower levers are also derailing switches or skotch blocks on each approach a sufficient distance back to insure that a car could not run over them and get into the draw. Other levers control danger signals at the approaches and mechanisms for locking the draw when the signals, switches, etc., are cleared for the electric road. The levers are interlocking so that it is impossible to unlock the draw after the signals, etc., have been set for the electric car to come ahead, and impossible to set the electric road signals to safety unless the draw is locked. Another and most important feature of this device is the provision for preventing the bridge tender from changing the levers and swinging the draw after the car has passed the danger signal and derailing switch, and is about to run onto the draw. When once the bridge tender has set the signals and other devices so that a car can go over the draw, they are automatically locked so that he can not change them until the car has used current from a section of trolley wire after leaving the draw. This releasing section of trolley is fed from the tower and the current supplied to that section works a relay which unlocks the levers so that after the car has passed under and used current on the releasing section and not until then can he move his levers to unlock the bridge and turn it. It is not necessary at present to go into the details of the interlocking arrangements, as they would be carried out by the various companies that do this kind of work. Figure 1 shows a diagram of the electric circuits as they would be run for such an interlocking plant. It requires three extra drawbridge contacts at the ends of the draw; one for connection with the main feed line and two for section feeds from the tower. The working of the arrangement is as follows: Suppose that the draw has just been opened to let a boat through, and that just after it has been closed an electric car wishes to cross. The tender first throws a lever locking the draw. This unlocks a lever which allows him to close the derailing switch which in turn unlocks the lever for closing the circuit which feeds the approach sections A. S. After he has done all this the levers which control the signals are unlocked so that he sets the signals at safety. Then the car can proceed but after the bridge tender has once set the signal at safety he can not unlock it until a car has passed under the releasing section R. S. after it has left the bridge. After a car has done this an electric unlocking device has unlocked the danger signal lever, which consequently unlocks the other levers in their proper order. The point is that after the signal for the electric car has been once set to safety the draw is locked until the car unlocks the levers which lock it by passing R. S.



SKOTCH BLOCK.



SKOTCH BLOCK.

As to whether a skotch block or derailing switch is best for this work there is room for difference of opinion. The skotch block is less liable to get clogged with snow or dirt but has a more disastrous effect on the car. If the derailing switch is used it should be made certain that a car will not run through it and run off the edge of an approach.

Mention was made last month of the jack knife bridge as a certain solution; and where a new bridge is to be constructed deserves most careful consideration. Its positive effectiveness is fully demonstrated in our illustration which shows the east half of the 4-track bridge of the Metropolitan Elevated Electric Railway, over the Chicago river. We are indebted to the Railway Review for the illustration. This article deals with two ways of solving the draw protection problem and we will leave other methods until later.

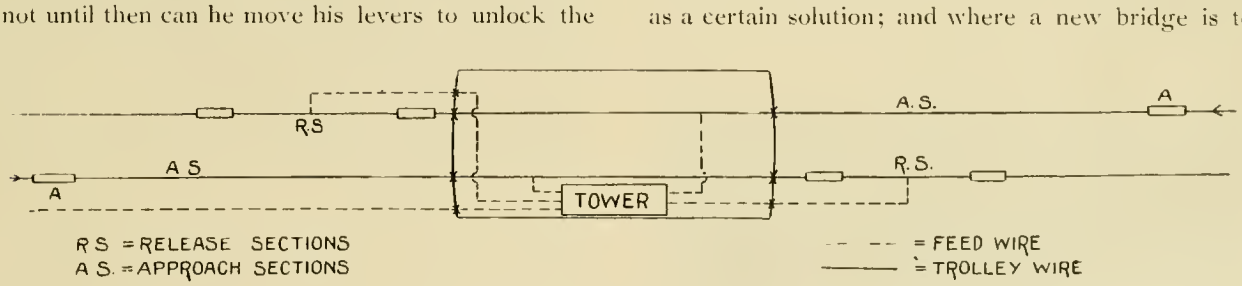
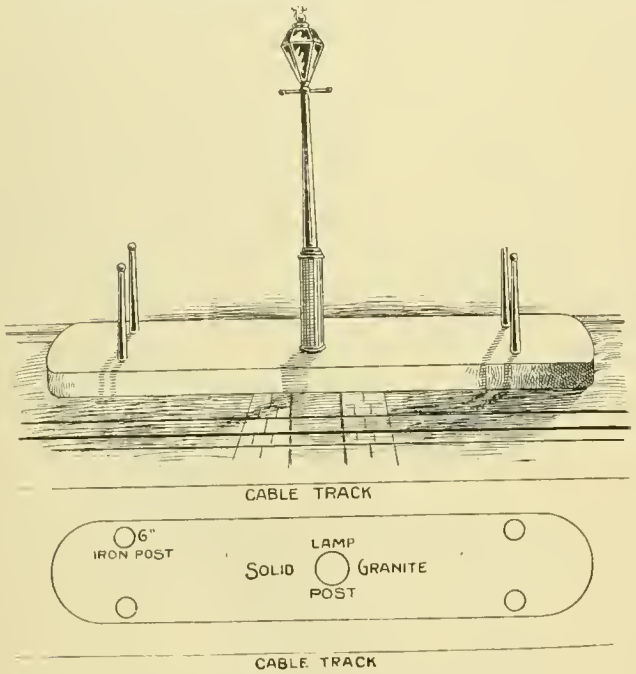


FIGURE 1.

DESIGN FOR WAITING PLATFORMS.

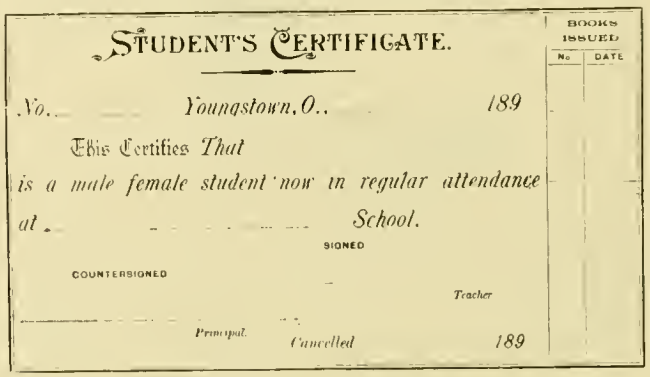
A San Francisco lady has designed the waiting platform which is here illustrated. The object is to provide a safe place between car tracks where women and children may await their cars without risk of being run down by reckless teamsters in wide streets where traffic is heavy. The platform is of cement and granite, 15 feet by 3½ feet by 9 inches high, with 4 stout posts of granite or iron each about 4 feet in height. A lamp post occupies the center.



SCHOOL CHILDREN'S FARES.

In many places pressure has been brought to induce street railway companies to introduce school children's tickets at 2½ or 3 cents. The Youngstown Street Railway Company, Youngstown, O., A. A. Anderson general manager, has been trying the plan of selling books of 50 tickets for $1.50. The company is not required to make a reduction, but has done so at the request of citizens. So far comparatively few tickets have been sold. The applicant is compelled to present a certificate signed by his teacher and countersigned by the principal. On the certificate is kept the record of the books issued to the pupil. Green tickets are given to the girls and yellow to the boys. Following are the conditions: "[Temporary] This book of students' tickets is for the sole use of———who is a male student of———school. Tickets from the book must not be offered in payment of fare for any other person than the one in whose name it is issued; and this book must not be loaned or transferred to any other person under penalty of forfeiture. Tickets from this book will be accepted as fares only on regular school days, not on Saturdays or Sundays, nor on or during school holidays. Certificate No———The Youngstown Street Railway Company———general manager."

TORONTO SCHOOL TICKET.


STUDENT'S CERTIFICATE.

BOOKS ISSUED
No. | DATE

No. Youngstown, O., 189

This Certifies That

is a male female student now in regular attendance at ——— School.

SIGNED

COUNTERSIGNED

Teacher

Principal.

Cancelled 189

YOUNGSTOWN SCHOOL TICKET.

The Toronto Street Railway Company, Toronto, Ont., sells school tickets to children up to the age of 17 or 18, during the period of the year when school is in session. J. M. Smith, comptroller of the company, writes "We use the same ticket as a regular child's ticket. All tickets are on sale at our general offices and by our conductors. We are compelled by our charter to have the conductors carry a supply of all tickets." Neither of these companies make a reduced rate for teachers.

EAT WHILE YOU RIDE.

Trolley party cars have developed into theater party cars, several of which are being constructed for the Brooklyn Heights Company. When the announcement was made that a buffet compartment would be fitted up for serving suppers on the way home from the theater, a Brooklyn caterer conceived the idea of serving meals at all hours on the electric cars. He says the serving of meals on cars seems to him the natural outcome of the progress of the closing years of the century.

He says: "On certain cars I should furnish breakfast during a stated time in the morning; in the interval preceding lunch time, serve a light luncheon to lady shoppers; during the noon hour provide a lunch, for which orders may be left in the morning, to insure its being in readiness on schedule time; during the afternoon a ladies' luncheon will be served, and from 5:30 to 8:30 a meal of a substantial character will be served; from midnight until 5 o'clock in the morning meals will be provided for those who are engaged in night work, and belated travelers could obtain cocktails without loitering in saloons."

FLY WHEELS AND WHY THEY BURST.

A Paper by Prof. Charles Henry Benjamin, of the Case School of Applied Science; Read before the Electric Club of Cleveland.

An eminent engineer, when asked to explain why boilers burst in so mysterious a manner said "Because the pressure is greater than the strength of the material." I think the same explanation will account for all the failures of fly wheels.

Speaking more in detail the wrecking of fly wheels may be attributed to one or more of the following causes:

1. Poor castings or internal strains.
2. Faulty construction and design.
3. Sudden shocks or stops.
4. Miscellaneous external causes such as the breaking of belts or shafts.
5. Excessive speed.

You will sometimes hear engineers remark that they feel entirely safe because their "fly-wheels are solid iron, not patched up with bolts, you know."

Well, it is a question whether it is better to have a built up wheel which you know is weak in spots and to know where the spots are, or to have a solid wheel whose strength or weakness is entirely a matter of guess work.

Some of our best founders acknowledge their inability to cast even a moderately large wheel without serious cooling strains. I have seen a pulley having a thin rim and a heavy hub, crack while cooling, at the base of the arms near the hub and others where a tap with a light hammer on the arms was enough to snap them.

Dr. Thurston speaks of one wheel which he found actually running with one of the arms cracked entirely off from this cause. A pulley of this kind on the generator is nearly as dangerous as on the engine and many serious fly wheel accidents have doubtless been due to failure of the driven pulley.

Blow holes and impurities in large castings are another source of uncertainty and danger. One wheel 20 feet in diameter lost a segment of its rim weighing 1800 pounds from this cause, the iron being badly honeycombed.

The sectional wheel may be free from cooling strains as the hub, rim and arms are cast separately, but unless properly put together it may be even weaker than its neighbor.

When the joints and joint bolts in the rim of a built up wheel are only one-third as strong as the rest of the rim the margin of safety may be very narrow.

The worst case of this kind on record is that of a large built up wheel which fell to pieces before the engine had made half of a revolution, the lower half falling into the pit and the upper half turning over and smashing the main connection of the engine.

The arms of a fly wheel are subjected to tension due to centrifugal force, to bending due to sudden stoppages and to the variable stress due to pull of belt when the fly wheel is also used as a belt wheel.

Experiments made some years ago at the Massachusetts Institute of Technology on belt pulleys showed that the bending due to pull of belt was not uniformly distributed among the arms but was greatest on the arm next to the driving side of the belt, the rim not being perfectly rigid. If an arm were fastened to the hub and jointed to the rim, it would then be in the condition of a beam fixed at one end and loaded at the other, would bend in one curve and be most likely to break at the hub.

The fact that the arm is also fastened to the rim causes it to bend in a curve of reversed flexure having maximum bending moments at hub and at rim, the moment at the hub being the greater. Such an arm may break simultaneously at both ends if it is tapered. A case in point is that of a Harris-Corliss engine at Tiffin, Ohio, in 1893.

The engine was running at its normal speed when the follower plate of the piston broke, jamming the piston near the end of the stroke and stopping the engine almost instantly. The momentum of the nine tons of metal in the rim of the fly wheel caused it to keep on and each arm was broken close to the rim and close to the hub. The rim parted in four pieces but the debris nearly all fell into the pit showing that the wheel had almost stopped before failing.

Probably most fly-wheel arms are amply strong to resist the normal pull of the belt, but they can hardly be expected to withstand such shocks as the foregoing.

A fly-wheel in a street railway station in Cincinnati was broken several years ago by throwing the current on and off during a short circuit, thus bending the arms alternately back and forward under a load much greater than the wheel was designed to bear.

The shortest time or distance in which the rim of a fly-wheel can safely be stopped by the arms, may be easily calculated if the strength of the arms is known, by dividing the total energy of the rim when running by the total safe pressure on arms at rim.

A calculation of this kind made on the 22½ foot fly-wheel of a Corliss engine showed that the engine could be stopped in one revolution with a factor of safety of about seven.

The fly-wheel 30 feet in diameter used by a Porter-Allen rolling mill engine could have been stopped in one revolution with a factor of safety of eighteen.

Excessive speed is probably the cause of the majority of fly-wheel accidents. The centrifugal force due to the speed of rim causes a tension on the rim similar to that produced in a boiler shell by the internal pressure, and may be calculated in the same manner.

If the material is cast iron and V = the speed of rim in feet per second, then it can be shown that the tension per square inch of cross section of rim is about $\frac{V^2}{10}$ pounds. If we put this equal to 16,500, the ultimate tensile strength of good cast iron in large castings, and solve for V we have:

V = 412.7 feet per second or allowing a factor of safety of 10
V = 128.5 feet per second.
= 7710 feet per minute.

The preceding would be correct if the rim were free to expand independently of the arms, always maintaining its circular form. The arms undoubtedly stretch a certain amount under their own centrifugal force and that of the rim, but not enough to allow free expansion of the rim.

Considering a segment of the rim between two arms, we see that it is approximately in the condition of a beam fixed at the ends and uniformly loaded with a total load equal to its own centrifugal force. The rim will tend to assume a wavy or undulating shape and at a point midway between the arms the bending moment will cause a tension on the outer fibers in addition to the centrifugal tension before mentioned.

It has been shown by Mr. James B. Stanwood, (Trans. Am. Soc. No. E. Vol. XIV) that if we neglect the stretch of the arms the tension on outer fibers of rim due to bending alone will be approximately:

$$\frac{S^1 - Dv^2}{tn^2}$$

where: D = diameter of rim in inches
t = thickness of rim in inches
n = number of arms.

Mr. Stanwood recommended allowing one-half of this tension as neutralized by stretch of arms.

Prof. Gaetano Lanza in a mathematical discussion of the subject has shown that in wheels of ordinary proportions the stretching of arms will relieve more than one-half of this tension, possibly three-fourths.

Even with this allowance the total tension will sometimes be more than double that due to the direct action of the centrifugal force and the greatest safe speed will be correspondingly reduced. The most obvious remedy is to increase the number of arms.

Most sectional wheels are made with the rim joints midway between the arms and this is undeniably bad practice, since it puts a joint always weaker than the rest of the rim at a point where the stress is most severe.

I have examined the joints of many fly-wheels and always found them much weaker than the rim itself. In both of the wheels just alluded to the strength of the joints was only one-third that of the solid rim.

The ordinary rim joint having internal flanges connected by bolts is particularly bad when located at the middle of a segment. The

binding moment there tends to open the joint on the outside making a fulcrum of the inside corners and thus bringing a magnified tension on the bolts.

This weakness may be avoided by having the joints come directly over the arms where the binding moment is in the opposite direction.

This is rather a difficult problem in construction, but has been successfully solved by several engine builders.

Even under the most favorable circumstances a cast-iron wheel is treacherous and not to be fully trusted.

The use of wood for fly-wheel rims is a recent development, those of the Amoskeag Manufacturing Company at Manchester, N. H., the Nashua Manufacturing Company, in the same state and the Willimantic Linen Company at Willimantic, Conn., being noteworthy examples. These wheels are all large ones and have wood rims built up on cast iron arms and segments.

With all due respect to the designers and constructors of this type of wheel, I must say that I am not favorably impressed with the idea and must regard it as a backward step. The strength of good pine and whitewood is undoubtedly much greater in proportion to its weight than that of cast iron, but the strength of the numerous joints in a wood rim can only be a matter of conjecture.

I will call attention briefly to three designs of steel wheels which have recently been proposed.

A wheel built of steel plate is described by Mr. Peter H. Bulloch in Machinery for June, 1895.

The rim joints are butt joints with inside straps and are claimed to have an efficiency of 80 per cent. The hubs and their flanges are of cast iron, joined to the rim by two webs made of sectors of steel plate. These sectors are riveted to angles inside the rim, and are butted together at the radial seams and joined by tee irons riveted on the inside. These tee irons also serve as members for attaching a series of diagonal braces which give lateral stiffness to the structure.

The result is a wheel entirely free from initial stresses, with no binding moments in the rim or arms, with a smooth external surface, offering little resistance to the air, and probably safe at double the speed usually allowed.

The only objection which can be urged is that of first cost, but it has been well said that companies which have had a fly-wheel burst on their premises rarely have much to say about the first cost of a new wheel.

A trussed steel wheel, designed by Mr. E. S. Cobb, is shown in the American Engineer for October, 1895.

Twenty-four radial steel spokes sustain the weight of rim and the centrifugal force and brace the wheel laterally, being somewhat similar to those of a bicycle wheel. The turning moment is transmitted by eight truss rods running from the rim tangent to the hub, where they can be tightened by nuts. When the wheel is turning in one direction four of these will be in tension and transmit the moment.

The last example I will mention is that of a composite wheel described by Mr. Archibald Sharp in the Electrical World of December 15, 1894. This wheel has a cast iron rim and hub connected by a series of steel loops. Each of these loops starts from the rim, passes around the hub in a spiral groove and returns to a point on the rim several degrees removed from its starting point.

The loops are held in place on the hub by friction, but are attached to the rim by check nuts, which can be screwed up to give any desired degree of initial tension.

The turning moment is transmitted from hub to rim by the tension sides of the loops.

The large number of spokes prevents binding of the rim and a tightening up of the nuts will lessen the centrifugal tension of the rim. Accidents to fly-wheels have been confined principally to large wheels of the built-up type on so-called slow speed engines, like the Corliss, having detachable governors. Such accidents can usually be attributed to the weakness and poor design of rim joints as a secondary cause, and to tampering with the governor as the primary cause.

Engines controlled by shaft governors, although usually running at high speed, rarely race enough to rupture a fly-wheel, since the governor is not detachable and cannot readily be blocked. Such a governor should be so designed as to close the ports when in its extreme outer position.

All governors of the Corliss type are probably provided with a safety cam so that in case the governor balls drop below a certain position the steam will be shut off and the engine stopped. But nearly all engineers are also provided with some sort of a block or wedge which will prevent this. The usual sequence of events in a fly-wheel accident has been this: A short circuit causes an increase of load and a consequent slowing down of the engine. The engineer has been told by "the powers that be" that he must on no account allow the engine to stop, and, accordingly, he first blocks the governor. The circuit breakers open suddenly and the engine begins to race. The engineer perhaps loses his head, and throws the current on once, twice, three times, in which case it is only a race between rim and arms as to which breaks first. He may try to close a throttle which takes a half-dozen turns of a wheel to shut off the steam, the throttle being, as it usually is, directly in range of the fly-wheel. I do not blame him if he fails to do this now, but I blame him because he did not let the governor alone and close the throttle while there was time.

A careful study of the fly-wheel accidents in power stations as described in the technical journals for the last two or three years, will show that the blocking of the governor was a feature of nearly all of them; that breaking of the generator pulley has been in several cases the direct cause of the bursting of the wheel, and that the sudden shocks caused during a short circuit by throwing the load on and off, are probably responsible for several more accidents.

Racing of an engine caused by its generator changing into a motor is still a disputed subject and as this paper is written from a mechanical standpoint, I will not enter into the discussion.

The time has evidently come when the fly-wheel is quite as dangerous as the boiler, and it should be surrounded with as many safeguards. If it is considered necessary to have boilers inspected by competent engineers, the same provision should be made for fly-wheels and the unsafe ones condemned. Pulleys driven by belt from a fly-wheel should be as carefully examined as the fly-wheel itself. The governing mechanism of the engine should be simple and direct, not readily injured or disconnected, and always provided with a safety cam—to stop the engine when the balls drop. It should be regarded as much an offense to block this safety device as to overload the safety valve of a boiler.

It should be possible to close the throttle quickly without standing in range of the fly-wheel, and an excess of speed of 5 or 10 per cent should operate to close a throttle at once automatically.

With the increased belt speeds now demanded in electrical work, a cast-iron wheel is hardly safe when used both as a belt wheel and fly-wheel, and it seems as if the time had now come to use structural steel in this as in other situations when cast iron has been tried and found wanting.

HEAVY MOTORS ON THE PACIFIC.

Heavy motors are finding a constantly increasing use and nowhere are they more popular than in some of our Washington and Oregon cities, where steep grades are numerous. S. Z. Mitchell and George W. Bird, receivers of the Tacoma Railway & Motor Company, have recently fitted up a double truck freight car with four W. P. 50 motors and special General Electric K 4 controllers. This car is used on the Steilacoom division for hauling cord wood and freight. The motors have a maximum speed of 12 miles an hour and handle easily two ordinary flat cars, each loaded with 8 cords of green fir wood. The Third Street and Suburban Railway, Seattle, has some G. E. 1,200 motors mounted on double maximum traction trucks and pulling trailers.

NEW CARS AT DETROIT.

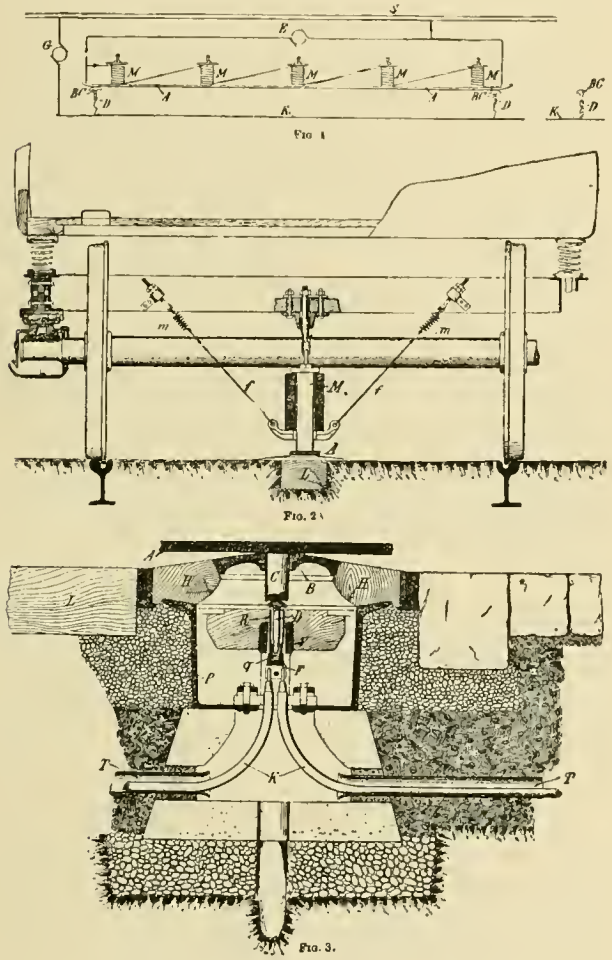
Manager Dupont, of the Detroit Citizens Company, has turned out of its shops a 24-foot car mounted on a single truck. It is strengthened by trusses and sills and will seat 36 and carry 80 passengers. If the experiment is a success, a 26 and a 28-foot car will be tried.

For not insulating a feeder the Cincinnati Street Railway is sued by a telegraph lineman who was thrown to the ground by an electric shock.

DIATTO CONDUIT AT TURIN.

An experimental section of conduit road known as the Diatto system, is being tried at Turin, Italy. The conduit is closed and the current taken from contact plates between the rails and located at intervals somewhat less than the length of the car.

Under the car is a long iron strip A, magnetized by the magnets M M. When this magnetized strip passes over the contact pins C in the roadbed it makes electrical



LATEST ELECTRIC RAILWAY CONDUIT.

contact with them and, furthermore, raises by magnetic force the plunger D, so that electrical contact is made between the surface contact pin C, which is normally dead, and the underground feed cables. The plunger D, rests in a small cup of mercury, thereby securing a good electrical contact without enough friction to interfere with the raising of the plunger by magnetism. The section of track has been operated through one winter.

ALL ON ONE FLOOR.

The sixth floor of the Garfield building, Cleveland, is taken up by street railway company offices. They are all interurban lines, and the officers call it Interurban Row. First is the Cleveland & Berea, and Cleveland & Elyria; next Cleveland, Painesville, & Eastern, and Akron, Bedford & Cleveland, and next the Lorain & Cleveland.

DAMAGES BY WRECK WAGONS.

The Atlantic avenue road, Brooklyn, has appealed from the decision of the City court, which awarded $5,000 damages to W. A. Northridge. The plaintiff was thrown out of the wagon he was driving by collision with a wreck wagon belonging to the company, and driven at a speed of 12 miles an hour.

The court refused to make the passage of the wreck wagons a parallel case with the fire department apparatus, "which as agents of the state, have perhaps the right of way. * * * The driver of a wagon used by a railroad company has the same rights as the driver of a wagon used by an individual; no more, no less."

PLASTIC BONDS FOR STATION CONDUCTORS.

Some more interesting applications of the Edison-Brown plastic alloy rail bond have been made on the Buffalo Railway. The company recently measured the drop on one of its large dynamos from the negative brushes to the rail bus bar and from the positive brushes to the switch board with a load of 1,200 amperes. Then plastic alloy rail bond material was applied on every unsoldered contact and on remeasuring the drop with the same load it was found that nearly three electrical horse-power had been saved in spite of the fact that the conductors throughout had a section of 1½ square inches. As a result Master Mechanic Dunning and Chief Engineer Henning have decided to apply the plastic bond material on all copper contacts on dynamos, switches, bus bars, and instruments in the power house, all unsoldered connections on the motor cars and all line switches and cut outs. It has heretofore been supposed than when two copper surfaces were milled to a perfect fit and bolted together under great pressure, the transmission loss at the contact surfaces was nominal. The modern power-house switches were also supposed to give perfect contact, but the results of these tests disclose unexpected sources of loss in these also. The Cleveland Electric Railway has recently been inspecting and tightening up the copper bonds on the Cedar street line near the large power house. There are two sets of copper bonds. One is of No. 0000 wire around the chair to the web of the rail, and another of four No. 0 wires riveted to the tram near the end of the rail. In spite of the re-riveting the loss at each joint during heavy load ran from .08 to .35 volts per joint. A new form of the plastic rail bond was then applied by drilling a horizontal hole through chairs and web of rail on each side of the joint. The steel was amalgamated and the hole partly filled with the plastic alloy. Then a tapering, soft iron plug was driven in from each side and held in place by a stove bolt running from side to side. After completing this work the drop was but .015 volts at the time of heaviest load.

The process of applying the plastic bond to dynamo and other connections consists in first cleaning the contact

surfaces with emery paper and then rubbing with the Edison solid alloy. A layer of the plastic alloy of the consistency of putty is then placed on one surface and the two bolted together tightly, squeezing out the extra material. This makes a joint of practically perfect conductivity, whereas with the copper surfaces only, there is a very perceptible drop with heavy currents.

STEAM AND ELECTRIC ROADS IN CONNECTICUT.

Clarence Deming, in the Railroad Gazette, gives a comprehensive review of the present relations of steam and electric roads in Connecticut, of which the following is an abstract. The steam roads in the state have a mileage of 2,583. The extension in the last ten years has been less than 75 miles. Twenty years ago building stopped and the population left to expand along a system of railroads, most of them already old. This explains the fact that half the people live along the main line of the New York, New Haven & Hartford Railroad, while at the same time there are large areas void of railroads. This centralization of population along certain lines has made it a very tempting field for the building of electric to compete with steam lines. Another thing to attract electric roads was the large volume of passenger business, as compared to the freight business. When trolley roads were first built the steam road people paid little attention to them. In the latter part of 1890, however, when city lines began to be extended to interurbans the steam opposition began and war has been waged in the legislatures, city councils and the courts ever since. In 1895 the steam roads won several victories in the legislature, which hampered the trolley companies to some extent. One of these was the law absolutely prohibiting the crossing at grade of steam and electric roads. Nevertheless the trolley extension was enormous for the last two years, and the steam roads, although not losing as much as represented before the legislative committee, still were undoubtedly losing some local business. Recently, however, a new policy has been disclosed by the New York, New Haven & Hartford Railroad. That road is to supplement its legal tactics with physical tactics by buying, building and operating its own electric lines. This is illustrated around Meriden, where several trolley roads have already been bought. The policy may be forecast briefly as the acquisition of any trolley roads where the purchase will break threatened extensive parallels, and at the same time allow economies by uniting in operation by a single power house, branch lines equipped electrically together with the trolley system bought up. Larger developments, such as the application of electricity to the main stem, or the proposed electrical equipment of two of the four tracks to enter Boston, so as to make a suburban trolley service, are more speculative and exceed the scope of this article. Suffice it to say that one of the leading officers of the consolidated company goes so far as to predict the time not very far distant when practically the whole electric system of the state in cities will be acquired by his company and utilized, not merely in the passenger service, but in the freight service also.

COVENTRY (ENG.) TRAMWAYS.

England seems to be waking up with a start in regard to electric railway matters. The opening of two new electric roads within six months of each other is doing things at a terrific rate for that country. Closely following the opening of the Bristol line came that at Coventry. It was over identically the same route as the present six-mile electric line that a stone tramway was built in 1811. Following the stone tramway came a steam operated line and now steam has given place to electricity. The contract for the electric equipment was given to the General Traction Company of Westminster, a concern closely allied to the Westinghouse Company. The construction is almost identical with American practice, and much of the apparatus was made in the United States. Babcock & Wilcox boilers and mechanical stokers are used. There are two 120-horse-power simple high speed engines of English make belted to Westinghouse generators. The rolling stock consists of two trailers and eight motor cars, on Peckham trucks, with Westinghouse No. 12 motors. The main part of the road is single track, but the turnouts are numerous, and the trolley wire is double nearly the whole length to save time at turnouts. In the narrower streets of the town there are are no poles as the span wires are fastened to insulated wall plugs on the buildings. These plugs are provided with an India rubber pad or cushion for silencing the noise of the trolleys. The work was under the charge of J. E. Winslow, chief engineer of the General Traction Company, and H. Lavington, resident engineer.

MOTORMAN'S RESPONSIBILITY.

It is the policy of the Montreal Street Railway to impress upon its employes that in accidents arising out of their inattention to their duties, while the company can be held financially responsible, the men, directly responsible, are also in a position to suffer their share of the punishment. Accordingly Duncan A. McDonald, superintendent, swore out a warrant for the arrest of Joseph Chartier, a motorman, who caused a collision in which another motorman was injured.

It is the first case brought under the criminal code, which provides that everyone is guilty of an indictable offence, and liable to two years imprisonment who, by an unlawful act, or by any wilful omission or neglect of duty, endangers or causes to be endangered, the safety of any person conveyed or being in or upon a railway, or aids, or assists therein.

One foggy morning the motorman, being too lazy to turn a switch, took the left-hand track instead of the right, as the rules required, when entering a double track from a single track. The result was two wrecked cars, for they were both running rapidly, and the injury of the innocent motorman.

THE BOOSTER IN RAILWAY WORK.

BY J. B. SCOTT ELECTRICAL AND MECHANICAL ENGINEER, CITY AND SUBURBAN RAILWAY, BALTIMORE.

In equipping the ordinary suburban electric road, one of the problems to be solved is to provide for the enormous increase of travel for short periods, caused by the rush of excursionists to the pleasure resorts on the line. This class of travel is not as profitable as an equal amount of steady riding, but it has to be reckoned on, and, in fact, many roads are built especially for this excursion travel, and depend on it for their dividends. The capacity of the equipment is determined by this maximum load, which means carrying a large surplus at

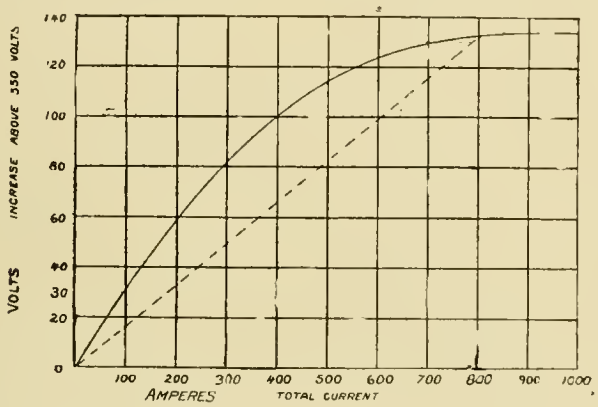


FIG. 1.

other times. The labor expense of the car crews, and the fuel expense in the power house are, roughly speaking, directly proportional to the load, but the interest on the surplus equipment is a dead loss when not in use; hence, any saving in the original investment of such a road, if not made at the expense of the service, is very desirable. The difficulty is, however, that the saving is usually attempted where it does harm, and one favorite place to begin is generally in the line copper. So much can be saved here without making any very decided difference in the appearence of things, that the larger question of decreased operating expenses and more efficient service are overlooked. The limitations of the 500 volt direct system of feeding are very soon felt when any very large amount of travel has to be provided for at a considerable distance from the power house. Here it becomes absolutely necessary to adopt some means of cutting down the enormous amount of copper needed, if the road is to be practicable from a financial standpoint.

To take an actual case: In laying out the feeder system of the City and Suburban Railway, of Baltimore, Md., the following conditions had to be met. The general plan of the system shows six main branches radiating from approximately the center of the city, on the south water front. It was determined to locate one main power house at this point, for besides being the center of the system, it had exceptional facilities for receiving coal both by water and rail, and gave an unlimited supply of water for condensing. Several of the lines extend from five to seven miles from this point, and have a very large summer excursion travel to the parks located at the ends. To handle this occasional load satisfactorily by the direct feeder system, at such distances, would have required an enormous outlay of copper. The extremely heavy load is only felt on Sundays and holidays and warm nights during about four months in the year. At these times there are as high as twenty cars on each suburban division, while for the remainder of the year but two or three cars are required. Under these conditions the booster seemed especially suitable, and was accordingly installed, with sufficient copper in the line for the ordinary travel up to six or seven cars, with a drop of fifty volts by the direct feed. The ordinary shunt wound booster used in lighting work was not considered suitable for this purpose, as it would have required constant attention to regulate the voltage by hand on the variable loads experienced in railway work. To accomplish this automatically the fields were wound with series coils only. This gives a regulation, which, while not theoretically perfect, is entirely satisfactory for railway work. The curve in Fig. 1 is plotted from readings taken from the machine in actual service, and shows the variation from the theoretically perfect regulation indicated by the dotted line. The greatest variation from this is at 400 amperes, where it amounts to 35 volts, this being only a trifle over 5½ per cent of 615 volts, the normal for that current in this case. This is negligible in railway work. The object, of course, is to make the increase of voltage at the station just equal the drop in the line for any given current.

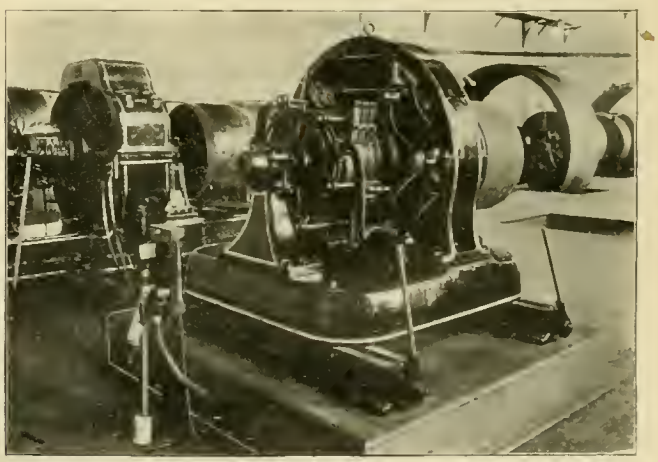


FIG. 2.

thereby securing a constant voltage at the end of the line. To do this the amount of copper in the line must be adjusted to the rate of increase of the voltage of the machine employed, or vice versa, the machine be designed to suit the amount of copper in the line.

The machine used in this case is a standard General Electric Company's six-pole lighting generator, with a capacity of 800 amperes and 125 volts. The field coils were rewound for series connection, and the machine was belted to an auxiliary engine already installed for running a 200-kilowatt standard railway generator. This

generator is used for lighting the cars and barns, and also for shifting cars after the road is shut down at 1:30 a. m. As the two machines are thus used alternately, no additional engine plant was required. These two machines are shown in Fig. 2. The remainder of the plant at present consists of four 500-kilowatt standard railway generators.

The switchboard connections, in simplified form, are shown in Fig. 3, but for convenience the circuit is run through a special panel, similar to the usual generator panel, but with only an ammeter, voltmeter and circuit

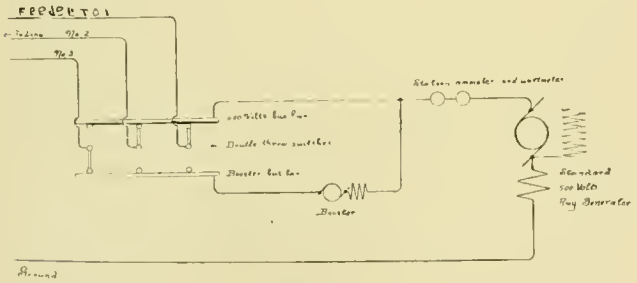


FIG. 3.

breaker on it. A quick break switch is placed in front of the machine to cut it entirely clear of the circuit when necessary, but the double throw switches on the feeder panels are generally used for throwing the machine in circuit. Fig. 4 shows a partial view of the switchboard. In the center is the main station panel, to the right of this is the booster panel, and to the left the first six feeder panels are arranged with double throw switches so that they may be thrown into the booster circuit. This circuit is taken from the main bus bar outside the station ammeter and wattmeter, which measures the entire output of the station at 500 volts, but does not include the booster load. For this a separate wattmeter would be required. From the main bus bar the circuit is through the circuit breaker and ammeter on the panel, to one side of the machine, through the armature and field and switch to an auxiliary bus bar on the long distance feeder panels. These are similar to the standard panels, except the double throw switches and the auxiliary bus bar. By throwing any switch up, the feeder is connected directly to the main bus bar at 550 volts. By throwing the switch down the circuit is completed through the booster, which raises the voltage on that particular feeder in approximately direct proportion to the current flowing. If the heavy loads on the different feeders do not occur at the same time, one machine can be made to serve for a number of feeders, but if the heavy loads occur simultaneously, it is preferable to have a separate machine for each feeder, though in an emergency two or three feeders can be thrown on one machine, up to its full current capacity, but without the advantage of automatic regulation of voltage.

The accompanying table shows what may be done with this particular machine on various distances. With higher voltages, longer distances may be economically fed, though, of course, the operating expenses and first cost of the machine would be somewhat greater. The results in the table, however, only show what has been actually accomplished with a machine in regular service. The first column shows the distance required to be fed, for simplicity a trunk line, without distribution. Columns 2 and 3 show the amount of copper required for the various distances when the drop is respectively 175 volts, and 50 volts, with a load of 675 amperes. Column 4 shows the actual amount of copper saved by allowing the additional 125 volts drop in the line. Column 5 shows this saving expressed in dollars, the copper being taken as worth $550 per mile erected, not including pole line. Column 6 shows the cost of the booster, including foundation, belt and switchboard panel,

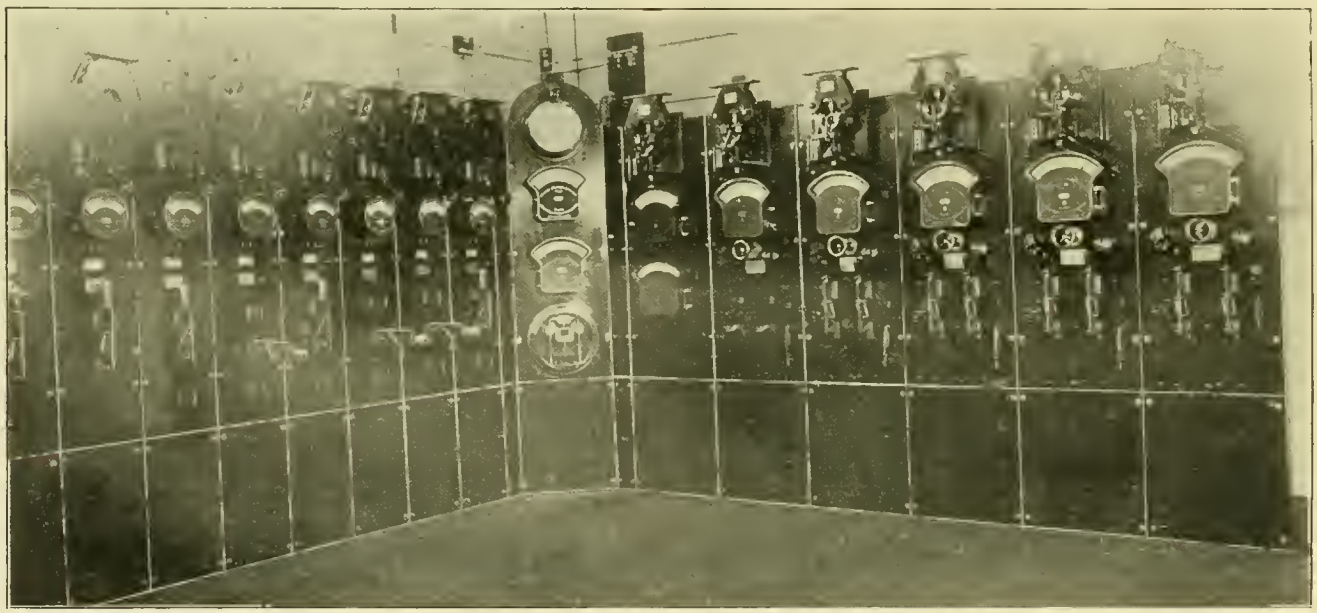


FIG. 4.

COMPARISON OF ONE CASE OF DIRECT AND BOOSTER FEED.

1.	2.	3.	4.	5.	6.	7.	A.	B.	C.
To Feed 675 Amp.	Copper required at 175 volts drop.	Copper required at 50 volts drop.	Copper Saved.	At $550.00 per mile.	Cost of Booster.	Net Saving in First Cost.	Capitalized Cost of Power 1 yr. at 10 hrs. per day.	Capitalized Cost of Power 4 mos. at 10 hrs. per day.	Capitalized Cost of Power 4 mos. 1 day a week.
1 mile.	1 mile 0000	3.5 miles 0000	2.5 miles 0000	$1,375.00	$2,500.00	—$1,125.00	$61,320.00	$20,440.00	$2,920.00
2 "	4 " "	14.0 " "	10.0 " "	5,500.00	2,500.00	+3,000.00	61,320.00	20,440.00	2,920.00
3 "	9 " "	31.5 " "	22.5 " "	12,375.00	2,500.00	9,875.00	61,320.00	20,440.00	2,920.00
4 "	16 " "	56.0 " "	40.0 " "	22,000.00	2,500.00	19,500.00	61,320.00	20,440.00	2,920.00
5 "	25 " "	87.5 " "	62.5 " "	34,375.00	2,500.00	31,875.00	61,320.00	20,440.00	2,920.00
6 "	36 " "	126.0 " "	90.0 " "	49,500.00	2,500.00	47,000.00	61,320.00	20,440.00	2,920.00
7 "	49 " "	171.5 " "	122.5 " "	67,375.00	2,500.00	64,875.00	61,320.00	20,440.00	2,920.00

this cost being constant for any distance in this particular case. Column 7 shows the saving in first cost between the booster for 175 volts drop and the additional copper required for the direct feed at 50 volts drop. This saving in first cost is itself sufficient to recommend the system to a large class of railway managers who, from necessity or otherwise, consider a dollar saved in the equipment worth two in the operating expenses.

But the next three columns show the real value of the booster in railway work. Column A, when operating ten hours continuously during the year, shows a loss between the saving in first cost and the capitalized cost of operating expenses for a shorter distance than seven miles. Column B, when operating ten hours a day for four months in the year shows a gain from a little over four miles and upward. Column C, representing Sunday travel during the summer and early fall months, shows a decided gain at two miles, while at five miles the saving in first cost is over ten times the capitalized cost of power.

In making the above comparisons the cost of power is taken at one cent per kilowatt hour, including fuel, water, labor, interest and depreciation of plant, and is a fair figure for an ordinary plant. At 675 amperes and 125 volts this amounts to $8.40 per day, which capitalized at 5 per cent per annum for the number of days in operation, gives the amounts in the columns.

It is only necessary to add that the machine is in every way satisfactory to the management of the road, having been in operation since July, 1895.

LIKE THE GOOD OLD TIMES.

There's lots of pleasure in recalling the good old days and many a manager will read his own experiences in the following which appeared in the El Paso, Texas, Herald last month.

"The street car company is breaking in new mules by hitching a rope to either side of the animal's bridle and fastening a lusty Aztec at the end of each rope. The Aztecs ride on the front platform of the car, and do their level best to deep the mule in a more or less hilarious frame of mind by a wide and varied assortment of exclamations in bald headed Spanish."

INTERURBAN CAR LICENSES.

Judge McPherson, of Harrisburg, Pa., has decided that the Citizens' Passenger Railway and East Harrisburg Railway Companies must pay $55 a year license for every car operated in the city. While the case applies to the city of Harrisburg alone, it is of interest to all companies. The interurban question was brought up on a point raised by the Citizens' Company, and the judge said that even if other municipalities through which the cars ran should charge a license of $55 a car, the city of Harrisburg could continue to impose a license and compel the payment of $55 a year for each car that ran over the tracks in city streets.

With respect to the contention that only those cars in regular use can be taxed, Judge McPherson says no exception of this kind appears in the act of 1889, and the court has the power to insert it. "If good reasons exist," he adds, "for levying the taxation in proportion to the number of passengers which each car may have carried, or in proportion to the amount of money which it may have earned, or upon any other basis different from that which the act has adopted, they must be referred to the Legislature as the only body competent to give them the effect which the defendant desires. How much a tax shall be and upon what subject it shall fall are matters of legislative discretion controlled only by constitutional limitations, and lie quite beyond the province of a court. If a car has been used in the city during the year for hire or pay the act expressly authorizes the city to tax it, and so far as the courts are concerned this is an end of the matter."

In the opinion of the court, the act of 1889 authorizes a tax upon or in respect of each car and not a tax upon the business or occupation in which the defendant is engaged. "If the defendant's position is sound," he says, "the act could bear only one of two constructions: first, either that the carts (for example) throughout the whole city could only be taxed one hundred dollars in the aggregate; or second, that every owner of carts used for hire or pay must be taxed the same sum, whether he owned and used one cart or ten carts."

It was urged by the street railway companies that the ordinance taxing the companies provides a penalty for refusal to pay and, therefore, that this remedy is exclusive. The court says it would be absurd to suppose that the ordinance intended to permit a claim for nearly three thousand dollars to be satisfied by the payment of a fine of only fifteen dollars. The court refuses to allow the penalty of five per cent for non-payment of the tax for the reason that there is no averment that a notice was sent to the company that it was delinquent.

With respect to the defense of the Citizens' Passenger Railway Company that its line stretches between two points in Swatara and Susquehanna townships, passing through the city on its way from one terminus to the other, and that the city cannot tax all the cars which are used upon its streets, but must be restricted to a tax upon a due proportion of the company's equipment computed according to its

mileage within the city, the court holds that both the Commonwealth and city are exercising an undoubtful legal right over a subject which is wholly within their power and the reason for applying the mileage method disappears. No doubt, if the townships of Swatara and Susquehanna and the borough of Steelton also enjoyed a similar right to levy a general revenue tax upon the defendant's cars, a case of probable hardship would be presented, which would appeal strongly to the Legislature for consideration, but no such situation exists to-day, and neither the defendant nor the court need trouble itself about burdens which may never be imposed.

DRYING SAND.

In these days of electric railroading, most managers would as soon think of getting along without fuel as without sand. In nearly every instance the methods employed for drying sand are very crude, and consequently slow and far from economical. The largest builder of driers in the country, and whose processes are widely known abroad, is the F. D. Cummer & Son company, of Cleveland, who make artificial driers for every imaginable purpose, from air to garbage crematories for

SAND DRIER.

city use. The company has built driers for paving and steam railroad work which handle 20 tons of sand per hour, and while these machines do perfect work, they are obviously too large for street railway requirements. It is proposed, however, to build smaller sizes especially for electric roads. The economy of operation will soon save the first cost of a machine, which is practically indestructible, while only a very small amount of power is required to operate the drier and its appurtenances. The sand goes into a bin from the wagon, and emerges at the further end of the drier clean, absolutely dry, and ready to be stored or used. The drier is simple in construction and can be operated by cheap labor, with a small amount of fuel. Managers who contemplate any changes or improvements in their present method of drying will get some excellent suggestions by making their requirements known to the F. D. Cummer & Son Company, of Cleveland, Ohio.

ADVERTISING A STREET RAILWAY.

Advertising to get business is growing to be more common among street railways. With some managers the daily newspapers suffice, while others supplement that method by using their cars and in other ways. The management of the Detroit Railway evidently believes in advertising for it has issued a handsome souvenir of 64 pages with a map of the city showing its lines together with the various points of interest they reach. The book is also filled with advertisements, which prove that the company has been able to impress others with the value of its enterprise. The book explains the transfer system of the company, gives a list of streets and numbers with the lines of cars that pass nearest, illustrations of points of interest and many other features. The company has four lines, each of which is designated by a certain signal of the motorman's gong. One stroke denotes one line, a double stroke the second, a triple stroke the third and a single followed by a double stroke the fourth, so that prospective passengers need not trouble to read the signs. The books were given away at the company's office, and were sent through the mail for three 8-for-a-quarter tickets.

NORTHWESTERN ELEVATED, CHICAGO.

The annual meetings of the Columbia Construction Company, which has the contract for constructing the Northwestern Elevated Railroad, and the Northwestern Elevated Railroad Company have been held, the report showing them to be in a flourishing condition. The work of the construction company in railroad construction and condemnation was phenomenal. Foundations have been put in for a large part of the structure, and as iron is arriving at the rate of 100 cars a day there seems to be no reason now why the road should not be completed within a year from date. Through the making of advantageous contracts closed when prices were low, $600,000 was saved on iron, $100,000 on foundations, and $75,000 on timber; so that this will be the cheapest, best and the greatest elevated railroad ever constructed: 5.5 miles being four track, and 1.7 miles two track. Three acres of ground on Fullerton avenue, east of Southport avenue, have been bought for a power station. The terminal will be at Wilson avenue, where 13 acres have been bought, which insures sufficient track room. Mr. Louderback estimates a saving of $100,000 a year as the result of having car barns at a point where cars will start out and stop.

The directors of the Columbia Construction Company are George A. Yuille, J. William Helm, W. F. Furbeck, E. E. Prussing, William Dickinson. The directors of the Northwestern Elevated Railroad are D. H. Louderback, L. S. Owsley, E. W. Sherman, J. L. Cochran, Howard Abel.

TO TELL THE WEATHER.

Observer Richardson, of the U. S. Signal Service, Columbus, O., proposes to distribute weather information by means of street cars. The plan is to put a small tin sign, the exact duplicate of the weather signals, on certain cars, as soon as possible after the forecasts are made. Whether this plan has any real value remains to be seen, as there are many people who believe that the chief duty of the Signal Service is to misinform.

TRACK AND OVERHEAD DEPARTMENT ECONOMICS.

BY J. W. GREER, SECRETARY AND GENERAL MANAGER, YOAKUM, TEX., IMPROVEMENT COMPANY.

PART II.

In building street railway track it is well to remember that if the joints are tight when they are buried they will stay tight unless the bolts break. If they are not tight they begin to wear immediately and keep getting looser each day; and after the angle bars or fish plates get "nicked" on the edges it is then too late ever to make a perfect joint. In steam road practice if the joints are not tight when first used, they are exposed and the track-walker, by giving the bolts a few turns each day, gets them tight before much damage is done to rail or joint. This we cannot and do not desire to do: we want to get the joint down perfectly and let it stay down. In order to get a pair of six-hole angle bars tight it is necessary to go over them three times, as follows: When the rails are first "strapped together," before being spiked down, drive the plates between the ball and flange solidly and screw the nuts up as tight as possible, then hammer the head of each bolt separately and screw it up before going to work at the next. After the track has been laid and raised go over each bolt in every joint, and you will find all of them loose. Proceed to tighten them with hammer and wrench again precisely as at first. After the track has been lined and put in readiness to fill up go over each bolt again for the third time, and you will find them all loose again. Give them another dose of hammer and wrench and if you have used a good spring washer nut lock on each bolt, and the ties are tamped, you can cover up the joint, feeling that it will never trouble you more than the solid rail. The slacking of the joint is due to the change of position of the rail during the three stages of construction as above described. It will not answer to put the joints together temporarily at first, and screw them up solidly after the track is finished; they will not be tight.

Haven't you got some joints in your track that are tight? They are just the same and have been used as much as those which give you trouble, yet they are tight. This should convince you that all could have been made tight had proper care been exercised.

Where two rails of a different section or pattern are to be joined, the only way to get a perfect joint is to take half a rail of each kind to the foundry, put them in position and cast a joint around them. This method is effectual, but expensive. No piece of rail shorter than half a length should ever be put in a track.

No switch or frog shorter than the wheel base of your cars should ever be allowed in a track. Flexibility is an essential feature to properly constructed track, but you want it in the rail rather than the foundation.

Ties 6 x 8 inches, 8 feet long, laid 2 feet from centers on straight track, and 18 inches around curves, with three ties under each joint, will make a solid foundation in dirt or graveled streets if properly tamped and drained. The center tie should be exactly under the joint, but the ends of the angle bars should rest on not more than half the width of a tie each. Tamp the center tie before the other two are shifted into position.

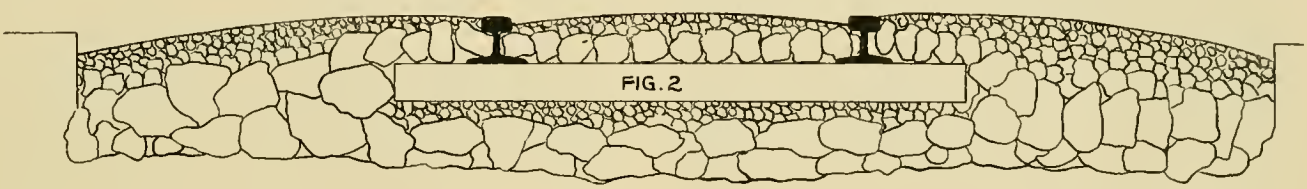


FIG. 2

Fig. 2 shows track construction in Telford pavement. Fig. 3 shows construction in block pavement. Telford pavement is made by excavating the street say 15 inches, rolling the surface with a 10 or 15 ton roller placing a layer of large boulders or broken stones evenly over the whole surface and covering with 6 or 8 inches of gravel or finely broken stone, and again rolling, first dry and then wet, until solid. Observe in the illustration that in lieu of planking the T or other rails, on each side, the layer of boulders is carried on a curve up to the surface at and against the rail, and the dressing of gravel applied thinly over the track and rolled wet until cemented together. The ties are the same size and thickness as those in dirt or macadamized streets, but are not so long, the stones each side of the rails for 18 inches should be driven in place with a 3-pound hammer. Track built in this way is thoroughly braced and practically indestructible if the work is thoroughly done. No trouble is experienced in crossing it, and all the repairs necessary is to reface it with gravel occasionally.

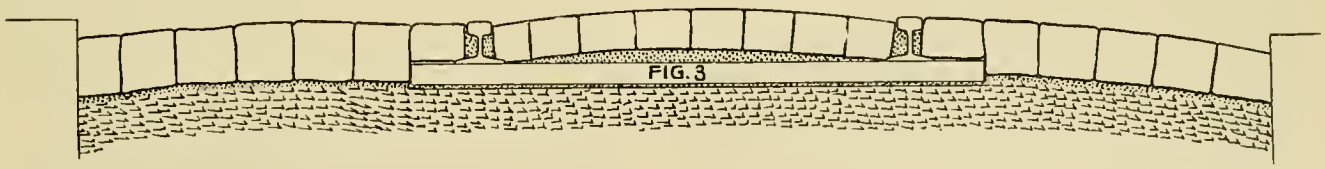


FIG. 3

Fig. 3 shows a cheap, practical, and thoroughly satisfactory method of paving to T or other styles of rail spiked directly to ties. Over six years' constant use in the crowded thoroughfares of a city is authority for the declaration. The paving material may be wood, brick or stone. If the blocks are wood or brick they should be octagonal in shape and one-half inch smaller all

round at the top than at the bottom. This allows the blocks to touch solidly at the bottom and leaves an opening at the tops between each of at least half an inch. This space is filled in by sweeping pea gravel into the spaces and pouring a hot mixture of coal tar and roofing pitch (from a kettle with a spout) into the crevices, which cements the blocks together, and effectually excludes water. The space between ball and flange of rail is filled likewise.

Fig 3 shows a pavement the specifications of which are as follows: Excavate to a depth of twelve inches; roll the surface with fifteen ton roller; level with sand. Cover to a depth of five inches with concrete made of Portland cement, (one to four) sand, and stone broken fine enough to pass through two-inch sieve; tamp thoroughly and let it harden. Cover the concrete with a cushion of sand one inch thick; pave with blocks six inches high bottoms touching, half inch space all round between blocks at top; fill space with grout of pea gravel, coal tar and pitch as above described. After the concrete has hardened and before the blocks to be laid, excavate for ties to a depth of two inches with a chisel pointed pick. Make the excavations just the size of a tie and two feet from centers with two ties at each joint, laid six inches each side of it. Put a sand cushion under each tie one inch thick rammed hard and level. Use a white oak tie three inches thick, eight inches wide, and six feet, eight inches long. Spike the ties with three spikes at each end, two outside and one inside the rail; the inside spike in the center of the tie; those on the outside about two inches from each edge. The size of the spikes should be 3/8x3 inches. Two of these have about the same or more tenacity than a five inch spike as ordinarily used in six inch ties. To tamp the track run a motor car up and down over it, if the trolley wire is up, if not have a heavily loaded flat car shoved back and forth over it; after the track has been settled in this way and leveled by adding or taking away from the sand cushion under the ties, turn the hose on the concrete between the ties, and after it is damp fill up to a level with the top of the ties with more concrete, put a sand cushion one inch thick on this and sweep it with an arched gage which is so formed as to leave it full thickness in the center of track, but tapers to the rail flange on each side. Block the track between the rails and as far outside as the ends of the ties with blocks one-half inch shorter than the height of the rails. Wedge the blocks solidly against the rail inside and out. Let the top of the blocks outside the rail be slightly above the rail; those inside a half inch below next the rail, gradually rising on the sand cushion until the center of the track is reached when the blocks will be half inch higher than the rails. It will be seen that no provision is made for the wheel flange. None is needed. Run a car over the track before the grout is put in between the blocks inside the rails, the flange will settle them to the exact place and you will not be troubled with complaints later on of vehicle wheels wrenched off or blocks working out.

The writer tried in his first experiments with T rail paving, putting an oak strip between the flange and ball of the rail to give flange room. Needless to say, it was a nuisance of the first water, and unsatisfactory in every respect. He also tried blocking even with the tops of the rails and solidly against them, afterwards cutting a groove for the flange next the inside rail, this was better but also a failure, as the groove soon enlarged to such proportions as to admit vehicle wheels, and prior to that would fill up with dirt so as to derail the cars. This is a simple and apparently insignificant point in paving, but it means the difference between success and absolute failure in the case of ordinary T rail.

It is neglect of the small matters, and lack of attention to details, that is the source of most of the woes of street railway officials. Patience and lots of hard work go hand in hand with success in any department of street railway practice, and unless a man is willing to exercise both, he is in the wrong pew and the sooner he gets into some other business the better it will be for both him and the company he is misrepresenting. Tired men and dudes have no place in any department of street railway economics. Eternal vigilance is not alone the price of liberty but is a synonym of first-class track and overhead construction, when exercised by the superintendent.

Have you got a comparatively new track for which you have furnished first-class material in abundance, and which looks like the waves of the sea? If so, do not go to the useless expense of digging it up completely because it has been improperly tamped, for this will cost much more per mile, than the original cost of laying it. Besides after the ties have been tamped by the action of the cars, they are probably on a more solid foundation then you would get under them without stopping the operation of the road. Therefore, leave the ties as they have settled. Get some well seasoned oak lumber. Cut it the width of the tie and in foot lengths. Have it split (with a saw) in thicknesses of half-inch, three-quarters,

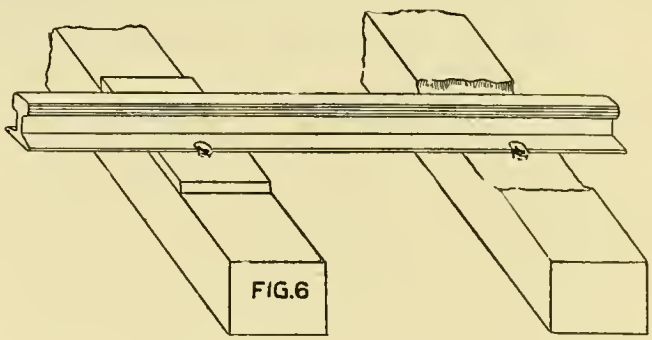


FIG.6

one inch, one and one-fourth and one and one-half inches. Excavate six inches each side of the rail and level with the tops of the ties only. Draw the spikes at the low points and insert between the rail and tie one of the pieces described, selected with regard to the thickness being exactly the height desired to raise the rail. Bore holes through the "Shim" reverse to the previous spike holes. Use an inch longer spike than originally and your track will be raised, lined, and tamped, thoroughly, quickly and inexpensively. The writer ridiculed the

above method of making good track of bad when it was first called to his attention, but years of practice have considerably reduced the size of his head. Try it and be convinced. The above method is called "shimming." When you can't get a shim a half inch in thickness between the tie and the rail either adz off the tie on which the shim is to be placed or adz all contiguous ties to a common level. Fig 6. shows the method above described.

Have you a lot of old style side bearing girder rail with narrow base which necessity compels you to use? If so, do not squander valuable time in railing at fate, for

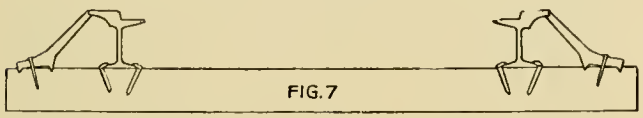


FIG. 7

it is possible to make better than an "average track" even out of this abortion. Spike the rails directly to the ties, see that the joints are thoroughly screwed up, put one tie directly under the joint and another each side as close as will allow of proper tamping, put on each of the three ties at the joints, and on each alternate tie throughout the track a brace made of cast iron made and applied as shown in Fig. 7. Every one who has had experience with side bearing rail knows that the chief difficulty to be overcome is the tendency to turn over sidewise thus drawing the inside spikes and twisting the joints. The method described is simple, cheap and very effectual.

MISTOOK THE SEX.

Here is a good story on A. S. Thompson, superintendent of the Paducah Street Railway, Paducah, Ky. One of the means of attracting passengers is La Belle park, a beautiful spot with a small lake, but there were no ducks to come to the banks after bread or crackers. Something of this sort is indispensable in a park, so Mr. Thompson hit on a brilliant idea. Why not get some ducks to breed? The children will be interested in seeing the ducklings and their parents will bring them out. Having made his decision Mr. Thompson went to the market, where he bargained for nine, getting as he thought six ducks and three drakes. Having made his purchase, he had visions of a pond full of offspring, and cars crowded with people coming to see their antics. Every day he used to go down to the little house on the lake hunting eggs, but nary an egg could he find. One day he said to a friend, "I can't understand why those ducks are so obstinate. Here I've had them nearly a month, and not an egg has been laid." His friend visited the pond, then smiled and said, "They're all drakes." Next season Mr. Thompson will buy eggs, and set them under hens.

The Milwaukee Street Railway makes it an invariable rule to return the fare paid by a passenger whom the conductor is obliged to eject from the car, before putting him off.

HARD ON THE MOURNERS.

Because it is a street railway people seem to think it can stand anything. When some roving adventurer follows up a line of highly flavored correspondence, and finally blows into town with more wind than wisdom and more gall than gold, the citizens make a grand rush; the board of trade hold a meeting; the dear public subscribe to a big bonus, and he gets land and buildings, free water and immunity from taxation and if there is anything left ungiven, he has only to ask for it and it is thrown in to round up the measure. Some of these schemes are good, many are not. But very few of them employ as many men as the street railway in the same town; not one of them are a public necessity, as is the road; none of them represent as great an investment, or begin to enhance the value of property—as does the street railway. We are speaking of the smaller cities of say 60,000 down.

We have in mind a city in Iowa of about 30,000, where the company has expended for labor alone more than $400,000 during the past six years. It has paid taxes amounting to more than $10,000 and now is forced to pay $30,000 for paving. The company never received a dollar of bonus, and while rendering a regular and very efficient service to the public, has never been able to pay its stockholders a dividend.

And now it is held up to the tune of $30,000 for paving which it absolutely cannot wear out as the system is electric. We say it is too hard on the mourners; we say it is not fair; we add it is entirely inconsistent with the policy extended to other labor employing concerns which the city is strongly fighting to secure as against rival towns.

What kind of a public spirit is it that discriminates in this way and thinks because it is a railway it should be bled in every pore? We trust our friend the manager will live to earn big dividends, which judging from the past seems another way of hoping he will be a second Methuselah.

ENCROACHMENT OF TRACKS.

Special damages must be proven in claims on account of alleged encroachment of tracks on private property. A decision on this point has been rendered by Judge Wheeler, of the Hartford superior court, in the case of John Pincher vs. the Central Railway & Electric Company, New Britain, Conn. The court said:

> The real question in the case is, has the defendant made an unreasonable appropriation of the street by its tracks and cars, constituting a private nuisance, seriously injuring the plaintiff's right of access to his land adjoining the highway, and disturbing him in the lawful and profitable use and enjoyment of his property? Unless the plaintiff proves such unreasonable occupation and use of the street by the defendant and special damage to himself therefrom, of course, he will fail in his action.

E. D. Du Bois, late superintendent of the Calumet Electric Railway, was presented with a gold watch and chain by the employes of the company, as a testimonial of esteem.

STREET RAILWAY PROGRESS 1895

The progress that has been made in the electric railway field the past year can not fail to be very gratifying to those engaged in the business, as so many decided advances have been made, both in the general scope of the electric railway and in particular devices.

Probably the most notable feature has been the use of electricity for heavier traffic than ever before and the invasion of a field heretofore occupied almost entirely by steam. The most notable instance of this is the Metropolitan West Side Elevated Railroad, of Chicago, with which our readers ought by this time to be tolerably familiar. The road was started in May and has been in very successful operation ever since, taking care of a very heavy traffic with practically no interruptions. The exact saving over steam service has not been made public, but it is very considerable and the absence of locomotives has unquestionably attracted much summer traffic that would not otherwise have come. The Lake Street Elevated Railroad, of this city, is also changing its motive power to electricity.

Another important invasion of the steam locomotive was that on the Nantasket Beach branch of the New York, New Haven and Hartford Railroad, near Boston. As indicating a probable line of future development this little road is of great interest. There are a number of places on nearly every great steam railroad system where it is desirable to haul a large number of short passenger trains at brief intervals. Now numerous short trains at short intervals can be taken care of by electricity with much greater economy than with steam. The greatest economy with steam demands that traffic be bunched in a few long trains. This latter kind of service is not suitable for suburban business, so that steam roads not adopting electric traction for suburban trains will be forced to drive away suburban patronage by infrequent service, or maintain a frequent service at a poor economical advantage. Electricity on the Nantasket Beach road was installed as an experiment by the great company owning it, and the result has been all that was anticipated. Traffic has increased greatly and other portions of the system will be electrically equipped in the near future for handling suburban traffic. The Pennsylvania Railroad has also tried a similar experiment at Mount Holly, N. J., with like satisfcatory results. In both these installations the motors were put under cars of the common steam road type and current taken from a trolley wire. The trolley wire on the Nantasket Beach road was however of a new form and it is likely that it marks an era in trolley line construction. For a number of years electrical engineers have settled down to a round No. 0 hard drawn copper wire as the standard trolley wire. The necessity for a heavy conductor that would give a larger trolley wheel contact and present an absolutely smooth surface to the wheel at clips called out on this road a pear-shaped form of wire, in many respects much superior to the round wire. This wire was also selected for the Clark street line in Chicago, and it or some similar form will probably be extensively used in the future.

Another piece of work that is of interest although it represents more what can be accomplished in a few isolated cases rather than the beginning of any great revolution in railway practice, is that in the Baltimore and Ohio Railroad tunnel at Baltimore. The novel features of this installation are the use of very heavy electric locomotives and special overhead work suited to the conducting of the tremendous volume of current necessary to operate such machines. The tests there have demonstrated that whatever may be the financial obstacles in the way of electricity on steam trunk lines, there are no electrical or mechanical difficulties of any account.

The next advance of general importance in electric railway work this year was the increase in the number of plants transmitting power long distances for railway purposes. At Sacramento, Cal., and Portland, Ore., power has been transmitted at high pressure (20 miles in the case of Sacramento and 14 miles in the case of Portland) from water power. Another long distance transmission of still greater importance is that at Lowell, Mass., where the Lowell & Suburban Street Railway transmits power 15 miles at 5,000 volts from its central steam plant to a sub-station. This is the first case in the world of a transmission of this kind from an electric railway steam plant.

One of the most remarkable developments of the year has been the business of cast-welding rail joints. From 2½ miles of experimental track in 1894 to scores of miles in 1895 is a rapid increase, even for this pushing industry. The success of continuous track has been more than ever demonstrated and even the most conservative are beginning to admit the correctness of the position which we took last spring that the continuous track is the track of the future.

Two conduit systems have been put in operation on a large scale, and a third is building. One of these is on the Lenox avenue, New York, the other at Washington, D. C., on the Ninth street line. The one under construction is being put in by the Third Avenue Railroad of New York. It is too early to say anything as to the ultimate electrical success of these undertakings. They are better pieces of engineering than any conduits heretofore constructed and for that reason have a better

show of success than any previous undertakings of the kind.

Several long interurban roads with heavy roadbed and rolling stock have been built, among which are the Niagara Falls and Buffalo Electric Railway, the Waukesha Beach Electric Railway and the Niagara Falls and Lewiston Railway. These are all built for speeds of 30 to 40 miles per hour.

Most gratifying progress has been made with the problem of electric street car brakes. Air brakes have been greatly improved and are doing good service: several good forms of friction brakes have been put on the market. The General Electric Company has vigorously taken up the matter of electric brakes and with its present prestige and commercial position will probably do considerable along this line, that the companies heretofore interested in such devices could not. Modifications of the common hand brake have been put forward also which add greatly to its efficiency.

In the way of preventing electrolysis and improving the ground return the most notable innovation this year, has been the introduction of the plastic alloy rail bond. The plastic alloy being so entirely different from anything heretofore used for the purpose it has attracted much attention. The results obtained are excellent.

The first extensive application of the booster system for feeding long lines of road having intermittent travel was made in 1895 although proposed some time before. The field for these machines is rather limited but it is interesting to chronicle the first use of them in railway work as they will no doubt in future be accepted as the proper thing to install where the local conditions are right.

In the larger plants the tendency is strongly toward the installation of large units.

There has been no radical departure in the type of passenger car; although the interurbans are buying long cars on two trucks, and in several cities the double truck car is again coming into favor. The constantly increasing volume of business in express, mail and freight is very suggestive of the future of the interurbans in this department.

The mail cars run on prominent lines in several of the largest cities have all proved highly satisfactory to the department, and the coming year will witness a large expansion of this service.

In the line of pleasure resorts and created travel the success has been marked and in many cases surprising. In this the Review, which from its first issue has persistently urged action along these lines, takes a modest gratification, and predicts a large expansion in this department of street railroading.

The coming year promises an enormous amount of construction work, especially in the interurbans. Reconstruction of track, equipment and power plants, both for renewals and extensions will give the manufacturers a very busy year, and as prices are being restored by reason of the large demand, promises a satisfactory one as well.

FACILITATING TRAVEL.

"Is any effort made to educate the people so as to facilitate travel?" Such was a question asked of a committee of citizens by John Lowber Welsh, president of the Union Traction Company, Philadelphia. The committee was endeavoring to secure a reduction of fares from 8 cents and a transfer to 5 cents and a transfer. Mr. Welsh pointed out to the committee that the company was spending $16.000.000 on improvements and was giving better service than when the various companies were operating as individual systems. Then he asked what the people were doing.

In the large cities, and in the towns, too, no attention has been paid to this phase of human affairs. The corporations have all been working for more rapid means of transportation. Horse and mule lines have been superseded by cable and electricity. In many places they have been hampered by the old speed regulations that governed the horse lines. Steam roads have put an express service on their suburban lines, thereby bringing remote points nearer to the metropolis. Yet the people alone stand still. Teams monopolize the street railway tracks, obstructing traffic, while hundreds of people are delayed in their business. Everybody seems to insist on everybody else hurrying except himself, and so takes his own time. Some people become angry if a conductor asks them to hasten their movements. In the small cities conductors and motormen, it is reported, are in the habit of waiting for passengers who may be some distance away. While this practice may gain a few friends for the company if traffic is light, it has the opposite effect if persisted in when traffic is heavy.

Although street railways have provided rapid transit, they have not made any efforts to teach people how to profit by it. In the December Review it was told how the Chicago roads were endeavoring to minimize delays by the enforcement of the ordinance against obstructing tracks and distributing cards illustrating the right and wrong methods of standing horses on streets that have car tracks. These measures have done a great deal to lessen the nuisance, while teamsters now pull out of the tracks at the first sound of the warning gong. Before, they staid until they got ready to move. It is the passengers that cause most of the delay. They take their time in getting on and off and if seats are all taken persist in standing as near the door as possible, requiring later comers to push their way through an almost unyielding mass of humanity.

Some lines of street railways are intersected by 16 streets to every mile, others have 8 cross streets to a mile. Suppose a car is delayed one-half minute at every crossing, that is 8 minutes where 16 stops are made to the mile, or 4 minutes where 8 stops are made. On this basis more time is spent in stopping than is required to run the mile, where a speed of ten miles an hour or one mile in six minutes is permitted. In a day these delays to one car figured on that basis would be equivalent to nearly one-half day's loss of service. It takes between

5 and 10 seconds to stop a car, unless an emergency stop is made, and about the same time to start and get under headway. While the time may seem short in itself, it rapidly amounts to something in the course of a day. A little thought on the part of passengers would cause them to dispose of themselves so they would not delay others, and to move a little more quickly, for they would see that the many would be benefited by the actions of the few, instead of hindered.

WILL OPEN VESTIBULE WINDOWS.

As a result of the viaduct accident on the Big Consolidated in Cleveland, Secretary J. B. Hanna, of the Little Consolidated, has issued an order directing all motormen to leave the front windows of their vestibule down during rain or snow, or whenever fog or dust obscured the vision. Secretary Hanna said:—"There is no use talking, a motorman cannot see when his glass is dimmed by any of these conditions and the railroads have no right to risk the lives of people as is done when the glass is closed."

A Review editor recently rode over a suburban electric line during a snow storm. The snow was very wet and the combined force of the wind and speed of the car which was fully 30 miles an hour, was sufficient to pack the snow an inch thick on the entire vestibule front. Occasionally the motorman would lower his front window and scrape a place about 6 inches square, clear. But this was again covered in a few moments, and at all times the glass was wet and streaky. That no one was struck during the trip was due to an absence of anyone upon the track, and not because the man could see where he was running. The Review has always maintained, that while the vestibule has certain desirable features, it was at the expense of increased danger in operation.

At the Cleveland inquest Motorman Rogers, whose car went into the river testified: "I do not know whether I could see a man distinctly on such a night as Saturday, unless I took a very careful look. The front glass of the vestibule was spattered with rain when the car approached the draw. The headlight on the car is not very strong and does not throw the light 50 feet ahead."

In this connection an interesting fact was met in talking with a number of employes in Cleveland. They all stated that while the motormen were on the whole glad of the vestibules the men for whom they were intended had made no effort or request for vestibules. That on city lines there were comparatively few days during winter in which the driver would have experienced any actual distress without them: and that on such days they were actually afraid to run with the windows closed for fear of accident.

Manager Raphael Semmes, of the Mobile Street Railway, Mobile, Ala., has substituted sheet iron on one side of car platforms for the two wire gates formerly in use. It will now be impossible for passengers to unfasten the gates, or fall off by displacing the guards.

NOVA SCOTIA POLE RAILWAY.

One of the cheapest roadbeds is that of the pole road, which has been adopted in many logging regions. No cross ties are needed, for there is no lateral pressure. The poles, which should be all heart, are about 9 inches in diameter at the smaller end. A socket in the largest end permits the smaller end of another pole to rest in it.

INITIAL TRIP OF POLE ROAD.

Curves are constructed of short poles, the joints being opposite. Construction costs from $75 to $250 a mile. The cars and locomotives are supplied with wide-tired grooved wheels. Where there are grades it is customary to place the locomotive in the middle of the train, so it can leave half its train of six cars, if necessary, and push the other three to the summit, returning for the other three. The illustration, which is reproduced from the Scientific American, shows the trial trip on a road in Nova Scotia. This type of road, while familiar to some, will be a curiosity to a large number of street railway men.

EQUALIZING THE EXTRA LIST.

Manager Wyman, of the Milwaukee system, has revised the order of calls for men on extra list. Heretofore, each day's calls for men on extra list to take out cars has been in the order of position of the men on the list. The result frequently was that a few men at the bottom of the list made very few runs in the course of the week, while those at the top had pretty steady work. By the change No. 1, on extra list receives the first promotion to steady run, just as before, and the extras all move up one number; but in assigning for daily work, calls are made consecutively until the bottom of the list is reached when the call goes back to No. 1. For instance: with 10men on extra list, if only five men are needed to-day the starter uses Nos 1 to 5; to-morrow, he begins the call with No. 6, and so on, giving every man on the list practically the same amount of work in the course of a month.

Funeral cars are about to be put on the Ridgewood line in Brooklyn as an experiment, which, if successful, will result in a number of cars being specially built, and a regular service inaugurated. Funeral cars ought to be a success in the City of Churches, if anywhere.

WILL ACCOMMODATE 125 PEOPLE.

One hundred and twenty-five people make a pretty good load for a street car, but the Mt. Adams and Eden Park Inclined Railway has two such cars in use, and is building 8 more in its own shops under the supervision of Charles J. Jennings. The total length of car is 38 feet 5½ inches; width at sills over all 7 feet; height from bottom of sill to extreme top 8 feet 7 inches. The car has two compartments, open and closed. The box compartment will seat 24 and the open 25, but 30 can be

NEW COMBINATION CAR.

crowded in. There is standing room for 75, which gives the car a capacity of 125 passengers. The sills have a steel I beam 7 inches deep 4 inches wide, serving as a subsill the entire length of the body. The body is mounted on a pair of McGuire adjustable traction trucks, each equipped with a G. E. 1,200 motor. The type K controller is used. The cars are supplied with safety brakes and push buttons and have five lights in the summer and five in the box compartment. The photograph and description were kindly furnished by John C. Weaver, superintendent.

QUITE AN ACCIDENT IN MEXICO.

This is the way the City of Mexico Herald describes a street car collision:

"The efficient Secretary of the 6th Police Station—Mr. Emilio Villareal—was yesterday afternoon the main factor in the capture of a reckless street car driver. About 3:15 p. m. at the corner of 1st Ancha street and 2nd Ayuntamiento, there was a crash between two street cars, and Apolinar de la Torre, coachman of the Tacubaya line, was instantly killed. The other driver, Vidal Zamora, of a Valley car was arrested by the order of Mr. Villareal, who happened to be at the scene of the accident."

OBITUARY.

E. Kessler, superintendent of the Richmond City Railway, Richmond, Ind., suffered the loss of his bright little daughter, Jessie, under extremely painful circumstances. She was waiting with her mother for a car when the motorman ran by the crossing. Not thinking that he would attempt to come back, the child ran towards the car on the track, and was struck by it. Before she could be carried into a house death ended her sufferings. Mr. and Mrs. Kessler were prostrated.

DURABILITY IN RAILROAD TIES.

B. E. Fernow, chief of the Forestry division of the Department of Agriculture, Washington, D. C., has for three or four years been working to make his office of commercial value in addition to making scientific research. There has just been issued bulletin No. 10, entitled "Timber; an Elementary Discussion of the Characteristics and Properties of Wood," by Filibert Roth, special agent in charge of timber physics. The report, which is a valuable addition to lumber and timber literature, should be in the hands of everybody who has anything to do with these commodities. Prof. Roth discusses some causes and remedies of timber decay, and gives the following range of durability in railroad ties:

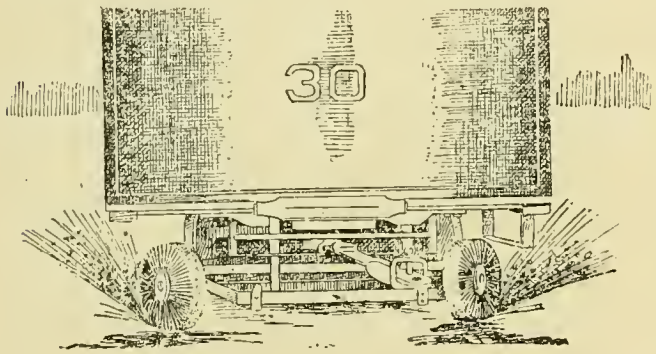
	Years.		Years.
White oak and Chestnut oak	8	Redwood	12
Chestnut	8	Cypress and Red cedar	10
Black locust	10	Tamarack	7 to 8
Cherry, Black walnut, Locust	7	Longleaf pine	6
Elm	6 to 7	Hemlock	4 to 6
Red and Black oaks	4 to 5	Spruce	5
Ash, Beech, Maple	4		

The "life" of these woods can be increased twice and three times its natural duration by impregnating it with various salts or other chemicals, which prevent the fungus from feeding on the wood. The wood is first steamed to open the pores and remove the hardened surface coating of sap and dirt. A liquid solution of the preservative material is then injected with the assistance of heat and pressure.

Prof. Roth says the cause of decay is a vegetable fungus growth that starts on the outside or sapwood of the timber, and eats it away toward the heart. It flourishes with warmth and moisture. He advises the use of means to prevent decay where timber is placed in position for fungus growth, as railway ties, joists and timber in contact with damp brick walls and all building material whose perfect seasoning is prevented by the absence of the proper circulation of air. Since charcoal resists the solvents of fungi, he recommends the charring of the outer parts of posts, so as not to open checks into the interior of the wood, as a very fine protection. Wood painted before it is perfectly seasoned falls a prey to dry rot; the fungus finds an abundance of moisture, and the protection intended for the wood protects its enemy, the fungus. Wood cut in the fall is more durable than that cut in the summer, only because the low temperature of the winter season prevents the attack of the fungi, and the wood is given a chance to dry. Usually, summer-felled wood, on account of prevalant high temperature and exposure to sun, checks more than winter-felled wood, and since all season checks favor the entrance of both moisture and fungus they facilitate destruction. Where summer-felled wood is worked up at once and protected by kiln-drying no difference exists. The phases of the moon have no influence whatever on durability.

SMALL TRACK BROOM.

A. S. Hickley, manager of the lines at Asbury Park, N. J., has placed in operation on his road a system of small sweepers attached to each passenger car, an illustration of which appears below. The idea being similar to that of scrapers which have been used for many years and working on the plan that a frequent cleaning of the track by light brooms or scrapers is very valuable as an adjunct to the work performed by the heavy sweepers



NEW TRACK BROOM.

and snow plows. The brushes are geared to the axle of the car and are placed at a tangent to the line of the rail. The apparatus is manufactured by The Hickley Launch and Electrical Manufacturing Company at Asbury Park, N. J., and the New York office is 203 Broadway, and in charge of T. C. Martin. It is said for the Hickley broom that the speed at which it revolves is not sufficient to throw its bristles or wires, or do any damage. Either rattan or galvanized steel can be used and the selection is dependent only upon its probable preponderance of mud or ice.

When worn out a broom can be replaced in two minutes at a nominal cost, and the price of the entire device is said to be reasonable.

GAS MOTORS FOR TRACTION.

The London Electrician says:

"Gas-driven tramcars have proven such a failure in this country that the advocates of this mode of propulsion must find comfort in the fact of the Dessau (Germany) gas tramcars having been run successfully for a whole year. The Dessau line was 2¾ miles in length when opened in November, 1894, but it proved so popular that it was soon extended to nearly 4 miles. The present equipment includes nine 7-horse-power cars, four 10-horse-power cars and four trailers. The amount of gas actually consumed in the engines on the cars has averaged 26.6 cubic feet per car mile, to which, however, must be added 4.46 cubic feet used in the engines driving the gas compressors. The total consumption of gas, therefore, has averaged 31.06 cubic feet per car mile. At 2s. 6d. per 1,000 cubic feet this represents a cost of fuel equal to 0.932d. per car mile. If it can be shown that what has been done at Dessau can be done elsewhere and wherever there is cheap town gas, the battle between gas and electric cars will evidently have to be fought on other issues than the cost of fuel. There still remains, however, for electrical engineers the comforting fact that gas cars have had more than one genuine trial in this country, and that they have always turned out to be genuine failures."

To which we might add, the gas motor for street railways has always been a dismal failure here.

NEAR CROSSING UNPOPULAR EVERYWHERE.

Without exception the "near crossing" stop has been unpopular with the public. Dr. C. D. Richards, of Detroit, thus expresses himself on the ordinance in that city:

"Is it not about time that the council repeal the ordinance? They claim that it avoids accidents. Such is not the case, for accidents occur only when the cars are going at full speed, not when they are slowing up to stop at the farther crossing. Why should we be obliged to tramp back through mud and slush to board a car that stops as it comes to the first crossing? I am sure that when it starts up, it crosses the street with the same rapidity that one does in slowing down. When in Atlanta last week I saw conductors have their cars backed up, if they happened to pass the crossing, so that ladies could get on without getting into the mud. Will they do so here? They say, 'get on the front end?' It is not made for that purpose, and the motorman has enough to do without attending to passengers. The ordinance is abominable."

WANTS TO CLIMB MT. ROYAL.

Application for an extension of its line over Mt. Royal has been made by the Montreal Street Railway, which will be equivalent to 4 miles of single track. The city surveyor has recommended the granting of the franchise, which would make the terminus near the park ranger's house. Only one crossing of park roads would be made, and that at the cemetery. Iron poles, the sodding of embankments and cuts, vines in rock work and a wire fence with rustic poles are to be required. There is much opposition by the Women's Council, Women's Musical Club, and Young Women's Christian Association.

MAN MUST GO AHEAD AT CROSSING.

The Ohio supreme court has decided that in order to be relieved of liability on account of accident at railroad crossings, street railway companies must have a man go ahead of cars to see if the way is clear. John Murray was in a street railway car that was struck by a B. & O. S. W. train. He sued and secured a verdict of $2,500 against both the street railway and railroad. The former claimed that as the crossing watchman had signaled the car to come ahead there was no negligence on its part. Under the statutes the company must send a man ahead to see that the crossing is safe, and this was not done.

THE POWER HOUSE

This department is devoted to the construction and operation of electric railway power houses. Correspondence from practical men is specially invited. Both the users and makers of power house appliances, are expected to give their views and experiences on subjects within the range of the department.

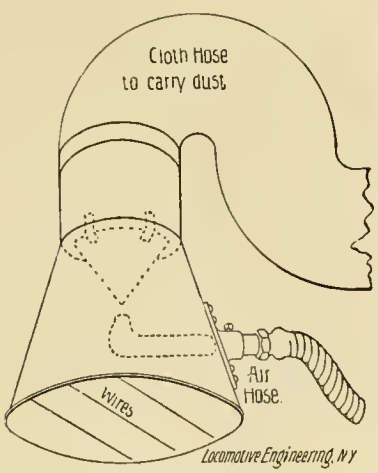
Very few small roads have a satisfactory daily engineer's report blank. Of course (?) all large roads have them. The blank on the following page is suggested as a convenient form to use. It goes into detail sufficiently so that the performance of the plant can be easily determined and yet the details are not so elaborate but that any competent engineer can make one out without undue labor every day if the proper records are kept.

* * *

The Citizens Street Railroad of Indianapolis is about to put in at its West Washington street power house the largest lightning arrester choke coils ever put up. These coils are designed to carry the total capacity of the station bus bars instead of the current of one generator or one feeder as is sometimes the case. The coils are to be used in connection with the Westinghouse tank lightning arrester and were made by the Westinghouse Company. There are 9 coils in all, arranged three in series and three in multiple. Each coil consists of 11 turns of copper wire 1⅛ inch in diameter. The diameter of the coil over all is 5¾ inches.

* * *

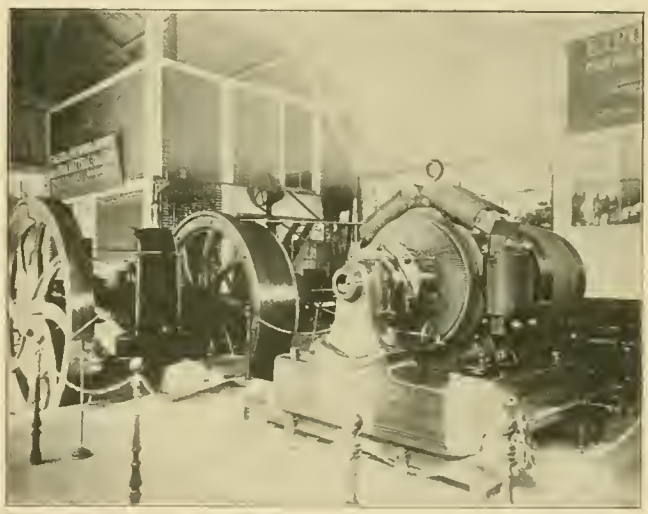
There are now very few modern power houses that do not have compressed air systems for cleaning out armatures and similar work that can be done well only in this way. Compressed air has been used a good many years for cleaning steam road coaches and will probably be more extensively used around street car barns than formerly. To the power-house engineer that has a compressed air system at his disposal the device shown in the accompanying engraving, may contain some suggestion. It is a cushion cleaner used at the Dubuque shops of the C., M. & St. Paul Railway, and for a description of which we are indebted to Locomotive Engineering. Instead of blowing the dirt out of a place only to light somewhere where it is not wanted, it sucks the dirt in and carries it in a cloth hose to the open air. It is a great success for cleaning cushions, and discharges a regular cyclone of dirt. No doubt it can be modified to be applicable to other uses.



AIR SUCTION DEVICE.

* * *

It is to the gas engine that the majority of engineers are looking at the present day for the most likely solution of the problem of how to produce electrical energy more cheaply, and there seems to be little doubt there will be a great development along that line in a few years. Several large electric light stations in Europe



GAS ENGINE—LYONS TRAMWAY.

are run by gas engines, and probably the main reason why there are not several electric railway stations so run is that electric railways are so few in the old country. If the gas engine industry had been developed to as great an extent here as in the old country it is probable that that there would be numerous electric railways with gas engine stations. A twelve-car road at the Lyons (France) exposition last year was run from a gas engine station. The interior of this station is shown in the accompanying engravings. The engine is a 200-horse

ENGINEER'S DAILY REPORT, MAIN STREET RAILWAY,

FOR DAY BEGINNING

4. A.M. ..... 189.....

STEAM PRESSURE	AMPERES	VOLTS	TIME
			A.M. 4.00
			4.30
			5.00
			5.30
			6.00
			6.30
			7.00
			7.30
			8.00
			8.30
			9.00
			9.30
			10.00
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			11.00
			11.30
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			12.30
			P.M. 1.00
			1.30
			2.00
			2.30
			3.00
			3.30
			4.00
			4.30
			5.00
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			10.00
			10.30
			11.00
			11.30
			12.00
			12.30
			A.M. 1.00
			1.30
			2.00
			2.30
			3.00
			3.30
AVERAGE AMPERES			
AVERAGE VOLTS			
HOURS RUN			
ELEC. H.P. HOURS			

POUNDS COAL USED

POUNDS WATER USED

PINTS VALVE OIL

PINTS DYNAMO OIL

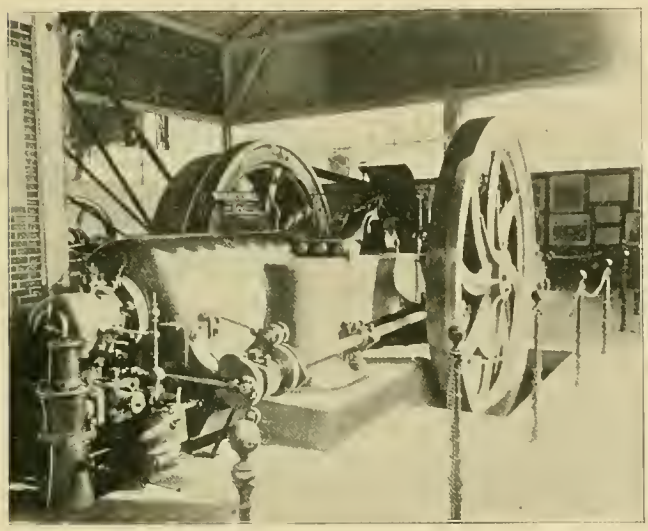
WAGES FOR DAY

HOURS RUN ENGINE NO. 1 2. 3.

HOURS RUN BOILER NO. 1 2 3. 4. 5.

REMARKS {NOTE HERE OPENING OF CIRCUIT BREAKERS AND CAUSE; ANY REPAIRS MADE IN STATION AND COST OF EXTRA HELP ON SAME; BOILERS CLEANED, ACCIDENTS ETC}

power Simplex, built by Matter & Co., of Rouen, driving a Thury multipolar generator. As it is of the single acting type, giving an impulse only every four strokes, the construction has to be very massive, both as to flywheels, bed and cylinder. Producer gas is used which is generated by spraying water through a column of incandescent coke or hard coal. As with all single acting gas engines the question of regulation was one of the most difficult. Keeping a practically constant speed with a variable load and only one-fourth the number of impulses that a steam engine would give at the same speed, is next to an impossibility, and has stood in the way of gas-engine development for electric work. At



GAS ENGINE—LYONS TRAMWAY.

Lyons, the difficulty was partially obviated by having a separate exciter for the generator, as is occasionally the practice with water power. If gas engines are extensively used in the future for driving railway generators they will probably be of some form of the two cylinder double-acting types which give two impulses to a revolution, and consequently as good regulation as a steam engine. Such engines are now on the market and are being extensively pushed for large work.

STATUS OF THE CAST WELDED JOINT.

Probably no one feature of street railway practice is receiving closer scrutiny,—and more so as the terrible wear of tracks is being appreciated—than that of cast and electric welded joints. Hence when some irresponsible daily newspaper man sent out a story which made the rounds of the eastern press, that the cast joints laid last summer in Chicago, were fast going to pieces and making a terrible wreck of the tracks, the falsity of the assertion requires specific and prominent denial. From the first, this magazine has stood for the endless rail through the use of a jointless track, and so far our predictions have been much more than realized. Now, what are the facts.

Instead of the big percentage of breakages reported here, the zero weather which lasted for over a week, and touched 10° below; had no effect to speak of on the cast joints. The Falk Company, which did the work, had a careful inspection made of all welded track only a few days before the cold snap. Immediately after the weather moderated, men were again sent over every foot of track. The breakage, or rather the drawing of joints on account of cold did not exceed one-eighth of one per cent which would have been very low for fish-plates. At St. Paul and Minneapolis, there were only 8 joints out of the 2,000 that were drawn in the cold snap, and most of the work there was done very late in the season. The breakage there was less than one-half of one per cent.

In Chicago, during the past season, 26,000 joints were cast-welded for the South and West side roads. Of this work, Superintendent Bowen of the Chicago city says:

"The Falk cast-joint, we have in operation on our road making a continuous rail is satisfactory in every respect. It eliminates the jar incident to passing over an old joint, as well as the question of maintenance, which cost us for electric and cable lines 80 cents per joint per year, heretofore."

Chief Engineer Weston, of the West Chicago Street Railroad, says:

"We have between 9,000 and 10,000 joints cast-welded and so far we have found them very satisfactory and everything they were represented to us to be."

In St. Louis, the pioneer in using the cast-weld, and where the joints have been in 18 months, General Manager Robert McCulloch says:

"We have used several miles of this track for a year. It has passed through the heat of the summer and the cold of the winter. It is not thrown out of alignment by the expansion of the summer's heat, nor is it pulled apart by the contraction of the winter's cold, why, we do not know, nor do we puzzle our brains to find out.

"Our faith in the virtue of this system of track-building is so great that we have constructed 10 miles of new track and have welded all the joints. We have the best 10 miles of track ever laid."

C. G. Goodrich, vice-president of the Twin-Cities road, Minneapolis also says "On November 1, we had 2,000 cast-joints completed, and are perfectly satisfied with the work."

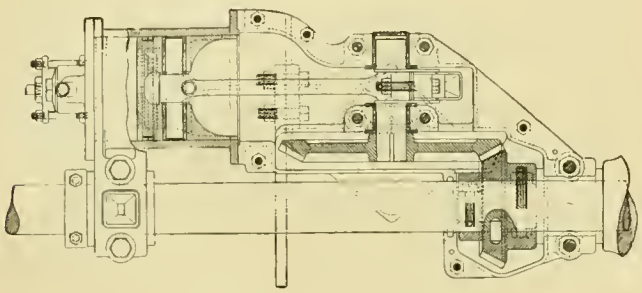
From the above it will be seen the endless rail is proving a big success. If the balance of the winter should be unusually severe there may be additional breakages, though this is not likely, as the cold snap came very quickly, and followed very warm weather for the season of the year, and the probabilities are the weak points have already made themselves known.

DON'T HAVE TO PUT ON GATES.

The Missouri supreme court has decided the law requiring gates or guards to protect the platforms of street cars to be unconstitutional. John Wilzman was awarded $2,000 for being thrown off a Southern Railway Company car. The company appealed and won its case.

STANDARD GEARED COMPRESSOR.

The Standard Air Brake Company, the pioneer in street car air braking, has put out a new geared compressor for high speed roads where it is undesirable for reasons of cost to use a special electrically driven compressor. The gears are enclosed and made of cut steel, which fact insures long life as demonstrated by the steel gears on electric motor equipments. For low speed cars the eccentric driven compressor answers very well, but on high speed cars the revolution is too rapid for the direct eccentric drive. An improvement in the geared compressor is the valve arrangement, whereby valves can be unscrewed and replaced in less than five minutes.



STANDARD GEARED COMPRESSOR.

so that they can be renewed if necessary while the car is in service. The compressor is flexibly suspended (a feature not shown in engraving) in much the same manner as a modern motor. The Standard Air-Brake Company's new geared type will be appreciated by managers of high speed roads, who, while realizing the vital need of power-brakes, do not feel able to pay the increased cost of the electrically-driven compressor for the air-brake system. The company now offers its axle-driven compressor for moderate speed cars, its geared type for high speed cars, and its electrically-driven type for cars making extraordinary speeds. It is thus possible for every car in existence to be equipped with an air-brake, the necessity for which is rapidly being appreciated.

SAN DIEGO ROAD FOR SALE.

As will be noticed elsewhere in this issue the San Diego Cable Railway, San Diego, Cal., will be sold by its owner. The line has been changed to electric and owns one of the finest park pleasure resorts in the country and should prove a good paying investment. The road has considerable surplus power, the electric plant having been installed with a view to future growth as well as present demands, and this surplus can be utilized for light and power purposes. A full descriptive circular with illustrations has been prepared and can be had by addressing the company. For a manager who desires to get out of the rigorous climate of the north into the perpetual summer of southern California this is an unusual opportunity. There are no snow plows or salt cars scheduled in the equipment, but no one will have any regrets that there is never any use for those cold-weather accessories.

PRESERVING WOOD TIES AND POLES.

Progressive managers are devoting much attention to the preservation of ties and poles. They realize the causes of decay are omnipresent, and are constantly at work, although their presence does not manifest itself until they have proceeded so far in their work of destruction that it is impossible to arrest them by any other means than to put in new work. The only successful way to prevent decay is to treat the ties, poles and timber so that it will be impossible for the germs to find nourishment. Street railway practice is such that it is more expensive to get at the ties than it is in the case of steam roads. In the latter class it is comparatively simple to discover a bad tie and replace it, but a street railway finds it necessary to remove considerable paving in order to examine into the condition of its ties and replace the paving after the ties have been renewed. Hence the importance of compelling the ties to last as long as possible by adding to their life.

One of the main difficulties which has stood in the way of the adoption of the more general processes of wood preservation has been the fact that the very first step required the erection of elaborate and expensive plants, or where the amount of timber to be treated did not warrant this expense, the added cost of transportation to and from established plants added very considerably to the cost and in many cases caused perplexing delays. Chemists and practical railroad men have long been searching for some means of preservation that can be easily applied at small expense. The Q. & C. Company, Western Union building, Chicago, believes it has secured in a specially prepared carbolineum, which is called the Q. & C., a preservative that meets all requirements for the arrest and prevention of decay in all classes of timber used on railways. In the preparation of this material, which is manufactured in Germany, special attention is directed to its more perfect adaptation to the woods and climate of the United States, which up to this time had never been considered.

Mr. Quincy, treasurer of the Q. & C. Company, says by the use of this product, timber, whether used in ties, platforms, poles, crossarms, docks, buildings or cars, is well preserved, so that its period of life and usefulness is much extended. Carbolineum can be applied by ordinary paint brushes, two coats being sufficient. In many cases timbers, poles, ties, crossarms, fence posts, etc., are dipped in the carbolineum, which is absorbed by the wood. This method of treatment has given better results than have been obtained from some of the more pretentious and elaborate processes.

The Q. & C. Company has in use on steam roads thousands of the Servis tie plates which protect the tie against wear and make it available for use until removed from the track because of decay.

It was the success of this device that led the company to direct its attention to the manufacture and introduction of wood preservatives. The Servis tie plate is specially adapted to all lines using cross ties. Several

mountain roads have discontinued the use of rail braces on curves because these tie plates have held the rails to guage where rail braces previously failed.

The severe strains of street railway service, together with the difficulty of access to the roadbed, make it advisable to use tie plates, for they lessen the wear of the ties and preserve a highly refined condition of track without the necessity of tearing up streets.

RED BALLS FOR SIGNS.

Red balls of cast iron on iron rods about 8 feet above the surface of the ground are used for street signs by the Chicago street railways. On the first day of the year a city ordinance went into effect, requiring near crossing stops, except where it is unadvisable for mechanical reasons. At the unusual places where stops will be made these iron ball signs are placed. Those on the South side are smaller than those on the West and North sides. They are neat and durable and do not take up much room.

BROKE LOOSE AGAIN.

If it wasn't for street cars the funny papers would miss a big share of the exhaustless fund on which they draw for stories. "Life," however, has slipped a cog

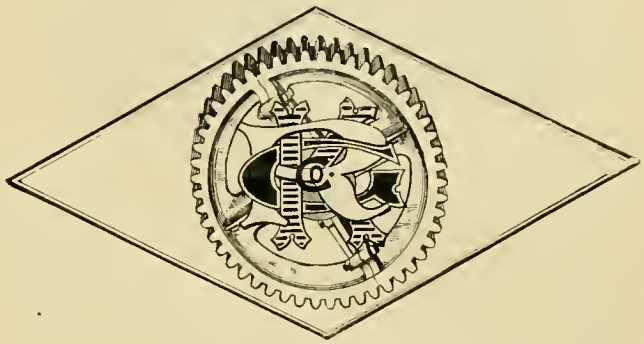
and libels the business in a most reprehensible manner as illustrated. Guess their supply of free tickets has been cut off.

DISPOSING OF SNOW.

The Commissioner of Public Works, Chicago, has resurrected an old ordinance which provides that the street-car companies must remove the snow piles formed on the street by the use of plows. The order has practically been a dead letter always, except in the business district.

KUNTZ AND RAW GEARS.

A new concern in the street railway trade is the Kuntz-Raw Gear Company, of 508 Montgomery Building, Milwaukee. Although the gears offered by this company are very low in price they are claimed to be of the highest quality, the low price being accounted for by the methods of manufacture employed by the com-



pany. The gear cutter used, we are told, is the invention of J. L. Kuntz and will cut and finish the teeth in a gear in less than one-third the time required on other machines. A further saving is said to be effected by a process of manufacture which saves nearly all of the material usually wasted in cutting gears from the solid blank. Semi-steel is employed in all this company's steel gears. This material was chosen because of the remarkable results obtained from it under the most severe conditions by the E. P. Allis Company and because of its superiority to other metals for the gears and pinions on the rolls of the Illinois Steel Company's Works at Milwaukee.

A GOOD SIGN.

One of the best signs of the times may be noted in the cars of the Cleveland City Railway, where very successful efforts are made to keep the rolling stock neat, clean and comfortable. The sign which shows conspicuously in every car, has an exellent effect and reads:

NOTICE.

Conductors must notify any passenger spitting on the car floor to desist at once, and if the passenger still persists in spitting, he will eject such person from the car.

GEO. G. MULHERN, Supt.

While the rule has in some cities been found a somewhat difficult one to enforce, it is plainly the duty of every manager to do so to his utmost ability.

Mayor Pingree made a demand for 6 tickets for 25 cents on the Detroit Ctizens' road; was refused, declined to pay 5 cents and was ejected. He brought suit to compel the company to sell 6 tickets for a quarter. He says the company has no right to increase its fares, and that the fact of 6-for-a-quarter tickets having been sold for nearly 30 years makes that the legal rate of fare.

TO PREVENT JOINT-POUNDING.

A device to prevent the hammering of rail joints, has been patented by T. M. Kenna, of New Haven, Conn. The device is so simple no further description than the

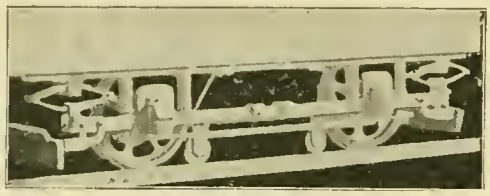


illustration is necessary. It is really nothing more than an application of the double truck. The striking difference in diameter between the large and small wheels employed, together with the small diameter and bearing surface of the shaft carrying the small wheels would seem to promise much more in theory than in practice.

IGNORANCE OR DECEPTION.

For a publication which lays claim to in any degree represent street railway interests, the following editorial from "the only weekly electric railway publication in the world," is simply lamentable:

"The practical working of the cable road, uneconomical as it may be, cannot be denied, and many miles of this construction are being successfully operated in various parts of the country. It should at once occur to those familiar in any degree with cable traction that *precisely the same obstacles are present as with electric conduit working.* Water in the conduit is even more objectionable, for not only does it *tie up the road, but any attempt* to run with a wet cable means its *failure in a few hours.* Therefore, a section of flooded conduit may tie up a much longer line on a cable road than on an underground electric system."

And so on. The italics are ours.

The mechanical editor of the publication quoted ought to take a few easy lessons in the elements of street railroading. Cables have been operating for 25 years and no one of them was ever yet "tied up" or lost an hour on account of wet or water in the conduit. "Attempt" to run with a wet cable does not mean failure, and ropes have run for days at a time with water dripping from every foot of cable outside of the power house. The grip abrasion on a wet cable is somewhat greater than on a dry one for the simple reason that the water peels off the oil and tar coating of the rope but we should like to hear of a line that was ever tied up from this cause. Outside of a strong conduit construction being required in both cases, where heavy teaming is in the street, the operating conditions are anything but similar, as every street railway man in the country knows.

The writer could have saved himself from such an egregious and mortifying admission of ignorance by asking any oiler who works along the Broadway track for a few shillings per day.

The Oakland Railway Company, Oakland, Cal., will change the San Pablo avenue cable line to electric.

PERSONAL.

Julius Runge becomes president of the Galveston City Railway.

J. H. Quigg is general manager of the Staten Island Electric Railway, now under construction.

William Ring, late of Paterson, N. J., has been appointed superintendent of the Fall River, Mass., Street Railway Company.

John I. Prince, of West Haven, Conn., has been appointed superintendent of the new electric road between Corning and Painted Post, N. Y.

W. E. Davis has been appointed general manager of the New Jersey Electric Railway Company, of Paterson, in place of A. L. Hayward.

A. F. Haas, general manager of the Seattle Cable Railway, is talked of as a republican candidate for mayor of that city. He would make an excellent one.

F. G. Jones, vice-president and general manager of the Memphis Street Railway Company, Memphis, Tenn., favored us with an enjoyable visit last month.

Philip D. Bagley, formerly superintendent of the Lowell & Suburban Street Railway, has returned from California to superintend the Nashua, N. H., Street Railway.

C. C. Sailer, after 30 years of faithful service, from watchman to general superintendent, with the Washington & Georgetown Railway, has retired to take a well earned rest.

James T. Richmond of New York, has been elected superintendent of the People's Street Railway at Nanticoke, Pa. Being a practical electrician Mr. Richmond will, no doubt, make a good superintendent.

Miss M. L. Hill, while secretary of the Lima, O., Electric Street Railway Company, became well and favorably known to many of the city's best young men, one of whom, Mr. Jones, has just led her to Hymen's altar.

A. K. Stone, formerly manager of the Omaha & Council Bluffs Railway & Bridge Company has been appointed assistant division superintendent on the Great Northern Railroad. With him went John S. Poole who has made so many friends while chief clerk of the company.

W. R. Daum, president of the Ottumwa, Ia., Railway, Electric & Steam Company, was confined to his bed by an injury to his foot, which occurred at the power house. Mr. Daum stepped on a large cinder which turned, spraining the ankle and tearing loose the tendons. It is hoped the injury will not be permanent.

John L. Kyne, the newly elected superintendent of the Syracuse street railway, who succeeds Mr. Douglass, is a newspaper man, who, as editor of the East Syracuse News, has been both successful and popular. The same executive ability which marked his journalistic work will have even larger scope in his new position.

Philip W. Moen, treasurer and general manager of the Washburn & Moen Co., is taking an active interest and leading part in the raising of $50,000 for the use of the Red Cross Society in its Armenia work. Mr. Moen is one of the four gentlemen who have pledged themselves to raise the amount named, which will place Miss Barton and 15 assistants in the field.

A. R. Duperu, assistant manager of the Alameda, Oakland & Piedmont Electric Railway, recently had a close shave, unequaled for celerity by any tonsorial artist. While instructing an employe in the power house at Alameda, Cal., the plans they were inspecting became ignited by a short circuit through a brass rule which had come in contact with a live wire. In the blaze Mr. Duperu instantaneously lost his eye-brows, whiskers and beautiful moustache.

Electric Laws of the State of New York; Banks Brothers, New York City. This legal compilation should be in the hands of every electrical corporation lawyer in the state named, as it combines in its 170 pages all the laws pertaining to companies engaged in the electrical business. The book is thoroughly classified and indexed so as to be very valuable as a work of quick reference.

KUHLMAN CAR COMPANY.

New Location—New Shops—New Machinery—Burned Out in December—Under Full Headway in January.

The street car factory of the C. G. Kuhlman Company, Cleveland, was a sorry looking affair on the morning of December 1, last, when a REVIEW editor crawled over fallen timbers and waded through pools of water in the wreck left by the fire of the day before. But the wheels of commerce were not destined to long delay, and one month later finds the same company installed in larger and better quarters than ever before and with increased zeal, pushing night and day to make up for lost time. The concern was fortunate in being able to secure buildings specially adapted to its requirements, facing Broadway and extending through the block to the C. C. & S. railway tracks. The office is No. 1949 Broadway. All the buildings are of brick with heavy slate roofs, and a portion is two stories high; and were built for manufacturing purposes. This plant, which already contained much machinery suitable for car work, has now been purchased by the Kuhlman Company. The erecting shop is 72x420 feet; paint shop, 57x280, with large offices and draughting rooms overhead; pattern room is 40x60; and the oil store room is a detached fireproof building 28x30 feet.

All the wood and iron working machinery is new, of latest type and is already nearly all in place. Every machine is driven by friction clutch pulleys. The boilers are tubular, of 200-h. p., the engine a 150-h. p., built by the Bates Machine Company, of Joliet, Ills. The feed water heater is a Berryman, built by J. B. Davis & Son, of Hartford, Conn. The wood working machinery is furnished by F. H. Clements, Rochester, N. Y.; John A. White, Dover, N. H.; Rowley & Hermance, Williamsport, Pa., and Levi Houston, Montgomery, Pa. The drier is equipped with Sturtevant hot air blowers, and has a capacity of 60,000 feet of lumber. Lumber is unloaded direct from cars into drier. The paint shop is steam heated, and the wood working shop by the Sturtevant, of Boston, hot air system.

The capacity will be three cars per day, although the company will also build snow plows. Shops are connected to both street and steam tracks.

All orders for delivery before February 1, are being finished at the old shops, which were not entirely destroyed, but which would have been too small to take care of the orders in hand for spring delivery. The new works will be in active operation by February.

The progress of this company, which did its first car building only four years ago, has been rapid and successful, and reflects much credit on the excellent management of G. C. Kuhlman.

The Indiana Electric Street Railway Company, Elkhart, Ind., published notices that it would not receive persons who visited houses displaying diphtheria signs, as the passengers objected to their presence.

PROGRAM FOR 1896 CONVENTION A. S. R. A.

The business management of the American Street Railway Association shows marked improvement over several years past. The official report of the Montreal meeting the last of October, comprising some 278 pages is already in the hands of members, and the executive committee have made the assignments for the papers for the St. Louis meeting in October next.

The subjects are excellent, on practical topics and will be prepared by men whose names stand high in the fraternity.

PROGRAM.

"Track and Track Joints, Construction, Maintenance and Bonding." M. K. Bowen, superintendent Chicago City Railway.

"Trucks." John N. Akerman, superintendent Worcester Consolidated Street Railway.

"How Can the Revenue of Street Railways Be Increased, Taking Into Consideration the Collection of Fares, Method of Registry, Transfers, Use of Tickets or Cash Fares, and Attractions Along the Line of Road." C. Densmore Wyman, general manager Milwaukee Street Railway.

"Modern Overhead Electric Construction." writer not yet selected.

"The Modern Power House." Richard McCulloch, engineer Citizens Railway, St. Louis.

"Selection and Management of Employes." W. F. Kelly, general manager Columbus Street Railway.

The meetings will be held in the Olympic theater, opposite the Southern hotel.

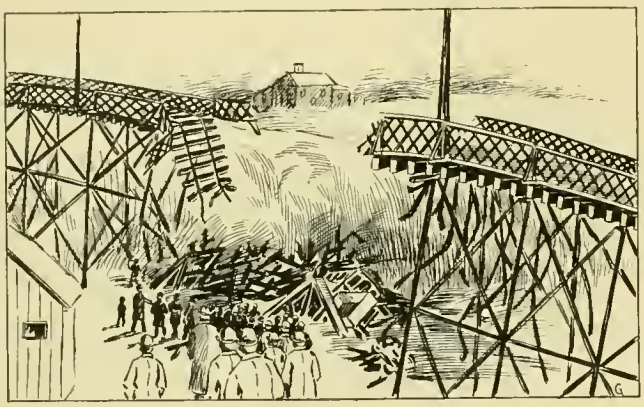
Place for exhibits not yet decided on, but will be announced soon.

The two New York cable railways, the Metropolitan Traction and Third avenue companies, will purchase only 40-ton cables. For some time they have been using ropes weighing 80 and 100 tons, but have become tired of the delays and difficulties of transporting such heavy ropes through the streets and on the river. Their own workmen will splice the shorter lengths.

The Chicago Electrical Association elected the following officers for the ensuing year at its meeting, January 3: —W. Clyde Jones, electrical patent attorney with Barton & Brown, president; S. G. McMeen, assistant engineer, Central Union Telephone Company, vice-president; J. R. Cravath, electrical editor STREET RAILWAY REVIEW, secretary; F. S. Hickok, designing engineer, Western Electric Company, treasurer. The next meeting will be January 17, when F. A. Muschenheim, designer for Western Electric Company, will read a paper on "Armature Windings for Multipolar Generators." February 6, W. R. Garton, manager railway department, Central Electric Company, will read a paper on "Lightning Arresters," which will be of special interest as coming from the inventor of one of the most successful arresters on the market.

DOWN WENT THE BRIDGE.

On the morning of January 9, a bridge of the Akron, Bedford & Cleveland Electric, spanning Tinkers Creek, near Bedford, gave way under the load of a snow-sweeper and a loaded coal car, the total weight being only 35 tons, while the bridge, which was only recently constructed, was guaranteed to carry a maximum load of 80 tons. Two trainmen were killed and one severely injured. Only a little while before one of the interurban passenger trains had passed over the structure in safety.



The bridge was so built that one end was considerably higher than the other, the span that fell being about 175 feet long. The snow plow, pushing the loaded coal car had nearly reached the center of the span, when there was a cracking and the span gave way, the two cars plunging down into the creek 50 feet below. There were fortunately no passengers, the three men killed and injured being the crew. Much heavier loads had been hauled across the structure, and its collapse was a great surprise to the officials of the company.

NEW DENVER SUBURBAN.

The Denver, Globeville & Golden Rapid Transit Company is intended to make a circle route between Denver and Golden, traversing several miles in Denver and compassing the gardens, farms and orchards lying between the two cities. It will be a broad gauge electric line, starting from a connection with the Larimer cable at Fortieth street.

The mileage of Denver roads is as follows:

Denver Consolidated Tramway Company	94
Denver City Cable Company	50
West End Electric	10
Denver, Lakewood & G. E. Company	5
Total	159

The Sandusky, Milan & Norwalk Electric Railway Company is rejoicing. A villianous complaint was filed with the Ohio state commissioner of railroads regarding the condition of the road and equipment. The expert inspector reported everything in first class condition, the ties and track being only two years old.

NEW TRADE PUBLICATIONS.

At this season of the year especially, there is issued a large number of trade catalogs, many of which contain much valuable matter in addition to the usual price-lists. We shall briefly mention in this column such as commend themselves to us as worthy of mention. Our readers will confer a favor if they will kindly mention the STREET RAILWAY REVIEW *in writing for any of these publications.*

The Globe Company, Cincinnati, has issued its 1896 catalog of its very full line of office desks and supplies.

J. W. Hoffman & Co., Harrison Building, Philadelphia, are sending out a handsome calendar with some useful tables on the back.

Hoefgen, Moxham & Company of New York, supplyers of everything for electric railway use are sending out a handsome calendar.

The special points of the Fishkill Corliss Engines are fully described in the new catalog of the Fishkill Landing Machine Company.

The Yale & Towne Company is putting out a very complete catalog of chain blocks, articles which every street railway company is interested in.

Catalog No. 4, of the Weir Frog Company, Cincinnati, O., is an elegant cloth bound book of 273 pages. In the back are a number of tables of value to track engineers.

The Weston Engine Company, Painted Post, N. Y., sends us a catalog which is a model in its way. It treats each subject briefly but very clearly and the typographical work is of the best.

The Ohio Storage Battery Company, maker of the Ford-Washburn Storelectro Company's storage batteries at Cleveland, describes its batteries and the various uses to which they have been and can be put.

Truths and Proofs is the title of the latest catalog of the Hogan Boiler Company, Middletown, N. Y. It enters extensively into the discussion of the technical points of steam making and appeals to intelligent purchasers.

The Replogle water wheel regulators now manufactured by the Replogle Governor Works, Akron, O., are fully treated of in a catalog issued by that company. These regulators make use of some new principles and the publication will be found interesting reading.

The very extensive output of Deane Brothers Steam Pump Works, Indianapolis, is beautifully illustrated and described in catalog No. 19—1895. This concern makes pumps for every conceivable purpose, and there is barely room in this 134-page book to give a little information about each style.

The Bacon air lift pump made by the Knowles Steam Pump Works, 93 Liberty street, New York, is described in a recent catalog. We predict that there are numerous engineers that are not acquainted with this pump and its various possible uses and it would be well for them to send for this catalog and read up.

Coal Handling for Steam Generation is a subject of special interest to large electric railways, and it is treated very fully in a book sent out by the C. W. Hunt Company, 43 Broadway, N. Y. Every detail of coal handling processes is fully illustrated and described. The book is an educational work as well as a catalog.

The R. Woodman Manufacturing & Supply Company, 63 Oliver street, Boston, Mass., has a neat little catalog of punches and speed indicators. Its punches are in extensive use on the West End of Boston, the Citizens of Detroit, and every road in Baltimore. The company makes a great variety as will be learned from the catalog.

James Leffel & Co., Springfield, O., send us two pamphlets. One relates to their turbine which is a pressure and reaction wheel adapted to heads of from 3 to 100 feet. The other is devoted to the "Cascade" which is an impulse and reaction wheel for heads of from 60 to 2,000 feet. They are building four 2,000-horse-power turbines to operate under 220 feet head.

The Marion Steam Shovel Company, Marion, O., has favored us with a neat calendar.

The "Chicago" rail bond, made by Washburn & Moen, is in use on the new tramway at Coventry, England.

It is reported, arrangements have been made to manufacture the Hoskins gas motor for street car use at Springfield, Ohio.

The Johnson Company will roll a large amount of 60-foot rail this season, as they are in special demand by electric roads.

The LaClede Car Company, St. Louis, has shipped a new closed car to the Warren Electric Street Railway, Warren, Pa., which is described as a beauty.

The Garton-Daniels Electric Company, Keokuk, Ia., manufacturers of the Garton lightning arrester, report a larger demand than ever in the winter months.

Robert Poole & Son Company, Baltimore, Md., is sending a neat calendar to its friends. It shows views of the works, interior and exterior, and various products.

B. J. Arnold, Marquette building, Chicago, has completed plans and specifications for the Englewood & Chicago Electric Railway, which will be operated by storage battery.

Charles N. Wood, 180 Summer street, Boston, dealer in second-hand electrical machinery, sent his friends a Christmas greeting accompanied by a "twig from our Christmas tree."

The Joseph Dixon Crucible Company, Jersey City, N. J., is sending the Dixon silica graphite paint to Washington, where it is being used in painting all the tin work and skylights of the public buildings.

Cyrus S. Hart, Oconto, Wis., has special facilities for supplying live peeled cedar telephone, telegraph, electric light and street railway poles. His operations are quite extensive, and he carries a large supply.

The Electric Switch and Supply Company, Saco, Me., has been incorporated with $100,000 capital, to manufacture electric railway motor and station switches. Leonard L. Davis, Springfield, Mass., is president.

The Jackson & Sharp company, Wilmington, Del., has completed three new cars for the Wilmington City Railway, that have several novel features, all tending to the comfort of passengers. The equipment is Westinghouse.

Elmer P. Morris, formerly of Morris & MacCurdy, Indianapolis, has returned to the General Electric Company, being stationed at Cincinnati. Mr. Morris has a wide acquaintance among the buyers of supplies, and knows how to sell goods.

The Bethlehem Iron Company, H. F. J. Porter, Chicago, representative, shipped a rough shaft 18 inches by 18 feet to the West Chicago Street Railroad on the third day after receiving the order. As quick work was made by the Walker Manufacturing Company, Cleveland, which finished the shaft and fitted it with a new drum.

The Sterling Manufacturing Company, New York, reports large sales of the Sterling brake, which has been adopted as standard by the Metropolitan Street Railway Company, New York; Steinway Railway Company, Long Island City; Staten Island Electric Railway Company; Paterson Railway Company, Paterson, N. J.

The Laconia Car Company, of Laconia, N. H., has just finished fifty closed cars for the West End Street Railway, of Boston, and is also delivering an order of twenty-four cars to the Lynn & Boston road. The West End order was for cars with 25-foot bodies to go on double trucks. The iron-working department recently turned out 200 trucks for the same road.

A company has been organized at Pittsburg, with $150,000 capital, by representative street railway men to manufacture car wheels. Those interested are George B. Hill, Pittsburg, Allegheny & Manchester Traction Company; George W. Elkins, Pittsburg Traction Company; C. L. Magee, Duquesne Traction Company; J. D. Callery, Second Avenue Traction Company; George I. Whitney, Central Traction Company.

The Standard Air-Brake Company, New York, E. J. Wessels, general manager, made several shipments abroad in December, the beginning of results from his European trip. Standard air brakes have been placed on all the cable cars of the Montague street line of the Brooklyn Heights Company, as an improved brake was needed on account of several costly accidents having resulted from the unreliability of hand brakes.

The J. G. Brill Co. captured the order of the Milwaukee Street Railway for twenty 36-foot-body cars, which will mount Brill double trucks. The interior plan is centre aisle with cross Rolan seats for 40 passengers. An electric button at each seat rings a bell on the conductor's platform. The vestibules will be of a removable pattern which, with large windows, extending quite low in split sash, will easily make the car convertible into summer use.

Records kept by the Citizens Traction Company, Pittsburg, show the average life of the Simonds Manufacturing Company trolley wheels to be 11,000 miles. The company is branching out in its sales of gears, pinions, trolley wheels and harps, and is making a wide reputation for good workmanship and prompt deliveries. The company is manufacturing the Thomas safety guard, which is made in two designs, one to be attached to the car body and the other to the truck.

William P. Seguine has connected himself with Edward B. Jordan, Brooklyn, having control of the railroad department. Mr. Seguine has been in the perforated seat and veneer business since it was started. Twenty years ago he got the first order for veneered seating ever given by a transportation line, placing seats in the steamer "Shady Side." He has sold more of his specialties than any other person.

For many years he was connected with the Frost Veneer Seating Company, New York.

The Standard Paint Company, of New York, maker of the P. & B. insulating compounds, reports a great increase in the use of the product in this country and Europe. P. & B. has become a household word with electric railways and its value in preservative paints, insulating compounds, armature varnish, insulating tape and Ruberoid car roofing is universally recognized. An office has been opened with R. W. Blackwell, 39 Victoria street, Westminster, London, for the sale of the P. & B. compounds, and a full stock will be carried there from which European orders will be filled.

Eugene Munsell & Company 218 Water street, New York, with agencies in the principal cities, report an increased demand for solid sheet India and Amber mica, of which they make a specialty for electrical insulation. The company import direct from the mines, and at all times carry the largest stock of mica to be found in this country. They have recently installed several new power presses, which gives them increased facilities for furnishing stamped solid sheet mica segments for all types of railway motors, and mica to any shape or pattern. Franklin Brooks, the junior member of the firm, is now making a tour around the world, and, at present, is spending considerable time at the mines in India, where the firm is largely interested.

The Ohio Brass Company reports a most satisfactory year's business, and the outlook for the coming year is more than encouraging. The establishment of several branch offices, and the adding of many domestic as well as foreign agencies, has resulted in largely increasing its sales, which have doubled in amount during the past year over the previous twelve months. This company, always on the outlook for new and important devices of utility, has added to its line recently the following articles:—Type K trolley wire hangers, mine insulator, Walker trolley ear, Walker splicing ear, a full line of straight under-running devices, such as the Detroit section insulator, straight under-running adjustable switch, straight under-running adjustable crossover, etc.; also the H. & C. sleet cutting trolley wheel, the adjustable track brush holder, and the Warner Electric car heater, all of which are already largely in use.

The Hoppes Manufacturing Company, Springfield, O., who make a specialty of the manufacture of feed-water purifiers and exhaust steam feed-water heaters, have, within sixty days, received a repeat order for two exhaust steam heaters of 2,250-horse-power each, from the Cambria Iron Company, Johnstown, Pa., making seven heaters, aggregating 13,900 horse-power in the Cambria Works. Among other shipments were:

St. Louis Dressed Beef Company, St. Louis, 850-horse-power live steam purifier, 1,800-horse-power exhaust steam heater; Bousfield & Company, Bay City, Mich., 600-horse-power heater; Globe Furniture Company, St. Louis, 150-horse-power heater; Christy Fire Clay Company, St. Louis, 400-horse-power purifier, 400-horse-power heater; L. Hoster Brewing Company, Columbus, O., repeat order 625-horse-power purifier; Columbus, O., Central Railway Company, repeat order, 1,300-horse-power heater; Columbus, O., Bolt Works, 150-horse-power purifier; E. C. Atkins & Company, Indianapolis, Ind., 625-horse-power purifier, 800 exhaust steam heater; Missouri Gas Company, Kansas City, Mo., 300-horse-power heater; Fox River Paper Company, Appleton, Wis., 500-horse-power purifier; American Glucose Company, Peoria, Ill., repeat order, 1,300-horse-power heater; Rochester, N. Y., Railway Company, 2,250 horse-power heater; Edison Electric Light & Power Company, Erie, Pa., 500-horse-power heater.

The McGuire Manufacturing Company, of this city, report the past year as the most prosperous in their successful business career. For the past four months it has been working twenty-four hours per day to fill the orders for its well known trucks and rotary track cleaners, to say nothing of its "Columbian" heaters, which is really a business in itself. The sale of the rotary track cleaner is unprecedented, not considering the fact that this is a practically new line in which they evidently excel. The sales of their trucks for the past year are an increase of 40 per cent over the number sold in 1894. A large number of the trucks for the Lake Street Elevated Railway have been delivered, and their work is being closely inspected by street railways intending to change from steam to electricity. The sample pair of these trucks for the Brooklyn bridge have been shipped. The stove business has far excelled their expectations, and even at this late date the orders continue unabated. They credit part of this to the advertisement in the Review, and say the new year has a promising outlook for them, inasmuch as they have orders for trucks on hand to keep them busy for at least three months.

The following extract from an article descriptive of the the great 10,000 volt Ferranti alternating dynamo at Deptford, Eng., taken from the London Electrical Engineer, will be of interest to all the numerous friends and users of micanite on this side of the Atlantic:

"The insulation between the carrier and the coils is effected with micanite shields. The carriers consist of two heavy brass castings clamped on to the segments. The complete carrier is supported on two bolts projecting from the rim. The insulation of these bolts is a matter of great importance. The field coils on this de Ferranti alternator are constructed by winding bare copper strips on edge into a spiral, with insulation between adjacent turns. The danger of the high voltage from the bare copper of the armature sparking across to the field has been overcome in this case by placing micanite caps over the poles. These caps, which are about ⅛ inch thick, have all been tested up to 25,000 volts. Since being in use, no faults have developed in them." The micanite used in the construction of this machine was manufactured in the American factory of the Mica Insulator Company, at Schenectady, N. Y. This company has recently established a factory in London, England, where it also manufactures micanite in its various forms.

The Peckham Motor Truck & Wheel Company's business, during the year 1895, was about thirty per cent larger than that of the preceding year. The works of the Peckham company were operated at full capacity throughout the entire year, and during the rush seasons night forces were employed. While the Peckham people have made a very gratifying showing in their list of new customers, the larger proportion of their business has been in second, third, fourth and even fifth orders covering increased equipments which have been peculiarly satisfactory to the company, as these renewal orders show the excellent satisfaction given by the Peckham trucks. Among orders which the Peckham company is working upon at present may be mentioned, a third order from the Bristol (Eng.) Tramway & Carriage Company, a fifth order from Brazil, a second order from the Coventry (Eng.) Tramways Company, a third order from the Dublin (Ireland) Southern Tramways Company, fourth and fifth large orders from the Metropolitan Street Railway

Company, of New York City (the Broadway road which has now adopted the Peckham truck as its standard equipment), third and fourth large orders from the Market Street Railway Company, of San Francisco; a third order from the Lynn & Boston Railroad Company, of Lynn, Mass.; and a third order from the Baltimore City Passenger Railway Company. Large orders have also been received from the Third Avenue Railroad Company, of New York, the Metropolitan Railroad Company, of Washington; the Seattle (Wash.) Consolidated Street Railroad Company, and the Halifax Electric Tramways Company, of Halifax, N. S. From the excellent showing made by the Peckham company during the past year, it is reasonable to predict that many street railway companies will, during the year 1896, adopt the Peckham truck as their standard.

SUBSTITUTE FOR SALT.

The triple-chlorides, made by the Fitch Salt Company of Bay City, Mich., and which is a harmless liquid brine, several times as effective as dry salt, is finding favor among railway men. We have already called attention to its advantages both in effectiveness and the facility with which it can be made to do its work just at the spot where action is required. For switch and curve work it is especially valuable. Among the users of triple-chlorides are the Fox River Electric Railway, of Green Bay, Wis., whose first order was for 30 barrels; Belle City road, Racine, 30 barrels; Terre Haute & Indianapolis Railway; Chicago & Grand Trunk; Ft. Wayne Electric Railway and the Big Consolidated, Cleveland. The same company also makes a disinfectant specially suited to use in street cars, of which its low price is by no means its least commendable quality. The Anderson, Ind., railway management say of this disinfectant, "We use your Purifine principally to disinfect our cars from the foul odors of tobacco, etc., after cleaning them at night, and we are very much pleased with it." Managers who will send for a sample of Purifine will certainly be pleased with it, as its action is quick and complete and effectually kills all foul smells.

RECEIVED 2,900 VOLTS AND LIVES.

In L' Elettricista, Signor Nizzola states that in the high-voltage plant installed in Frankfort-on-Main, a workman was carrying on some repairs in the distribution system when he touched a bare copper wire while standing in good contact with the ground, and received a shock of about 2,900 volts. He immediately fell to the ground, and remained for half an hour apparently dead. A bright spark was seen when he broke contact. Artificial respiration and throwing cold water on the breast gradually restored life, and he was able to resume work the next day.

Thomas M. Patterson, editor of the Denver News, defeated the Denver Consolidated Tramway, which sued him for libel. The court decided that newspapers are entitled to publish criticisms on an existing state of facts.

ACCIDENTS ON METROPOLITAN ELEVATED.

Within the past month two accidents have happened on the Metropolitan Elevated road of this city, caused by cars crashing into bumpers at the end of the line. The first one occurred at the terminus of the Garfield park line and West Forty-eighth street about 4 o'clock in the morning. The train consisted of simply a motor car which was giving the all night service. The motorman fell asleep and the car ran into the bumper at nearly full speed. The car went through the bumper. One end remained on the structure, the other on the ground. The strength of the car body was strikingly shown as it was injured but little. The second accident happened at about the same time in the morning at the end of the Humboldt park line. Three cars were standing on a siding against a bumper at the end of the structure. One of the all night service motor cars ran into these cars and pushed one of them off the structure. The accident is ascribed to carelessness on the part of the motorman.

Since these accidents some have seen fit to criticise the weakness of the bumpers. We are rather inclined to the belief that it is a good thing the bumpers were no stronger. When a car runs into the bumpers with much force something must give way, either the bumpers or the car. The chances are that if the bumper is strong enough to hold, the car will be badly smashed and more damage done to persons and property than if the bumper gave way and allowed the car to go partly off the structure. One weak point in the system of train control which the two accidents bring forcibly to mind is that no one but the motorman has any control over the train and in case his faculties fail at a critical time the train is entirely without control. We think the management recognizes this weakness and will take steps to remedy it. It will not be a very difficult matter to arrange appliances within easy reach of the conductor whereby current may be shut off and brakes applied by the conductor at the rear of the trailer.

ELECTRIC AND CABLE TRACTION COMBINED.

The West Chicago Street Railroad now has a combination of electric and cable in its Van Buren street tunnel. About half a mile west of the tunnel the Van Buren street electric cars are attached as trailers to the Halsted street and Blue Island cable trains to be taken around the loop down town. Instead of leaving his car and taking the next one back as formerly the motorman stays on his car to handle the brake and turn on current in the tunnel. Trolley wire has been strung through the tunnel, and when the heavy grades in the tunnel are reached the motorman turns on the current and helps the train up the grade. The electric lights in the car are also turned on. The lighting of the tunnel is now done by incandescents, five in series from the trolley circuit in place of the arc light system run by a special plant as formerly.

News From The Cities

Alabama.

Birmingham, Ala.—The Birmingham Railway Company will equip its Behrens Park division for electric traction.

Arkansas.

Chickasawba, Ark.—John B. Driver and L.W. Gosnell have organized the Chickasawba, Luxora & Gilmore Railway Company and will construct 12 miles of road.

California.

San Jose, Cal.—W. T. Webber is organizing a company to construct an electric line to Saratoga.

Los Angeles, Cal.—It is reported a suit will be begun to set aside the sale of the Los Angeles Electric Railroad.

San Bernardino, Cal.—The City Street Railway Company may adopt electric traction on the Third and D street lines.

San Jose, Cal.—The Santa Clara Valley Railway Company has begun condemnation proceedings for right of way from Aloiso to this city.

San Francisco, Cal.—The Electric Railway Hill-Cable Company has been incorported with $1,000,000 capital by N. W. Griswold, W. H. Birch, John L. Boone, Fred C. Hart, all of San Francisco.

Santa Monica, Cal.—It is reported that Thomas H. James, town engineer, has completed the survey for the Los Angeles & Santa Monica Electric Railway, and that construction will soon begin.

Sacramento, Cal.—L. T. Hatfield has applied for a franchise for the Sacramento, Fair Oaks & Orangevale Electric Railway through Highland Park and Oak Park to Fair Oaks and Orangevale colony lands. The franchise will be sold in January.

Canada

Kingston, Ont.—The Kingston Street Railway will extend its lines.

Brantford, Ont.—Robert Henry is provisional liquidator of the Brantford Electric & Power Company, insolvent.

Ridgeway, Ont.—The Crystal Beach Improvement Company will construct 2 miles of electric railway from Crystal Beach to Ridgeway.

Brockville, Ont.—The Brockville Electric Street Railway, Ltd., has been incorporated with $200,000 capital by W. H. Comstock, W. A. Gilmour, C. S. Cossit, D. S. Booth, G. J. Mallory, O. K. Fraser, M. M. Brown, Brockville.

Walkerton, Ont.—E. A C. Pew and Dr. Rolston, promoters of the Hurontario Electric Railway, are hard at work. At a meeting of citizens Mr. McNamara, collector of customs, was chosen provisional director and Mayor Bires, treasurer, for the Walkerton subscribers.

Napierville, Que.—The Napierville Junction Railway has been subsidized $3,500 a mile by the government and will construct 22 miles of electric road connecting St. Remi, St. Michel, St. Edward, Douglasburg, St. Philippe and Stottsville. Bonuses of $15,500 will be paid in addition to the $3,500 per mile. Hon. Mr. Laviolette is president, and Mr. Lafontaine, secretary.

Hamilton, Ont.—Joseph Powell, chief engineer of the International Radial Railway Company, invites proposals for electric generators, steam engines, kerosene and gas motors for use on the 350 miles of road which the company is constructing to do a freight and passenger business. He wants to secure the best motive power for such service. A. Burns, LL. D., is president; Alex McKay, M. P., vice-president; J. D. Andrews, secretary; W. G. Lumsden, treasurer; P. D. Crerar, attorney; Joseph Powell, chief engineer.

Chicago.

Chicago.—The North Side Electric Street Railway has filed a mortgage for $1,500,000.

Chicago.—The Englewood & Chicago Electric Street Railroad Company has issued $1,600,000 bonds of the $2,000,000 authorized.

Chicago.—The West Chicago Street Railroad has asked for franchises over 13 miles of streets The proposed lines are to be operated by electric or cable power.

Chicago.—Norman B. Ream says there is no truth in the story telegraphed from Toledo that the Robison Electric Railway has been purchased by him and his associates.

Chicago.—Henry L. Glos, Elmhurst, is reported to be organizing a company to build an electric road from Elmhurst to Melrose Park to connect with the Cicero & Proviso.

Chicago.—Citizens of Wilmette petitioned the Evanston city council to extend the franchise of the North Shore Electric Railway to the northern city limits, so it can reach Wilmette.

Chicago —The South Chicago City Railway Company has purchased the Hammond Electric Street Railway. Improvements will be made including a new double track line between Hammond and Roby.

Chicago.—G. A. Leeds, Title & Trust Building, 100 Washington street, general manager of the Suburban Electric Railway, has specifications ready for generators, boilers and engines. There will be three 200 K. W. generators, or two 400-K. W. B. J. Arnold is consulting engineer.

Chicago.—The Chicago & Wisconsin Inland Lakes Railroad has opened offices at 621-22-23 Chicago Stock Exchange building. Contracts will be let in February for 23 miles and one power plant. The road will be 60 miles long of T rail on private right of way and will touch 80 lakes. Express, freight and passenger business will be handled. A. E. Case, is president; H. Marcus Rothschild, vice-president; Andrew J. Toolen, general manager; F. Boden, treasurer; C. D. Green, secretary.

Chicago —J. C Shaffer, 812-14 Marquette building, has specifications ready and will let contracts for construction of 17 miles of double track for the Englewood & Chicago Railway (storage battery), work to be completed by April. Specifications for the remaining 30 miles will be ready in time to have the entire line completed by May. Two 200-K. W. General Electric generators have been purchased. Specifications for engines and boilers and cars will be ready next week. There will be 50 motor cars of special design, equipped with two 25-horse-power G. E. motors, and 50 trail cars. B. J. Arnold is consulting engineer.

Colorado.

Canon City, Col.—F. A. Raynolds, Thomas Wells, Henry Earle, T. M. Harding, J. H. Peabody, E. F. Rockafellow, J. H. Harmon and Dr. F. E. Bartlett are interested in a proposed electric railway 26 miles long to Cripple Creek. Freight and passenger traffic will be maintained.

Connecticut.

Middletown, Conn.—The Middletown Electric Railway will construct a power plant.

NEW LONDON, CONN.—The New London Street Railway will build a $40,000 power house.

MIDDLETOWN, CONN.—It is reported that the New York, New Haven & Hartford Railroad will construct an electric road to Cromwell.

MIDDLETOWN, CONN.—The Middletown Horse Railway will extend its line to Cromwell, Portland and to a summer resort six miles south of Middletown.

NEW HAVEN, CONN.—The Manufacturers Street Railway has been granted a franchise. It will carry freight exclusively to factories in the eastern part of the city.

BRIDGEPORT, CONN.—Charles E. W. Smith, New York, attached the interest money of the Bridgeport Traction Company in the hands of its New York depository for $26,000 commissions alleged to be due for selling $1,300,000 bonds.

DANBURY, CONN.—F. S. Wardwell, I. W. Ives, Danbury; B. C. Norris, M. Brook and Edward Brady, of Golden Bridge, have organized the Danbury & Golden Bridge Transportation Company, which will extend through Ridgeway and North Salem.

NORWICH, CONN.—The Connecticut Engineering Company, George W. Phillips, president, has secured the contract for constructing the Sea View Railway from Watch Hill through Point Judith and Narragansett Pier to Wickford; also for the Narragansett Electric Railway from Kingston Junction to Narragansett Pier. The two roads will extend over 40 miles, work to begin in January.

Delaware.

REHOBOTH, DEL.—The Rehoboth Street Railway Company is reported to have all the stock subscribed and to be ready to let contracts. Hiram R. Burton and H. V. Lyons are interested.

District of Columbia.

WASHINGTON, D. C.—The Belt Railway Company has applied for an amendment to its charter, and for extension of its lines.

WASHINGTON, D. C.—The Eckington & Soldiers' Home Railway Company has applied to Congress for an amendment to its charter and franchises for several miles of double track.

WASHINGTON, D. C.—The Columbia Railway Company and Metropolitan Railway Company have petitioned Congress for the right to consolidate as the Metropolitan Electric Traction Company and to extend their lines.

WASHINGTON, D. C.—The East Washington Heights Traction Company, Capital Railway Company and Brightwood Railway Company have applied to Congress for franchises. James G. Berrett, Archibald M. Bliss, Hamilton Disston and George S. Boutwell are interested in the former.

Florida.

KEY WEST, FLA.—An electric road costing $150,000 is to be built.

JACKSONVILLE, FLA.—J. F. Eldridge expects to construct an electric railway to Orange Park next summer.

Illinois.

BELLEVILLE, ILL.—The Belleville Electric Railroad Company has let the contract for building its power house to Hilb & Bauer for $7,192.

ROCKFORD, ILL.—The Chicago Title & Trust Company has bought the West End Street Railway at receiver's sale for $18,861. Improvements will be made.

CENTRALIA, ILL.—It is reported that the stock of the Centralia Street Railway Company is changing owners and that the company will be re organized and changed to electric.

ROCKFORD, ILL.—The Rockford Traction Company, Chicago, has been incorporated with $300,000 capital to operate the street railway by Harry Moore, Harry L. Jewell, William F. Burns.

Indiana.

PRINCETON, IND.—J. A. McCrea, Alexandria, has been granted a franchise for an electric road.

PRINCETON, IND.—The Princeton Interurban Electric Railway has been granted a franchise. Louis Oswald is the promoter.

MADISON, IND.—Mayor Maguire says plans and specifications for the construction of an electric railway to be operated in connection with the municipal electric light plant, are nearly completed.

SOUTH BEND, IND.—The South Bend Street Railway Company has been incorporated with $300,000 capital by J. Ben Burdsell, F. C. Nippold, A. L. Brick, W. A. Funk, James McM. Smith.

NEW ALBANY, IND.—It is reported that an electric line will be built connecting New Albany, Jeffersonville, Sellersburg, Memphis and the region about the cement quarries in Clark county, Ind.

NEW ALBANY, IND.—It is reported that eastern capitalists are negotiating for the purchase of the New Albany & Paoli Turnpike Company's road, with a view to constructing an electric road to Paoli.

NEW ALBANY, IND.—Judge George B. Cardwill, J. H. Stotsenburg, W. F. Tuley, C. E. D. Knoefel are interested in the proposed electric road to Leavenworth. The towns along the route are reported to be ready to vote $40,000 bonus.

SOUTH BEND, IND.—The Federal court has confirmed the sale of the South Bend & Mishawaka Electric Railroad to George E. Clifford, president of the Wachusett National Bank, Richfield, Mass., for $50,000. Improvements will be made.

HAMMOND, IND.—The new officers of the Hammond Electric Railway are A. Murray Turner, president; V. Shaw Kennedy, vice-president; O. S. Gaither, secretary and treasurer; B. M. Cummings, Lazarus Silverman and the officers, directors.

FT. WAYNE, IND.—John J. Shipherd, Cleveland, and associates have bought the electric lines and will organize as the Consolidated Electric Railway Company with $1,500,000 capital and $1,500,000 bonds. Extensions and new equipments to the extent of $300,000 will be made.

Iowa.

DUBUQUE, IA.—John Balch, receiver of the Dubuque Light & Traction Company, reports receipts $57,997.44; disbursements $53,930.55; balance $4,066.89.

WATERLOO, IA.—L. S. Cass, Sumner, Ia., is the leading spirit in the proposed electric road 13 miles long. He writes that no date will be set for letting contracts, but they will be let by correspondence. This project depends on the sale of building lots.

WATERLOO, IA.—J. H. Rafferty, of the Waterloo & Cedar Falls Rapid Transit Company, writes that the company expects soon to be able to entertain propositions from electrical engineers and contractors. Work will begin on 15 miles of road as early as practical in the spring.

Kansas.

LEAVENWORTH, KAN.—The Leavenworth Electric Railroad Company will employ conductors.

EMPORIA, KAN.—J. O. Patterson, 79 Dearborn street, Chicago, who secured the franchise for an electric railway, writes that as soon as a company is organized, bids will be required for 6 or 7 miles of single track from those who can bid on entire plant including power house equipped ready for operation, also bids without power house. The present horse railway will be withdrawn from the field.

Kentucky.

BELLEVUE, KY.—On January 30 the city will receive bids for an electric railway franchise.

WADDY, KY.—An eastern syndicate proposes to construct 14 miles of electric line to Frankfort by way of Alton.

CARROLLTON, KY.—Capitalists have offered to construct a bridge and an electric railway connecting suburban towns for a bonus of $20,000.

Louisiana.

NEW ORLEANS, LA.—The New Orleans & Carrollton Railroad will extend its lines to Jefferson.

Maine.

PORTLAND, ME.—The city council has passed an ordinance requiring fenders.

CHERRYFIELD, ME.—The Cherryfield & Millbridge Electric Railway is here, not in Missouri.

ROCKLAND, ME.—The Rockland, Thomaston & Camden Street Railway will extend its lines.

ELLSWORTH, ME.—George E. Macomber, Augusta, Me., is projecting an electric railway to Ellsworth Falls.

WATERVILLE, ME.—The Waterville & Fairfield Electric Railroad Company is contemplating extensions.

BANGOR, ME.—Gen. Henry L. Mitchell is said to be local representative of Boston and New York capitalists, who propose to construct 31 miles of electric road connecting Bangor, Charleston, Hampden, Winterport, Levant, Glenburn, Kenduskeag amd East Corinth.

NORWAY, ME.—The Norway & Paris Electric Street Railway Company has chosen H. L Shepherd, Rockland, and Gen. George L. Beal, Norway, to confer with the officials of the Grank Trunk Railroad in regard to the operation of the latter's branch from Norway to South Paris by electric traction.

CHERRYFIELD, ME.—The Cherryfield & Millbridge Electric Railway has been incorporated with $30,000 capital by S. D. Leavitt, Eastport; George A. Curran, G. A. Murch, Calais; W. M Nash, G. R. Campbell, Cherryfield; James Mitchell, Portland, to construct 5 miles of electric road and connect with the Washington County Railway.

Maryland.

BALTIMORE, MD.—The directors of the City Passenger Railway will vote, January 8, on the advisability of a change of the Blue line from cable to electric.

BALTIMORE, MD.—The Columbia & Maryland Railway is recording its trust deed in every county through which its lines pass, to secure payment of $6,000,000 of gold bonds.

BALTIMORE, MD.—The Rapid Transit Construction Company has been incorporated with $25,000 capital hy William F. Rogers, Charles H Hopkins, Harry C. Primrose, George N. Holloway.

HAGERSTOWN, MD.—The Harrisburg Construction Company contractors for the Hagerstown & Potomac Electric Railway, have bought the Martinsburg Street Railway for $10,000, and will use the material in the construction of the new road.

Massachusetts.

ROCKLAND, MASS.—The Hanover Street Railway has increased its capital to $50,000.

PALMER, MASS.—The Palmer Electric Street Railway Company has decided to extend its franchise

NEWTON, MASS.—The Commonwealth Avenue Street Railroad Company has applied for franchises.

WORCESTER, MASS.—It is reported that the Worcester & Shrewsbury Electric Railway will be extended to Marlboro.

CONWAY, MASS.—The Conway Street Railway Company has applied for a franchise to extend its tracks to Greenfield.

MILFORD, MASS.—The Milford, Holliston & Framingham Electric Railway has bought land for a second power house.

STURBRIDGE, MASS.—The Southbridge & Sturbridge Electric Street Railway Company has been granted a franchise.

LOWELL, MASS.—The Lowell & Suburban Street Railway Company will increase its power plant by 2,000 horse-power.

EAST BRAINTREE, MASS.—The Weymouth & Braintree Street Railway Company will erect a power-house here 45x100 feet.

NEEDHAM, MASS.—The Needham & Newton Street Railway Company is about ready to begin work on the routes recently granted.

WAKEFIELD, MASS.—Obnoxious restrictions having been repealed, the Mystic Valley Street Railway will be extended to Winchester.

MONTAGUE, MASS.—The Montague Street Railway has applied for a franchise to Lake Pleasant, Miller's Falls, Turner's Falls and Greenfield.

QUINCY, MASS.—Citizens of East Milton have petitioned the Quincy & Boston Street Railroad to extend its lines three miles to Mattapan via Milton Lower Mills.

NORTH WOBURN, MASS.—It is reported that State Treasurer Shaw is at the head of a syndicate that has bought the North Woburn Street Railway, which will be changed to electric.

FALL RIVER, MASS.—The Fall River & Taunton Street Railway Company has petitioned for an amendment to its charter to permit it to construct and operate an electric line between New Bedford and Taunton.

WORCESTER, MASS.—The Worcester North Street Railway Company has been granted until next September, to complete its lines connecting Worcester, Lancaster, Leominister, Sterling and Washacum park, H. L. Pierce is largely interested.

AMHERST, MASS.—The Worcester Construction Company has made an estimate of $75,000 as the cost of building the electric road from Mill Valley to Sunderland. H. M. McCloud, W. D. Cowles and H. L. Ufford are soliciting subscriptions.

MILLBURY, MASS.—Citizens of many towns in this vicinity are working for a belt electric road connecting Whitinsville, Linwood, Riverside, Rockdale, connecting with the Blackstone Valley Electric Railway, Sutton Center, West Sutton, Manchaug village, East Douglass, Northbridge and Woodbury's village.

EDGARTOWN, MASS.—The Martha's Vineyard Street Railway Company will apply to the legislature for a franchise to connect Edgartown, Cottage City and Tisbury by an electric road. John R. Graham, John A. Dugann, Fred H. Smith, Josiah Quincy, Fred Nichols, W. A. Gallivan, John F. Merrill, are interested.

AMHERST, MASS.—Application for incorporation with $50,000 capital has been made by the Amherst Electric Road Street Railway Company. It is proposed to connect Mill Valley in Amherst with Sunderland, and permission is asked that the two towns may take stock and purchase bonds. Freight, express and passenger service will be maintained.

DEDHAM, MASS.—The Norfolk Central Street Railway has been granted a franchise for 10 miles of electric line to Norwood and West Dedham. The capital is $75,000 and the directors are Hon. John R. Bullard, Thomas T. Robinson, Henry C. Delano, Dr. John W. Chase, Ferdinand F. Favor, all of Dedham; Francis Doane, Norwood; A. A. Muttier, Boston. The road will probably be completed by July.

Michigan.

MARINE CITY, MICH.—The Detroit & St. Clair River Railroad has been granted a franchise.

DETROIT, MICH.—The Detroit Railway has applied for franchises for 45 miles additional track.

SAGINAW, MICH.—It is reported that the Bay City Company will absorb the Saginaw Company.

LANSING, MICH.—The city council is considering an ordinance requiring conductors on all cars.

CHEBOYGAN, MICH —William Blake says he will construct an electric railway to Petoskey in the spring.

ISHPEMING, MICH.—Hiram A. Burt, promoter of the Marquette & Iron Range Railway, says he will construct 15 miles of electric line to Marquette.

CHARLEVOIX, MICH.—The city council has granted a franchise for an electric railway to Charles Gabriel, who will construct a line from the depot to Round Lake.

GROSSE POINTE, MICH.—The Mt. Clemens & Lakeside Traction Company, Frederick T. Ranney, Frank C. Hall, Frank B. Trout and Thomas N. Fordyce, all of Detroit, and Vincent Field and Louis H. Kean, Detroit, are three parties applying for street railway franchises.

YPSILANTI, MICH.—T. H. Newberry, H. B. Joy, W. S. Huyette, Detroit, are reported to be negotiating for the Ann Arbor & Ypsilanti Street Railway with a view of constructing an electric line to Detroit and connecting with the present line, making a continuous line from Ann Arbor to Detroit.

DETROIT, MICH.—Charles A. Parkins, Cameron Currie and William J. Gray in behalf of the Wyandotte & Detroit River Railway have secured a franchise from Springwells township board. The Ft. Wayne & Belle Isle Railway has a single track on the same streets, and is required by its franchise to lay another next season.

Minnesota.

BRAINERD, MINN.—The Brainerd Traction, Light & Power Company has been incorporated under Illinois laws, to consolidate the Brainerd electric railway, water works and lighting interests. C. N. Parker, Brainerd, is president; E. C. Gibson, New York, N. Y., vice-president; P. A. Gibson, Erie, Pa , secretary; Fred S. Parker, Brainerd, manager; H. D. Freglaroney, treasurer. Improvements will be made at once.

Mississippi.

SCRANTON, MISS.—The city has grant d the application of Martin Trumbull for an electric railway franchise, on condition that work be begun within 60 days after acceptance and completed in four months.

Missouri.

CARTHAGE, MO.—The Jasper County Electric Railroad Company will issue $150,000 in bonds to pay for improvements.

ST. LOUIS, MO.—The Central Railway Company has been incorporated with $2,000 capital by Eugene Sweeney, William S. Long and Albert Blair.

KANSAS CITY, MO.—It is reported that the Union Cable Company, which has been under a receiver for a long time, but never operated, will be equipped as an electric line.

ST. LOUIS, MO.—The mayor has signed the franchise of the Manchester Road Electric Company to extend its tracks and connect with the St. Louis and Suburban Railroad.

KANSAS CITY, MO —The report of Robert Gillham, receiver of the Northeast Electric Railway, shows receipts for 25 months $94,611.22. There is $2,715.38 cash. The receiver was awarded $12,500 for services

ST. LOUIS, MO.—J. B. C. Lucas, president of the Citizens' Bank, who is interested in the proposed electric road to St. Charles, says preliminary surveys are being made, and it is likely the old Greensfelder franchise will be used.

ST. JOSEPH, MO.—The directors of the St. Joseph Street Railway, Light, Heat & Power Company have elected E. H. Harriman, president; C. S. Elliott, secretary and treasurer; W. T. Van Brunt, general manager. The track will be relaid with T rails, new cars and new motor equipments purchased, and the lines extended.

Montana.

BUTTE, MONT.—The Butte City Electric Railway has accepted the franchise granted by the county commissioners.

New Hampshire.

EXETER, N. H.—The franchises of the Exeter Electric Railway have been assigned Charles J Gilman.

New Jersey.

BELMAR, N. J.—The Bergen County Traction Company has applied for a franchise in Belmar.

LODI, N. J.—The New Jersey & New York Railroad Company will build an electric road to Hasbrouck Station.

FULTON, N. J.—The Fulton & Oswego Falls Street Railway Company will increase its capital from $15,000 to $100,000.

ORANGE, N. J.—It is reported that Watson Whittlesey, receiver of the Suburban Traction Company, is promoting a company to construct an electric road over the mountain.

TRENTON, N. J.—The American China Development Company has been incorporated with $1,000,000 capital to establish steam and electric railways, steamship, telegraph and telephone companies in China.

PASSAIC CITY, N. J.—The Susquehanna Railroad Company has sold its Lodi and Hackensack branch to the Bergen Traction Company which will extend its line to Fort Lee. The new route will bring Passaic less than 8 miles from New York.

STOCKHOLM, N. J.—A. L. Schwarz, Paterson, is president and J. H. Neighbor, Dover, N. J., secretary-treasurer of a company to be organized with $100,000 capital to construct an electric road from Stockholm to Woodport via Edison and Ford Mine.

New Mexico.

ALBUQUERQUE, N. M.—H. D. Johnson, 209 West Railroad avenue, writes that the organization of the proposed electric road will soon be perfected. Six miles will be constructed in the city, and 10 miles to a neighboring canyon.

New York.

TROY, N. Y.—The Troy City Railway will purchase 27 open cars.

AUBURN, N. Y.—The Auburn City Railway has issued $300,000 in bonds.

YOUNGSTOWN, N. Y.—Thomas Brighton is working for an electric railway franchise.

UTICA, N. Y.—The Utica & Mohawk Street Railroad Company has issued $35,000 in bonds.

AUBURN, N. Y.—The city council has directed the Auburn City Railway to equip with fenders.

BROOKLYN, N.Y.—The Kings County Electric Railway Company has secured a franchise in Flatlands.

BUFFALO, N. Y.—George A. Ricker has been appointed chief engineer of the Buffalo Traction Company.

KINGSTON, N. Y.—A new company is being organized to operate and complete the Colonial Electric Railroad.

SOUTHFIELD, S. I., N. Y.—The Midland Railroad has been granted a franchise for an electric railway to Richmond.

TONAWANDA, N. Y.—The Buffalo, North Main Street & Tonawanda Railroad Company will double track its system.

CANANDAIGUA, N. Y.—The Canandaigua Electric Railroad will change to double motor equipment and buy one car.

LOCKPORT, N. Y.—Milton Tennant is securing rights of way for the electric road to Buffalo, which will be extended to Wilson.

NEW ROCHELLE, N. Y.—The Westchester Electric Railroad has been granted a franchise. The fare to New York will be 15 cents.

BROOKLYN, N. Y.—The Long Island Traction Company has been sold for $5,500,000 to the reorganization committee, the only bidder.

PORT CHESTER, N. Y.—The Port Chester, Rye, Harrison & White Plains Electric Railway has been granted a franchise in White Plains.

BALLSTON, N. Y.—Construction will begin January 31 on the Ballston Electric Railway. Henry McTighe, New York, has the contract.

WATERTOWN, N. Y.—J. A. Lawyer, receiver of the Watertown Street Railway, has issued $13,000 in certificates to pay for improvements.

KINGSTON, N. Y.—Charles Stewart Davidson, New York, representing first mortgage bondholders, bought the Colonial Electric Street Railway for $70,000.

NEW YORK, N. Y.—The offices of the Metropolitan Traction Company will soon be moved to the new power station Twenty-fifth street and Lexington avenue.

COHOES, N. Y.—The Cohoes City Railway will be extended to Crescent, if citizens will subscribe for enough stock to pay for construction; $6,000 has been subscribed.

BUFFALO, N. Y.—It is reported that the Buffalo, Kenmore & Tonawanda Electric Railroad has been sold to parties interested in the Buffalo Traction Company.

BALLSTON SPA, N. Y.—A. B. Paine and C. H. Stanton, New York, representing A. N. Chandler & Co., Philadelphia, have applied for a franchise for an electric road to Rock Falls.

HERKIMER, N. Y.—The Herkimer, Mohawk, Ilion & Frankfort Electric Railway will place an incandescent dynamo in its power plant to furnish lights to the villages on its right of way.

SYRACUSE, N. Y.—The Syracuse & Oneida Lake Electric Railroad Company has been granted permission by the Railroad Commissioners to construct 11 miles of electric railway to Oneida Lake.

NIAGARA FALLS, N. Y.—The Niagara Falls & Suspension Bridge Street Railway Company has applied to the Commissioners of the State Reservation for a franchise for a single track on Riverway.

FULTON, N. Y.—The Fulton & Oswego Falls Street Railway Company has increased its capital from $15,000 to $100,000. A consolidation of the Fulton and Oswego systems will, it is reported, soon be effected.

SMETHPORT, N. Y —The Smethport & Olean Railroad Company has been incorporated with $400,000 capital, to build 18 miles of electric railway to Eldred township, McKean county. George J. Wolfe, Bradford, is president.

LONG ISLAND CITY, N. Y.—It is reported that the Steinway Railroad Company and the lighting interests of the city have been sold to a Philadelphia syndicate, which will organize the Kings County and Long Island City Traction Company with $2,000,000 capital.

LEWISTON, N. Y.—The Lewiston & Youngstown Frontier Railway Company has applied for a franchise. The officers are L. D. Rumsey, president; H. C. Howard, vice-president and treasurer; Carl Evans, secretary; F. R. March, Buffalo, attorney; Paul Vorhees, chief engineer.

BROOKLYN, N. Y.—The Brooklyn Bridge, Prospect Park & Eastern Railroad Company has been incorporated to construct 44 miles of surface lines. Capital, $500,000; incorporators, Anthony N. Brady, of Albany, Frederick S. Flower, Edward Browne, W. J. K Kenny, and Ira A. Place.

BATH, N. Y.—The Bath & Lake Keuka Railway has been incorporated with $100,000 capital to construct an electric road from Bath to Hammondsport. The directors are I. A. Kelsey, West Haven, Conn.; J. T. Prince, Boston; J. T. Prince, Jr., C. L. B. Tylee, F. H. Viele, George E. Tylee, all of Corning, N. Y.

NEW YORK, N. Y.—The Empire City Traction Company has been incorporated with $100,000 capital to construct 3¼ miles of cross-town lines by H. L. Scheuerman, F. H. Knight, E. M. Johnson, B. F. De Freece, F. W. Elder, M. J. Katz, H. W. Mayer, Homer Scoville, of New York city, and Samuel Slater, Arlington, N. J.

PORT CHESTER, N. Y.—The Port Chester Electric Railway Company has been incorporated with $500,000 capital to construct 10 miles of electric road. Directors: Thomas S. Krutz, J. E. Bowles, Theodore L. Cuyler, Jr., Charles P. Bruch, George E. Boucheir, Albert E. Beck, David J. Pearsall, Henry F. Hawkins, all of New York city.

PORT JERVIS, N. Y.—The Port Jervis Electric Railroad Company has elected the following: Lafe Pence, president; Andrew G. Haines, treasurer; D. Lake, secretary; Haines Bros., 100 Broadway, New York, purchasing agents. Messrs. Haines and Pence are members of Haines Bros. Seven miles of electric road will be built in the spring.

ROCHESTER, N. Y.—The Windsor Beach & Summerville Electric Railroad will build an electric railway from Forest Lawn to Summerville. E. O. McNair, H. G. McNair, Warsaw; A. J. Johnson, J. C. Tone, F. W. Elwood, Edward Ellwanger, George Wilson, Daniel Platt, William Bowman and Horace Pierce, Rochester are interested.

PLATTSBURG, N. Y.—The Plattsburg Traction Company has applied for a franchise for 6 miles of electric road. S. M. Weed, H. M. Pierson, H. G. Runkle, D. F. Dobie, H. E. Barnard, T. F. Conway, W. H. Chappel, J. O. Smith, Geo. S. Weed, M. B. Snevily, Geo. M. Cole, S. D. Curtis, A. E. Reynolds, J. H. Bagg, John B. Riley, W. L. Pattison, and T. F. Mannix are interested.

Ohio.

NEW PHILADELPHIA, O.—Charles E. Mitchener says work on the new electric road will begin in April.

CLEVELAND, O.—The Cleveland Electric Railway has applied for a franchise in the village of Newburg.

NEWARK, O.—The Newark Consolidated Electric Railway has a franchise pending for an extension to Hanover.

CLEVELAND, O.—The Cleveland, Painesville & Eastern Railroad Company has been granted a franchise through Mentor.

EAST LIVERPOOL, O.—The East Liverpool & Wellsville Street Railroad Company will be extended into West Virginia.

YOUNGSTOWN, O.—The Mahoning Valley Electric Railway may be extended to Hubbard, where a power house will be located.

ANDERSON'S FERRY, O.—The Cincinnati Street Railway will extend its line 6 miles from this point to Fernbank for a bonus of $50,000.

TOLEDO, O.—The Presque Isle Company is negotiating with the Toledo Traction Company for a double track line to its race track.

YOUNGSTOWN, O.—P. H. Burnett and Oscar Davis are securing consents for an electric railway from Haselton to Lowville and New Castle.

AKRON, O.—The Akron Street Railway & Illuminating Company has issued $1,500,000 in bonds with the Manhattan Trust Company as trustee.

XENIA, O.—S. W. Dakin will receive bids until noon, December 21, for the construction and operation for 25 years of an electric railway in the city.

CLEVELAND, O.—The Peoples' Railway is the name selected for the new company to be organized by H. A Everett, B. Mahler, C. L. Pack and associates.

DAYTON, O.—O. S. Kelly will conduct his underground experiments here instead of at Springfield, as the authorities would not grant him the franchise he desired.

AKRON, O —The Akron, Bedford & Cleveland Electric Railway will soon have an independent line in this city. It now uses the tracks of the Akron Street Railway.

MANSFIELD, O.—Nelson Ozler, T. Y. McCray, B. F. Platt, T. B. Martin, Z. S. Stocking, James Jackson, are interested in the proposed Mansfield, Savannah & Wellington Electric Railroad.

STUEBENVILLE, O.—J. F. Flood, superintendent, of the Steubenville Traction Company, writes that plans for rebuilding and re-equipment of the road will soon be ready. Extensions are contemplated.

CINCINNATI, O.—E. P. Wilson, B. Campbell and Capt. Robert W. Wise are a committe to bring about the purchase of the turnpike from Anderson's Ferry to Delhi for the uses of an electric railway.

CLEVELAND, O.—The Lorain & Cleveland Electric Railway has organized with S. H. Short, president; Barney Mahler, vice-president and general manager; J. B. Hoge, secretary, and E. W. Moore, treasurer.

WADSWORTH, O.—The Wadsworth Electric Railway Company has completed surveys for its lines from Wadsworth to Cleveland and to Barberton. From present indications May 1 will see the beginning of work on the entire line.

WARREN, O.—Referee Charles M. Wilkins says creditors will get 60 per cent of their claims against the Mineral Ridge & Niles Electric Railway Company, as $6,000 can be secured from stockholders under the statute enforcing double liability.

AKRON, O.—The Akron Street Railway & Illuminating Company has elected J. B. Clews, of Henry Clews & Co., E. C. Gibson, Samuel Thomas, New York, N. Y., Aaron Wagoner, J. A. Long, G. A. Seiberling and Ira Miller, Akron, directors.

CLEVELAND, O —The Cleveland & Chagrin Falls Electric Railroad Company has been incorporated with $300,000 capital to build an electric line to Chagrin Falls and Warren. Vincent A. Taylor, 224 Cuyahoga building, says work will soon begin.

CLEVELAND, O.—The Walker Company, of Cleveland, has been incorporated at Trenton, N. J., with $2,500,000 by John Ludwig, Charles King, Martin W. Dixon, Jersey City. It is proposed to manufacture generators, motors and other electrical apparatus.

LORAIN, O.—B. Mahler, vice-president of the Lorain & Cleveland Railway Company, 617 Garfield building, Cleveland, says, the company expects to be ready in January, for proposals for construction, material, etc., for 22 miles of road to be operated by overhead trolley.

CLEVELAND, O.—The Everett syndicate has applied for franchises in the city for the Cleveland, Painesville & Eastern, Akron, Bedford & Cleveland and Lorain & Cleveland Electric roads The proposed lines parallel existing lines, but take in much new territory and reach all steam road depots.

AKRON, O.—The county commissioners have granted the Akron & Cuyahoga Falls Rapid Transit Company from Barberton to Hametown. The proposed line will run to Wadsworth in Wayne county. The line when completed will run from Portage to Wayne county, 26 miles. Thomas F. Walsh is general manager.

AKRON, O.—The Akron Street Railway & Illuminating Company has been incorporated to succeed the Akron Street Railway Company and the Akron General Electric Company. Capital, $1,500,000; incorporators, J. B. Clews, banker, New York; E. C. Gibson, promoter, New York, and J. A. Long, F. A. Seiberling and Ira Miller, of Akron.

EAST LIVERPOOL, O.—George P. Rust, associate general agent of the Northwestern Mutual Life Insurance Company, Cleveland, is the secretary of a syndicate that will build a bridge 1,450 feet long at East Liverpool to cost $225,000, found a town on the West Virginia side and construct an electric railway from East Liverpool to Rock Springs. J. E. McDonald, East Liverpool, an attorney, is president; W. L. Smith, pottery manufacturer, East Liverpool, treasurer.

Oregon.

PORTLAND, ORE.—The Portland Traction Company has applied for a franchise to adopt electricity on its cable lines.

PORTLAND, ORE.—The Consolidated Street Railway has been purchased at foreclosure for $307,000 by the Rollins Banking Company, Boston.

SALEM, ORE.—F. R. Anson, superintendent of the Salem Consolidated Street Railway Company has been appointed receiver of the company. The First National bank applied for the receiver on account of unpaid accomodation notes for $8,712.

Pennsylvania.

OIL CITY, PA.—City council has passed a fender ordinance.

PITTSBURG, PA.—The City Incline Plane Company will build a suspension bridge 1,565 feet long.

LEBANON, PA.—The Lebanon & Myerstown Electric Street Railway will soon be extended 6½ miles to Womelsdorf.

YORK, PA.—The York Street Railway will extend its line to Jenkintown. It is reported that contracts have been let.

MAHANOY CITY, PA.—Executions aggregating $4,160 have been issued to supply men against the Lakeside Railway Company.

PITTSBURG, PA —It is reported that the Second Avenue Traction Company will build a bridge and extend its system to Duquesne.

CONNELLSVILLE, PA —The Connellsville, New Haven & Leisenring Street Railway Company will extend its line to South Connellsville.

MCKEESPORT, PA —The McKeesport, Duquesne & Wilmerding Railway Company will extend its Duquesne branch over private right of way.

MEADVILLE, PA.—The Meadville & Saegertown Railway Company has been incorporated with $34,000 capital to construct 4 miles of electric road.

MEADVILLE, PA.—The Saegertown & Venango Street Railway Company has been incorporated with $72,000 capital to construct 8 miles of electric road.

NEWTOWN, PA —Henry W. Watson, president of the Newtown, Langhorne & Bristol Electric Railway, says the road will be extended to Bristol this season.

PITTSBURG, PA —The Second Avenue Traction Company has bought at Braddock a site on which to build a car barn for the Glenwood and Wilmerding branch.

CARBONDALE, PA.—It is reported that the Lackawanna Valley Rapid Transit Company will reorganize. J. W. Aitken will remain as general manager and treasurer.

READING, PA.—The United Traction Company, which absorbs the electric railway systems has appropriated $200,000 for improvements. John A. Rigg is president.

PITTSBURG, PA.—Stockholders of the Pittsburg, Duquesne and Central Traction Companies have voted to consolidate with the Citizens and Ft. Pitt companies.

WARREN, PA.—It is reported that James D. Woodard is negotiating to obtain a controlling interest in the Warren Electric Railway. If he succeeds the line will be extended to North Warren

SHAMOKIN, PA.—E. C. Hamilton, president, and G. M. Smith, manager of the Shamokin-Mt. Carmel Electric Railway Company, are interested in a proposed electric railway to Bloomsburg and Berwick.

PITTSBURG, PA.—The Incline Plane Company has been incorporated with $1,000 capital to construct an incline plane for passengers. Directors, John P. Moore and Webster W. Murray, of Knoxville, and James W. Patterson, of Pittsburg.

PHILADELPHIA, PA.—Signs of activity are noticed in three street railways incorporated in 1889. Applications for franchises have been made by the East Philadelphia Street Railway, Enterprise Street Railway and Western Philadelphia Street Railway.

CORRY, PA.—The Corry Street Railway Company has been incorporated with $25,000 capital to build 4 miles of street railway. Manley Crosby is president and J P. Jefferson, G. W. Sill, R. F. Van Doorn, Charles B. Ayers, and S. J. Franklin, directors.

POTTSVILLE, PA.—W. E. & E. J. Howes, lumber dealers of Philadelphia, have filed a mechanics lien of $4,246.85 against the Schuylkill Electric Railway Company, reputed owners of the Car Equipment Company, of Philadelphia, for material for the power-house at Palo Alto.

PITTSBURG, PA.—M. G. Bulger, Brownsville, is president and E. M. Condit, M. J. Eakin, Allegheny; D. L. Starr, Jr., Bellevue; P. C. Johnston, A. R. Burleigh, Pittsburg, directors of the Pittsburg & Monongahela Traction Company, incorporated with $12,000 capital to build 2 miles of electric road.

PITTSBURG, PA.—The Duquesne Branch West Side Railroad Company has been incorporated with $100,000 capital to construct 10 miles of electric road from Baldwin to Mifflin. J. D. Callery is president and John C. Reilly, W. J. Burns, J. S. Scully, D. W. Evans, Pittsburg, and James W. Scully, Allegheny, are directors.

ALLEGHENY, PA.—Andrew Pafenbach, 254 Federal street, is president and H. G. Bolsler, Lawrence A. Thompson, H. W. Klein, William L. Hartmeyer, John G. Eckerman, T. R. McCreary, all of Allegheny, directors of the Allegheny & Evergreen Street Railway Company, incorporated with $30,000 capital to build 5 miles of electric railway.

PITTSTON, PA.—The Pittston Peoples' Electric Railway Company has been incorporated with $50,000 capital to construct an elecric line to Wilkes-Barre, by Joseph H. Glennon, West Pittston; Joseph C. Reap, Michael J. Langan, Pittston; James F. L. Flynn, Marcy. John T. Lenahan, Wilkes-Barre, is the largest stockholder.

OXFORD, PA.—Theodore H. Stubbs, secretary of the Board of Trade, writes that S. M. Patterson, West Chester, Pa., is general manager of the Oxford & Parkersburg Electric Railway, which has a charter in Oxford, and D. M. Taylor, Oxford, is interested in the Oxford & Wilmington Electric Railway, which is only partially located.

DERRY, PA.—Hugh Keogh, Lancaster City; Samuel H. Miller, Latrobe, Manager Sanxman, of the Sanxman Coal & Coke Company, Latrobe, are interested in a proposed electric road from Derry to Latrobe and to Youngstown, connecting many coke villages and settlements. Col. Keogh, Lancaster City, will superintend construction.

LIGONIER, PA.—The Ligonier & Latrobe Electric Railway Company has been incorporated with $72,000 capital to build 12 miles of electric road in Westmoreland county from Loyal Hanna Creek through Unity and Youngstown to Ligonier. Edward E. Robbins, Greensburg, is president and John E. Kunkel, Harry E. Yont, H.F.Stark, all of Greensburg, and S. H. Wheeler, Allegheny, are directors.

Rhode Island.

PROVIDENCE, R. I.—The Providence & Taunton Street Railway Company is being organized to construct 11 miles of electric road through Seekonk, Rehoboth, Dighton to Taunton, by Earl H. Potter, J. A. King, Seekonk; Reubien Brown, Rehoboth; N. A. Walker, North Dighton; W. B. M. Miller, Providence; Peter H. Carr, Taunton. Fred E. Jones, Providence, is general manager.

PROVIDENCE, R. I.—Residents along the Warwick & Oakland Beach Railroad are petitioning the New York, New Haven & Hartford Railroad to electrically equip the Oakland Beach branch.

South Dakota.

PIERRE, S D.—Applications will soon be made to the city councils of Pierre and Ft. Pierre for an electric railway franchise. A pontoon bridge will be used in summer and tracks will be laid on the ice in winter to connect the two cities.

Tennessee.

JACKSON, TENN.—The Jackson & Suburban Street Railway Company will install an arc and incandescent plant.

NASHVILLE, TENN.—The Nashville Street Railway, E. G. Connette, general manager, is in the market for second-hand 35-to-45-pound T rail, and 10 16 foot closed car bodies.

CHATTANOOGA, TENN.—The sale of the Chattanooga Electric Railway has been postponed to February 24. It is reported that the present owners of the road have notified the trustees that before that date they will be able to pay all obligations.

Texas.

TERRELL, TEX.—E. H. R. Green, president of the Texas Midland Railroad, is reported to be figuring on adopting electric traction.

Utah.

SALT LAKE CITY, UTAH.—The city council is considering an ordinance requiring conductors on cars.

Vermont.

ST. JOHNSBURY, VT.—F. C. Kennedy and J. S. Pierson, Burlington are promoting an electric line to Summerville.

SPRINGFIELD, VT.—Surveys are being made by the Springfield Electric Railway Company for a passenger and freight electric road to Charlestown, N. H.

BENNINGTON, VT.—The Bennington & Woodford Electric Railway Company has appropriated $20,000 for extensions, 4½ miles from Woodford to Glastenbury.

Virginia.

RICHMOND, VA.—The Richmond Traction Company has negotiated a mortgage of $500,000 to complete its road.

PORTSMOUTH, VA.—General Sigfried has been elected president of the Portsmouth Electric Street Railway Company, and construction will soon begin.

STAUNTON, VA.—The City Railway Company has been authorized to adopt electric traction on its 5 miles of road, and to discontinue operating for four months. Conductors will be put on. D. D Parmely, president of the Phœnix National Bank, and of the brokerage firm of Marquand & Parmely, New York, is president of the company. R. D. Apperson is manager.

West Virginia.

CHARLESTON, W. VA.—The Charleston Traction, Light & Power Company has been incorporated with $500,000 capital by W. A. MacCorkle, Malcolm Jackson, M. M. Williamson, all of Charleston.

CHARLESTON, W. VA.—The Charleston Electric Railway & Power Company has been incorporated with $500,000 capital by Neil Robinson, E. S. Buttrick, D. W. Patterson, F. H. Markell, all of Charleston

Wisconsin.

FT. HOWARD, WIS.—The McCartney Street Railway will extend its lines to the Ft. Howard Cemetery.

MILWAUKEE, WIS.—On January 29 at 2 p. m. the Milwaukee Street Railway will be sold by Frank M. Hoyt, special master.

OSHKOSH, WIS.—C. E. Loss and Philip J. Partenheimer, Chicago, have applied for a receiver for the Central Wisconsin Electric Street Railway.

APPLETON, WIS.—The Appleton Edison Electric Company will be sold during the first week in February by Charles F. Hunter, special master.

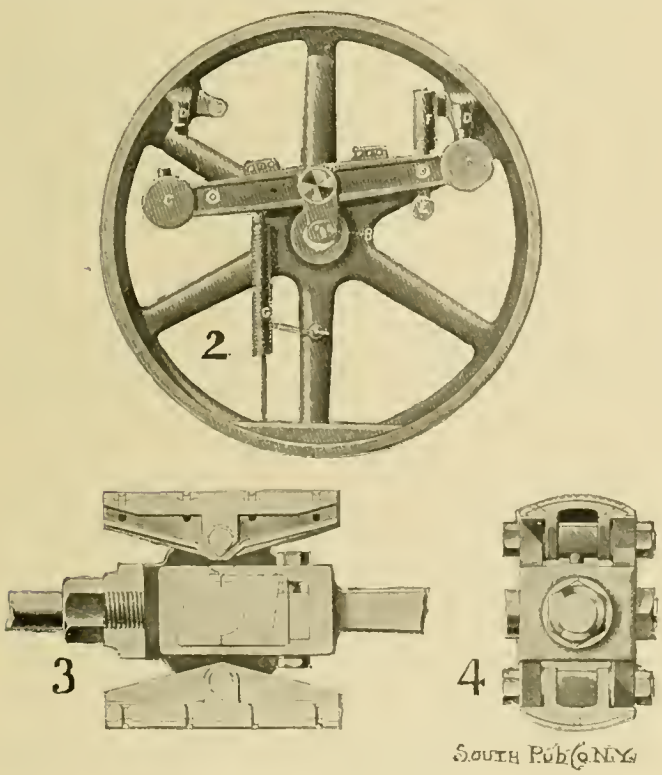
MILWAUKEE, WIS.—The Milwaukee Street Railway extensions include the continuation of the State street line, Forest Home avenue, a new line on Oakland avenue, and extensions into the suburbs.

MILWAUKEE, WIS.—The McGann Company has withdrawn its application for a street railway franchise, because the council required $100,000 cash to be paid into the city treasury, underground feeders and other conditions.

MILWAUKEE, WIS.—Judge Jenkins has decreed $551,264.26 interest and $9,425,293.64 in bonds due and payable by the Milwaukee Street Railway and ordered the sale of the property. No bid for less than $5,000,000 will be accepted.

NEENAH, WIS.—F. Schumacher, president of the Menasha & Neenah Street Railway, denies the report that the company has been purchased by the Central Wisconsin Interurban Electric Railway. He says no one has even had an option on the property.

RACINE, WIS.—Matthew Slush, Mt. Clemens, Mich.; A. W. Bishop, president of the Cleveland & Berea Electric Railway, Cleveland; Thomas M. Kearney, Racine, have incorporated the Milwaukee, Racine & Kenosha Street Railroad Company, with $100,000 capital. It is proposed to construct a freight, express and passenger line connecting Chicago and Milwaukee via South Milwaukee, Town of Lake, Cudahy, Mt. Pleasant, Caledonia, Racine, Somers, Pleasant Prairie, Kenosha.



J. H. M'EWEN COMPANY'S ENGINES.

THE J. H. McEWEN COMPANY'S DYNAMOS.

Some Important Improvements in Dynamo Building.

The J. H. McEwen Manufacturing Company of 26 Cortlandt street, New York, the well-known builder of automatic engines, has entered the electrical field and is building dynamo electric machinery in connection with its engine business. Its high speed engines, which have been in market for about four years, have gained an enviable reputation as high grade engines. It claims that for direct connected apparatus much better results can be obtained when both engine and dynamo are built by the same company, and assembled and thoroughly tested before leaving the works. Then again all parts can be standardized, and made duplicate, and can be turned out at less cost, than is possible when the engine is built by one company and the dynamo by another in widely different localities. The complete machine, having been thoroughly tested at the works, insures quick and satisfactory starting when it reaches its destination. This feature will be appreciated by those who have had experience in this line.

This company has made some recent improvements in the details of its engines, notably in the governor and cross head. Figure 2 is a cut of the governor, which is extremely simple, having but one bearing, and that a roller pin bearing, which requires no lubrication, so that the want of lubrication will not effect its regulation, and as the spring is the only part that is adjustable, there can not be any trouble from misadjutsment.

That the engine must regulate well is shown by the guarantee made by the builders with every engine sold, viz:—that the engine shall not run one revolution slower when fully loaded than when running empty, and a reduction or boiler pressure from the greatest to that necessary to do the work, will not reduce the speed of the engine one revolution. Any engine failing to meet this guarantee, becomes the property of the purchaser, upon payment of one dollar.

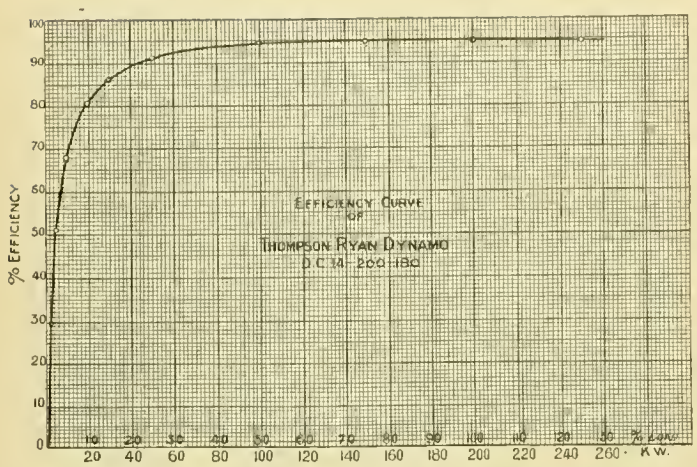
Figures 3 and 4 show the construction of the cross head. The shoes are held in position by eccentric bolts. To adjust for wear the eccentric bolts are turned and when the nuts are tightened they will remain in adjustment. The shoes swivel on the eccentric bolts so that they always have a full bearing.

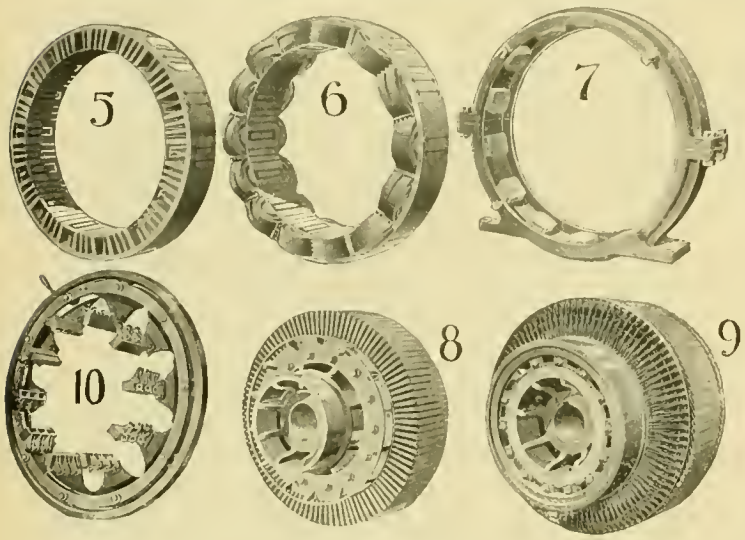
The Thompson-Ryan dynamo, which this company manufactures, presents a radical departure from the beaten tracks of dynamo design, differing in nearly every detail of construction from the ordinary type of machine. The most important feature is a set of series windings surrounding the armature, and termed balancing coils. This feature, which is the invention of Prof. Harris J. Ryan, of Cornell University, was introduced for the purpose of balancing armature reaction and carefully conducted scientific tests show that it accomplishes the desired end perfectly.

The field castings of these machines are of steel and consist of but three pieces which are held together by four bolts. One of these castings is the "pole-ring," shown in Fig. 5, through which the balancing coils are wound, and the other two constitute the field ring proper, Fig. 7.

Fig. 6 is a view of the completed pole ring. The field ring, Fig 7, shows on its internal periphery the "pole necks," around which the coils are placed. It will be seen that the field ring is of such a shape as to entirely enclose the field coils, thus thoroughly protecting them from mechanical injury. It will be noted also that the space in the field ring allowed for the field coils is unusually small. This arises from the fact that less than one-fourth as much energy is required to magnetize the fields of this dynamo as is necessary for a machine of equal capacity of ordinary design. On account of the very small amount of field, energy required the rise in the temperature of the field coils is very slight, notwithstanding the fact that these coils are so nearly surrounded on all sides. No compound winding is used on these dynamos, since the balancing coils afford a compounding.

All of the armatures for the Thompson-Ryan dynamos, of whatever capacity and whether wire wound or bar wound are constructed on the same general style. The cores are built of thin plates of a peculiar special steel, the distinctive feature of which is its unusually low hysteresis loss. The plates are stamped out in the form of rings, and a series of long slots are punched near the edges. These rings are then clamped firmly to a central hub or spider by means of brass end plates. There are no bolts passing through the laminated core, and no iron comes in contact with these plates. As a consequence of this there is no leakage of magnetism and no development of potential in any part of the core to cause eddy currents and waste energy. The holes in the plates form





J. H. M'EWEN COMPANY'S DYNAMOS.

"tunnels," in which the armature windings are placed. Fig. 8 gives a very good idea of the appearance of the finished armature core.

Another peculiarity of this machine is the large number of poles used. This feature, which in ordinary designs would be bad practice, is a valuable one of this peculiar style of design, enabling the builders to greatly shorten their armature conductors, and to use on all their armatures what may be described as the cylindro-hexagonal style of drum winding. In this winding, all parts of every conductor of any particular layer on the armature lie in the same cylindrical surface, and the windings do not bend down over the end of the armature core at any point, and the conductors being placed through the core and below the surface, no binding wire is necessary.

Fig. 10 is a view of complete brush holder arrangement. The brush holders project outward, and leave the entire outer end of the commutator free and accessible.

The whole brush holder arrangement is adjustable around the commutator, and by loosening the clamp bolts, the brushes may be shifted backward or forward. This is only done, however, for the purpose of adjusting the compounding of the machine. By shifting the brushes in this way the machines may be adjusted through a range of from 10 per cent drop at full load to 10 per cent rise, and this without any effect whatever on the commutation.

Figure 11 shows a curve of commercial efficiency taken from actual tests of a Thompson-Ryan 200 K. W. railway generator. The peculiar features of this curve are not so much the good efficiency under heavy load as the unusually high efficiency under light loads and the very great range of uniform efficiency. This is due to the unusually small fixed losses, the result of the very small field energy consumed and the light core losses.

Another important feature of this dynamo is the great ease with which two or more machines may be worked in parallel. The design of the machine peculiarly fits it for this sort of service. They may be thrown in parallel while differing widely in voltage produced, and each machine will take its due proportion of the load, notwithstanding the fact that they may be greatly over compounded. Two or more of these machines will work perfectly in parallel, and divide the lightest load evenly or maintain perfect unison with the entire load thrown off.

The Thompson-Ryan dynamos are built in sizes from 12½-kilowatt to 1,500-kilowatt capacity, both belted and direct connected.

PERSONAL.

H. A. Dorner, president of the Dorner & Dutton Company, Cleveland, favored The Review with a welcome call.

Edward Lusher, secretary and treasurer of the Montreal Street Railway, was quite ill last month, but fortunately recovered.

F. C. Boyd, the genial general manager of the New Haven Car-Register Company, spent several days in Chicago recently and visited the Review.

Frank J. J. Sloat is superintendent of the Akron, Bedford & Cleveland Railroad. He was formerly superintendent of the Sandusky Street Railway.

The many friends of C. G. Convers, manager of the Hot Springs, Ark., Street Railway, will be pained to learn of the death of his eldest daughter, Bessie.

S. A. Frazier has been elected secretary of the Centralia & Center City Street Railway Company, Centralia, Ill., to fill the vacancy caused by the death of G. P. Duncan.

W. W. Hatch, Goshen, Ind., has the contract for constructing the Indiana Electric Railway from Goshen to Elkhart. He is also figuring on several other important contracts.

Benjamin Willard, general manager of the New Orleans Traction Company, spent the day before Christmas in this city, and called to wish the Review the compliments of the season.

Col. C. L. Magee, Pittsburg, has presented the city with $100,000 with which to establish a zoological garden at Highland Park. This munificent gift will bring enjoyment to thousands of people.

Dow S. Smith, superintendent of the St. Paul division of the Twin City Rapid Transit Company, will be married January 20,to Miss Lillian J. West, one of the belles of Minneapolis. Mr. Smith is well and favorably known in both cities, and highly esteemed for his social and personal qualities as well as for his business ability.

Jesse Hildebrand, an old time street railway man of Allegheny, Pa., passed away recently after an illness of 15 months. For 20 years he was superintendent of the Pittsburg, Allegheny & Manchester line, later of the Pittsburg Union Passenger Railway Company and Allegheny Traction Company retiring in 1893 owing to failing health.

Charles Bayliss, during his brief superintendency of the Washington, Pa., Electric Railway, by his able management and uniform courtesy so won the good will of employes and public that the news of his departure for a larger field of usefulness as superintendent of the Citizens' Street Railway at Muncie, Ind., was received with universal regret.

D. L. Winters, inventor of the Winters' street car brake, has just returned from a visit to his home, Pueblo, Col., which is the nearest large city to the Cripple Creek country. He says that while speculators are taking the usual advantage to boom worthless mines, there are any number of very valuable mines and big money being made. A single train load of ore shipped for smelting contained $1,000,000 in gold.

W. Worth Bean, president of the St. Joseph-Benton Harbor line has won a suit brought by Alderman Shriver whose leg got in front of some buck shot emanating from a gun in the hands of Mr. Bean at the time the latter was defending his legal rights. Alderman Shriver conceived a brilliant idea of tearing up Mr. Bean's tracks, and paid no attention to the demand made on him by the sheriff, to desist. The suit was for $15,000, and Mr. Bean is to be congratulated.

PUBLISHER'S DEPARTMENT.

Glad to See You, Come In—His Ad. Keeps Him Busy—Got No Direct Returns—The New Year's Present—A Dose for the Non-Advertiser—People Do Read Ads. The Review in Paree—After Many Days.

This column is intended for our advertisers who now form quite a large enough number to constitute a reading contingent by themselves. Just a little chat with advertisers; that's all—though there is no objection to the people who don't advertise reading it, too—may give them some suggestions.

* * *

And speaking of advertisers one of them told us the other day he had had so many replies to his ad in our magazine he had been obliged to get up a special circular in order to facilitate replies to the inquiries, and as he advertises in no other publication than ours, he knew where they came from. It pays to advertise.

* * *

Within the past few days another advertiser called. Said he did not know as he could trace a single sale as a direct result of his ad in the Review. It looked as though there was a kick coming somewhere in this vicinity, and as his contract expired this month, we didn't know but he was going to quit. And he uses a large space, too, and has had his ad in the Review ever since he started in business, four years ago. (About a year ago he doubled the size of his space.)

"Well, are you dissatisfied and want to stop?" we inquired. "Bless you, no; I shall keep right along. You see, I sell entirely through jobbers, and I am satisfied they get returns from my ad, because they get mail orders in plenty. I make the goods and the jobbers sell them; but as I said, mine is one of those cases where I, the manufacturer, don't get the orders direct, and hence have no direct means of locating the returns. But the ad pays; of that I am well convinced, or I would not have kept it there all these years."

* * *

Now, these were two cases in which the visible results are diametrically opposed. The difference is accounted for in the manner in which the goods are sold. One sells direct, exclusively; the other sells indirectly, exclusively.

* * *

People read ads now-a-days. Prove it to you by yourself. Take a Century or Harper's or a Cosmopolitan and no one lays a copy aside until he has scanned the advertising pages. And they are good reading matter, too. Now, the street railway manager is just as interested in new ideas and devices pertaining to his business, and he reads our advertising pages. We know he does for any number of them have told us so. This suggests the necessity of good, live ads, well written and well displayed. Don't run the same old ad until it is warped and faded. Change it once in a while. If your ad isn't just to your mind, and you cannot spare the time to mend it, write us and we will see what balm there is in Gilead at this end of the route, and get you up one or two samples for inspection. Don't cost you anything, either.

* * *

The manager of a road known all over the country sends in a subscription for the Review one year, and asks us to send it to his nephew in a distant part of the country as a New Year's present. The young man hopes to be a street railway magnate when he grows up, and the uncle says he doesn't know of another present as good. We are forced to agree with uncle on this point, and wish there were more of him.

* * *

The "Le Directeur" of the French Thomson-Houston Electric Company, Paris, writes as follows: "We would be pleased to have you send us an extra copy of the souvenir edition of your esteemed journal, and we take advantage of this opportunity to congratulate you most heartily upon one of the most beautiful productions of the printer's and engraver's art which it has been our pleasure to receive."

* * *

Bread cast upon the waters is not all water-logged; one can never tell when it will return. We received a letter from a firm of manufacturers' agents in Portland, Oregon, asking the address of a firm that over a year ago advertised their goods in a small card, just one time. The letter stated the writer had visited the public library of his city and made a diligent search, but as several back numbers of the Review had been spirited away he presumed the ad must have been in one of the missing numbers. We immediately put the buyer and seller in touch with each other, and have no doubt an order was the result.

* * *

Speaking of public libraries suggests a mention of the fact that the Review is on file in the public libraries of all the larger cities, and is found also in the best clubs and leading hotels. We also send them to the technical schools and leading colleges. While these young men are spending more money now on football suits and flowers than on street railway supplies, many of them will soon be toiling in the ranks of electrical engineers and as superintendents and later, as managers; and we want them to know all about our advertisers and the Review now. They will not forget either when they get into the harness and join the list of buyers.

Nothing like getting in on the ground floor everywhere and all the time. That's what the Review does.

* * *

Once there was a very—

What, time up? well, tell you next month.

TROLLEY AND TURNPIKE DAMAGES.

Pennyslvania interurban lines have had more or less trouble with turnpike companies which maintain toll roads. In many cases the electric lines have taken away business from the turnpikes, who have brought suits. It has been decided that the proper basis for assessing damages is on the stock quotations of the turnpike company. The Allentown & Coopersburg Turnpike Company sued the Lehigh Valley Traction Company in the circuit court at Allentown, Pa., for $20,000 damages for occupying a section of the pike 400 feet long. Judge Albright said the electric road had the right to occupy the turnpike, and the latter's receipts before and after the road was built cut no figure in the case. The question of damages was to be determined by the relative value of the stock before and after the construction of the trolley road. The verdict was $3,800.

CAUGHT ON THE RUSH TRIP.

James I. Ayer, St. Louis; Cameron Currie and Thomas Jerome, Detroit, are reported to be about to purchase the Detroit Electrical Works for $50,000, and organize a company with $100,000 capital to operate.

McIntosh, Seymour & Co., of Auburn, N. Y., will furnish 2 engines of 2,400 aggregate horse power to the City & Suburban Railway, Baltimore, the present 7,200 horse-power equipment having proved inadequate to the increasing traffic. The new engine will be direct-connected to the generators.

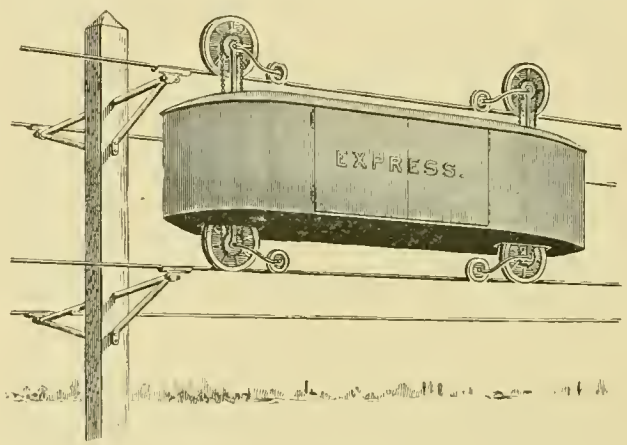
The sale of the Schuyler Electric Manufacturing Company and Schuyler Electric Company, of Middletown, Conn., to the General Electric Company, for $4,825 and $73,000, respectively, has been confirmed by the court. The property of the Schuyler companies has been in the hands of Lewis Sperry, receiver.

The Live Wire Cut-out Company, Jersey City, New York, Albany and Boston, has been incorporated with $250,000 capital, $5,000 paid in by William Kennon Jewett, New York; Henry K. Wight, Springfield, Mass.; Robert M. Dixon, East Orange, N. J., to manufacture appliances for street railway and light purposes.

The Hillsboro Street Railway Company, Ft. Worth, Tex., has been placed in operation. It has three cars built by the Massachusetts Car Company, equipped with Westinghouse motors. The officers are W. H. Carter, vice-president; R. J. Ware, secretary and treasurer. J. T. Voss, general manager. The Glenwood & Polytechnic College Street Railway Company, has been changed from horse to electric, having six Massachusetts Car Company cars equipped with Westinghouse motors. The company has bought the Park line and leased the Arlington Height Railway. The horse lines will be changed to electric. The officers are J. T. Voss, president; Woodford Brooks, secretary and treasurer; W. E. Voss, electrician.

SUSPENDED ELECTRIC EXPRESS SERVICE.

The Electric Express & Transportation Company, of New York, announces its wish to contract with local companies for the construction of overhead lines for carrying parcels in city and suburban districts. The proposed form of overhead lines is shown in the accompanying engraving. Although we do not know how fully the mechanical details are worked out there may be a good field for this kind of business. The idea is to



deliver packages through city and suburban districts for 5 cents each. Stations and express agents are to be placed at convenient intervals. The earning power of such lines has never been demonstrated, but in view of the small fixed charges on investment it looks as if there would be a good many places where such lines would prove profitable. It is to be an electric system with the upper cable for one side of the circuit and the lower for the other. The construction in order to carry cars heavy enough to be of any value in such a service will have to be very heavy, and for this reason the estimate made in the company's circular of $2,500 per mile for complete equipment is too low. Even with allowance for this, the plan is worth considering from a financial standpoint, if the mechanical operation is guaranteed by the builders.

QUEBEC AFFAIRS.

Our Quebec correspondent writes that the contemplated use of storage batteries has been abandoned after a careful study of storage failure elsewhere. A contractor named Beeman secured a charter for electric lines through the principal streets and agreed to begin construction July 1; but so far no material has appeared. Owing to narrow streets there is not room for double track, although the present company offered to solve the problem by running down one street and back on the next, and pay 5 per cent of gross receipts and pave tracks for the extra streets needed, thus abolishing turnouts. It is understood American capital is back of the proposed new road but the enterprise is very unpromising as the snow fall is very heavy and the receipts small in winter.

LOADING.

ELECTRIC RAILWAY EXPRESS.

BY A. L. STONE, SECRETARY O. S. L. & H. ELECTRIC RAILWAY.

The Oakland, San Leandro & Haywards Electric Railway, Consolidated, operates an express service between Oakland and Haywards, a distance of about 17 miles. The line passes through the following towns and suburban localities, viz: leaving Oakland, next comes East Oakland, Fruit Vale, Melrose, Fitchburg, Elmhurst, San Leandro, San Lorenzo, Castro Valley Junction, ending in the town of Haywards.

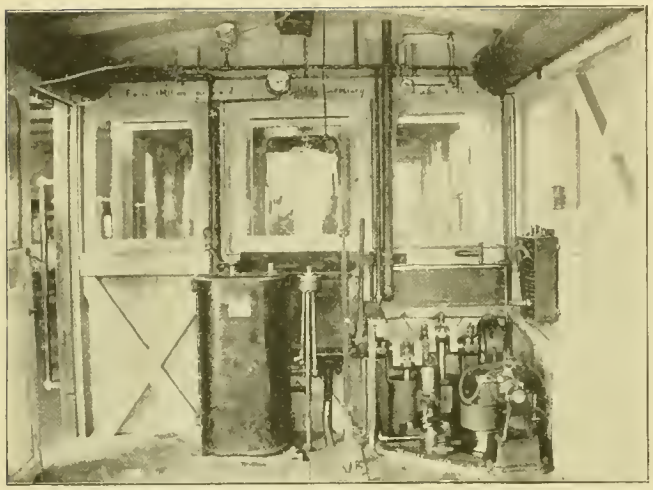
Between all of the points named and San Francisco the express business was formerly carried on by means of wagons drawn by horses, which was a slow method compared with the present service. The company stations wagons in San Francisco, seven miles distant from Oakland, which during the day gather up parcels, packages and about everything ordinarily handled by express companies, and, having collected these at a depot, the same are loaded into heavier and larger wagons, according to destination, and these are drawn upon the ferry boats running between San Francisco and Oakland, and upon arrival in Oakland, are again drawn a distance of but two blocks to the waiting express train specially designed for the transportation of loaded wagons.

Upon arrival of the train at the towns herein mentioned, the loaded wagons are lowered from the cars and their contents distributed in the ordinary way.

A description of the train itself and ways of handling the wagons, and other uses to which the cars are put, is interesting.

It was necessary to construct a motor car adapted for heavy pulling, and this was built at the shops of the company at Elmhurst. The car is 18 feet over all with a wheel base of 6½ feet, and weighs 11 tons; in order to obtain this weight, and at the same time increase the rigidity, a floor of rails laid side by side was laid, and on top of this was placed an ordinary floor. The car is equipped with two W. P. 50 motors and a type K controller. The car is also equipped with a most complete

LOADED



AIR PUMP, CONTROLLING VALVES, SAND BOX, RECEIVER, MOTOR.

air brake, consisting of a duplex pump driven by a 2-horse-power motor, the pressure being automatically regulated and controlled. When the desired pressure is obtained, the pump is instantly relieved, and when the pressure is lowered about 3 pounds it again assumes a pumping position. The receivers are made of two 8-inch by 15-foot iron tubes placed under the ceiling of the car, as will be seen in the cut showing the interior of the car; the jam cylinder is also placed inside of the car.

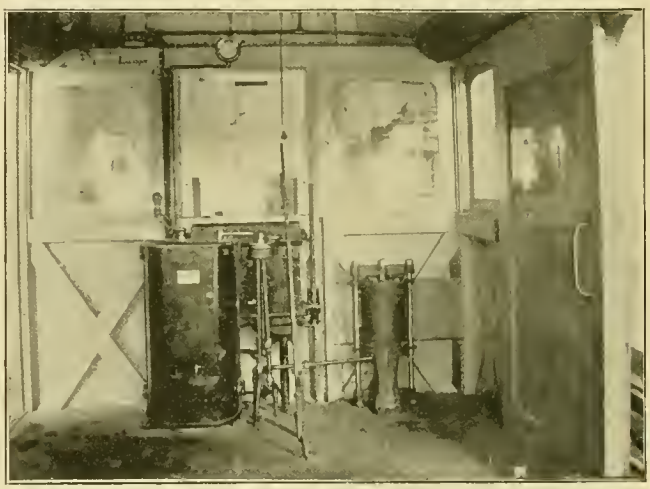
The pump was designed and built at the shops of the company, and credit therefor is due to Superintendent Gustafson. The appliance was seen to possess great merit, and is covered with a patent.

The car is provided with sand boxes, and can pull a load of over 30 tons over a 5 per cent grade with the greatest ease.

It was found desirable to give the car an outward appearance like the passenger cars of the line, in this way inviting less criticism by reason of the train passing through the principal business streets. The cars behind the motor are of the ordinary flat car pattern, painted in colors corresponding to the colors adopted by the company. The wagons are loaded by causing the motor to pull the same upon the car by the aid of ropes and skids, as is shown by the accompanying cut. One wagon is placed upon a car and well secured by means of clamps. The train takes up and discharges express matter along the route, and the motor car, as well as the floor of the flat cars, is often used for express matter, in addition to the contents of the wagons. The motor car also hauls coal cars, the latter holding about 7 tons each, and arranged to dump contents close to the doors of the boiler room at the company's power station; and finally, this car is used in the summer time for handling large crowds to and from picnics, as its speed is as high as that of the passenger cars, and moreover, it is well suited to this class of work, as three or more trail cars can be attached, and, as will be seen in the cut, a large number of passengers are handled at once.

SOMETIMES HAULS PASSENGERS.

The flat cars, coal cars and trailers are all equipped with air brakes, the air being supplied from receivers in the motor car, and coupled with the Westinghouse air brake couplers; the controlling valve in the motor car is so constructed that the air can be momentarily applied on the train, independent of the motor car; this appliance grew out of the necessity of handling heavy loads through crowded streets, where it was unsafe to work without being able to make quick stops.



JAM CYLINDER, ETC.

ELECTRIC SYSTEM FOR DUBLIN.

Dublin, Ire., will soon have an extensive system of electric roads. The Dublin & Southern Electric Tramway Company, [illegible] J. Clifton Robinson is managing director and electrical engineer, has applied to parliament for franchises for extensions to all the suburbs of the city. The gentlemen of the Dublin United Tramways Company who visited the United States this fall, have perfected plans for extensions to their lines.

The courts have decided the celebrated Brooklyn fender ordinance to be unreasonable and impracticable, though suggesting that it is quite possible for the city to draft a fender ordinance which the courts can sustain.

A Record that Records.

In no department of street railroading more than in the claim department, is there greater need of a record which will not only be complete and afford easy reference to every name contained; but which will also permit of positive comparisons.

M. B. Starring, the assistant general counsel of the Chicago City Railway, devised and put in operation about two years ago a system of bookkeeping covering damage cases and claims of all kinds, which is at once easily understood and kept without any red tape methods, but which shows at a glance the whole history of every case. Further, the footings, which are made by individual months, and months of the year to date, always tell the story of how much money is going out in this way, and is always comparable with the corresponding periods of one or more years previous.

DATE	NAMES	VOUCHER NUMBERS	PERSONAL INJURIES NOT EMPLOYES	PERSONAL INJURIES EMPLOYES	DAMAGE TO PROPERTY	SURGEON'S BILLS	DRUGGIST'S BILLS AND SUNDRIES	TOTAL				YEAR OF ACCIDENT	LEGAL EXPENSES	REMARKS
								CABLE	HORSE	ELECTRIC	TOTAL			

The record book from which we copy the heading is a large one, specially ruled and printed and made to last several years. Each page is about 24 inches from left to right and about 15 inches deep. Of course it is indexed. A division of expense is provided for the several systems, cable, horse and electric, and if desired could easily be expanded to distribute to every line in a system if any object was served in doing so. All the papers in the case are filed away in heavy manilla envelopes and are found by referring to the "voucher number" on the envelope which appears in the record in column three.

* * *

The supreme court of Georgia has decided a case which touches on the erection of poles near tracks. The opinion says:

"Although the evidence warranted a finding that locating the post so near the track was a negligent act, it does not show that so doing was violative of any duty due by the company to the deceased at the time he was killed, and, therefore, this act was not relatively to him a negligent one; and as no other negligence was alleged or proved against the defendant, the plaintiff failed to establish that so far as her husband was concerned the company was negligent at all."

The husband of the plaintiff, an employe of the Savannah Street Railroad Company, was riding on the platform of a car, stooped down to look beneath it, raised his head just in time to be struck by a pole, and was killed. The court held that it was not shown that he was then under any necessity or duty of being in that position, and, therefore, it did not affirmatively appear that he was free from negligence.

* * *

Anyone who believes that the personal injury attorney of a large company has an easy time, will be compelled to change his opinion upon reading this item. The same attorney looks after personal injury cases in the courts against two of Chicago's great systems. He had on the November trial calendars of the different courts 515 cases, 345 in the superior court and 170 in the circuit. Each day he had about 10 cases on call before the different judges and on two days had 14. It was estimated that if each case consumed 10 trial days, it would take him 34 years, 4 months to try all the cases; if 4 days, it would take 13 years, 8 months; 2 days, 6 years, 10 months.

* * *

STREET RAILWAY LAW on page 753 of the December issue has several decisions of particular interest to claim departments. One is a platform case in which the Pennsylvania supreme court decides that when plaintiff's injury does not result from any accident to the train, or from any defect in the means of transportation, the burden of proof is throughout on the plaintiff to show his injury was the result wholly of the defendant's negligence. Where a passenger on the conductor's invitation boarded a car, but could not get inside because of the crowd, was compelled to stand on the platform, and was finally pushed off the car by the crowd, and injured, it was held that the defendant was not liable.

* * *

Among the archives of the city court of Brooklyn is the following unique complaint, which was discovered by an attorney who was looking for a document of record in a case of his own. It was not followed up to see if he secured a verdict.

The City Court of Brooklyn. Leib Schachner against Brooklyn Elevated Railroad Company.

Now comes Leib Schachner complaining of the de-

fendant and alleges: That this plaintiff is of the blood of Israel proud of his lineage, its customs and virtues, but recently arrived in Brooklyn from the land of Sobieski the Pole.

That on or about the 3d day of January, 1890, this plaintiff paid the defendant 5 cents and was a passenger upon one its trains.

That in the control and management of the car in which the plaintiff rode were two servants of the defendant numbered respectively 448 and 488.

That said servants designated numerically as 448 and 488 heaped indignity and insult upon this plaintiff by signs, and words, such as, bending the elbow toward the body so that the hand rested with the palm upturned on a line just below the chin, and then moving the hand in a lateral direction in front of the face from side to side, leaning their heads the while to one side and with grimaces crying "Sheeny," then scratching with the ends of their fingers imaginary beard, with signs designating the presence of familiar vermin, saying, "Sheeny whiskers" and other English words the plaintiff could not understand.

That by reason thereof this plaintiff was publicly ridiculed, abused and insulted * * * to his damage $5,000.

Wherefore plaintiff demands judgment against the defendant for $5,000 and the costs of this action.

CHICAGO ELECTRICAL ASSOCIATION.

For some months past, Chicago has been without any local organization of electrical men. Recently the desire of a large number of the numerous members of the electrical fraternity in and around the city, to get together for the exchange of experiences and for purposes of becoming better acquainted, has led to the revival of the Chicago Electrical Association. A large number of new members have entered, and judging from the attendance and enthusiasm exhibited at the first three meetings the association has a very pleasant and profitable year of work before it, and is destined to take a prominent place among the local electrical societies in the larger cities. At the meeting held December 6, Albert Scheible, president, gave an address on "Our Electrical Association," which was followed by an informal discussion. Following are the papers for the present quarter: December 20, "What Next in Electric Railway Work," J. R. Cravath, electrical editor, STREET RAILWAY REVIEW; January 3, "The Protection of an Invention," W. Clyde Jones, with Barton & Brown, patent attorneys; January 17, "Armature Windings for Multipolar Generators," F. A. Muschenheim, designer for Western Electric Company; February 6, "Lightning Arresters," W. R. Garton, manager electric railway department, Central Electric Company; February 20, "The Outlook for Electro-chemistry," Bertrand S. Summers, chemist, Western Electric Company. The meetings are held at the rooms of the Western Society of Engineers, 1737 Monadnock Building. All electrical men around Chicago are invited.

A MONSTER CATALOG.

The biggest thing in the catalog line ever presented to the electrical trade is that of the Metropolitan Electric Company, Chicago, which has just been issued. It is 10½ by 8 inches, containing 755 pages. It is needless to say that its contents are as complete as its immense size would indicate. As large as is this catalog compared with previous ones, the increase in size is probably not great enough to be proportional to the increase in the volume of business done by this company.

IS COSTLY FUN.

The following is from a Massachusetts daily paper: "The motormen have a merry little game now, with which they amuse themselves on these wet, cold evenings when standing on a turnout gets monotonous, even in a vestibule car with red striped curtains. Just beyond the Plainfield street bridge, is a long stretch of single track, extending clear across to the Park street turnout and with so many curves that it is not easy to tell whether a car is coming. The game is for two cars going in opposite directions to race each other to the middle, the one getting there first winning the right of way, while the unfortunate man who has charge of the destinies of the other gets a stiff neck trying to switch the trolley pole about in a hurry so as not to keep the procession waiting. A conductor on a car the other evening got very badly rattled, indeed, and, after missing the wire three or four times, took to stabbing wildly into the dark in the hope of hitting something, while the people on the other car made encouraging and patronizing remarks. Before he made the lucky hit he began to feel as though he were threading a cambric needle with his thumbs. But such little episodes are all in a day's work."

Perhaps it only required the publicity given the practice to cause the manager of the company to stop it, but there is no good excuse for permitting it to be done more than once. Aside from the liability of collisions, there is the delay to traffic, waste of power, wear on car equipment, wear on overhead work, wear of track, and other waste, all unnecessary, which in the course of a year would amount to a tidy sum of money.

ADVERTISING CONTRACTS.

C. F. Seidel & Co. made a contract with the Pittsburg & Birmingham Traction Company, for the advertising privilege of its cars for a term of three years at $5,000 a year. An advertiser counted the cars in service, and thought he was paying for nearly twice as many cars as there were in actual service. He broke his contract with Seidel & Co., who broke their contract with the company. The latter sued to recover. Seidel & Co.'s attorney made the point that as the railway company was chartered to carry passengers only, it had no legal right to go into the advertising business. The street railway company was given a verdict, but an appeal was taken.

Skating and sleighing have arrived sooner than usual this season, and ought to bring with them additional nickles into the coffers of the street railway companies that are in position to take advantage of nature's gifts. There are many companies that have realized the resources for revenue that accompany cold weather, but there are many which are losing money every season, because they do not seek to develop the opportunities that exist around them.

It is easy to create a fad, but fads do not remain long unless there is something about them that is pleasing all the time. Ice skating is one of the fads that never grows tiresome Roller skating and shooting the chutes soon outlived their usefulness, yet ice skating has as many devotees as when the old rocker and half rocker were in fashion. The expense necessary to keep a skating rink in condition is small. One man will be able to keep a large area clean. A little water put on top of the rough ice at night will become a smooth surface of ice by morning. An old car or two with a stove in each will be good enough shelter for the patrons.

Some roads charge a nominal fee for the privilege of using the ice, usually the price of one fare, passengers buying a round trip ticket being admitted free, or 15 cents for a round trip including a coupon giving admission to the ice, general admission being 10 cents. Other lines are content to carry skaters to and from the ice making no charge for the use of the latter. They are in large cities where the pleasure seekers are many. Another class of roads engages a band and charges 25 cents admission to the ice on account of the expense of maintenance on an elaborate scale.

The Union Traction Company, Philadelphia, has a large skating pond at Willow grove.

The Concord Street Railway will keep a portion of the surface of Contoocook river clear for skaters.

The Belle City Electric Street Railway Company, Racine, Wis., has leased the ball park, which will be flooded for use of skaters.

The Lehigh Traction Company, Hazleton, Pa., will again flood a large space in Hazle park, having had a successful season last winter.

The Mt. Hamilton Incline Railway, Hamilton, Ont., has an immense mocking bird siren whistle at its power house, 350 feet above the city, to remind people that it is doing business. It is 5 inches in diameter with 150 pounds pressure behind it.

The Versailles Traction Company, McKeesport, Pa., is not a large system, but maintains a skating pond with profit, using a portion of the creek.

The Ligonier Valley Electric Railway has a park at Grapeville, Pa., with a lake 8 acres in area, which accommodates a large number of skaters.

The Taunton Street Railway Company, Taunton, Mass., has flooded a marsh at Somerset, and maintains a toboggan slide at Sabbatia park, Taunton.

The Holmesburg, Tacony & Frankford Electric Railway has a resort called Torresdale park. There is a toboggan slide, gravity railroad, ball field and half-mile bicycle track.

The Woronoco Street Railway Company, Westfield, Mass., has flooded a small tract near its car house. Wires have been strung around the pond, which is illuminated with 150 incandescent lamps.

The Detroit Railway has a skating park. Coupon tickets giving holders rides on the cars and admission to the park are sold. The rink, which covers 4 acres, is lighted with arc lamps. A band is in attendance.

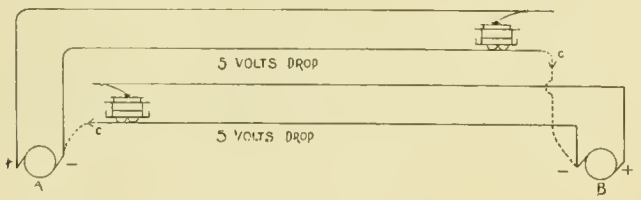
The Norwich Street Railway Company, Norwich, Conn., has an artesian well 6 inches in diameter and 80 feet deep to supply water for its skating pond. Coupon tickets are sold on cars for 15 cents, giving two fares and admission to the ice. General admission is 10 cents.

The Consolidated Street Railway, Grand Rapids, Mich., will have a larger skating surface this season, than it has ever had. Last season was so successful that it was decided to be in position to accommodate more people. The company has a restaurant under its direct management, and a large waiting room.

The Buffalo, Kenmore & Tonawanda Electric Railway has a fine property in Kenmore park. The grounds contain 28 acres of which a fine grove occupies 13 acres. There is a running track, ball ground and facilities for all kinds of athletic sports. A summer and winter palace 120x60 feet shelters the people.

BALANCING RETURN CIRCUITS.

What takes place in the return circuit when the territory of two roads overlap and each one operates cars near the power house of the other? We venture to say that very few electric railway engineers have thought out the general answer to this, though it is simple. In brief, the answer is that the drops in voltage in the two return circuits tend to oppose and eliminate each other. If the drop is equal in both cases between the two power houses no current will flow in the ground between them, and the working will be virtually that of a balanced three wire system, the tracks being neutral and carrying no current except at such times as the voltages may not balance each other. Suppose, taking a simple concrete example, that A and B represent two power houses owned by different companies, each feeding lines which run near the other power house. Suppose also that as indicated the drop in the track circuit of both is the same. As long as this is true it is evident that no current will flow either way on the tracks between A and B unless



BALANCING RETURN CIRCUITS.

the earth is of high resistance in the vicinity of the power houses. The voltages are opposed and balanced. The current from A flows out over the trolley wire and through its car near B power house. From the car wheels instead of flowing back over the track to A, it flows to the negative bus at B, (indicated by the dotted line) through the generator at B, out on B's trolley line, through B's car and into the negative bus of A. This state of affairs assumes that there is a good connection between the tracks at both ends. Exactly such conditions would not exist in practice once in a thousand times but it illustrates a principle that has not been called attention to before in this kind of work. It also brings to mind the importance of interconnecting the tracks of two different systems where they invade each others territory not only to save energy but to prevent electrolysis. In the example cited both A and B roads have virtually saved what energy they would loose in the ground return if the other road was absent. The importance of interconnecting tracks to prevent electrolysis is evident. The tracks and water pipes at c c will be positive to the negative poles of the generators at both stations and unless there is a low resistance connection at these places there will be great danger of electrolysis. This a point upon which rival roads in the same territory can well afford to co-operate. A failure to do so will only result in detriment to both. It is sometimes the case that roads paralleling are not on friendly terms and do not like to co-operate, but in this case they will both work injury to themselves if they do not.

WANTS SOFT SEATS.

A newspaper correspondent believes pleasure riding in summer could be largely increased if the seats were made more comfortable. He says:

"While there are a great many nickels taken on electric cars on warm summer nights from passengers who are riding for pleasure, ten times the number of nickels remain in the pockets of would-be passengers simply because the delight of moving rapidly through the evening air is offset by the uncomfortable hard wooden seats that they are forced to occupy. On many of these hardwood, straight-backed seats it requires a sensible effort to prevent a gradual sliding towards the floor of the car. A wooden upholstered seat is too hot for summer use, and the slippery convex cane seats are an abomination. Mr. Bain advocates the use of some strong, cool fabric for the seats and backs, which can be inflated with air, like a bicycle tire. If passengers are only made sufficiently comfortable they will multiply like the sands of the sea, and a clean, cool, yielding cushion seat and back would make it necessary to put on extra cars on hot summer nights to accommodate all the people who wanted a restful ride."

The Review will undertake to see that during the next five months at least that the seats are not too hot. The suggestion however contains some truth, and roads that do the least for their patrons may expect their patrons to do as little as possible for them.

STREET-CAR MANAGER ARRESTED.

H. Warren, general manager and superintendent of the Duluth Street Railway Company, was arrested at the instance of the Trade and Labor Assembly for violating the law requiring all street cars to be vestibuled by November 1 of each year.

When the case came up for trial it was discovered that the animus was spite work on the part of a labor organization. The day was warm, and only one car was operated which did not have a vestibule. It was shown that Mr. Warren had no knowledge that the car was in operation. The jury could not agree, so a new trial was ordered, but before it came up the case was dismissed.

CREATING REVENUE IN HOLLAND.

American street railways are not alone in their efforts to increase their revenue by attractions other than good rolling stock and well operated roads. One of the means adopted by the tramway company of Rotterdam, Holland, is the sale of chocolate. Little shops are erected at favorable points on the lines all over the city. Here for a few cents a cup of chocolate and milk can be obtained of a fresh-looking Dutch girl, who keeps her little shop in so neat and attractive a manner that she does a thriving business. Water for drinking purposes is scarce in Holland, and sells for about the same price as beer in this country.

THE STORAGE BATTERY FOR STREET CAR TRACTION.

Fancies, Facts and Figures on a Revived Corpse.

The article on "Storage Bobs up Again" in the September REVIEW has called out a protest from storage battery people from whom the following has been received:

EDITOR STREET RAILWAY REVIEW: In the September 15th issue of the STREET RAILWAY REVIEW, the citations from Prof. W. A. Anthony's editorial, on "The Storage Battery," contain sufficient inaccuracies regarding the economical aspect of the industrial application of storage batteries to traction purposes as to invite no little criticism.

To begin, Prof. Anthony says, that "the cost of the central station plant for charging batteries would not be much different from that of a plant to run the cars direct." Our opinion is that the difference is very great, amounting to at least a saving of one-third of the cost in a plant used for charging batteries. The important factor in deciding this point is the relation between the average and the maximum load on the machinery. We have data covering this point for a number of roads, and these show a difference between average and maximum load of from 20 to 1200 per cent. O. T. Crosby puts the relative size of a power plant for the direct and the storage battery system as 1:⅔. This is a less favorable figure than is justified by the conditions governing the operation of numerous roads in this country. Assuming that the ratio is fair, we think an economy of 33 per cent in cost of construction—involving, as it does, a diminished cost for real estate and building, is a very strong point in favor of the storage battery system.

Again he says, "There is the cost of the storage battery equipment to offset the saving in line, and, perhaps, subway. Which of these would be the greater would depend upon the conditions in the given case." With regard to a comparison between the cost of underground conduit construction and that of storage batteries, we cannot conceive how the two costs could approximate each other, unless about eight cars were run to every mile of underground conductor—which is a condition not met with in practice. Taking all the trolley lines in the country, there is, on an average, only two cars per mile of track. The cost of the line equipment including poles and feeders, especially where, as in cities, the latter must be buried, is about $12,000. The cost of storage batteries for two cars would be about $7,500, so that while it is conceivable that the cost of the storage battery equipment may exceed that of overhead or underground part of the construction, average conditions would render the storage battery equipment considerably cheaper.

Further he says, "the loss of energy would not differ greatly for the two modes of propulsion. For short lines the loss would be against the battery." While we agree with the implication that for long lines the efficiency of the storage battery system is greater than that of the trolley system, we are prepared to go a step further and say that even on short lines the loss of energy in the storage battery system is not greater than in the trolley system. To understand why this is so consider the relative efficiency of the two systems. For the sake of example, suppose the average trolley power plant contains three units which are used one, two, or three a time, depending on the requirements of traffic. Experience shows that if the variable load were converted into a steady load the coal consumption could be reduced by at least 20 per cent. Considering the energy contained in the coal, the trolley system has an efficiency, compared with the storage battery system, as 80:100. This represents, practically, the relative energy that is employed in doing work in the steam engine. Assuming that 10 per cent is lost in the steam engine by friction, these figures are reduced to the ratio 72:90. The efficiencies of the dynamos under a variable and a constant load being as 80:90, this ratio becomes 57.6:81. Against the loss of 5 per cent on the line, we have (with a battery of 80 per cent efficiency) a loss of 20 per cent in the battery. Making the further reduction we have the ratio 55:65. With a 70 per cent motor efficiency in both cases the ultimate ratio becomes 38.5 to 45.5. In other words, the same amount of the heat energy of the coal furnishes about 20 per cent more energy applied at the axles, in the case of a storage battery system, than in the case of the trolley system. In the case of long lines where the fall in pressure amounts to 40 per cent on distant sections of the line, the efficiency of the storage battery will be very much greater.

Lastly, Prof. Anthony says, "the cost of maintenance of a storage battery would be much greater than a well-constructed line." This is undoubtedly true since the total maintenance of a power plant, rolling stock and storage battery is about 1.3 cents greater per car mile, than the maintenance cost of power plant, rolling stock and line in the direct system. On the other hand he does not take into account the smaller interest charge and smaller cost for power in the storage battery system. If he did, he would find that this balanced the greater maintenance cost of the storage battery, and put the two systems on an equality.

Thus it appears that the storage battery system has first cost in its favor, and is not at a disadvantage with the trolley system when operating expenses are considered.

Very truly yours,

MAURICE BARNETT.

Now as we have said many times before, the storage battery has its proper uses, but experience has so far failed to demonstrate that in this country it is anything more than a financial failure for street car traction unless it is put as an auxiliary to the power plant, and not on the car. We do not like to discourage experiments, but it seems as if the time had come when it is proper to raise a protest against the wholesale squandering of money in extensive trials of a system that has such splendid chances of failure. If the system is still worth experimenting with let it be done on a small scale. If storage battery traction ever proves to be a success it

will be directly contrary to the teachings of experience up to date.

The criticised statement that the cost of power plant is about the same for the trolley and storage battery systems, is essentially correct, as a little figuring will show. Suppose a plant is to be built to deliver a maximum of 1,000-horse-power at the car motors. With the trolley system having 10 per cent drop in the line (this is a high figure for the best modern city construction) this requires a capacity of 1,111-horse-power at the switchboard. Now admit the proposition that the reduction in power plant made possible by being able to charge the storage batteries at a steady average load is 66 per cent (a very fair figure for a road of that size), and we have to provide for a delivery at the switchboard in the battery plant of 660-horse-power, not allowing for any loss in the batteries. Mr. Barnett assumes a battery efficiency of 80 per cent. The highest reliable efficiency test figures on traction batteries that we have in hand are only a little over 60 per cent. As no figures are brought to prove the assumption of 80 per cent (which is about the average efficiency on stationary work), we will split the difference with Mr. Barnett and compromise on 70 per cent efficiency on traction work. This would require a power house of 904-horse-power capacity as against one of 1,111 for the trolley system. But that is not all. The storage battery station must provide rooms, switchboards and appliances for charging the batteries, and this feature would bring the cost of the battery station up to and probably more than the trolley station. Even this does not take account of the undeniable fact that the storage battery cars will take more power to go a given distance in a given time because of their nearly double weight. So much for the first criticism.

The second criticism dodges the question by assuming one set of conditions in the case of the trolley and another in the case of the storage battery. He says, "taking all the trolley lines in the country there is on an average only two cars per mile of track." He then immediately jumps over and compares this average condition with a city road having buried feeders, ignoring the fact that such a city road would probably have six or eight cars per mile of track. If he wants to compare systems on an equal basis he must compare a mile of road having two cars with battery equipments (cost of batteries $7,500) with such an overhead trolley equipment as would probably be put up on such a road and which would probably not cost over $3,000 per mile of single track, assuming that it is a double track construction. The places where the line equipment costs $12,000 per mile of single track are few and far between, but if such lines are to be equipped with storage batteries, comparisons, to be fair must assume that the car equipment will be somewhere near the magnitude that would justify such expensive line construction and six cars a mile will not be far off. At Mr. Barnett's figures battery equipments for six cars will cost $22,500 against $12,000 for trolley line. Even with four cars to the mile, the figures will not balance in favor of the batteries.

The next argument in regard to the relative efficiencies was nearly all answered in a previous paragraph when taking up the relative power plant capacities required. The efficiency of 80 per cent assumed for the batteries is very questionable and should not be assumed in an argument of this kind without some proof to show that it is commercially possible. Furthermore the assumption of 30 per cent greater power plant efficiency on account of a steady load is not warranted unless in the case of smaller plants as we think the figures in our power house department for several months show. The machines in the best power plants are generally running with a sufficient load so that their efficiency approaches the best obtainable. In addition to all this no account is taken of the energy commercially wasted in hauling around the storage battery on each car. This again leaves the storage battery with no advantage.

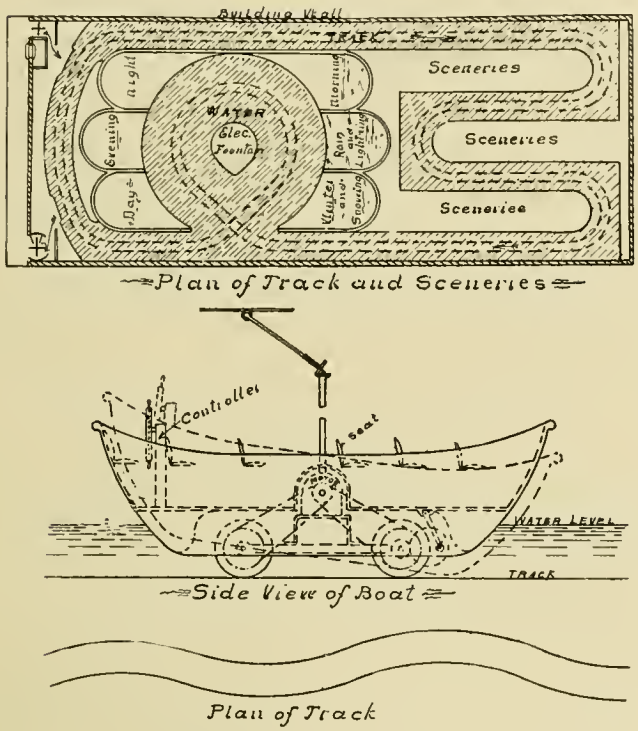
The question then simmers down after all to the old original one that has been the "hoodoo" of the storage battery car ever since it made its first appearance, viz., the cost of maintaining the batteries. We have shown that the battery has nothing financially to gain over the trolley in any of the items previously mentioned and the only question is as to how much more it is going to cost to maintain the storage battery and the additional track repairs it entails than to maintain an overhead line. In an article in another paper Mr. Barnett gives the cost of maintaining an overhead system as .18 cent per car mile. In the same article he gives the cost of battery maintenance as 2.70 cents a car mile. If that figure is ever attained in practice it will be a record breaker. The maintenance account in all American storage battery experiments heretofore has shown an uncomfortable tendency to run out into infinity. Mr. Barnett's figures are based on a battery performance in Paris where the cells were maintained for 3.5 cents a car mile (with labor about two-thirds cheaper than in America) and cars making 60 to 97.5 miles a day. It is evident that a system having neither first cost nor operating expenses in its favor is not going to come into use very rapidly until companies are absolutely sure that after a few years the battery maintenance will not run up to a prohibitive figure.

Fleetwood, Eng., proposes to build an electric railway along the coast to Blackpool. Three corporations are interested, the Lytham & Blackpool Company, the Blackpool Corporation and the Fleetwood & Blackpool Company. The idea of a continuous electric line from Lytham to Fleetwood has aroused the enthusiasm of the visitors and dwellers along the coast.

The second electric locomotive has been put in service in the B. & O. tunnel at Baltimore. It has improved on all previous performances by hauling a train weighing 1,400 tons through the tunnel at the rate of 23 miles an hour. In starting this train a draw bar pull of 58,630 pounds was exerted. The current taken was 4,100 amperes at a pressure of 600 volts.

ARTIFICIAL SEA VOYAGE FOR PLEASURE RESORTS.

A. G. Carlson, of 24 Baxter street, Chicago, has applied for a patent on a system for producing an artificial sea voyage. The dotted lines in the plan of track and scenery indicate a T rail track of 3 feet 6 inches gage, laid in the bottom of a cement lined excavation 8 to 10 feet wide, which is then filled with water to a depth of 3 or 4 feet. The track is laid on a uniform grade but is a continuation of slight reverse curves, which give a tacking course to the boat. The boat is 4½ feet wide by 18 feet long; seats 12 passengers, and is carried on



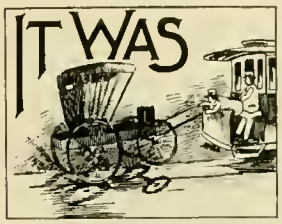
REVENUE PRODUCER FOR RESORTS.

four wheels. A 10-horse power motor, taking current either from overhead trolley or storage battery, propels the craft by means of link belts to the axles. The boat is pivoted amidships on the truck, and a cam or crank motion causes the bow and stern alternately to rise and fall, causing a pitching motion and creating heavy waves which precede the boat. The pitching motion may be thrown in and out of action at any time by the person in charge of the boat. This, with the tacking course caused by the line of the track furnishes a decidedly stormy voyage. A mast and sail may be added to make the sensation more realistic. The illustration suggests the electric scenic features which may be worked out *ad lib.* The place may be inclosed and roofed or not as desired. In a building 50 by 150 feet about 800 feet of track can be laid. The idea is offered as a suggestion to electric roads planning novel features for the '96 season.

The Hestonville Company, Philadelphia, gave its employes $2,500, because they didn't strike.

A HORSELESS CARRIAGE.

But it Went as Fast as the Electric Car.



a strange sight that greeted the eyes of people who happened to be along the line of the Holyoke, Mass., cars. On the rear platform of a Springfield bound car stood a man grasping tightly the shafts of a light buggy. The man had caught the car in South Holyoke and over-coming the objections of the conductor and the friendly warnings of the motorman, had boarded the rear platform for the purpose of drawing his vehicle to Springfield.

The man when he reached that town, didn't complain that his novel method of transportation was not swift enough for him, in fact he was pretty well satisfied and considered that it was a little the fastest thing he had ever had the pleasure of running against. Down the river road this combination of electricity and woodwork came at a riproaring, tearing pace that made the people in the car wonder and the farmers mechanically hoeing their potatoes in the fields along the way, stare open-eyed at the sudden gale of wind, an accompaniment to the car.

The man on the car held tightly to the shafts. The motorman let out the juice another notch. The buggy rocked from side to side as if in a cross sea and the whole looked like an escaped lunatic on the dead run for some self-originated goal. Down over Meeting House hill the two came. The man still held the shafts and the buggy seemed to increase its dizzy course by deep draughts of the flying dirt. Several trees were struck but strangely everything remained intact and the man got off at Elm street.

As he stepped from the car, he said, wiping his forehead: "Well, I'm satisfied."

EFFICIENCY OF FENDERS IN BOSTON.

Some valuable statistics on the efficiency of fenders on the West End Street Railway, of Boston, are given out by C. S. Sergeant, general manager. During the three years ending October 14, the statistics were:

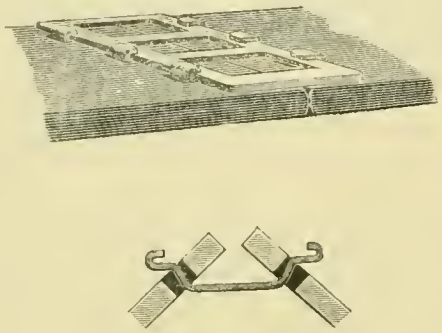
Persons in collision with fenders	347,
Persons escaping unhurt, or with slight injuries	301, or 86.7 per cent.
Persons receiving injuries more serious	40, or 11.5 per cent.
Persons killed	6, or 1.7 per cent.

The electric car mileage during these three years was 52,700,000, a small part of which was made by cars not equipped with fenders. This seems to show beyond question the value of the fenders as used on the West End road as life saving appliances.

London has a new electric railway project. A syndicate proposes to acquire the metropolitan extension of the London, Chatham & Dover Railway and install electricity.

METALLIC BELT FASTENER.

The illustration given herewith shows a strong and durable belt fastener, recently brought out in England. Steel hooks hold the joint together, the novelty being in the use of a steel plate on the outer face of the belt.



Square holes are cut through the belt as shown and the ends of the hooks passed up through. When the hooks are in place and the belt is flattened out, a thin stamped steel plate is slipped edgeways across the belt and tightly wedged between the jaws of the hooks. As the hooks are not bent up square, the belt, when under strain, has a tendency to ride up the incline and press against the steel plate, thus giving a more extensive bearing on the leather.

SAVES $40,000 IN TAXES.

Last year the Wisconsin legislature passed a law requiring street railway companies to pay a percentage of their gross receipts for taxes on the basis of 1 per cent on the first $250,000, 1 per cent on the second $250,000, and 2 per cent of the receipts above $500,000. It was thought that this measure would bring about an increase in revenues. The Milwaukee Street Railway paid $60,000 taxes in 1894. This year its gross receipts were $1,286,880.01, making its tax $21,987.60. The saving is about $40,000 in addition to the old license fee of $15 a car which was abolished by the new law.

TO REACH PROMISED LAND IN HORSE CAR.

horse cars have been used to house chickens, for waiting rooms, for fruit and peanut stands, for house boats and for residences. In Baltimore there is a church constructed from old horse cars. The First Colored Baptist Society, of Mt. Washington, bought a number of old horse cars for a nominal sum. One side of each car was removed and two cars put together to make a room, the roofs and ends being joined. Seats were put in, and a platform and pulpit erected at one end. Other rooms were similarly constructed so that the congregation had quite a respectable church at a nominal cost. There are many struggling missions in all large cities that are anxious to own their own houses of worship, but are prevented from attaining their ambition on account of lack of funds to build even a cheap structure. To such organizations the old horse car church ought to appeal on account of its low cost.

READING ROOM AT SOUTH CHICAGO.

Superintendent B. J. Jones, of the South Chicago City Railway has fallen in line and fitted up a reading and instruction room for employes that has all the modern improvements. In addition to current popular and technical literature there is in one corner a truck fitted with the most common equipment in use on the road, where motormen can be instructed in the details of the apparatus they handle. This instruction feature is getting to be more and more common on the best systems of our country and is to be heartily recommended.

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CORRESPONDENCE

We cordially invite correspondence on all subjects of interest to those engaged in any branch of street railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers.

DOES THE MANAGER WANT ANYTHING?

If you contemplate the purchase of any supply or material, we can save you much time and trouble. Drop a line to THE REVIEW, stating what you are in the market for, and you will promptly receive bids and estimates from all the best dealers in that supply. We make no charge for publishing such notices in our DAILY BULLETIN.

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A STRONG effort is being made by members of the National Electric Light Association, to bring about a consolidation with the American Street Railway Association. It may be noted, first, that the effort towards coalition comes from the light people and not from the railway party. While the gentlemen composing the Light Association are away up on lighting, and good fellows, and all that, the interests of the two organizations have very little, if anything, in common. They meet once a year, and occupy three days' time in convention. The Railway meets once a year and barely gets through in four days. Is it worth while for the benefit of those few railway men who do a light business also, to load down the time already all too short, with papers and discusssions which are of no immediate interest to street railway men; especially when the few railway men who want light on light subjects can get it at the other convention. Again the membership of the two associations is on an entirely different basis. In the American Street, membership is vested in companies; in the other, any person engaged in electric work or in the sale of electric supplies can become a member. And when it comes to voting on questions of policy in the management of street railways what will the light men know about it?

The street railway interests aggregate $1,300,000,000, the light interests $600,000,000. The American Street Railway Association was organized in 1882; the National Electric Light Association in 1885. The American Street Railway has managed to "keep a going" so far, and when the enormous interests increasing in value and importance every year—when these interests no longer warrant the maintenance of an association, distinctive, exclusive, to itself; then, we say, and never until then, will there be any advantage in uniting the two associations. The American Street Railway Association never was as strong as it is to-day, never had more necessary and practical work to do, never was as valuable to its members, and never had so bright a future. It's very kind of the Light men to invite us to come in on their circuit, but we had better stick to our own track, and not get off our trolley.

THE surprisingly large subscription to the new bond issue, pending which money for investment purposes has been rather restricted during the past month, will have a tendency to make the placing of loans easier.

MONEY for investment purposes has been somewhat restricted during the past month pending the allotment of the new bond issue. Now that the sale is over, the surprisingly large subscription will have the tendency to make securities move more freely than in a long time.

IN some large factories an emergency medicine chest is a part of the shop equipment: containing bandages, plaster, salve, etc., and a few simple remedies. The idea contains a good suggestion for similar boxes for use in car houses and shops.

WHEN the new photographic discovery is so perfected that an inspector can carry a shootalet and photograph through a conductor's vest and get the readings on the brother-in-law concealed under that garment, then and only then, will the art have reached its degree of greatest perfection.

THE continued inroads of the interurbans on steam road passenger traffic is being more and more recognized. In Ohio the prospect is a reduction in fares on suburban lines where the trolley is in competition. The moral is very plain as to what should be the attitude toward new electric lines, of those who may be possible patrons.

THE program for the October convention has now been completed by the appointment of Ben Willard, of New Orleans, to prepare a paper on "Modern Overhead Electric Construction." A better appointment could not have been made, and Mr. Williard's long experience and original ideas, will insure a most interesting and valuable report.

THE maximum size of overhead feeders, which should be used in heavy electric railway construction, is a matter of a good deal of importance and one on which we may expect some interesting developments in the next few years. The commonly accepted limit at present is a cable of 500,000 circular mils cross section, but the electrical engineer of a large system recently built, drew the

limit at 350,000 circular mils. This was not done without due consideration and a tour of inspection of all the large roads which have had heavy overhead construction in service for some time. The results of his observation convinced him that while a 500,000 circular mil cable can be put up in good shape at the start, there is undue sagging when the line gets old. We might also add that taking down feed lines for house movers does not improve them or reduce the sag. A feed line can never be restored to its original condition after once being opened. Time alone will tell whether our present limits are too low or too high.

The offering of prizes for faithful service and freedom from accidents seems to be growing in favor, although the scheme is by no means one of recent introduction, having been adopted on some horse roads many years ago. Theoretically there is no reason why an employe who is receiving fair wages should require an additional bonus to insure the faithful performance of those duties for the doing of which he expressly hires himself. But men are but human, and the element of chance, and the possibility of getting more than the usual is a strong element with us all. There can be no question that Superintendent Jenkins, of the Covington road, never made a better investment for his company than in the payment of the three hundred and twenty dollars he distributed on the first of the year. He will never know how many damage claims and serious accidents his prize money saved him, for it is the disasters the manager learns about and not often the narrow escapes. Of course, on some of the smaller roads it is possible to keep a close surveillance over the men; and in such cases, too, a man is more careful to obey orders and hold his position than in larger cities, where greater opportunity for employment always exists. But on the larger roads the prize scheme is unquestionably a money saver.

It is not often that we are able to present an article of such general interest and value to all electric railways as that in our last issue setting forth the methods of testing in the care and repair of motors at Indianapolis. The use of the ammeter and and voltmeter in testing cars in daily practice is not new, but we believe that nowhere has it been put into such extended use and in as convenient and practical a form as at Indianapolis. The methods outlined must, we believe, soon come into general use on electric railways. They involve but small investment, but they have an all important bearing on the operating expenses. No road can afford to ignore them. The difference between the old and new methods is as great as between darkness and daylight. In fact, the shop that depends entirely on the magneto for testing, is operating in darkness as far as an electrical knowledge of the state of an equipment goes. Attempting to find electrical faults under such conditions is like trying to find mechanical faults in literal darkness. The time ought to have been past long ago when crude, go-in-the-dark, guess-at-it methods prevailed, in the care of electric railway equipments; but since it does not seem to be past, the thing for managers to do is to brace up and make the small changes necessary for the needed improvements.

After all has been said and done regarding the electrical and mechanical improvements which help to more economical operation, the solid fact remains that the proper handling and training of men stands at the top of the list in the order of importance. The apparatus is under the care of the men as is also the cash income of the company. The largest item in the operating expense account is that of trainmen's wages. Strikes and damage suits can knock out more dividends than old style motors or an uneconomical power house. We do not for a minute wish to underrate the importance of the electrical and mechanical departments. Our readers know that this magazine has always given special attention to economies along these lines. They are not to be neglected, but must not attract so much of a manager's attention that he forgets the even more important part of the work. The two departments are not distinctly separate and never can be. They must go hand in hand. Those who have supervision of motormen must be directly in touch with the power plant and repair shop work. The conductors, of course, are nearly independent of the mechanical department though the linemen are decidedly interested in the way these do their work. One of the best street railway men in the country says that "good track is the basis of all successful operation," and it is perfectly true from the purely mechanical standpoint. If the word employes were substituted for track, it would express another great truth. The intelligence and good discipline of employes depends very much on the management, and wherever these qualities are wanting there is something wrong. It is one of the hardest tasks in the world to bring good discipline out of chaos, but there is nothing more essential to the profits of an undertaking.

"Where ignorance is bliss, 'tis folly to be wise," seems to be the motto of the great majority of roads with regard to their return circuits. The trouble with the motto in this case is that ignorance is not likely to be bliss very long. If a road waits until water and gas companies find out that its return circuits are in a bad condition, it is going to cost it many times as much to remedy the evil as if the curing process had been started earlier in the game. It is indeed surprising that so few roads have any systematic system of checking up the loss of energy in their return circuits, or the condition of track and return feeders with reference to neighboring pipes. Electric railways have usually been willing to do all they could to co-operate with water and gas companies to prevent electrolysis after it has been discovered, but they ought, for their own protection, to go a step further. It is not a difficult or expensive matter to arrange for and keep records of ground return losses. The investment in return circuits is immense, and the

possible damages which may be collected by other companies having metal underground are greater yet. What road can afford then to neglect to keep records which will assure its officers that it is free from danger of loss, or if there is danger tell them where it is? Every English road now built is required by law to keep such records. American roads should not need any law. We are safe in saying that there are not half a dozen electric roads in America that know from month to month the drop of potential in the ground return between the power station and points on the system at various hours of the day. After all that has been said and done with reference to return circuits in the last three years, this truth reflects rather severly on our boasted perfection of American electric railway practice, but it is never too late to mend, and the large roads which have big sums invested in return circuits and are investing each month big sums in coal to help destroy said return circuits had better begin to mend as quick as they can. Nine out of every ten electricians of roads will assure all questioners that their return circuits are all right and as near perfect as they can be made, but it is painfully noticeable that they never bring forward any figures which conclusively prove their statements, and the listener has to draw his own conclusions as to the occult process of reasoning by which the conclusion was arrived at.

NEW MOVE BY GENERAL ELECTRIC COMPANY.

The General Electric Company evidently intends to take full advantage of its recent victory in the under-running trolley litigation. February 6, a bill for an injunction was filed in the United States Circuit Court at Baltimore, to prevent the City & Suburban Railway of that place from entering into contract with the Westinghouse company for the equipment of seventy-five new cars, because it is alleged that in carrying out this contract certain patents which belong to the General Electric Company are about to be infringed. The patents are those for the under-running trolley. This is a rather interesting and decidedly unexpected turn in the developments.

BUFFALO TRACTION KNOCKED OUT.

The efforts of the Buffalo Traction Company—the Tom Johnson syndicate—met with utter defeat before the State Railroad Commission, which refused to grant the petition to construct lines in Buffalo. The fight was a bitter one, including voluminous testimony and several hearings before the Commission. The Johnson syndicate now propose to take an appeal to the Supreme Court, though it would seem to be a hopeless case. The Commission held that the evidence clearly and overwhelmingly established that neither public necessity or public convenience required that the certificate be granted the traction company.

THE GAS MOTOR CARS OF THE DESSAU TRAMWAY.

From time to time various glowing reports have reached us on this side of the water, of the wonderful Luhrig gas motor cars on the Dessau tramway. At last we are able to show our readers a picture of the apparatus, which, with the following description, is taken from Le Genie Civil, a French engineering paper. The first of these motors were operated over a 2½-mile stretch of track in November, 1894. A month later another two and one-half-mile section was worked with the same power. The gage of track is approximately our standard. The heaviest grade is 5½ per cent and the shortest curves of forty-foot radius. There are nine cars equipped with gas motors. The cars weigh six tons each and have seating room for fifteen people. The accompanying view of a car has the side door which covers the motor removed. The motors are built at the Deutz works at Cologne. They are of the Otto type and have two

GAS MOTOR CAR AT DESSAU.

cylinders in tandem under one of the car seats. The rated horse-power is seven, but 10 per cent more can be developed. The motor runs continuously and connection with car axle is made with clutches. The gas is carried under pressure in three reservoirs, two under the platforms and one under the row of seats opposite that under which the motor is placed. Gas is taken from the street mains at the charging stations and compressed by gas engine compressors to twenty atmospheres. The capacity of the tanks at the charging stations is enough to charge three cars without running the compressor. Charging takes two minutes. The renewal of the water used for cooling the cylinders takes another minute. The account does not state wherein this system of gas motor propulsion is different from others which have been tried and found wanting. We think that manufacturers of electric railway motors need not quake and tremble before this new competitor.

The Metropolitan Street Railway, New York city, has fixed conductors' wages at $2.25 after one year's service.

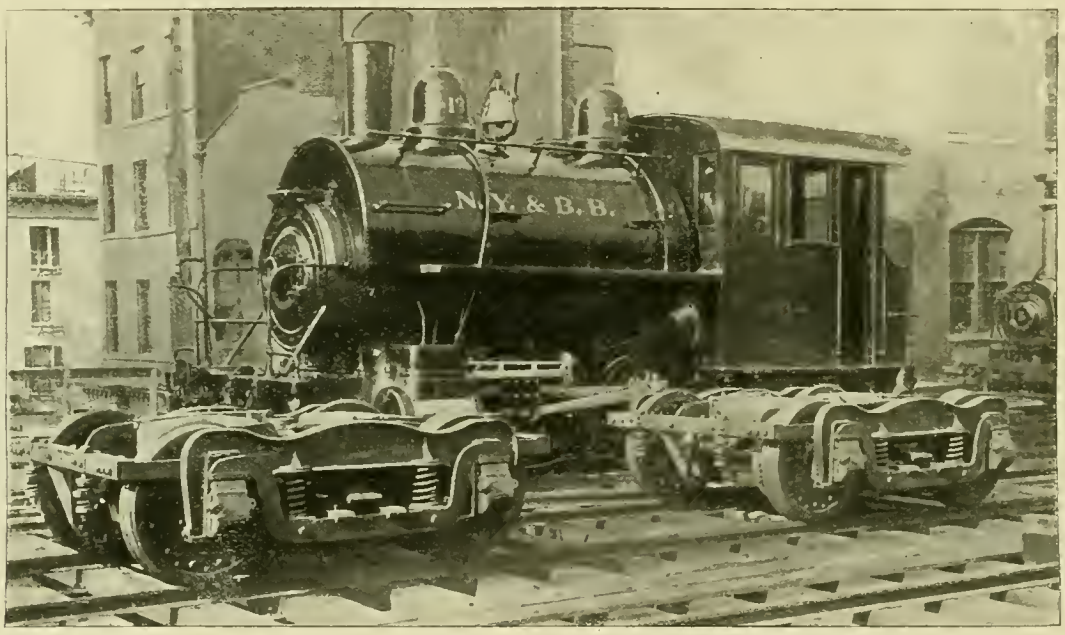
ELECTRICITY FOR SWITCHING AT BROOKLYN BRIDGE TERMINALS.

The first official exhibition of electricity as applied to the switching of cars on the Brooklyn bridge, was made February 8, at 11 a. m., in the presence of President Howell, Vice-president J. Seaver Page and Trustees Keeney and Henriques. The motor car was coupled to three of the ordinary passenger cars, and the complete train of four cars was switched by the motors from the incoming to the outgoing platforms and thence to the cable sheaves several times. The car was then taken over the complete bridge circuit twice. Complete satisfaction was expressed by the president and by Chief Engineer, C. C. Martin, at the manner in which the work was performed.

The use of electricity in place of steam for switching the cars at either end of the Brooklyn bridge has been recognized as the most suitable method ever since the electric railway motor became a practical fact. But not until the motor had been adapted to heavy train service did its employment in the bridge service become possible. Experiment is not a function of a municipal body, such as that governing the operation of the bridge; consequently it hesitated to apply electricity to bridge traction service, until it was certain that if applied it would work without a hitch.

To enable the trustees and the engineer the better to judge of the advantages which electric motive power might offer over the steam power hitherto employed for switching service, bids were called for the proposed electrical equipment. The General Electric Company offered to fully equip one car, operate it for thirty days and at the end of that time, if the results were not satisfactory, to restore the car to its original condition and bear the cost of the experiment. This offer was accepted.

If the general plan adopted at first proves economical as well as satisfactory, a certain number of cars will be equipped with four motors, one on each axle. These cars are to be known as motor cars and each will remain with its own train at all times, switching it from the incoming to the outgoing tracks and pulling or pushing it over the tilting sheaves when the grips will take up the cable and the motors cease work. Should the grips slip while the train is mounting the 3.78 grade, the motors can come again into requisition and assist the trains over the summit. Moreover, during the early morning hours when traffic has become light and the cable is no longer running, the trains can be operated entirely by motor cars, as they now are by the locomotives. The eventual outcome will probably be the exclusive operation of the bridge railroad by these motor cars. Meanwhile they will switch the trains, and as each train is equipped with its own switching power (the motor car) all the interference which the steam locomotives have hitherto placed in the way of the incoming and outgoing trains, will be done away with, and the complexity of the switching be greatly reduced. At present, the time consumed in switching a train is twenty seconds, and in that time a vast number of people gather on the platforms. With the new motor and the new principle of operation it is expected that passengers will at all times have cars waiting for them. Besides the gain in time in the switching process all the inconvenience of the locomotives—the noise, smoke, steam and gases will be eliminated, and this in itself will be no small gain.



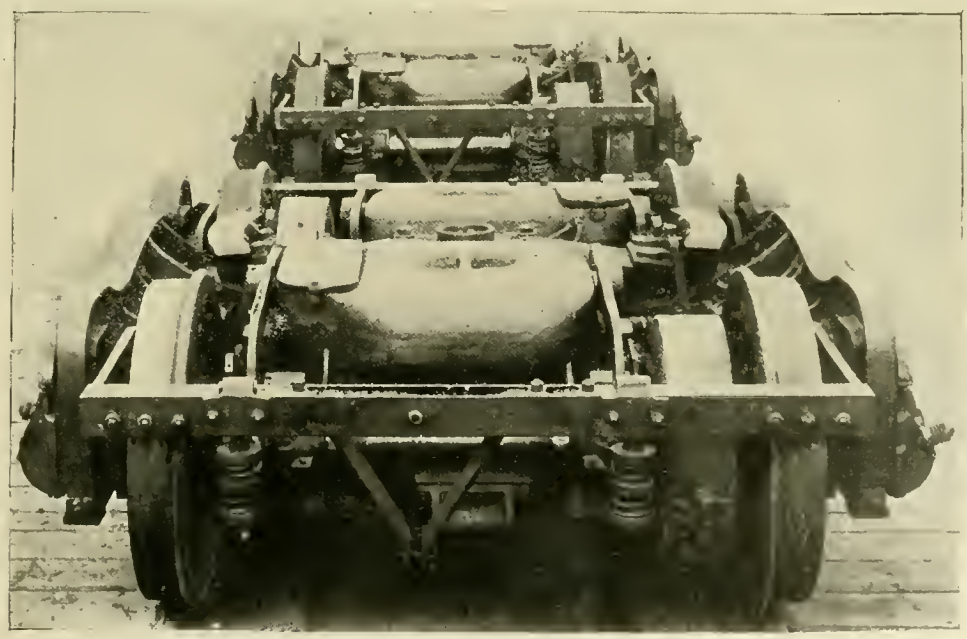
THE NEW MOTOR TRUCKS AND A BRIDGE LOCOMOTIVE.

Car number 76, one of the regular passenger cars of the Brooklyn bridge, was selected to receive the first

BRIDGE MOTOR CAR READY FOR SERVICE.

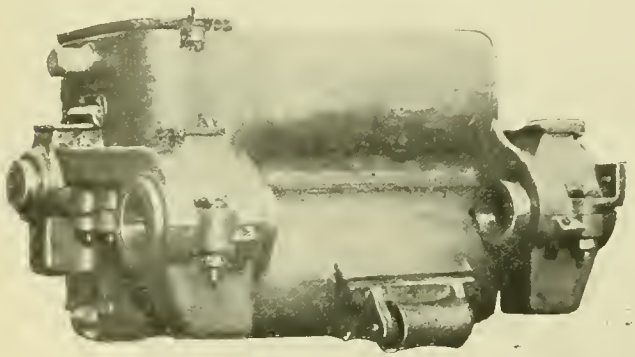
electrical equipment. All the apparatus, with the exception of the controlling handles and circuit breakers, will be placed out of sight beneath the floor of the car. The ordinary light Pullman trucks on which it has hitherto run and the cable grip mechanism have been removed. Heavier trucks were necessary to carry the motors. These were supplied by the McGuire company of Chicago and combine the best features of the passenger and locomotive truck.

The general character of the motor equipment is similar to that in use on the Chicago Metropolitan Elevated and Nantasket Beach roads. The motors, however, are lighter, being the G. E. 1,200. Four of these motors are employed, one to each axle or two to each truck. The Eickemeyer winding is used on the armature. By this method the crossing of two wires of large difference of potential is avoided. The insulation is substantial and each segment of the commutator is of hard drawn copper. The armature is mounted on a sleeve keyed to the shaft which may be withdrawn without interfering with the armature structure. The field frame is of cast steel. The ratio of reduction between the armature shaft pinion and the wheel gear is 3.5 to 1. Each motor weighs about 3,000 pounds. With this equipment and



THE TRUCKS WITH MOTORS.

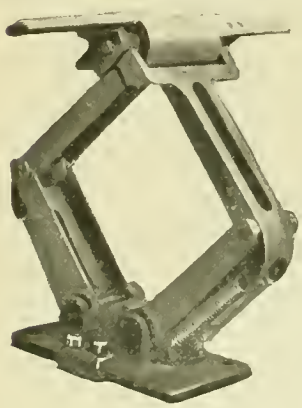
the regular train a speed of about fifteen miles an hour may be obtained. Each motor is suspended on the truck from two trunnions in the upper field set in two bars, the outer ends of the bar resting on elliptical springs. The axle is thus relieved of nearly all the weight of the motor. At the base of each motor, facing the ends of the car is a small roller which depresses the cable and



G. E. 1200 MOTOR.

allows it to pass the motor without injury, while a long iron bar runs beneath the truck and depresses the tilting sheaves preventing them from striking the motor.

There are two L 4 controllers like those on the Metropolitan elevated each operated from its own platform and either controller will operate the four motors or any two of them as may be desired. The resistances as well as the magnetic cut outs are also placed beneath the car floor. Beneath each hood of the car is an automatic circuit breaker, placed within easy reach of the motorman. The operation of this device is instantaneous and is an effectual safeguard against any accident to the motor. These circuit breakers take the place of the main circuit hood switches, but are wired in multiple with each other instead of in series. To guard against any possibility of one being closed while the motorman is at the other end of the car and desires to open his main circuit, only one handle is provided. The handle cannot be taken off without opening the circuit breaker and when removed the circuit is locked open. As the motorman must take the controller and circuit breaker handles with him when changing ends all danger of complication is avoided.



THE COLLECTOR.

The car is equipped with twelve electric heaters, manufactured by the Consolidated Car Heating Company, of Albany, N. Y. This system of heating has been extensively adopted on the surface cars in the city of Brooklyn and the consequent abolition of the objectionable stove has caused a general feeling of relief.

The collector, which will take the current from the overhead wire is a diamond-shaped frame of metal set longitudinally upon the roof of the car and carrying at right angles a bar in the center of which is a roller. The arms are wide enough to preclude any possibility of missing contact. The diamond frame is depressable and expansible on the principle of the pantograph, allowing a play up and down to conform to the varying heights of the overhead wire. With this collector the trouble of reversing is entirely done away with.

The power to run the car will be taken from the overhead wire already in position supplying current to the electric lights in the cars. The extra current, however, will be supplied from Fulton street feeder of the Kent Avenue Station of the Brooklyn City Railway, the return wire being connected to the rails of the surface roads.

POSTAL CARS FOR NORTH CHICAGO.

Three postal cars have been put in service on the lines of the North Chicago Street Railroad. They run to within one block of the general postoffice. At this point the train to which they are attached is stopped long enough to allow the necessary pouches to be unloaded into a mail wagon which takes them to the postoffice. This is done on the crowded down town loop without se-

NORTH CHICAGO HOME MADE POSTAL CAR.

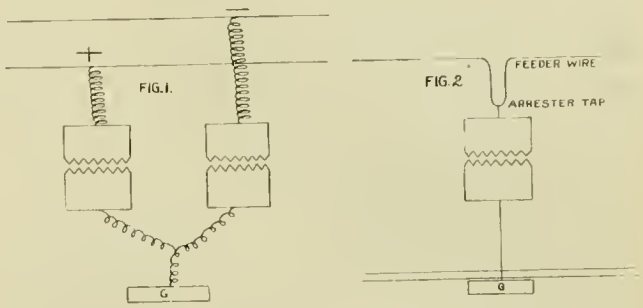
riously interfering with the time table. The cars are rebuilt horse cars from the shops of the North Chicago Street Railroad. They have bodies sixteen feet over all. In rebuilding it is seen that the platforms were taken off as they were entirely unnecessary and would tend to deceive the public into thinking they were passenger cars. Entrance is from the side. The interior is fitted up very much as the other postal cars illustrated in the Review from time to time.

A burning electric car running at full speed was a spectacle furnished the inhabitants of Bustleton Turnpike, Philadelphia, recently. The car was almost empty and the fire gained headway between the timbers until it burst into flames. In trying to run to a place where water could be had the flames were fanned into a furnace and the crew compelled to jump. The car was a total loss.

LIGHTNING ARRESTERS.

Abstracts From a Paper Read Before the Chicago Electrical Association February 7, 1896, By W. R. Garton.

One of the most trying questions presented to the workers in this industry has been the development of a reliable and accurate lightning arrester which would effectually cope with the enraged elements, and ward off the destructive blow commonly known as the static discharge. To this end many have striven, resulting not only in numerous developments, but the outcome in many instances has been a happy solution to a greater or less degree of perfection. The variety of design is almost as great as there have been ideas to promulgate and carry into effect, but no matter how efficient the device or how perfectly it performs its function, it is useless unless installed in reasonable numbers in well chosen places with the precision of an artist in fulfilling the instructions of the manufacturer who has, without question, given much time, study and careful thought to the matter of the proper installation of his apparatus, for he knows that the proper application of the remedy is the only guarantee for satisfactory results. It is very often considered a trick of the manufacturer in prescribing a goodly number of arresters. But both theory and practice have conclusively proven that during the existence of static influences there are established nodal or non-discharging points, where a discharge will never, or hardly ever occur. The nodal points are constantly shifting and therefore, it is impossible to locate them, and the only possible way of avoiding them is to provide enough arresters so that some of them may be at the discharge points. It is always advisable to place an arrester at the terminal of each line, and especially if it is a long one, as it will almost wholly overcome an effect known as a "kick" which is very trying on insulation. When arresters are placed at the end of lines, it is found that very heavy end or brush discharges takes place. The most reasonable explanation of the "kick" which I have been able to formulate is that similar to the jarring of a water pipe after the pressure has been relieved and suddenly thrown on by the closing of the faucet. To overcome this concussion, a small neck or extension of the pipe is made beyond the hydrant, which when the faucet is closed acts as an air cushion to neutralize the shock. The same effect results upon a line and the end arrester has the effect of overcoming this jar or "kick." Too often it is the case that some wholly disinterested employe is delegated to effect the installation. He is given the device and told to put it up. Instructions are disregarded and he is allowed to use his own judgment. The pride of the lineman ofttimes prompts him to inaugurate ideas which are most detrimental, such as for instance, the addition of a few sightly turns or coils in the lead in or lead out wires. This alone in many instances is sufficient to completely counteract the good influences exerted by the arrester. I remember having seen this very idea so nicely carried out as to have rendered the lightning arresters of little or no value. (see Figure 1). In this particular instance the arresters were in a station connected to an arc circuit. I at once caught sight of these coils of wire leading to and from the arrester. Upon inquiry it was found that they were originally so placed and I also learned that the arresters had always proven very ineffective. I advised the straightening and shortening of the wires. I learned afterwards that this had been done, resulting most satis-



factorily. The execution of proper joints or proper contact in the joints is an essential which quite often is badly neglected. It has always been my custom in putting arresters on a line to insert as much hinderance in the pathway of the discharge between the apparatus and the arrester as possible. I almost invariably place the arrester tap in the extreme point of a very abrupt angle or clinch in the feed wire; thus aiding the arrester to turn the lightning to earth (see Figure 2). I have found some of these seemingly small things to give admirable results, even though in some instances the so-called arresters were not models. As true as the old adage, "if a thing is worth doing, it is worth doing well," if arresters are a necessity the proper and careful adjustment and the location are equally important. Some of the causes for trouble from lightning are results of faulty workmanship, carelessness and ignorance. It is well established that inductive resistance is the most formidable enemy of high frequency currents. Lightning abhors induction as nature is foreign to a vacuum, and convolutions, turns or curls in a conductor although few in number offer more impedance to a discharge than do thousands of feet of straight wire. From this very fact, it is obvious how burnouts in apparatus occur, and it is plain how a small amount of inductive resistance is capable of debarring the static discharge when ohmic resistance cannot withstand. Thus we arrive at the sequel and are convinced of the cause for the discharge puncturing the insulation in preference to traversing the path of the normal current. With the introduction and development of the telegraph and telephone trouble from nature's batteries became apparent as an ever present barrier, but notwithstanding all this the protection of instruments from the damaging influences can be said to have been accomplished. These circuits being of low potential and small current flow, the establishment and maintenance of an arc was prohibited. With the development of the dynamo and its introduction into the

ranks as a commercial benefactor, the necessity of the lightning arrester became still more apparent, but at this juncture another serious question was to be grappled with; that of affording a good path for the discharge and still prohibiting the permanent establishment of an arc across the air space over which the discharge had passed. To accomplish this end various principles were introduced, but a type which predominated for sometime was the simple air gap in conjunction with some fusible metal in series. When the dynamo current would bridge the air gap the abnormal flow would cause the blowing of the fuse, thus relieving the strain of short circuit on the generator. The apparatus in circuit being the only communication between the two sides or the line, under the extreme stress of the charge something must give away. The weakest place of course will be the first of exit. At such a time as the breaking down of the difference and restoration to equilibrium occurs there is a disruption or lightning burnout. In the case of the burning out of an armature or field, the windings offer a high inductive resistance. The lightning entering at one of the terminals must find a way of escape (see Figure 3). Almost invariably this is through the insulation or if an armature, from one commutator bar to the next, to an immediate point of outlet.

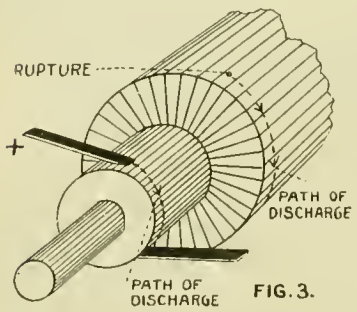
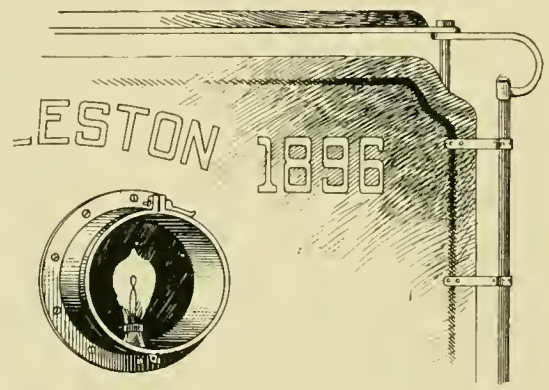


FIG. 3.

The fundamental principle of all lightning arresters is that of discharge points in conjunction with some high resistance between the two sides of the circuit and ground. This in most instances is an air gap. As far as the efficiency of the old original type of air gap, the same as that in use to-day on telephone and telegraph circuits is concerned, as a lightning arrester it is most capable. The reason why the simple air gap will not answer on other than telegraph or telephone circuits is as has been described. The formation of an arc is certain. The resistance of the air gap is sufficiently high to defy in most instances the passage of the normal current unless some means of reducing the resistance of the di-electric or air is afforded. Such is the case after the passage of the discharge. The reason for this is that the discharge is accompanied while leaving the air gap by incandescent particles transferred from one electrode to the other together with the abnormal heating of the air due to its high resistance. Thus materially reducing the air resistance. This is proved by causing a blast of hot vapor to be blown between the two closely adjusted discharge points while a great difference of potential exists between them. A lightning arrester to meet the requirements of railway and electric light circuits must be possessed not only with the capabilities of an arrester, but also those of a circuit breaker or arc defier.

NEAL ELECTRIC HEADLIGHT.

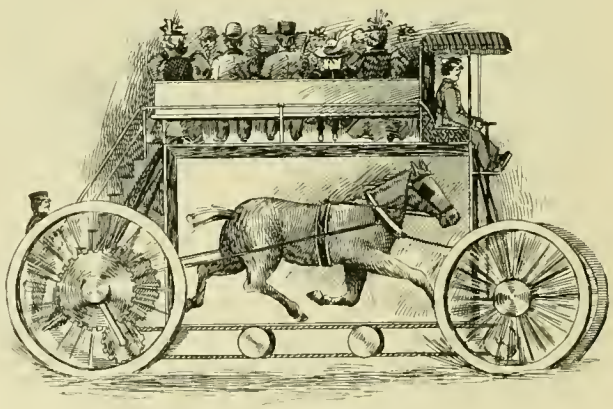
In spite of the fact that many oil headlights (too many) are still in use we think that most of our readers are at least beginning to realize that an oil headlight is an expensive luxury, if luxury it can be called. The Neal electric headlight is a dash light, offering all the advantages and none of the disadvantages of an oil headlight as to position and lighting the track. It has been adopted



NEAL ELECTRIC HEADLIGHT.

by the West End of Boston, the order from that road being for something over 4,000. The cost of installation is almost nominal and the saving in insurance, oil and wages will pay for them in a short time. F. E. Huntress & Company, of Boston, are general agents for the Neal light which is put up in very substantial form so as to be in little danger in collisions.

WHAT WE ARE COMING TO.


THE HORSELESS (?) VEHICLE.

American roads are not the only ones which have their ups and downs. W. J. Carruthers-Wain, of England, when at the Montreal convention told of an acquaintance of his who invested $15,000 in Australian street railway securities when they were very low. The lines boomed, enormous dividends were paid, and his holdings advanced until he could have sold them for over $250,000. His friends urged him to sell, but he refused until suddenly the Australian boom collapsed and he found his stocks absolutely worthless. He then put a bullet through his head.

POINTERS FROM MILWAUKEE.

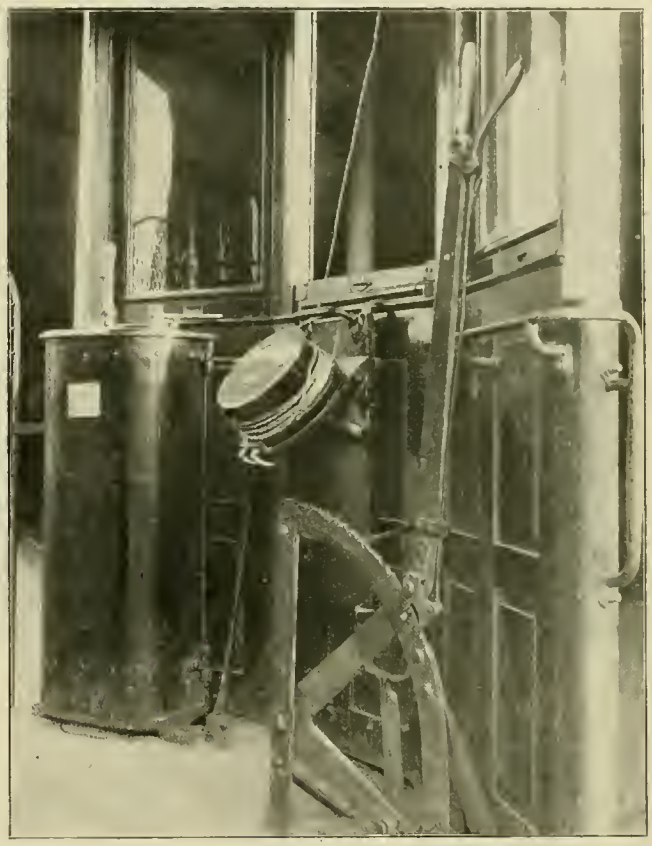
From the standpoint of the electric railway man who is out to learn, a visit to the Milwaukee Street Railway is of interest. The system is laboring under difficulties both legal and mechanical that do not trouble some roads installed in more recent years, but the men now in charge are as progressive and wide awake as any that can be found in the country, and where there are men with ideas, there are always to be found valuable pointers.

We believe the most important thing to be learned from the practice at Milwaukee at present is in regard to methods of educating motormen. While these methods have not been in operation long, there is no doubt as to their efficacy, and the great wonder is that they were not thought of and put in practice before. The idea of putting an ammeter on the front dash while teaching motormen, which we have mentioned editorially in previous issues, originated we believe in the superintendent's office of this company. We do not hesitate to pronounce this system infinitely superior to any other method of instruction in controller handling yet proposed. When the officers of the company were first considering methods it was suggested that a truck be fitted up at one of the waiting rooms and instruction given there to men off duty. The objection was raised to this that when men got through with their day's work, they were tired and would not take as kindly to instruction as if it could be given them on the car. Furthermore the operation of a stationary truck in a room is a very different thing from running a car over the road, and at best, very little instruction could be given as to the use of brakes. Such arrangements are valuable for showing motormen the details of their equipment, but the method of putting ammeter and instructor on the car in actual service was suggested by one of the staff as the best, quickest and

AMMETER ON THE DASH, MILWAUKEE.

most practical way to teach both new and old men to handle cars properly. This is accordingly the method that is to be put in practice.

The plan has not been put in operation as thoroughly yet as is intended, but enough has been done to show its great value. The instructor will put the instrument on the car when it is lying over at the ends of the route. Then the motorman is allowed to run his car a trip, handling it as usual, without any instructions except to keep watch of the ammeter, so that he can carry in his mind an idea of how much current he uses. The next



AMMETER ON THE DASH, MILWAUKEE.

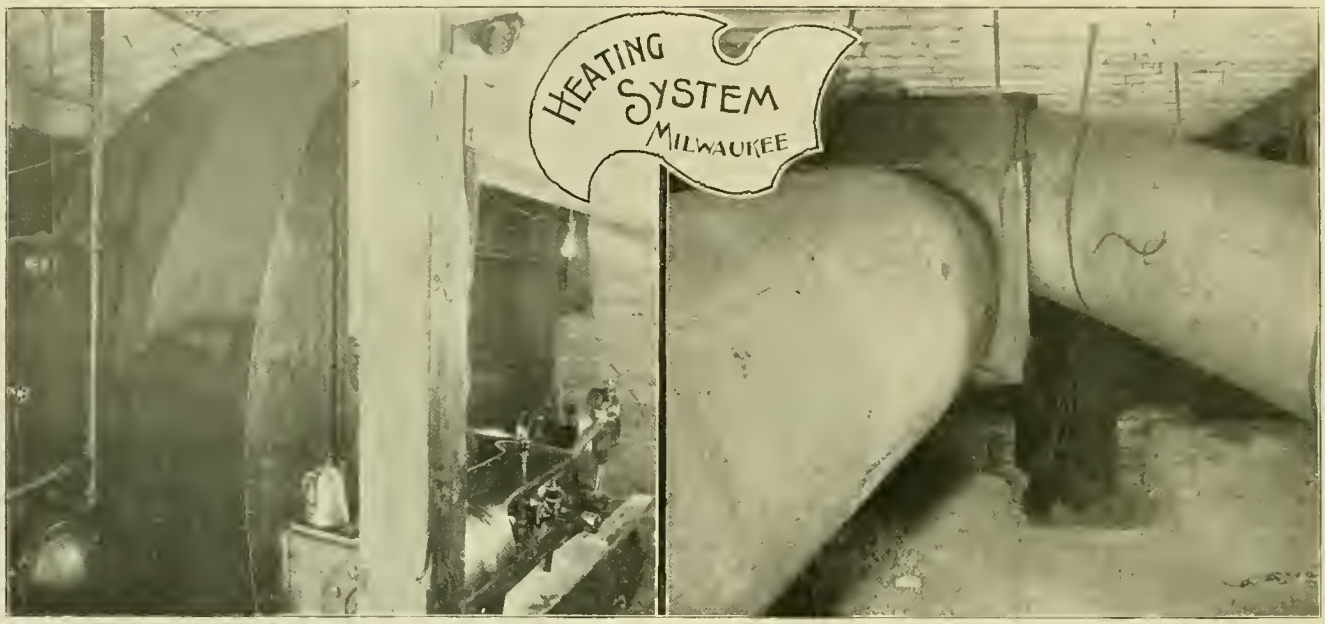
trip the instructor takes hold, and shows what the possibilities are as to economy of current. Then the motorman takes hold again, and with the ammeter constantly before him, attempts to reduce his consumption of current. The instructor, staying with a man for half a day, enables a great deal to be learned by experience with the ammeter. When lying over at the end of a run, the instructor tells the motorman about the details of his equipment, and by the time the half day is over the motorman is a much more efficient servant of the company (if he is any good whatever) than he was at its beginning. All the old employes are to be instructed in this way, and new ones as fast as they come in.

The apparatus for this instruction, employed at Milwaukee, consists of a Weston shunt station ammeter, mounted on a board which can be hooked on the front dash, directly in front of the motorman, so that the dial is in plain sight. A shunt station ammeter was used, because it had a larger dial than the common portable instrument, and could be read more easily than the portable. Connection with the car circuit is made on the car roof. The wire connecting the car circuits with the trolley base is pulled out and one of the ammeter wires attached to it with a connector. Then the other ammeter wire is put under the trolley base. The shunt is left

on top of the car, and wires lead from it down over the hood to the ammeter on the dash. Whether the shunt ammeter or the total current type is preferable for this kind of work, is a question on which there is room for a difference of opinion. The ordinary portable total current ammeter is light to carry around, and probably more accurate than the shunt instrument in a place like this, because with a shunt instrument there is a chance for error through poor contact in any of the connections between the ammeter and its shunt. The dial of the ordinary total current portable, however, is not easily read at a casual glance by a man standing up in front of it. If instrument makers would get up a reliable total current ammeter with a big dial, it would be the most suitable thing for this work.

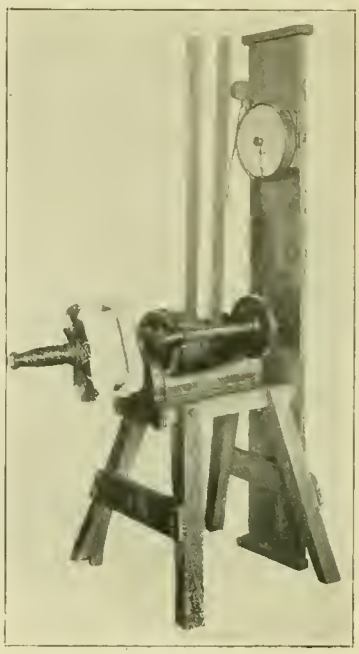
However absolute accuracy is not essential in this kind of work. It is comparative accuracy that is wanted. When the instrument is put on the car the object is to show the motorman how much less current his instructor uses than he does, and for comparison of this kind it does not matter much whether the readings are all too low or not. However it is desirable to have the readings accurate because of another advantage aside from instruction of motormen to be derived from this system. Defects in the electrical equipment will sometimes be discovered. If a car takes an unusually heavy current in spite of careful handling it is time for it to receive attention at the shops.

The Milwaukee Street Railway, under the able management of C. D. Wyman, has been making a very commendable effort for some time past to get a better understanding between officers and men and educate the men to a high grade of service. The method of instruction just described is one of the outgrowths of this effort. The Milwaukee Street Railway Bulletin, which has been published monthly for several months past, and of which mention has been made several times before in these columns, is an important factor in bringing officers and men in touch with each other. It is a novel thing in the business and an excellent idea. It is 11x9 inches and usually consists of four pages of reading matter, set to



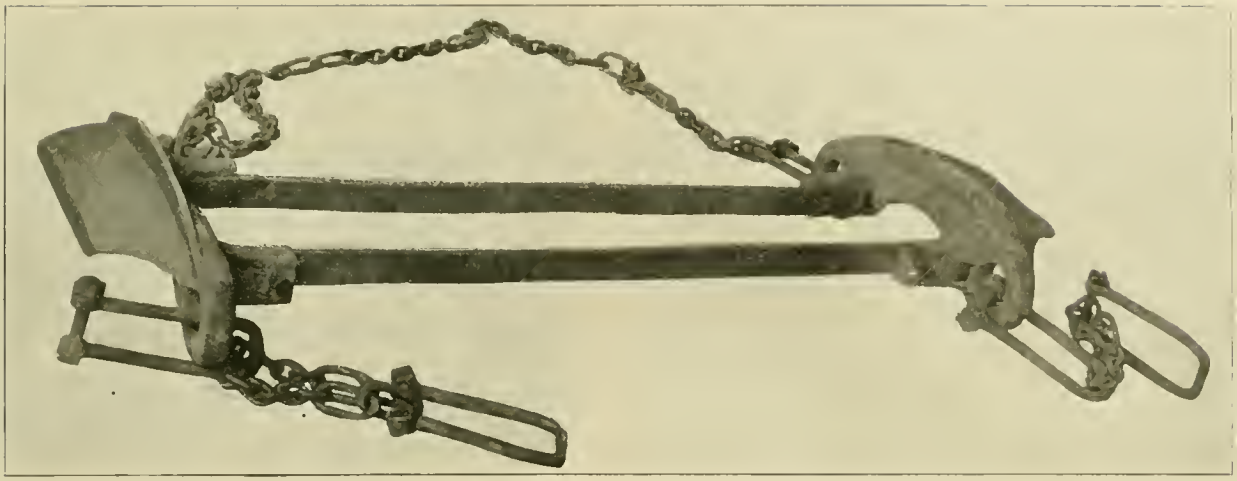
FAN BLOWER. PIPES FROM BANK OF COILS.

newspaper column. In the articles the men are talked to in a friendly, common sense, business like way, about improvements in the service and care of passengers and apparatus. The Bulletin is mailed to the homes of the men so that it gives the officers a chance to appeal to the best that is in its employes at a time when they are best fitted to receive, and will take most kindly to suggestions.



FIELD COIL WINDER.

The company has recently completed very commodious repair, rebuilding and paint shops, at its Kinnickinnick avenue depot. The shops were destroyed by fire in 1892. A fine car barn, machine and repair shop, and store room was immediately afterward erected, but it is only recently that the job was completed by putting up roomy quarters for painting and rebuilding cars, across the street from the first building. One of the finest features about these shops is the method of heating, which is by indirect



SKID FOR CARS WITH BROKEN AXLES, MINNEAPOLIS AND MILWAUKEE.

steam. Down in the boiler room, close by the boilers, is a big bank of live steam coils. A Sturtevant fan blower, driven by a direct connected steam engine, forces air through these coils, and through galvanized sheet iron pipes, leading to all parts of the shops, discharging at proper intervals. The result is the best warmed set of shops and car barns we have ever visited, and a very marked economy over the old direct radiation system with steam coils running to all parts of the building. The old shops, which were destroyed by fire, were heated with the direct radiation system, and took about twice as much fuel in the course of a winter as the present system, to say nothing of the fact that the old building was smaller and was far from being heated as well as the present one.

The company makes a great deal of its own special track work, and has excellent facilities for doing this kind of work.

A great variety of equipment is in use. Nearly every make of motor ever turned out is represented. So many old surface-wound, double reduction motors are in use that the armature winding department, is of course, kept busy. The life of some of these armatures has been increased by making the wire larger and of fewer turns, so as to secure better chance for insulation and putting more turns on the fields, so that the speed is about the same as before. In winding fields, some old fare registers are put to good use as labor saving devices. They are connected to the winding lathe so that its revolutions are recorded and the attendant is sure he is getting the right number of field turns without the trouble or uncertainty of counting.

A plan is under consideration for testing motors for several hours in the shop under full load before putting them under a car. Two motors can be tested at a time. One motor will be run as a straight series motor and will drive by a belt the other motor, which will be run as a dynamo. The motor running as a dynamo will have its field excited by a circuit independent of the armature, and the intensity of its field will be regulated by a rheostat in its circuit, so that the dynamo voltage can be raised enough to give energy into the line until the dynamo is fully loaded. Both dynamo and motor will then be running at approximately full load, yet the only loss of energy will be that in the motors themselves all surplus being given back to the line.

For hauling in cars with broken axles and preventing the blockades which are usually the results of such misfortunes, a pair of wrecking skids designed originally by E. F. Keister, master mechanic of the Twin City Rapid Transit Company, Minneapolis, are employed with excellent results. They are made to fit under the wheels on the broken axle and are held in place with chains. It is surprising to see how easily a car can be pulled along on these and how well the skids take curves and switches. Of course, they work much better in wet weather than when the rails are dry and dusty, but in any event they will do the business. The skids are light enough to be carried on a wreck wagon.

The operating officers at present are: C. D. Wyman, general manager; G. W. Kimmerlein, superintendent; T. E. Mitten, assistant superintendent; A. W. Lynn, superintendent of construction and repairs. Walter Smith has charge of electrical and mechanical repairs at the shops. O. M. Rau, electrician, has charge of the overhead construction.

ELECTRICITY FOR A HORSE-THIEF.

A dapper young man with discriminating taste for fast horses recently stepped into an Elizabeth, N. J., livery stable and borrowed the best rig in the establishment. The livery stable owner's suspicions were aroused by the young man's subsequent actions and two detectives were summoned. The minions of the law seeing other pursuit impossible boarded the first electric car and gave chase via the trolley. Of course the thief was overhauled and surrendered at the point of two life-sized revolvers. The electric cure for horse thieves has a well-established reputation in Jersey now.

RIGHTS OF ELECTRIC RAILWAYS IN CONNECTICUT.

The supreme court of the state of Connecticut has just handed down an important decision in reference to the rights of street railways in that commonwealth. The case upon which the court passed was that of the New Britain Electric Railway Company.

The decision was written by Judge Baldwin, a man who has figured in street railway matters before; a man better qualified than any other to render a just and intelligent opinion. The report in brief holds (1) that where an appeal is taken from votes of a city common council opposing a railway location on any streets on conditions, and the judge to whom the appeal is taken commits any error of law in dealing with it, his decision can be reviewed in the supreme court; (2) that a city can refuse to approve the location of tracks in a street unless it is indemnified against any expenses that may be incurred in repairs to the rest of the street on account of the increased amount of travel therein by excluding ordinary vehicles from the space between the tracks; (3) that a condition may be imposed against abandoning tracks already laid in other streets; (4) that fenders can only be ordered by the state railroad commissioners.

Judge Baldwin says further: The case does not call for a decision as to any of the points of constitutional law such as compensation for use of streets or the power to charge a license fee. The provision for the payment of such compensation was not an exercise of a power to tax nor of a power to license and to charge license fee. To ask for equitable compensation for injuries occasioned by the location is something very different from laying a tax or charging a license fee. There can be no obligation to pay unless the tracks are laid; and it will then be merely a contractual obligation, voluntarily assumed, to make good a loss that would otherwise ensue to the municipality from their location. The city gains nothing. It simply seeks to protect itself from loss.

A HORSE TALE OF 2000 A. D.

Many strange tales are related of the now extinct species equus caballus, then known as the horse, and which at one time was so common a sight in the streets of all cities as to excite no wonder. Even the children paid no attention when two of them drawing a big box on four wheels, and called a wagon, passed by. At that time the cable system of street cars was first introduced, which was the occasion of a most remarkable incident showing the wonderful reasoning powers and comprehensibility of the animal. It is related that the the horse, drawing a delivery wagon, was about to cross the track of a line of cable cars. Neither the gripman nor the driver saw each other until it seemed almost too late to avoid an accident. The horse by this time was half way across the track and the cars were close upon it.

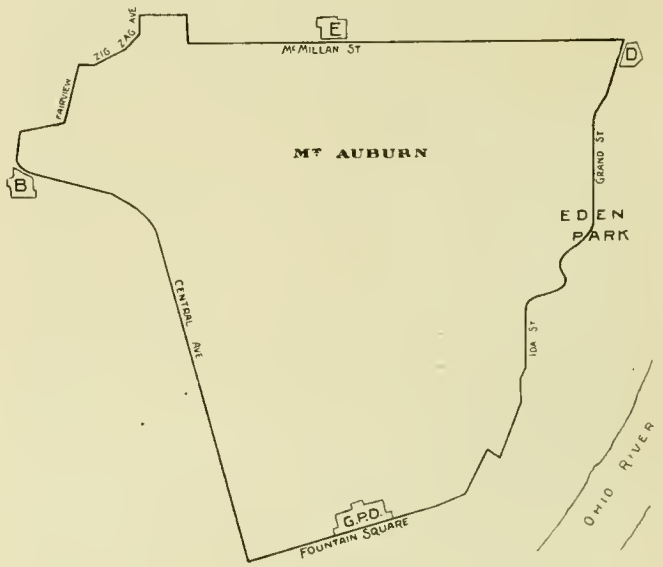
The gripman let go his grip and put on the brakes, but the animal, apparently realizing its inability to get across the tracks without demolishing the wagon at the probable cost of the driver's life, and without running into other vehicles, stopped short, reared on its hind legs, and when the car approached brought its front hoofs down lightly over the dashboard and into the car. It then quickly raised its hind legs on to the steps and the car came to a stand still. The horse backed off slowly and, with a loud neigh, proceeded. The wagon suffered no damage beyond the breaking of one of its shafts.

TROLLEY POSTAL CAR, CINCINNATI.

The most recent car put in service is on the lines of the Cincinnati Street Railway. A description of the car is best given in the illustrations which tell the whole story. The outline map shows the location of the general postoffice and the three substations which are all that are included in the first schedule which is as follows:

Trip.	Leave G. P. O.	Pass B.	Pass E.	Pass D.	Arr. G. P. O.
1.	5:50 a. m.	6:05 a. m.	6:20 a. m.	6:27 a. m.	6:50 a m.
2.	7:05 a. m.	7:20 a. m.	7:35 a. m.	7:42. a. m.	8:05 a. m.
3.	10:00 a. m.	10:15 a. m.	10:30 a. m.	10:37 a. m.	11:00 a. m.
5.	2:30 p. m.	2:45 p. m.	3:00 p. m.	3:07 p. m.	3:30 p. m.
	Leave G. P. O.	Pass D.	Pass E.	Pass B.	Arr. G. P. O.
4.	12:35 p. m.	12:55 p. m.	1:02 p. m.	1:17 p. m.	1:35 p. m.
6.	5:30 p. m.	5:50 p. m.	5:57 p. m.	6:12 p. m.	6:30 p. m.

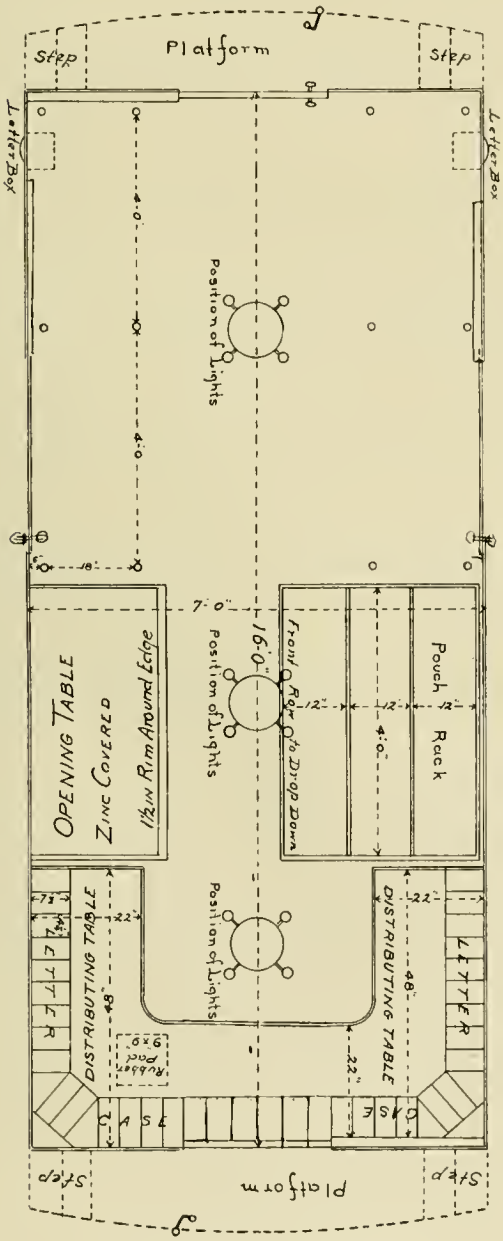
The car is devoted exclusively to postal purposes: its dimensions will be found in the cut showing plan.



MAP CINCINNATI POSTAL ROUTES.

The steady increase in the number of cities where the trolley car is being made a factor in the improvement of urban postal service, is deserving of the study of every manager. That the department, which certainly is not much given to experimenting, thoroughly believes in the plan is assured by the expansion of the service as fast as appropriations will permit. In many places the sum now paid for wagon haul between general postoffice and substations can all be diverted into the coffers of the railway by a little effort on the part of the manager.

CINCINNATI POSTAL CAR.



PLAN CINCINNATI POSTAL CAR.

HAVE FUNERALS THE RIGHT OF WAY?

Every little while the question arises as to which has the prior right of way—a street car or a funeral procession. As a rule, companies instruct their men to observe the usual courtesies by giving the funeral the preference where both meet at cross streets. But where the procession is of any considerable length the car or cars should certainly be allowed to cross the street.

An interesting court decision was made in St. Paul, by Judge Brill, in the case of two Johnsons who sued the company for damages in being thrown out of a buggy while in a funeral procession. The jury awarded $900 and $175 respectively, and in granting a new trial, Judge Brill said:

"Section 6 of the ordinance of 1869 relating to fast driving and driving of horses in the streets does not apply to the operation of street cars. At the time the ordinance was passed street cars were not in use in the city, and the ordinance was intended to apply to such vehicles as are driven about the streets, and may be moved from place to place at the will of the driver. The person in charge of an electric car does not "drive" the car in the ordinary acceptation of the word. Processions upon the street sometimes are of great length and occupy a considerable period of time in passing a given point, ten, thirty, forty minutes, or an hour or more. An ordinary loose vehicle can turn aside and proceed upon another street without much inconvenience. A street car is a public conveyance for the transportation of passengers. It proceeds upon a fixed track, and could do nothing but wait, whatever the time might be, and such a rule would greatly inconvenience the public. The interruption to a procession by the passage of a car would at most be slight, and frequently there are breaks in a procession through which the car might pass without interrupting the progress of the procession at all.

"Of course, without an ordinance the street car has no greater right of passage than the persons in the procession. The company is liable for negligence the same as in any other case, but these cases were tried and submitted to the jury on the theory that the ordinance gave the procession the right of way, and that to run the car through the procession was a negligence per se, and hence, there must be a new trial without regard to whether, aside from the ordinance, there was sufficient evidence to sustain the finding of negligence upon the part of the defendant."

Switzerland has three electric lines on the tapis, one from Meiringen to the Great Scheidegg; another from the same place to Alor Falls, and the third a conversion of the steam road between Kriens and Lucerne.

Teheran, the city of 60,000 people where the Shah of Persia holds court, is to be connected by electric railway with the mountain villages ten miles north, where foreign residents dwell during the dreaded hot season. The concession has been granted to a German, Felix Moral.

PLASTIC BOND TESTS AT BUFFALO.

The following are some tests on the conductivity of rail joints with plastic bonds made on January 23 by Robert Dunning, master mechanic of the Buffalo Railway, at the power house of that company. In these tests a Weston millivolt meter was used which had just been recalibrated at the factory.

COPPER BONDS.

Joint of ninety pound girder rail six feet long, with one number 00 Chicago bond six inches long through rail base. Contacts clean, tight and new.

Amperes.	Total Drop.	Drop of Rail.	Net Drop of Bond only.
125.	0.04 volts.	0.0075 volts.	0.0325 volts.
1,200.	.28 "	.072 "	.208 "
1,400.	.35 "	.084 "	.266 "
1,450.	.40 "	.087 "	.313 "

Bond very hot at end of tests.

Same joint with same Chicago bond and one number 0 copper wire thirty inches long newly fastened with channel pins.

Amperes.	Total Drop.	Drop of Rail.	Net Drop of Bond only.
200.	0.04 volts.	0.072 volts.	0.028 volts.
1,200.	.28 "	.072 "	.178 "
1,500.	.30 "	.09 "	.21 "

Resistance of rail 0.00001 per foot.

PLASTIC BONDS.

Joint of ninety pound Girder rail five feet long with standard type of plastic bond between web of rail and angle-plate on one side only.

Amperes.	Total Drop.	Drop of Rail.	Net Drop of Bond only.
160.	0.01 volts.	0.008 volts.	0.002 volts.
200.	.02 "	.01 "	.01 "
950.	.08 "	.0475 "	.0325 "
1,200.	.095 "	.06 "	.035 "
1,400.	.11 "	.07 "	.04 "

Bond cold at end of tests.

PLASTIC PLUG BOND.

Joint of sixty-two and one-half pound girder rail four feet long, on chairs with T rail under joint; one pair of ⅝-inch holes through chair and rail base into top of T rail; holes amalgamated with plastic alloy, and filled with same. Resistance of rail 0.000014 ohms per foot.

Amperes.	Total Drop.	Drop of Rail.	Net Drop of Bond only.
190.	0.015 volts.	0.01064 volts.	0.00436 volts.
400.	.0425 "	.0224 "	.0201 "
1,200.	.13 "	.0872 "	.0628 "
1,500.	.17 "	.084 "	.066 "

Bond cold at end of tests.

Same joint with one pair of ⅝-inch holes on each side of rail; amalgamated and filled with plastic alloy.

Amperes.	Total Drop	Drop of Rail.	Net Drop of Bond only.
190.	0.0125 volts.	0.01064 volts.	0.00186 volts.
1,100.	.10 "	.0616 "	.0384 "
1,200.	.11 "	.0672 "	.0428 "
1,300.	.115 "	.0728 "	.0422 "

Bonds cold at end of tests.

Joint of sixty-two and one-half pound rail three feet long, with horizontal hole ⅞-inches in diameter in meeting ends of rails, with grooved steel dowel pin, amalgamated and filled with plastic alloy.

Amperes.	Total Drop.	Drop of Rail.	Net Drop of Bond only.
200.	0.011 volts.	0.0084 volts.	0.0026 volts.
340.	.0223 "	.0145 "	.008 "
1,000.	.08 "	.042 "	.038 "
1,300.	.11 "	.0504 "	.0554 "
1,500.	.13 "	.063 "	.067 "

Bond cold at end of tests.

NEW ORLEANS TRACTION COMPANY.

President J. H. Maury, in his annual report to the stockholders of the New Orleans Traction Company, recommends additional electrical construction and the abandonment of four car houses, three being sufficient to accommodate all the cars, thereby saving a large sum to the company and making the real estate available for the market. Fifty-five miles of electric railway have been placed in operation and five and two-tenths miles additional are ready, waiting only for electric power. Indebtedness has been reduced $1,000,000 and $1,100,000 paid out for material and construction. The total track is 138.2 miles. The company owns 275 electric cars, 51 cars, and 7 locomotives of the West End dummy line. Last year was the first a record of operating expenses of the dummy line was kept. The books show that it cost 90 per cent to operate, so it will be converted to electric. The new directors are Albert Baldwin, R. N. Walmsley, J. C. Denis, Frank T. Howard, C. H. Hyams, J. H. Maury, New Orleans; John D. Taggart, Louisville.

WOULD IT WORK THIS YEAR?

A new manager was called to take charge of a small road in a factory town in the east, last year, where the road was barely keeping out of a receiver's hands. The new manager was not very long sizing up the situation, which was desperate. Then he went to work and rented suitable grounds for a pleasure resort at the end of the line, and spent a very little money in fixing up a "park." The most of the fixing consisted in a few wooden benches and tables and a dancing platform. Then he hired a local band, and came out with his announcement. The usual sequel to such a tale would be a great rush of people and big receipts. But there wasn't any big rush or even a little rush, and the road was in the hole for the band. Things did not look very auspicious for the new manager, but he was not to be knocked out at the first discouragement. He waited until the next Saturday. In the morning he distributed several hundred free tickets, good for the round trip, on that one day, among the young women factory hands. That afternoon and evening the cars were crowded and the park was filled, and the band played to a full house. It was not very late in the evening when as many lonesome young men were asking each other what had become of their several hundred sweethearts. As soon as the secret was out, the young men with one accord took to the cars, which brought them in due time to the park—at 5 cents per young man. The scheme was continued for several weeks, by which time the popularity of the resort, to which other amusements were added, had become established, and a good business was built up.

But what would have been the result in this leap year of grace, 1896?

The Detroit Railway transfers are good only on next following car.

Munich is to be connected with Giesing, Germany, by electric railway.

Tarcento to Udine, Italy, is the route of a proposed electric railway.

They have gone us one better across the water, and painted ads on the omnibus windows.

St. Petersburg, Russia, is to have a storage battery line on the Vosnessersky Prospekt, Erbsenstrasse and Kasanckaya.

The London & Provincial Tramway Syndicate has projected an electric street railway system for Sheffield and Rotherham.

Novelda, Spain, has formed a company with $50,000 capital, to build a street railway between the towns of Novelda and Aspe.

Three electric lines to connect Kidderminster with Stourport, Eng., are proposed by a company which is soon to be incorporated.

Gothenburg, the chief commercial port of Sweden, expects to construct an electric line from an outlying railroad station to the center of the city.

Conduit and overhead trolley systems of electric traction are both favored for experiment by the highways committee of the Leeds, Eng., Corporation.

Bergen, a seaport of Norway, is to have an electric railway. Germans are largely interested in the company which has been organized to build the lines.

G. Carnaby Harrower has resigned his position as London manager for the Hobart Electric Tramway Company, of Hobart Town, Tasmania, Australia.

Buenos Ayres' new street railway has recently placed in operation two important extensions; one to a public square and another to the Southern Railway station.

On the Nechells street railway, at Birmingham, Eng., the overhead trolley will be given a trial. One wire only will be used, and this supported by the present lamp-posts.

Directors of the Hawaiian Tramways Company in London are investigating electric traction with a view to its adoption on their Honolulu lines. The change of government from monarchy to a republic, and the declaration of martial law caused a loss of $5,000 in profits the past year by restricting the peoples's hours of movement.

Motorcycles of the Daimler type will be purchased by the government of Ceylon, India, to carry the mails from the general postoffice to the railway stations at Colombo, a distance of twenty miles.

Zurich, Switzerland, is the headquarters of a syndicate which has applied for rights to build electric railways in the cantons of Zurich, Argovie and Zug according to plans prepared by Prof. Du Riche Preller.

At Llandudno, Wales, the Great Orme's Head Marine Drive Company, is about to sell the highway to the Edison-Swan Electric Supply Company of Manchester, which will construct an electric railway thereon.

Auckland, New Zealand, will electrify its street railways as soon as the pending negotiations for their sale to a London syndicate are concluded. Mr. Stewart, C. E., is the Auckland representative of the promoters.

The London Daily News announces that "the British Electric Traction Company has been formed to take steps for the development of electric traction in the United Kingdom, and elsewhere, on systems which have already proved successful in the United States."

The proposed electrification of the horse car lines of Augsburg, Germany, will render that ancient and picturesque city still more attractive. Schuckert & Co., of Nuremberg, who have acquired the lines, are forming a company with $500,000 capital to operate them when completed.

Berlin's 1896 Exhibition includes an electric railway 2.5 miles long for which the contract has been given to Nagle Bros. Eighteen two-car trains will run on a standard gage track, taking current from an overhead wire. The track will be fenced off from the footpath, which will be elevated at crossings.

Teplitz, Austria-Hungary, will be equipped with several lines of electric railway by the International Electric Company, of Vienna, which has been granted a franchise. Lines are also projected for the towns of Pecs, Nagyvarad and Szekesfchervar. The electric railway which is being constructed between Fiume and Abbazia will be extended to Lovrano.

Madras, India, has recently made rapid progress with the construction of the electric railway. 5⅓ miles of road, including sidings, having been laid in eleven weeks. Grooved sixty-pound steel rails are spiked to ties five feet apart. The ties are of Pingadu wood, imported from Burmah, and rest upon blocks of cement concrete 2 feet by 1 foot by 4 inches. Between ties the rail is supported by concrete blocks 1 foot wide by 6 inches thick.

ANNUAL REPORT OF CHICAGO ROADS.

The annual report of the Chicago lines is always read with interest, and the showing this year is quite satisfactory. The effect of changing horse to electric lines in increased earnings is marked.

NORTH CHICAGO STREET RAILROAD.

Receipts, all sources	$ 2,780,487
Operating expenses	1,312,107
Fixed charges, rentals, interest, etc	471,251
Net earnings	997,127
Dividends paid, 1895	659,922
Surplus, 1895	337,205
Surplus to date	1,664,281
Earnings, cable lines	1,632,797
Expenses, " "	651,942
Net earnings cable lines	980,855
Earnings, electric lines	670,284
Expenses, " "	303,136
Net earnings, " "	367,148
Earnings, horse lines	301,276
Expenses, " "	357,028
Net earnings, horse lines	34,248

Taking the whole system, the operating expenses were 48.70 per cent of earnings, as against 54.33 per cent in 1894. The road earned 18.12 per cent net, upon its capital stock. An extra dividend of $1,100,000 was given the stockholders at this meeting.

WEST CHICAGO STREET RAILROAD

Has 201 miles of road, of which 121 are electric; 30 cable, and 49 horse.

Earnings entire system	$ 4,201,477
OPERATING EXPENSES.	
Conducting transportation	1,252,419
Maintenance of way	99,758
Motive power	526,698
Maintenance of cars	92,863
General expenses	295,455
Total	$ 2,267,195
Net earnings	1,934,281
Dividends paid	791,340
Surplus, 1895	240,926
Surplus to date	1,722,619

The road earned 7.82 per cent net on its capital stock.

CHICAGO CITY RAILWAY.

Earnings, all sources		$ 4,476,824
Operating expenses, insurance and taxes		2,807,726
Interest on bonds		207,877
Depreciation; relaying 11 miles (single track) rails $78,860; on 492 horses sold	13,650;	92,510
Net earnings		1,368,709
Dividends paid, 12 per cent		1,140,000
Surplus, 1895		228,709

The road earned 14.41 per cent on its capital of $9,500,000; the average daily earnings for the year being $12,165; average daily operating expenses $7,692 The earnings increased $549, and the expenses decreased $84 per day as against 1894. Car miles run, cable, 14,872,580; horse, 1,542,560; electric, 5,526,760; total 21,941,900.

Cost of operating per car mile:

	1895	1894
Cable lines	10.240c	9.972c
Horse lines	30.550	25.393
Electric lines	14.776	16.904
All lines	12.796	13.487

Horses were reduced 1,112 in 1895, making a reduction since 1892 of 2,119 head. The road has 35 miles cable track; 118 miles electric; 10 miles horse. Car equipment, 1,785 cars as follows: 490 box trailers; 539 open trailers; 150 open motor; 286 box motor; 320 grip. During the year 70 miles horse lines were changed to electric.

CASH PRIZES AT COVINGTON.

Superintendent T. M. Jenkins, of the South Covington & Cincinnati Street Railway, has tried the cash prize for faithful service of conductors and motormen, and has found the experiment a good one. On the first of January 1895, he posted the following bulletin:

"At the end of this year a cash prize will be awarded the motorman at each of the four car houses who has the least number of accidents during the year. The same rule will apply to the conductor at each of the four car houses whose car is the neatest kept. Another prize will go to the second, and still another to the third whose cars are next in a condition of tidiness."

The boys made valiant efforts to earn a prize and the result was a marked improvement in the *esprit de corps*. The longer a man succeeded in running without a break in his good record the harder he tried to hold out until the end of the year. The offer included a first, second and third to both motormen and conductors at each of four car houses, payable in gold, and figures out thus:—

Four 1st prize	conductors @ 25	$100
Four 1st "	motormen @ 25	100
Four 2nd "	conductors @ 10	40
Four 2nd "	motormen @ 10	40
Four 3rd "	conductors @ 5	20
Four 3rd "	motormen @ 5	20
Total, 24 prizes		$320

The announcement bulletined January 1, 1896, reads:

"The following bulletin was issued on 1st of January, 1895:—

"At the end of this year a cash prize will be awarded the motorman at each of the four car houses who has the least number of accidents during the year. The same rule will apply to the conductor at each of the four car houses whose car is the neatest kept. Another prize will go to the second and still another to the third whose cars are next in a condition of tidiness."

"For the ensuing year (1896) and at the beginning of next year (1897) we propose to distribute a cash prize of $25.00 to the motorman who has served during the year and who while operating his car does not have an accident.

"Those who have not served a year and who do not have an accident will also receive a prize; the same to be determined by length of service.

"The prizes to be given conductors for neatness and tidiness about their cars will be governed by the same regulations as governed last year."

The Women's Civic League of Cincinnati, has done a lot of good things and the latest is to appeal to the mayor to compel city police to cease expectoration on street cars or sidewalks. Let the good work go on and apply to the general public as well.

BROOKLYN HEIGHTS PARLOR CARS.

The newspapers and public of Brooklyn have been rejoicing greatly recently over the advent of two elegantly fitted up parlor trolley party cars purchased from the Barney & Smith Car Company by the Brooklyn Heights Railroad. And indeed, the people of Brooklyn are to be congratulated on having two such cars at their disposal for trolley and theater parties.

PARLOR CAR FOR BROOKLYN.

These cars are 25 feet long over the body and 36 feet long over the platforms. The width over the main panels is 7 feet 9 inches, the width over the cove panels is 7 feet, and the height from the bottom of the sill to the top of the roof is 8 feet 6 inches. The cars are framed with the Barney & Smith special iron construction, with extended platforms supported by "T" irons. The platforms are enclosed with railings, with bronze trimmings and with solid bronze posts supporting the hood. The windows of the car are furnished with selected plate glass, the inside finish is of St. Jago mahogany, handsomely decorated and carved and finished in oil. The windows are supplied with Burgess tapestry curtains, with Burrowes automatic fixtures and furnished with silk velour draperies of the most artistic design. In each of the four corners of the car there is a buffet with lockers above and below, the doors in the upper lockers are furnished with bevel French plate mirrors. The doors are of the double automatic pattern at each end. There are three incandescent electric chandeliers in each car with an incandescent goose neck bracket over each buffet. The headlining in the car is of the Barney & Smith composite pattern, such as is used in parlor cars and ornamented in the most artistic manner by hand. The hand straps are carried on bronze hand rods supported on solid bronze brackets of the latest design. The seating is of loose wicker chairs made by this car company, upholstered in the most approved manner, and so arranged that the car cannot be marred, as all points that are liable to come in contact with the sides of the car are handsomely upholstered. The floor is covered with the Bigelow Wilton carpet. Each car is also supplied with two tables which may be attached to the sides of the car at different places.

The cars are painted a Marseilles royal blue and ornamented in gold leaf as shown on the elevation. The cars are mounted on the Barney & Smith standard class "E" suspension spring motor trucks, which are so arranged that the height of the body of the car is very little different from that of the ordinary four wheel car. The wheels are 30 inches diameter. In addition to the seating capacity above mentioned, each car is supplied with twelve camp stools carried in boxes on each platform, which may be used in case seats are desired on the platforms.

INTERIOR PARTY CAR BROOKLYN.

The cars are named Montauk and Amphion. Provision is made for serving light refreshments.

ENGLISH BOARD OF TRADE RULES FOR RETURN CIRCUITS

The rules of the English Board of Trade, governing the installation and operation of electric railway return circuits have now been in force about two years but only recently have had any application because no new roads were opened from the time of their adoption, March 6, 1894, until the latter half of 1895. Now that the interest in these rules is being revived by the installation of several roads which have had to answer their requirements, it will be proper to give an outline of the rules as they stand to-day. They have received very little attention from electric railway men on this side of the water, but we believe they are worth some study. It may be well to explain that the Board of Trade in England is a government institution, having power to make and enforce rules relating to commerce. It was originally restricted to shipping, then enlarged to include harbors, and, later, railroads and street railways. The "Board" has a chief, whose office is a sort of cabinet position, with assistant chiefs over each department governed. Hence it will be seen the title "Board of Trade" has quite a different significance from the term as understood here.

These rules on electric railway returns, therefore, must be lived up to now by every road installed in the United Kingdom, or the operation of the road must stop.

While we cannot endorse the rules in toto and hope that no such rules will ever emanate from any state or municipal governing body in this country, they contain valuable suggestions to the managers of every American electric railway. It is in the hope that it will cause an improvement in our slipshod methods of keeping track of the state of ground returns that this synopsis is given.

The regulations are stated to be for the purpose of "preventing fusion or injurious electrolytic action of or on gas or water pipes, or other metallic pipes, structures, or substances, and for minimizing, as far as is reasonably practicable, injurious interference with the electric wires, lines, and apparatus of parties other than the company."

The generator used must be of such construction that it will produce a continuous current without appreciable pulsation (presumably because of telephone induction). All supplementary return wires must be insulated from the ground unless they are within three feet of the rails. All parts of the return must be insulated except the rails and such supplementary wires as are within three feet of them unless said return is of sufficient cross section to reduce the total drop below 7 volts. When any uninsulated conductor laid between or within three feet of the rails forms any part of a return it shall be electrically connected to the rails at least every 100 feet by copper conductors of at least one-sixteenth of a square inch cross section. The ground return must always be connected to the negative generator terminal. The negative bus at the power house must also be connected through an ammeter to two separate earth connections or ground plates placed not less than 20 yards apart. One of these earth connections may be a water pipe of not less than 3 inches internal diameter. The two earth connections must have a sufficent contact with the general mass of earth so that an electro motive force of not more than 4 volts between them will cause a current to flow between them through the earth of at least two amperes. A test of this kind must be made once a month. No portion of these two ground plates must be placed within six feet of any pipe except the water pipe before named. The current passing from these earth connections to the negative bus (which must be continuously measured with a recording ammeter) shall not at any time exceed two amperes per mile of single track, or five per cent of the total output of the station. If at any time and at any place a test be made by connecting a galvanometer or other current indicator to the rails or uninsulated return and to any pipe in the vicinity, it shall always be possible to reverse the direction of any current indicated by interposing a battery of three Leclanche cells connected in series, if the rails are positive to the pipes. If the pipes are positive to the rails it must be possible to reverse the current with one Leclanche cell.

A continuous record must be kept by the company of the difference of potential between the farthest point on the track and that uninsulated portion of the return nearest the power station, and this drop of potential in the return must not exceed seven volts. This is done by running a small wire from the station to the most distant point on the track, and connecting through a low reading recording voltmeter to the negative bus at the power house. Every electrical connection with any pipe shall be so arranged as to admit of easy examination,and shall be tested by the compnny at least once every three months.

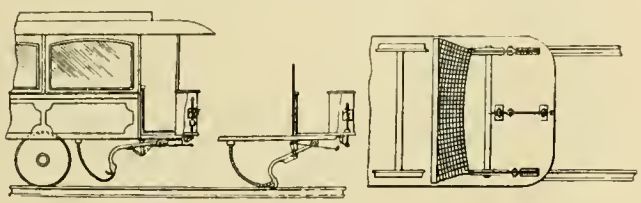
Insulation of the overhead lines must be such that the leakage current shall not exceed .01 ampere per mile of road at the working station pressure. This test must of course be made when no cars are on the road. Insulated feeders laid underground must maintain an insulation resistance equivalent to 10 megohms per mile. Where the tramway is built parallel to existing wires the the owners of such wires may, with the Board of Trade sanction, require one or more induction coils to be inserted in the overhead or return feeders. The balance of the rules relate to such details as are not necessary to mention here. The company must keep daily records for the Board of Trade as follows:—Number of cars running; maximum working current; maximum working voltage; maximum current from the earth connections to the negative bus; leakage current in trolley lines and feeders per mile of single track; fall of potential in return.

These rules could doubtless be improved on, but they contain suggestions of records which every American electric road ought to adopt in self defense. Electrolysis and loss of power mean sure financial loss to an elec-

tric road. The longer a manager is in ignorance of the state of the return circuit the greater is the chance for the destruction of his coal pile and underground property, and the greater the possibilities for big damages to pay water and gas companies for destroyed pipes.

A GERMAN FENDER.

The fender craze seems to have made its way across the water, and H. H. Stolling, of Altona, Germany, has



A GERMAN FENDER.

patented the device shown in the cut. The net is made of rope, and can lowered or raised. There is also a rail cleaner in connection with the fender.

WIRE GAUZE BRUSHES FOR RAILWAY WORK.

In our issue of December, 1895, we gave a short description of the electric locomotives used in constructing the new underground road in London, and mentioned the peculiar fact that wire gauze brushes were employed in place of carbon. Siemens Brothers & Co., of London, who built the locomotives, and are responsible for this peculiarity, write us that this is not the first case in which they have employed the wire gauze brush in place of carbon. The motors on the cars of the Hobart Tramway have copper gauze brushes as do also the electric locomotives on the City & South London Railway. In fact, it is their usual practice to use gauze brushes for motors. The secretary of the company says:—"The reason is that we find that with a well-designed motor there is no sparking with metallic gauze brushes, and it has generally seemed to us that the use of carbon brushes might be looked upon as a convenient expedient for correcting slight faults in design which are conducive to sparking, and which may be entirely eliminated by care in designing. As regards the performance of metallic gauze brushes we may say that in 1894, one of the locomotives on the City & South London line had run 50,000 miles with the same brushes; and we are not sure whether it did not continue to run for some time longer before new brushes were put in." It seems strange to hear of the use of metallic brushes on railway motors when the carbon brush has come into almost universal use in this country, not only for motors but for generators.

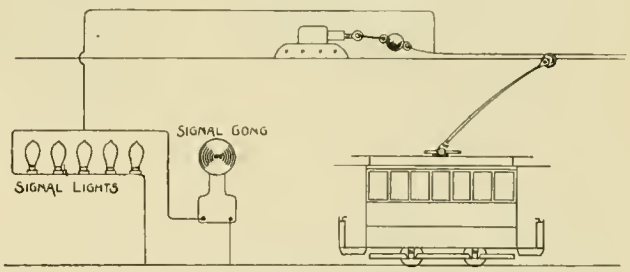
The Camden, N. J., Post suggests that motormen be permitted to carry whips, to administer a stinging cut to every youngster who attempts to cross in front of a car.

AN AMATEUR MANAGER.

Preston M. Rheims, of Denver, who reads the REVIEW and expects to grow up when he gets big and own a street railway of his own, writes us: "I am no great railroad man, but a boy of 15 years. I know the number of every car in Denver, the color, whether cable or electric, motor or trailer, the truck under it, where it was built, the line on which it runs and everything about it. I have made thirty or forty wooden cars and, if I do say it myself, I can draw any car there is. I got first prize at the high school, of which I am a member, for the best drawing of a car. I built a miniature street railway when I was thirteen. I had car-houses, bridges, repair shops, rolling stock, in fact everything."

JORDAN CROSSING SIGNAL AT BROOKLYN.

The accompanying sketches show the general principle of a crossing signal which has been in operation several months on the Coney Island & Brooklyn Railroad. It is the invention of William H. Jordan. Over the trolley-wire is hung a second or signal wire. When no car is passing, the wires hang free from each other, and the signal wire is insulated from the other wire at the special hangers. When a car passes, the trolley wheel presses up so that the two wires are brought into electrical contact. When the contact is made the cur-



JORDAN CROSSING SIGNAL AT BROOKLYN.

rent flows through a bank of danger signal lamps, and also sounds a gong. These signal sections can extend as far back from a crossing as desired. Of course, it is easily possible to make the bell and lights operate simultaneously, or independently, as desired, and by a single switch the whole apparatus can be cut out.

INADVERTENT TESTIMONY OF EMPLOYES.

In the Milwaukee Street Railway Bulletin, Manager C. D. Wyman calls his employes' attention to a matter which we feel is worth the consideration of other managers, that they may in turn give their men similar warning. It is in the form of a story, of which we will give a brief synopsis.

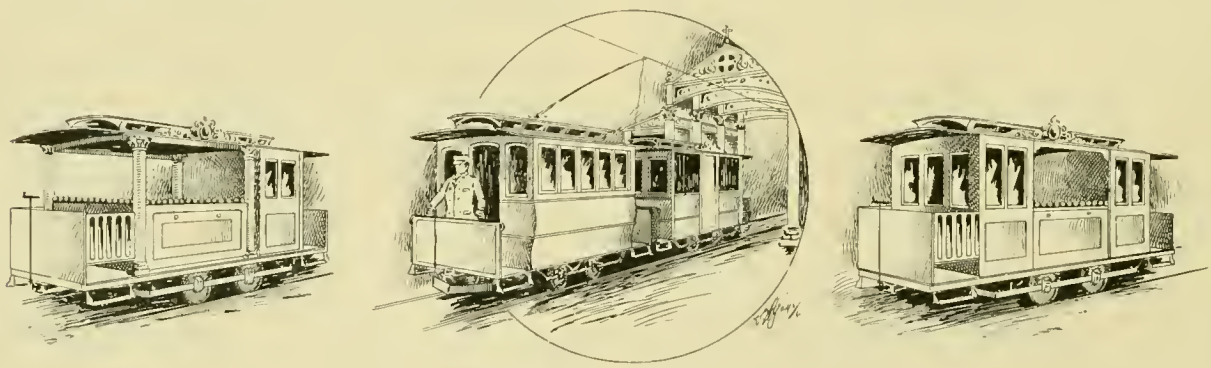
One pleasant morning as a motorman was taking a car toward the heart of the city. He was running at full speed when a short distance ahead he saw a man running toward the nearest corner and motioning for him to stop. Quick as the skilled hands of the motor-

man can do it the current is shut off and a turn of the brake handle takes up the slack; another turn sets the brake hard, and in a surprisingly short time the car is at a standstill. The quick stop has set a stranger on the front platform to thinking, and when the car is again in motion and all is clear ahead he propounds to the motorman the question:—"In how short a distance, with a level track and a dry rail like this, and a good brake such as you seem to have, if you had about your present load of passengers, could you, if required, stop this car if it were going say eight miles per hour?" The motorman answers without hesitation:—"Eight to ten feet." Now the inquisitive stranger happened to be working in the interest of a prosecuting attorney in a damage suit then before the company. He rode on other cars and asked the same question of other motormen, receiving nearly the same answer. Securing the names of his unthinking informants he had them subpœnaed. Upon the witness stand they could not deny they had so spoken. Technical testimony on the part of the defendant was introduced to show that their statements must have been mistaken ones, but the jury preferred to believe the careless answer they had given upon their cars. The attorney for the injured person maintained that had the motorman used his brake properly when he saw the person or had the apparatus of the car been in good order, the car could have been stopped in the 15 to 20 feet, which witnesses proved to be the space which intervened when the motorman saw the injured party. Were the motormen technically right in their inadvertent testimony? A little thought would have shown them that they were not. At 8 miles an hour a car travels 11.73 feet per second. How long does it take to set the brake shoes after a motorman knows he must make a quick stop? The eye or ear gets a signal. A fraction of a second elapses while it is transmitted to the brain and from there to the hand. Then the power must be shut off and the brake lever turned, until the shoes are set. By this time our fractions of a second have added up to a second or over, and the car at an 8-mile speed has gone over 11 feet, before the checking of its speed has even begun. After that the time in which the car will be brought to a standstill depends much on conditions, and will be from 30 to 45 feet. If motormen realize this there will be fewer damages resulting from reliance on stopping a car in an absurdly short space, and it is this lesson as well as the one in regard to inadvertent testimony that managers should impress upon their men.

FUNERAL CARS AT MILAN.

Foreigners seem to take more kindly to special funeral cars than do the Americans. In this country, except in a few localities the people prefer going to the cemeteries in the good old fashioned way in carriages and buggies, preceded by the hearse, as their parents did. The many obvious advantages of special funeral cars on electric roads will bring them more into use as the years appear.

The Milan Street Railway, Milan, Italy, has been extended to a new cemetery at Musocco: and has constructed special cars for funerals. They are of three styles. Two are motor cars and the other a trailer. Special trailers are also used in this service, painted a dark blue with fine lines of red at the top and bottom of panels. The motor cars are black, the windows being supplied with black shades. When there are enough people to attend the services at the cemetery, the relatives and friends ride in the trailer, only the bearers accompanying the body. The design of the cars can be seen in the illustrations.



MILAN FUNERAL CARS.

At first it was the intention to have first, second, third and fourth class cars. The first class was to carry only one body; second, two; third, three; fourth, four bodies. The municipal authorities objected to the plan, so only one class is allowed. The charge for the car includes transportation for eight members of the family of the deceased in the trailer. The fare for each passenger is 15 centimes (three cents). The equipment of the company consists of two Conti generators driven by two 180-horse-power engines. Iron side pole construction is used.

Red cars every 8 minutes from 6:45 a. m. to 9:30 a. m., and 4 p. m. to 6:30 p. m. on the Brooklyn Heights Railroad are for use of smokers.

Untidy and careless employes of the Conshohocken branch of the Schuylkill Valley Traction Company spilled coffee on car floors. Now they cannot carry it.

SUBURBAN COMPETITION AT BALTIMORE.

The annual report of President Hood, of the Western Maryland Railroad (one of the steam roads doing a large suburban business out of Baltimore) is interesting as showing the effect of reduced fares and increased competition on suburban business. The road pursued the policy of reducing its fares heavily to meet trolley competition. The result is outlined in the following extract from the president's report:

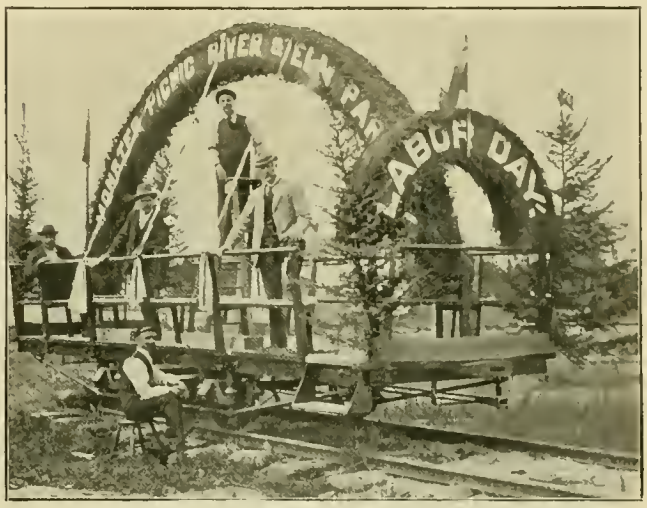
"The electric railroad competition, upon the twenty miles of line next to Baltimore during the five months most favorable to such competition, May 1 to September 30, with the consequent reduction of rates, resulted in an increase of 9,128 passengers hauled by this road upon this portion of its line, with a falling off of $6,973.34 in earnings from such business as compared with the corresponding months of 1894. As there was, however, a falling off of $21,705.68 in the passenger earnings of the entire system, it is likely that a portion of this loss is attributable to the continued business depression more than to the electric railroad diversion. Had rates been maintained by this company, it is believed that a materially lighter business and a heavier falling off in revenue would have resulted."

Thus it appears that the effect of the electric lines in this case was to force a much better accommodation of the public with little or no loss to the steam railroad. It is safe to say that the electric roads got enough to live on, so that the effect of the trolley was beneficial to many people and really harmful to none of the interests involved.

The suburban territory around Baltimore has been wonderfully built up, the residents have been given a service greatly improved as to frequency, a great electric railway industry has been established and the steam roads have practically lost nothing.

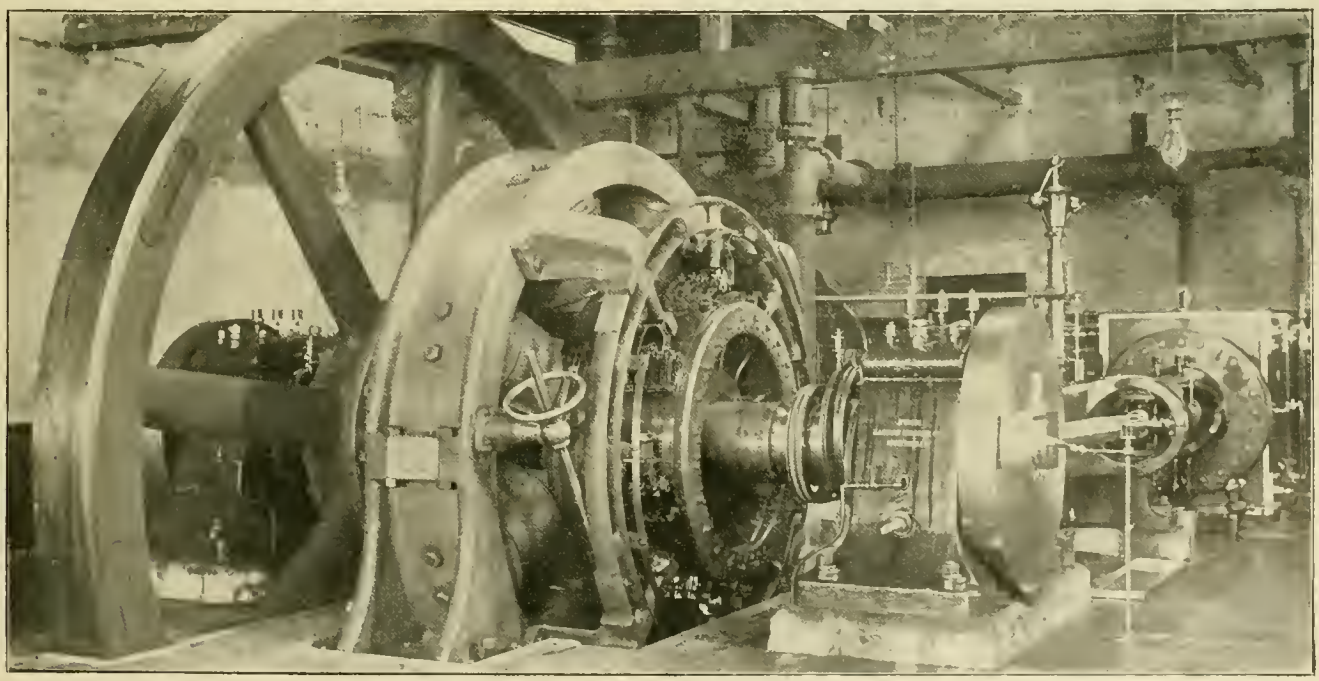
WINNIPEG ELECTRIC STREET RAILWAY.

The Winnipeg Electric Street Railway has recently been doing some work that is of interest, in the way of inducing travel. Our engraving shows one of its excursion cars fitted up with transparencies for advertising a labor day picnic. A motor car with three trailers and one of these cars with a band in it, would, last summer, go around the "belt line" every evening. Many would make the trip just for the sake of the band and the ride. This is a form of free for all trolley party that we believe has not been tried elsewhere.



BAND CAR ADVERTISING LABOR DAY PICNIC.

Another of the engravings shows a line of cars near the city hall, ready to go to Elm park. This park is about three miles out of the city. It is a favorite pleasure resort, and makes no small addition to the company's revenue.



DIRECT CONNECTED GENERATOR, WINNIPEG ELECTRIC STREET RAILWAY.

The direct connected generator shown, is the third large direct connected machine installed in Canada, and that it should be installed on as small a road as that at Winnipeg, speaks volumes for the progressiveness of the management. The engine is a Laurie cross compound condensing corliss, built at Montreal, and the generator is from the works of the Canadian General Electric Company.

The rating is 400 kilowatts. The fly-wheel is 18 feet in diameter, and weighs 25 tons. The speed is 90 revo-

READY TO GO TO ELM PARK, WINNIPEG.

lutions per minute. The power house is located on the banks of a river which furnishes water for condensing. The concrete and brick foundations of this engine and generator rest on piles. The total weight on this foundation is 125 tons. Surface condensers are used in this station. An electric damper system in the boiler room keeps the steam pressure within 2 per cent.

The system comprises 16 miles of track, of which 1½ is double. The rolling stock consists of 24 motor cars, 10 trailers and 7 excursion cars. The snow-fall, which is, of course, severe in that city, is taken care of with a revolving broom sweeper and a West End plow.

George H. Campbell, who has been the leading spirit of the enterprise since the company was organized in 1891, is general manager, and H. J. Somerset, electrical engineer, is one of the brightest electricians in Canada.

CHARLES LE BLANC ON EUROPEAN PRACTICE.

When Charles Le Blanc, who has been chief engineer of the General Electric Company in France, Italy, and Spain for some time past, was in the United States recently making arrangements for taking the agency for the Walker Manufacturing Company in France, he was interviewed by a Chicago Tribune reporter, who it is safe to say learned, in that brief interview, more truth about European street railway working than has been published for some time past. The trouble with many reports on street railway appliances which find their way to this country is that they are made by non-technical observers and are very misleading. It is refreshing to hear from a thoroughly capable engineer such as Mr. Le Blanc, who has, by the way, installed numerous roads in this country as well as in Europe. He says in part: "I believe the only practical method of operating street cars by electricity is in operation here in Chicago. From my observations I have come to the conclusion that a road like that in Budapesth would be impracticable here for several reasons, one of which is the question of the slot in the rails. Owing to the narrow tires in use generally in this country, wagons could not, with safety, pass over a slot of such dimensions. Another thing that permits the conduit to work satisfactorily in Budapesth is its excellent streets. If I knew nothing about this underground system I should be convinced that it was a failure from the fact that the company which owns it is now putting up the overhead trolley in every part of the city for which it can get permission. Most of the cities in Germany—Munich, Bremen, Hamburg and Berlin, that have good streets have given franchises for 50 years for the installation of the overhead wires. These franchises were not granted until after the Budapesth system had been examined by engineers appointed for that purpose by the cities named. I think that action establishes the fact that the overhead trolley is now the most practicable system in use anywhere. All the electric roads with the overhead system have given perfect satisfaction in Europe. There is no agitation against the trolley over there. The only thing in that way that troubles us in Europe is the false statements regarding the underground system that find their way into our newspapers and which are quoted from American journals."

MOVING TWO THIRTY-SIX INCH WATER MAINS WITHOUT SHUTTING OFF THE WATER.

PAPER READ BEFORE THE AMERICAN SOCIETY OF CIVIL ENGINEERS, BY E. C. MOORE, JR.

The Metropolitan Street Railway Company, of New York, secured the franchise for a cable road through Lexington avenue, from Twenty-third street north to the Harlem river, and the author has been the division engineer in charge of its construction. The fact was recognized early that one of the most serious difficulties to contend against was presented by the substructures already in the street. With this fact in view an attempt was made to get an accurate record of exactly what was in the street, by looking up the maps and records of the various gas companies, the city water department and the subway company.

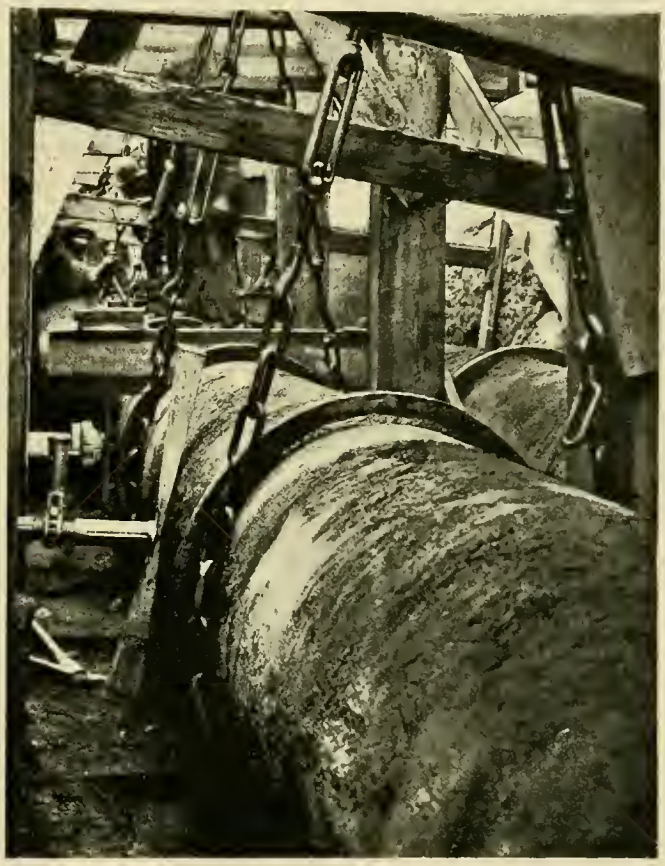
The maps of the gas companies were thoroughly unreliable as to location, as was also the water map; those of the subway company were a little better, but not infallible, so at an early stage in the construction these maps were entirely discarded and no calculations were made for the moving of obstructions until they were actually encountered in the work. It was found more convenient and less expensive to move obstructions after the excavation had been completed, and the extra expense of a second digging was saved. More obstructions were encountered at intersecting streets than elsewhere, and it was frequently necessary to move two or three outlying pipes or subways in order to get the room required for moving the one which was in the way.

While this system worked very well on Lexington avenue, where there were no cars to be taken care of on side-tracks, it would not answer when the work was extended through Twenty-third street, where there were not only large numbers of cars to be taken care of on the side-tracks, but a heavy traffic through the street as well. Moreover, the business houses along the line had to have entrances to handle their wares. Provision was also made for two cables for Twenty-third street proper, in addition to the Lexington avenue cables, and the construction problem was, therefore, a complicated one. All the mains which were parallel to and within the tracks already in use were replaced by new mains, laid on the outside, and in some cases new mains were laid on one side of the street, when there was already a main on the other side, in order to get rid of the house connections, which usually ran too high for the cable construction.

The success of these operations was encouraging, and furnished ground for the belief that it would be possible to move two 36-inch water mains in Broadway, between Twenty-second and Twenty-third streets without shutting off the water, which would not be permitted by the Department of Public Works. These mains were laid in 1839, and had joints every nine feet.

It was decided that the pipes, which had to be dropped a maximum distance of two feet and moved laterally one foot, should be lowered by chains and turn-buckles swung from yokes placed over them at each joint. The yokes were made of 8 x 12 inch yellow pine, the posts being eight feet six inches long, set on a wooden foot block of 5 x 12 inch yellow pine two feet long, and the cap piece was about eleven feet long, being nine feet between the posts.

The posts were sawed off square, and, after they were set up in place, the cap piece was laid on top of them without framing, then cap and post were fastened together by a cleat of 2 x 9 inch spruce about two feet long, which was nailed to their sides, one being used at each post and on opposite sides of the bent. Then two diagonal braces about three feet long of 2x9 inch spruce



MOVING WATER MAIN.

were nailed diagonally from the cap piece to the opposite side of the post.

As soon as the first bent was set up and braced from the ground, the next bent was set up, and the two were fastened together by nailing two pieces of 2 x 9 inch spruce on top, reaching from one bent to the other at the ends, and so on, until twenty bents were in place.

Then the chains, which were of ⅞-inch round iron with links seven inches long on the inside, were put in place (see cut). The chain which went over the yoke was five feet long, and that which went around the pipe was eleven feet long. There were two turn-buckles at each bent, so that the chain would not have to slip around the pipe or the timber in lowering. Each turn-buckle was of 1½-inch iron, with hooks on each end, and could lower twelve

inches without changing hooks. The hooks were made to just fit in the links of the chain, and when the pipe was dropped as far as the turn-buckle would go, each turn-buckle was taken off in turn and the hooks placed in links nearer the end of the chain, when the lowering proceeded as before. Everything was made of sufficient strength to allow of every other turn-buckle being taken entirely off without blocking the pipe. This proved of great advantage, as much time would have been lost if it had been necessary to lower the pipe down on blocks in order to change the turn-buckle.

When the lowering of the pipe began, it was decided to move it sidewise at the same time. This was accomplished by hanging the chains over the cap piece a few inches to one side of a perpendicular through the center of the pipe, and putting a brace of 4 x 6 inch spruce from the end of the cap pieces to the bank, to prevent the carrying over of the top of the bent toward the pipe, instead of the desired movement of the pipe in the opposite direction. At the same time, a brace of 2 x 9 inch spruce was added at each end of each bent, running diagonally down from the top of one bent to the bottom of the next, and in opposite directions at the opposite ends of the bents. This was to take care of the torsional strain caused by the cap piece being at right angles to the pipe. By moving the chains along the cap piece a few inches at a time, it was found that when the pipe was down it was exactly in position sidewise also.

By beginning at one end, it was possible to lower the first 100 feet of the pipe into position, and to take down and move ahead the first eleven bents; then, as the pipe came into position, each bent was taken down and moved ahead again. The two pipes lay parallel to each other and five feet apart from center to center. One pipe was lowered at a time. There was one hydrant connection on each pipe; this was cut off outside its gate, and a clamp of wood was fitted around the pipe and a long arm attached which reached out to the cut in the connection, and gave it a support at that point. Clamps were put around the joints in the hydrant connections to prevent any possibility of their blowing out.

It was found that almost no calking was necessary during the lowering of the pipes; there were occasional small leaks, but they generally stopped themselves as the pipe was lowered and the joint had a chance to come back into place. It was thought desirable to do no more calking on the pipe than was absolutely necessary until the work of lowering was entirely finished; then all the joints were gone over and put in good condition.

As it was desired to push the work as fast as possible, a connection was made with an electric lighting cable, and eight arc lights and about twenty incandescent lights were set up, and the work proceeded night and day. Excavation began on June 19th, and the work of putting in the bents over the mains began on June 22d. Both pipes had been moved and were in place June 29th, and within another week the trench was filled and paved over, except where the line of the excavation for the cable tracks crossed.

The pipes were moved the extreme distance for 100 feet, and 100 feet was allowed at each end of this distance for the gradual swing, so as not to strain the joints too much by short bends. This made a total length moved of about 300 feet for each pipe.

The approximate cost of the moving was about as follows:

40 1¼-inch turn-buckles with hooks on each end	$102 40
320 lineal feet ⅞-inch B. B. chain, 7-inch links	102 05
Lumber, including bridging and wedges	208 74
Electric lights	175 00
City inspectors	463 62
Engineers	109 00
Labor, carts, etc	4,250 00
Total	$5,501 71

The foregoing cost may be considered somewhat high, but while the main object sought was the completion of the work in the shortest possible time, every effort was made to avoid unnecessary expense. Night work adds very materially to the cost of such undertakings, because a man cannot do as much work at night as in the day time, and there is also more opportunity to shirk. The cost of providing lights and other conveniences and safeguards must be considered.

(We are indebted to the American Gas Light Journal for the illustration.—Ed.)

ARTIFICIAL LIGHTNING IN CHICAGO.

Artificial lightning has been plentiful in Chicago the past two months, and many an unobservant and unthinking citizen has been fooled into believing that the unusual phenomenon of a winter thunder storm was almost upon him. The Metropolitan Elevated is the chief cause of the display. In bad weather, when there is a tendency for ice to form on the third rail, there is considerable arcing at the contact shoes. This is reflected on low lying clouds. When a person is far enough distant, all the arcing which takes place along the whole line of road can be seen on the sky and the appearance to the uninitiated is that one of the biggest thunder storms in the history of the city is coming. The trolley lines paralleling the elevated also help add to the display.

MORE POSTAL SERVICE.

The Scranton Traction Company, of which Frank Silliman, Jr., is general manager, has made a contract with the post office department for carrying mails between Scranton and Dunmore post offices, and between Scranton and Dickson City post offices. The work is done on the closed pouch system. San Francisco will probably fall in line with some kind of a street railway mail service before long. Postmaster McCoppin, of that city is earnestly investigating the subject.

The authorities of Kansas City have refused to pay the Metropolitan Street Railway $3.50 for damages to a car in a collision with a hook and ladder truck.

QUARTERLY PRIZES.

The Camden, N. J., Horse Railroad (electric now) distributed $250 among the motormen and conductors as prize money. The money was divided among those who, during the last six weeks in 1895, had no black marks against them. The men received an average of about $3 apiece. The next prize money, amounting to $500, will be divided in April next.

INVESTIGATION OF ELECTROLYSIS AT ST. LOUIS.

The annual report of A. J. O'Reilly, supervisor of city lighting at St. Louis, tells of the steps taken during 1894 and 1895 to learn the extent of, and prevent electrolysis. In April, 1894, a circular letter was sent out to all plumbers and to all persons engaged in placing of pipes of any kind underground, requesting their co-operation by informing the supervisor of city lighting as to any evidences of electrolysis discovered by them, so that intelligent steps could be taken to remedy the evil. In making the report the following questions were answered as far as possible:

Date pipe was taken up?

Location?

Kind of pipe, size and length?

How long down?

Joints much affected?

How much lead, tin, or iron removed by corrosion?

Fourteen people and concerns responded to this request and twenty cases of electrolysis were reported. These reports do not seem to indicate a very alarming condition of things. In addition to the reports and in order to find out more accurately to what extent electrolysis was taking place, copper plates were put in the ground at the bottom of stop valve boxes and ground fire plugs. There were two plates 1½ by 6 inches and weighing fifteen grams at each location. One of these was connected with the water pipe and the other was not. They were carefully cleaned and weighed before putting in the ground. After being buried for 100 to 150 days they were taken out, cleaned, and weighed again. The difference in weights gave the effect of electrolysis. Besides this method, voltmeter readings were taken between rails and water pipes at numerous places.

The report states that in some cases the street railway rails were examined and found to be reduced fully one-third around the base. It is recommended that promiscuous connecting of rails and water pipes be not allowed but that if this is done it be only in a systematic manner after plans approved by the Board of Public Improvements. Unless this precaution is taken connections with water mains are liable to do more harm than good.

Mr. O'Reilly writes us that many of the roads of St. Louis have improved the bonding of their rails since the report was made but that there has been a marked increase in traffic, and consequent electrical output at the power houses. He is led to believe, however, that with the exception of one or two localities electrolysis has been less destructive to pipes during the past six months than previous to that time.

We might add that most of the roads in St. Louis were built several years ago and, consequently, probably do not many of them have as good return circuits as are generally installed at present on large roads. That electrolysis has caused so little trouble even under such conditions certainly goes to show that it is an evil not to be greatly feared. It should be watched for and prevented in time: that is all.

MOTOR VENTILATING DEVICE.

It took several years of evolution before electrical manufacturing companies came to make motors entirely enclosed, and although the entirely closed motor was recognized as the most practicable thing for service in all kinds of weather over all kinds of track, there is no doubt a general feeling among electric railway men that having a motor closed entirely is very undesirable, and only justified by the more serious evils which may result from leaving the motor open. James J. Devine of Clifton Heights, Pa., has invented an arrangement whereby the motors of a car are closed to the street and "all the evils thereof" while at the same time being well ventilated with a current of clean air. The accompanying engrav-

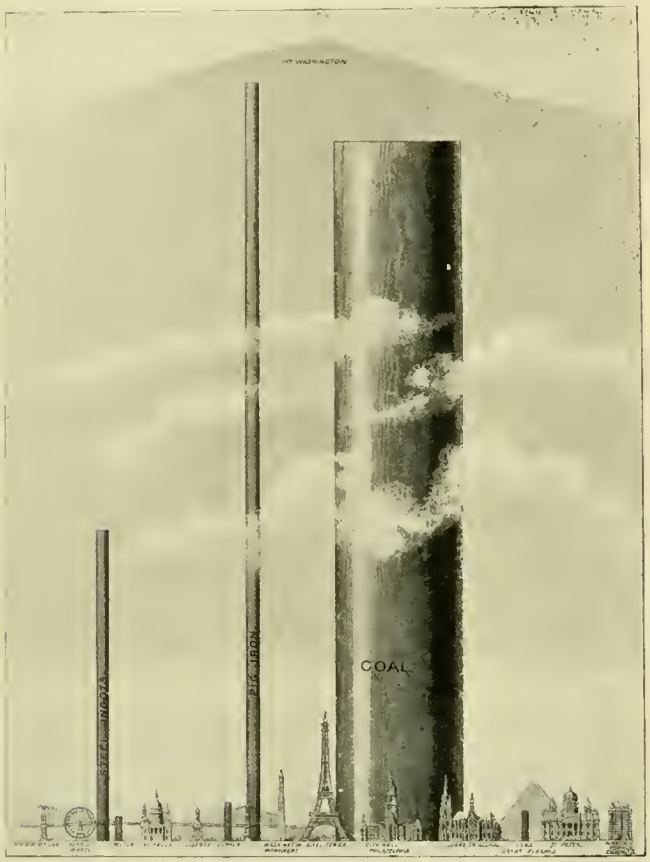
MOTOR VENTILATOR.

ing is taken from a photograph, and shows the exterior appearance of the apparatus on the car. From the ventilator on the near corner of the car roof the cold air goes down through a pipe in the corner of the car, and feeds into the motor cases. From the cases it is discharged through one of the hot air escapes in the sides of the car. Which of the two holes is to be closed is determined by the direction the car moves. The ventilator connections are made with rubber pipe. The increased efficiency and longer life of motors due to keeping them cool is well known and needs no explanation. The device has been used on the Delaware County & Philadelphia Electric Railway, and is highly spoken of by the management.

Every other street railway car in New York city must be heated and carry a sign to that effect.

COAL IS KING.

The Iron Age, in its mammoth issue for January 2, reviews the comparative production of the metals and coal in the United States in 1895, and strikingly sets forth



the contrast in the following illustration. In the scale of the illustration the diameter of the column of coal is 1,000 feet; of pig iron and steel ingots, 100 feet; and of copper, lead and spelter, 50 feet each.

THE K2 CONTROLLER.

The K2 controller of the General Electric Company is a modification of the familiar and successful K controller to adapt it to the higher speed motors which are now required for street railway service. The modifications consist chiefly in the introduction of an additional resistance point to secure a smoother acceleration both in the series and in the multiple positions. A cast cylinder has been adopted for the controlling mechanism in place of the original cylinder used with the K, as the newer form presents certain advantages in wearing qualities. The K2 case is very slightly larger than the K, but most of the working parts of the two controllers are identical. Several thousand of the K2 controllers are now in use, and their success is but a continuation of the good results reached with the thousands of K's that have preceded them.

The West End Street Railway, Boston, keeps its electric heaters disconnected from 4 to 7 p. m.

A FACETIOUS FENDER MAN.

A fender inventor writes us as follows: "I am happy to say that through your valuable journal I heard of a railroad company that wanted car fenders. I arranged with it to try one of mine and if it proves satisfactoryI am liable to go into the soul-saving business. I am aware that the business is well worked now in many large cities, but there is room for one more, I am told. I have some doubt about the success of my fender in this case, as it went 800 miles from home, alone, and without any money, among strangers. It is quite a good invention that can go so far from home under the circumstances and establish a favorable record. From this on I shall hunt your journal for information pertaining to the fender and soul-saving business, so if you are interested in the human family, please give early notice to the perishing. Whoso believeth in my fender and useth it, shall be saved if he is on the street railway track."

UNDER-RUNNING TROLLEY SUIT.

An appeal has been allowed in the now famous under-running trolley case which was tried before Judge Townsend at New Haven, last fall. This suit it will be remembered is an attempt on the part of the General Electric Company to secure the exclusive right to the under-running trolley by virtue of some of its Van Depoele patents. The nominal defendant in the case is the Winchester Avenue Railroad of New Haven, the real defendant being the Westinghouse Company. The decision rendered by Judge Townsend on December 7, last, was in favor of the General Electric Company on one of the patents. The appeal having been allowed, the case is returned to the United States Circuit Court of Appeals.

OUTSIDE ADVERTISING ON CARS.

A prominent advertising company which uses a great many of the street cars in the larger cities, has recently sent out circulars showing a street car in one town on which they have secured the privilege of placing advertisements on the outside. The step and deck are literally plastered over with pill and soap signs, and were it not for the trolley pole, persons desiring to become passengers, might have some difficulty in recognizing the moving bill-board as a street car. This is following after an English custom which has long prevailed and which never fails to strike a visiting American as a gross disfigurement of the rolling stock on English roads. It is all right for a street railway to hang out banners and signs announcing some special event to which the car carries passengers, or indeed, equipping an entire car for advertising, for some special occasion, when the car is not used for passengers; but for the regular, every day service-car to be covered over with advertisements such as the advertising companies usually place, we think is going too far and that managers will do well to be satisfied with the revenue which they derive from the rent of the inside panels.

TRACK AND OVERHEAD DEPARTMENT ECONOMICS.

BY J. W. GREER, SECRETARY AND GENERAL MANAGER, YOAKUM, TEX., IMPROVEMENT COMPANY.

PART III.

Before leaving the subject of track construction let us look, for a moment, into the art of constructing curves and switches. That there is an art in constructing switches that the cars will take every time properly, and through which they pass without jar or jolt, or in the construction of curves around which they will pass smoothly and easily, without the ear-piercing shriek so often heard, there can be no doubt, in the minds of those who have personally tried to attain proficiency along this line. Nothing will call forth the wrath of the patrons more quickly or furnish a better excuse for vigorous and variegated remarks than the derailment of a car. Not alone those who happen to be passengers on the particular car are inconvenienced but usually the whole line schedule is thrown "out of whack" and at least the time of one round trip must elapse before the equilibrium of the time card is again ascendant. In the interim the superintendent will generally be found as "long" on "language" as the receipts will be "short" in nickles.

The great majority of derailments occur at curves or switches, and the usual remedy applied is to lay off, fine, or fire, the motorman. It is true a good motorneer can manage by hitting it just right, and the application of the brake at the proper instant, to round almost any curve that is at all possible, or force a car by momentum, with the wheels sliding, through anything that passes for a switch. While such skill is often valuable, as temporary defects are liable to occur at times in the best constructed tracks, yet the manager who relies on the skill of his motorneers to successfully get the cars over his switches and around his curves is not fit to run a business where every nickel lost is that much taken from the net earnings solely.

Did you ever see or hear of a car being derailed that didn't have on board some unfortunate female in a "delicate state of health." And have you not wept out great gobs of grief as the learned gentleman for the plaintiff explained to the honorable court and gentlemen of the jury how Uncle Sam had been despoiled of a prospective citizen and the census taker robbed of his legitimate fees for all time to come through the "wilful, malicious and premeditated" shaking up which the plaintiff was subjected to, through the "direct connivance and criminal neglect" of yourself and the other culprits who claim to represent, as officers, the "grinding monopoly" whose "soul can only be reached through its pocket," and which you feel morally certain is about to be "touched" for many shekels.

That the delicate and fragile flower afterward makes (just as you expected) a wonderful recovery and multiplies and replenishes the earth to the extent of a dozen or so strapping boys and rosy cheeked girls "cuts no ice," as the company ought to be disgorged of some of its ill-gotten gains on general principles. 'Twas ever thus——!

Give the motorman a chance and save your company damage suits by trying a car over the switches and around the curves occasionally yourself. Let me say right here you are not qualified to pass on the merits or demerits of a motorneer unless you are capable of filling the position yourself. I also desire to say no track foreman should be allowed to attempt the construction or repair of street railway curves and switches who has not been broken in as a motorman until he is thoroughly competent. A knowledge of motorneering gives the intelligent trackman the power to find out to a fraction the proper "set" of his switches, or the correct "kink" for his curves.

It also enables him to appreciate the difficulty of running cars over improperly constructed track and teaches him that there is something more than a chronic growl in complaints of track by motormen, at times.

All curves above seventy-five feet radius may be made "round" or "true curves" without fear of derailment or inordinate strain of cars. Curves of less than seventy-five feet radius should invariably be transition curves. By means of these it is possible with the six and a half or seven foot wheel base used by the great majority of

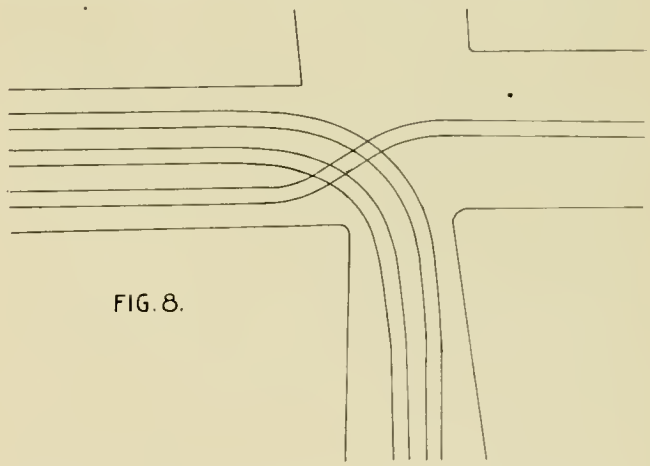


FIG. 8.

roads to round with ease a curve which at its shortest point may be only thirty-two feet radius. The writer saw in use daily for some years a pair of curves of this kind, the inner one of which had a radius beginning at points of curve of seventy-five feet and at the curve center a radius of only thirty-two feet. To complicate matters another road crossed these curves as shown in Fig. 8. The cars round these curves and pass over the crossing with scarcely a perceptible jar. It will be seen at a glance that it would have been impracticable to cross these curves in a straight line, without causing the derailment of all cars attempting to round the curves, as the angle of the crossing would have been so acute that the flange grooves of the straight track would catch the wheels and force them over the rails. Again, a transition curve should have the outside rail elevated in proportion as the curve decreases or increases in radius. If the

radius at point of curve is seventy-five feet elevate the outer rails say three-fourths of an inch and gradually increase the elevation as the curve decreases in radius until if the center of curve is thirty-two feet the elevation of the outer rail will be 1¾ inches approximately. Proper elevation allows the car to round a curve with the least possible friction against the guard rail, reduces the strain on both car and track to a minimum, and results in wear of rails being reduced to simply the face grinding from necessary sliding of wheels in equalizing the difference in length of the two sides of the curve. A proper guard rail is an essential feature of street railway curves. Curves should invariably (if possible) be constructed of the same rails as the remainder of the track, and should be rolled to radius on the ground where used. The guard rail should be applied after the curve has been laid and lined. The difficulty in applying guard rails to curves so that the proper distance would be maintained throughout the whole length between the guard and rail, has led in many instances to buying the curves ready rolled of grooved rail or T-rail with guard bolted on and filled with a cast-iron core, or adoption of other devices not necessary to enumerate here. The worst possible point for a change in rail sections is at a curve, and yet many roads buy every curve as noted above, and wonder why the cars bump, and joints refuse to remain tight.

The device shown in Fig. 9 is a simple and effective method of applying guard rails to either T or girder curves. The curves are laid continuously with the track, as it is constructed, and the guard rail is entirely independent, so it can be adjusted to make a groove of proper width to suit the radius of the particular curve to which it is being applied. In Fig. 9, the diagram A, shows a cast iron chair or tie plate four inches wide, with a hook on one end, under which the flange of the guard rail slips. Two spike holes are cast in the chair, one directly under the center of the rail and the other at such a point as to allow a spike to impinge against the inner flange while the hook holds the outer flange. The spike under the rail has a counter sunk head and holds the chair in place.

It will be observed that the chair is so constructed as to allow the flange of the guard rail to over-ride that of the track rail, so by setting the chairs in or out, any desired distance can be maintained between the two. This is an important point, as it is seldom two curves on a road have the same radius, so manifestly they do not require grooves the same width. The space between the guard and track rail is filled with either dirt or gravel, level with the rail tops. The material not being able to escape is packed solidly by the wheel flange, and in time becomes almost as firm as the iron.

B shows a guard made of lighter section than the main rail, which allows the ball of both rails to be on a level. C shows a T-rail guard applied to a girder rail. D shows guard and main rail, both of same section, allowing the guard rail to extend above the main rail the thickness of the shoe, usually three-fourths inch. This is the best practice when the city authorities will permit it.

Guard rails should be laid with joints broken opposite the center of track rails. This gives a perfectly smooth curve. The guard rails are strapped together with a fish plate next the track rail and angle bar on inside.

In the days of hay motors "old gray," the "dun mare," or the "one-eyed mule," usually kept posted on the condition of the track, and could be relied on to pull her over at the proper instant at defective curves or switches. Unfortunately for the trackman mechanically propelled cars evince anything but a desire to help him shirk his duty, so switches nowadays must be properly constructed and kept in perfect order. Nearly all the manufacturers of special work make first-class switches and frogs, but it is a rare thing to find accompanying the switches clear and intelligent instructions for setting them.

It is a question open yet to discussion whether a cast iron or steel switch or a built-up or a composite switch is most suitable for electric railway purposes. There are fewer accidents to vehicle wheels, and the pavements are easier kept up where cast switches are used. On the other hand, it is almost impossible to make a perfect joint

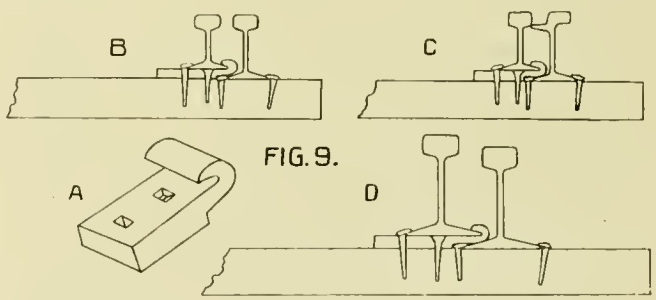


FIG. 9.

between rail and switch. Switches built up of the same rail section as the track make the most perfect construction from purely a trackman's point of view, but the claim agent and the paver both have increased duties to perform, and where these men hustle hardest the treasury suffers unavoidably. A composite switch is perhaps best in the long run, though more expensive in first cost. By a composite switch is meant one built up of the same rail sections as the track and then put in a mold where the cast iron or steel which makes the cores and body is poured around it.

This leaves a switch the shape of which has the advantages of a cast switch while retainmg the jointing advantages of the built-up switch.

All switches for electric railways should have a tongue on one side which is controlled either by a positive throwing arrangement or by a spring.

If the cars are expected to go to the right the tongue should be placed on the left side of the track, if expected to go to the left the tongue should be put in the right side of the track. The reason for this is that it is impossible to prevent a certain amount of dirt from obstructing the tongue. It is therefore necessary to have the tongue switch and mate so constructed that when they

are at tight gage at heel and point the gage at point of tongue will be ⅜ inch loose as shown in dotted line A. Fig. 10.

It is clear that if the tongue was allowed to guide the car the difference in gage at the point of tongue would produce a disagreeable bump when the wheels of a car reached that point. Again, it is equally clear that if the switch is at gage throughout its length the smallest amount of dirt or other obstruction between the tongue and the rail would produce a tight gage and cause the wheels to ride the switch, in which event the car takes the wrong track or becomes derailed. Observe the difference in the shape of the throat of the tongue switch and mate. It will be seen that of the tongue switch is wedge shaped slightly, while that of the mate is perperfectly straight from B to C. It will be noticed that the point of the throat C is considerably back of the line A. As the throat of the mate from B to C is straight and just wide enough to easily admit the flange of a wheel it necessarily follows that the wheel will be guided by this throat, and when it leaves the throat the opposite wheel has passed at least six inches beyond the end of the tongue, thus it is impossible for the car to take the wrong track or become derailed.

In setting switches it is well always to set the tongue switch ½ inch higher than the mate; this throws the car by gravity in the direction it should go Many improperly constructed switches can be made passable by this simple expedient.

Never allow the trackman to skew a switch out of line

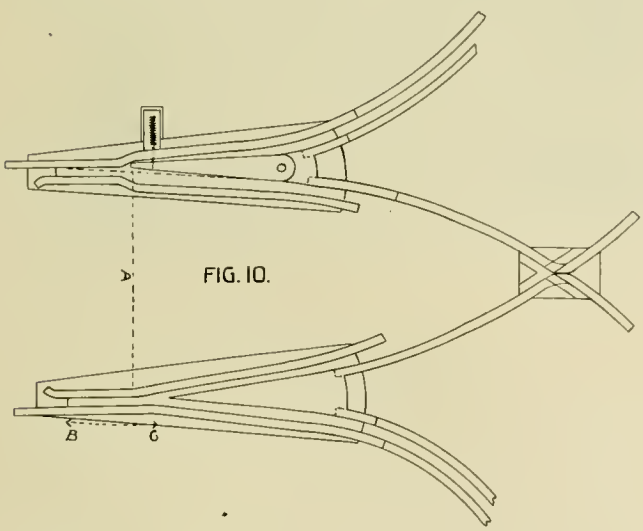


FIG. 10.

in order to make cars take it, as such a makeshift nicks the wheels, strains the car bodies and gives the patrons a disagreeable shaking up.

The switches and frog shown in Fig. 10 are composite. The frog is made of two pieces of rail only, each having a groove planed across its face where the angle is bent, to allow the wheel flange passage way. A rectangular body of cast iron or steel is poured around the two pieces of rail after they have been fastened together at the center, or point of angle rather.

A word in regard to ties and then we will take up the other part of the subject. The four principal woods used for ties in this country are named in the order of most extensive use; yellow pine, white oak, cypress, red cedar. The longevity of these is in the following order: red cedar, cypress, white oak, yellow pine; exactly reverse to the ratio of use. The true value of these woods for street railway purposes as developed by years of actual trial is as follows: cypress, white oak, red cedar, yellow pine. Cypress is a soft wood, straight grain, free of knots, does not split when spikes are driven, and holds the spike with great tenacity. Its life is from twelve to twenty years when buried completely. Its weak point is softness. Sometimes the rail base if narrow, will sink gradually in the tie leaving the spike heads loose from the flange to some extent. White oak is a hard wood, not easily cut by the rail base, not easily split, holds the spike well but has a life of only six to twelve years, and is subject to attack by wood borers. Red cedar would seem at first glance the ideal wood for ties. Its life is longer than any of the timbers named: it is hard enough to withstand the rail base, and is not attacked by any insect, yet there are fatal defects in it. It has what wood butchers call a dead grain and either splits when the spikes are driven or allows them to work out from its lack of tenacity. The ties made of this wood also contain many knots, and while they practically never rot, unless made abnormally large will often break under the weight of a heavy load. For short curves they are practically worthless. Yellow or southern pine, is the best of all timbers for steam or elevated railway ties. It is a light, strong wood, very tenacious, and the life where exposed to the air, or even partially exposed is from twelve to fifteen years. But burying it completely as is necessary in street railway practice, is fatal to its longevity, reducing the average life in most soils to less than five years (often not more than three) so that all its excellent qualities go for naught.

WIDENER AND ELKINS RETIRE.

The retirement of P. A. B. Widener and William L. Elkins from the Philadelphia syndicate, will remove two of the best known financial factors from the street railway world. In a recent interview Mr. Widener said that the only street railway interest he would retain was his representation in the Metropolitan, of New York. A close friend of the two gentlemen said that the step had been contemplated for five years past, but was unable to be consummated. Mr. Widener expects to take a trip around the world, and develop the common fad of street railway magnates—art. His especial interest is in the proposed art museum at Fairmount Park. He will bend all his energies towards making it one of the best in the country. Of course, it is impossible to reckon the amount with which the pair go into the cold, cold world, but the rest of the fraternity is assured that no special assessment will be necessary to keep them in coal next winter.

WINTER SCENERY FOR NIAGARA ROADS.

The numerous roads now centering at Niagara Falls have as an attraction at present the bits of ice scenery shown in the accompanying engravings which show the ice bridge which formed across the gorge below the falls on January 7, this year. The present bridge formed about one week earlier than the other structures of its kind former years. The Niagara ice bridge is a magnificent display of the power of small things when united. Many who visit these wonderful formations expect to find it composed of massive cakes of ice, but on the contrary discover that there are few pieces to be found larger than a peck measure. On no river in the world is the jam of ice looked for and welcomed as it is at Niagara. It does not come as a destroyer but as a beautiful wonder. With the coming of winter the bridge is watched for, and when it does form there is rejoicing both by the public and by the electric railway men. We are indebted to Charles Bierstadt, the well-known Niagara Falls artist, for the photographs.

ICE BRIDGE AT NIAGARA.

STEAM ROADS DIE HARD.

The Northern Central Railroad (steam) and the Mechanicsburg Electric Railway came to a misunderstanding at Riverton, Pa., recently, on the bridge question. To block proceedings, the steam road sent two locomotives to the front of battle. This pair of artillery were arranged directly between the abutments on which it was proposed to place the steel girders. The wheels of the tenders were blocked and the track greased so that the engines could puff and blow without moving, while pouring up such clouds of smoke as effectually to prevent any work overhead. A large crowd of people gathered to see the expected combat. The trolley employes discussed many plans by which they might be able to secure their rights, and it was even proposed to blow up the engines with dynamite cartridges. The situation was quite serious when the telegram announcing the order of the court to stay proceedings was received. The sympathy of the people is with the trolley, of course.

THE LEGISLATING OF WAGES.

The following from the Troy, N. Y., Press, is too good to reduce by a single item. The Press says:

A new member of assembly has introduced a bill providing that all surface railroad companies shall pay their employes two dollars per day, no more, no less. Good enough. And while the new member is about it, why not try to pass another bill providing that all churches shall pay their pastors $1,000 per year, that all cities shall pay their school teachers $900 per year, that all manufacturers shall pay their employes $2.50 per day, that all publishers shall pay their traveling agents $3 per day, that all farmers shall pay their laborers $1.75 per day, that all merchants shall pay their clerks $13 per week, and so on ad libitum ad infinitum? While we are paternalists let us go it with both feet.

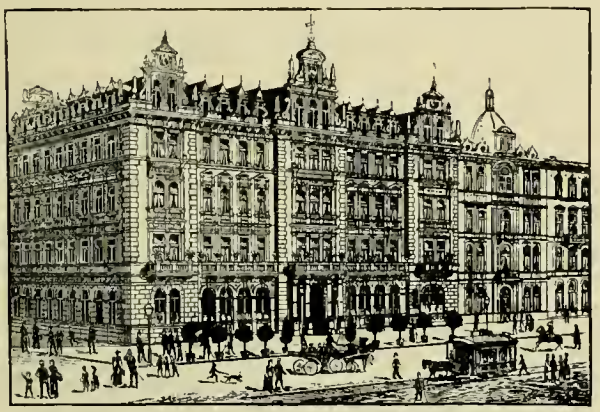
MR. PAYNE IN EUROPE.

By the courtesy of C. D. Wyman, we are permitted to quote from a letter from Henry C. Payne, Milwaukee, which will interest his many friends:

"I am feeling much stronger and better. I enclose picture of the hotel at which we are stopping in this quaint old place (Nuremberg) for the purpose of showing the magnificent cars on the street. One-horse cars, not more than 12 to 14 feet in length.

"Identically the same equipment is in use in Cologne, Mayence, Frankfort and Nuremberg—all the cities we have so far visited, except London and Paris. I am told this is about what we will find everywhere on the Continent, except at Buda Pest.

"The rate of fare charged is from 2 to 10 cents. Two cents takes you about as far as the length of Wisconsin street, from the lake to the river. An additional fare of 1 cent to Sixth street, and 1 cent additional for every six blocks—so by the time you got to Thirty-fifth street, it would cost 10 cents, and no transfers.



PALATIAL CARS AT NUREMBERG.

"In Paris and London, much the same system prevails, except that in the latter city transportation is had in old lumbering omnibuses, while in the former it is partially by 'busses and partly by street cars. It costs, in Paris, 10 cents to go from the Madeline to St. Denis—a distance less than from the Pfister Hotel to the Soldier's Home.

"On the Continent, the men are paid from 75 cents to $1 per day of 14 hours' work. In London, $1 for conductors, $1.25 for drivers, and about the same hours."

Mr. Payne further writes that his physicans order him south to a warmer climate, and that he is now en route to Italy.

EXTENSIONS IN BIG CITIES.

Brooklyn, Chicago, St. Louis and Cleveland will have considerable construction work this season. The Brooklyn Heights Company of which C. L. Rossiter is president, will reconstruct part of its road-bed with 90-pound rails, and has applied for franchises over 200 miles of streets. Several double truck cars will be purchased. The Nassau Company will complete its system and extend several lines that were in operation last season.

In Chicago, the Englewood & Chicago Electric Railway will lay about 50 miles of track. Cars will be operated by storage batteries. The Suburban Electric Railway intends to complete its system, and some of the other projected lines may show activity. The first timbers and ties for the Northwestern Elevated are to be delivered in May, and the contract must be completed by November. The Ogden Street Railway, which is practically the Cicero & Proviso, E. A. Cummings, being president of both companies, gets its current from the latter and transfers to its lines. In April, 11 miles of track will be operation, and 20 miles will be constructed this season. The company covers southwestern Cicero and the western villages south of Madison street. Its eastern line is West Fortieth street, and it will have tracks on West Fortieth street from Thirty-first street to Fortieth street, on Twelfth street from West Fortieth street to Harlem avenue, on Harlem avenue to Forty-eighth street, on Forty-eighth street along the line of the Chicago, Burlington & Quincy, through Hawthorne, Clyde, La Vergne and Berwyn; also on Ogden avenue connecting with West Chicago Street Railroad, west on Twenty-sixth street, southwest on Ogden avenue through Cicero to the center of the town of Lyons.

There will also be considerable new work in St. Louis. The Fourth street and Arsenal Railway Company will double its capital and issue $150.000 in 6 per cent bonds. The money will be used in extensions. The Southern Electric, Scullin system, National system, and Lindell Railway will reach out into the suburbs. In addition, there is likely to be some work by companies that are passing through the incubator.

The Everett syndicate, at Cleveland, has applied for franchises that will permit its interurban lines to obtain an entrance into the city. The proposed routes cover sections of the city which are without facilities and a loop connecting all depots. A building will be secured in a central location to be used as a terminal station in which passengers can be transferred from one car to another without going out of doors. Waiting, baggage and check rooms will be provided.

ELECTROCUTES STEAM ROAD FARES.

Electric railway competition is playing the part of reductionist in steam road circles in Ohio. The railroads into Cleveland, from the south, have come down to 2 cents a mile. Passenger Agent Mengensdorf, of the A. B. & C. Electric Railway says that 2-cent fares will not interfere with the interuban business of the electric on account of the frequency of the latter's trains. A slump in fares will follow throughout the state. The significance of this fact is the doom of steam suburban service.

AND THE MULES SMILED.

FOR eight and a half years the Pomona, California, Second street and Orange Grove street has never paid a cent of dividends. For the last year the mules have worn an anxious smile when feed time came, and of late the receipts didn't furnish fodder. The business men want the tracks declared a nuisance and torn up. Here's a chance for municipal ownership.

A SAVING SWITCH.

A quick-witted switch-boy saved a score of lives in the Newark, N. J., Consolidated Traction Company's recent down-hill runaway. The Kinney street hill is one of the steepest in Newark, and the track at the bottom is provided with a switch. The curve here leads to the main line, but a straight track of fifty feet in length is provided in case of accidents of the kind mentioned above. By opening the switch a runaway car may be shunted onto the straight track, and a tip-over thus saved.

In the last accident the motorman lost control of his car near the top of the hill, and before reaching the bottom was scared literally stiff. The switch-boy saw the predicament and opened the straight away track. The car shot on until running onto the granite pavement it spent its energy. The passengers were mostly women, and except for the bumping and the fright they were uninjured.

A STREET RAILWAY MEN'S CLUB.

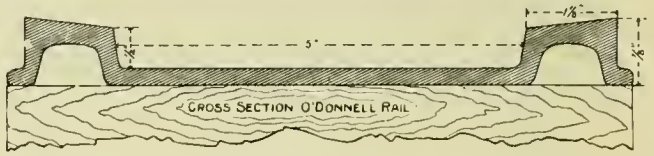
On February 15 the new car house of the Brooklyn Heights Railroad Company on Mahattan avenue was ready for occupancy. The building is of brick, two stories high, and covers 25 by 200 feet of Brooklyn real estate. The lower floor is used for car storage with a capacity of 300, and the upper room is devoted to the club for the men. The club will be a mutual affair. President Rossiter of the company said in relation to the club: "The company will provide a reading room, a general assembly room, and put in baths. The men may do what more they please in the way of gymnasium and games." There will also be rooms for instruction of the employes in their various duties. The free use of technical reading matter is one of the most praiseworthy features of the arrangement, and the periodicals devoted to street railways and applied electricity will be on file. The extras, as well as regulars, will be here accommodated. President Rossiter says further: "Our principal object is to make our men the most intelligent of any engaged in their class of work, and thus be not only more competent in serving the public, but more valuable to the company. It remains with the men alone to what extent this opportunity may develop."

HOT COFFEE FOR TRAINMEN.

General Superintendent Ira A. McCormack, of the Brooklyn Heights Railroad, has adopted the plan of furnishing hot coffee free to conductors and motormen on very cold days and nights. This is done at three of the largest depots. He says the men seem to appreciate this arrangement and he has received a number of letters from employes and others commending the company for doing this. They have been able to utilize their present depot force to look after the coffee, except at one place where one man has to be put on for that special purpose because some of the largest lines run in there. At this largest depot there are 450 men, and at the other two, 200 and 370. The cost of putting the arrangements in at three depots was a little over $200. The cost per day varies greatly but Mr. McCormack thinks that both company and men are benefited by this plan; in which he is no doubt right as it keeps them in a better humor, in a better condition for their work, and removes much of the temptation to visit saloons.

GUTTER TRACK RAIL.

A steel rail rolled to usual lengths, weighing thirty pounds to the yard, and to be laid to standard gage on longitudinal stringers resting on cross ties; is proposed by John O'Donnell, of Lowville, N. Y., as a solution of



TRACK FOR TEAMS.

the good roads problem. He also recommends it for arteries of heavy teaming in cities. The inventor estimates the cost of construction at $3,000 per mile of single track, without paving. It would seem difficult to keep the rail clear in snowy or freezing weather, and the first cost and maintenance would be a serious question for any community.

A BROOKLYN RUNAWAY.

A Brooklyn electric car on the Vanderbilt avenue line recently dashed away down hill all by itself. When it stopped a mile away the motorman and conductor were the worst scared men in greater New York. It seems that when the "two-bells" were given and the current turned on, the car didn't start, so both the men got off the platforms to investigate. Just as they had decided that nothing was the matter, the car gave a jump and started off. The trolley pole finally jolted off the wire and the runaway stopped. The cause of the accident was probably a circuit-breaker opening at the power house. The careless motorman left the platform without his controller handle. When can men be taught care in this matter?

CEDAR RAPIDS AND MARION CITY RAILWAY.

The Cedar Rapids and Marion City Railway is an excellent example of a small, well-managed, paying road, and the present article dealing with some special features, and also with some general points in the carrying on of the business will be of value for comparative purposes to the many managers of similar sized enterprises.

Cedar Rapids is an important Iowa manufacturing and shipping town of 20,000 inhabitants, with plenty of public improvements, well-to-do citizens, fine residences and educational advantages. Marion, the county seat, is six miles distant and is joined to Cedar Rapids by the interburban line of the company. Its population is 3,500. Between the two is the suburban village, Kenwood Park —a result of the transportation afforded by the interurban road. The system has fifteen miles of track including the six mile interurban. The interurban is thirty-five pound T rail. Most of the city work is girder rail, though there has been some satisfactory experimenting with T rail and brick pavement. The track has been maintained in remarkably good shape and it is rare

GATE ON INTERURBAN CAR.

to find on any road a track which has withstood the use of years as has this. Superintendent F. L. Diserens was a steam railroad civil engineer by profession before he built and took charge of this road and the result is manifest in the tracks as they exist today. The entire road is gone over by the track foreman every day, and the slightest defects are at once attended to. The motormen also make immediate report of anything wrong with the track. Here it may be well to mention a feature which has much to do with the success of the road. There is the heartiest co-operation to promote the welfare of the road, from the lowest to the highest employe and every one is encouraged to do his best. A reading room is maintained, where are kept all the important technical papers and the catalogs and circulars daily received.

The system grew out of the old steam dummy line which originally ran between Cedar Rapids and Marion. After this interurban was started, branch horse car lines were built at Cedar Rapids and finally after various changes which it is not necessary to enumerate here, electricity was put in service in 1891. Everything was done in first class shape and the system as it stands today is a testimonial to the wisdom of such a policy.

The interurban line now maintains a forty minute service during the day, and the regular fare is fifteen cents for the six miles. Commutation rates are ten cents. Transfers are given to and from all city lines. From the beginning a baggage and express service has been

HOME MADE SNOW PLOW.

maintained. But one steam road goes through Marion, while Cedar Rapids has four. Consequently the advantage of the choice of express routes sends much express by way of Cedar Rapids. All express consigned to Marion by the American Express is carried on a percentage basis. A good local business is also taken care of between the two cities. The rates received are ten cents for small parcels twenty-five cents for trunks and barrels of produce and higher prices for more bulky articles. A special motor baggage car makes regular trips in this work. The business has increased so that another old car is being fixed up as a baggage car. There is also a flat car for lumber and agricultural implements and a car for transporting milk to a condensed milk factory.

We presume our readers are acquainted somewhat with the power house from the report of its excellent performance which appeared in our issue of August, 1893. It is presided over by R. H. Holbrook, chief engineer, and it is perfectly safe to say that in no small power plant in the country is the performance more thoroughly and systematically tested than in this. The regular work is done by a 250-horse-power Allis simple corliss condensing engine direct belted. Two smaller engines and generators are held in reserve.

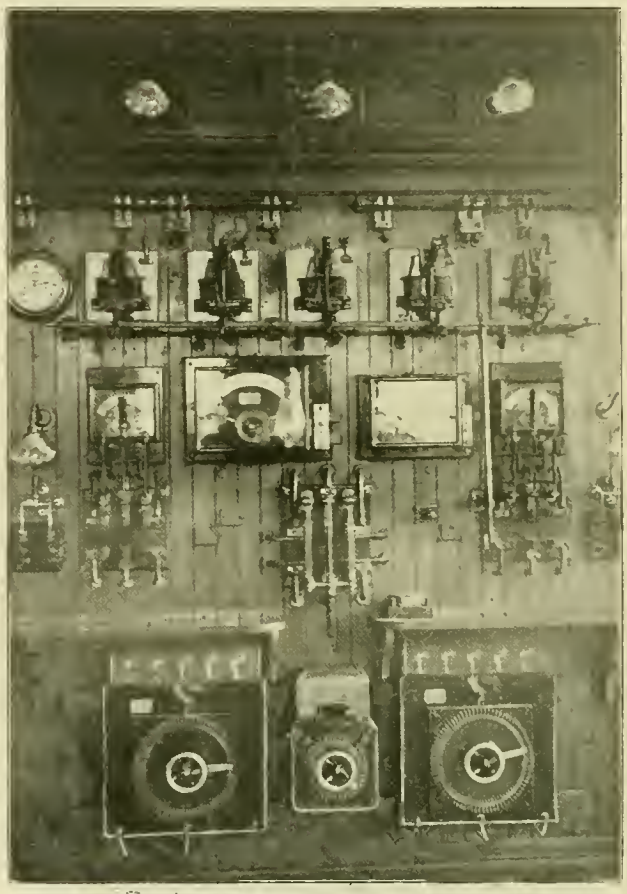
There are three 5x16 foot horizontal return flue boilers, each containing forty-four 4-inch tubes. The grate surface was originally twenty-five square feet, but it has been diminished by lining the furnace with fire brick so that now it is only eighteen square feet, thus mak-

ing the ratio of the grate surface to the tube surface as one to 41.5. But two of these boilers are used at a time. The feed water enters at the top in front of the dome. The water used contains 12.09 grains per gallon of scale forming solids. The best results have been obtained from soda ash and sodium phosphate as scale preventives. The three boilers are connected to an iron stack fifty-four inches in diameter and 100 feet high. The capacity of the fuel storage is 125 tons, and forty tons of Iowa lump are usually kept on hand, though slack is regularly burned. When lump coal has been burned it has been found most economical to use one instead of two boilers and fire heavily. Black smoke is almost entirely prevented by opening air holes in the fire doors immediately after putting on fresh coal, and leaving them open until the smoke producing gases have been driven off. By this arrangement the air admitted just over the fire mixes with and consumes the smoke producing gases.

A novelty which immediately attracts attention in the engine room is the brick switchboard, an illustration of which is shown. When the station was built the elaborate solid wood board which was common at that time was put up. Something over a year ago this was replaced by the brick board. The main reason for the change was the considerable decrease in fire insurance rates which the insurance companies offered for an incombustible board. Marble and slate were talked of, but finally it was decided that pressed brick when dry was high enough in insulating properties. After one year's use it

NEW BRICK SWITCHBOARD.

is pronounced a decided success. It is 13 by 9 feet. The panel for instruments is ten inches thick and the pilasters sixteen inches thick, except at the base where they are twenty-four inches. It is built on a stone foundation that rests on solid rock fourteen feet below the floor line. An air space was left between front and back of board. It is necessary in making a board of this kind



OLD WOODEN SWITCHBOARD.

to provide holes for the wires as it is erected as it is almost impossible to drill the pressed brick.

The equipment of the station for testing purposes is worthy of notice. Water is measured with a device mentioned in our August, '93 issue, depending on the flow of water through a given opening with a given head. After one of these has been calibrated it is much more accurate than a water meter. A wooden pointer attached to the governor rocker arm indicates the point of cut off and by calibration with indicator cards is now provided with a scale which shows the indicated horse-power being developed. Test pipes for calorimetric measurements have been inserted in the steam mains. Mr. Holbrook is now experimenting with a device for giving an alarm when the vacuum falls below ten pounds, or twenty-one inches.

The interurban service is taken care of with long double truck cars, having 24-foot bodies. Two of these cars are equipped with three 25-horse-power motors, and two with two 50-horse-power motors. All cars are mounted on McGuire trucks, and all cars are vestibuled. The interurban cars, it will be seen, are vestibuled only at one end, as there is a Y at each end of the road.

A novelty in the shape of a gate is shown on the interurban car. It is home made, after the design of Super-

intendent Diserns, and is giving the best satisfaction of any of the many kinds tried. It opens and closes on the fan principle, and being very simple is not easily put out of order. Its greatest advantage is that it is impossible to hurt it by leaning on it, as the top bar is firmly held by a catch on the corner rod which supports the hood.

The trolley poles are also home made, from iron pipe. They are in three sections, consisting of seven feet of 1-inch pipe, five feet of ¾-inch and two and a half feet of ½-inch. The unusual length is needed because the trolley wire is all twenty-two feet above the street. The

TELEPHONE BOX ON INTERURBAN LINE.

various sections of pole are riveted together with a 5-inch lap joint, and inside the smaller sections are wood sticks. These sticks keep the pole from getting badly bent or breaking near the trolley head, when it strikes a bracket.

The barns have tracks arranged with a down grade toward the doors, sufficient to run the cars out without current in case of fire. In the repair shop, a set of pulley blocks for hoisting car bodies, is suspended from a truss girder in the roof. The rope from these blocks can be used either by hand or for heavier work attached to a motor car. The company has its own repair and paint shop, and does its own blacksmith and armature work. A very good snow plow was assembled out of the scrap heap this fall. No new material whatever was used. It is a shear plow. The body was that of an old horse car. This was mounted on heavy sills as shown. A home made, plain parallel rheostat controller is used, as it gives better traction than the series parallel method. All the controlling apparatus is inside, as is also a tank of the "triple chlorides" from the Fitch Salt Company. The officers are delighted with the effectiveness of this solution, and think it is greatly superior to salt. A very small quantity does the work.

The total force of men required to operate the line at present is as follows: One superintendent, two bookkeepers, one store-keeper, one lineman and assistant, two engineers, two firemen, one helper for power station and barn, one carpenter, one blacksmith, two barn foremen, six barn helpers, eighteen motormen, eighteen conductors, one baggageman, with helper, and two track foremen with three men each. The ordinary daily schedule calls for the operation of eleven cars.

The superintendent's office is connected by private line with two points on the interurban line and with the power station about one block from the office, and also with the public exchange.

The general set of books was planned by the auditor, H. V. Ferguson, who is one of the best posted and most progressive men in the country in this line of work. It was devised in 1891 and is nearly the same as that reported to the Atlanta convention in '94.

The property is under the care of P. E. Hall, president; W. D. Douglass, vice-present; Charles R. Clark, secretary and treasurer; H. V. Ferguson, auditor; F. L. Diserns, superintendent, and R. H. Holbrook, chief engineer.

STANDARD ELECTRIC STATEMENT.

The Standard Electric Company, Chicago, which recently made an assignment, issues a statement over the signature of E. E. Crepin, treasurer, which states the failure was due to poor collections. It is expected the creditors can be paid in full without any expense on their part, and leave something for the stockholders. The officers of the company are making every effort to this end, and ask the co-operation of the creditors.

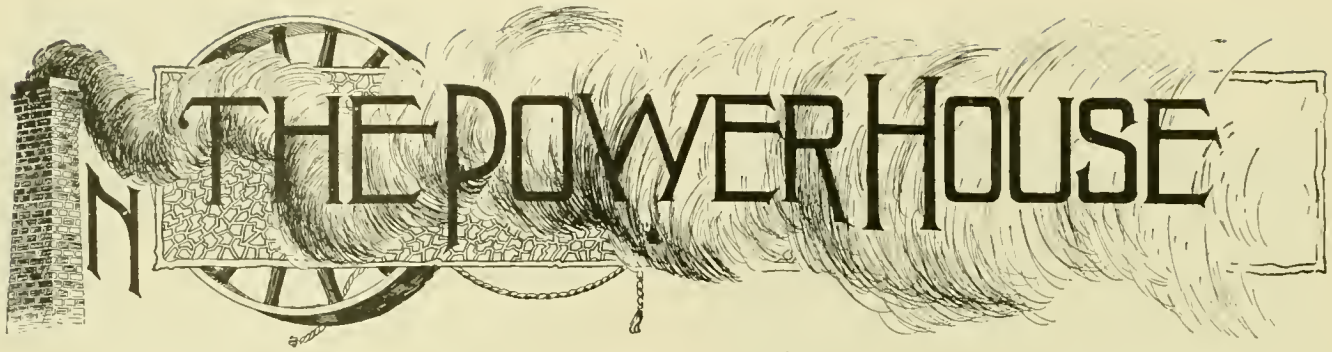
The assignee has completed his inventory which schedules as follows:

Machinery and tools	$ 32,684 64
Merchandise and manufactured machinery	94,490 27
Bills receivable	5,449 21
Accounts receivable	73,393 45
Office furniture	75 00
Real estate	60,400 00
Stocks and bonds	5,750 00
Total	$272,242 57
The liabilities are	100,142 97
Total of assets over liabilities	$172,099 60

In this inventory are not included patents and patterns, which represent a considerable amount upon the books of the company, and which are of some value to a going concern.

The Hestonville, Mantua & Fairmount Company of Philadelphia, shows for 1895: Receipts $573,212; operating expenses $315,761; total net receipts $207,450, less fixed charge of $97,965 leaves $109,484 to the good for '95.

A strange fatality seems to have followed the master mechanics of the Chicago City Railway during the past few years. Magnus Ohlson, who was for many years master mechanic and who resigned some six years ago, has just been adjudged insane and sent to an asylum; his successor, J. B. Wright, who was master mechanic for some four years, lost his life by breaking away from his attendants while delirious and sick with pneumonia and rushing out into the wintry air, thus causing his sudden death; his successor, E. A. Hovey, has recently died in Arizona, where he went a few weeks ago, hoping to stop the ravages of quick consumption.



This department is devoted to the construction and operation of electric railway power houses. Correspondence from practical men is specially invited. Both the users and makers of power house appliances, are expected to give their views and experiences on subjects within the range of the department.

The Metropolitan Street Railway, of Kansas City, is considering the question of driving all its cables by electric motors, supplied with current from one central plant. The plan has not, we believe, been adopted as yet, but the conditions in Kansas City are very favorable to the success of such a system. There are a number of small cable plants which are old and nearly worn out. They have simple engines, and are not situated on railroads, so that coal has to be hauled in wagons. All these conditions are fatal to the best economy. Furthermore, these plants all must buy water, and this adds another important item of expense. The idea is that if a big triple expansion, condensing, direct connected electric plant, can be built somewhere down on the river where condensing water is cheap and coal can be obtained from the siding of some railroad, power can be generated and transmitted at a very much lower cost than by so many separate plants as at present. The cost of attendance is a big item with so many small plants.

* * *

The Findlay Street Railway reports as follows as to its power plant performance:

No. 17.—Output at switchboard in electrical-horse-power, hours per day 720. Station operated about 18 hours a day. Equipment, two 6x18 foot horizontal return flue boilers; hand firing; Hoppes exhaust steam heater; two 12x21 simple high speed Buckeye engines, direct belted. Fuel is run of mine Hocking Valley coal and costs $1.75 per ton, delivered at the power house.

Results:

Fuel consumption per electrical-horse-power hour	6 pounds.
Cost fuel per electrical horse-power hour	$ .0052
Cost station labor per electrical horse-power hour	.0050
Fixed charges, such as water, taxes and insurance, per day	.85
Cost of oil and waste, per electrical horse-power hour	.0005

* * *

The Northeast Railway, of Kansas City, had two rather peculiar and unusual accidents in its power house recently. One evening during the heavy rush hour load, the cross-head of a 200-horse-power, Armington and Simms engine, broke just behind the pin. The piston was then pushed to the rear end with such force as to knock out the cylinder head and break off the guide blocks. The cylinder head was found just outside the 12-inch brick wall, which it penetrated. A new cylinder head, cross-head and guide blocks were put on, and the engine was soon running again. Everything went smoothly until about 9 o'clock the next morning, when another crash came from the same engine. It was found that the center had pulled out of the piston head. A new piston head was put in and by 5:45 that evening the engine was running, and Superintendent W. O. Hands, and Engineers Casebolt and McVey were again resting easy after their prompt exertions. Mr. Hands writes us that the cause of the first accident is not yet clear. The engine was pulling heavily and a car was reversed at the time. The iron around the pin was found to be somewhat crystallized. The last accident he thinks was evidently due to a fracture in the piston head caused by the first breakdown.

* * *

H. B. Niles, electrician of the Citizens Street Railroad of Indianapolis, recently called our attention to a feature of the operation of old railway generators that we believe has not been thought of much as yet, and which has been noticed on some of the older generators in use at Indianapolis. When the fields of a generator have been used for several years the constant strong magnetization tends to make the fields permanent magnets. The residual magnetism becomes stronger year after year. Some of the machines at Indianapolis develop a surprising voltage without any field excitation whatever. Now this phenomenon would be nothing much more than a curiosity were it not that the more like a permanent magnet a field gets the more sluggish it is in responding to the effect of the series coils when the load suddenly rises. The effect is that the shunt field has to be made stronger and stronger as time goes on in order to make the generator take its share of heavy loads when running in parallel with others which are newer. The result of this has finally been that the shunt field could hardly be made strong enough even when running with all the field resistance cut out, and in some cases more turns have been added to the shunt field to overcome this.

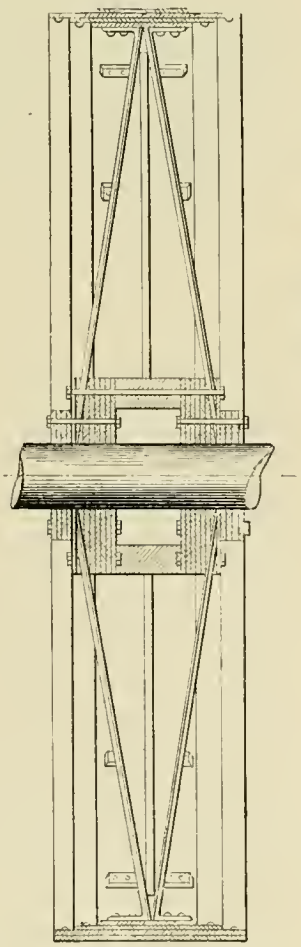
* * *

A well-known electrician (whose name is not given for obvious reasons) recently told us of a plan which he

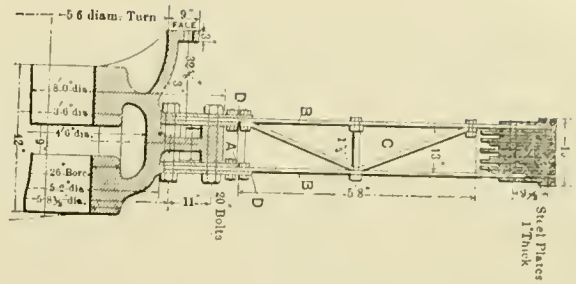
has in readiness to carry out in case strikers should ever make trouble by grounding the lines. He reasons that the overhead work is the weakest part of a street railway system, and that in case of a strike it can be disabled easier than anything else. Among the thousands of trolley hangers on a system the introduction of one or two that have been "doctored" may make short circuits that it will take several hours to find. There are also other ways of grounding that can make infinite annoyance if the evil doers are sufficiently educated in electricity because of the difficulty in finding them. These short circuits are so heavy that they are entirely above the capacity of the station and hence the circuit breakers cannot be kept in even for an instant. To enable these short circuits to be burned out, a big water rheostat such as a great many companies have for testing new machines is provided. In case of trouble it is only a short job to connect the big rheostat in series with the feeder on which there is a ground. Then when the feeder is connected to the bus bars the current flowing over it can be kept by the rheostat within the limit of the capacity of the station until the ground has been burned out. The total capacity of the station can be turned through the one ground, and of course it is only a question of a few minutes until something is bound to melt. The probabilities are that the melting will be somewhere near the short circuit so that it can be located easily, whereas it might take hours by another method. Of course there is the chance that the melting will be somewhere else than at the troublesome short circuit but in time of strikes heroic methods are in order and such chances can be taken.

* * *

Improvements in fly-wheels seem to be numerous, and indeed, considering the number of fly-wheel accidents recently, it is not strange that there should be a desire to get a wheel that will not go to pieces as easily as cast iron, in case the speed gets excessive. The Allis Company is building a fly-wheel built up of steel plates for a direct connected unit to go to the West End Street Railway, of Boston. The only cast part of the wheel is the hub. The balance is a steel structure. The Albany railway is to have a wrought iron built-up



WROUGHT IRON FLY-WHEEL FOR ALBANY RAILWAY.



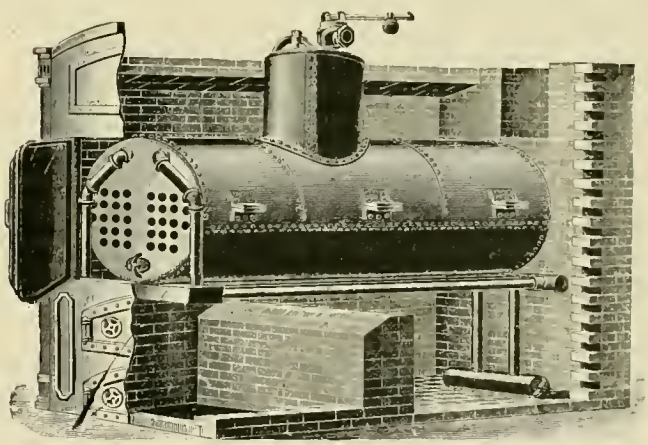
STEEL PLATE WHEEL FOR BOSTON.

wheel, employing practically no cast iron. Sections of the Boston and the Albany wheels are shown herewith.

* * *

New Type Economizer.

The Hascall Richards Steam Generator Company, 36 Bromfield street, Boston, is introducing a device for use with boiler plants which is attracting interest because of the rather remarkable guarantee that is made for it. The guarantee is that it will save 10 per cent of the fuel used, other conditions being the same as before it was put in. The general principle of the device is shown in the engraving. It is the invention of James J. Bush, and embraces arrangements for taking care of the contraction and expansion of the long horizontal pipes. Of course it adds to the boiler capacity by increasing the heating surface. The appliance can be put on any horizontal boiler without removing the masonry or changing



NEW TYPE ECONOMIZER.

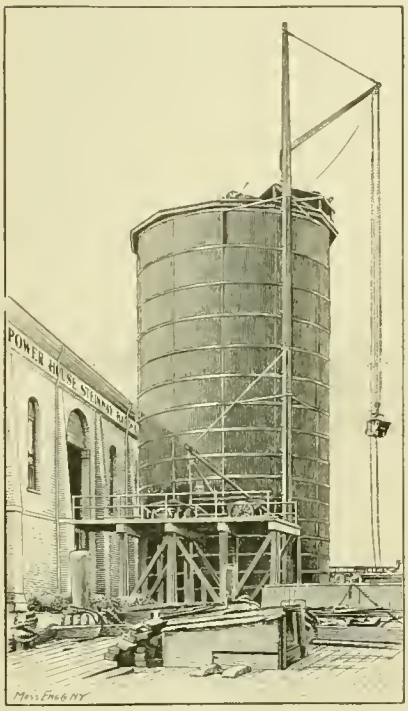
the requirements of firing. The partitioned water box at the front end dispenses with the brick arch. The circulation is claimed to be greatly increased by the economizer. However, the important consideration is the guaranteed fuel saving, and if proper provisions are made for cleaning the economizer tubes, steam users will be glad to adopt it under such a guarantee.

* * *

Coal Storage at Astoria, Long Island.

Our illustration shows the patent circular coal pocket now in use by the Steinway Railway Co., at its Astoria power house on Long Island. Where provision

has not been made above the boilers in power houses for the storage of coal. this coal pocket provides a most convenient and economical method for the storage of the fuel outside of the building. Owing to the cylindrical form of the coal pocket. it occupies the least possible space. The frame consists of a center post. surrounded by a series of posts on the circumference of the cylinder. all thoroughly braced together. The outside posts are surrounded by adjustable hoops with lining of plank. The pocket can be built with or without a roof. An endless variety of constructions may be designed to meet the various requirements. both as to the dimensions of the coal pocket. and the machinery for unloading and delivering the coal. At the Astoria power house the coal is raised from the boat to the top of the pocket by means of buckets and unloaded at the center of the coal pocket. The coal is then carried to the boilers in the small cars shown on the trestle in the illustration. These cars are loaded by means of chutes. from the sides of the coal pocket. and then run into the boiler house and dumped in front of the boilers. The patents on this coal pocket are controlled exclusively by the Berlin Iron Bridge Company. of East Berlin, Conn.. which will be pleased at all times to reply to inquiries in reference to it. and to make plans and estimates.

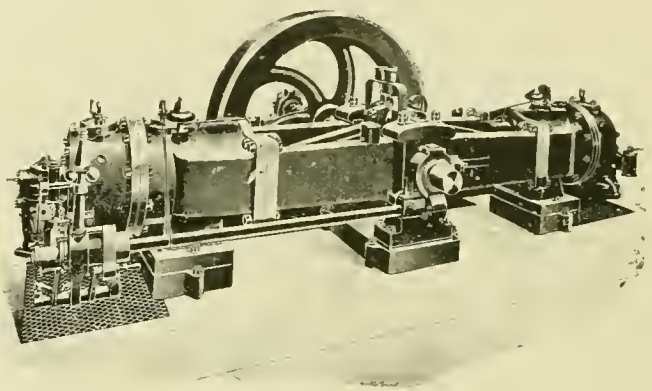


COAL POCKET AT ASTORIA.

* * *

Gas Engines for Lausanne Electric Tramways.

The accompanying engraving reproduced from the Scientific American. shows one of the 130-horse-power gas engines which is running the electric railway at Lausanne, Switzerland. There are two of them in the station. and they were built by Crossley Brothers. Manchester. England. A set of storage batteries has been installed to take up the fluctuations and allow the engines to work on a steady load. This a very necessary feature of a gas engine plant for electric railway work. because of the difficulty of getting good speed regulation. The engine and dynamo room at this station is 56 by 56 feet and 26 feet high. Adjoining is a room 41 by 37 feet for the three producer gas generators. The storage batteries are in another room 42 by 41 feet. Apparatus for refrigerating the water which circulates around the gas engine cylinders to keep them cool. is put in an annex.



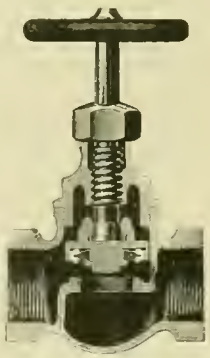
GAS ENGINE FOR LAUSANNE TRAMWAYS.

The amount of fuel used is 1.2 pounds of anthracite per horse-power hour and 4.5 pounds per car mile.

* * *

A New Improvement on an Old Valve.

All engineers know what renewable disc valves are; some of them say they have gained such knowledge at the expense of patience and pocket book. and have gone back to the old style brass disc valves. The trouble has been with the discs. not with the principle. Renewable disc valves are generally heavier and better made than the common valves; they can be repaired at a nominal expense; will last longer and are more reliable. But the disc the most important feature of the valve —has always been made of some vulcanized rubber composition. This is the weak point. You might as well make a cold chisel to cut steel. out of brass. as a valve disc out of rubber and expect it to last for any length of time under steam at over eighty pounds pressure. It is not only the trouble caused by constantly putting in new discs. but the resulting damage to the body of the valve itself. Valve bonnets must of necessity be screwed on tight. Taking off and replacing the bonnet time and again stretches the metal. and before long the threads around the bonnet leak so badly that the valve has to be thrown away. All this trouble can be avoided by simply making the disc of some metallic composition. soft enough to make a good joint on a flat seat. but from its nature far more durable than rubber. The Crane Company commenced three years ago to experiment along this line. They made some metal discs and tried them on their own steam lines for two years. About a year ago they put the valves on the market. meeting with gratifying success. The bodies of the valves are made very heavy. the seats wide and strong. and provision is made for re-



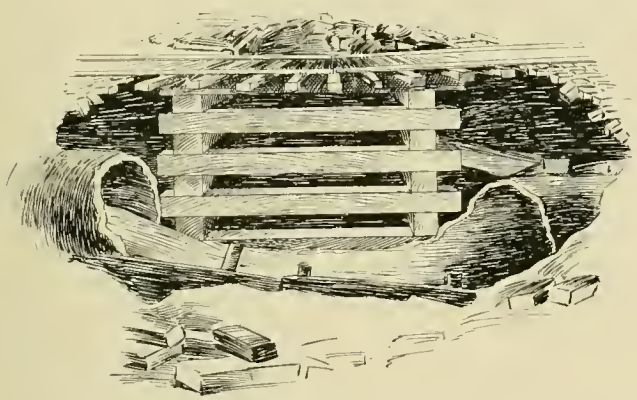
packing the stuffing boxes while steam is on the line. The renewable metal discs have proved more than satisfactory, lasting very much longer than any vulcanized rubber disc made. A sample disc will be sent to any engineer upon application to Crane Company, Chicago.

FLOOD IN FRISCO.

A severe rain and electric storm the latter part of January did considerable damage to the lines in San Francisco. The great flood of waters washing down the steep hills, carried tons of earth and sand. The greatest trouble was in suburban districts.

At Silver avenue and Mission street the car tracks were buried for a distance of about 100 feet. At China avenue nothing could be seen of the rails. There was a bank of sand over the tracks. The same state of affairs existed at Brazil avenue, where the road bed was covered to a depth of four feet. At the crossing at Persia avenue nothing whatever could be seen of the rails for the distance of a block.

On Mission street, about 200 feet north of Onandago avenue, the sewer broke and about two-thirds of the road-way was washed down upon the adjacent property.



The culvert on Onandago avenue, just west of Mission street was washed away, and the tracks of the Ingleside road went with it.

Six of the Ingleside cars were left on the other side of the roaring torrent, and the sand carried along by the storm waters soon buried the wheels.

The Castro-street cable road was also compelled to shut down. The storm waters carried down the sand from the grades above Diamond street, and a mound of sand about eight feet high covered the crossing at Twenty-fourth and Castro streets. On the Union street cable line the water came up even with the seats in the grip cars.

The San Mateo line was heavily damaged south of Ocean View. The roadbed was washed away for nearly a mile. Between Colma and Holy Cross the track was under water, and in many other places nothing could be seen but sand.

From two to eighteen hours was necessary to clear wrecks and shovel out the tracks.

IMPROVEMENTS ON THE BUFFALO-FALLS LINE.

The Buffalo & Niagara Falls Electric Railway has improvements in contemplation, which, when completed will materially better its service between Buffalo and Niagara Falls. When the road was first projected, it was not contemplated to use the river road to the present extent, but the route proposed, crossed through considerable private property between Gratwick, a suburb of North Tonawanda, and the Falls. The original route would have resulted in a more direct line and it is now proposed to lay tracks along it. The operation of the line over the river road has developed constant sources of annoyance in the many curves and liability of accident owing to the wagon traffic. For all it has this improvement in contemplation, the company does not propose to abandon the river road, but will run it for the local traffic and devote the new road to the operation of through "express trains" between Buffalo and Niagara Falls. The stops of these trains will be very few, and the advantages will be shorter distance with better time, features of vital importance in competing with the steam roads beside which the trolley line runs. The Buffalo-Falls road is said to have ordered new cars which are to be ten feet longer than those now in use, and which are to have compartments for smoking, lavatories, etc., about the same as steam railway coaches.

NEW GOVERNING BOARDS.

John D. Taggart, of Louisville, representing large interests in the New Orleans Traction Company, has been elected a director in place of Henri Bier.

The Scranton & Pittston Traction Company has elected L. A. Watres, president; Lemuel Amerman, vice-president; Charles H. Mullin, treasurer, and Robert C. Adams, secretary.

The Woronoco Street Railway Company, of Westfield, Mass., has new officers all around. James A. Lakin is president. R. D. Gillett secretary; T. J. Cooley, treasurer, and James A. Lakin general manager.

The officers of the New Orleans City & Lake Railroad Company are Albert Baldwin, president; James H. Maury, president pro tem; A. H. Ford, secretary. A semi-annual dividend of 4 per cent has been declared.

The Berkley (Va.) Street Railway Company elected T. H. Synon, president; William Tillotson, secretary, treasurer and general manager. The directors authorized the president to make contracts for electrical equipment.

When control of the Buffalo, Kenmore & Tonawanda Electric Railroad passed to the Buffalo Traction Company, the officers were succeeded by Edwin G. S. Miller, president; Herbert P. Bissell, secretary, and Joseph B. Mayer, treasurer.

The Du Bois Traction Company, Du Bois, Pa., has elected directors as follows: president, M. D. Wayman; vice-president, G. E. Grier; secretary, J. D. Bailey; treasurer, David Reams; A. C. Bailey, J. W. Grier, J. C. Grier and C. J. Jessop.

Some changes were made in the officers of the Schuylkill Electric Railway Company at Pottsville, Pa., Richard H. Koch being promoted from vice-president to president, in place of C. H. Barritt. The other directors are F. H. Treat, vice-president; Jesse Newlin, secretary and treasurer; Mark H. Hubbel, general manager; R. C.

Luther, L. B. Walker, Matthew Beddow, James Goodwin, C. P. King, W. F. North, Thomas B. Prosser and H. H. Pearson, Jr. The new lines to Schuylkill Haven and Heckscherville will be pushed to completion as fast as the weather will permit.

G. M. Smith and David Rebstock are respectively the new president and vice-president of the Shamokin & Mt. Carmel Electric Railway Company, of Shamokin, Pa; C. Smith, treasurer; H. S. Snavely, secretary, and W. P. Marr superintendent, hold over.

The retirement of W. R. Vaughn from the vice-presidency of the Park City Railway Company of Bowling Green, Ky., marks a change in the ownership of the line. I. B. Wilford, president; Col. M. H. Crump, secretary and Col. T. J. Smith, treasurer, are now the sole proprietors.

The Port Chester & Glenville, N. Y., Tramway Company, which was organized three years ago, is now prepared for construction, having recently elected the following directors: David J. Pearsall, president; W. G. Bushnell, treasurer; R. J. Walsh, secretary; Thomas S. Krutz and James H. Hunt.

The Pontiac & Sylvan Lake Electric Railway Company, of Pontiac, Mich., which began regular operation with the new year, has elected the following directors: Merrill B. Mills, president; Thadius A. Smith, vice-president; William G. Hinman, treasurer; Delos D. Jayne, secretary, and Henry C. Ward.

Bartlett, secretary; M. S. Robinson, treasurer and general manager; L. D. McNutt, superintendent. The name has been changed to the Fort Wayne Consolidated Railway.

The Brooklyn Heights Railroad Company, which was reorganized the past year, has elected the following directors: Clinton L. Rossiter, president, T. F. Jackson, vice-president; T. S. Williams, secretary and treasurer; Anthony N. Brady, Henry Seibert, John G. Jenkins, William C. Bryant, David H. Valentine, Seth L. Keeney, John D. Kieley, W. W. Goodrich, John Englis, and Charles N. Young.

The Springfield, Mo., Traction Company (last year's reorganization of the Metropolitan Street Railway) has elected C. M. Parker, president, and J. F. G. Bentley treasurer, to succeed George W. Parker, who filled both offices; A. J. Eisenmeyer, vice president, and C. H. Smith, secretary. Mr. Parker retains his interest, only giving up active management to make an eight months' European tour.

OTTAWA, CANADA, REPORT.

The annual report of the Ottawa Electric Railway shows a good business, in which the earnings are steadily increasing and the percentage of expense growing smaller. The property stands on the books at a little less than one million dollars. The comparative table for the past four years is interesting.

	O. E. S. R. Co. — 11 months ending May 31, 1892	O. E. S. R. Co. — 12 months ending May 31, 1893.	O. E. S. R. Co. — 12 months ending May 31, 1894.	O. E. R. Co. — 12 months ending May 31, 1895.	O. E. R. Co. — 7 months ending Dec. 31, 1895.
Passengers carried	1,520,405	2,394,504	2,797,281	4,119,084	2,843,173
Mileage	303,363	592,199	759,433	1,171,849	850,661
Gross Receipts	$71,698 99	$110,071 67	$129,484.02	$193,991.36	$128,173.98
Expenses	$45,199 80	$70,221.25	$83,324.64	$122,335.67	$73,983.48
Per cent. Expenses to Receipts	63%	64%	64%	63%	57%
Receipts per car mile	23 63c.	18.5c.	16.60c.	15 65c.	14.47c.
Expenses do	14.89c.	11.8c.	10 97c.	10.04c.	8.25c.
Profit do	8.74c.	6.7c.	5.63c.	5.61c.	6.22c.
Receipts per passenger carried	4.65c.	4 5c.	4.49c.	4.45c.	4.33c.
Expenses do do	2.97c.	2 93c.	2.99c.	2.85c.	2.46c.
Profit do do	1 68c.	1 57c.	1 50c.	1.60c.	1.87c.

The St. Johnsbury Street Railway Company, St. Johnsbury, Vt., has opened its stock subscription books and will construct an electric line this season. The officers are F. C. Kennedy, Burlington, Vt., president; T. C. Fletcher, St. Johnsbury, vice-president; A. O. Humphrey, Burlington, clerk and treasurer.

Having purchased the controlling interest in the Berlin & Waterloo, Ont., Street Railway, held by Mrs. Burt, of New York, E. Carl Breithaupt, W. H. Breithaupt and others, have elected E. C. Breithaupt a director and president. T. M. Burt continuing as manager, and T. E. McLelan as his efficient assistant.

The newly incorporated Colonial City Traction Company at Kingston, N. Y., has elected the following directors: Charles M. Preston president; John E. Kraft, secretary; Abram Hasbrouck, treasurer; John I. Waterbury, August Belmont, William F. Russell, William Hutton, G. D. B. Hasbrouck and George Hutton.

For the Syracuse & Oneida Lake Electric Railway, now under construction at Syracuse, N. Y., the following directors have been elected: Hiram McGonegal, Walter S. Wales, William B. Kirk, Josiah B. Morgan, William O'Conner, Thomas M. Meacham, Edwin Lodder, James N. McCormick and William E. Wheaton.

Since the purchase of the Fort Wayne Electric Railway by John J. Shipherd and associates of Cleveland, the board of officers has been changed to the following: John J. Shipherd, president; J. M

Mother-in-law is the nick-name for electric heaters.

Must be because they keep things warm for everybody.

Since the resignation of F. L. Threedy from the general management of the North Chicago Street Railroad and the announcement of his intention to retire from active service, he has been induced by the earnest solicitation of Mr. Yerkes to partially reconsider his action. In a communication to Mr. Threedy, Mr. Yerkes said: "There is no reason why you cannot retire from active service and at the same time not resign from the service of the company. * * Your thirty-five years of active service in our employ, during which time you gave such earnest and valuable attention to the affairs of the company, has placed you in position where I do not feel satisfied to allow you to give up your connection with the company entirely." He has, therefore, decided to remain with the company in some capacity.

The Reduction in Car Fare

Some of the dailies in the smaller cities are working themselves in quite a frenzy over the discovery that while the selling price of almost every commodity has been greatly reduced during the past two years, the price of a street car ride remains the same as before.

At first glance, and to one unfamiliar with street car business there would seem to be some foundation for such an impression. We have always been inclined to the belief that very much of adverse public opinion arises from an entirely wrong conception and understanding of the situation; and that too often the manager, discouraged and disgusted at the tide of unreasonable demands made upon him, has good reason to believe that the celebrated Vanderbilterian philosophy did the subject but scant justice. At the same time, no opposition is so dangerous as ignorant opposition; and when that ignorance prevails among the intelligent classes of a community, the misfortune is doubly aggravated. But this is precisely the situation in many places. On no other one subject, outside of a man's own occupation, does he really believe he is so well informed, as on how to run a street railway. Hence, when the local press, inadvertently,—or frequently from less honorable motives—throws out the statement that a five cent ride is a robbery, the public arise as one man and shout amen.

But have not fares been reduced? We assert that on 19 out of every 20 roads in this country, they have. On some with very short hauls and a greatly increased volume of business, it has been possible to actually make the fare unit less than 5 cents. On the others the reduction has been in furnishing a 10 cent ride for the old 5-cent-rate.

The public do not expect as good a room, in as good a part of the house, nor as fine a meal served by well-trained waiters in dress suits, at a dollar-a-day tavern as they demand at the palatial hotels where the charges are from four to eight dollars per day. In this, they expect and are satisfied to pay in proportion to the service, the comfort, and something for the reputation of putting up at a place which everybody knows is first-class. The citizens realize that at least one good hotel is an absolute necessity in every city. They take pride in it; they urge their friends to patronize it as it has largely to do with the good or bad impression of the town, a visitor carries away with him. They do not think of asking a four-dollar house to make a two-dollar rate and furnish the same quality of service.

To a much larger extent than in the case of the hotel, is the street railway of a city a quasi-public institution which has come to be one of the surest means of determining what kind of a town it exists in. If the tracks have all gone to pieces, the cars old and dirty and uninviting, oil dripping from dingy lamps; the men in charge unkempt, uncivil and stupid; the cars operated at infrequent and irregular intervals, and in fact the whole system run down; it gives the town a black eye as as nothing else can do. It is, therefore, admittedly, a question of personal interest, pride, and indirectly money; to every business man and resident in that town to have its street railway a creditable one.

But what readily passed as a creditable road a few years ago, would be laughed at as a back number now.

Let us take an example of which there are scores of illustrations. Slowtown was still dragging along in old style horse cars; Pushtown, its rival neighbor, opened its new electric line with great eclat. There the cars were new and large and comfortably seated. To ride in them as compared with the old horse cars was as different as a ride in a lumber wagon is different from conveyance in a carriage. This would not do. Visitors lost no chance to ridicule the one and praise the other. It began to get abroad that Pushtown was walking away from Slowtown. Something had to be done.

And so it was the owners of the Slowtown road had to sell their horses for a song; build heavier tracks for electric cars. These cars were new and expensive. They were modern in all respects; attractively finished, the seats were easy, the interior made as bright as a drawing room with clusters of incandescent lamps. The cars were mounted upon good trucks and springs, and traveled on good wheels. Then, there was the overhead system to install, and extensive alterations to make in the car house, and new tools and machinery to buy; for the curry combs, blankets, forks and hay choppers that were all right for a horse road, somehow proved of no account in repairing motors and rewinding armatures. And there were motors to buy for the cars, and a great big power house to install with costly engines and boilers and generators; and when the owners got through they found they had built a new road and it was a puzzle where the old one had gone to.

And while the owners were reconstructing they made an extra effort and extended some of the lines. True, the business in sight did not warrant the expenditure but the manager was progressive and took chances on the future. He didn't get any more money for handling the people the extra mile or two. The citizens were just that much ahead. And when the new road was finished, and carried passengers three times as fast as before, and in cars that cost three times as much as the old horse cars, they didn't raise the price as is done when an old hotel is rebuilt and converted into a first class house. No, the quality and quantity of the service was more than doubled, but the price of fares remained the same.

Hence, we affirm, comparing the present with past service rendered, the public are receiving a 10-cent ride for

5 cents. It not only is well worth five cents, but the people are willing to pay it. There can be no question about this. Given an electric road, say three miles long on one street, equipped as electric lines are; and given an old style horse road three miles long a block away and parallel to the electric; then let the horse road make a 3-cent fare and the electric a 5-cent fare, and the public will not need any logician to elucidate to them which is the cheaper ride—the best bargain—the road which gives the largest return for the money. Not only is time "money;" but Americans want good things and are willing to pay for them.

Everybody knows the best costs more than cheap substitutes.

Another feature which the local press and the public seem to entirely overlook; viz: that in most cases; and to a large extent in every case the money which has been the golden key which has opened to the city all the countless benefits of rapid transit; has been secured from outside sources. It is just that many hundreds of thousands added to the wealth of the city, for it is built there and cannot be taken away. The owners of the road have, of course, large sums of their own money invested, but they have also assumed responsible obligations in interesting—no easy matter either—outside capitalists to entrust their good money to the managers of the Slowtown road. They took chances; chances none of the people who growl about a 5-cent fare took; and many of them will not get their money back for years; some never will. What seems strange, too, is the fact that none of these people who make the howl about high fares, saw the big returns to be realized by putting some of their own money into the road. There is not a manager in the country but would be delighted to have every share of stock and every dollar of bonds owned by the people who ride in the cars these stocks and bonds paid for. And the people who raise the cry of high fares, are the people who are best able to pay. The workingman does not rebel. He is willing capital, should have a just return, and he is willing to pay a rate of fare which will enable the manager to pay fair wages to the employes and reasonable returns to the owners.

But the all-convincing argument on which the papers clinch their assertions, is the great economy of electric operation over animal power. But this is less than supposed, with the present low prices of horses and feed; as against increased investments for power. It is misleading, for it is obviously unfair to take the figures of horse car operation of any road, say three or four years ago, and compare them with the cost of electric operation to-day, with horses cheaper than ever before, and feed cheaper than in 20 years past. Electricity has made the horses cheap by closing the market to 100,000 head a year. But the decrease in cost of actual power used over horse power of the past, has been at the expense of vastly increased first cost in plant and cars and track. Interest has to be paid on this increased capitalization, but interest charges are seldom figured in operating expense. This alone goes a long way toward offsetting what at first seems a big saving in the cost of hauling a passenger. Then, again, there is a big charge to be made for renewals which will come one of these days, in a bunch, when engines, boilers, generators, and especially tracks, have all to be renewed. The life of these fixtures cannot yet be closely determined. As in the early days of cable railway, several years' operation was necessary to determine the life of cables, drums and engines. So now, maintenance is figured in the statement of operating expenses, but the depreciation of the big items which start in the thousands and quickly reach the hundreds of thousands, is as yet to a large extent an unknown quantity; to be determined only by several years' actual operation. These renewals of worn out apparatus, and the additional expense of throwing out machinery still good but out of date, in these days of rapid changes and improvements aggregate in the whole a very large and important factor.

People pay more to ride in palace cars than they do in day coaches, and are glad to; a telegram is quicker than a letter, and costs over ten times as much; even a special delivery letter costs five times as much as the one which takes the usual course of the mails, and people recognize the justice of the increased tax. In the case of the street car they demand both the luxury of fine rolling stock and rapid and frequent operation of the cars; two items which increase the cost of producing a ride. And in these days the people have a right to demand good service; but, in all fairness, should they expect to keep their cake and eat it too? And where this superior service is rendered is it unfair that the producer should be paid accordingly?

What? "Street car fare the only thing which has not been reduced." Why, it has been reduced 100 per cent!

OVERHEAD SYSTEM IN MADRAS.

The Madras, India, Times says: "The overhead system which is being adopted on the unopened sections lends itself to much more rapid construction than was the case with the conduit system, and the lines are now being laid down with almost most speed, which contrasts pleasingly with the delays of the opening work. The difference is so great, that it is wonderful that the system was not adopted in the first instance."

And Indian Engineering, Calcutta, comments on the above: "We have from the very commencement, expressed our conviction of the failure of the conduit system when applied in this country. And it was the adoption of the system in the face of strong opposition from shareholders which well-nigh succeeded in bringing the Madras Electric Tramway to a permanent collapse. With the now obvious success of the application of electricity to traction in Madras, we may fain hope to see the element further adopted throughout the country.

The Cincinnati Street Railway inaugurated a special mail service with fitting ceremonies.

SCALED A HIGH CHIMNEY IN SAFETY.

Encroaching rows of small dwellings have displaced one by one the foundry buildings occupied by Morris Tasker & Co., before they moved their plant to the present location. Like all products of Morris Tasker & Co., these buildings were constructed to last a long time. There was a chimney 200 feet high, which was so strong it had to be torn down from the top. Thomas Cutler got the contract for razing it, and his first task was to get a man up to the summit through the interior. First a hole was broken, so a man could get into the stack with a fine line and some sky rockets, which were shot off, the stick with the line attached falling to the ground, leaving half the line inside and half outside the chimney. An inch and a half rope was pulled up and fastened to an iron pole, its other end dangling down the inside of the stack. George Brennan was ordered to climb the rope on the inside for the purpose of rigging a block and tackle on the top. He started up bravely hand over hand, but lost his strength when less than half way, and slid down blistering his hands. Cutler, the contractor, made the next attempt, which was successful, for in a few minutes his head appeared over the top. He worked in his perilous position all the afternoon.

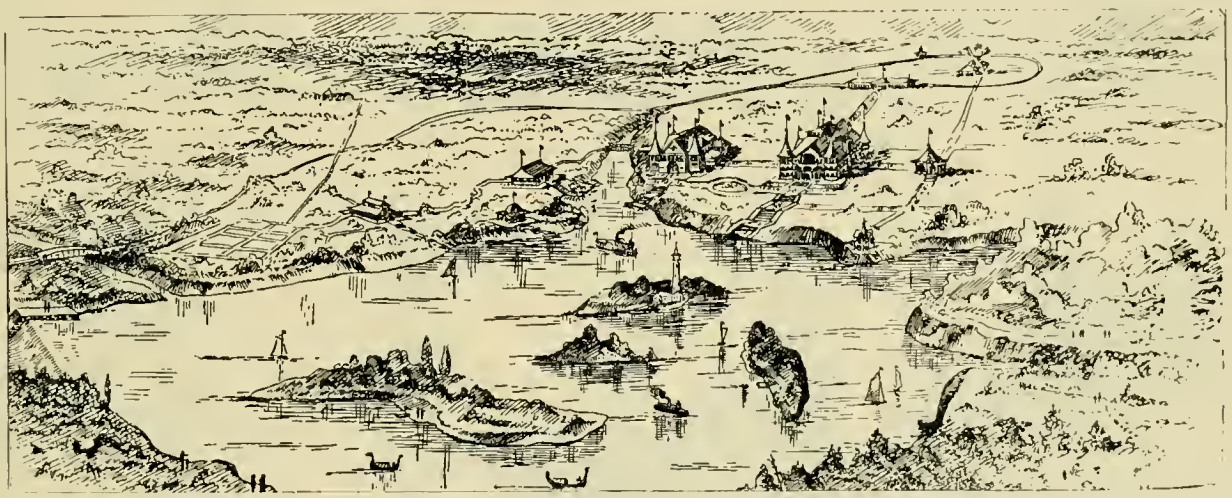
WORN SILVER COINS GOOD.

Chief Justice Fuller of the United States Supreme Court has decided that silver coins which are abraded only by circulation are legal tender as long as they bear semblance of the coin. James E. Morgan tendered a worn ten cent piece for fare for himself and wife to a conductor of the Jersey City and Bergen Railroad Company. It was refused because the conductor thought it was too badly worn to be worth par. Morgan got $315 and costs, which was affirmed by the Supreme court of the state and lastly by United States Supreme Court.

LAYING OUT A SUMMER RESORT.

Our illustrations give a hint of what the new park and summer resort of the Ft. Wayne Consolidated Electric Railway will look like, when it is completed. This is the only park in Ft. Wayne, Ind., yet if there were others the many attractions that this enterprise has to offer, would cause the rival parks to be deserted. The park is situated a short distance from the city and lies between the St. Joe river and a canal. The tracks of the company are being laid on the tow-path, so that even before the park is reached the ride puts the visitor in condition to fully enjoy the scenes at the end of the journey.

At night, the tracks will be lighted with incandescent lamps in 5-lamp clusters at 200 feet intervals. Cars will enter a terminal station 300 feet long, at the park, supplied with a loop, situated on a peninsula between two bayous. All the buildings are located on the peninsula, which is 600 feet long and about 25 feet above the level of the river. About 150 feet from the station, connected therewith by a covered walk, is the pavilion. The people are prevented from being crowded on the tracks by a fence with 25 gates, each guarded by a watchman. When a train is filled, the gates are closed.

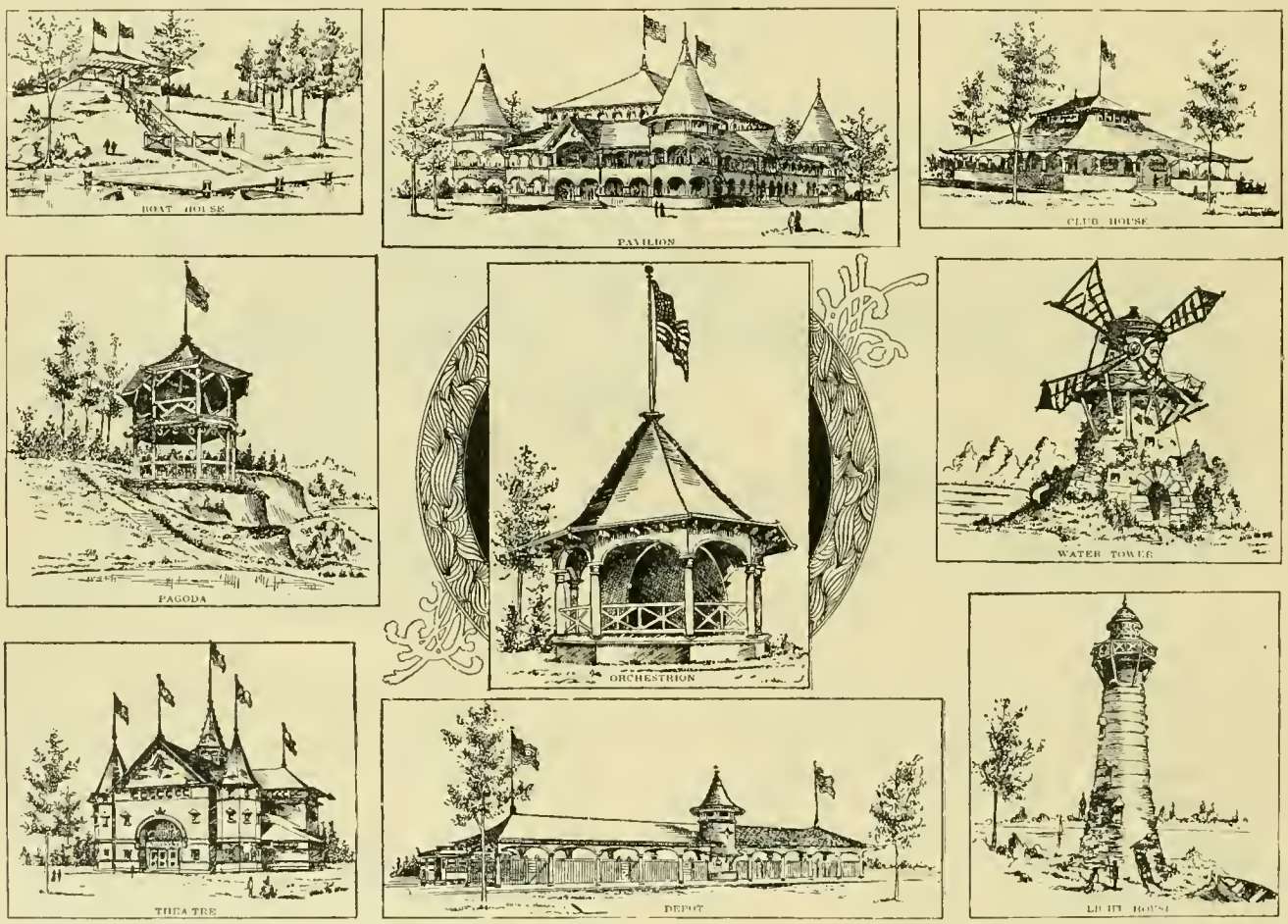


FT. WAYNE CONSOLIDATED RAILWAY.—BIRD'S EYE VIEW OF PLEASURE RESORT.

The pavilion, which will accommodate 500 people, is 150 by 100 feet, two-stories, facing the river. At each corner is a round tower. On each tower and corner, and on the angles of the roof, will be left spaces for flags and colors of societies which patronize the park. There will also be a club house with billiard, reception and private dining rooms, a theater that will seat 1,500 persons, a boat house, a water tower, and a light house. The marshy places on the property have been dredged, while the higher places make picturesque islands. Rowing, river tournaments and regattas will be features of the summer. On many points in the grounds, shaded by trees, little pagodas have been erected for the use of picnic parties.

Another commendable feature of the enterprise is the manner in which the management has advertised it. A description fully illustrated, has been printed on heavy card, which is placed where it will do the most good. Every man, woman and child in Ft. Wayne and the surrounding territory, knows of the new park, and is earnestly waiting for summer so he can enjoy its beauties.

M. J. Degnon, Cleveland, is the landscape engineer, who has laid out and designed this resort. He is also constructing 10 miles of extensions for the Fort Wayne Consolidated Company. Last season he designed and superintended the beautifying of the parks of the Columbus, O., Electric Railway, the famous Lagoon at Ludlow, Ky., opposite Cincinnati, and the park of the electric road from Youngstown to Niles, O.



RESORT BUILDINGS, FT. WAYNE CONSOLIDATED RAILWAY.

FOOLHARDY PEDESTRIANS.

Why do pedestrians and drivers expose themselves to the risk of personal injury by crossing tracks ahead of a moving car? asks a philosopher. The answer is that life in great cities educates persons to take risks. A person desiring to cross a street on which the traffic is heavy has two alternatives presented to him: taking a hasty survey of the moving vehicles he may plunge into the midst of the maelstrom and quickly thread his way across at considerable risk of life and limb; or he may wait, perhaps 5 or 10 minutes, for the crossing to become clear, and risk his chance of arriving at his destination on time. He chooses to risk his life. But many persons with whom time is no object exhibit the same propensity: from a dislike to making a sudden and unexpected stop. By the law of inertia, there is always more or less of a shock in stopping and starting; that is, a continuous motion is easier than a broken one. There is also a natural reluctance to allowing an inanimate object precedence over ourselves.

The young man who hurries across the track in front of the car has the same instinct as the one who helps the motorman to make schedule time by boarding the car while in motion. The cautious individual who hugs the sidewalk is the one who "falls asleep" on the car step while getting on or off. Indecision of the fair sex is the cause of many accidents. A woman will cross half way over a street, change her mind and attempt to run back, only to be run down by cars or teams, the drivers of which are totally unprepared for such a sudden move on her part.

Towson, the county seat of Baltimore county, Md., and Catonsville are 8 miles apart. The City and Suburban Railway has put on through cars at 12-minute intervals between them.

Six years ago—on January 10, 1889—a terrible wind storm wrecked the upper suspension bridge that spanned the Niagara chasm. Clean from its supports it was torn and dropped bottom up, on the banks and in the river 200 feet below. Nothing but the towers, the cables and the broken suspenders were left when daylight came to tell where the bridge was suspended when darkness fell the night before.

With remarkable enterprise the two companies controlling the bridge immediately placed orders for the necessary iron for a new bridge exactly like the one destroyed, and within seventy days the first delivery of material was made. Work was carried on night and day in the various establishments furnishing the steel. On March 22, 1889, the work of rebuilding commenced. The erection of the bridge consumed thirty-eight working days, so that 117 days from the time traffic was suspended, or on May 7, 1889, it was again reopened.

This was, indeed, engineering work worthy of praise The bridge destroyed by the fierce gale was itself a new structure, having been completed on December 15, 1888, less than one month before it was wrecked. Naturally, in the reproduction of this structure the bridge companies felt they knew what they needed and wanted, and that they were building a structure that would last for many years to come, but in entertaining such ideas the owners made a mistake. Their original bridge of wood stood for nearly twenty years, and had the bridge companies then been informed that steps to replace their new steel structure would be taken within six years, they would have laughed their informant to scorn. But this is what actually has occurred.

In 1889, when they were hurrying their bridge to completion, the bridge companies failed to take into consideration the possible development of the electric railway. In 1889 there was one street railway line at Niagara Falls. In length, it was 1⅞ miles long, and the company had some seventy stockholders.

Back and forth the horses went, and the people were unmindful that this little strip of track was practically the opening wedge of a grand development that was to be so revolutionizing as to force the expenditure of hundreds of thousands of dollars in bridge construction to accommodate the operation of cars, the motive power of which, in such a town, was simple expectation. Since then, the big tunnel of the Niagara Falls Power Company and the power installation connected therewith have been completed, there has been wonderful trolley line building in and about Niagara until so great is the desire to progress that there is an urgent demand for bridges across the gorge to accommodate trolley cars. To meet this demand, the Niagara Falls & Clifton Suspension Bridge Companies have already broken ground for the foundation abutments of a new steel arch bridge to replace the suspension bridge built so hastily in 1889. This new project is the most marked effect yet seen of the electrical development of Niagara. When completed the structure will be a wonder. From center to center of towers the suspension bridge is 1,268 feet long. The new bridge will have a span of 840 feet. In width, it will be 49 feet, the present structure being but 17½ feet wide. This increased width is made necessary by the fact that about 23 feet of the center will be given up to a double track tolley line. On each side of these tracks there will be carriage ways eight feet wide, and beyond these still there will be elevated walks, each about three feet, nine inches wide, for pedestrians. In all about 4,000,000 pounds of steel will be used. In order to avoid the outlet, or portal of the Niagara Falls Power Company's tunnel, it has been found necessary to carry the American end of the proposed steel arch a little to the south of the existing structure, but the center of the Canadian end will be on the exact center of the present bridge. The erection of this new bridge across the Niagara chasm tells that before many years visitors to the Falls will find it possible to make the trip around the gorge on trolley cars. Now a very fine double track road is in operation along the edge of the bluff on the Canadian side from the Falls to Queenston. A company is about to apply to the Dominion government in Ottawa for incorporation and a franchise to erect a bridge across the Niagara at or near Queenston. Such rights are already in the possession of the company on the New York state side, and no doubt before long a bridge will be built at or near Queenston on the one side and Lewiston on the other. Connections can then be made at Lewiston with the Niagara Falls & Lewiston or "Gorge Road," and cars direct from the city of Buffalo will find it possible to cross the river in sight of the Falls on the arch, run along the high bank on the Canadian shore to Queenston, cross the river to Lewiston, and run up through the beautiful Niagara gorge to the Falls and on to Buffalo along the river, making one of the most picturesque and delightful trolley rides in all America.

All this will electricity make possible.

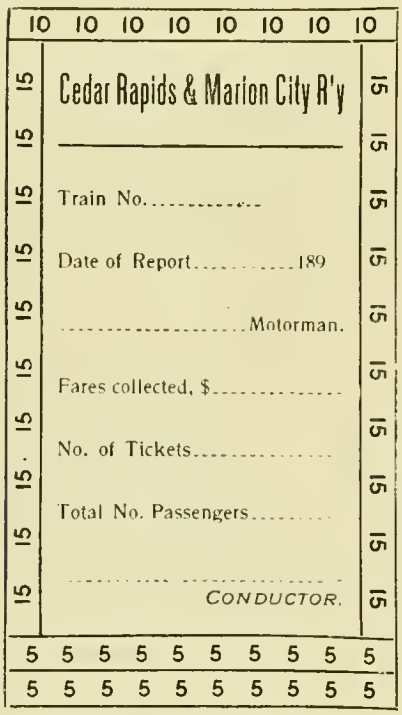
PAPER STREET RAILWAYS.

Pennsylvania's secretary of state has been getting after street railway companies that took out incorporation papers but have not done any construction. In Philadelphia there are 50 street railway companies that appear on the books of the secretary, but not one has secured a franchise or laid one foot of track. There is not a state that does not have a number of paper companies, which are of no account, yet there are so many of them that they keep investors who would develop such properties out of the field because they want too much for their franchises. It would save a lot of useless running around, if each state had a law requiring parties, proposing to incorporate, to show that they are able to do what they pretend they want to do.

HANDLING INTERURBAN FARES.

PART IV.

Even a small road can often give pointers to managers of large street railway properties, for problems have to be solved there, too. Several plans of handling interurban fares and different ways of accounting for them have been described in preceding issues of the REVIEW. In this issue is the plan of the Cedar Rapids & Marion City Railway, Cedar Rapids, Iowa. The company employs on its interurban line, three conductors, who have been in the service a long time, and have served the company so well that there is no doubt of their honesty. There are three classes of fares 5, 10 and 15 cents, with 25-ride tickets that sell for $2.50, good for a continuous trip from one end of the line to the other. When the conductor collects a fare he punches the amount on the trip card shown full size herewith. The daily report shows number of trips, time of leaving and arriving at terminals, number of 5, 10, and 15 cent cash fares, total cash, total tickets, total transfers, total dead heads, names of purchasers of tickets, ticket number, destination, amount paid, names and ticket numbers of dead heads, except police, letter carriers, employes, whose badge numbers are recorded, laborer ticket numbers, time car received with names of motorman and conductor, and time delivered, with names of motorman and conductor.



The company has 14 miles of single track and owns 20 motor cars, most of which are used in Cedar Rapids, the interurban service being a special service. P. E. Hall is president, John Ely, secretary, C. H. Clark, treasurer, F. L. Diserens, superintendent.

L. N. Downs, E. E. Downs and F. N. Rowley, owners of the Citizens' Street Railway, Battle Creek, Mich., who recently bought the Lansing City Electric Railway Company have overhauled the system. The track has been rebonded with No. 0 copper wire in place of No. 8 iron. New rail has been laid and several new cars have been put in service. An extension to Leadler's Park will probably be constructed in the spring.

THE GOING OF THE TROLLEY.

Fred De Land, in his Electrical Engineering tersely says:—"The trolley must go. Of course it must go. What else was it devised for but to go, and to go quickly? It's a dutiful trolley and it's going on about its own business, up one street and down another, out to the distant suburb and into the heart of the city. Going at a speed that enables working boys and girls to sleep half an hour longer in the morning; going so swiftly that the father may do a bit of housework after enjoying a hot supper; going so securely that the good mother need fear no harm shall befall her dear ones; going out into God's section of the great city, where the green grass and the birds and the fresh air may be enjoyed by many a family heretofore huddled in a single room or two in a down town tenement. Oh! the trolley is going—going to regenerate the social conditions of thousands of working men and women. And may it continue to go on this mission until a better system can be devised for rapidly transporting the public."

EDWARD F. C. YOUNG.

Edward F. C. Young, president of the Consolidated Traction Company, Jersey City, N. J., is a self made man, who is recognized as a power not only in financial circles, but in political circles in his state. He began his career in 1835, in Morris County, N. J., where he first saw the light of day. In 1852, he was employed as clerk in the Hudson County Bank, and stuck to banking, being promoted from time to time as he thoroughly mastered his duties, which have fitted him so well for the high financial position he occupies as president of the First National Bank, of Jersey City, and Director of the Liberty National Bank, New York. Mr. Young was city treasurer for five years, alderman, freeholder and state railroad director. He has been invited twice to become a candidate for United States senator, three times to be candidate for governor, and several times asked to stand for congress, but, his business did not permit him to accept. Mr. Young has been receiver for several large enterprises, among them the sugar and cordage trusts.

E. F. C. YOUNG.

A leak short circuited a submarine cable of the City & Suburban Railway under the river at Portland, Oregon, and the cable was melted in two. A local paper thinks that whatever burns a cable in two when at the bottom of a river is "hot stuff."

STREET RAILWAY LAW.

EDITED BY FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Duty to Place Guard Wires Between Trolley and Telephone Wires.

Negligence in omitting to place guard wires between trolley wires and telephone wires, and whether such negligence was the proximate cause of a shock to a traveler from contact with a broken telephone wire which had fallen across the trolley wire, are questions for the jury.

The lack of guard wires between trolley wires and telephone wires will render a trolly company liable for injury to a person in a street by contact with a broken telephone wire lying across the trolley wire, if the omission of the guard wires was negligent and was also the proximate cause of the inquiry.

Newman J. in the opinion of the court said; no doubt it is the duty of the defendant to use such customary and approved appliances as are known and used in the business of operating electric railways. So far as reasonable knowledge, in the present state of the science and the practical use of electricity as a motive power for street railways, and reasonable foresight, can go, it is bound to guard the public against the perils attendant upon this use of electricity. But it is liable only for what is known as "reasonable care." The present state of the science, and the present practical knowledge of the most practical and effectual means and methods of guarding against such perils as are incident to its use, are a most important element in the question of what is reasonable care. In the present condition of the science and of the practical knowledge on this subject, it cannot be said, as matter of law, what method of guarding the wires shall be required, nor whether any guards shall be required; for it is not known to the law that any method now known will prove effective. But it is a question for the jury, under all the facts in the case, to determine whether the method actually used was negligent. The trial court treated this question as one of law. He instructed the jury, in effect, that guard wires placed over the trolley wires is the approved method of protecting the telephone wire, in such places, and refused to submit to the jury, in the special verdict, the following question proposed by the defendant: "Did the defendant, in the construction and operation of the street railway in question, exercise such care and prudence for the safety of persons using the highway as men of ordinary intelligence and prudence engaged in operating the railway in question would have exercised at the place in question?" The instruction virtually took the question of the defendant's negligence from the jury. The refusal to submit the question asked withdrew it altogether from the jury. The question of the defendant's negligence is always for the jury, unless the negligence is so clear upon the evidence that intelligent minds cannot fairly form different conclusions upon it. This question was a proper one to be submitted in a special verdict. It related to a material issue of fact, and one upon which the case, in a large measure, turned. Both the charge upon this point and the refusal to submit this question were error. This is in no way inconsistent with what was decided in State v. Janesville Street R. Co., 87 Wis. 72, 22 L. R. A., 759. That case was on demurrer to the complaint. The action was mandamus to compel the railway company to put guard wires above its trolley wires at crossings. An ordinance of the city required it. The complaint alleged the ordinance, and that guard wires are the proper and approved method of preventing danger from the falling of the telephone wires upon the trolley wires. These facts were admitted by the demurrer. The case in no way involved the decision of the question whether guard wires are the proper method, or whether it is negligence to omit the guard wires.

It is claimed that plaintiff's accident was caused, directly, by contact with a telephone wire, belonging to the telephone company, and neither owned nor controlled by the defendant and in a street to which its system did not extend. More remotely, it is supposed to have been caused by the falling of the telephone wire upon the trolley wires, which became a live wire by such contact. There would be no claim against the defendant unless it could be shown that the telephone wire was alive with electricity communicated to it by the trolley wires. The defendant may be liable for the result, if its omission to guard its wires was negligence, and if that negligence was the proximate cause of the plaintiff's damages. The real first cause of the accident is in doubt. The real test of the defendant's liability for the plaintiff's accident is whether the omission to guard its wire, that being found by the jury to be negligence, was the proximate cause of the accident, the negligence is not the proximate cause of the accident, unless, under all the circumstances, the accident might have been reasonably forseen by a man of ordinary intelligence and prudence. It is not enough to prove that the accident is the natural consequence of the negligence. It must also have been the probable consequence. (Atkinson v. Goodrich Transp. Co. 60 Wis., 141, 163, 50 Am. Rep. 352 Barton v. Pepin County, Agr. Soc., 83 Wis., 19.) This, too, is always a question for the jury, where the evidence is not clear, or the proper inference from undisputed evidence may be in doubt. The defendant asked to have this question submitted in the special verdict. This was refused, and no instruction was given relating to this element in the question of proximate cause. The defendant's proposed question was as follows: "Ought men of ordinary intelligence and prudence, engaged in operating the street railway in question, to have reasonably expected that the telephone wire in question would be likely to come in contact with its trolley wire at the place in question, and occasion injury to persons lawfully using the highway crossed by said telephone wire?" The refusal to submit this question, in a proper case, has been held by this court to be

error. Atkinson v. Goodrich Transportation Co. supra. These two special questions, which the trial court refused to submit, cover the whole question of the defendant's liability. Was the defendant negligent? Was the negligence the (proximate) cause of the damages? These are material issuable facts, such as a party has the right, under the statue, to require to be submitted in a special verdict. They should have been submitted, at least, in substance. The charge of the trial court was long and copious. It contained a long and able disquisition upon the subject of the uses and purposes of highways, and of the rights of travelers to free and unobstructed passage therein. He said: "The public have the right to the free and unmolested and unobstructed use of the streets, and no person has the right to hinder and prevent the use of the streets for the purpose of travel," and much more to the same purpose. It would be all very well in a case where questions of that nature were involved. But in this case it tended really to keep out of sight and obscure the real point in controversy. Both the telephone company and the defendant had a perfect legal right to have their wires over the streets. They were no illegal obstruction of the streets. The point involved in relation to them depended on entirely different considerations. It was whether the defendant was negligent in permitting the telephone wire to fall upon its wires. This part of the charge went upon a mistaken theory of the case, and was very likely to mislead the jury by distracting attention from the point of stress in the case.

Relating to the amount of the damages to which the plaintiff might be entitled, and as affected by the permanency of the plaintiff's injuries, the court charged: "I instruct you, gentlemen, that you cannot take into consideration, as an element of damages, any testimony on the subject of the permanency of the injuries, unless you find, from the testimony, that there is reasonable probability that the injury that he has sustained, and the suffering and disability he is now under, will be permanent and lasting." The criticism is on the phrase "reasonable probability." Because the phrase is equivocal, it is liable to communicate to the jury an erroneous impression that some degree of proof less than of reasonable certainty may be sufficient. It is settled in this court that the degree of proof must amount to reasonable certainty. (White v. Milwaukee City R. Co., 61 Wis., 536, 50 Am. Rep., 154; Hardy v. Milwaukee Street R. Co. Wis.) decided at this term, but not yet officially reported. The defendant asked for a special instruction to the effect that damages as for permanent injury should not be allowed unless the jury could say from the evidence that it was reasonably certain that the injury would be permanent, and that reasonable probability was not sufficient. This the court refused to give. The instruction given was erroneous, and it was error to refuse the instruction requested. For the errors mentioned, the judgment must be reversed.

(Supreme Court of Wisconsin, Block v. Milwaukee Street Ry. Co., 27 Lawyers Reporters annotated, 365.)

Passenger Crowded off Platform—Notice to Conductor to Stop.

A street railway company is not chargeable with negligence toward a passenger who is crowded off the platform of a car by other passengers, where there was plenty of room inside the car, although he had assumed such position after notifying the conductor to stop at a certain street which was not done, and the accident occurred while he was waiting for the next street to be reached.

(Supreme Court of New York, Glyn v. New York and H. R. Co., 85 Hun. 408.)

Care Required of Street Railway Company—Not Required to Select Best Method—Injury to Workman—Failure to Ring Bell.

A street railway company in operating its road, running its cars and selecting its appliances and employes, is not required to exercise the best method human skill and ingenuity have devised to prevent accidents, but the care and prudence employed should be reasonably commensurate with the danger to be encountered.

A gripman upon a cable car has the right to assume that a workman upon the street will exercise ordinary care to note the coming of the car and get out of the way in time to avoid danger.

Failure of the gripman of a cable car to ring the bell or sound a gong is not of itself sufficient to render the company liable for the death of a workman upon the streets where the latter could, by the exercise of ordinary care, have avoided the accident.

Contributory negligence by one run over by a cable car will not prevent recovery for his death if the company discovers or should discover such contributory negligence in time by the exercise of ordinary care to avoid its effects and fails so to do.

A street railway company is not liable for the death of a workman upon a street who, in a condition of fright, steps to the wrong side of the track and into the danger, unless some neglect or wrongful act on its part occasioned such fright.

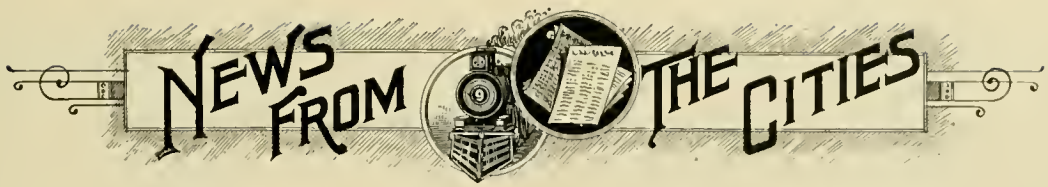
A workman upon a street who fails to exercise his faculties of seeing and hearing to note the approach of a cable car, and to exercise ordinary care and prudence to get out of its way, when by so doing accident could be avoided, is guilty of contributory negligence.

(Superior Court of Cincinnati, McKeown v. Cincinnati Street Railway Company, 2 Ohio Legal News, 388.)

Injury by Acts of Fellow Passengers—Ejecting Passenger from Car.

A carrier is not liable for an injury to a passenger by another passenger shoving him in the way of a third passenger who is being ejected from the car, although the act is done in the presence and with the knowledge of the conductor.

(Appellate Court of Illinois, Springfield Consolidated Railway Company v. Flynn, 55 Illinois Appellate Court Reports, 600.)



Alabama.

SELMA, ALA.—The Selma Street Railroad, formerly a dummy line, but now operated by mules, is to be changed to electric if a franchise can be obtained.

MONTGOMERY, ALA.—The Montgomery Suburban Street Railway Company has been incorporated with $100,000 capital by Alexander Troy, George B. Shellhorn and W. T. Siebles to purchase the West End & Riverside Street Railway. Improvements and extensions are planned.

Arkansas.

PINE BLUFF, ARK.—J. M. and J. G. Taylor, attorneys for the St. Louis Trust Company, have begun suit to foreclose a mortgage for $90,000, on the entire property of the Citizen's Street Railway Company. Electricity will probably be adopted after the sale.

California.

SAN BERNARDINO, CAL.—Foreclosure proceedings have been brought against the Arrowhead motor road.

SACRAMENTO, CAL.—The Sacramento, Fair Oaks & Orange Vale Railway Company has been granted its electric franchise.

LOS ANGELES, CAL.—The Los Angeles Electric Railway Company has purchased the Main Street & Agricultural Park Street Railway.

OAKLAND, CAL.—John Allman, W. H. McKinnon, of Oakland, and Richard Wylie, of Napa, are interested in a project to build 72 miles of electric road between Napa and Vineyard.

SAN FRANCISCO, CAL.—Sydney E. Cushing, A. E. Kent, Alfred Borel, Louis Janes and others are interested in a company which will build up Mount Tamalpais. Some contracts have been let.

OAKLAND, CAL.—Mrs. Phoebe Blair has brought suit against the Consolidated Piedmont Cable Company to recover $10,000 on a promissory note. An execution for $11,496 has been issued against the company in favor of A. L. Black.

Canada

OSHAWA, ONT.—The Oshawa Electric Railway Company's barn has been burned together with three cars.

TORONTO, ONT.—The Toronto, Hamilton & Niagara Falls Electric Railway Company has applied for incorporation.

HULL, QUE.—Theo. Viau has leased water power for his proposed road to Aylmer, and is organizing a company for construction.

CHATHAM, ONT.—Thomas W. Horn and H. A. Beatty, of Toronto, have been here looking up the prospects for building an electric road.

HAMILTON, ONT.—The goods of Hamilton Radial Railway have been sold under several executions. The company will start again under new management.

CORNWALL, ONT.—Having raised the requisite capital, Mr. Hitchcock has let the contract for constructing the Cornwall Electric Railway to Hooper & Star, of Montreal and New York.

VICTORIA, B. C.—The mortgage on the thirteen miles of road operated by the Victoria Electric Railway and Lighting Company, has been foreclosed, and the system is offered for sale.

Connecticut.

MIDDLETOWN, CONN.—The Middletown Street Railroad has purchased the Portland Street Railway.

WESTPORT, CONN.—The Westport trolley company has bought three mill powers for an extension to Redding.

WESTPORT, CONN. Directors of the Westport & Saugatuck Street Railway, have voted to extend to Compo Beach and Lyon's Plains.

CLINTON, CONN.—W. H. McMurray, of Hartford, has been buying disused water powers in this vicinity for an interurban electric road. J. Hazelton Cook is his attorney in Clinton.

POINT JUDITH, CONN.—William C. Clark, of Wakefield, is about to begin the construction of the 30 mile seashore electric road between Watch Hill and Narragansett Pier via Point Judith.

WOODBURY, CONN. Henry Jeffrey says the electric railway project is being revived. The road is to be twenty miles long, connecting Farrington, Litchfield, Morris, Bethlehem and Woodbury.

Chicago.

CHICAGO.—The Union Loop Company has leased a site on which to build a power house costing $200,000, to furnish current for the elevated electric cars.

CHICAGO.—The new ordinance of the General Electric Railway Company has been passed by the council. Three years are given in which to lay track and place the road in operation. Underground or overhead trolley may be used.

CHICAGO.—Foreclosure proceedings were begun January 30, against the Lake Street Elevated Railroad by the Farmers' Loan & Trust Company, of New York, on a mortgage for $7,515,000. The trustee also asks the appointment of a receiver.

CHICAGO.—Lesser Franklin has given a mortgage for $150,000 to the Security, Title & Trust Company, on Franklin Park and Gage's addition to Franklin Park. The money will be used to construct two miles of electric railway and water works.

Delaware.

WILMINGTON, DEL.—The shed and eight cars of the Wilmington City Railway were burned on the night of January 16. Loss, $8,000. Fully insured.

WILMINGTON, DEL.—Having obtained its right of way the Wilmington & Elsmere Electric Railway Company will construct immediately five miles of line.

District of Columbia.

WASHINGTON, D. C.—The Washington, Annapolis & Chesapeake Railroad Company has been incorporated by Gen. Joseph B. Seth and others, to use steam or electric power.

Florida.

PALATKA, FLA.—William P. Craig, contractor, writes that he has been granted an extension of his franchise, and will lay two miles of track to Palatka Heights.

PENSACOLA, FLA.—The Pensacola Terminal Railway Company will meet at Baltimore, Md., to decide upon a change of motive power from horse and steam to electricity. W. H. Bosley, the principal bondholder, and J. H. Macleary, general manager, have planned for the expenditure of $200,000 on the change.

Georgia.

ATHENS, GA.—Superintendent C. D. Flanigen, of the Athens Railway (electric), says that work on the extensions will soon begin.

ATLANTA, GA.—Rolling stock will be purchased in the spring for the extensions of the Chattahoochee River Electric Railway. Jerome Simmons and J. K. P. Carlton are sole owners, the latter having bought out the Short Electric Company and E. H. Jones & Co.

ATLANTA, GA. Receiver J. F. W. Darr, who has been operating the Chattahoochee Street Railway Company as the Collins Park and Belt Railroad Company, has been discharged by the court, and the line restored to the stockholders, who contemplate extensions and improvements.

Illinois.

OTTAWA, ILL. A. F. Schoch, ex-receiver for the Ottawa Electric Street Railway, is trying to organize a company to operate the road.

QUINCY, ILL.—J. C. Hubinger, the street railway man of Keokuk, Ia., proposes to build an electric road sixty miles in length between Quincy and Niota. James Harrington is getting the right of way.

ELGIN, ILL.—On January 29 stockholders of the proposed electric railway from Elgin to Aurora met to change the name to Suburban Railway Company, and increase the capital to $5,000,000 and issue $3,000,000 bonds.

OTTAWA, ILL.—Albert Schoch, who is forming a company to operate in Ottawa has almost given up the plan to buy the old street railway of the General Electric Company, and now talks of building an entirely new system at a cost of $70,000.

ROCKFORD, ILL.—The Rockford Traction Company, recently organized, with John Farson, president, H. B. White, secretary and treasurer, and Chris Murtagh, superintendent, has taken possession of the West End road, and will make radical changes. Headquarters will be in Chicago.

Indiana.

WABASH, IND.—Charles Everett, of Fort Wayne, is promoting an electric line from Celina, O., to Rochester, Ind., by way of Wabash.

WASHINGTON, IND.—The Washington Street Railway will at once be converted from horse to electric and extended. Pleasure resorts will be established.

MADISON, IND.—L. E. Walkins, of Boston, has organized the Ohio River, Madison & Central Railway Company, with $100,000 capital, to build the proposed electric road, franchise for which has not yet been granted.

VINCINNES, IND.—B. G. Hudnut, of Terre Haute, has purchased the interests of local parties in the Citizens' Street Railway Company, and is now sole proprietor, E. F. Tindolph having resigned his position as general manager.

MADISON, IND.—The city council has engaged Pierce and Richardson, of Chicago, to prepare plans and specification of the proposed electric changes and extensions of the horse line now operated by the Madison Street Railway company.

NEW ALBANY, IND.—Edward B. Coolman, of New Albany, is surveying the electric road to Leavenworth, the promotion of which has been reported in the DAILY BULLETIN. When the survey is completed a meeting will be held at New Amsterdam, Harrison county, to organize a company.

ANDERSON, IND.—Noah J. Clodfelter, of Indianapolis, has incorporated the Indiana Interurban Railway Company, with $50,000 capital, to take the place, he says, of the Anderson & Marion Electric Railway, which he tried to start a year ago. Other incorporators are; W. R. Pearson, of Fairmount; A. J. Yawger, of the Yawger Construction Company, of Bucyrus, O.; William J. Kyle, of Gas City; John H. Winston, of Fairmount; John T. Sullivan, of Summitville, and L. C. Boyd, of Gas City.

Iowa.

KEOKUK, IOWA.—J. C. Hubinger has been offered a bonus of $75,000 to build an electric road to Quincy, on the Illinois side of the Mississippi river, over which a bridge may have to be built.

Kentucky.

GEORGETOWN, KY. Over $9,000 of the $12,500 required for the electric road and ice plant, has been subscribed.

MT. STERLING, KY. Hon. John P. Martin, Xenia, O., is promoting a 12-mile standard gage electric coal road to Sharpesburg.

COVINGTON, KY.—The South Covington & Cincinnati Street Railway Company will expend $10,000 in improvements at the Ludlow Lagoon summer resort.

HENDERSON, KY.—W. F. Rapier, proprietor of the Ellendale Fair Grounds at Curdsville, is organizing a company to build an electric railway between Henderson and Curdsville.

LAWRENCEBURG, KY.—The electric road from Waddy to Frankfort is now pronounced a fake by all reports from the localities it would have traversed.

PADUCAH, KY.—A. C. Einstein, manager, writes that the Paducah Electric Company will probably install one 250 or 350-horse-power water tube boiler, complete; one 60 or 80-kilowatt generator, 500-volt direct-connected; several car equipments and several cars, bodies and trucks.

Maine.

BANGOR, ME.—The erection of a power house is contemplated by Bangor, Orono & Oldtown Railway Company.

SKOWHEGAN, ME.—The Somerset Traction Company, has been incorporated to construct and operate a street railway. Capital stock, $75,000, of which $30,000 is paid; president, R. B. Shepherd, of Skowhegan, and treasurer, T. H. Anderson, of Skowhegan.

GARHAM, ME.—The citizens want an electic road to Westbrook. Among those interested are, Stephen Hinckley, George B. Emery, Lewis McLellan, Thomas Farden, John A. Waterman, George W. Lowell, John A. Hinckley, W. W. Corthell and Hon. Frederick Robie.

Maryland.

BALTIMORE, MD. The Baltimore and Catonsville Construction Company, which is constructing the Columbia & Maryland Electric Railway from Baltimore to Washington, has appointed David Newbold, John Hubner and R. S. Carswell, all of Philadelphia, a committee to award machinery contracts.

Massachusetts.

ATHOL, MASS.—The Athol & Orange Street Railway will construct a power-house here.

DIGHTON, MASS.—The Dighton, Somerset & Swansea Street Railway has increased its capital to $125,000.

NORFOLK, MASS.—The Norfolk Suburban Street Railway Company has asked authority to issue $75,000 stock to take up debts and make extensions.

SHELBURN FALLS, MASS.—The Shelburn Falls & Colraine Street Railway Company was incorporated February 5, by H. Newell, Andrew Sauer, A. J. Amstein and A. W. Ward.

BRAINTREE, MASS. The Weymouth & Braintree Street Railway Company is to erect at once in East Braintree a power house 45 by 100 feet, to contain three 300-horse-power boilers and two 150-horse-power engines, etc.

WOBURN, MASS.—The Woburn & Reading Street Railway Company has been granted right of way. Col. Charles F. Woodward, of the Wakefield & Stoneham Railway, says he expects the road to be in operation by May 1 next.

HANOVER, MASS.—Richard F. Jenness, Boston, has been chosen treasurer of the Hanover Street Railway Company. Construction will have to begin soon to save the franchise.

HOLYOKE, MASS.—W. S. Loomis, treasurer of the Holyoke Street Railway, says that the route of the proposed electric railway up Mt. Tom has been surveyed. The extension is estimated to cost $100,000, and would include summer resort features.

BROCKTON, MASS. The proposed 18-mile electric road is to be known as the Brockton, Bridgewater & Taunton Street Railway. The principal stockholders are William L. Douglas, president; William Jones, treasurer; Charles C. Merritt and Col. John J. Whipple.

MEDWAY, MASS.—The town meeting has voted in favor of the 7-mile trolley road to Milford, in which G. H. Ford, C. A. Tomkins, W. B. Stoddard, G. M. Gunn, C. W. Beardsley, of New Haven, and Willard B. Ferguson and Washington Benedict, of Boston, are interested.

GARDNER, MASS.—The Templeton Street Railway Company has been incorporated. Capital stock, $50,000; incorporators, Isaac Baum, S. F. Greenwood, John F. Chamberlin, George W. Baum, Eugene Lincoln, Frederick Greenwood, C. E. Ingalls and H. J. Wright.

WATERTOWN, MASS.—Col. Charles F. Woodward, general manager of the Wakefield & Stoneham Street Railway Company, is organizing a company to be known as the Winchester, Arlington & Watertown Street Railway Company. Capital stock, $150,000; and length of road 8 miles.

WAKEFIELD, MASS. Still another electric road is being promoted to pass through this place—the Winchester, Arlington & Watertown Street Railway. The majority of the stockholders are local residents, among them being Treasurer James F. Shaw, of the Wakefield & Stoneham Street Railway Company.

GLOUCESTER, MASS.—The Rockport Street Railway Company has been organized to build an extension of the Gloucester lines. Capital, $125,000; directors, W. B. Ferguson, Malden, Leander M. Haskins, Charles H. Cleaves, Alpheus Goodwin, and Henri N. Woods, Rockport; Albert D. Bossom, Chelsea, and A. R. Hallowell, Gloucester.

HINGHAM, MASS.—A company with S. W. Anthony, of Boston, as president, is to build a road connecting Hingham, Hull, Brocton, Nantasket Beach, and other towns. The directors are Wm. A. Tucker, Fred C, Hinds, Arthur H. Brooks, of Boston; Bradford C. Williams and Edward a Cowing, Hingham. Pepper and Register, of Philadelphia, are identified with the scheme.

GARDNER, MASS.—A bill has been filed to incorporate the Baldwinville and Gardner Street Railway, with Elwin L. Thompson, C. Aylmer Smith, Lorey D. Day, Willard Baker, Milton A. Wilson, Lucius W. Baker, Andrew M. Holmon, Henry L. Shepardson, Frank E. Russell, Gilman Waite, Herbert W. Small, Francis Leland and Fred Stone as incorporators. They are authorized to build a road anywhere in Templeton, Gardner and Phillipston.

Michigan.

YPSILANTI, MICH.—Thomas D. Kearney, attorney, has applied for an electric railway franchise.

ANN ARBOR, MICH.—J. R. McDonald, promoter, has taken an option on the Ann Arbor Street Railway.

MT. CLEMENS, MICH.—The Rapid Railway Company is about to enlarge its power plant to double its present capacity.

BAY CITY, MICH.—William B. McKinley, president of the Consolidated Street Railway Company, says the line to Essexville will be rebuilt.

DETROIT, MICH.—The Belle Isle Traction Company, newly organized by Vincent Field and Louis H. Kean, proposes to build an electric road and bridge to Belle Isle.

DETROIT, MICH.—George A. Parker, of Marine City, and Don M. Dickinson, a large property owner, are the leaders in the newest project to build an electric line between Detroit and Port Huron.

GRAND RAPIDS, MICH.—Stockholders of the Consolidated Street Railway Company will hold a special meeting February 20, to vote on the proposition to increase the capital from $2,000,000 to $3,000,000 to make improvements.

Minnesota.

DULUTH, MINN.—The Minnesota Point Street Railway Company, will extend and change from horse to electric.

MINNEAPOLIS, MINN. It is reported, though not on good authority, that the Minneapolis & St. Louis Railroad is thinking of operating a suburban electric service to Lake Minnetonka.

Missouri.

ST. LOUIS, MO.—The Southern Electric Railway will build a double track extension to Jefferson barracks.

DADEVILLE, MO.—R. A. C. Mack is agitating the question of building a motor line from Dadeville to Sharon.

KANSAS CITY, MO.—The Metropolitan Street Railway Company contemplates extending from Argentine to Turner, 4 miles.

ST. LOUIS, MO.—The Central Railway Company, promoted by Mr. Sweeney, has been granted franchises for many miles of electric railway.

KANSAS CITY, MO.—The Tenth Street Cable line will be sold under foreclosure at the upset price of $185,000. The liabilities are over $1,000,000.

ST. LOUIS, MO.—J. C. Jannopoulo, owner of the Suburban Garden, at Wellston, Mo., has been given the contract for $15,000, to build an electric road at Creve Cœur Lake.

KANSAS CITY, MO.—W. O. Hands, purchasing agent, writes that the North-East Street Railway Company wants prices on good second-hand pressed steel rail chairs.

ST. LOUIS, MO.—Stockholders of the Fourth Street & Arsenal Railway Company, voted January 31, to convert their lines from horse to electric; to increase the capital stock from $150,000 to $300,000, and the bonded indebtedness from $150,000 to $300,000.

ST. LOUIS, MO.—President Charles Green, of the People's Railway, has received a bid from the Love Electric Company for changing the Fourth street cable to the conduit electric system. The bid of $240,890 includes 3 generators, a 500-horse-power engine and 25 cars.

New Jersey.

BRIGANTINE, N. J.—Joseph Thomson has been appointed receiver of the Brigantine Transit Company. The liabilities are alleged to be $472,000 and assets $300,000.

PORT JEFFERSON, N. J.—The incorporators of the Patchogue & Port Jefferson Traction Company are Edwin Bailey, of Patchogue, president; P. H. Flynn of the Nassau Electric Railroad Company, Brooklyn, secretary; Frank Miller, Bridgeport, Conn., treasurer; Joseph A. McElroy, New York, and Fred C. Cocheu, Brooklyn.

ELIZABETH, N. J.—Barnard M. Shanley and David Young, of the Consolidated Traction Company, are conferring with Elizabeth capitalists on a plan to extend the company's line through Elizabeth, Cranford, Westfield and Roselle to Plainfield. The project includes the construction of a bridge over the sound to reach Staten Island.

New York.

MILTON, N. Y.—A. B. Paine has applied for an electric railway franchise.

PLATTSBURG, N. Y.—The Plattsburg Traction Company has been granted a franchise through the streets here.

SYRACUSE, N. Y.—The Syracuse Street Railroad is considering the buying of new cars and extending the system.

NORTH TONAWANDA, N. Y.—George P. Smith, of this place, is promoting a new line from Buffalo to Niagara Falls,

MT. VERNON, N. Y.—The North Mt. Vernon Electric Company will apply April 20, for a street railway franchise.

COHOES, N. Y.—The Cohoes City Railway is to be extended to Crescent, the business men having subscribed the funds.

WHITE PLAINS.—A franchise has been granted the New York, Elmsford & White Plains Electric Railway Company.

STILLWATER, N. Y.—The Stillwater & Mechanicville Street Railway Company has obtained consents for an extension to Troy.

BUFFALO, N. Y.—The Buffalo, Kenmore & Tonawanda Electric Railway has been bought by those interested in the Buffalo Traction Company.

SYRACUSE, N. Y.—The State Railroad Commission has granted a certificate allowing the Syracuse & Oneida Lake Electric Railway to construct its road.

BINGHAMTON, N. Y.—The Binghamton Railroad Company is figuring on several extensions, deriving current from the power house by "booster" or converter.

BROOKLYN, N. Y.—The East River & Atlantic Ocean Railroad Company, in which P. H. Flynn is interested, has renewed its application for franchises over thirteen miles of streets.

BATH, N. Y.—The Bath & Keuka Railroad Company has made application for a trolley railway here. Frank H. Viele, T. C. Bates, E. P. Shaw and W. H. Tyler, are interested parties.

LEWISTON, N. Y.—The Lewiston & Youngstown Electric Railway has been granted a franchise. F. R. March, Buffalo, is the attorney, and says 6 miles of road will be constructed this season.

PELHAM MANOR, N. Y.—The North Mt. Vernon Railway Company, which appears to be connected with the New York, Westchester & Connecticut Traction Company, has been granted a franchise.

NEW YORK.—The Fulton Street Railway Company has purchased all the franchises and personal property of the North & East River Railway Company, some time ago bought in by John H. O'Rourke.

BROOKLYN, N. Y.—Property owners have offered the Nassau Electric Railroad Company a free right of way as an inducement to extend through a number of suburban towns from Jamaica to Hempstead.

NEWBURGH, N. Y.—A consolidation of the Newburgh Electric Railway Company and the Orange Lake & Walden Electric Railway Company has been effected as the Newburgh, Orange Lake & Walden Railway Company.

PORT JERVIS, N. Y.—The Port Jervis Electric Railway Company has been incorporated, with $70,000 capital, to build 7 miles of road. Among those interested are Charles D. Haines, Lafe Pence, George McKibbin, Stephen R. Lake, Andrew G. Haines.

PATCHOGUE, N. Y.—The project to build a trolley line between Patchogue and Port Jefferson, L. I., which has been on the tapis for several months, is showing signs of life. The Patchogue & Port Jefferson Traction Company has just been organized.

NEW BRIGHTON, N. Y.—The New York & Staten Island Traction Company has been incorporated to construct railroads. Capital, $2,500,000; directors, Charles L. Horton, Arthur D. Chandler, Daniel H. Shea, Francis P. Lowery and William R. Morrison, of New York.

BUFFALO, N. Y.—The Elmwood Avenue & Tonawanda Electric Railway Company has applied for franchises. This company is controlled by the Buffalo Traction Company, which was recently denied right to operate by the state commissioners, and applies for practically the same streets.

Ohio.

CANTON, O. William A. Lynch has begun the survey of his proposed electric line to Akron.

DAYTON, O. The White Line Street Railroad Company has given a trust deed to secure $300,000 in bonds.

LIMA, O.—The Lima Electric Street Railway will extend its lines this season and will buy two open and one closed car.

LANCASTER, O.—Andrew Bauman & Company have bought the Lancaster Street Railway, and will improve and extend.

MT. VERNON, O.—Manager P. B. Chase, of the Mt. Vernon Electric Railway Company, says he will make extensions east and west.

YOUNGSTOWN, O.—The franchise of the Youngstown, Park & Falls Street Railway Company was, on February 5, declared illegal by Judge Gillmer.

ASHTABULA, O.—I. B. Reed, of Jefferson, has engaged surveyors to lay out the trolley line proposed between Jefferson and Ashtabula or Geneva, 8 to 10 miles in length.

CLEVELAND, O.—Vincent A Taylor, 224 Cuyahoga building, has applied to the county for a franchise for the Cleveland & Chagrin Falls Electric Railway Company.

SPRINGFIELD, O.—The Pennsylvania Railroad has instructed Electrician Crawford, of Altoona, to report on the cost of converting the Springfield branch, 10 miles long, into a trolley line.

ELYRIA, O.—A. L. Garford, E. D. Mussey, William G. Sharp and H. H. Clough, of Elyria, have purchased the new Elyria & Lorain electric, and will parallel Tom L. Johnson's Elyria & Lorain electric line.

MANSFIELD, O.—The Mansfield, Savannah & Wellington Electric Railroad Company, which was incorporated in January, has elected T. Y. McCray, president; T. B. Martin, secretary, and Nelson Ozier, treasurer.

LANCASTER, O.—The Lancaster Street Railway has been sold by Receiver H. B. Peters to A. Bauman, George Matt and Charles F. Nester, local capitalists, for $6,000. An electric line will be constructed within six months.

LORAIN, O.—W. G. Sharp and A. L. Garford, representing capitalists who brought the Mauldin franchises from Elyria to Lorain via North Amherst, have applied for an extension of the franchise for 90 days, when it is believed work will begin.

AKRON, O. The improvements planned by the new management of the Akron Street Railway & Illuminating Company include a car barn 50 by 150 feet, separate power house for the railway, a number of new cars and the overhauling of the old cars.

YOUNGSTOWN, O.—The consolidation of the Mahoning Valley Electric Railway Company and the Youngstown Street Railroad Company, which has been talked of for some time, was practically agreed upon at the stockholders' annual meeting.

CLEVELAND, O. The Akron, Bedford & Cleveland at its annual meeting, decided to increase its capital stock from $300,000 to $1,000,000, the increase to be spent on improvements on the suburban line and the proposed entrance to the city.

DAYTON, O.—John G. Webb, Springfield, has petitioned the Montgomery County Commissioners for right of way for the Dayton, Springfield & Urbana Electric Railway. Franchises have been secured in Clark and Champaign counties and construction work will soon begin.

CLEVELAND, O.—C. V. Hard, president of the Wooster, Medina & Cleveland Street Railway Company, and cashier of the Wooster National Bank, says that his company has right of way in Medina and Wooster counties and, after obtaining a franchise in Cuyahoga county, will begin construction.

AKRON, O.—The county commissioners have granted an eight months' extension of the time for beginning work on the Akron & Cleveland Electric Railroad Company, which will run through Portage, Bath and Richfield townships. By the original franchise the road was to have been completed next October.

CLEVELAND, O.—The Central Ohio & Pennsylvania Company has been incorporated with $50,000 capital to build and operate an electric or steam road from Warren, O., through Howland and Brookfield to Sharon, Pa. The incorporators are: Robert J. Hamilton, Frank S Dailey, John A. Naaf, Joseph B. Turner, and T. C. Willard.

WOOSTER, O.—C. V. Hard, Wooster, president of the Wooster, Medina and Cleveland Electric Railway Company, has applied for franchises for 45 miles of electric road. The line will pass through Creston, Seville, Chippewa Lake, Medina, Parma and Albion, and will connect with the Cleveland Electric Railway at South Brooklyn. The capital will be $500,000. L. P. Ohliger and J. W. Roof, Cleveland, are interested.

Oregon.

PORTLAND, ORE.—The Portland Railway Company, has been incorporated by O. F. Paxton, A. F. Sears, Jr., and J. V. Beach, to operate the Consolidated Street Railway, the Vancouver and the Oregon City lines pending reorganization.

Pennsylvania.

DUNMORE, PA.—The Olyphant & Winton Traction Street Railway has a franchise through Dunmore.

PITTSBURG, PA.—The Braddock Electric Street Railway Company has been granted its franchise in East Pittsburg.

OLYPHANT, PA.—Six months' extension of time has been allowed the Olyphant & Winton Traction Company to complete its line.

BRADFORD, PA.—The Bradford Electric Street Railway has given an approved bond to guarantee the faithful execution of its franchise.

NORRISTOWN, PA.—The Schuylkill Valley Traction Company has given a mortgage on its leaseholds to the West End Trust and Safe Deposit Company, to secure $500,000 bonds.

PITTSBURG, PA.—The Mt. Joy & Reserve Township Traction Street Railway Company's petition for a franchise, has been favorably reported by the Allegheny council committee.

DOYLESTOWN, PA.—John Walton, agent for the Bucks County Railway Company, is meeting with success in selling bonds for the trolley line to Willow Grove, the estimated cost of which is $300,000.

PITTSBURG, PA.—The Federal Street & Pleasant Valley Traction Company will apply for a franchise for 2 miles of track to enable funeral trains to reach the cemeteries. New cars will be put on the new line when completed.

BRISTOL, PA. Franchises through Bristol have been granted the Philadelphia, Bristol & Trenton and the Newtown, Longhorne & Bristol Companies. The latter also contemplates an extension from Langhorne to Somerton, by way of Parkland and Neshaminy Falls.

PITTSBURG, PA.—The newly incorporated Pittsburg, Braddock & McKeesport Railway Company, has petitioned for right of way in Braddock. The Braddock & Duquesne Bridge Company has been incorporated to bridge the Monongahela River for the new line.

PHILADELPHIA, PA.—The Delaware & Schuylkill Electric Railway Company, incorporated in 1893, has finally arranged to build nine miles of single track of ninety-five-pound girder rail; also a power house at Tabor Station 75 by 75 feet, to contain two engines and generators of 300-horse-power each. Fifteen cars will be operated at the start.

NORRISTOWN, PA.—The Schuylkill Valley Traction Company, lessee of five lines, has decided to extend its lines to Collegeville, Royersford, West Conshohocken and Pottstown, connecting with the railway at the latter point, and with the Norristown and Chestnut Hill Railway, forming a complete circuit between Pottstown and Philadelphia.

South Carolina.

COLUMBIA, S. C.—The Columbia Electric Street Railway, Light & Power Company will lay 3 miles of rail, etc.

GREENVILLE, S. C.—A. G. Gower has bought all the rights, powers rolling stock, etc., used in the street railway and the drayage business from the estate of his father, the late T. C. Gower. Mr. Gower will make some needed improvements.

Tennessee.

CLARKSVILLE, TENN.—W. R. Vaughan will build an electric railway at this place. Mr. Vaughan has been vice-president and part owner of the Park City Electric Street Railway at Bowling Green.

CHATTANOOGA, TENN.—T. J. Nichol has been appointed receiver of the Chattanooga & North Side Street Railway Company, on a petition of the New York Security & Trust Company, holding $60,000 of bonds, upon which interest has been defaulted.

Texas.

SHERMAN, TEX.—The College Park Rapid Transit Railroad has been purchased by N. M. Lee, S. M. Hurd and Z. P. Dederick, who will build extensions.

HOUSTON, TEX.—Receiver Kirby and General Manager Hayward of the Houston City Street Railway Company have decided to relay the entire system with 60-pound rail, and to purchase 20 open cars trucks, etc. The improvements are to be paid for by an assessment of bondholders.

DALLAS, TEX.—The Dallas City Street Railway Company has been reorganized. The present lines will be improved and electric cars placed on three routes. Capital, $350,000; officers, Channing M. Ward, president; Henry Garrett, secretary and treasurer. Board of Directors, Frank P. Clark, W. H. Blackford, John Gill and George Jenkins, Baltimore; Godwin L. Blackford, Denison, Tex.; C. A. Keating, J. T. Trezevant, Channing M. Ward and Henry Garrett, Dallas.

Vermont.

BARRE, VT.—A company is being organized to build the electric road. The directors are J. S. Pierson, president; F. G. Howland, vice-president; A. O. Humphrey, clerk and treasurer; D. M. Miles, H. K. Bush and J. J. Flynn.

ST. JOHNSBURY, VT.—The St. Johnsbury Street Railway will be constructed this season. F. C. Kennedy, Burlington, is president; T. C. Fletcher, St. Johnsbury, vice-president. A. O. Humphrey, Burlington, clerk and treasurer.

Virginia.

BERKLEY, VA.—T. H. Synon, president of the Berkley Street Railway, has been authorized to change the system to electric. William Tillotson is secretary, treasurer and manager.

NORFOLK, VA.—The Norfolk Street Railroad is about to issue $1,000,000 in bonds, with which to make extensive improvements. The mortgage is filed with the Mercantile Trust Company, of Baltimore.

NEWPORT NEWS, VA.—A consolidation is being effected of the Hampton & Old Point Railway and the Newport News Street Railway, to be known as the Newport News, Hampton & Old Point Railway Company.

Wisconsin.

LA CROSSE, WIS.—The LaCrosse City Railway is after extensions.

JANESVILLE, WIS.—The Janesville Street Railway Campany will resume operation by March 15th next.

CHIPPEWA FALLS, WIS.—John H. Murphy has been granted an electric railway franchise, work to begin within six months.

FT. HOWARD, WIS.—Superintendent McCartney of the Electric Railroad & Light Company is in the market for feed water heaters.

KENOSHA, WIS.—W. H. Wheeler & Co., of Beloit, have made a proposition to the city to build an electric light and street railway plant.

OSHKOSH, WIS.—J. K. Tillotson denies that his company will forfeit its franchise as provided in the council grant, but will resume construction in the spring.

MADISON, WIS.—Suit to foreclose a mortgage against the Madison City Railway Company was brought, February 5, by the New York Guaranty & Indemnity Company.

MILWAUKEE, WIS.—The promoters of the Milwaukee, Racine & Kenosha Electric Railway are applying for franchises. Ordinances were introduced at South Milwaukee and Kenosha.

MILWAUKEE, WIS.—The Milwaukee & Wauwautosa Motor Road has been placed in the hands of J. W. Bingham, as receiver, on application of Luther L. Caufy, who has a $5,031 claim.

SUPERIOR, WIS.—S. T. Norvell, of Superior, and F. W. Oakley, of Madison, have been appointed receivers of the Superior Rapid Transit Railway Company, upon request of the Central Trust Company, of New York.

OSHKOSH, WIS.—The appraisers appointed in the attachment proceedings of F. A. Wachter against the Central Wisconsin Electric Railway, find the value of the company's property in that city to be $19,228.57.

APPLETON, WIS.—A. L. Smith, who bought the electric railway, has organized the Appleton Electric Light & Power Company with $50,000 capital stock. President, A. L. Smith; vice-president, John S. Van Nortwick; secretary and treasurer, Miss Cora Hatch. Large steam engines will be placed in the power house so as to be independent of the varying water power.

MILWAUKEE, WIS.—The Milwaukee Street Railway was sold January 29, for $5,000,000 to William Nelson Cromwell of New York, who made the bid in behalf of C. W. Wetmore, Arnold Marcus, and himself, of New York, and Frank G. Bigelow, Charles Pfister, and B. K. Miller, Jr., of Milwaukee. The company will be reorganized as the Milwaukee Electric Railway & Light Company, with a capital of $8,000,000. Of this amount $4,500,000 will be preferred and $3,500,000 common stock. The management of the company will remain the same as heretofore.

DENVER DOTS.

The Tramway Company has installed safety switches at all railroad crossings.—Conductors are not now allowed to pass between motor to trailer while tram is in motion.—A snow plow was used with success in clearing outlying tracks of mud. The Tramway will do considerable construction the coming season. A pending ordinance provides that all cars shall come to a full stop before passing round a corner at an intersecting street; and that stops to receive and discharge passengers shall be made at the near crossing.

GAS LIGHTED STREET CARS.

The Pintsch light which is now generally used by steam railroads the world over, is steadily gaining in popularity with the street railway companies. Its adoption by the Broadway and Third avenue cable lines of New York city, has been attended with such excellent results that not only have these cars become famous in street railway circles, but many other roads, both cable and electric, in various sections of the country are now using this light almost exclusively. Chief among these are the cable and elevated roads of Chicago, The Columbus Central Electric Railway Company, The Denver City Cable Company, and more recently the Missouri Railroad Company of St. Louis.

In the Pintsch system a specially prepared and very rich oil gas is supplied under pressure to tanks beneath the cars. Before the gas enters the pipes in the main body of the car, to be burned in the draft-proof lamps, it passes through an automatic regulator, which reduces the pressure, so that whatever the pressure in the tanks, that at the burners is always the same, and the cars are always illuminated by a mellow, steady light. This gas is now available in all the principal cities of the United States.

The system operates satisfactorily in trolley cars. The ordinary electric lamp often fails, even on the best of systems; and when a circuit breaker blows out at the station or the trolley slips from the wire, the light is gone entirely. This one feature of constant and unfailing illumination when the Pintsch light is used, is alone conclusive evidence of its special adaptability to trolley cars. The statement of the Columbus Central Railway Company in its use has shown economy as compared with electric light derived from the power current.

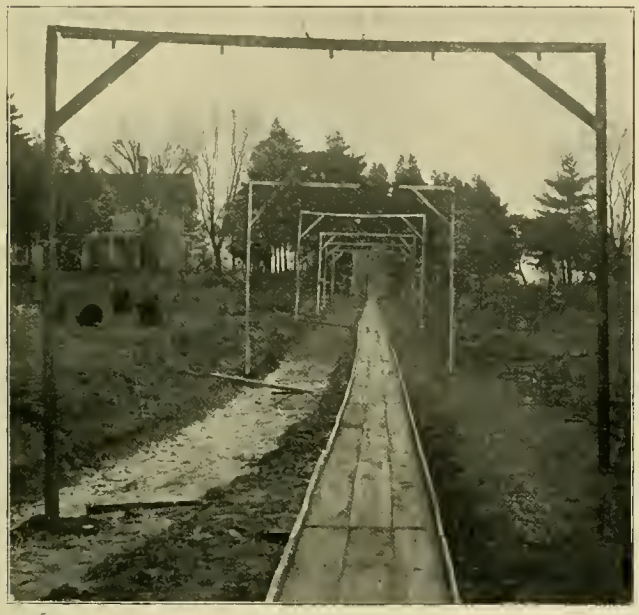
The increased traffic on the roads adopting the Pintsch system is direct evidence of the public's appreciation of well-lighted and comfortable cars. The merited favor which the system has received in the past, will doubtless continue and its application be largely extended. The Pintsch system is controlled by the Safety Car Heating and Lighting Company, 160 Broadway, New York.

TOBOGGAN SLIDE AS A TRAFFIC CREATOR.

E. F. Tindolph, who has just sold his interest in the Vincennes, Ind., lines, built and operated very successfully during the brief, cold weather, a toboggan slide at one terminus of his road, a description of which will be suggestive. While rather late now, with the prospect of a continued mild winter, the scheme is a good one to have in mind for another season.

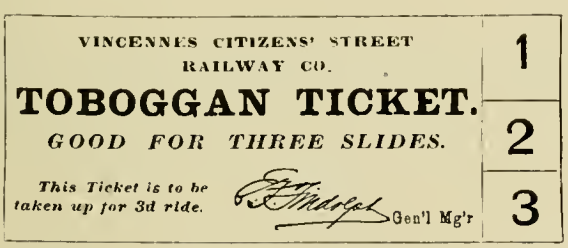
The plan of the road is V shaped, as shown in the cut: at one terminus the slide was built, while at the other a skating rink was flooded. Both were operated at the same time.

The slide is built on a hillside, is about 1,000 feet in length, and is free to all street car patrons to the extent



TOBOGGAN SLIDE AT VINCENNES.

of three rides to each passenger. A special slide ticket was used, which we show. Outsiders, or passengers who want more than three slides pay five cents for each additional ticket. The parties who ride ascend to a


VINCENNES CITIZENS' STREET RAILWAY CO.

TOBOGGAN TICKET.

GOOD FOR THREE SLIDES.

This Ticket is to be taken up for 3d ride.

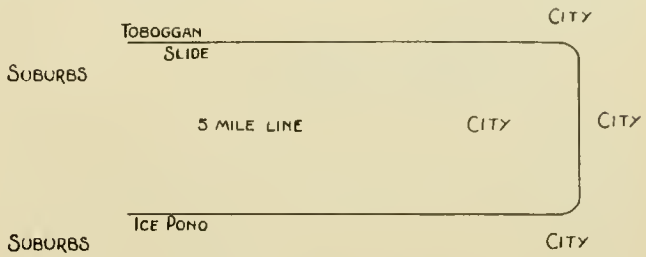
Gen'l Mg'r

1 2 3

platform where a collector punches tickets and has them on sale. A guide is furnished with each toboggan to go down with the load and bring the toboggans back. Two toboggan clubs have been organized and great interest aroused.

The slide is built of boards, 30 inches total width, with sides 5 inches high. It can be flooded and put in condition in 30 minutes in freezing weather. About one-fourth inch of ice is put on. The slide is lighted by 75 incandescent lights placed on arches.

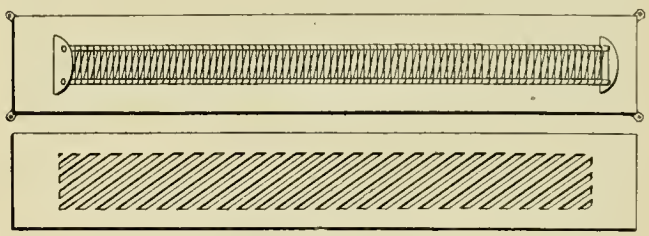
The skating rink is free to street car patrons, and ten



cents charged all others. Prizes were given for the best skaters. In one day 1,000 persons were on the ice, which for the size of the city is a great showing. The rink is also electrically lighted.

HOSKIN'S ELECTRIC HEATER.

A simple new form of electric heater, the design of Walter S. Hoskins, has been used on the Gardner (Mass.) Electric Street Railway, with which Mr. Hoskins is connected. The back or main frame of this heater is a long casting having diagonal slots for the radiation of the heat from the wires. Screwed to this back are two half circular iron plates one inch thick with two shallow holes sunk in them to allow of supporting a pair of iron pipes. These pipes are covered with asbestos, which is wet when applied, and is allowed to dry hard.



HOSKIN'S ELECTRIC HEATER.

The iron resistance wire is wound over both pipes with no attempt to avoid their contact by contraction and expansion, as this was found unnecessary. The coils are protected by a sheet of zinc held by the end plates. The ends of the wire come through holes in the zinc, bushed with common porcelain bushings. Each heater has 100 feet of No. 19 iron wire, and two heaters are operated in series. The two consume about 2,500 watts, and will heat a car on a moderate day. On a cold day four are necessary. It is needless to say that this makes a very cheap form of heater, as it is simple in construction.

The dog-in-the-manger policy is not a rarity but Tarrytown, N. Y., has a new breed of these animals. Most of the citizens of Tarrytown want the electric railway but a coterie of wealthy men are against it because of its "vulgarity don't you know." But lo and behold a new company appears on the scene with these men as directors. The suspicion is that they will get and hold the franchise and prevent building.

Publishers' Page.

Japan.
Francis Willard.
Advertising Like Farming.
Taking Our Own Medicine.

Among recent foreign subscriptions is the Miyoshi Electric Works, of Tokyo, Japan (telephone No. 49, if you want to use the long distance wire), whose enterprising managers are T. Mayeda and K. Itarney.

* * *

As a bell without a clapper,
Useless and forgotten lies,
So doth the business of the man
Who will never advertise.

* * *

Francis E. Willard is the best-advertised woman in the United States, and she knew what she was talking about when she said: "The voice that speaks dies on the air almost before its echoes reach us, but the firm types and black ink hold through months and years."

* * *

Advertising is a good deal like farming—it is a good deal like many things—but its farming we are speaking of now. To wait until the time for harvest before planting means a late crop or none at all. Plant your ads early, in columns, and don't be afraid to let them grow. They are working nights and days for you; while you are asleep they are getting in their good work, for the street railway manager of the Pacific coast is just settling down in his easy chair to read a REVIEW at the hour when those in the far east are in bed—or ought to be. And the REVIEW has lots of warm friends beyond the Rockies.

* * *

Still they come. The Atlantic Printing & Publishing Co., which issues "Mechanical Progress," and does an immense amount of fine printing, and whose plant is at Broadheath, near Manchester, England, writes: "Can you spare us a copy of your October, 1895, issue? We have seen several references to this number and would very much like to own a copy. We shall be pleased to refer to your journal in our periodical, several hundreds of which go over to your side."

* * *

The REVIEW is no curiosity but it occupies, by request of the director of the Philadelphia museums, a place in that institution where, he says: "It will be seen by great numbers of business men."

* * *

In a duel a man needs to take a steady aim in the right direction. No shooting with one's eyes shut or cross-eyed. And he should take the same sure aim in advertising. "Business," a Canadian paper says: "All advertising does not pay because all advertising is not placed where it can be made to pay. Business men who are shrewd to buy goods that they feel confident will sell are not equally shrewd in placing their advertising where they are going to hit the kind of people to whom they expect to sell their goods."

To reach street railway men advertise in the REVIEW. It never misses fire.

* * *

One of our advertisers remarked to us the other day, "Here you are talking to me about the benefits of advertising, why don't you take some of your own medicine?"

He was not a little surprised when we informed him, that we did, and not in homeopathic doses either. The REVIEW spends, and has for years, more money in advertising each month, than it receives from its largest advertiser. We always use some of our own advertising space, and it brings us good returns, too; but necessarily a publication has to find other means of advertising than its own pages. Those who receive the REVIEW each month do not need to be informed in a special page what its merits are. They are strikingly set forth on every leaf from cover to cover. We don't need to say our paper is specially made to order—everybody knows its is the best paper stock used by any trade journal in the country; nor to call attention to the quality of illustrations, which equal many literary magazines, though we might add what is not known to all our readers, that we have as a part of our office staff an artist and an expert photographer. Every reader is aware that the quality of reading matter is high grade, up-to-date, progressive, and made up in attractive and lively style, and so on.

* * *

Well, how do we advertise? First, we spend a good deal of money finding out the names and addresses of people who contemplate the organization or promotion of new roads. In most cases street railway work in all its phases is new to them, and as for knowing the merits of the best cars, and trucks, and motors, and all that, the fact is they never even heard of the names of even the most prominent makers, some of whom have been in the business for years, and fondly imagine "everybody knows us." Now while the old wheel horses who have been going to conventions for the last ten years most certainly do know, these new people, who will become buyers of somebody's stuff if their road goes through, do not. When we get the names of these new people we write them a personal letter; we send them a copy of the REVIEW, we offer to assist them in any reasonable way in the securing of data which will be helpful in getting their enterprise fairly before the public. All this costs money—as much money as several pages at our advertising rates. But it pays; and it is our way of advertising; and your best and cheapest way of advertising is in the advertising pages where these new people are hunting for what they want, and getting posted on street railway supplies and practice.

Oh, yes, we beleive in advertising and shall keep it up.

J. W. Hoffman & Co. announce their removal from the Bullitt building to 14, 15, 16 Harrison building, Philadelphia.

The Johnson interests are erecting a large foundry at Lorain, O., to be operated in connection with their steel rolling mills.

The Hunter fender people have one on the Market street San Francisco line, and are trying to have them adopted there.

The McGuire Manufacturing Company, Chicago, has sold to the Los Angeles & Pasadena Electric, eighty-four double and single trucks.

Stern & Silverman, Philadelphia, have issued a handsome illustrated book in cloth covers setting forth their system of storage batteries for street-car service.

The Meaker Manufacturing Company, of North Chicago, has sent out a very attractive calendar, in which its stationary and portable register occupies a prominent place, set forth in handsome colors.

The Wegnon Construction Company, of Cleveland, has been incorporated with a capital stock of $200,000 to build and equip street railways. A contract has been closed to construct 10 miles for the Ft. Wayne Electric Railway.

Max A. Berg, whose energy and pleasant manner have won him many friends, gives up the management of the Chicago office of the Ohio Brass Company, to accept a responsible position in the company's office, at the Mansfield works.

A. M. Loper, who so acceptably represents the interests of the New Haven Register Company, has just closed an order with the Calumet Electric Railway of this city for 125 of the double stationary, for separate recording of cash fares and transfers.

C. L. Wakefield, Dallas, Texas, secretary of the Texas Street Railway Association, invites all street railway supply men to correspond with him, with a view to making an exhibit at the annual state meeting, which will be held in Galveston, March 18.

The Standard Railway Equipment Company, Chicago, sold to the Dry Dock, East Broadway & Battery Railway, New York, thirty-five of its standard stoves, as the result of these stoves having been used on the Sixth and Ninth avenue lines in that city.

Bowers Brothers, dealers in electrical mica, 117 Lake street, have in press their new standard mica catalog for 1896. There will be no change from the standard prices of 1895, the same being adopted for this year. The catalog will be ready about the 20th inst.

The board of directors of the New Castle Street Car Manufacturing Company, consisting of W. G. Butlinger, W. H. Cox, F. A. Hover, V. K. Phillips and S. P. Emery, has elected the following officers: President, W. G. Butlinger; vice-president, V. K. Phillips; secretary and treasurer, S. P. Emery.

Lest the similarity of names should lead any to confuse the two companies, we call attention to the fact that it is the Standard Electric Company of this city which has failed and not the Standard Railway Supply Company, of which Garson Myers is manager, and who says business is good and getting better all the time.

A contemporary who is making all sorts of desperate and weekly efforts to create a demand for his wares; announces the startling information, which he calls a "pointer," that if people will subscribe for his paper, and then bind them, that "years hence" they will sell for more than they cost. Yes, about 500 years hence!

An order has been placed with the Sterling Supply Company, New York, for the Sterling brake, for all the Broadway cable cars, to be used in combination with the grip release attachment. The popularity of this brake has exceeded even the expectations of the makers, over 800 having been sold within the past four months.

The Akron Street Railway has equipped two of its twenty-foot cars with Baker heaters, and in reply to our inquiry, Superintendent Chapman says: "They are giving us excellent satisfaction, using about six cents worth of hard coal each, per day. We are contemplating equipping more of our large cars with these same heaters."

In addition to having the largest gear-cutting equipment in the world, it may surprise some of our readers to learn that the R. D. Nuttall Company turns out some of the finest machine work in the country, including such work as sewing machines, geometrical lathes, etc., and has a standing in these lines equal to its reputation in the electrical trade.

The rivets in Peckham trucks are now "power driven hot rivets," which have many obvious advantages over hand driven. The number of Peckham trucks in use on the Metropolitan, cable and Third avenue cable roads, New York City is 4,000. This enormous number is alone a magnificent testimonial to the merits of the Peckham truck.

The Borden and Selleck Company has just equipped the power house of the Chicago North Shore Electric

Railway, and the power house of the Chicago Electric Transit Company at Roscoe boulevard and California avenue with the Harrison conveyor. The latter plant cost $20,000, and comprises ten boilers. The coal and ashes are all handled automatically.

The West End Street Railway of Boston has ordered four 1,200-kilowatt General Electric direct connected generators and one 1,500-kilowatt, making a total of 6,300 kilowatts in five units. The Cataract Construction Company at Niagara Falls has ordered a 500-kilowatt rotary transformer from the General Electric Company for operating the Buffalo & Niagara Falls road.

The Westinghouse Company of Pittsburg, Pa., has been awarded the contract to furnish the equipment for a new electric railway to run between Washington and Baltimore. It is provided in the contract the machinery furnished shall send the trains at a speed of sixty miles an hour. The first generator in each power house is to be ready by May 1st. The entire road is expected to be completed in August.

J. A. Hanna, eastern agent of the McGuire Manufacturing Company, of Chicago, has a most comfortable and attractive office, as shown in our illustration, at 1302 Havemeyer building, New York. While he does not

J. A. HANNA'S OFFICE.

attempt to carry on exhibition there, a full line of trucks and snow sweepers, he succeeds in making good use of the order blanks with which his company supply him and captures a big share of the eastern trade.

The business of the Standard Air-Brake Company has increased so rapidly that it has become necessary to secure larger office space and better facilities. In considering the different buildings adapted to its use the company decided that the American Surety Company's mammoth new structure at 100 Broadway would be the most desirable headquarters. A suite has been rented on the tenth floor, giving an abundance of light and air, where they are already settled. The view from the offices is fine, and takes in the harbor and river. Mr. Wessels says the latch-string will hang out and that he will be glad to welcome old and new friends in the new offices

The Badger Manufacturing Company, Milwaukee, has issued an illustrated catalog describing its overhead materials. The Badger overhead work has been adopted as standard by the Milwaukee Street Railway and many other roads, and is constantly growing in favor as it is becoming better known and appreciated. The management are practical and progressive and take every care, not only to send out a good article, but to do so promptly.

The Gates Electric Company, Chicago, assigns to the Chicago Title & Trust Company. Liabilities, $10,000; nominal assets, $17,000. The immediate cause was the non-payment of wages covering three weeks. Company is said to have sold goods on too long time for amount of working capital. J. Holt Gates is president and manager of the company; W. F. Camp, Jr., secretary and treasurer; Adolph Lissau, superintendent, and Otto Lissau, electrician.

The Milwaukee Trackwork Company, is the name of the business established by A. W. Lynn—who, however, will continue in his present relations with the Milwaukee Street Railway—and Clement C. Smith, formerly in charge of the track engineering of the Chicago City Railway and other roads. They have secured shops for making their special work, and are prepared to undertake general street railway engineering and contracting. The hosts of friends of each, will wish them unbounded success.

The Whittingham Electric Car Heating Company, of Baltimore, reports a successful year, not only in sales, but in the operation, of its electric heater. Among the roads on which they are in use may be named the City & Suburban, and the Baltimore Traction, of Baltimore; Section Avenue Traction, of Pittsburg; the Ithaca Street Railway; Montreal Street Railway; Terre Haute Electric Railway; North Chicago Street Railroad; Winnipeg Electric Railway, and Bloomington, Ill., City Railway. A special point is made of the fact that the heat is evenly distributed throughout the entire length of the car, and is not intense at any one point, while at other places there is a want of proper warmth.

The Central Electric Company finds that the new sheet insulator, "micanoid," which it is selling, is one of the most promising materials on its list. The new changeable electric headlight is also gaining prominence, and samples sent for trial usually result in an order. This headlight is put on the dash, and when it is moved from one end of the car to the other, the electrical connections are automatically changed by sliding the lamp into its socket on the dash, so that the headlight and

rear platform light are always going when the headlight is on the car. The company is also doing a splendid business refilling commutators for all systems, always using, of course, the Billings and Spencer drop forged bars.

President Carson, of the Sterling Supply Company, made the assertion the other day that his clock register would tally a million fares without a miss. As this is the equivalent of about six years' collections of one car a manager dared him to try it. Accordingly a machine was selected at random and so connected up to a shaft that it struck seventy times per minute. The power was turned on and kept going until over 2,000,000 registrations had been made, and without a break. This was equal to fully twelve years' collections, and was made at a speed greatly in excess of what any conductor could ever attempt. When the test was finished the machine was taken apart and the wear on the wheels was very slight.

The Fitzgerald-Van Dorn Company, Chicago, is mailing the most complete and attractive catalog of couplings ever sent out. It is handsomely illustrated, showing the adaptation of the coupler to all types of street and elevated cars, and shows in detail all the parts. Any manager who has not received a copy should secure one for he will find it an excellent and valuable treatise on how to couple cars and absolutely do away with all jerking between motor and trailers. The coupling is both a time saver and a life saver, and is shown with new and valuable attachments. The company has been in receipt during the past few days of several large orders from roads where the coupler is already in use, to go on new cars now being built.

Some managers are inclined to be somewhat reluctant in giving testimonial letters, and among these is M. K. Bowen, superintendent of the Chicago City Railway. The following under date of January 16, 1896, is therefore especially appreciated by the Falk Manufacturing Company, of Milwaukee, to whom it was sent. Mr. Bowen writes:

"Respectfully referring to my conversation with you, I herewith beg to refer to the fact that your company has cast-welded about 40 miles of track on our road and the joints have passed through both summer and winter to our perfect satisfaction. I have given the cast-welded process a great deal of attention during the time the work was in progress on both the old and the new rail, and am perfectly well satisfied that it is the only device by which a lasting and smooth riding track can be obtained."

H. E. Collins & Company, of Pittsburg, Pa., sales agents for the Cahall vertical water tube boiler, manufactured by the Aultman and Taylor Machinery Company, of Mansfield, Ohio, have just issued a little circular showing comparative tests made on the Cahall boiler and other the leading types of boilers. It affords excellent reading to those interested in this line. The following recent sales of the Cahall boilers are reported: National Chemical Company, Cleveland, 150-horse-power; Republic Iron Works, Pittsburg, fourth order, 250-horse-power; Municipal Electric Light plant, London, Ohio, 250-horse-power; Voight Brewing Company, Detroit, 500-horse-power; Michigan Alkali Company, Wyandotte, Mich., fourth order, 300-horse-power; Jefferson Coal Company, Coal Glen, Pa., 500-horse-power; Ohio Iron Company, Zanesville, Ohio, 500-horse-power.

That first cost is by no means the all important consideration, is forcibly illustrated in a case which occurred with the Charles Scott Spring Company, Philadelphia. A certain railway had been buying from 250 to 300 elliptic springs, each month, of another spring maker. This had been going on for many moons. At last they were induced to put in one month's order with the Scott Company, at a somewhat higher price than they had been paying. This order was continued each month, for nine months, when orders suddenly quit entirely. An agent was hastily dispatched to discover the trouble, and was told that the road had now been entirely equipped with the Scott Spring, and as none were breaking, there was no need to order. This was ten months ago, and the road has not bought a spring of any one since. It pays to get a thoroughly good article, even if is does cost a little more.

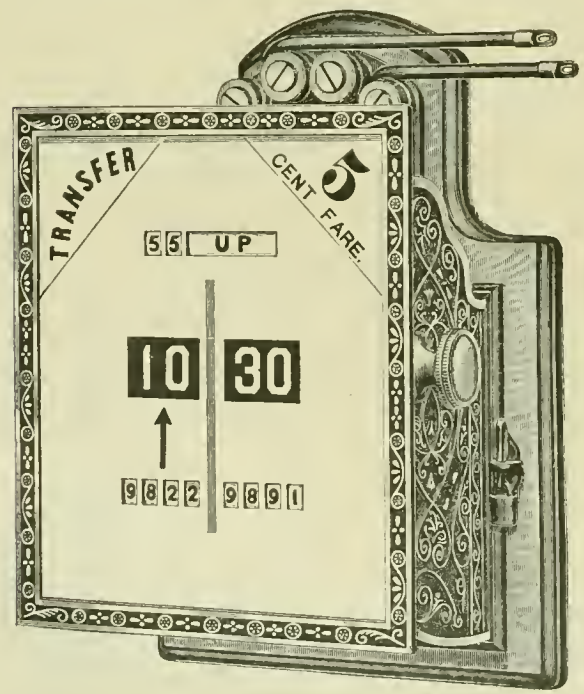
The Stirling Company reports business booming; its orders since January 1, 1896, exceed in horse-power those received during any corresponding period in the history of its business. Prominent among the sales made are mentioned: Armour Packing Company, Kansas City, third order, 1,000-horse-power; People's Light and Power Company, Moline, Ill., 500-horse-power; Detroit Railway Company, Detroit, Mich., second order, 2,500-horse-power; Kyoto Electric Light & Power Company, Kyoto, Japan, 250-horse-power; Calumet Plantation, Berwick, La., second order, 400-horse-power; Suburban Railroad Company, Chicago, 750-horse-power; Passaic Electric Light Company, Passaic,

NEW COMBINATION CAR AT CINCINNATI.

N. J., 600-horse-power; Suburban Electric Light Company, East Orange, N. J., 250-horse-power; Johannesburg, Consolidated Gold Mining Company, Johannesburg, S. A. R., 350-horse-power; Mazatlan Electric Light & Power Company, Mazatlan, Mexico, 200-horse-power.

Among the new year changes in business, which will interest engine men, we learn that F. H. Ball has sold his interest and retired from active participation in the management of the Ball & Wood Company, of Elizabeth. Mr. Ball has been one of the officers of this company for a number of years, and desires to take up actively the profession of consulting engineer and mechanical expert, in which capacity he will still be connected with the company, and his son, Bert C. Ball, also remains at the head of the draughting department. The business of the Ball & Wood Company, has been excellent during the past year, and has extended largely through the west since its Chicago office was opened a year ago. At present its shops are very busy executing the contract for a number of large engines for the Edison Electric Illuminating Company, of Paterson, and also orders for the New York & Brooklyn bridge; Johnston building, New York; Ellicott Square building, Buffalo; St. Charles hotel, New Orleans, and others.

Among the street car exhibits at the Atlanta Cotton States Exposition was that of the New Haven Car Register Company, whose registers were awarded the high-



NEW HAVEN DOUBLE REGISTER.

est medal and diploma given fare registers. Their exhibit was very attractive, including a full line of single, double, and triple registers. This company also received the highest award at the Columbian Exposition, and has been very successful in anticipating the requirements in its line of modern street railways. Its registers have been adopted by many of the leading street railroads of the country, and attract attention at once by their very rich and elegant appearance, and win friends everywhere by their completeness and durability. The double and triple registers this company is making are rapidly becoming very popular for the registration of different classes of fares, or fares and transfers. Where transfers are registered, managers are rapidly coming to realize the advantage of a separate registration for the transfers, and the New Haven double register does this perfectly.

The Leschen-Macomber-Whyte Company has just been incorporated and has opened an office and warehouse at Nos. 19 and 21 South Canal street. Henry Leschen, the president, is a St. Louis wire rope manufacturer. Mr. Macomber has heretofore been the Chicago representative of the A. Leschen & Sons Rope Company, and Mr. Whyte has been identified with the electrical and wire rope business for the past eight years, and has an extensive acquaintance with the electric, street railway and lighting field. The company will carry a complete stock of wire rope and fittings, also manilla and the "Hercules" and the flattened strand wire rope and black manilla transmission rope. They also represent in Chicago and vicinity the Charles Scott Spring Company, maker of spiral and elliptic springs for street railway trucks and machinery purposes; the Badger Manufacturing Company, overhead line material; Fletcher Manufacturing Company, electric light and railway specialties; and the Bradford Belting Company's "Monarch" insulating paint. They also handle insulated copper wire and cables, rubber insulated wire, galvanized steel strand, rail bonds, etc. The young men are hustlers and no doubt will make a success of their enterprise.

The Standard Underground Cable Company, Pittsburg, had a most prosperous year in '95, the business amounting to nearly one million dollars. Four dividends were paid, and a large sum carried into the surplus account, now nearly $500,000. A new factory "C" was erected, factory "B" rebuilt and in all three new machinery installed; the most important part of which is a moderate sized, but complete modern plant for the manufacture of rubber covered wires and cables, so that this enterprising company is now prepared to furnish wires and cables of any kind a customer may desire, whether insulated with fibre, paper or rubber. The officers are: George Westinghouse, Jr., president; Joseph W. Marsh, vice-president and general manager; F. A. Rinehart, secretary and treasurer; P. H. W. Smith, assistant manager; C. M. Hagen, auditor; W. A. Conner, general superintendent manufacturing department, and Henry W. Fisher electrician and chemist. The company's branch offices are ably manned by George L. Wiley, manager of eastern sales department, Times Building, New York; E. W. Dugdale, No. 336 North Broad street,

Philadelphia; and J. R. Wiley, manager western sales department, the Rookery, Chicago, at each of which places (as well as in Pittsburg) experienced construction corps are constantly maintained for the installation of the company's products.

A. H. Woodward, who for a young man is one of the old settlers in Chicago, and therefore full of push and energy, became treasurer and director in the International Register Company, of this city, less than a year ago. He now adds to those duties that of the general management, and has rapidly made his new acquaintances his friends in the street railway field. He is a graduate of Cornell in the department of mechanical engineering, and after leaving college spent considerable time in travel and further study. The International register has made many friends and that they are giving excellent service and satisfaction is evidenced by numerous testimonial letters. Regarding the new stationary register, C. P. Holcomb, now superintendent of the Holmesburg, Tacony & Frankford Electric, Tacony, Pa., says "While general ticket agent of the Intramual, World's Fair, I used your portable register and found it very satisfactory, and find them equally so here." S. S. Crane, superintendent of the City Passenger Railway, Altoona, says, "Theyare giving satisfaction." W. D. Hawley, superintendent of the Citizens road, Kalamazoo, says, "They are giving excellent satisfaction. In all the registers we have ever used, none have been so satisfactory."

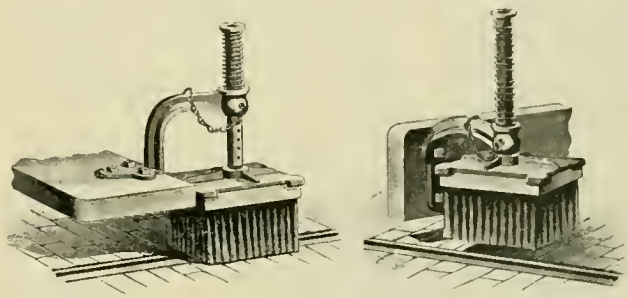
A. H. WOODWARD.

REORGANIZATION OF THE LONG ISLAND TRACTION.

The incorporation January 18, of the Brooklyn Rapid Transit Company completes the reorganization of the Long Island Traction Company, undertaken by Roswell P. Flower and associates. The capital stock is $20,000,000, which when distributed according to the plan of reorganization, leaves $1,176,000 in stock, $2,125,000 in new bonds and $1,280,000 in cash for improvements etc. The chief assets of the new company are the $3,878,000 guaranty fund of the Long Island Traction Company, the $2,000,000 stock of the Brooklyn, Queens County and Surburban Railroad Company, and the $200,000 stock of the Brooklyn Heights Railroad Company. The thirteen directors are: William C. Bryant, Eugene L. Britton, William F. Creed, Horace C. Duval, Frederick S. Flower, Otto Zanker, Thomas Renwick, Floyd Vail, William W. Goodrich, John D. Kelly, Clinton L. Rossiter, James N. Wallace and Timothy S. Williams.

IMPROVED TRACK BRUSH.

Track brushes on every car or even every second car, running on a line will often save the expense of sending out a plow or sweeper, and the saving in power required



to move a car on a dirty track will always pay the cost of brushes many times over. The brush illustrated is made by the Ohio Brass Company, and attention is called to the coiled spring, which is always in compression. The brush has a wide range and close adjustment.

MONARCH INSULATING PAINT.

The Bradford Belting Company of Cincinnati, O., is now the sole manufacturer of Monarch insulating paint. This paint is a composition of nearly pure asphalt which when dry forms practically a fireproof coating. Consequently it is of great value in electrical work. O. M. Hubbard is manager of the company. He was formerly manager of the supply department of the Thomson-Houston Company at Cincinnati, O. He was afterward with the Central Electric Company of Chicago one year, so that he has both plenty of experience and a good paint with which to win success.

CHICAGO NEAR CROSSING ORDER REPEALED.

The "near crossing" ordinance, which was passed by the city council of Chicago, and which went into effect January 1, has been repealed. It lasted just five weeks, and the public raised a storm of objection. The experiment resulted as it has elsewhere—in failure.

Engineer Parsons estimates the cost of two underground roads for the New York Rapid Transit Board at $65,000,000.

OVERHEAD CONSTRUCTION IN NEW ORLEANS.

Owing to peculiar local conditions in New Orleans, the difficulties arising in construction of overhead work for electric railways, are more numerous and trying than those usually encountered in construction of similar work in other large cities. As the surface level of the city is lower than the Mississippi, from which it is protected by

DECATUR STREET LOOKING EAST FROM DUMAINE.

the levee; the sub-soil is thoroughly saturated with water. The dry surface soil is one to three feet deep. After digging through this dry soil, water is reached in quantity. This wet sub-soil is heavy and apparently firm in places, while quicksand and buried cypress swamps are frequent. Neither water, quicksand or cypress logs mixed with earth in bottom of pole holes would be classed by any construction company as "pay dirt." Consequently to overcome these difficulties, great care and experience is necessary, and nothing but high grade material will answer.

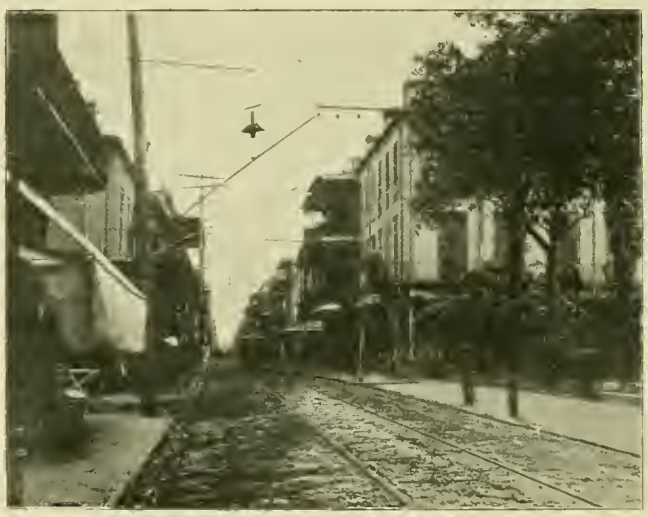
After careful study of these conditions, H. J. Malochee, chief engineer, and Ford & Bacon, electrical engineers, drew up the plans and specifications for the Orleans Railroad Company, setting forth in detail the kind and quality of work and material required to meet the conditions. The contract was awarded to the Creaghead Engineering Company, of Cincinnati, well known railway contractors. This road has just been completed and accepted by the engineers and directors of the company, with the testimony that they consider that they have the best piece of overhead line work in the country.

The poles used are mostly steel, but some wood poles were also used. The steel poles are two-section, single joint type, made with swaged joints and ornamental collars. The straight line poles are thirty-one feet long, extra heavy, weighing 750 pounds, and corner poles thirty-two feet long, 1,000 pounds each, and set in concrete seven and eight feet respectively.

The wood poles were sawed square with chamfered corners. Straight line poles with 7 by 7 inch tops are thirty-one feet long and corner poles 9 by 9 inch tops thirty-two feet long. At the bottom of each hole was placed a large cypress block three inches thick, onto which the pole was set. After pumping out the water from the hole, the concrete, made of sharp sand, broken stone and imported cement, was laid in courses and thoroughly tamped with heavy bars.

By referring to the illustrations the reader will notice an abundance of sheds and balconies. These balconies, especially the "double-deckers," seriously obstructed the work of erecting heavy poles. It was necessary in a great many cases to cut through these balconies to secure the proper location of poles. A great many of the streets are narrow and bracket construction is used to great advantage. We show an interesting illustration of Decatur looking east from Dumaine street, showing numerous balconies on the left and the celebrated French market on the right. The trolley is supported on sixteen-foot brackets of the "Creaghead" rigid type provided with Creaghead double insulation, link-joint bracket hangers. There are over two miles of this bracket construction on the Orleans Railroad Company's lines alone. It may be interesting to note that the St. Charles Street Railway Company of New Orleans has just completed over two miles of flexible bracket construction on its lines. We illustrate a section of its line on Royal street, looking east from Toulouse street. These brackets are the Creaghead patented flexible brackets thirteen and one-half feet long. The feeders were supported from these brackets by means of feeder hangers, which are attachments for the brackets. Each hanger is double for support of two feeder lines.

On the Orleans Railroad the specifications required



ROYAL STREET LOOKING EAST FROM TOULOUSE.

double insulation throughout and insulating devices of highest grade. The Creaghead standard material with some special forms was used throughout. In the span wire construction on iron poles, a pole clamp and insulated turn buckle were attached to each pole for the support and adjustment of the span wire. At feeder spans a double insulated turn buckle was used at each end.

This feeder span was a heavy insulated steel cable soldered to the feeder wire at one end and to a solid bronze bell in the center of the span. This bronze bell is made the same shape as the line insulators and connected to the trolley ear by heavy stud bolt thus completing feeder connection with the trolley wire.

On the wood-pole construction a galvanized eye bolt with a Bourbon No. 2 strain insulator is used on each pole to support the feeder span wire. We illustrate wood pole construction on Dumaine street, looking north from Johnston street, and show a feeder span in the foreground.

The road is divided into sections by means of section insulators and a system of feeders reaches each division.

DUMAINE STREET LOOKING NORTH FROM JOHNSON.

The system is protected throughout by means of Wurts lightning arresters, and we may add that there is no difficulty in securing a wet ground connection for lightning arresters in New Orleans soil.

H. J. Malochee chief engineer during construction, has been made general superintendent as an evidence of the Orleans Railroad Company's appreciation of his services. Ford & Bacon, electrical engineers during construction, were appointed consulting engineers for the Canal and Claiborne lines on account of the ability displayed in their work on the Orleans. George R. Scrugham, representing the Creaghead Engineering Company during construction, is now in the east looking after the interests of that company.

SUTRO LINE OPENED.

The opening of the Sutro Electric Railway, the new Cliff House and the Sutro baths, of San Francisco, occurred Saturday, February 1, with much pomp and ceremony. There was a general celebration along the line of the road, which was decorated with flags and lanterns at important points, and in the evening there were fireworks. At a banquet tendered by Mayor Sutro, at the Cliff House, to a delegation from the board of supervisors and the officers of the railway company, the mayor made an address.

Hardly had the Sutro Railway been in operation a day when an accident occurred which marred considerably the pleasure which the officers and patrons were experiencing as a result of the completion of the enterprise. When rounding a curve on a down grade at Point Lobos and Thirty-third avenues at considerable speed, one of the trucks left the track and several people were thrown from the car and injured. The cause is unknown. The derailment occurred as the car was leaving the curve, thereby showing conclusively that the speed was not excessive.

THE VALUE OF PLATFORM GATES.

No road which has ever once used platform gates, has been known to go back to the old method of receiving and discharging passengers on both sides of the car. It probably has more to do with preventing accidents than any other mechanical equipment of the car, and when the very reasonable price at which they can be installed, is considered, the wonder is that any road should long be without them.

One of the most successful of these platform gates, and which has been adopted on such roads as the West End, Boston; Union, of Providence; Third avenue cable, of New York, and many others, is the Wood's patent safety gate, made by the R. Bliss Manufacturing Company, of Pawtucket, R. I. It has few parts, is simple in detail, and built on the interchangeable plan. A swinging post with arms at top and bottom, is securely attached to the end of the car by pivotal bearings at top and bottom. The illustration shows the very convenient manner in which the gate folds back out of the way when not in use. Special attention is called to the absence of points which could catch the garments of passengers. The gate is securely held when opened or closed, by one double-acting latch attached to the top of the posts.

To operate the gate, the latch is turned, the gate swung, when it will automatically lock itself in the opposite direction and vice versa, and in the travel of the gate it never swings out beyond the platform. The grab-handle and grab-rail usually furnished with the car is a part of and is furnished with the gate.

TROLLEY CAR RACES AN ENGINE.

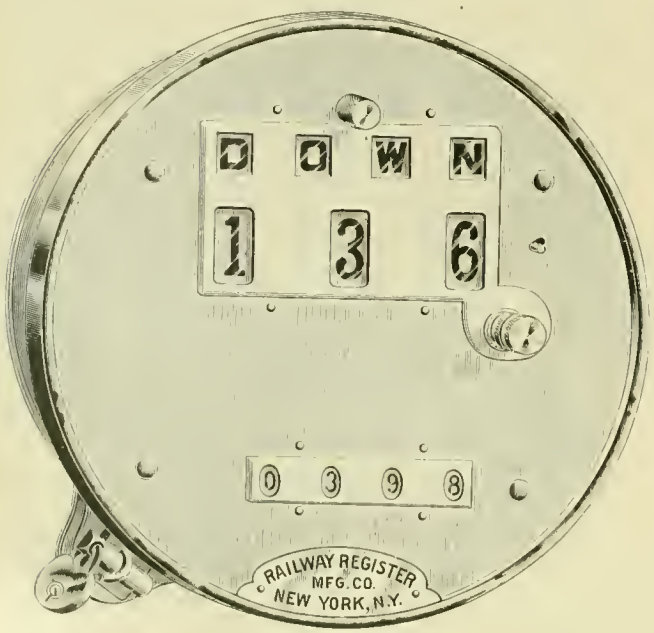
For considerable of the distance between Gratwick and Niagara Falls the Buffalo & Niagara Falls Electric Railway and the tracks of the New York Central run side by side. On Monday evening, January 27, there was a very pretty race between a trolley car bound for

the Falls and a Lehigh Valley freight, the latter running on the New York Central tracks. It was at the overhead crossing at Gratwick that the freight train and trolley car commenced their trial of speed. Only a few passengers were on the trolley car, the road was clear and the power supply from the mammoth turbines of the Niagara Falls Power Company was very good. The Lehigh freight was pounding along heavily, but at a lively gait, and for a time it looked as if the steam power would have everything its own way, not so much on actual time, but because the trolley had a winding road to cover and the railroad train was running almost on a straight line. At La Salle both came in almost even, neck and neck. From La Salle to Niagara Falls the course of the two again varied widely, the freight running straight as a line could be drawn, and the trolley along the River road winding around innumerable curves, making from one-half to three-quarters of a mile further to go. At Echota, however, the trolley hove in sight fully 500 feet in lead of the train and stopped for passengers. This brought the train again abreast of the trolley, and before it was started the engine and several cars had passed, but when the trolley got down to work it shot ahead like an arrow and swiftly passed the freight, going at a speed that seemed almost incredible, yet riding was so smooth that not a jar could be felt and at the Falls Street depot the trolley stopped in advance of the train.

Of course, the conditions of the run, the Lehigh engine drawing a heavy train and the trolley car running "light" are hardly a fair comparison, but it is noticed that the motormen never aspire to run with the New York Central's Empire State express.

LATEST IMPROVED MONITOR REGISTER.

With each added improvement the manufacturer queries to himself, "Is any further improvement possible?" but the progressive one does not rest content, and no sooner has made one betterment than he sets about discovering another, and it has been this persistent, incessant study to improve, which has brought street railway appliances to their present high standard. Naturally, he who has devoted his whole time to the study of the wants of one particular branch of street railway work, is specially favored by years of experience, and when such an one announces some new improvement, it is safe to conclude that it is to be depended on.



MONITOR REGISTER.

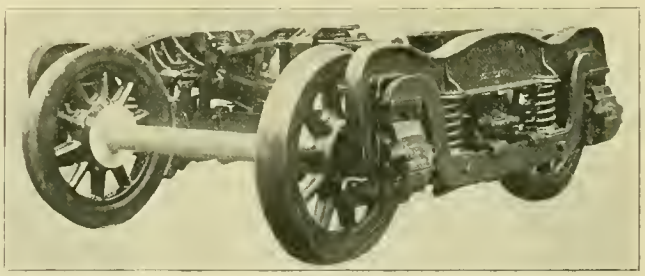
Edward Beadle, who for years has been the manager of the Railway Register Company, of New York, has brought out his latest improved Monitor Register.

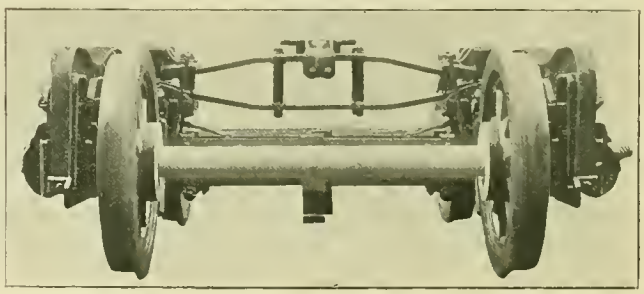
The machine belongs to the class known as stationary registers, and is of the "Duplex" type. It has a 12-inch white enamel dial, and shows on its face large figures each time it is operated. The general register runs up to 10,000 and then resets itself. The direction plate must be changed each time the register is set back to zero before it can again be operated, thereby compelling the conductor to set his register back at the end of each half trip.

It is a perfect working and durable register, and can be furnished with or without fixtures.

LAKE STREET ELEVATED MOTOR TRUCKS.

We show herewith two views of the electric motor trucks built by the McGuire Manufacturing Company for the Lake Street Elevated Railroad of this city which is equipping electrically. A description of these trucks





appeared in our December, 1895, issue. The truck is designed to carry a car both on straight track and on curves with the same easy motion that modern steam passenger cars have, in combination with practically the same points of draught or draught connections between the driving wheels and body that a modern steam locomotive has.

PERSONALS.

P. P. Bradt, of the Worcester Construction Company, committed suicide recently.

John Brill sailed this month for Europe on a combined pleasure and business trip.

Herbert Kahn succeeds Murray Hubbard, deceased, as treasurer of the Cohoes City Railway, Cohoes, N. Y.

John Narrimore has been promoted to superintendent of the Camden, Gloucester & Woodbury, N. J., Railway.

C. C. Dellority has been elected manager of the Elwood, Ind., Electric Street Railway in place of O. B. Frazier.

Charles Currie, assistant, has been promoten to secretary of the London, Ont., Street Railway, S. R. Break having retired.

W. R. Proudfoot, who for three years has been superintendent of the Janesville, Street Railway, Janesville, Wis., has resigned.

Robert K. Howard goes from the office of the Columbus, O., Street Railroad to superintend, the Knoxville, Tenn., Street Railway.

George M. Kimmerlein has been appointed general superintendent of the Milwaukee Street Railway. T. E. Mitten is his assistant.

Charles H. Ledlie has succeeded Wilgott Klingberg as superintendent of the Colonial City Traction Company, Kingston, N. Y.

D. S. Carll is chief engineer and superintendent of the Capital Traction Company, Washington, in place of C. C. Sailer, who resigned.

In Chicago during the past week —A. E. Lang, President Consolidated Toledo; and W. Worth Bean, president St. Joe-Benton Harbor lines.

Fred H. Allen, has been succeeded as superintendent of the Kokomo Street Railway Company, Kokomo, Ind., by C. T. Geddes, Adrian Mich.

F. A. Estep, president of the R. D. Nuttall Company, was a most welcome visitor at the REVIEW office, and among his many western friends.

W. L. Morgan, assistant superintendent of the Beaver Valley Traction Company, has resigned to take charge of the Sharon & Sharpsville road.

J. P. Van Leuven, the retiring assistant superintendent of the South Covington & Cincinnati Street Railroad, has the best wishes of his former associates.

William C. Baker, of the engineering department of the White-Crosby Company, has been in Chicago looking after that company's interests recently.

G. Brigger, has been promoted from the claim department to the superintendency of the Minneapolis division of the Twin City Rapid Transit Company.

Geo. B. Willcutt, Jr., of the Market Street Consolidated, San Francisco, who has been spending a month in the east, was a REVIEW caller, on his way home.

E. Peckham, president of the Peckham Motor Truck & Wheel Company, has left business cares for a few weeks and is taking a pleasure trip on the Pacific coast.

J. A. Bendure, has retired from the Atchison Railway, Electric Light & Power Company, Atchison, Kan. His successor as superintendent is James W. Waggener.

W. W. Willson, has resigned as general manager of the Houston City Street Railway, Houston Tex., to become general manager of the Gulf, Beaumont & Kansas City Railway.

Edward S. Ells, has been promoted to the superintendency of the Houston City Street Railway, Houston, Tex., succeeding Robert Adair, who becomes chief adjuster of claims.

F. W. Brooks, for ten years connected with the Illinois Central Railroad in various departments, has been appointed general manager of the Rapid Railway Company, Detroit.

Frank D. Runser, who had been superintendent of the Shenango Valley Electric Railway, Sharon, Pa., from its beginning, has been succeeded by W. T. Morgan, of Beaver Falls, Pa.

President McGuire, of the McGuire Manufacturing Company, has been called to California on account of the serious illness of his daughter, who, with her mother, is spending the winter there.

Howard Abendroth, of the Abendroth & Root Manufacturing Company, New York, spent several days in Chicago, on his way to the Pacific coast, where he will combine business with a pleasure trip.

A. A. Anderson, of the Youngstown, O., road, and W. S. Wright, of the Wheeling, W. Va., lines, are two promoters of an inter-state base ball league which will play games in the cities named and other places.

George Turner, who has been superintendent of the Marion, O., Electric Light & Power Company, will in future devote all his attention to the Marion Street Railway, with which he has also been connected.

William H. Hansell, the wide-awake manager of the street railway department of the Charles Scott Spring Company, Philadelphia, made a flying western trip and captured a big order the latter part of last month.

Edward F. Seixas has been appointed electrical expert for the Tennessee Centennial which will be held at Nashville, Tenn., opening September 1, and continuing one hundred days. The appointment is an excellent one.

R. M. Rose, of the New York Fare Register & Supplies Company, has just completed a tour of the west in the interest of his machine. Mr. Rose was in the fare register business sixteen years ago, and has recently taken it up again.

R. T. Ramsey, treasurer of the Federal Street & Pleasant Valley Passenger Railway Company, Pittsburg, has been elected secretary also, owing to the retirement of William H. Graham, who has accepted the presidency of the Mercantile Trust Company.

S. L. Nicholson has severed his connection as manager of the electrical department of James Boyd & Brothers and made an engagement with the Cutter Electrical & Manufacturing Company of Philadelphia, where he will be pleased to hear from all his old friends.

Marion Crabtree, who recently resigned his position with the Columbus Street Railway to accept the superintendency of Columbus Central, was agreeably surprised when eighty of the men called at his residence one evening and presented him with a luxurious leather couch.

George Cockins, for five years with the Waterbury Electric Light & Traction Company, has been appointed general superintendent of the Bristol & Plainville Tramway Company, at Bristol, Conn., where he formerly resided. O. F. Strunz resigned because his extensive business interests required his entire time.

William Mott Tobias, former private secretary to Benjamin Norton, while the latter held the Long Island railroad vice-presidency and the presidency of the Atlantic avenue railroad, in Brooklyn, has been called to the office of general manager of the Newburg Electric Railroad, of which Mr. Norton is the head.

John H. Passmore, on leaving the employ of the Schuylkill Valley Traction Company, Norristown, Pa., gave a banquet to the trolley men, fifty-seven in number, with whom he had sustained such pleasant relations in his capacity of superintendent. The festivities were

kept up from 12:20 until 4 o'clock in the morning. A surprise was the presentation of a solid silver service to the retiring superintendent, who responded in a fitting manner.

J. B. Crossland has resigned as general manager of the Home Electric Company, Baton Rouge, La., to accept a position as sales agent for the Westinghouse Electric & Manufacturing Company, with headquarters at Charlotte, N. C. Mr. Crossland has a large southern acquaintance and will push the good work actively.

Capt. Robert McCulloch, St. Louis, spent several days in Chicago, and reports arrangements as progressing finely for the October convention. The carriage men of the United States, had already decided to meet in St. Louis the same date, and make headquarters at the same hotel. The captain, however, succeeded in getting them to change their date to a week earlier.

Edward Tindolph, who as manager of the Vincennes, Ind., lines has made an enviable record, has sold his interest in the road, and will soon make a connection with some good road. He has done much to advance the interests of his city, while advancing those of the street railway. He should not be allowed to rest long, although he has earned a good vacation. Theo. P. Agnew succeeds Mr. Tindolph.

NEW PUBLICATIONS.

The Interstate Commerce Commission has issued its report on the steam roads of the country for the year ending June 30, 1894. It not only appears earlier than usual, but is most excellently arranged and tabulated.

Lippincott's for February keeps fully up to the high standard which is able to hold its own without the aid of illustrations, and the complete novel "Ground Swells" by Jeanette H. Walworth is most excellent and up to date.

Emergencies in Railroad Work by L. F. Loree, division superintendent of the Pennsylvania Railroad is the subject of one of the recent Bulletins of the University of Wisconsin. It deals with the methods of taking care of wrecks, washouts and strikes in steam railroad practice.

The Digest of Physical Tests and Laboratory Practice, a resume a practical tests made in the laboratories of the world is a new publication of which the first number appeared with the beginning of this year. It is to be published quarterly by Frederick A. Riehle, 1421 North Ninth street, Philadelphia, Pa. Judging from the first number it is to be a publication of great value. It contains numerous articles by eminent technical authors from some of the principal laboratories in this country.

OBITUARY.

Mrs. B. F. Harris, Sr., grandmother of B. F. Harris, Jr., of the Urbana & Champaign Electric Railway, died January 15, last.

Elmer A. Hovey, who was for some time master mechanic of the Chicago City Railway, and who had been with the road seven years, died of consumption last month in Arizona, where he had gone as a last resort. The remains were brought back to Chicago.

STEEL MOTOR COMPANY MOVES TO JOHNSTOWN.

The Steel Motor Company is moving its works from Cleveland to Johnstown, Pa. The change is taking place in such a manner as to interfere with the output of apparatus as little as possible and without shutting down and losing valuable time. The capacity of the works when the change is finally completed will be double what it was at Cleveland. Orders on hand are sufficient to keep them running many months after the change is made.

Horses to the number of 275,000 have been displaced by the electric motor on street cars. At 125,000 bushels per day these would consume 45,000,000 bushels of corn and oats in a year. If this quantity of grain remains on the farm it means a loss to railroad traffic of 62,500 carloads annually.

THE Street Railway Review

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H. H. WINDSOR, Editor.
F. S. KENFIELD, Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of street railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers.

DOES THE MANAGER WANT ANYTHING?

If you contemplate the purchase of any supply or material, we can save you much time and trouble. Drop a line to THE REVIEW, stating what you are in the market for, and you will promptly receive bids and estimates from all the best dealers in that supply. We make no charge for publishing such notices in our DAILY BULLETIN.

This paper is a member of the Chicago Trade Press Association.

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VOL. 6. MARCH 15, 1896. NO. 3.

IT is certainly somewhat out of keeping with the eternal fitness of things that while inventors are making a desperate effort to perfect a successful electric bicycle lamp, there are many electric roads that still cling to the oil headlight although the electric headlight would be far cheaper and more convenient. Verily, we never appreciate things unless they are hard to get.

A GREAT deal of discussion has been going on in some of our contemporaries on generators acting as motors and causing fly wheel accidents. This is a profitable subject for discussion but it might be well for some one to explain at about this stage of the game how a generator can act as a motor and run away with its engine when its circuit breaker is wide open. Consideration of this important little detail seems to have been omitted from much that has been written.

THE general quality of street car service, all over the country, has greatly advanced, especially during the past two years. Indeed, in many places, the service rendered is altogether beyond the city, and out of proportion to the revenue earned. In some places the service can be materially improved, and without greatly increasing operating expenses. In a few places the service should be bettered at once, regardless of the increased cost. Where a company is really living up to its obligations with as frequent service as business warrants; and its cars are kept warm and clean; its employes polite, and mindful of the comfort and accommodation of the public, it would seem that such a company had in advance taken the wind out of the sails of threatened competition and invasion of its territory by speculating promoters.

WE all know the wide difference between theory and practice, and yet many managers do not realize that difference in some very important matters. In the question of the minimum distance in which a car can be stopped there is a very great misconception on the part of motormen. Of course the varying conditions of rail will make an important difference, often as great as 100 per cent in the case of a greasy rail over a clean, dry rail. But even under favorable conditions the average motorman is almost sure to overestimate his ability to make an emergency stop. And too, he may honestly believe his mistaken estimate to be a correct one. The very important part which the motorman's testimony has in a damage case, should lead every manager to demonstrate to his men just what is the usual distance in making a stop. The method adopted by Assistant Manager Fassett, of the Albany Railway, and described elsewhere in this issue, is well worth adopting by every manager.

WHILE people in this country are wondering whether the sudden impetus given the subject of horseless vehicles is but a passing fad which will soon exhaust itself; across the water the horseless carriage is marching boldly on to victory. A parliament bill is now pending and will soon be passed removing the ban which now classes the autocar with steam rollers, and requires a man with a red flag to precede the vehicle. Early in the coming summer an international exhibition of autocars will be held in London which promises to be a great event. One company has already 600 motors in operation, and has orders on its books which cannot be completed under two years, and is even returning money to parties ordering now. Such a condition could not exist here, but goes to show the genuine boom the autocar has created, and we may accept it as having come to stay, just as the bicycle has. What with bicycles and autocars and rumors of balloon cars, the trolley promises to have plenty of company in these days of busy and unparalleled inventive accomplishment.

PRESIDENT CALDWELL, of the Lake Shore road is credited with saying that his line is so far a gainer by the operation of the electric suburbans which run out of Cleveland. That while the new lines with frequent service and lower fares have taken some of the local passenger business which formerly was hauled by the Lake Shore, that on the other hand the suburbans are good feeders, and bring passengers to them from points not on the Lake Shore line. These passengers some of

them go long distances, and the earnings from one such would frequently amount to as much as that derived from fifty short haul passengers that have been lost on account of the electric. The more frequent stops will, for a long time give the steam roads an advantage in time on points more than ten miles distant, and as Mr. Caldwell says, when the competition gets too hot there is nothing to prevent him from building an electric line on their present right of way, outside of the existing steam tracks. The lesson for the steam road executives to study is where and when it will pay them to do this and thus forestall competition, which in some cases could have been prevented.

The first American city to pass an ordinance regarding electrolysis of water and gas pipes is, we believe, Richmond, Va. While it is all right to make an electric railway company liable for the damage done by electrolysis caused by it, and may be all right to state in an ordinance that it shall be so liable, it is going too far for a city to specify to a railway how its ground return shall be constructed as Richmond has done. What difference does it make to a city how electrolysis is prevented if it is only prevented? If it did not take up so much space we would like to print the ordinance word for word as a humorous production. In the first place it says that rails must be electrically welded at the joints or if this is not done they must be bonded with certain sizes of a certain type of bond. Apparently the man who drew up the ordinance did not happen to think that possibly a company might like to use some other type of bond just as good or better or lay cast-welded joints. Then follow some more specifications as to supplementary wires, etc., and a lot of delightfully uncertain sentences as to under what conditions it shall be considered that electrolysis is taking place. "A little learning" proved to be "a dangerous thing" in the hands of the man who drew up the ordinance. It is a combination of too definite specifications as to construction with too indefinite provisions as to the actual results. Taken altogether the ordinance is absurd. If there must be electrolysis ordinances let them be brief, to the point, and based on actual damages done, not on some man's theories as to how a return circuit should be installed, and when there is "danger" of electrolysis.

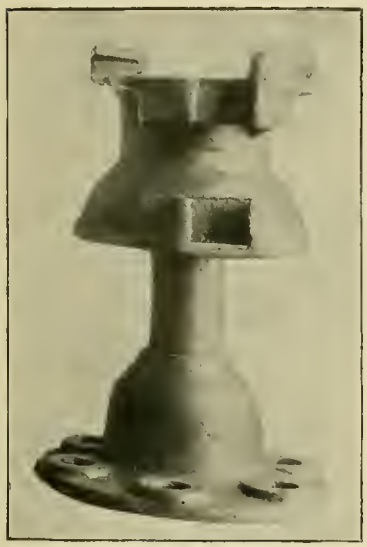
The old notion, held by many in the early days of the electric road, and still held by a few, that but little training is necessary to make a good motorman, is rapidly dying out. It is a fact for which we may well be thankful that superintendent's are giving more and more thought to this matter, and that methods of instruction are being improved. While it is absurd to argue the similarity between the locomotive engineer, who has charge of a good sized steam plant on wheels, and the motorman who has a couple of comparatively simple motors which can be run without any knowledge of their makeup; still a great many street railway officers underestimate the value of a skillful, practiced motorman, who is naturally careful, as compared with a new or careless man. As the business gets older and experienced men become more numerous, the standard of experience required of motormen will undoubtedly be raised. At present a great many managers prefer to educate their own men rather than take those who come from other cities, because they claim that they are more sure of their material when they take new men, and the men from other towns are too apt to think they know it all. It is surely an unfortunate state of affairs if it is generally better to go to the expense (variously estimated at from $50 to $500) of teaching a motorman rather than take one who is already supposed to know something about his job, and it does not speak very well for the skill of motormen as they are at present. It is along this line of training and keeping tab on motormen that there is more room for advancement than along any other at present (with the possible exception of the care of rolling stock) and it deserves very earnest attention.

There has always been more or less of a tendency among electric railway builders to buy good material and then do such poor construction work with it that much of the money invested in it is lost. The remedy that has usually been sought has been to buy still more expensive material for the next job and adhere to the old faulty construction methods. The series of articles concluded with this issue, by J. W. Greer, on track and overhead construction, calls attention to some of these faulty methods, and we hope will accomplish its mission in teaching more care in construction. Mr. Greer writes specially for the smaller roads and points out that faulty methods of constructing track are often to blame for troubles that are usually laid at the door of too poor or too light materials. But in addition to this there are many things said in the series that may well give the large roads something to think about. We see all kinds of ridiculous extremes in track building. One engineer puts so much money in concrete foundation that it is almost a wonder sometimes whether ties and rails are necessary. Again we see the other extreme of a heavy track for heavy traffic being laid on a foundation of mud simply because in laying the track it is a little easier for the construction gang to put the mud which was last taken out of the excavation under the ties, and let the gravel which came out first and naturally is at the bottom of the pile be carted away. It is an easy matter to go through the motions of laying good track without really accomplishing that result, and it is very essential that the foremen be thorough men. Track work is like a chain. A weak link in specifications or methods may cause the premature failure of the whole. A concrete example of this is the use of too few ties. Fortunately this evil is growing less every day, but we still see some interurbans and small roads that are ruining good heavy rails for want of proper support.—rails which would do good service had a little more been spent on ties. So we see all along the line in track construction there are chances for an enormous waste of money through apparently small mistakes at the beginning.

THIRD RAIL ON STRUCTURE.

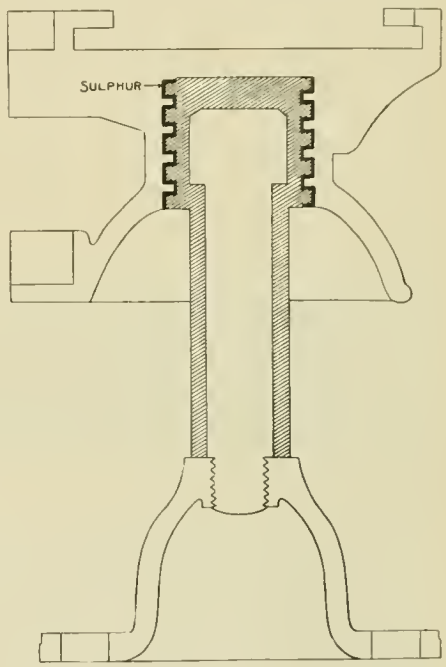
THIRD RAIL AND FEEDER EQUIPMENT OF THE LAKE STREET ELEVATED, CHICAGO.

The third rail and feeder arrangements of the Lake Street Elevated Railroad of this city, which is now being electrically equipped, are radically different from those of its neighbor, the Metropolitan, equipped last year. While the Lake street electrical construction is much more expensive per mile, it is believed by those who have planned it that in the long run it will be enough more substantial to make up the difference in first cost. The work is being carried on by the electrical department of the Yerkes interests, which has put up all the overhead construction on the North and West side surface lines, and of which J. R. Chapman is the manager. The work is under the immediate charge of C. E. Collins.

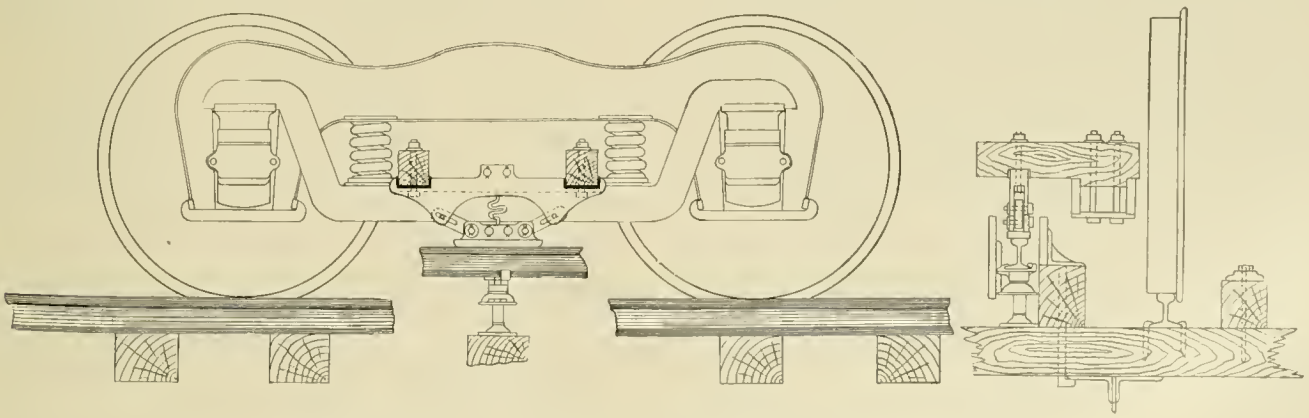


THIRD RAIL SUPPORT.

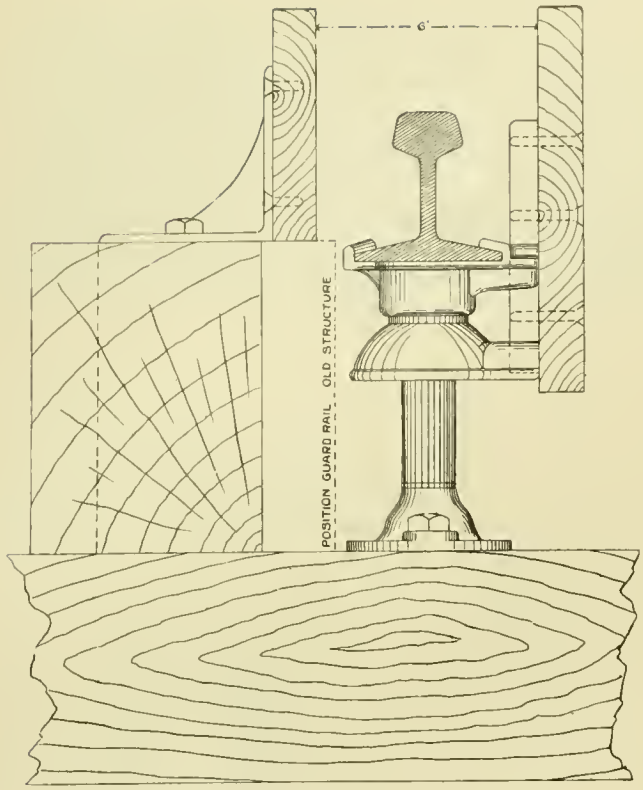
The most important new feature of this construction is the use of a third rail support somewhat similar in form to a trolley wire hanger, with insulating compound for insulation in place of wood. Figures 1 and 2 show one of these third-rail insulators, and it is also shown in some of the other drawings. Its general principle is that of the modern trolley wire hanger, viz.—a bolt covered with insulating compound and secured in a metal hoop. The insulating material is furnished by Albert & J. M. Anderson of Boston, and was chosen on account of its great strength and the way it has stood up under insulation tests. However, in adapting the trolley wire hanger principle to the support of a forty-eight-pound T rail on an elevated road there are a number of problems to be met, and these have been very sucessfully worked out in the present form, which is the invention of Messrs. Chapman and Hanson of the electrical department. In the first place, as these sup-



SECTION THROUGH THIRD RAIL SUPPORT.

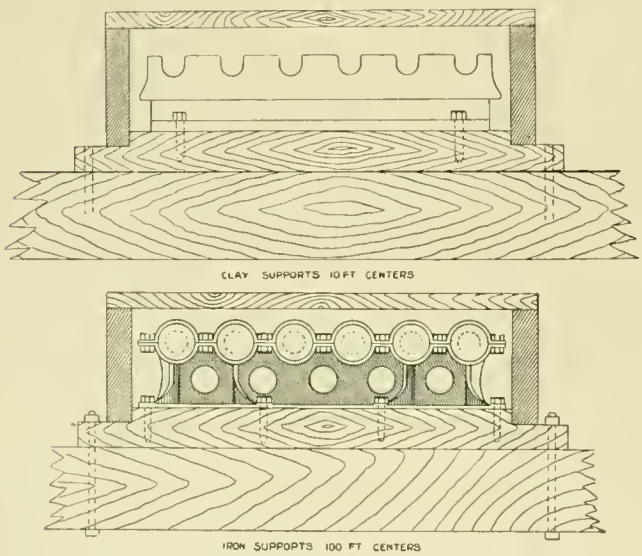


GENERAL PLAN OF TRUCK, CONTACT SHOE, AND THIRD RAIL ARRANGEMENT.



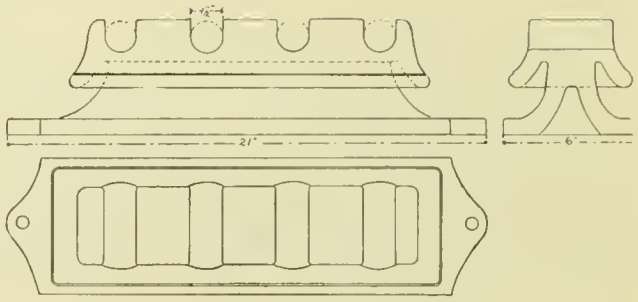
PROTECTING PLANKS AND THIRD RAIL.

ports are placed about every six feet, and consequently there are many thousand of them on the road, it is essential that they be designed with a view to cheap manufacture. Besides this they must be simple and easy



IRON AND CLAY FEEDER SUPPORTS ON STRUCTURE.

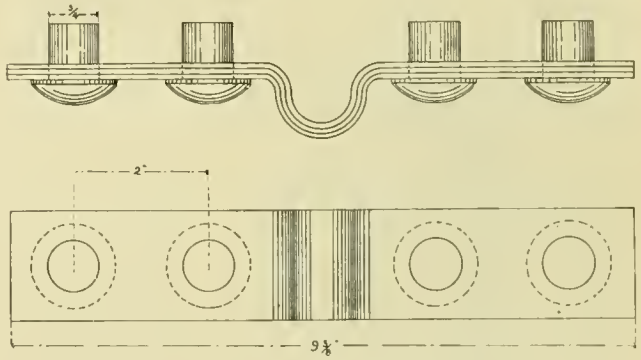
of application and perfectly firm and solid when once in place. The top and base of this support are of cast iron. The only machine work about the device is where the insulated bolt screws into the cast-iron base. The top has a thread cast in it, into which the insulator screws. As this rough-cast thread would not make a tight fit, melted sulphur is poured in when the device is put together, insuring an absolutely tight fit between the



VITRIFIED CLAY FEEDER SUPPORTS.

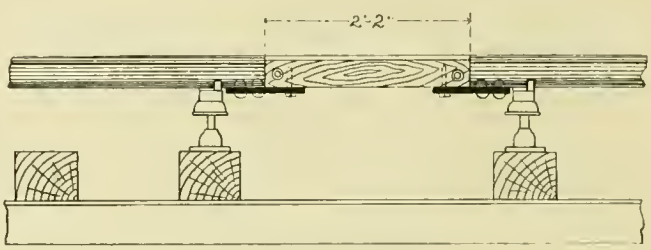
insulator and cap. Of course this kind of insulator, protected as it is from the weather, is much superior to a plain block of wood, and will be less affected by brake shoe dust, sun, rain and storm than exposed wood.

The feeders for this road will be of copper cables instead of bonded rails, as on the Metropolitan. The management thought best to do away with the uncertain resistance of bonded rails. The feeders are 1,000,000 and 1,500,000 circular mil cables. On the structure they are



BOND FOR THIRD RAIL.

bare but boxed over. Two kinds of supports are used. Every ten feet is a vitrified clay insulator made by H. P. Camp & Co. of Alton, O. This insulator is shown in the drawings, and is something of a novelty in the insulating line. It has been found by tests to have high insulation resistance. Every 100 feet is placed an iron bracket with Anderson insulating compound bushings through which the cables pass. These hold the cables



SECTION INSULATOR FOR THIRD RAIL.

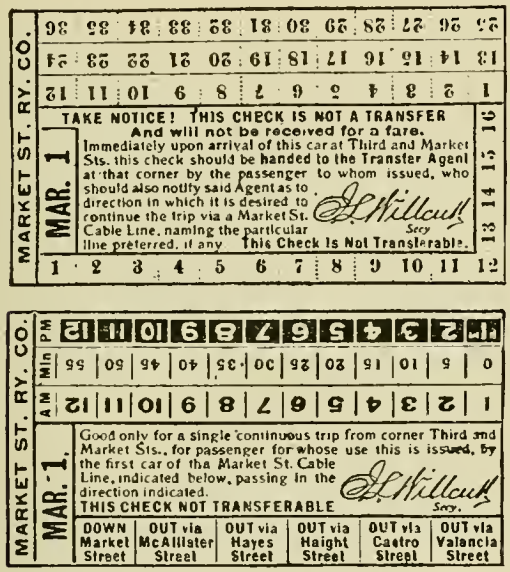
firmly in place, the clay insulators between simply acting as supports.

The third rail is to be protected by a plank on each side so that it will be impossible for careless workmen to lay crowbars across track and third rails at once. It will also reduce accidents to workmen from getting

shocks. The protecting plank on one side will be fastened to the wooden track guard rail. On the other side it will be supported by a locust pin driven into a slot of the third rail support. The third rail joints are made with two-bolt fishplates and bonded with copper strips 9⅜ inches long by 1⅝ wide and composed of three thicknesses of No. 11 copper. Track rails are bonded in the middle to the structure.

SAN FRANCISCO TRANSFER SYSTEM.

To protect against an abuse of the transfer ticket, the Market street road, San Francisco, has adopted a new system of transfer. The first of the two forms shown is issued by the conductor to the passenger, who



SAN FRANCISCO TRANSFER.

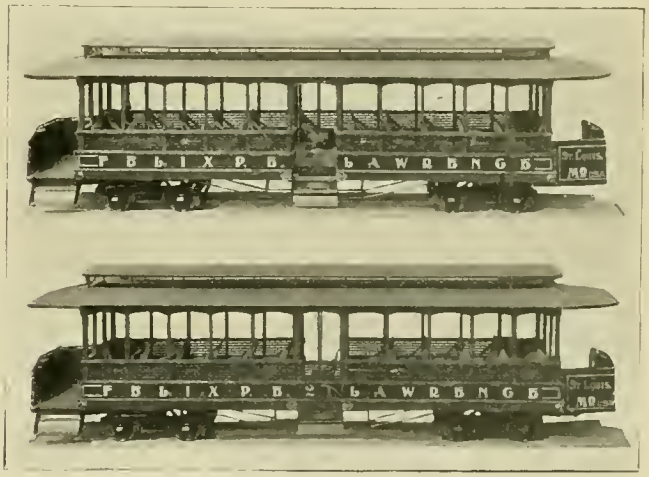
retains it until the transfer point is reached, where it is exchanged by the transfer man for the second form shown. The conductor's slip shows by punch marks the number of his run and number of his trip. The transfer man punches out the line, the a. m. or p. m. hour, and a time limit of five minutes, which would seem to be getting the transfer down to a fine point, especially in the short time limit, which is particularly good.

NEW RAILWAY COMPANY FORMED IN DENVER.

The Denver City Railway Company, composed of the purchasers of the properties and leases of the Denver City Cable Company, was incorporated the twenty-eighth of last month with a capital stock of $3,700,000. The names of those appearing on the state paper as sponsors for the new institution are: George E. Randolph, Colin A. Chisholm, Henry F. May, Charles W. Waterman and John F. Heeney. In 1888 the Denver City Cable Company was organized, and after operating five years went into the hands of a receiver owing to the general business depression. George E. Randolph, the then general manager of the concern, and a heavy bond holder in it, was appointed receiver, and he will continue his stewardship until the coming May term of the United States Court, when the property will be turned over to the new organization, which is virtually the old company revived. The affairs of the Denver City Railway Company will devolve upon a directorate consisting of seven members. They are: George H. Holt, Gaston D. L'Hulier, William Cole, Charles Skehan, all of New York; Arthur Knight, East Greenwich, R. I., and George E. Randolph, of Denver. It is the intention to use electricity on the new lines and possibly on the cables.

MOVABLE CROSS SEAT FOR DOUBLE TRUCK CAR.

Two bright young men of St. Louis, Felix P. Lawrence and Harry Smith, have built a handsome model car, several feet in length to illustrate their ideas of an improved side entrance door. The seats are arranged in two rows of cross seats, with reversible backs, and a centre aisle. The side doors on either side of the car open inward and the plan is to always have the entrance



NEW SIDE ENTRANCE.

next the other track closed. The cross seat opposite the side door slides from one side of the car to the other, and the moving of the seat automatically closes one set of doors and opens the others. Doors on both sides may be closed if desired. Our illustration is of a double truck summer car and shows the near side as it appears when opened and closed.

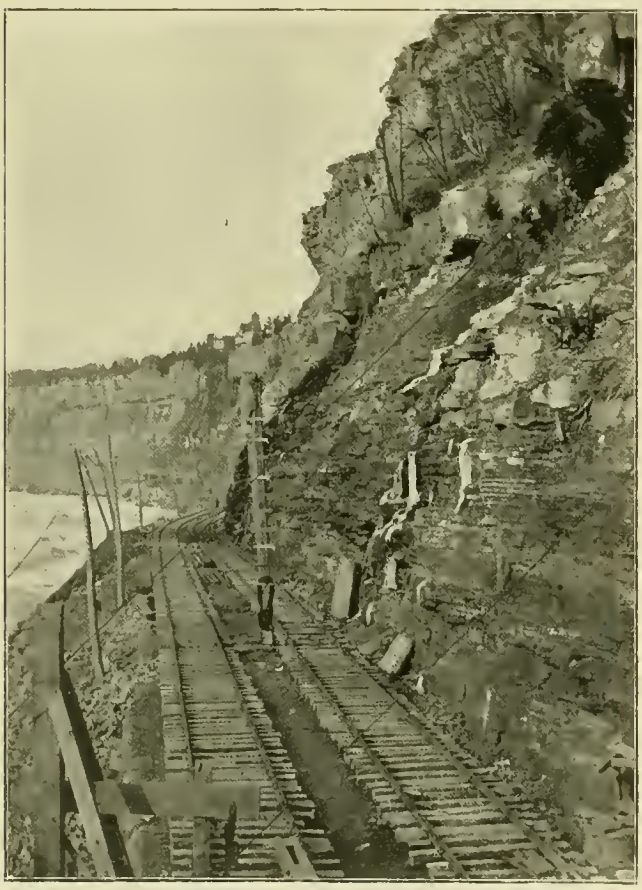
TEXAS STATE CONVENTION.

The Texas Street Railway Association will hold its second annual convention, March 18, at Galveston. Supply men will be welcome, and space will be provided for them for exhibits, if they desire it. Applications for exhibit space should be made to J. K. Urie, care Galveston City Railroad Company.

TRESTLE AT CANTILEVER BRIDGE ABUTMENTS.

WINTER SCENERY ON THE "GORGE ROAD."

The most scenic electric lines in the country are, undoubtedly, those along the Niagara River. The group of views shown on this page were recently taken along the line of the Gorge Road. The large group



SCENE BELOW THE BRIDGE.

of views shows the mammoth icicles, many of them weighing tons, depending from the cliffs.

Switchmen have been placed at the intersection of all railroad and electric lines in Denver.

PLEASURE RESORTS FOR 1896.

The great importance of pleasure resorts, parks and special attractions, as means of creating and inducing travel, is now universally conceded, and it is with no small degree of pride the REVIEW looks back upon its years of effort in this direction, for it was the pioneer. Having brought about an appreciation of the almost unlimited possibilities of created travel, we now as earnestly set about gathering the latest and best on the subject. What every resort manager is anxious to know is, what new and novel features he can introduce this year, and what proved most successful elsewhere last season. During the next few months the REVIEW will devote a large amount of space to its resort department, and we urge all our readers who have had any experience along these lines to send in their views and suggestions, in order that the greatest good may come to all. Write us what proved most successful last year; what did not, and what you will attempt the coming summer.

We will start with a success—operations of General Manager Warren, of the

DULUTH STREET RAILWAY.

He says: Three or four years ago we built a pavilion on a high bluff above the city at the head of our incline railway. We have had military band concerts there every season since the building has been put up, and as it has a heating plant and can be entirely enclosed, we often have entertainments and gatherings in the building during the winter.

Last season we put in a stage and turned the building into a summer theatre. We were in the "United States Street Railway Circuit" and had, in addition to a military band of twenty-three pieces all season, high class vaudeville attractions. We had a very good attendance during the season, considering the very unfavorable weather and the fact that the regular theatres down town gave us strong competition by reducing their prices and keeping their houses open nearly all summer.

Our plans for the coming season are not definitely settled, as yet, but we expect to have some sort of attractions, as we are satisfied that it pays. It is probable that we will, this season, have dramatic and opera companies at our pavilion in place of vaudeville, as we had last season.

We charged an admission of five cents and with reserved seats at ten and fifteen cents last season. This season we expect to make the admission free, charging only for reserved seats.

It is very hard for us to determine what sort of performance is the best attraction, but we consider, at such a resort, a good military band is essential. Vaudeville attractions seemed to be quite popular last season, and if we have summer opera and dramatic companies this season we will be able to form an opinion as to which class of entertainment has the greater attractive power.

ANOTHER POPULAR RESORT.

Operated by a road, the name of which is withheld by request, is located upon a high bluff on the bank of a river. The manager writes:

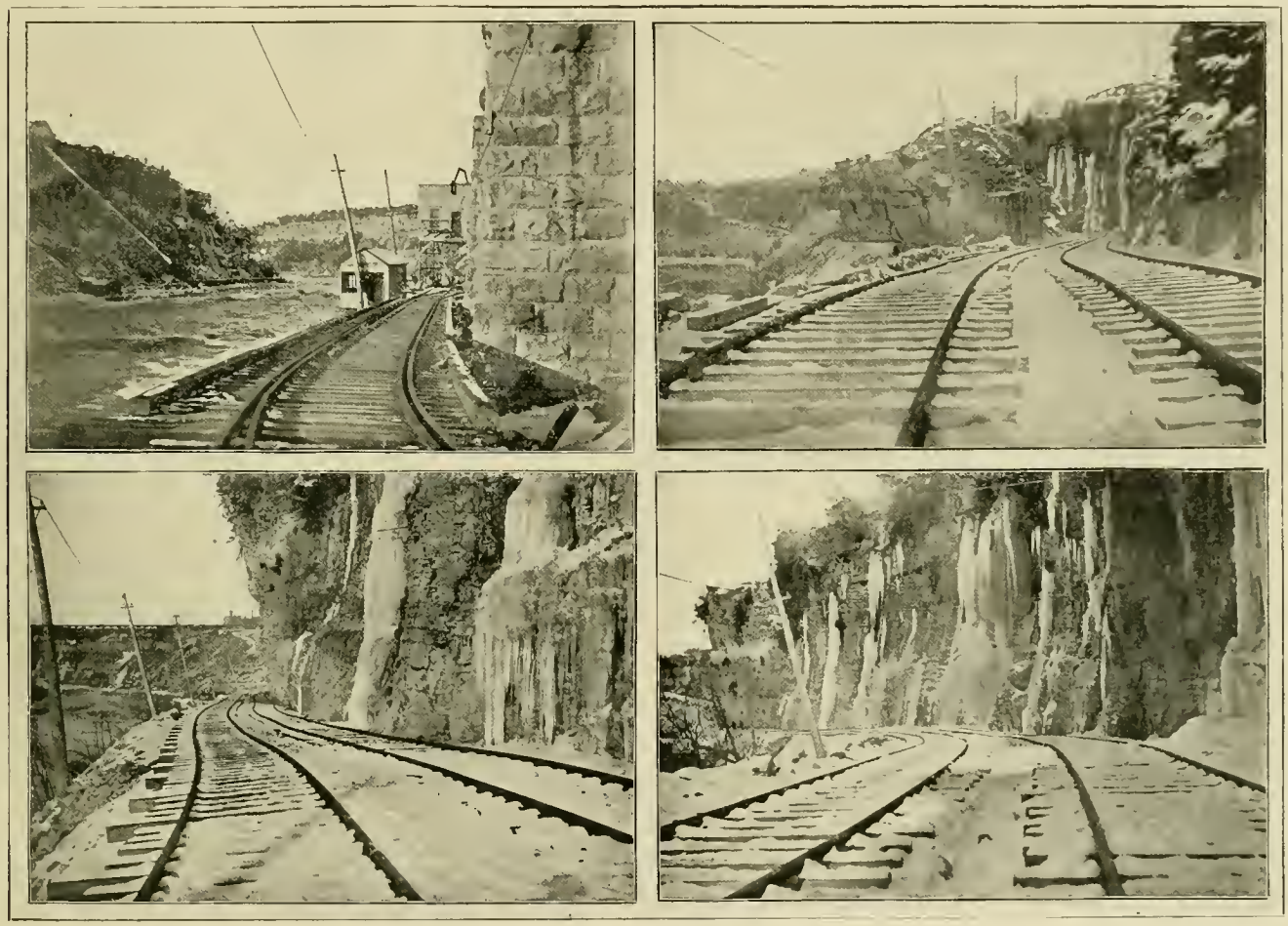
The surroundings are very picturesque and attractive. We have erected a large, modern pavilion and dancing hall on the brow of the bluff, and several smaller pavilions and band stands throughout the grounds. Last season we built a small, open-air summer theatre as an experiment, and put on vaudeville entertainments throughout the season, which, as a novelty, attracted a large number of visitors. We also erected a small, crude home-made electric fountain, which produced beautiful light effects on a 40-foot stream of water, and proved quite a drawing card. We have, of course, the usual summer park attractions, such as the "merry-go-round," museum, shooting galleries, etc., including water toboggan slides. We intend to follow up about the same line of amusements this season, and if possible, secure a good band or ladies' orchestra, and employ them during the entire season, thus furnishing our patrons good music every afternoon and evening. We intend this season to devote considerable effort with the steam railroads and boat lines on the river, with the view to bringing in excursions, with our resort as an objective point. We have found this a very profitable source of business in the past, as excursionists not only visit our resort, but ride around the city. We also intend to devote considerable attention to "trolley parties" during the coming season.

General Manager M. S. Robison, of the

FT. WAYNE CONSOLIDATED,

says: Our company is just going into the pleasure resort business the coming season. We have purchased a large tract of land situated nicely on the river, and we are going to equip it extensively, with a large pavilion, club house, boat house, bathing house, and we will have a merry-go-round and a shooting gallery, and will probably give light theatrical performances during the season. We want to make this so attractive that our people will all stay at home during the summer and get their recreation and amusement here, in place of going away.

Last year we gave an experiment with light theatrical performances at a small garden we have here, and the attendance was very large, indeed. We are satisfied that it will pay roads, where they do not have fine parks and plenty of attractions, like some of the larger cities, to go into this business.



WINTER SCENES ALONG THE GORGE ROAD, NIAGARA.

THE ELECTRIC STREET RAILWAY AT ANDERSON, IND.

We have a park of forty-four acres on our North Anderson line which we opened last season, but on account of work that was being done in the park last season we were not able to make it as attractive as we desired, but we now have it in a very nice condition. The only thing we have as yet in connection with the park is a boat house with boats, we having a very beautiful and picturesque stream of water running through the park half a mile in length.

Our opening attraction, Alphonso King, was the most attractive and popular of the season, although we had but very few others. We have not made any arrangements this season for attractions, but will probably do so later.

FROM CINCINNATI.

The Cincinnati Street Railway has once more joined the ranks of amusement promoters. "This company has not for several years past had anything in the way of parks or pleasure resorts as special inducements to create travel. Formerly there were what were known as hill-top resorts, namely, the Highland House, Bellevue House, etc., and there we gave concerts, theatrical and operatic performances, encouraged picnics and things of that kind; but those resorts gradually ran down and are at present entirely abandoned.

This year we have gone more extensively into the business and have what is known as "Chester Park," a large tract of ground lying just north of our city, and have sub-let the park to an Athletic Club Company, which purposes during the season to run all sorts of amusements, one of which is a bicycle track, claimed the most rapid track in the world, within which is a sprinting track. Adjacent on convenient sides are a grand stand for any spectators, with club rooms beneath for bicyclers, and off at a little distance a large club house where drinks and edibles may be obtained. A large roller coaster or scenic railway, the longest in the world by more than double, and many other attractions which are not yet fully developed. We cannot give you any information as to the success of this until next fall, when we hope to be able to announce a complete financial and amusement success."

G. S. Johnson, general manager of the Consolidated Street Railway at

GRAND RAPIDS, MICH.,

says:—We have two resorts here, one of which is large and of considerable importance. It is situated on a lake, on which two or three steamers of considerable size ply and is filled with row and sail boats, during the suitable seasons.

At this resort we have a very handsome pavilion, probably as good and as large as any in the west. In this pavilion refreshments of all kinds are served, except liquors. It is provided with a large dining room, nicely furnished, and lunch counters, so that parties can have plain or elaborate lunches, as they choose. We maintain a band continously during the season.

Besides this, we have numerous attractions, such as Madam Carlini and her trained animals, the Tak-aza-wa Japs, Harding and Ah Sid, and entertainments of that character. Also we have trapeze and tumbling acts, concerts and quartets. We vary the entertainment according to the facility with which the performers can be brought here.

We find it desirable to have something going on most of the time, as our car receipts are considerably increased thereby. I shall be glad to get any suggestions from those who have had any experience in this direction.

The lake shore cities have splendid natural advantages, many of which are as yet undeveloped. The road at

SHEBOYGAN, WIS.,

however, has taken energetic steps and finds the resort feature pays. Secretary Debell says:

Some of the stockholders of our company own a large park at the southern end of our lines, which is situated upon a high bluff overlooking Lake Michigan. We already have quite a menagerie at this park; also a dancing pavilion, orchestra and refreshment stand and dining room. We expect this summer to have music, frequently, on pleasant evenings, and occasionally fire-works display off the shore. This is practically the plan arranged for the coming season, but it will be altered or added to as we find necessary.

As regards the attractions that proved most acceptable last year, we cannot pick out any one feature that alone drew any large number of people to the park. The cool lake air on the bluff, the pleasant view of the lake, the natural beauties of the park and surrounding lands, the pleasant play grounds for children, all contributed to make it pleasant for visitors.

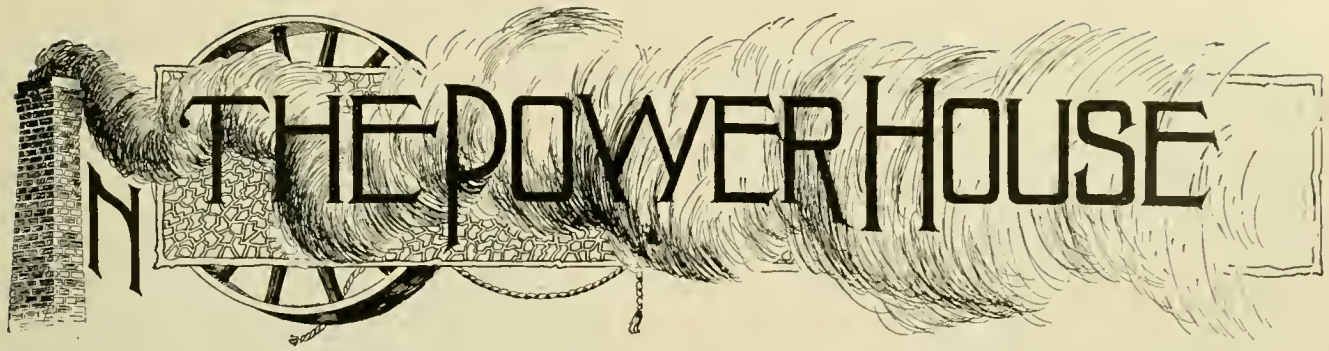
Church people, as well as numerous societies, have made use of the grounds for picnics, and the main celebration last 4th of July was held on these grounds.

In addition to this park feature we have always tried to have visiting circuses pitch their tents at a point favorable for our business, and seize every opportunity to promote and encourage gatherings of any kind that will bring our car service into demand.

In conclusion we wish to commend your purpose of collecting and publishing communications of this kind, and shall take much pleasure in reading what our friends have done, and will do, in this line.

Another road which has a good many thousand dollars invested in a famous resort, states, that what proved most successful last year was good vaudeville companies. The same plan will be followed this year, only the attractions will be even still better and finer.

Numerous hold-ups on the New Haven, Conn., suburban runs, have induced all employes to go armed. The superintendent readily consented to the plan.



This department is devoted to the construction and operation of electric railway power houses. Correspondence from practical men is specially invited. Both the users and makers of power house appliances, are expected to give their views and experiences on subjects within the range of the department.

Another electric railway power plant has adopted electric motors for driving stokers, boiler feed pumps, and economizer cleaners, viz: that of the Southern District Tramway Company of Dublin, Ireland. Still electric railway people here in America do not seem to have realized the advantages of this practice and yet adhere to the direct acting steam pump, one of the most wasteful and troublesome appliances to be found around a modern electric railway station.

* * *

A novel ash conveyor has been put in the power house of the Atlanta Consolidated and is described to us by Thomas Elliott, chief engineer. It might more properly be called a sluice as water is the propelling power. The sluice was made by splitting in halves a 14-inch cast iron pipe. This pipe is laid the length of the boiler room with a fall of one in forty, and is placed just in front of the ash pit doors. The split pipe was laid and bricked up to the floor level. Then the whole was covered by cast iron plates with an opening 8 by 24 inches in front of each ash pit door. This opening is covered except when taking out ashes. The water for carrying the ashes is furnished by a 3-inch pipe from the condenser discharge which is opened when needed.

* * *

It is not uncommon to hear an engineer boast of the great number of years an engine of his has run without any repairs. This sounds very well and gives the casual visitor the impression that the engine must be from a remarkably good builder and under the charge of a remarkably good engineer. To a certain extent this supposition is warranted, but when an engine has received no repairs for a long series of years it is a sure sign that it is time for repairs to begin, even though the engine is to all outward appearances running smoothly. The valves and piston head may be leaking so badly that it would have been economy years before to undergo the expense of reboring cylinder and renewing valves and rings rather than have the constant drain on the coal pile due to waste of steam. Before accepting statements as to the good records of engines and engineers one is perfectly justified in asking to see an indicator card or a record of steam consumption from the engines in question. Money spent in coal is worth just as much as money spent in repairs. Some owners and engineers fall into the error of thinking that if they have compound or triple expansion engines that economy must necessarily follow, and so sit down and fold their hands, forgetting that with lack of attention to leaks they may lose all their theoretical advantage over simple engines. Furthermore, the opportunities for leakage are much greater with the compound engines. Put in compound engines if the price of fuel justifies them, but whatever you put in stop the leaks. If you have inefficient and out-of-date machinery and no money to buy better, don't waste any tears on it, but go to work to get the best results possible out of what you have. You may be able to work wonders.

* * *

The Rochester Railway hands us the following report of its power plant performance.

No. 18.—Output in electrical-horse-power hours per day, 21,862. Station operated twenty hours per day. Record is kept by recording wattmeter, and by separate readings every hour. Equipment: four Heine and three Babcock & Wilcox water tube boilers, 350-horse-power each; hand firing, Hawley down draft furnaces; one Hoppes' exhaust heater, 2,200-horse-power; two Hoppes live steam purifiers, 1,000-horse-power each; one McIntosh & Seymour 500-horse-power; two McIntosh & Seymour, 300-horse-power each; three Ball engines, 275-horse-power each; all compound, condensing, direct belted; three Ball engines of 165-horse-power each, simple, non-condensing, direct belted. Fuel costs at power house $2.10 per ton of 2,000 pounds. Soldier's run selected lump soft coal. Results:

Fuel consumption per electrical-horse-power hour	4.39 pounds
Cost of fuel per electrical-horse-power hour	$ .00460
Water evaporated per electrical-horse-power hour	36.58 pounds
Water evaporated per pound of coal	8.30 pounds
Cost station labor per electrical-horse-power hour	$ .00203
Cost oil and waste per electrical-horse-power hour	.00010
Cost station repairs per electrical-horse-power hour	.00009
Cost motive power per motor car mile	.01267
Total cost power per electrical-horse-power hour	.00782

A western Masssachusetts road makes the following excellent showing:

No. 19.—Approximate output at station switchboard, 5,021 electrical-horse-power-hours per day. Station

operated 19.2 hours. Equipment: Three 200-horse-power Babcock & Wilcox water tube boilers with forced draft and Green economizers in stack; primary and secondary New Haven feed water heaters (water enters primary heater at 35°, secondary heaters at 106° and Green economizer at 207°, entering boiler at 255°); engines are tandem compound condensing Corliss, 400-horse-power, direct connected, 15 by 28 by 48 inch stroke. Fuel is "Pocahontas" soft coal, and costs $4 per short ton at the power house. Results:

Fuel consumption per electrical-horse-power hour	2.14 pounds
Cost of fuel per electrical-horse-power hour	$.00382
Water evaporated per electrical-horse-power hour	21.4 pounds
Water evaporated per pound coal	10 pounds.
Cost station labor per electrical-horse-power hour	$.00349
Interest on cost station per electrical-horse-power hour	$.00368
Water taxes and insurance per electrical-horse-power hour	$.00064
Cost oil and waste per electrical-horse-power hour	$.00035
Cost motive power per car mile	$.03132
Total cost power per electrical-horse-power hour	$.01201

The Atlanta Consolidated through its chief engineer Thomas Elliott furnishes the following:

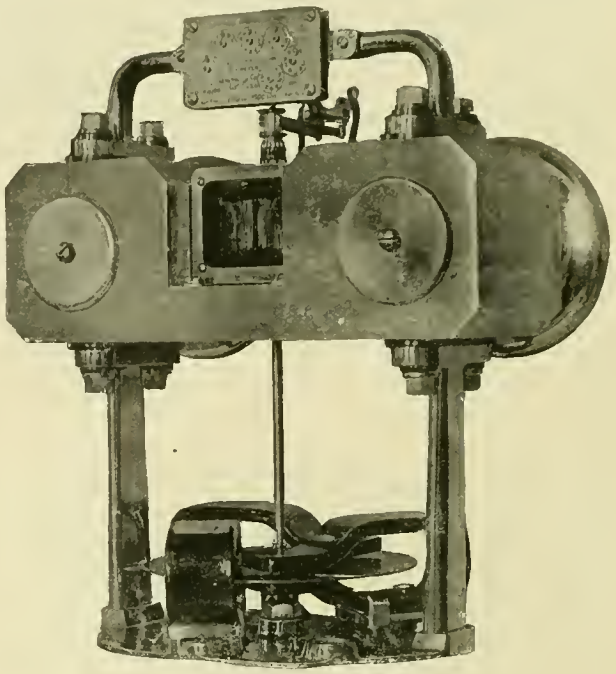
No. 20.—Output at switchboard 8,713 electrical-horse-power hours per day. Station operated nineteen hours. Record kept by recording wattmeter. Equipment: three 125-horse-power horizontal return flue boilers and three 250-horse-power Manning upright boilers; hand firing; one 400-horse-power national feed water heater; two 20 by 40 simple corliss engines running 90 revolutions per minute, direct belted; one 22 by 40 by 48 compound, direct connected, condensing, corliss, running 90 per minute; one 24 by 44 by 48 compound, direct connected condensing, corliss, running 80 per minute. Jellico nut and slack costing $1.60 per ton at the power house is the fuel used. Results:

Fuel consumption per electrical-horse-power hour	3.90 pounds
Cost fuel per electrical-horse-power hour	$ .00312
Cost station labor per electrical-horse-power hour	.00123
Interest on cost of station per electrical-horse-power hour	.00235
Water, taxes, insurance, etc., per electrical-horse-power hour	.00009
Cost oil and waste per electrical-horse-power hour	.00019
Cost station repairs per electrical-horse-power hour	.00061
Cost of motive power per motor car mile	.01322
Total cost of power per electrical-horse-power hour	.00759

No deduction is made for the heating of the shops which is done by live steam. The plant has been using a better grade of coal since the report was made with decidedly better results.

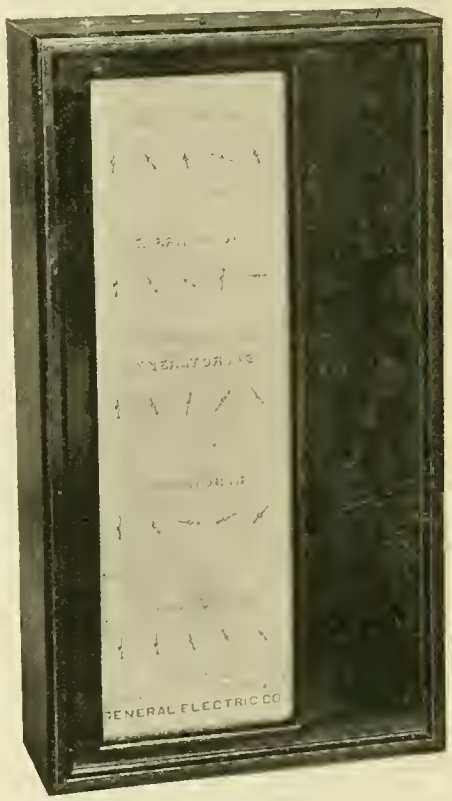
* * *

In central stations and railway power stations using Thomson recording wattmeters to measure the total output from each machine, or upon each feeder, the grouping of the dials of all the meters in one place where they could be conveniently read at one time, has been frequently urged as advantageous. The General Electric Company has, therefore, brought out a telltale dial system. This permits the placing of all the dials upon one panel and the installation of the meters out of ordinary reach, as it is no longer necessary to read them each day. The necessary wiring from the meters to the panel is simple and inexpensive. The panels can be duplicated and the performance of the meters be read either in the dynamo room or in the manager's office, or any other necessary place, and the performance of the station be accurately learned at any time. Each row of



TELLTALE WATTMETER.

dials on the panel represents a single generator or feeder, and the recording indicator is actuated every kilowatt hour by a simple make and brake device upon the meter



TELLTALE WATTMETER DIALS ASSEMBLED.

measuring its circuit. The dials are several times larger than those on the ordinary meter, and they are all direct

reading, all constants being eliminated by modifications of the actuating mechanism. It is only necessary in ordering the telltale dial, to state the constant of each meter and the character of the generator. The panel can then be properly lettered. The introduction of this ingenious telltale system renders the use of a complete system of station output meters possible in many stations hitherto unable to use them on account of the difficulty in installing them, where they can be conveniently and rapidly read.

* * *

Three Years Fuel Test.

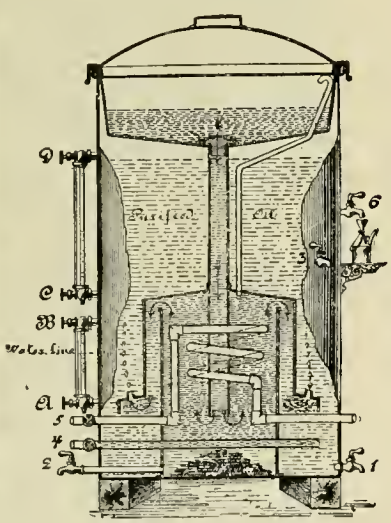
While the record given below is that of the Stevens' linen works, at Webster, Mass., it is of interest on account of the long record, covering as it does three years. Engine is an Allis cross compound, 22x40x48; boilers, two Reynolds' vertical, eighty-four inches. The engine was indicated both a. m. and p. m., and the average taken for daily record. The boilers used exclusively for the engine, and figures of coal include all night banking.

	1893.	1894.	1895.
Average I. H. P. for year	381	393	396
H. P. hours " "	1,042,221	893,792	1,076,134
Engine coal " "	1,831,700	1,493,243	1,775,720
Average coal per I. H. P. per hour for one year	1.76	1.67	1.65

* * *

Q. & C. Perfection Oil Purifier.

The Q. & C. Company of 700 Western Union Building, Chicago, is introducing a new oil filter and purifier which is meeting with great success where it has been tried. The use of waste or filtering compounds is dispensed with entirely in these filters, water being the only filtering medium. They should be set on a stand high enough so that a bucket can be passed under faucets 1 and 2 as shown in the diagram of the interior. Steam connections are made at 4 and 5. Water is poured into the pan until the filter is filled to within two inches of the top of the lower gage glass. In regular operation steam is turned on at 5 just enough to keep the water in the filter at a temperature of 115 to 120 degrees Fahrenheit. Dirty oil is poured in at the top and after filtering through the water as indicated by the arrows is drawn off for further use at 6. Faucet 3 is for use only when the surface of the oil falls below 6. To clean the apparatus faucet 6 is opened and water slowly poured in at the top until no more oil runs from 6. Then the steam connection valve at 4 is opened wide as are also faucets 1 and 2, and the dirt will wash out.



* * *

Cleaning an Oil Cask.

Sam Short, in Locomotive Engineering: "I had a funny experience with my stationary engineer the other day," remarked the master mechanic from Maine.

"Fritz is a good man and attends to his duties in fine shape, but he is not burdened with an overplus of brains.

"He came to me and said: 'Mr. M., I haf some abbles dot I vill make de cider, an' I vud like un oil gask for holt de cider. Vill you sell me de gask?'

"'Put cider into an oil cask?' I said. 'Why, you must be crazy. No one could drink cider that was flavored with kerosene oil.'

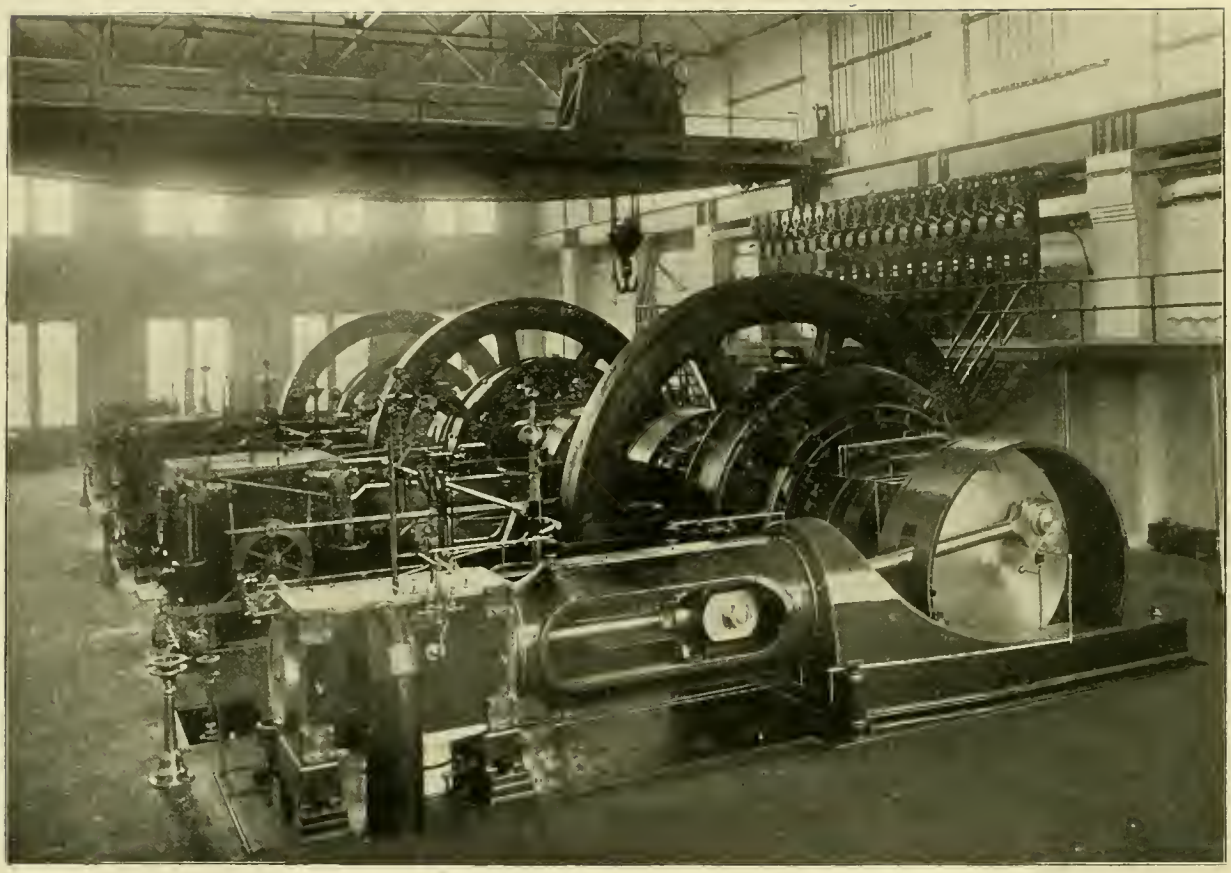
"'But, Mr. M.,' said Fritz, 'I vash de gask mit shteam.'

"'Well, you may take a cask,' I said.

"An hour or two after that conversation I happened to be passing the engine house, and there was my brave Fritz preparing to 'vash his gask mit shteam.'

"A one-and-a-half-inch pipe leads from the boiler house through the wall to the outside. It is used for blowing out the boiler. There is a cock outside for convenience of opening. The pipe is pretty close to the ground, but not so close that the bung of an oil barrel cannot be pushed on to it.

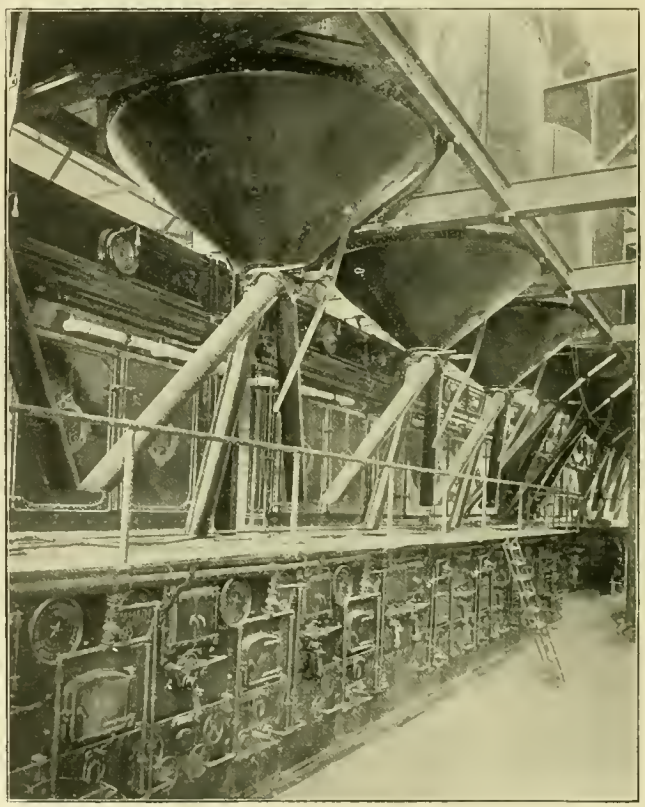
"When I got there Fritz was working the end of the blow-off pipe into the bunghole of the barrel. It was a tight fit, but after considerable wrestling he got it in. Then he reached over for the blow-off cock and opened it gradually. As the pressure accumulated the tendency was for the steam to force the cask off the pipe. Fritz resisted this, with all his weight lying upon the cask, and as he found that he could hold it in position he reached over and opened the blow-off cock wider. Then there was a struggle between the forces of fat and muscle and the power of expanding steam. One end of the cask would jerk out; then, under the weight of Fritz, it would bound back, and the other end would plunge to escape from its moorings. There seemed to be nearly an equal combat between the contending forces, when, all at once, cask staves, hoops and Fritz went into the air in a promiscuous mass! They all came down together, after having gone up about twenty feet, and I ran up, expecting to find Fritz dead. He looked up, a little dazed, and, lifting a stave and looking at it, he remarked, 'By golly, I clean dat gask goot!'"



ENGINE ROOM OF HAWTHORNE AVENUE STATION, CHICAGO.

Hawthorne Avenue Station Chicago.

The third great electric power house to be built by the Yerkes interests in Chicago is that of the North Chicago Street Railroad at Hawthorne avenue and Hobbie streets. The two previously completed plants were described in our issue of September, 1895. The Hawthorne avenue station is situated on the North branch of the Chicago river about two miles from the heart of the city. It furnishes current for the North Chicago lines south of North avenue, and on account of its proximity to the business district and favorable conditions for current will for the first few months at least, furnish power to the down town end of the Lake street elevated road as soon as that road is electrically equipped. It is without doubt the best located of the large stations in Chicago. It is on the river so that there is plenty of free water for feed and condensing, and is on a railroad siding so as to get cheap coal. It is also near the center of the district it supplies. The station is planned for a capacity of 6,000 horse-power in four units of 1,500 horse-power each. Three of these are now in place leaving the fourth to be installed at some future date. The engines are cross compound condensing horizontal corliss, built by the Edward P. Allis Company of Milwaukee. The independent condensers are from the same works and a Reynold's feed water heater is operated in connection with them. The cold feed water is first put through these heaters and then through an exhaust heater which is supplied from the exhausts of the condenser air pumps and boiler feed pumps. By this means the water is brought nearly up to boiling. The generators are the General Electric



BOILERS, STOKERS AND COAL STORAGE.

Company's make. Ten 300-horse-power boilers have been put in. This is the full capacity of the boiler room. These boilers are the Standard water tube and are fitted with automatic stokers and complete coal and ash conveying apparatus. A hopper holding five tons is put over each boiler. The conveying apparatus is arranged so that coal can be taken in or ashes discharged at either end of the boiler room—that is on the river side or on the switch track side. At present fuel oil is being used but coal is to be tried soon. There is a basement under the entire building. The steam main is put under the boiler room next to the engine room wall. This leaves the engine room basement free for the condenser mains and attendant piping. The steam main is drained by Westinghouse steam loops running straight up the wall between the engine and boiler rooms. The building and details are after the general plans of other power houses mentioned at the first of this article, all being built under the supervision of S. Potis, Jr., chief engineer of the North and West Chicago Street Railroads, and J. R. Chapman, head of the electrical departments. One excellent feature of all these power plants is that they are absolutely fireproof. It would be an impossibility for any of them to burn. The engine room floors are rolled steel plate and the boiler room and basement floors floors are of concrete. On account of the proximity of the river and the clay soil, foundations had to be put on piles. The feed water is taken from the Chicago river but is filtered before using so that the heaviest of the sediment is removed. There is not, however, as much sediment in the water as it comes from the river as would seem from the surface appearance and after being filtered through sand it has nothing more than a slightly milky appearance.

LEGISLATED TO DEATH AT SANTA ANA, CAL.

The Santa Ana Orange & Tustin Street Railroad, of Santa Ana, Cal., has been playing what might be called a hide-and-seek game with the town authorities, with unsatisfactory results all around, and we imagine the people and their representatives do not feel as "fresh" as they did before the circus began. The company had a franchise to operate a street railroad over certain streets in Santa Ana, and one of the conditions was that it should pave with planks or macadamize the entire length of its line. The road was never a paying investment, the travel being insufficient, so when the city ordered the track paved, the company served notice that it would not expend the necessary money, but offered to keep the road in operation if the city, or citizens, would do the paving. This the city refused to do. The company then asked permission to remove the rails and ties from that portion of the street. This was also refused. The company then filed with the board of trustees a surrender of its franchise, and asked to be allowed to remove the ties and rails. The board did not act on this, and after it had lain over several meetings the company withdrew the proposition. The company then stopped the running of cars, and gave notice that it would abandon the system and wind up the business. At this the city started out to compel the company to do the paving, but after spending several hundred dollars, found it had no power to compel a company to conduct a business after it had given notice to abandon. It then declared the franchise forfeited and gave permission to remove the property just what the company proposed to do in the first place. The company has torn up its track, and at last accounts from Superintendent M. J. Bundy, had a good supply of old steel rail for sale. It is apparently almost as hard work to stop a road as to start it.

STATUS OF THE UNDER RUNNING TROLLEY LITIGATION.

In reply to our inquiry as to the status of the test suits, one of the attorneys for the General Electric replies as follows:

Two test suits were instituted some years ago by the Thomson-Houston Electric Company to restrain infringement of the leading patents upon the Van Depoele underrunning trolley railway system. One of the suits was brought against the Winchester Avenue Railroad Company, of New Haven, and the other against the Elmira & Horseheads Railroad Company, of Elmira, N. Y.

The Elmira & Horseheads suit was decided last summer by Judge Coxe. An appeal was taken, and the Circuit Court of Appeals, concurring with Judge Coxe, sustained a large number of important claims of patent No. 424,695, granted to C. J. Van Depoele, April 1, 1890. An application was then made by the defendant to have the case carried to the Supreme Court of the United States on a writ of certiorari for further consideration. This application was denied by the Supreme Court and the decision of the Circuit Court of Appeals stands as absolutely final. A final decree has been entered sustaining the patent, and a permanent injunction has been issued against the Elmira & Horseheads Railroad Company, restraining further infringement.

The New Haven suit was decided by Judge Townsend in the Circuit Court for the District of Connecticut, December last, and broad claims in patent No. 495,443 for the under-running trolley system were sustained. Subsequently Judge Townsend granted an injunction against the Winchester Avenue Road, though pending a possible appeal to the Circuit Court of Appeals, the road will be permitted to continue to use its present apparatus, though enjoined from purchasing new infringing apparatus or disposing of what it already has.

Suits have been started against all the leading manufacturers of switches and trolleys, and against some of the trolley roads. Preliminary injunctions have already been secured against the Fiberite Company, of Mechanicsville, N. Y., the New York Electrical Works, and other motions for injunctions have been argued and are awaiting decision.

WAVE MOTOR EXPERIMENTS.

A Review of the Past Experiments Made on the Pacific Coast, and Description of the Extensive one Now Being Carried on.

The Pacific coast has always been a favorite place for experiment with wave motors, and the following account of the latest and largest from the Journal of Electricity of San Francisco is full of interest:

The little of village of Capitola, a pleasant suburb of Santa Cruz, California, is fast assuming a new importance, particularly in the mechanical engineering world, because of the series of experiments that are now about to be carried out there, and which the promoters believe will contain the results of all the experiences hitherto derived regarding the utilization of the energy of the waves of the ocean in the development of power. Almost from the earliest appreciation of the value of power the mind of man has been captivated with the possibilities of wave motors, but the fact of the commercially successful utilization of such prime movers is yet to be recorded.

PIER AT CAPITOLA.

On the Pacific coast several rather extensive experiments have been made, two of which, in San Francisco, gave naught but discouragement in repay for the efforts and money which their promoters expended. Both of these experiments were carried out on the rocks beyond the Cliff House, and one of the wrecks remaining, and shown in Figure 1, exists as a monument to the fond but delusive hopes of the inventors. The first experiment at the Cliff House was that of the Steen wave motor (Figure 1). The rocks at the point of its location form a sort of cave, where the breakers rush in and out, sometimes with tremendous fury. Over the entrance of this cave a bridge was constructed, from which depended a huge paddle that was designed to swing, pendulum-like, back and forth in the waves. From its lower extremity a pitman was carried back toward the cave to the piston of a pump, sixty-five feet distant, the idea being that the latter could be operated from the stroke of the paddle. The timbers of the mechanism were of great strength, but not sufficiently so to withstand the beating of the waves, with the result that first the pitman was demolished and then the main timbers of the paddle gave away, and with it the perseverance of the inventor succumbed, as the wreck now standing evidences. It was designed that the pump should force water from the ocean to the top of the hill, at an elevation of between three and four hundred feet, and the pumping plant was put in with this intention, but the first rush constituting the maximum power of each wave, imparted such a blow to the pumping equipment as to not only prove the weakness of the machinery installed, but also to demonstrate the fact that something was radically wrong with the design of the apparatus.

FIGURE 1. A WRECKED WAVE MOTOR.

The next effort at the Cliff House, and which constitutes the last endeavor there made toward the utilization of wave power, resulted in the building of elaborate paraphernalia, the ruins of which still exist.

The principle upon which this apparatus was constructed was the one yet predominating in the minds of inventors, namely, that the energy of waves may best be made available by the rise and fall of floats, but although the conditions were favorable for the test, and an expensive plant was put in, the inventor's hopes were not realized and

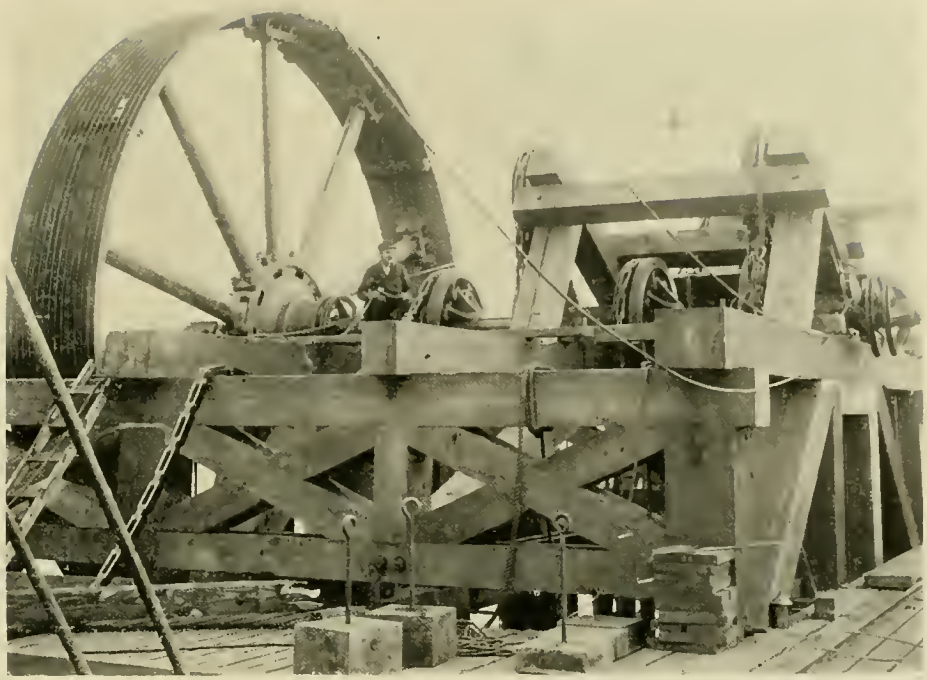
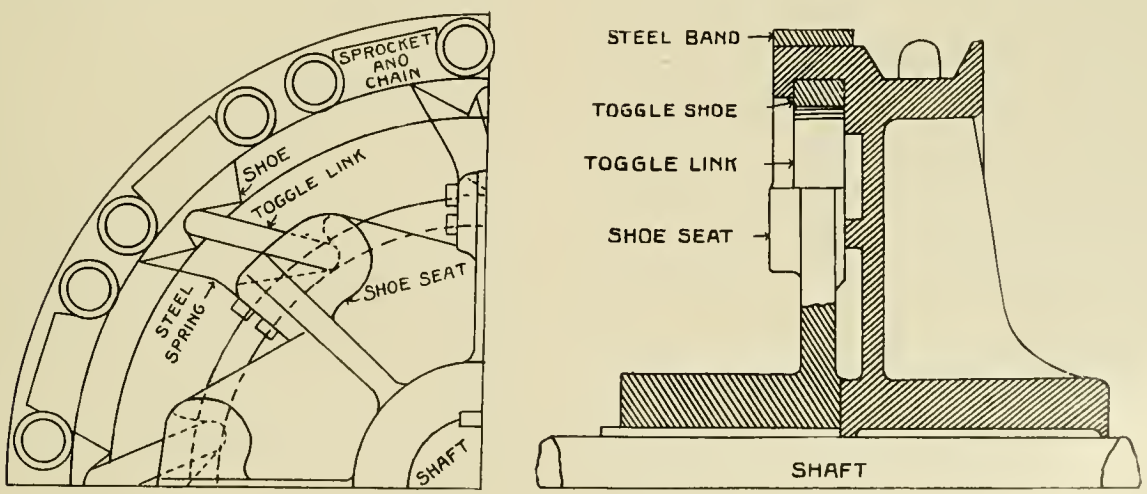


FIGURE 2—MAIN SHAFT OF GERLACH WAVE MOTOR, SHOWING SPROCKET WHEEL AND TOGGLE CLIPS.

the explosion of the dynamite-ladened schooner "Parallel" off the Cliff House rocks seven years or so ago, wrecked the outfit, and afforded a fitting pretext for its abandonment. In this, as in the Steen motor, the ambition was to operate pumps for forcing water to the hill top, but if reports be true, it was found that the capacity of the apparatus was limited by the weight of the float, which, together with the rise and fall and the time factor, was insufficient to develop material power. The Gerlach water motor, which is now under test at Capitola, exceeds all previous experiments on the Pacific coast in point of magnitude and cost. Its general form, which is shown in the illustration at the heading of this article, is in particular a development of an experiment made at Long Beach, Cal., about two years ago. In this experiment a paddle wheel thirty-six feet in diameter, and having paddles six feet wide by three and one-half feet deep, was erected on a temporary structure of eight piles that were driven at the extremity of a wharf extending 1,100 feet into the sea. When a wheel is suspended in the rollers with axis parallel to the beach, the wheel will tend to rotate in the direction of rolling from the shore, because of the greater force of the inward than the outward motion of the waves. Although the action of the wheel is of an oscillatory character, there is thus a tendency to effect its revolution, which led to the construction of a wheel in the Long Beach experiment, rather than the building of pendulum like vanes or paddles. The power of the wheel was made available by a rope passed about its circumference, which was connected to a pulley fitted with differentiating pawls and ratchets, so as to give the driven shaft continuous rotation, and under test the apparatus lifted a weight of 8,500 pounds to a height of eighty feet in thirty seconds, representing a theoretical energy of a trifle over thirty-two horse power.



FIGURES 4 AND 5.

The results obtained at Long Beach were satisfactory to the inventor, who at once set about the organization of a company to prosecute experiments on a larger scale, and the fruits of his labors are represented in the Capitola experiments. A wharf extending into the sea a distance of 750 feet has been leased for twenty years, and upon the end of the pier has been extended 200 feet of very stable wharfing, upon which has been erected the plant shown in the accompanying illustrations. The general scheme of the Gerlach wave motor will be understood from a study of the first illustration. Two sets of vanes or paddle wheels swing with the surges of the waves, and from the extremities of each, chains fit to sprocket wheels, equipped with the differentiating gear,

PADDLE SUSPENSION OF GERLACH WAVE MOTOR.

to be described, and by means of which rotation is imparted to the shaft carrying the large fly-wheel shown. In detail, this main shaft is thirty feet in length and eight inches in diameter. The fly-wheel has a diameter of twenty-four feet six inches; it weighs 60,000 pounds; its grooved face has a width of four feet. Upon this shaft has been placed four sprocket wheels, two for each paddle, and a portion of which are clearly shown in Figure 2. Each of these sprocket wheels is five feet in diameter, and is provided with eight right-hand toggles, two and one-half by six inches in size, which act as pawls. By running two chains from each paddle, one of which chains is connected direct to its sprocket wheel and the other being carried over an idler wheel before being secured to the sprocket wheel, the same direction of pull is given to the shaft for either stroke or swing of the paddle. The paddles are each mounted upon a shaft eight inches in diameter and fifteen and one-half feet long, and are so equipped as to have a range of lift of thirteen feet in order that they may be kept at the most advantageous depth of immersion at all tides. The paddles are raised and lowered by screws in the pillars, which are actuated through worm gearing by means of power applied to the sheaves shown from the small sheaves on the main shaft. The paddles are of a uniform width of twelve feet, and are nine feet deep, hence there being three paddles to each equipment, there are 324 square feet of surface to each mechanism, or a total of 648 feet of paddle surface. The paddles weigh eight tons each, and swing with a radius of thirty-two feet, describing an arc, the maximum chord of which is twelve feet, while the average chord ranges between seven and eight feet. The swing occurs eight times per minute, thus giving thirty-two pulls per minute to the main shaft from the two paddles.

A vital feature of the mechanism will be understood by reference to Figures 4 and 5, showing the arrangement of sprocket wheels on the main shaft and by means of which it will be remembered the main fly-wheel is to be rotated. As shown in Figure 5 in detail the sprocket wheel proper really forms an idler that were it not for the toggle links, would revolve freely in either direction. Abutting this is the eight-arm spider shown in Figure 5, which is rigidly keyed to the shaft. Referring again to Figure 5 it will be seen that an extension of the flange of the sprocket wheel is made to overreach a portion of the spider wheel. The under side of the flange is grooved to confine within it the steel toggle shoe shown in elevation in Figure 5 and in section in Figure 4. This shoe is of peculiar formation and is held in place first by the toggle link shown and second by the constant pressure of a steel spring, the tendency of which is to cause slippage when the idler is run in a left-hand direction. When the direction of revolution of the idler changes, however, the toggle shoe grips with it as in a ratchet and pawl motion, and the shaft rotates.

On January 9th the first and only effort was made to test the machinery, when it was found that the toggle pawls in the sprocket wheels on the main shaft were not properly proportioned and did not grip, and thus, instead of producing the desired friction, the sprocket wheels slipped without turning the main shaft. The motion imparted to the sprocket wheels by the paddle chains was satisfactorily regular, but in order to satisfy those present as far as possible, one of the steel toggles was made to fit temporarily, when the main shaft began to revolve at a considerable speed, thus demonstrating the practicability of the idea. The trouble with the toggle pawls constitutes a minor defect, which is now being remedied by the Atlas Iron Works of San Francisco, the contractors for the plant, and it is promised that the machinery will be in proper working order early in February, when it will be fully tested and the results published. The inventor expects that at least 200-horsepower will be developed, which it is proposed to utilize by compressed air.

SECURITY AGAINST COLLISIONS AT NIGHT.

BY H. E. D. LIGHT.

If a man would take thought of the purpose of headlights he would immediately perceive that our present headlights do not fulfill their purpose.

The principal purpose of a headlight is to light up the street in advance of the car so that the motorman may be advised of any source of danger upon the track, and necessarily to light the street for such a distance in advance of the car that the motorman may be advised of the danger in season to avoid it by stopping his car.

The street then should be lighted up for such a distance as the motorman requires to stop his car. To secure safety beyond any ordinary possibility of doubt the motorman should be able to perceive an obstruction at a distance that will be sufficient beyond any ordinary possibility of doubt to stop the car in. Under the best circumstances a car may be stopped when at ordinary speed in 100 feet or less. But it would be absurd to allow lives and property to depend on a car always being stopped in this distance. With a train of one or two trailers, and a heavy load, with high speed, a slippery rail, a loose brake-chain, a grade, and with a motorman surprised by the sudden appearance of danger, a car may not be brought to a stop in 200 or 300 feet or even more.

Our present headlights make the track hardly visible 250 feet ahead. They are simply insufficient. Light is cheap; oil is cheap; electricity is cheap; why not have a headlight that is ample? A motorman may need 400 feet to stop his car: there should be a margin of safety, besides, of at least 200 feet. A headlight should light up the street clearly and plainly for a distance of 600 feet. For that distance it should be strong enough to turn the night into day. A motorman cannot see too well. In well-lighted streets the light from the headlight is not so necessary, of course, but the greater part of the mileage of the electric roads is not well-lighted. Much of it is not lighted at all.

It is the custom now to run rapidly through open, thinly-settled country. At night in such territory there is not much likelihood of finding teams or foot-passengers on the tracks: the motorman does not expect to find them there: accordingly it is on these unfrequented, unlighted tracks that accidents occur. The driver of a team is half asleep or drunk: or there is a covered buggy, milk wagon or delivery wagon in which a driver has shut himself in from light and sound. With the present headlight, unless the motorman is looking sharply at the very instant that his rapid car brings him within seeing distance of the wagon, there will be a collision.

Present headlights are as far behind the times as the links and torches that people used in London 200 years ago. A motorman cannot in fact see anything clearly by means of his headlight. If he is a careful, zealous man he stands on the front platform constantly straining his eyes into the darkness ahead. He is constantly wondering whether a deeper blotch of blackness, a thicker gloom in the darkness before him is a wagon or an illusion of his eyes. Often he slacks up for an illusion, and sometimes he pays no heed to the illusion and strikes a wagon.

The street car men should demand of the headlight manufacturers a strong light: and the manufacturers should reply in the spirit of the old blacksmith in Geauga county, Ohio, who said to the man who wanted a trap for wood-chucks: "Mr. Stofford, if you want a trop strong enough to hold a woodchuck, I'll make you a trop strong enough to hold a bar." Why not have light enough? Why not have plenty of it and to spare?

This is half the story. Plenty of light should be thrown ahead from the car: but to avoid collisions with wagons another safeguard should be adopted. It arises naturally from the law, based on the common sense of men, which requires prudence of all. Prudence should require that a vehicle running at night upon street railway tracks should give some sufficient token of its presence. Public convenience has come to demand that street railway cars should run at a high speed. The service of these cars forms one of the principal public uses of the street. A wagon upon a street is not there by any higher or different right of public utility than a street car. The street car company and the driver or owner of the wagon owe each other like duties. The street car company should use all proper and fit means to advise itself of the presence of a wagon upon its tracks ahead of a car, and the driver of the wagon should use reasonable means to let the presence of his wagon be known. What could be more reasonable than to require the wagon to display a light? Ordinances should require every vehicle running along street railway tracks laid down and operated by authority of law to display a light. Light, as before said, is cheap. The light should of course be visible from both front and rear. If a wagon carried a light in this manner its driver would be using means to take care of himself. As the law is now, almost the whole burden is placed on the street car. A small light upon the wagon would suffice. It could be said of it as Shakespere said: "How far that little candle throws its beams!"

Ordinances requiring these lights will eventually, in all probability, be passed in all cities. They would be passed at once if city councils had their attention called to the necessity of them. They would work no hardship. Carriages already are required to carry lights, or without being required, carry them for their own protection. Carriages have carried lights for years as a safeguard against collision with other vehicles, the danger of which is trifling compared to the danger of collision with rapidly running cars. Teaming wagons could carry a lantern. The safety of life and property is the crown of civilization. Safe transit on the streets by night requires nothing but light. And light is cheap.

WORK OF DORNER AND DUTTON WHEEL FOUNDRY.

The car wheel which in the concrete plays so important a part in transportation, has in the abstract so many points of interest that information regarding its processes of manufacture may be advantageous reading to railway men and others interested in transportation. To illustrate some of the modern processes of manufacture and methods of testing street car wheels for all classes of service we have chosen the street car wheel department of the foundry operated by the Dorner & Dutton Manufacturing Company of Cleveland. Situated in the outer portion of the city, where the facilities for transportation are the best, both for raw materials and finished products, the company has great advantages, besides having ample room for its extensive works, which include the foundry with its numerous connecting pits and machine shops, where the wheels are finished and mounted on axles, and trucks made.

In the interior of the works, a glance around the casting room shows the arrangement of the molds to be something of a novelty. The molds are arranged in circles, with a crane standing in the center of each circle, which carries the ladles of metal from mold to mold. The position of these center cranes is such as to command each a circle of molds, and at the same time to be within reach of one another, enabling any load to be carried up and down the shop from crane to crane if necessary. Each circle contains sixteen molds.

The annealing pits where the wheels are gradually cooled, consist of wells built of fire brick and surrounded by non-conducting material. Peculiar and especially adapted hooks, which hold the wheel by the center are used for lowering into the pit. These hooks, when the wheel has reached the bottom of the pit, trip, let go their hold, and are again hoisted out to take on other wheels. From eight to fifteen minutes is the time required to sufficiently harden a wheel to enable it to be handled after it is poured. When they are red hot, which is about the best temperature for annealing they are closed in the annealing pits, and are left for a certain time, which varies with the conditions, size and purposes for which the wheels are intended.

DORNER & DUTTON DOUBLE PLATE STREET CAR WHEEL.

To cool a wheel in the ordinary way would be to subject it to breakage by its own contraction in cooling, or to so temper it as to make it unable to resist a blow. It is therefore required to so anneal the metal as to relieve the soft web and hub from all strain caused by the shrinking of the hard chill and thick rim. It is important, too, that this annealing be so exactly done that the hardness of the chill is not disturbed. Every wheel when it is removed is subject to a series of severe tests to determine the uniform hardness of chill and its general quality. Defective wheels are always thrown out, though the per cent of imperfect wheels in a carefully managed foundry is exceedingly small.

Figures 1 and 2, show front and back views of the Dorner & Dutton double plate car wheels, of which they are making a specialty. The double plates starting from both ends of the hub and uniting to form the tread, but with a series of ribs on the back which take the place of spokes, make a strong construction without interfering with the depth of chill or other essentials. Just what the difference is may be ascertained from a test which was made of two wheels at the Dorner & Dutton works. In weight there was a difference of but fifteen pounds between the wheels, but the plate wheel gave way with eight blows from a 145 pound drop falling sixteen feet, while the spoke wheel resisted but six blows from a 12-foot drop. The curve form of the ribs and of the plates themselves has a double office to perform. The first of these is to enable the metal to shrink and readjust its particles in cooling, so as not to have any strain within the wheel, and the other is an even greater advantage in imparting to the wheel a certain amount of elasticity. For this purpose cast iron is especially suited. Its elastic properties are greater than is generally known. Although the cushioning effect of the curved plates and spokes is not to be measured by feet and inches, yet the destructive effect of a blow delivered upon a wheel which is of such shape as to utilize the elasticity of the iron is considerably less than of a wheel of different form.

THE DORNER & DUTTON DOUBLE PLATE WHEEL.

DOUBLE TRUCK CARS FOR CHICAGO.

At last the triumphant march of the double truck electric motor car, which is finding such favor in many cities has reached Chicago. The Chicago General Railway has put a number of forty-foot vestibule cars in operation on its main line on Twenty-second street. They are mounted on McGuire bicycle trucks, each truck having a G. E. 1,200 motor, and when thundering down the street at a fifteen-mile gait are very imposing pieces of rolling stock.

CHECKING FALSE TESTIMONY.

BY EDGAR S. FASSETT, ASSISTANT GENERAL MANAGER, ALBANY RAILWAY.

Your article in the current issue, February 15, in relation to the inadvertent testimony of employes, has inspired me with the idea of writing to you as to what we have done here to head off such testimony, and also the testimony of the discharged motorman, who is always (on the witness stand) able to stop his car in from six to ten feet, going at any rate of speed.

In the first place, taking a car with the old General Electric rheostat controller, we put men on the car, and with a stop watch, took the accurate length of time that it took to throw off the power, pull over the reverse handle, and put the power on one turn. This we found, in every instance, took from three to four seconds. I was not satisfied with this time test, and took our men out on the road, and on a piece of level track, with a car having Number 3 Westinghouse motors, made an actual test of the distance required in stopping the car. The conditions were to start from one pole, and acquire all the speed possible to the next pole (125 feet), and then to stop the car, either with the brake or the reverse, in as short a time as possible. From calculations we made, cars in that distance acquired a speed of a little over eight miles an hour. The shortest stop made by any of our men was forty-five feet, and the average of over one hundred men was fifty-six feet. I have a register of the distance required to stop a car under those conditions, of every motorman in the employ of this company, and I feel that I have not only educated them, but I have prevented the 10-foot stop testimony being given by any of them if they should become discharged employes.

SOME EXPERT OPINIONS ON GUARD WIRES.

The mayor of Manchester, N. H., recently instituted an inquiry relative to the value of guard wires in preventing fires from the trolley lines. The following from Captain William Brophy of the wire department of the city of Boston will be of interest as showing the opinion of one of the best experts on the subject in the municipal service in this country:

"I would say that guard wires, when properly installed, do, in a measure, prevent electrical contact between the trolley and other wires, thus preventing danger to fire alarm apparatus, telephone and other instruments, and in that way preventing injury to persons using them, and at the same time reducing the danger from fire. But they are not an absolute safeguard for the following reasons: (1). They are not always properly insulated from the pole and trolley wire; (2), there are not many hours in the day when the trolley does not come off the wire. In such cases, the trolley, span and guard wires are connected electrically through the medium of the trolley pole, thus making the guard wires as dangerous as the trolley itself.

"One of the worst burnouts that ever befell the Boston fire alarm telegraph occurred in that way. One of the circuits came in contact with the guard wire at some point of the West End railway system. The trolley left the wire at some point and the pole rested against the trolley and guard wires. As the latter is one continuous unbroken line, current was conveyed to the point where the fire alarm wire was resting on it, and destroyed every instrument on the circuit.

"Accidents of this kind to telephone and other circuits are quite frequent.

"It is often, as you know, necessary to cut the trolley and guard wires when they are an obstruction to the fire department. In all such cases the span and guard wires become as dangerous as the trolley; and a very large number of the accidents that have occurred to the members of your department, when on duty, are, as you well know, due to this cause.

"I think on the whole the guard wires, as erected at the present time, are often a real source of danger to firemen and others.

"If they are erected, it should be in the following manner: They should be insulated thoroughly from the span wire that supports them, and if iron poles are used, insulated from them also in a most thorough manner. They should be divided up into sections or lengths of 500 or 1,000 feet, and an insulator or circuit breaker placed between the different sections. These insulators will prevent the flow of current from one to the other.

"The trolley wire should be divided up and the sections insulated from each other in the same manner, with a suitable switch at the junction of the sections to connect or separate them. In that case the current could be cut off from one or more sections, and the trolley, guard and span wires cut or handled with perfect safety. The location of these switches should be made known to the chief of the fire department and his assistants, and they should have access to them in case of fire. This will prevent accidents to firemen and others when it is necessary to cut these wires when they are an obstruction."

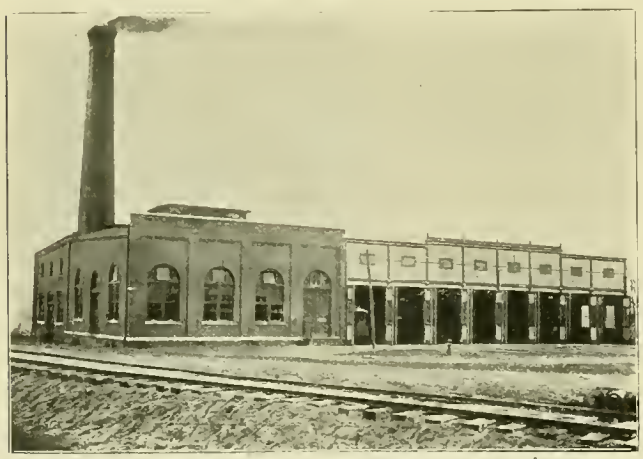
PRIZES FOR TRAINMEN.

Conductors and motormen of the Grand Rapids Consolidated Street Railway are much pleased with the offer of General Manager G. S. Johnson to give prizes for the best six-months' record. First, second and third prizes will be given, according to merit, as determined by the daily accident record. The motorman and conductor at the end of six months who have the best record will each receive $40 in money and a week's vacation with full pay. The second-class prizes will be $25 in money and one week's vacation with full pay. The third prize will be $15 in money and one week's vacation with full pay.

MACON CONSOLIDATED STREET RAILROAD.

So many roads, especially in the south have failed to meet the interest on their bonded indebtedness that the Macon Consolidated, which has always met the interest on its $300,000 worth of bonds and the last year paid a dividend of 1 per cent on its capital stock of $500,000, stands out with some prominence.

The population of Macon and suburbs is variously estimated at from thirty-five to forty thousand. About one-third of the population is colored, and but a small per cent of the latter use the cars. The system under the consolidation covers about eighteen miles of track on which the regular schedule calls for the operation of sixteen cars. The rolling stock available numbers twenty-eight cars. The accompanying engraving shows the power plant and car barn. The performance of the power plant was given in our issue of October, 1895, and shows that it is a very economical station. The equipment is two 250-horse-power McIntosh & Seymour compound condensing engines and four 100-kilowatt generators. The plant has been running eighteen hours a day for over three years, and the company has not expended $20 on repairs to engines and generators in that time. The cars have single equipments of W. P. 50 motors and old style T. H. rheostats. A practice we believe peculiar to this road is that of putting a weight weighing 1,000 pounds on the axle not equipped with motors. This, it is claimed, answers the double purpose of keeping the cars on the track and preventing the light wheels from skidding. These single motor equipments give good service and haul the heaviest loads over



MACON CONSOLIDATED PLANT.

a 7 per cent grade 1,500 feet long. They are economical beyond a doubt, as sixteen cars are handled daily with a 150-horse-power engine.

The property is under the care of E. E. Winters, superintendent, whose connection with the road dates back to the time when there were eight miles of horse road and four miles of suburban line operated with steam dummies. Four miles of horse road were first converted to electricity with such satisfactory results that the following year the dummy line to Crump's park, three and a half miles from the city, was operated by the same power. This gave the public an attractive mode of travel to a pleasant park with an abundance of shade and plenty of clear spring water. It soon came to be regarded as the popular resort for all pleasure-seekers and it has been a great source of revenue to the company. It is owned by the street railroad. It is thirty acres in extent, has a conveniently located spring

E. E. WINTERS.

which supplies drinking water and two small lakes in the center of the park. A bold stream supplied by living springs runs directly through the property and forms a lake covering between four and five acres, which is used for boating and bathing. In this connection there are neat bath houses and attendants to furnish bathing suits. On the highest point in the park is a pavilion with lunch rooms, reception rooms and a large stage. During the summer season the park is well lighted every night with arc and incandescent lights and has regular attractions in the way of concerts and various light theatrical and minstrel performances Mr. Winters gets good attractions and sometimes has to pay high for them, but makes money by it, and is convinced that no electric road is complete without an attractive park somewhere on its line. He even goes further and says that he considers that it is a physical impossibility for an electric road in a small city to make a good showing without some such attraction to induce extra travel.

Another feature that is the result of good management and which has contributed to the success of the property is that there is a very friendly local feeling and the people of Macon are proud of the road. There has never been any unfriendly legislation by the city nor a single unjust decision in the courts.

A judgment for $15,000, where $50,000 was sued for, has been awarded a Cleveland lady who was thrown from a sleigh which was struck by a car of the Big Consolidated. Case appealed.

PASSENGERS SIGNALLING TO STOP.

It's all very well to smile at the frantic antics of the old woman who tries to stop the car when she suddenly discovers she is being carried by her destination; and it's very gallant to jump to your feet for a pretty young lady, and pull the bell rope as if the rapids were below you; but when the car happens to be a trailer and the conductor ahead is inside and fails to hear, there is a general feeling of smallness comes over one as a smile is seen on every face but two.

Our attention has been called several times of late, to the poor arrangements in use on many roads for signaling from the trailer. And the criticism is just, and being so simple a matter to remedy reflects no credit on roads not equipped as they can easily be at trifling expense.

Nearly every car in Cleveland has push buttons ranged at the side of the car within easy reach of every passenger. Then if the car is crowded, and the conductor engaged, it is an easy matter to press the button which rings a bell on the conductor's platform, and which can be heard by him anywhere on the car. This plan is by no means new and is in use on many roads. The wonder is that there is any road without it. For trailers, the two cars should be connected with flexible cord and plug joints. This was done on a few roads two or three years ago, but does not seem to have been very generally adopted. It should be, however, as the expense is very slight, and is easily worth many times the cost as a safety measure, for there are times when the loss of a few seconds in getting a stop signal to the driver means serious injury to some passenger, and the consequent damage claim.

CLEAN CARS.

The local press hits the nail on the head sometimes. Whether the following is a just reflection on the condition of a certain company's cars we do not know but it is so full of suggestion to street railway managers in general that we cannot refrain from quoting it in full. It is headed "Meditations of a Street Car."

"It is half past eleven and I have been put away for the night. I have been wondering whether I shall start out again in the morning or stand here and refuse to move and run from S—— to N—— many times every day, and I think people appreciate me, judging from the number I carry back and forth. Through rain and shine I travel on, trying to accommodate all. Once in a while my motorman forgets to tell me to stop at the corners, so I disappoint some belated traveler; but, if warned in time, I retrace my steps and go back for him. People of all classes and conditions patronze me, but lately I have heard whispers of dissatisfaction. Today a lady, richly dressed, got on board and as soon as the door was closed said, 'I do not like to sit down, my dress will be ruined on the floor.' Two pretty girls stood looking at me as I came round the curve, apparently considering whether they should ride or walk, when one of them said, 'I would rather walk and get the pure air, there is such an unpleasant odor in the car.' A gentleman boarded a sister car the other day and said he wondered whether she had been given a bath since on the road. No wonder she was so insulted she refused to come up town again, and I was compelled to go down and tow her up. I, myself jumped the track one day because I was so indignant at the remarks passed upon me. Our motormen and conductors are kind and obliging, but it is not their business to fix us up. I think the company we are trying to serve should do as railroad companies do—get someone to give us plenty of pure water frequently and people will love and patronize us better."

STREET RAILWAY MAN IN POLITICS.

The street railway fraternity have furnished not a few able political managers, to both parties, to fill positions requiring great keenness and executive ability. Among them may be mentioned Henry C. Payne of Milwaukee, more than once chairman of the republican national

MARK A. HANNA.

committee; John D. Crimmins, of New York City; C. L. McGee, of Pittsburg; Stephen B. Elkins, Philadelphia, and there are many others.

Mark A. Hanna of Cleveland, who has long been a strong factor in the street car interests of his city, and who is now president of the Cleveland City Railway Company, has been selected to manage the McKinley campaign.

The young ladies of Towson, Md., during the extreme cold weather, kept a coffee house for the benefit of the street railway employes.

Saginaw, Mich., is the scene of much street railway excitement over the building of the interurban. The grading over a difficult swamp has been done by hand. The General Electric has the contract for the motors and Jackson & Sharp will build the cars.

CHICAGO GENERAL VS. CITY RAILWAY.

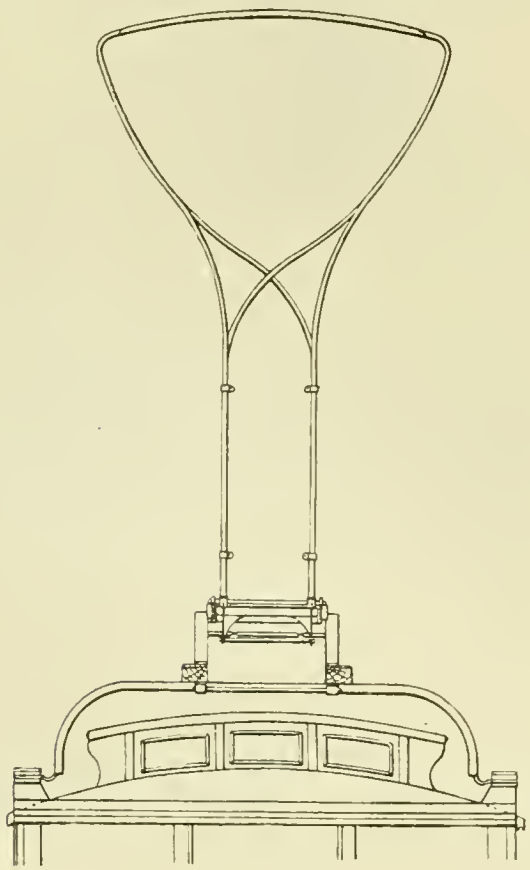
The bill of the Chicago General Railway Company against the Chicago City Railway Company asking for a decree giving complainants the right to operate cars along Twenty-second street over the tracks of the defendant between Grove and Jefferson streets, was dismissed, February 11, for want of equity, by Judge Waterman, of the Appellate Court, who said in concluding:

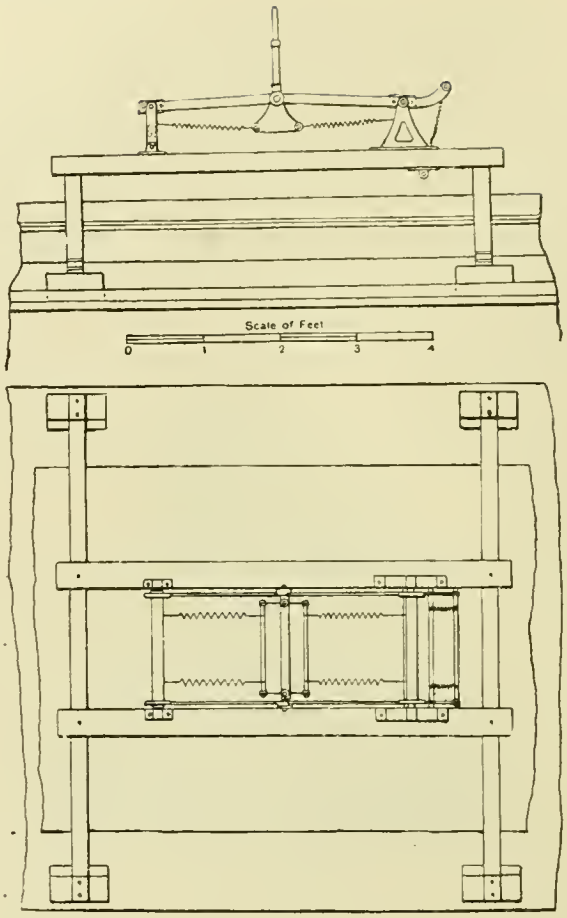
"Being property held under certain conditions, it [a street railway] may be forfeited, but it cannot, either in whole or in part, be, by the mere will of a legislative body, taken from its owners, either for public or private use.

"If it is to be taken for public use its owners are entitled to just compensation, and that compensation, it would seem, must be ascertained by a jury."

SIEMENS & HALSKE SLIDING CONTACT.

Although most of our readers have doubtless heard of the sliding contact trolley, used by the Siemens & Halske Electric Company, of Berlin, on some of its roads, we doubt if many are familiar with the details of the device. The accompanying engravings are reproduced from the London Electrician. The horizontal contact bar is four to five feet wide, slightly higher in the middle than at the ends, and interchangeable, so as to be easily renewed. A recent improvement consists in making the contact bar of a soft alloy, having an aluminum U shaped groove filled with grease. This is said to prevent the noise which has always been urged as an objection to the sliding contact, and to make the bar wear longer. By using the soft alloy the trolley wire gradually becomes coated with a layer of the softer metal. All of the wear therefore comes on the contact bar and practically none on the trolley wire. Of course the great advantage of the device over the trolley pole and wheel is that it never leaves the wire. It is in successful use on over six continental roads.





SLIDING CONTACT BASE.

NO REDUCTION IN FARES AT GRAND RAPIDS.

The press correspondents at Grand Rapids have been industriously heralding the news that the Grand Rapids Consolidated Street Railway was, on March 1, to reduce fares to four cents. This attempt to manufacture news was no doubt influenced by the fact that newspaper filling on the subject of low fares is at a premium among the daily papers at present. No reduction in fares has taken place at Grand Rapids or is likely to take place. The company has had under discussion the advisability of experimenting for a month or two with a sale of six for a quarter tickets, but the change was not made.

Even in New Orleans the citizens complained of open cars.

CONTRIBUTORY NEGLIGENCE RELIEVES FROM DAMAGE.

From two decisions recently rendered it appears that proper weight is at last being given to contributory negligence in damage suits. It is to be hoped that this is the beginning of a turn in the tide and that in the future companies will not have to pay out so many dollars for the negligence of the public.

In the superior court at Grand Rapids, a decision was rendered in favor of the defendant in the case of Terrence McGee, vs. the Consolidated Street Railway Company, which had been on trial for a week. The plaintiff was crossing a street when he was struck by an electric car and his left leg cut off. He sued for damages; showed that there was no headlight on the car and the jury rendered a verdict of $6,000 damages. The supreme court reversed the case and a carefully prepared opinion was handed down declaring that the plaintiff, according to the facts shown, was guilty of contributory negligence. No headlight was necessary, as the car was brilliantly lighted and carried colored lights according to the provisions of the city ordinance.

In a case before Justice Morris, of the court of appeals at Washington, D. C., the justice also holds that it is the duty for the citizen to look both ways in crossing a street car track, and to avoid going between two cars running in opposite directions if they are close together. The speed of cars in such a case, it is asserted, need not always be taken into consideration.

The suit decided was Thomas Hurdle vs. Washington and Georgetown Railroad Company. Hurdle saw the cars approaching, but miscalculated the speed of that one on the farther track. It was at a greater distance than the car on the track nearest him. It was in the days before the cable was put in. Hurdle ducked under the heads of the horses on the near car, but the horses on the farther track was coming much faster than he supposed. They knocked him down, and he was badly crushed under the car.

In the lower court the judge held that the accident was Hurdle's fault, and directed a verdict for the company. This view was sustained by the court of appeals. As the farthest car was only about twenty feet away, says Judge Morris, the plaintiff needed only to wait a moment for the way to be clear.

Under the conditions, the speed of the car which ran him down "plays no part" in the problem presented.

Another decision relieves the employes of a railroad company, to a large extent, of the duty to be watchful, if the crossing is protected by gates let down. The case was John Cullen, father of Paul Cullen, a twelve-year old boy, who was killed by a Baltimore & Potomac engine. The boy ran under the guard-gates to get his hat which had been thrown there by some companions, and was run down by an engine. It was claimed the engineer was looking the other way. However, the court decided in favor of the railroad. The opinion recites that whatever may have been the negligence of the company, the error of contributory negligence on the part of the plaintiff wholly precludes any recovery unless the boy was in some way relieved of the legal consequences of his own carelessness. It continues:

"We are now asked to hold that in order for the defendant to be liable he need not have knowledge of the plaintiff's exposed situation, but that it would be sufficient if, with reasonable diligence on his part, he could have had that knowledge. We cannot admit the soundness of this proposition."

After citing precedents the court concludes:

"In nearly all cases if the defendant had not been negligent in the first instance he could have ascertained the contributory negligence of the plaintiff in due time and avoided the consequences. To hold him to liability for that failure would be to relieve the plaintiff of the legal consequences of contributory negligence in all cases."

Judge Coles of Washington, D. C., likewise held that a man injured going from one car to another of a fast moving train was committing an act of contributory negligence, and a railroad company could not be held liable for the accident.

RUNAWAY CARS AT BUTTE.

The prompt action of a motorman of the Consolidated Railway Company, of Butte, Mont., averted what might have been a terrible collision between his car and two freight cars loaded with ore, on which the brakes refused to work on a down grade one day last month. The street railway company recently inaugurated a system of transporting ore over its lines. At the top of a grade about a mile and a half long, the brakes on the ore cars would not work and the cars started down the hill. All the men left the car with the exception of Motorman Joe Nelson and Superintendent J. S. Wethey. Half way down grade the runaway met a passenger car. The motorman of the passenger, seeing that the ore train would not be able to stop before it reached him, reversed motors. As the ore cars were heavily loaded and there were but few persons in the passenger, they naturally came together before they reached the end of the long grade, but the percussion was exceedingly light under the circumstances. At the foot of the hill the ore train left the track and the passenger was stopped. Motorman Nelson sustained a fracture of the leg from being thrown down when the freight jumped the track. Superintendent Wethey also received slight injuries in endeavoring to persuade those in the passenger to remain in the car and not attempt to jump, as there was no danger.

Force of habit and good discipline are exemplified on the Detroit Citizens' Railway. An abandoned switch track has not been used for six months, but every conductor who approaches it, runs ahead, notes if the crossing is clear, and signals the motorman to come ahead. The rule has not been abolished.

THE YEAR IN GREAT BRITAIN.

The year 1895 was a good one for the street railway interests in Great Britain. The English roads show a net of nearly 6 per cent; in Scotland the net increased nearly ¾ of 1 per cent; and the Irish lines a small gain. Of the total of 154 roads, thirty-nine are owned by local authorities and 175 by companies. Only seven miles new track was laid. The increase in capital was £274,735 in Scotland; £230,992 in England, and £61,918 in Ireland. The table shows comparative figures of '95 and preceding year.

Year ending June 30.	England	Scotland.	Ireland.	United Kingdom.
Length of line open—	Miles.	Miles.	Miles.	Miles.
1895	774	93	115	982
1894	772	88	115	975
Increase	+ 2	+ 5	..	+ 7
Number of passengers carried				
1895	525,838,415	91,011,220	44,910,824	661,760,461
1894	501,494,739	74,623,285	40,855,003	616,972,830
Increase	+ 24,343,678	+ 19,388,134	+ 1,055,821	+ 44,787,631
Capital expenditure—	£	£	£	£
1895	11,685,355	1,903,407	1,367,581	14,956,343
1894	11,454,363	1,628,672	1,305,663	14,388,698
Increase	+ 230,992	+ 274,735	+ 61,918	+ 567,645
Gross receipts—				
1895	3,038,864	424,882	270,704	3,733,699
1894	2,960,198	391,491	264 148	3.615,837
Increase	+ 78,666	+ 33,391	+ 5,856	+ 117,853
Working expenses—				
1895	2 314,302	373,179	201,009	2 878,490
1894	2.336,860	324,176	198,026	2,859,056
Increase	+ 7,422	+ 9,00.	+ 2,983	+ 19,434
Net receipts—				
1895	694,502	91,703	63,995	855,200
1894	623,338	67,32	66,122	756,781
Increase	+ 71,164	+ 24 382	+ 2 873	+ 93,419
Percentage of net receipts to capital expenditure—	%	%	%	%
1895	5·94	4 82	5 05	5 72
1894	5·44	4·13	5·14	5 26
Increase or decrease	+ 0·50	+ 0 69	— 0·09	+ 0·46

OLD CABLES FOR RETURN FEEDERS.

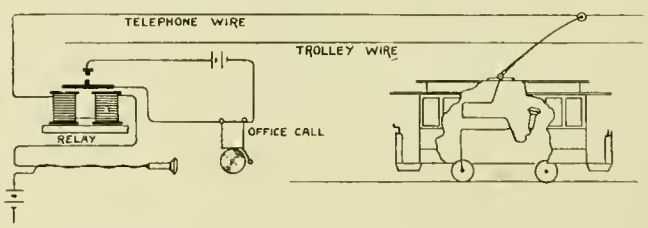
A correspondent writes to ask if it is practicable to utilize the worn out cables of cable railways as return feeders for electric roads. This was tried without success, some three or four years ago. The difficulty seems to lie in the fact that a cable is thrown out of service when the wires begin to strand and break, and this breaking arises from crystallization of the individual wires. This fact renders the cable a poor return feeder for the reason that the individual wires are broken at intervals throughout their entire length, and while they would be a good conductor when new, they become entirely useless when they are thus crystallized and broken. The conductivity of a steel cable is not great at best.

CHICAGO-HAMMOND POSTAL SERVICE.

A plan to establish a street railway postal service between Chicago and Hammond, Ind., has been projected, and received the sanction of the postal authorities. This will make Hammond one of the leading mail distributing points in Northern Indiana. The proposed route is over the Hammond, Whiting and East Chicago Electric, South Chicago and Chicago City Railway lines. It is thought it will be put in operation in a short time.

TELEPHONES FOR INTERURBANS.

I. L. Meloon, superintendent of the Bangor, Orono & Oldtown Railway, has provisions for telephone service on his road (which is a long interurban), that will, no doubt, be of interest to managers of similar systems. The road is a little over fourteen miles in length, and most of it is on the side of the road, with the overhead work on bracket construction. The first idea, when the telephone subject was brought up, was to use an instrument without the induction coil, with a double closed circuit and connections at each turn out. A later idea was to bring a connection down the pole at intervals, but this was found to be of limited usefulness, as a car is as liable to get off the rail, or be disabled between the connection poles as near them. The final arrangement was to run the telephone wire about six feet from the trolley wire, where there is bracket suspension, and use it as a guard wire with the cross suspension. This telephone wire extends the whole length of the line. The office



TELEPHONE SYSTEM ON BANGOR, ORONO & OLDTOWN RAILWAY.

end is connected to a relay and an office instrument on open circuit. The relay rings the office call with separate battery. The connection betwen car and office is made by taking the trolley off the main wire and putting it on the telephone wire. The telephone on the car is contained in a small box made to match the finish of the car, and connected through a spring key with the car wiring. Another spring key is used to short circuit the instrument to close the circuit through the office relay. When behind time, off the track or disabled, the orders are to call the office for instructions. The trolley is swung over to the telephone wire. Pressing a spring key calls the office; pressing a second key, and holding during conversation, completes the circuit through the instrument, which is transmitter and receiver together. This gives the office more perfect control over the cars than the steam roads have, and is certainly an excellent arrangement for interurbans, as it involves no more expense than other telephone systems, and is much more useful.

COLUMBUS STREET RAILWAY REPORT.

The Columbus (O.) Street Railway report showed the following excellent record as to operating expenses and receipts:

Earnings per car mile	$ .1740
Operating expenses per car mile	.0870
Net receipts per car mile	.0870
Maintenance of way per car mile	.0090
Maintenance of equipment per car mile	.0100
Cost power per car mile	.0080
Fixed charges per car mile	.0051

FITZGERALD-VAN DORN COUPLERS.

The Fitzgerald-Van Dorn Company is making constant improvements and additions to its line of couplers, notwithstanding the fact that it is practically free from competition as having the only automatic street car coupler offered to the street railway trade. Figure 1

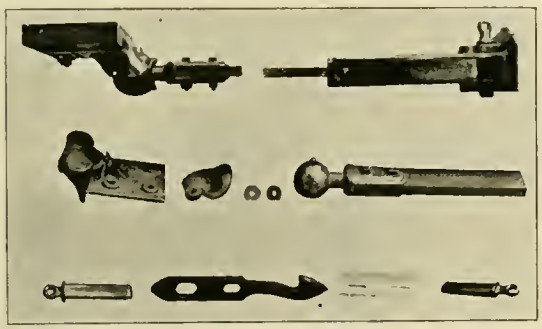


FIGURE 1.

shows the number 1 automatic coupler which embodies all the latest improvements. It is machine fitted, with two springs to each head, and the links are machine milled. The coupling bar used with this is automatic only at one end, while the other end makes a common pin and link coupling and will couple with other makes

FIGURE 2.

of couplers. This is the lightest coupler the company makes. Figure 2 shows a number 5 coupler with the Van Dorn improved ball joint attachment. There is a $\frac{3}{8}$-inch adjustment for wear and after years of service there will be no lost motion. This attachment is not necessary to these couplers but is desirable on account

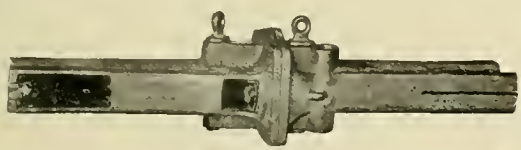


FIGURE 3.

of its durability and absence of shock from lost motion. Figures 3 and 4 are different views of the number 5 showing the methods of coupling. The coupling can be placed in either of the draw bar heads as desired, the pin in the opposite head, of course, being in a position to be coupled to. Figure 4 shows the ends of the couplers as they appear when fixed ready to make a coupling. When the point of the coupling link or bar enters the opposite head the springs in the head are sprung out sufficiently to allow the hook to pass around the pin and fasten. The usual play allowed is $\frac{1}{16}$ of an inch.

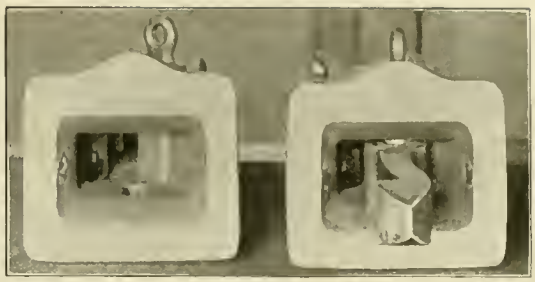


FIGURE 4.

Each head has two or more springs and the present mode of construction makes it impossible to damage the springs by coupling to other classes of couplers. The draw bars can make a common pin and link coupling and will couple readily to other classes of couplers. Fig-

FIGURE 5.

ure 5 shows the number 5 coupler and a front view of the method of application of the ball joint attachment to the car.

The Van Dorn coupler has made a great success and is already standard on a large number of roads. Where once used they are always ordered when new rolling stock is purchased.

A SENSIBLE VIEW.

President Caldwell of the Lake Shore & Michigan Southern Railway, if properly quoted by the daily press, takes a sensible view of the building of electric interurban roads around Cleveland. He said:

"Trolley competition is a good thing, and it is an absurdity to think that this road will ever declare a 2-cent-a-mile rate between Elyria and Cleveland. The electric lines help us in many ways, and we would be hurting our interests to start in fighting them. They are a necessity, and how would we be competing with them by making a two-cent-a-mile rate?

"Traffic would not be large enough to permit us to run trains at regular short intervals. The local lines are now bringing in business to us daily by carrying passengers into the city, who then leave for the east and west via our road, which before would have lost this traffic, as it did not touch some of the suburban towns.

"You may state that whenever the local electric roads set too hot a pace for the Lake Shore, then will the matter of competition be taken up, and we will fight them with their own weapons. It would be an easy matter for us to lay rails in our present right of way, paralleling our tracks, and run our own electric roads."

MAYER & ENGLUND.

The extensive supply business conducted by Charles J. Mayer has been re-organized and strengthened by the association of A. H. Englund, of Chicago, under the firm name of Mayer & Englund. Both gentlemen are widely known, very popular, and there can be no doubt that the individual success of each, in the past will be largely increased by joining forces and interests.

CHAS. J. MAYER.

During the first four years of the R. D. Nuttall Company, which was the first in the field as independent manufacturers of motor gears, pinions, trolleys, etc., Mr. Mayer gained a large experience and wide acquaintance as general sales agent, working largely in the west. Much of the early success of that concern was due to his untiring efforts. After that company had acquired its commanding position, and when electric construction was commenced in Philadelphia, in 1894, Mr. Mayer returned east and established the middle states office of the Nuttall company. His efforts there quickly led to a greatly increased business, as evidenced by the adoption of their improved trolley as standard by all the roads in Philadelphia; upwards of 2,000 being sold in that city alone. Having established the Nuttall trade, in that territory he enlarged the scope of his business by a line of overhead materials of which he has furnished over 300 miles in Philadelphia alone. In two years the business has increased to an extent absolutely requiring increased facilities, and which has led to the union with Mr. Englund.

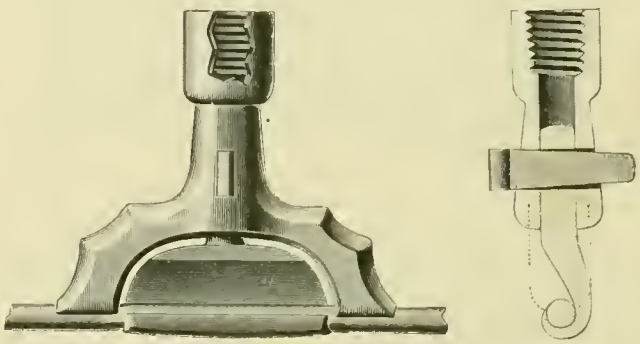
A. H. ENGLUND.

A. H. Englund's new association does not mean any material change in the International Register Company, of Chicago, of which he still remains the secretary and a director. One of his first objects will be to push the register actively in the east.

The factory and general office of the register company will remain in Chicago under the management of Treasurer A. H. Woodward, while Mayer & Englund will handle the eastern territory. In addition to the supplies named the new firm represents the Partridge Carbon Company, of Sandusky, O., and the Westinghouse glass factory of Pittsburg, makers of globes, shades, etc. This combination of young men of ability and energy, with their wide acquaintance cannot fail to result in all the success their hundreds of friends in the trade sincerely wish them.

WAYMAN TROLLEY CLAMP.

We show herewith a trolley wire clamp designed by A. J. Wayman, electrician for the DuBois Electric Light, Power & Heat Company, of Du Bois, Pa. The construction of this clamp is very simple, as it has no screws or bolts to keep it together. In placing this clamp on the trolley wire a forming tool is put on the yoke of the clamp. Then the hook of the clamp is put in the forming tool and by turning a set screw the wire is forced down by the yoke so as to make a straight under running surface for the trolley wheel. This clamp is a time saver as there are no screws or bolts to work with. The Ohio Brass Company is the manufacturer.



WAYMAN TROLLEY CLAMP.

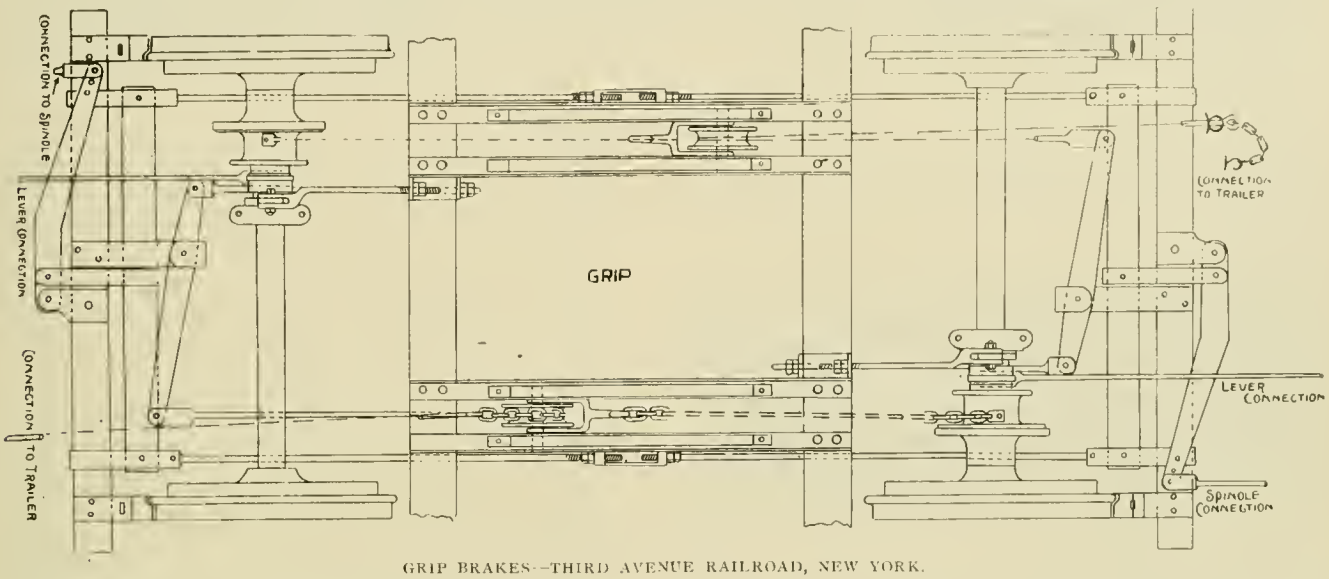
ANOTHER FAKE CLAIM TURNED DOWN.

The $50,000 damage suit of C. C. Phillips, against the Market Street Railway Company for alleged injuries, resulted in a verdict for the defendant. Two important facts were brought out in the trial. First, it was shown that the gripman was not to blame for the accident—the running of a cable car into the bumper of a Hays street car, upon which the plaintiff was riding. Secondly, that Phillips had received no injuries from the same, but was simply malignering. This testimony was secured from special detectives, who watched the plaintiff, who traced him from the time of his alleged injuries until his appearance in court. It was shown to the satisfaction of the jury that Phillips, who could scarcely walk when in the court room, could go down the street at a 2.40 gait, and despite his claims of inability to work, he had been employed as a waiter since the day of the accident. The jury was out three-quarters of an hour, rendering a unanimous verdict for the railway company.

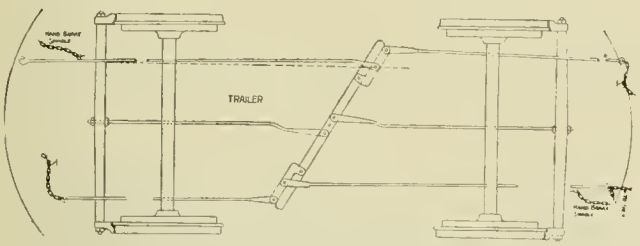
Trolley parties brought in $70,000 during the summer for the Philadelphia companies as follows: Philadelphia Traction, $30,000; Electric Traction, $20,000; Peoples' Traction, $17,000; Hestonville, $7,000.

BRAKES FOR THIRD AVENUE CABLE TRAINS, NEW YORK.

The accompanying diagrams are self-explanatory, showing the brake rigging for the Third Avenue Railroad cable trains in New York. They are friction brakes, similar to those in use on other cable roads with slight modifications in equalizing gear. The pressure between grip and the following train is equalized by a pulley on the grip as shown. This pulley is drawn up by a chain winding on the friction drum. The pressure between first and second trailers is equalized by levers on the end of the trailer brake levers.



GRIP BRAKES—THIRD AVENUE RAILROAD, NEW YORK.

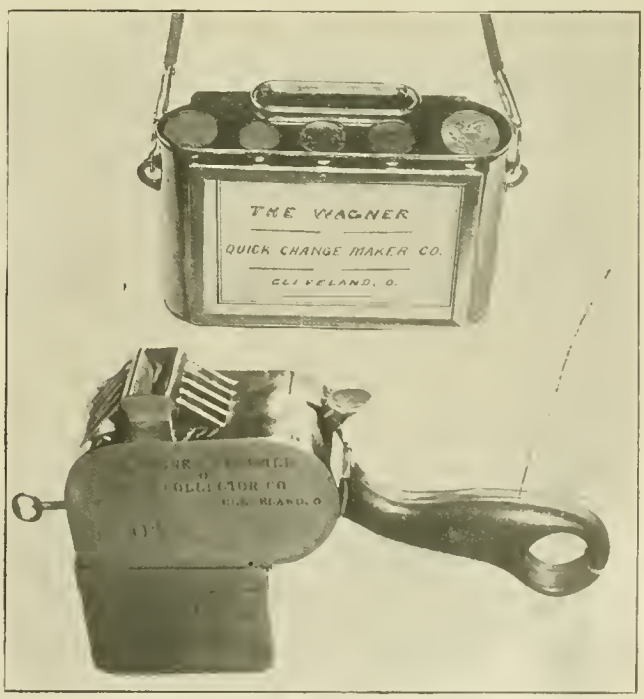


TRAILER BRAKES—THIRD AVENUE.

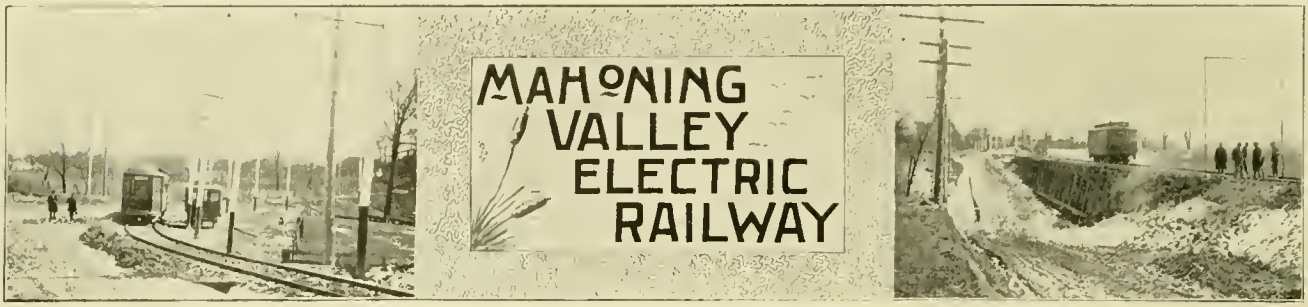
THE WAGNER FARE COLLECTOR.

The illustration shows a new type of fare register and fare collector which is known as the Wagner, and is manufactured by the International Typograph Company, of Cleveland Ohio. The collector is a small, compact and strong device, weighing about fifteen ounces. It is intended that the conductor in passing through the car shall extend the collector to passengers and that they drop their fares in the slot in the machine. The conductor then presses a lever and the fare passed through a pair of corrugated rubber rolls into a smaller receptacle into which all the fares go. The compartment holding the fares can only be opened at the office by the cashier who has a special key. With one movement of the lever the fare is registered, a bell sounds, and the coin or ticket passes into the locked receptacle below.

The machine registers to 100,000 then automatically returns to zero. The rubber rolls are directly under the chute in which the fare is deposited and the rolls take hold of the fare and press it into the money holder. Our illustration is about one-fourth the size of the machine which will hold about $16, although larger machines can be made carrying a day's collection. The conductor in using this device becomes simply a change maker and for the purpose of facilitating this work a change box is carried by the conductor, a descripton of which is unnecessary as a reference to the illustration will fully explain its use.



WAGNER FARE COLLECTOR.

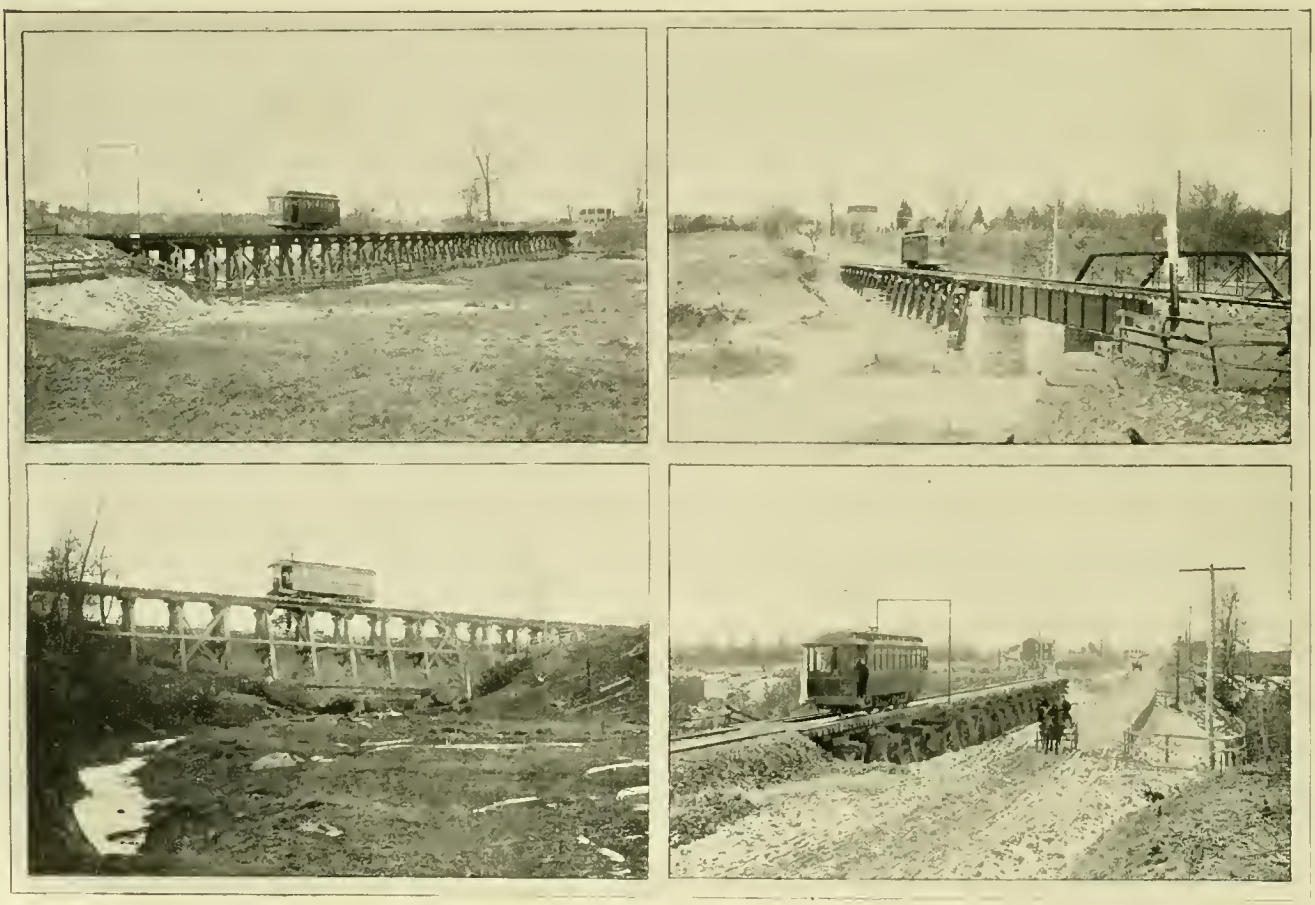


Among the numerous northern Ohio interurbans one of the most recent is the Mahoning Valley Electric Railway, (the opening of which was chronicled in our December number) which extends from Youngstown to Girard and Niles, O.

The company was incorporated in November, 1894. The line was completed to Girard and put in operation on October 5, 1895, and was completed to Niles, November 4, 1895. The distance from Youngstown to Girard is five miles and the distance from Girard to Niles is five miles, reaching a population of nearly fifty thousand people.

The roadbed is one of the best constructed in the country laid with 67-pound T rail and 68-pound girder rail. Owing to the nature of the country through which it passes considerable heavy grading was necessary, and four pieces of trestle work, the total length of which is 1,700 feet. The trestles are built in a most substantial manner of Georgia pine. There is also one bridge span of seventy feet, the abutments of which are laid in Portland cement, the span consisting of two 6-foot deck plate girders. A portion of the road is built over ground purchased outright giving perpetual right of way, and owing to the expenditure of a large amount of money bringing the grade of the county road between Girard and Niles approximately to the grade of the track a fifty year franchise was granted over the greater portion of the distance between the latter named towns.

The car equipment consists of four 32-foot vestibuled car bodies built by the Barney & Smith Company, of Dayton, Ohio, mounted on McGuire maximum traction trucks equipped with G. E. 1,200 motors. These cars have cross seats with an aisle in the center, and will be well adapted to summer business. There are also two Pullman vestibuled car bodies twenty-eight feet in length with side seats mounted on McGuire maximum traction



trucks equipped with G. E. 1,200 motors, and two Gilbert 16-foot car bodies mounted on McGuire single A 1 trucks equipped with G. E. 1,200 motors.

At present this line is being operated from the power station of the Youngstown Street Railway Company in Youngstown, but a modern power house is to be erected in Niles, Ohio, during the coming spring. It is also the purpose to consolidate the two companies in the near future, and the consolidated companies propose extending the lines to other cities in the Mahoning Valley.

The officials of this company are as follows: C. F. Clapp, president, Warren, Ohio; R. G. Sykes, vice-president, Niles, Ohio; John E. McVey, secretary, Youngstown, Ohio, and A. A. Anderson, treasurer and general manager, Youngstown, Ohio. The other directors are Mr. G. E. Herrick, B. F. Miles and Andrew Squire of Cleveland.

We heartily congratulate General Manager Anderson on his enterprise and success in this venture.

NEW TYPE ELECTRIC LOCOMOTIVE.

The new electric locomotive, built by the Westinghouse Electric and Manufacturing Company, and the Baldwin Locomotive Works, and now in the Westinghouse yards at Pittsburg, is decidedly different from the few heavy electric locomotives which have been built so far. The accompanying engraving shows its general appearance. It is thirty-eight feet long, and nine feet wide. All the operating parts of the locomotive have been placed on the trucks. The controlling apparatus will be put in the car, which can also carry baggage, tools and train supplies. One of the characteristic features of the locomotive is the truck construction. The

BALDWIN-WESTINGHOUSE ELECTRIC LOCOMOTIVE.

wheels are forty-two inches in diameter. There is to be a 200-horse-power motor on each axle. Completely equipped, the weight of the locomotive is eighty tons. The motors are to be geared instead of being directly on the axle. This was decided on because it enabled the use of smaller and more efficient motors for a given work, and consequently reduced the cost. The Westinghouse people state that while the electric locomotives used in the Baltimore tunnel cost $50,000 each, the Baldwin-Westinghouse type will cost only about one-third of that amount, while being able to accomplish the ame amount of work. The Baldwin-Westinghouse combination is drawing up plans and constructing electric locomotives for all kinds of purposes. The one under consideration is intended as a regular passenger engine, rated at 1,000-horse-power. Before long, another locomotive designed for elevated roads will be completed at Pittsburg. The motors on this new locomotive have been geared to produce a speed of seventy-five miles an hour.

LITTLE GIANT TRACK CLEANER.

F. B. Lee, superintendent of the Norway & South Paris Street Railway, Norway, Me., has invented a track scraper which he has named the "little giant." Its tension against the track is kept by four powerful

LITTLE GIANT TRACK SCRAPER.

springs, which springs also serve to hold it up when it is not set on the track. It works unusually well on track low in the paving because the narrow blade always finds the track. By connecting a wire from pilot hanger to scraper the car is never at a loss for a ground.

THE NATIONAL RAILWAY REPORT.

The National Railway system of St. Louis, of which Robert McCulloch is general manager, earned 8.01 per cent on its outstanding stock the last year. The remarkably low record for operating expenses which has been established previous years was kept up, as a glance at the following table shows:

Operating expenses, cable	56.6 per cent
Operating expenses, electric	59.5 per cent
Operating expenses, both	58.5 per cent
Total car miles run	11,445,075
Total number passengers carried	28,029,177
Cost of operating per car mile, cable	5.74 cents
Cost of operation per car mile, electric	8.06 cents
Cost of operating per car mile, both	7.17 cents
Total expenses per car mile, cable	8.41 cents
Total expenses per car mile, electric	11.90 cents

ANOTHER STORAGE BUBBLE.

The story has been industriously going the rounds that the Manhattan Elevated of New York, had made a contract to equip one of its branches with storage battery traction. On investigation, however, it appears that there is no foundation for the report which probably emanated from storage battery stock jobbers who are losing no opportunity to boom their holdings.

TRACK AND OVERHEAD DEPARTMENT ECONOMICS.

BY J. W. GREER, SECRETARY AND GENERAL MANAGER, YOAKUM, TEX. IMPROVEMENT COMPANY.

PART IV.

There is no business in which the element known as common hard horse sense can be used to better advantage than in electric railroading. This when judiciously mixed with a large amount of practical experience, and not too much theoretical knowledge, is the combination which makes the successful, practical head, of what are usually termed small roads. By small roads, is meant the four or five hundred roads, outside of the dozen or so large cities, and of which small roads we rarely read, as most of the trade journals are busy describing track which costs $30,000 per mile, ornamental overhead construction at from four to five thousand dollars per mile, or the herculean efforts being put forth to coax three or four thousand amperes of current to return to the half million dollar power plant, instead of roaming round eating up the "lead pipe cinch" and other assets of a water company or gas trust. While these various things are unquestionably of the highest value to a few roads in our largest cities, and makes, as Horace Greely used to say, "mighty interesting readin'," for even the small fry; yet to the capitalist who understands the value of money, but knows nothing practically of the cost of constructing such property, it must seem that all electric railway enterprises are equally costly in proportion to length; and when he is approached with a scheme to build a road in the suburbs, or in a city of fifty thousand inhabitants or less, and is informed that a first-class road can be built for less than a third of the amounts before mentioned, he is naturally skeptical and the promoter gets "nit."

To illustrate the ease with which capitalists are sometimes misled by reading only the difficult and expensive problems met with in special cases, the writer calls to mind an instance which came to his notice a couple of years ago. It was just at the time when the whole technical press was teeming with the newly discovered idea that the supplementary wire as a factor in return circuits was N. G. with a large N and a big G; that the humble channel pin and copper wire bond was worse than useless, and the copper rod and ground plate system was not, nor ever had been in it. The discussion was started and handled in a masterly way by eminent electrical engineers, who really had a great problem to solve in returning thousands of amperes which flowed through hundreds of cars crowded on a limited trackage in the congested centers of Boston, Brooklyn, Buffalo and other cities, which had wholly adopted the trolley. While the storm center was raging around this rail-bonding question, a wide-awake business man and financier who had succeeded in getting control of thirty-five miles of electric railway in a flourishing city, became very much interested in the subject and straightway jumped to the conclusion that all that was necessary to be done in order to completely wipe out the fuel bill, was to dig up the track from end to end and rebond it, "according to Hoyle" or some other authority. It was useless to point out to him that he was operating twenty-six double motor cars over thirty-five miles of track containing more than seventy short curves, and the seven divisions of which all ended in grades of three to six per cent several miles from the power plant, and yet the main ampere meter showed the average current used to be a total of less than three hundred and fifty amperes.

Well, he is still digging, and experimenting with new styles of bonding, and confidently expects to reap great results when he hits the right combination. In the meantime he is doing very little damage outside of loosening the joints in the track, and squandering some good money, as the negative side of his circuit is not connected at the power plant to the track, but wholly to the water pipes which enter it, and the track is soldered to the water system in more than five hundred places.

It will be seen at a glance that this method prevents electrolysis of the pipes at or near the power plant, since as has been clearly shown in the interesting and valuable articles of Mr. Brown on electrolysis prevention, contributed to THE REVIEW, electrolysis shows its effect most thoroughly in the neighborhood of the power plant, at the point where the current leaves the pipe for the rails which are connected to the negative terminals of the dynamos. Now, if the rails are not connected to the dynamo but the current returns over the water pipes to the boiler room where it is connected in plain view to the negative terminals it follows that there can be no tendency to leave the pipes for the rails, consequently no resultant electrolysis. As the water pipe from the street main into the plant usually belongs to the water taker any damage at the point of connection would fall upon the proper parties. The writer would say, however, that having more than five years since connected a plant using from three hundred to one thousand amperes as above described, to a 4-inch pipe leading from an 8-inch main (the connection in sight) no change has been observed in either the connection or pipe and nothing has been done all these years toward renewing or repairing same.

Years of experience and close observation leads the writer to believe that it is almost impossible to maintain an efficient return circuit where the rails are depended upon wholly as a means to that end. Not, however, because of any difficulty in electrically connecting one rail to another, but because of the frequent repairs necessary to the track, and because that work is usually in the hands of men who little realize the vital importance of maintaining a perfect return circuit. Consequently the cutting of a bond with his pick, or the severing of the supplementary with his bar as he "Yo, heaves," is an incident which to Pat or Mickey or Fritz is not of suf-

ficient moment to even mention to "de boss," so a shovel full of dirt is thrown over the severed ends, a row averted and some labor saved. Don't all rise at once to remark "but we have a system of watching these things, etc.," for as the illustrious son of Georgia, Sam Jones, remarks, "its only the hit dog that howls."

The track being buried it is almost impossible to tell, after repairs to it have begun, by outward observation alone, the condition of the return circuit. Could the tracks of his system be laid bare for an instant many a painstaking manager would be astonished to find what a wreck had been made of the carefully planned bonding system he so faithfully installed, and much of the theoretical resistance due to "corrosion of copper" or "rusting of rails" could be remedied by replacing the missing bonds. Cast welded, and electrically welded joints, obviate to some extent this trouble, but do not wholly eradicate it, as they occasionally break.

When the writer says that, all things considered, he believes it is to the interest of the water companies as well as to the street railways to have the tracks thoroughly connected to the water pipes it will, perhaps, lend more force to the assertion to incidentally mention that among other things he is at this writing managing a water works system. Hydraulic engineers nowadays strive as far as possible to lay the mains of a water system so that there are no dead ends. In other words, they form a belt line so that the water will circulate instead of stagnating. This is not alone a fine thing for the water consumers but is one of the prime reasons that a water system is a good thing to tie to in bonding, as the water pipes would have to be severed in more than one place to interrupt the return of the current to the plant. A glance at Fig. 10 will show a method of rail

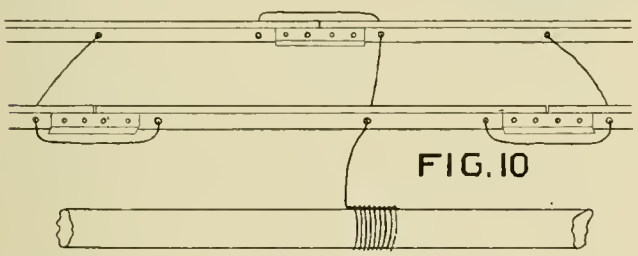


FIG. 10

bonding which is simple, and easy of application. A single piece of wire makes the bond around the joint, cross-connects the track, and connects the track with the water pipe. It will be observed that there are three holes in each rail, one in each end near the end of the splice bars, and one in the center of the rail. The writer formerly used channel pins for fastening the wire in the rails, but the bonding pins of the style advertised in the Review by the Creaghead Engineering Company are better, as they are applied in the same simple manner and give much better contact, surrounding the bond wire completely.

For new construction, have the holes drilled in the rails before leaving the mill, it is cheaper. Have the holes drilled a fraction tight, and just previous to inserting the bonds, drive a tapered smooth punch through the holes. Drive it hard, and when it is removed you will find a bright polished surface throughout, wipe the bonding pin and wire carefully with a woolen cloth saturated with vasaline, drive the bonding pin in tight and you can rest assured you have a much better and easier path for the current than that it finds through the fifteen or more loose connections between trolley wire and rail, through the medium of a car equipment.

Observe that you could cut all the bonds opposite the joints and yet there would be a continuous zig-zag path through the rails by way of the cross bonds, to say nothing of the path over the water system. Observe

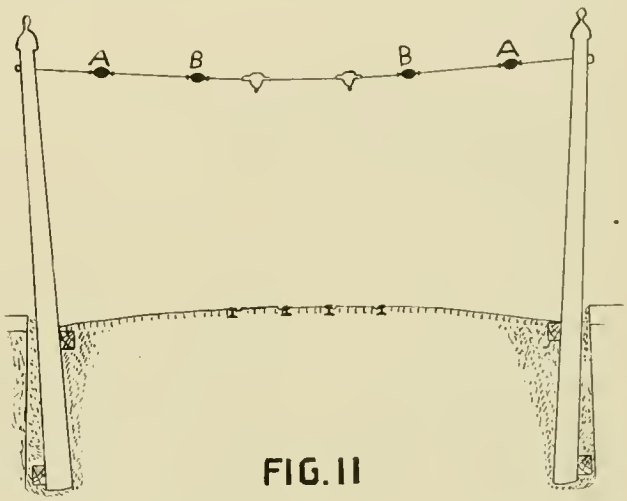


FIG. 11

that the end of the wire which is carried to the water pipe is that which passes through the center of a rail.

The joints in track are disturbed much oftener than the rail centers, hence it is best to connect the water pipes to the rail centers. Observe, further, that in this system of bonding it would be necessary to sever each bond twice, and also the connection to the pipe, in order to have a dead section in the return circuit. This is not likely to occur by accident.

This system of bonding can be doubled, tripled or quadrupled to meet the requirements of even the largest systems. No system of bonding can be relied on which simply connects the rails at the joints, for the reasons before mentioned. Confidentially, the writer wants to say, that although he has been in the business practically since the beginning, he has had to do with very little of the kind of current that prefers to leave a rusty rail and skip through the earth several feet to a rustier water pipe in preference to skipping an eighth of an inch or less through the same earth to the next rail.

He also wants to say that many times he has been astonished at the amount of current he found leaking through span wires and poles (wood at times as well as iron) into the earth and thence to water pipes or rails, whichever was most convenient. The feeder wires, too, at times, he has found contributing their quota to the water and gas pipes through trees and poles and defective insulation. Take your portable voltmeter and

ammeter, and a fishing pole with you, walk over your line, ground the span wires, feeders and poles, to the track through the volt meter, and when you get back to the office you will doubtless know more practically, than you thought you knew theoretically, before you started.

Never rely wholly on the trolley wire insulator to prevent escape of current from the overhead system, but put at least two globe stain insulators in each span wire, as shown in Fig. 11 AA. If you are compelled to use iron poles, put four of these insulators, at points AA and BB. Put two of these insulators in each curve pull-off wire, and one in each guy wire. You will find it pays. The best tree insulator is a saw or hatchet, used with such liberality that no limb can possibly touch the feeders.

Of course, your engineer tests the line each morning for ground before starting, and never finds one, but don't let that keep you from making the test above mentioned or putting in the insulators as advised.

Either bracket or center pole construction is much more expensive to keep up than the cross suspension method, and the use of either of the first named should be avoided when possible. One of the principal causes of trouble with both bracket and center pole construction is rigidity. If however, you have some of this construction, or must in compliance with edicts of the powers that be, construct same, then make the best of a bad bargain by using short span wires, as shown in Fig. 12. Observe that the improvement is merely an elbow, a short-nipple and a T, screwed together, and on the end of the usual pipe bracket arm. This addition to the bracket arm should not hang vertically, but should be canted so as to allow the span wire to pass the pole without touching it. The span wire is fastened at each end by means of insulated eye-bolts, or with a hook bolt and a globe insulator in each end, as shown in the illustration. For bracket line, an eye bolt through the pole with a globe insulator between it and the span wire serves to keep the end next the pole in place.

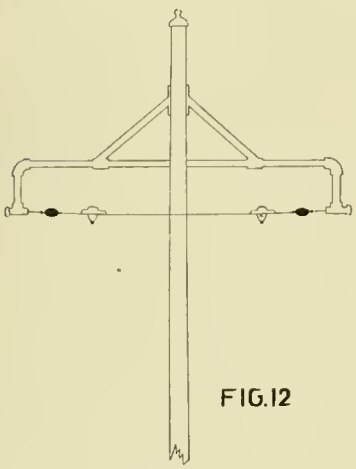


FIG. 12

Many broken trolley poles, many broken insulators, many delays, much wasted current, and a large amount of profanity can be saved by the substitution of this method for the old rigid style.

In setting poles for the cross-suspension method of overhead construction, drop half a tie crosswise in front of each pole, just below the surface, for a breast plate, as shown in Fig. 11. Also drop a piece of tie, eighteen inches long, behind the pole at the bottom of the hole for a heel, ram the pole hole well with gravel as a filler, and it is set permanently. One-fifth the length of each pole should go in the ground. Never use iron poles if it can be avoided. They are expensive in first cost, hard to insulate, and rust out quicker than a red cedar pole will rot.

The value of different woods for street railway poles is, in the order they are named, red cedar, white cedar, chestnut, heart pine (southern.)

In conversation with a telephone manager recently, the writer was informed that the line men connected with the telephone office in a certain city, had been doing a land office business charging storage batteries with "stray current," as he expressed it. It seems that the iron waste pipe from the sink in the office passed near an iron pole belonging to the street railway company. The pipe was buried about two feet below the surface, and did not touch the pole, although near it. One day some one in the office attempted to turn the water on from a faucet above the sink, while holding on to the sink with the other hand. A shock was the result. Did this Sunday-school scholar hunt round to find who was losing current? Well, hardly! Like a man who knows a good thing when he feels it, he proceeded to "squat on the claim" with the office testing set, and it proving to be "pay dirt," he straightway began to work it, which, so the story goes, he continues to do to this good day.

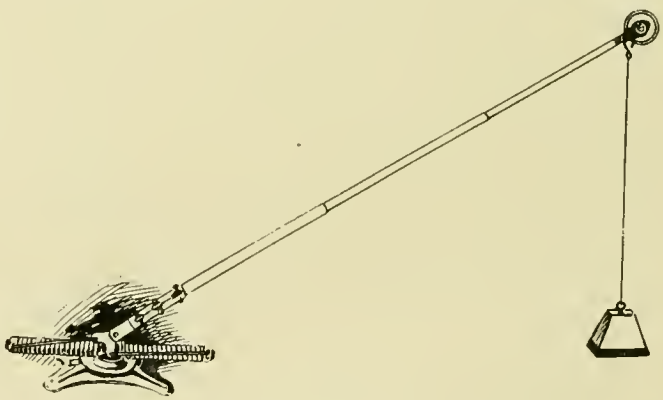


FIGURE 13.

Do not try to get the overhead system tight as a fiddle string. Give the trolley wire a chance to wobble; your overhead work will not look as well, but the trolley will keep the wire better if it is flexible.

One of the principal points in the maintenance of the overhead system is to see that all the trolley poles are precisely the same length, and exactly the same tension. With a good track, first, the trolley poles all of exact length and tension, second, and a flexible cross suspension overhead line, third, but little use will be found for a hurry up wagon. Say the pressure you desire the wheel to exert against the trolley wire is twelve pounds. Take a 12-pound weight, tie a cord to it with a hook in one end, hook the weight to the trolley fork, and screw up on the trolley springs until the wheel barely touches the wire with the weight suspended, as shown in Fig. 13. Trolley wheels are necessarily an item of consid-

erable expense in the operation of electric railways, and in order to get the longest life possible, the tension on the springs of the trolley stand should be just enough, and no more, than is necessary to maintain, at all times, good contact between the wheel and wire. Those who have seen copper brushes used against a commutator, know that at certain tensions the contact is perfect, and the surface of the commutator becomes polished to such a degree that little wear ensues to either it or the brushes. If, however, you tighten up a little on the brushes, the surface of the commutator is cut, the brushes wear away, and copper dust flies everywhere. The action of the trolley wheel against the wire is the same as the action of the brushes against the commutator. Intelligent co-operation between the master mechanic and the superintendent of the track and overhead department on this matter will result in much good all around. A trolley pole, cheap in first cost, easily repaired, and which will bend without breaking, is made of three feet of block pipe, 1¼-inch, four feet of 1-inch, and five feet of ¾-inch, inserted into each other, as shown in Fig. 13 A couple of rivets through each connection, serve to prevent the pole from turning or unjointing. The trolley fork is welded into the ¾-inch pipe. These poles can be made and repaired between times in your own shops.

The writer has tested, practically, trolley wheels made of cast iron, steel, aluminum, brass, bronze and tempered copper. The copper wheels are far superior to the others, but the merit of each runs in the order in which they are named above. The life of cast iron and steel wheels is much longer than the others, but they wear the trolley wire rapidly. Aluminum is too soft. Brass and bronze have not the life of the copper wheels, and wear the trolley wire more. The copper wheel should wear out two bushings and run over twelve thousand miles on moderately straight line. Graphite bushings oiled once each day give good results: it is not economical to oil the bushings, but it prevents the annoying rumble heard in the car when they are allowed to run without oil.

In discussing track construction, we have seen that all curves of less than seventy-five feet radius should be transition curves. Now in constructing overhead work this does not apply, and all overhead curves should be as nearly round or true curves as possible. If you attempted to follow the contour of a transition curve with the overhead work you would find that, as the trolley pole swivels from the center of the car and the wheel trails several feet back of the car center, that when the car was at the shortest part of the curve, the trolley wheel would lack several feet of being there and as the car advanced out of the curve, the trolley wheel would be trying to get round the short part. For this reason it is necessary, in order to keep the trolley from flying off, to make the overhead curve as nearly a true curve as possible.

Put a stake in the center of the track where the curve begins and ends, stake out a regular curve between these points, plumb the trolley wire by the stakes in the ground without regard to the position of the rails, and if the proper elevation is in the track curve, your trolley will not fly off. Fig. 14, section A is a transition track curve, and the dotted line represents the true curve staked out by which to plumb the overhead curve. Sec-B, Fig. 14, shows the position for the overhead switch, relative to the track, at a switch which is to be used for

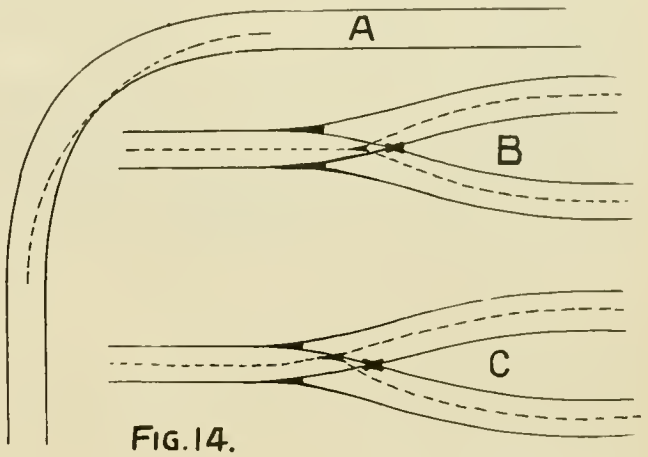


FIG. 14.

cars going both to the right and left. It will be seen that the dotted lines which represent the trolley wire, are very much out of the center of both tracks, but hold the trolley wire straight over the center of the single track. Section C, shows the overhead switch, central between the track switches and cross frog, and also between the rails of the left track. This is the proper method of setting an overhead switch where the cars go to the right only.

These are the small points in overhead economics which if carefully looked to permit you to dispense largely with the services of a "line gang."

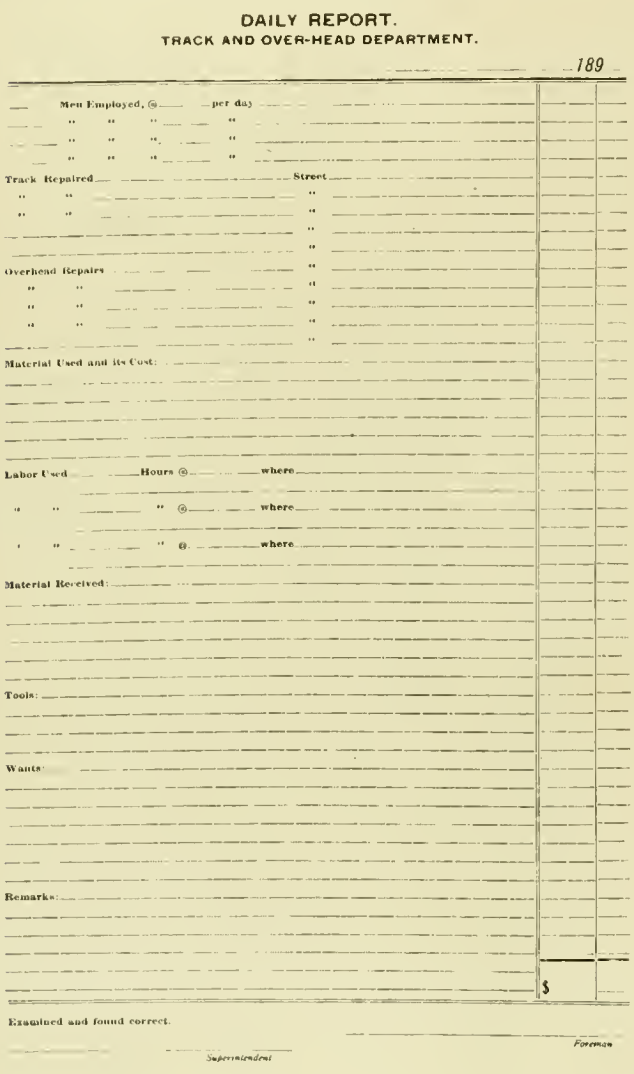
The fewer sections your overhead system is divided into the less power is required to operate the system, but there should never be a less number of sections than of divisions in the operating scheme. Again, there should be no division so great in extent that the current capacity required for it alone is greater than the output of the smallest power unit in the power plant.

A plug switch and automatic circuit breaker should both be provided in the power plant for each feeder, and the circuit breaker should never be replaced until the plug has been pulled; this gives the circuit breaker a chance to fly out instantly when the plug is put in if there should be a ground.

The feeder for each division should always continue the length of the trolley wire and be tapped into it at short intervals, as it is much quicker for the motorman and conductor to bend a hook on the broken ends of trolley wire and tie them together with the rope which should be in each car for the purpose, than to wait for the fastest hurry-up outfit in the land. If the feeder provides current both sides of a break, and the motorman and conductor have been properly instructed, a delay of not over five minutes at the outside, should occur from a broken trolley wire.

At this late day no one would, of course, think of constructing or repairing overhead work with fixtures requiring solder. The time and labor saved by the new, is too great to be overbalanced by any theoretical advantage of the old method.

"A stitch in time saves nine;" it is better to stop a car for a few seconds while the crew ties up a loose hanger or pull-off, temporarily; than to wait for the "hurry-up" and take chances of an accident in the meantime. "But the passengers will howl!" Of course they'll howl; that's one of the greatest privileges of the travelling public, and street railways act as a kind of universal safety valve for the pent up choler of the citizen, without distinction of race, color or previous condition. Give them a chance to exercise their inalienable right, while you say nothing and saw wood.


DAILY REPORT.
TRACK AND OVER-HEAD DEPARTMENT.

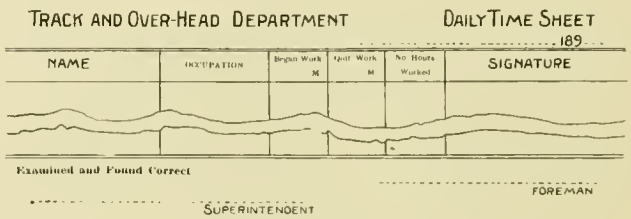
189

Men Employed, @ per day
" " " "
" " " "
" " " "
Track Repaired Street
" " "
" " "
"
"
Overhead Repairs "
" " "
" " "
" " "
" "
Material Used and its Cost:
Labor Used Hours @ where
" " " @ where
" " " @ where
Material Received:
Tools:
Wants:
Remarks:
$
Examined and found correct.
Superintendent
Foreman

FIGURE 15—FRONT.

There is no department in street railroading where material and supplies can be wasted with greater facility than the track and overhead department. A strict account should be required, therefore, of the foreman for all material, supplies, labor, etc.

Fig. 15 is a daily report blank, easily and quickly filled in, and which gives a complete history of everything necessary to the correct keeping of the accounts, in the books, pertaining to this work. It is not intended that the foreman shall do the clerical work of running out the amounts, or casting up the expense column, but simply fill in the data necessary to that end. On the reverse side of the blank is a daily time sheet, to be filled in by the foreman, and signed by each man. This prevents padding, and kicking about short time.


TRACK AND OVER-HEAD DEPARTMENT DAILY TIME SHEET

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NAME	OCCUPATION	Began Work M	Quit Work M	No. Hours Worked	SIGNATURE

Examined and Found Correct

SUPERINTENDENT FOREMAN

FIGURE 15—BACK.

A "check" is indispensable in all departments of street railroading. Those who have followed me through this paper, have noted that there are some things advocated which are not, or have not been considered orthodox. I can only say in extenuation, that what I have written is the result of years of practical experience and careful observation, and has been written largely with a desire to help the managers of "small roads," those men who, in the interests of economy, are expected to do without the advice of a civil, mechanical, and electrical engineer, and who, in order to make both ends meet, are expected to do the work of five men on a salary of one, and who, in order to hold down the job, are at least expected to be walking encyclopædias.

TROLLEY WILL WAKE UP THE EGYPTIANS.

The advent of the modern trolley car in old Egypta is already having a modernizing influence, and in the construction of the line now in progress, it has already led to a widening of some of the streets. The Egyptian Gazette, the English daily published at Alexandria, says:—

"We are glad to see that the authorities have realized the danger which was likely to arise from the position of the tramway line, recently laid down in Cairo, at the head of Boolak street, where it joins the road between Shepheard's and the Opera Square. A portion of the pavement is being removed, the width of the street being thereby increased. Now that so many of the Cairo roads are occupied by a double line of tramways, it would be very advantageous to increase the width of the roadway in this manner in several of the thoroughfares, when the width of the pavement or footpath is out of proportion to that of the driving road. There are many streets, along which the tramways are to pass, in which a slice off the edge of the footpath would not inconvenience foot passengers and would be a boon to carriage traffic. The exact date of the opening of the new tramways is not yet definitely fixed but it is likely that all the lines will commence work together in July next."

SHOWING ARRANGEMENT OF LEVER BRAKES ON WILMINGTON CITY RAILWAY.

LEVER BRAKES.

BY C. F. HUTCHINGS, SUPERINTENDENT WILMINGTON CITY RAILWAY.

Lever brakes have been in use on the Wilmington City Railway since 1889 and have been so satisfactory we wonder why this type of brake does not come into more general use in street railway practice. We use 14, 16, 18 and 20-foot closed cars and 30-foot open cars on single trucks 7-foot wheel base, all equipped alike with two lever brakes, right and left hand. The right hand is the most powerful, applying the shoe to the outside of the wheel while the left hand works a toggle joint between the wheels and has one-half the braking power of the right hand. When starting down grade the motorman pulls back his left lever and the thumb latch holds it. Then with his right hand or both hands the motorman lets his car down grade at any desired speed in a manner consistent with comfort to his passengers and without strain to his muscles or any fear that his car will get away from him. Should the right hand rigging fall clear off the car he could still control the car with the left hand and vice versa. The entire record of our road does not show a single case of a car running wild on account of defective brake rig.

In our twenty-five miles of track there are hardly 1,000 feet of level track. Our lines are made up of grades long and severe but they cause us no uneasiness in so far as descending them is concerned. The fact of setting the left hand brake at the start renders descent safe. The car is then under partial control and in case of accident to the right brake or to the motorman, the conductor has ample time to learn that something is wrong and to lend a helping hand even to the extent of going through the car to the front platform, whereas with the ordinary style of single brake in general use the conductor has no intimation of trouble until his car is running away; then he is liable to become rattled.

In time of danger self-confidence is the most potent ally to wise and speedy action. Our men do not have to contend with the fear of ratchets getting out of order, the handle slipping out of the hand and breaking a rib, or the waste of time winding up a chain. Good brakes, and plenty of them, strengthen the motorman's confidence.

If a collision is imminent the first natural impulse of any man is to retire at once from the point nearest the danger. Motormen are not exempt from the law of self preservation and having the brake lever in hand it is but natural to pull it back without the loss of a second and the car will be stopped if there is any stop in it. Eighteen or twenty inches throw gives the maximum braking power.

Our levers are attached without any intermediate gearing direct to the brake rod of Brill's standard truck. The left-hand rig with shoes between wheels is the "toggle joint" principle and an extra costing very little. We made nearly all our own, the Brill Company a few.

We operate between forty and fifty cars. One man is responsible for the brakes on all, adjusting when necessary, and inspecting daily. The lever brake requires neater adjustment than the "coffee-mill" type. The shoes must hang closer to the wheels so the throw of the lever will not be excessive. A motorman and two levers take up about all the room on the front platform which is proper enough as passengers have no more right on the front platform of a street car than they have in the cab of a locomotive. I have heard railroad men say that the lever brake, although quicker and more effective, required too much attention and careful adjustment to allow of general use on big roads. Our man takes a half day to inspect and give the necessary adjustment to the fifty cars and he does his work in such manner that we never hear anything about brakes. They undoubtedly require more attention and more skill but we are amply repaid.

It is a better principle to choose the labor to suit the machine rather than build the machine to suit the labor; there is no reason why a car should be put up like a thrashing machine or a pile driver, with a view to operating it with unskilled labor.

A finished car represents a great mass of intricate problems, mechanical detail, and years of study, and the great majority of these beautiful pieces of mechanism are sent to the butcher shop of incompetence to be ruthlessly destroyed by ignorance. Better labor is wanted, then better brakes can be used. We think the double lever brake leaves very little to be desired.

THE HEILMANN LOCOMOTIVE AGAIN.

There has been a temporary lull in the excitement which the Heilmann electric locomotive was expected to create when held up to public gaze a few months ago. The system will be remembered as including a boiler, steam engine, dynamo and motor all on one car. It was claimed for it that a short haul was made of a light train at a speed of sixty-seven miles per hour. A test is about to be made of the two new and larger Heilmann's, which have tapered noses to decrease wind resistance, and which are expected to generate 1,900-horse-power, and haul 290 tons at a speed of sixty-two miles an hour.

As an ordinary American steam locomotive of only 900-horse-power will draw a 290-ton load at sixty-two-mile speed, it is difficult to discern wherein the great advantage lies in favor of this self-contained electric locomotive.

$3,000 IN CASH PRIZES.

WAS THE AMOUNT PAID BY THE ATLANTA CONSOLIDATED —116 PRIZE WINNERS—THE SCHEME A SUCCESS.

When it was decided to hold the exposition in Atlanta, the management of the consolidated lines at once set about the necessary preparations to handle the expected crowds. This was accomplished in a satisfactory manner, and Joel Hurt, the president, attributes no small share of this success to his plan of awarding prizes for faithful service. Of course, under the conditions of overloads day after day, a train crew is naturally inclined to grow careless after a time, and it was to counteract this influence that the prize money was offered.

The plan is described by Superintendent Hunt as follows:

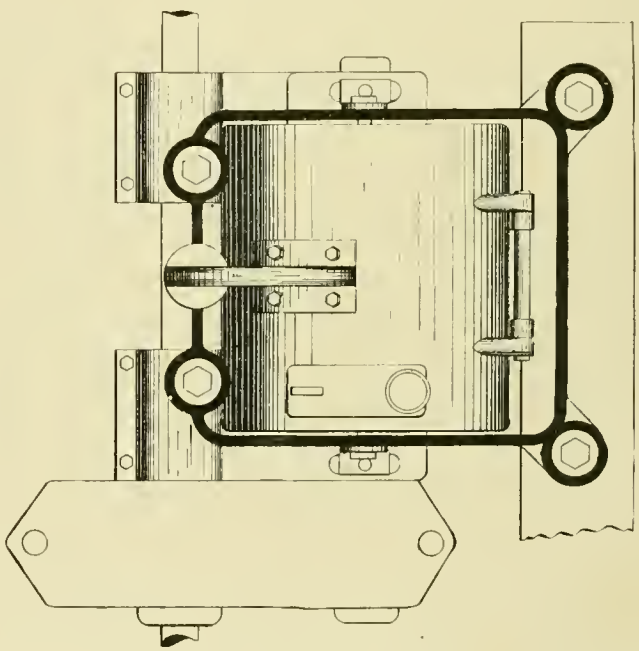
"On July 1, 1895, the board of directors of this company set aside $3,000, to be given as a bonus to the motormen and conductors for good service, who remained in the service of the company from July 1, 1895, to January 1, 1896; to be added to this $3,000 such fines as the superintendent might see proper to impose upon any of the car men for neglect of duty. After all the fines imposed were added to the original fund it was pro-rated according to the time put in by each man. The motormen and conductors gave me such excellent work that I found it necessary to only impose $152 in fines, which added to the original fund, made the amount to be pro-rated $3,152. It was found January 1, 1896, that there were 116 men to share this bonus. The total number of hours put in by these 116 men was 184,435, making the prize money 1.709 cents per hour.

Multiply the number of hours put in by each man, and deduct his fine (if there was any against him), which will show the amount due him. For instance, Jno. Doe made 2,202 hours x $.01709 = $37.63 minus $7.50 fine, leaves a balance due Jno. Doe, $30.13. The highest amount drawn by any one man was $39.07, by motorman J. T. Royster. The lowest prize was $3.47.

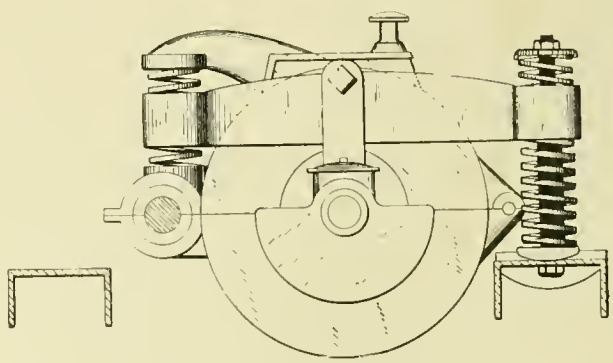
The small amount of fines is an evidence of the good service the company received from its motormen and conductors for the $3,000 investment. I must say that I consider the plan a success."

NEW MOTOR SUSPENSION.

A patent has recently been issued to George F. Card of Mansfield, O., for the method of motor suspension shown herewith. With it there is practically no dead



CARD SUSPENSION, PLAN.



CARD SUSPENSION, ELEVATION.

motor weight on the axle, all being spring supported. A square frame is built around the motor and springs are put under each corner of this frame, two being over the axle and two on the cross bar of the truck. The drawings make the construction clear.

STREET RAILWAY LAW.

EDITED BY FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Rejecting Bid for Street Railway Franchise—Bond of Bidder—Collusion to Make Low Bid.

While the authorities of a city may reject a bid for a street railway franchise if frivolous, sham or fraudulent, it must, under the Ohio statute declaring that no grant shall be given except to the persons agreeing to carry passengers at the lowest rate of fare, award the contract to the lowest bidder, and disregard informalities not clearly going to the very substance of the bid.

A bid for a street-railway franchise by a person named, for himself "and associates," accompanied by a bond describing such person as the bidder, is sufficient as the bid of such person.

That bidders for a street railway franchise have colluded to make a low bid is not ground for rejecting the bid.

(Circuit Court of Ohio, Compton ex rel. Cincinnati v. Johnson, 2 Ohio Decisions, 228.)

Liability of Driver of Car for Injury to Passenger—Failure to Escape from Runaway.

A driver of a horse car is not guilty of negligence rendering him liable for an injury to a passenger in failing to stop the car or drive faster on seeing a runaway herdic approaching at a short distance, where a prudent man would have no reason to think one spot safer than another.

(Supreme Court of Massachusetts, Hamilton v. West End Street Railway Company, 39 North Eastern Reporter, 1010.)

Attempt to Become Passenger on Electric Car—Acceptance by Carrier.

One does not become a passenger on an electric car by getting on the step of the car for the purpose of getting on the platform as a passenger, with the intention of paying his fare when called upon, unless there is some act indicating an acceptance on the part of the carrier.

(Supreme Court of Missouri, Schaefer v. St. Louis & S. Railway Company, 30 South Western Reporter, 331.)

Consent to Location of Tracks — Municipal Authorities to Determine Location.

The municipal authorities must themselves determine the question whether one or two tracks shall be laid, and on what part of the street they shall be placed, and where sidings, cross-overs, and switches shall be built, in granting consent to the location of street railway tracks, under the New Jersey Traction Companies' Act of March 14, 1893, P. L. 1893, p. 302, and cannot leave it to the discretion of the company.

Municipal consent to the route of a railway is not a necessary preliminary to an application to the municipal authorities for the location of the tracks, under the New Jersey Traction Companies' Act of March 14, 1893, P. L. 1893, p. 302, but such consent is necessary only to secure an exclusive right to the route.

(Supreme Court of New Jersey, State ex. rel. Theberath vs. Newark, 30 Atlantic Reporter, 528.)

One Street Railway Company cannot at Will use the Tracks of another—A Franchise is Property and can be taken for Public or Private use only by Condemnation.

Waterman, J.:—It substantially appears that upon an important thoroughfare in this city, Twenty-second street, from Grove street to the east of the bridge over a branch of the Chicago river, for a distance of 300 feet the Chicago City Railway Company had placed a double track, that for several years they operated only one car thereon and that at infrequent and irregular intervals and did not operate any car upon the east approach to said bridge, which was wholly unused for operation of cars. That after the Towns Company secured an ordinance giving it the right to operate cars on Twenty-second street east of the river, over tracks not owned by it, upon terms to be agreed upon between it and the companies owning such tracks, it endeavored but without success, to arraign said owners for the use of said tracks from Grove street to the Chicago river. Appellant's contention that the City Railway Company by its conduct, particularly in suffering appellants to expend large sums of money in repairing the bridge and its eastern approaches, is estopped to deny the existence of an arrangement for the use of the 300 feet of track in question, is not sustained by the evidence.

The general solicitor of a corporation is not presumed to have authority to make agreements for it, save in matters belonging to his department of which leasing or selling property is not ordinarily a part.

It also appears by affidavit that appellant's attempt to run a car onto the aforesaid tracks was met with such resistance by appellee, that the car was smashed and completely destroyed by employes of the City Railway Company, acting under orders of an official of that company. Affiant states that the president of the General Company restrained the bystanders from interfering with the men engaged in destroying appellant's car and used the most strenuous efforts to preserve the peace, otherwise the violence and destructive acts of the employes of the City Railway Company would have led to riot and blood shed.

Appellee alleges "that it has lawful right to keep possession of its tracks and prevent the use thereof by complainants by the use of such force as may be necessary to accomplish that end."

The constitution of this state provides that "No * * * law * * making any irrevocable grant of special privileges or immunities shall be passed;" and that "Railways heretofore constructed, or that may hereafter be constructed, in this state, are hereby declared public

highways, and shall be free to all persons for the transportation of their person and property thereon, under such regulations as may be prescribed by law." (Art. 11, Secs. 2, 4, 12.)

The ordinance by which appellee acquired its right to lay down and operate its street railroad in the portion of Twenty-second street in question, is a law within the meaning of the constitution. Mason v. Shawneetown, 77 Ill., 533; City of Chicago v. McCoy, 136 Ill., 344, 351; Hayes v. Mich., C. R. R., 111 U. S. 288, 237.

If the time of the court permitted, it would be interesting to enter upon a consideration of the many questions discussed by counsel. It may be conceded that public streets are held in trust by the city for the use of the public, and that as streets, they cannot be lawfully given or contracted away for mere private use; also that it is the case that the right of appellee to lay tracks in and thereon run cars through the streets of the city, was given and exists solely because of appellee's undertaking and duty to serve the public and that it cannot maintain its tracks for all or any portion of a public street, for no other purpose than to hold a fight to the street, or for the object of keeping the public, either through another company, or in any other way, from using the street in a manner that shall serve the public convenience. It is the duty of appellee to use, for the benefit of the public, all the rights granted to it to lay tracks in the public streets, and to afford the public all reasonable and proper facilities in the way of travel over each and every part of its tracks; to do otherwise, to stand in this regard as a hindrance to the accommodation of the public, is a gross perversion of the privileges accorded by the municipal authorities to appellee.

But it does not follow that if appellee has done this, or if it has taken the law into its own hands, and with a great force of men by unseemly violence and riot in the public streets to the annoyance and terror of peaceable citizens, broken and destroyed the property of appellants, that thereby appellants have acquired a right to make use of the rails of appellee in any portion of Twenty-second street.

This appeal involves not the wrongs of which appellee may have been guilty, but the rights possessed by appellants.

The right given to the Towns Company to operate its cars over the tracks of appellee, is upon such terms and conditions, by lease or contract, as may be agreed upon between the companies owning said tracks, or otherwise. "Otherwise" does not extend to appellants the right to use these tracks in the absence of either lease, contract, invitation, acquiescence, or estopped, and in opposition of the will of those owning them.

The right in consideration of services rendered the public to lay tracks in a public street and to operate cars thereon, is a valuable property, and is therefore a property right. How lasting it may be, how it may be regulated or revoked, or taken away is another matter.

Being property held under certain conditions, it may be forfeited, but it cannot, either in whole or in part, be, by the mere will of a legislative body, taken from its owners, either for public or private use. If it is to be taken for the public use, its owers are entitled to just compensation, and that compensation, it would seem, must be ascertained by a jury. Peoria, Pekin & Jacksonville R. R. Co. v. The Peoria and Springfield R. R. Co., 66 Ill., 174; Central City Horse Ry. Co. v. The Fort Clark Ry. Co., 81 Ill., 523; Chicago, R. I. & Pac. Ry. Co. v. Town of Lake, 61 Ill., 333; Cincinnati, Lafayette and Chicago Ry. Co. v. Danville & Vincennes Ry. Co., 75 Ill., 113; Metropolitan City Ry. Co. v. Chicago West Div. Ry. Co., 87 Ill., 317; Chi. & N. W. Ry. Co. v. Chicago & Evanston Ry. Co., 112 Ill., 589.

(Appellate Court of Illinois, First District, Chicago, General Railway Co. v. Chicago City Railway Co., 4 Chicago Law Journal 51.)

(NOTE. See also 5 STREET RAILWAY REVIEW, 475. Where the act granting the franchise placed no limit upon the time within which the company might exercise the right to extend its lines, it was held there was no abandonment by non-user of a particular street over which in good faith it was preparing to extend its lines, where it appeared the company had made extensions as fast as the growth of the business warranted, and that it did not neglect any territory into which it was authorized to extend, nor leave such territory without adequate railway service. Supreme Court of New Jersey, West Jersey Traction Co. v Camden.)

STOLEN IN THE AIR.

D. F. McManus, of Philadelphia, was recently held to the criminal court in $1,000 bail, charged with stealing trolley wire from a line which was being constructed to West Chester. Some laborers saw the man standing on the high seat of a wagon, cutting away at the trolley, one morning soon after daylight. They told a milkman, who notified a police officer, and McManus' arrest followed.

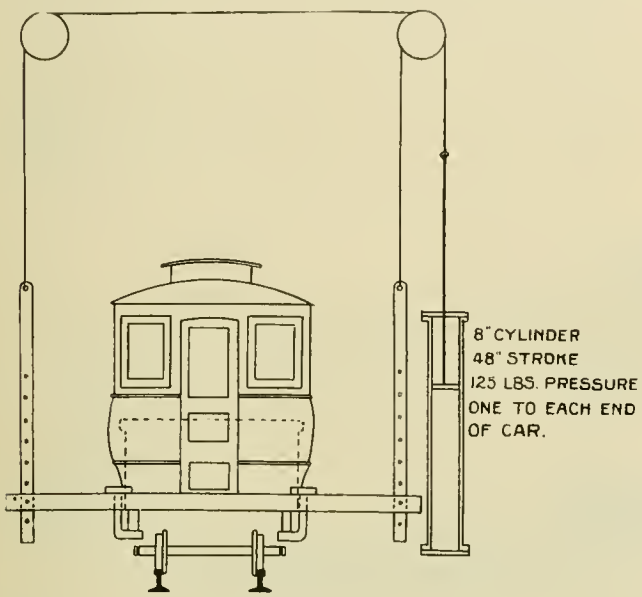
JUST LIKE FINDING IT.

The story that President Jeremiah J. Sullivan, of the Electric Traction Company, of Philadelphia, has received within the past three months $150 from an unknown source, with the request that it be credited to the "conscience fund" of the Fifth and Sixth Streets Passenger Railway Company, will be received with a grain of salt by most railway men. Not that there is not such a thing as "conscience money," but it is a rare, and almost unknown thing to have it come in such quantities, and so frequently. Twenty-five dollars of the sum received was sent with a letter signed S. B., but the remainder was anonymous. Mr. Sullivan is at a loss to tell from whence the money comes—whether from employe or conscience-stricken patron. If the latter, he thinks it is being refunded with compound interest.

The Woman's Health Protective Association of Brooklyn, has compelled the daily cleaning of Brooklyn L smoking cars with hot water. General Manager Barton thinks the idea a good one but the car cleaners well they think "Nit."

HYDRAULIC HOIST FOR CAR BODIES.

Of the many handy schemes for hoisting car bodies that we have seen and which have been described in these columns one of the best is that put in by Thomas Elliott, chief engineer of the Atlanta Consolidated. The plan of the arrangement is shown in the accompanying



HYDRAULIC HOIST AT ATLANTA.

diagram. It is a hydraulic hoist with two 8-inch cylinders forty-eight inches long, standing on end, and bolted to the floor. Cables run from the pistons over pulleys overhead. Water at 125 pounds from the boiler feed pump is employed for operating the hoist as only a small amount is used.

HALIFAX, N. S., TROLLEY LINE OPENED.

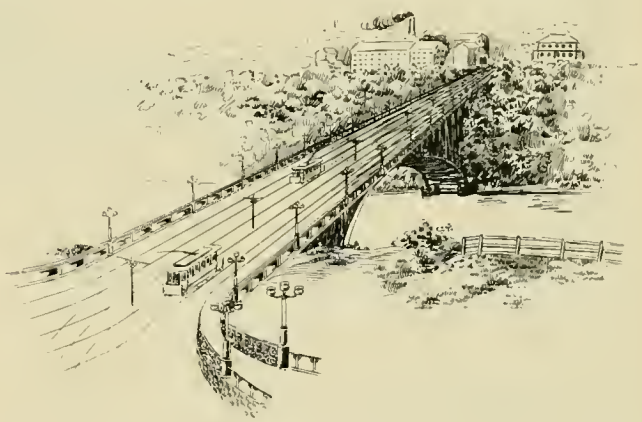
The trial trip of the first trolley car of the Halifax Electric Tramway Company of Halifax, N. S., was quite an event in the history of that thriving municipality. It was made over the company's lines the afternoon of February 12, the car being filled with a number of the representative men, and several ladies of Halifax, the guests of B. F. Pearson and Superintendent R. C. Brown. The people are now rejoicing that at last they have an electric railway. The apparatus used is chiefly of Canadian manufacture, with the exception of the Peckham truck.

HIGH GRADE STEEL.

The time when high grade steel castings could only be obtained in the east has long since passed, and St. Louis counts among its many extensive industries, one of the finest steel plants in the country. The Shickle, Harrison & Howard Iron Company, was established forty years ago, and has constantly grown in size and importance all these years. The works cover three large blocks, and furnish employment for 1,000 men. The foundry has a capacity of forty tons of steel castings per day. Among the various departments, the gear cutting is one of the most extensive, including gears ranging from one pound up to those tipping the scales at over a ton, and in addition to the finest machinery obtainable for this work and experienced men, the concern has the further advantage of cutting only from its own steel. We believe it is the only gear cutting establishment in the country which cuts gears from steel of its own production. This enables it to know exactly what material enters into its finished product, and explains largely the success which has attended the introduction of its goods in the street railway trade. Its open hearth steel is famous for its fine quality, and street railways which have used its gears have received good service.

TROLLEY-CAR BRIDGE AT NIAGARA.

The new steel bridge to be erected the coming summer across the Niagara river, a short distance below the falls, and which will carry a double-track trolley line,



NEW NIAGARA BRIDGE.

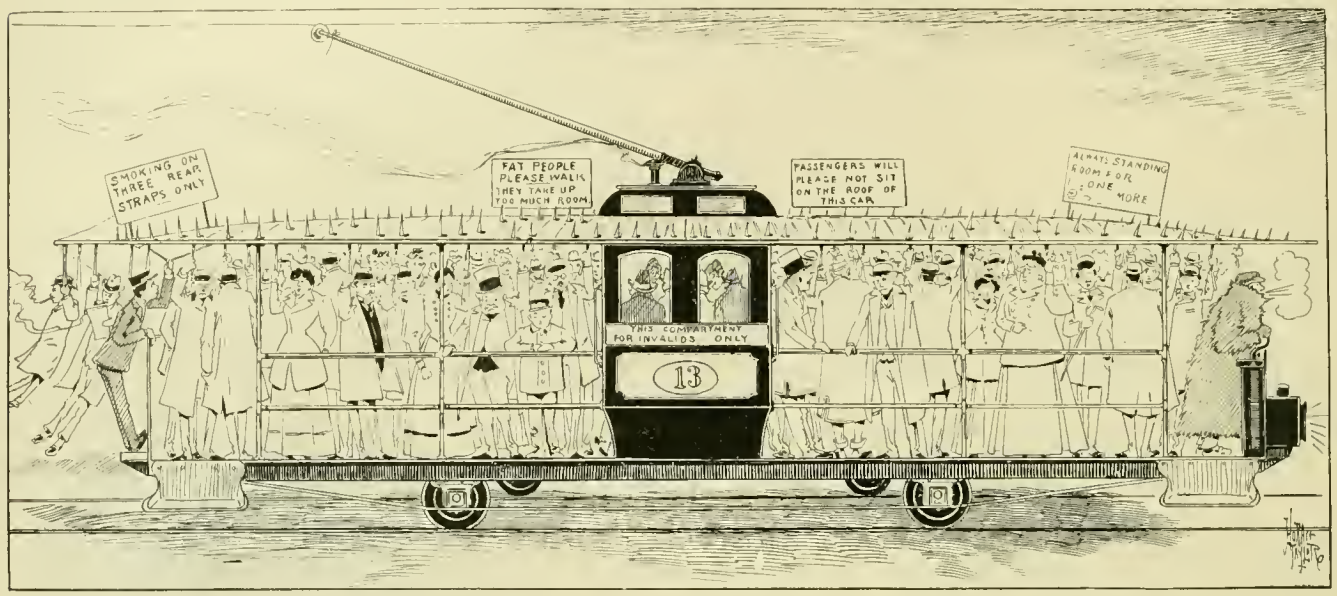
will be the finest span over the river. It will have ample room for vehicles and walks for pedestrians, and the trolley wire will hang from center poles.

TROLLEY HAS COME TO STAY.

A monthly issued in Philadelphia, and whose chief claim to being a street railway journal is in its name, comes out with the ridiculous statements that the days of the trolley are numbered and that gas and petroleum motors will very shortly displace electricity. It is unnecessary to waste even a few words in comment, so far as any man making the slightest pretense to being a street railway man, is concerned, but the daily press are very apt to be deceived and fail to distinguish between a technical journal which is such, and one only such in appearance. Hence the idiotic and false assertion when copied through ignorance is calculated to work great injury to such roads as are trying to secure extensions of lines in places where city officials are ignorant or mercenary; or as is more likely, both.

THREE-CENT FARE FOR STANDERS.

The cartoon herewith, and for which we are indebted to the Chicago Times-Herald, suggests what might come if the threatened ordinance in this city should ever pass—which it will not. The ordinance calls for a 3-cent fare for all passengers who are not seated, and the illustration pictures the type of car which would be needed to fill the bill.



SUGGESTED TYPE OF CAR FOR 3-CENT STANDING PASSENGERS.

OVERCROWDED CARS IN SCOTLAND.

The daily papers in this country are forever harping on the beauties of the European system which limits the number of passengers in a car to the seating capacity. That even the English public sometimes grows restive at delay and insists on boarding a car already legally loaded, and the dire consequences to the unfortunate conductor is evidenced in the following from the Glasgow Daily Mail.

"At the Eastern Police Court, William Scott, tramcar conductor, pleaded guilty to having, on Saturday, the 18th inst., overcrowded his car while in Canning street. The indictment bore that the car contained 28 outside and 22 inside—being six and four respectively in excess of the stipulated numbers. The accused, in extenuation of his offense, said he could not help himself in any way. When starting to collect his fares in Canning street, he found in the inside the full complement of passengers. Going upstairs there also the full number were seated, and he commenced lifting fares.

At this juncture some half-dozen inside passengers possessing tickets, and who had given the inside places to late-comers, appeared on the top of the car. He asked them to leave the car, they refused, and as the lot held tickets for the journey he let them keep their places."

It seems to be a situation where the poor conductor is fined if he does, and abused if he don't.

WAGES IN LEEDS, ENGLAND.

The drivers and conductors employed by the street railway which is operated by the city of Leeds, are clamoring for more pay. When the munificient wage scale is seen there is little surprise at the complaint.

Drivers of 1-horse cars receive 7½ cents per hour first three months; 8 cents second three months, and 8½ cents thereafter. Drivers of 2-horse cars receive 8½ cents first three months; 9 cents second, and 9½ thereafter: Drivers of 3-horse cars, 9 cents first three months; 9½ second, and 10 cents thereafter.

Conductors are paid for same length of service, 7, 7½ and 8 cents per hour. Figures given are in American money. Working days average 10 hours and the highest pay for drivers working seven days is given as $7.74, and for conductors, same time, $6.18 Our American employes who hear so much about the advantages of municipal ownership as practiced abroad, will not find much to interest them in the adoption of the English system here.

TICKETS GOOD OVER STEAM ROADS.

The recent acquisition of the Meriden, Conn., electric railway by the New York, New Haven & Hartford Railroad has suggested interchangeable tickets to avoid the confounding of transfers and to convenience the public.

The officials are considering a plan to issue tickets between the various stations of the steam road with electric road coupons attached, good for a continuous ride to any part of the city or town for which the ticket is purchased.

Some of the companies in Denver have already put their open cars in service.

HALF FARES

Interesting Bits of Information from all Parts of the Country, Boiled Down for Busy Readers.

John E. Calderwood, auditor of the Minneapolis Street Railway Company, of Minneapolis, made a sad journey to Fenton, Mich., February 19. He was called to attend the funeral of his mother.

The tribulations to railway men from spring floods have set in. One day last month the Danbury & Bethel trolley cars had to suspend operations. The water rose so high in the power-house as to extinguish the fires under the boilers.

Since March 1 the Newburg Electric Railway Company, running between Newburg and Walden, N. Y., has been carrying mail cars upon its line. The new system has considerably increased the volume of business at the Newburg postoffice.

Manager Vining of the Market Street Railway, San Francisco, has determined to stop gambling among the employes of his road. He has notified his men not to visit race tracks, or poolrooms on or off duty, or gamble in any form, under penalty of discharge. The reason for this step is obvious.

The Massachusetts Street Railway Association has petitioned the legislature of that state for such legislation as will permit the investment of deposits in savings banks, institutions of saving, the capital stock of insurance companies, etc., in the legally issued stock or bonds of any lawfully state-organized street railway company.

Three temporary spans of the new bridge being erected across Tinker's creek for the Akron, Bedford & Cleveland Electric Railroad fell February 12, precipitating eight workmen into the creek, sixty-five feet below. Five received serious injuries. This bridge was a temporary structure being built to replace the one that collapsed in January.

The Brooklyn bridge trustees have decided to let the trolley companies run through the grand plaza at the Brooklyn end of the big span, making a sort of central depot there. This decision ends a long discussion between the authorities and the surface car companies, resulting in a victory for the latter. The companies will pay nothing for the privilege.

Secretary A. L. Stone of the Oakland, San Leandro & Haywards Electric Railway, Oakland, Cal., announces that the company has decided to give up the wagon delivery part of its express business. He says he has found the handling of express by wagons to be entirely separate from legitimate railway transportation, and requiring another set of employes.

The Alameda and Oakland Electric Railway, Alameda, Cal., was awarded a judgment for $40 against G. W. Henderson, a house-mover. Henderson blocked the company's tracks four hours with a house which he was moving, besides cutting the wires. Court held company was not required to move poles and repair wires for the benefit of house-movers.

An unusual number of trolley cars are reported as catching fire on the street the past winter. In several cases the fires have gained such headway as to burn the cars to the trucks. It has always been considered that cars were safe from fire when out on the road, but if the present rate of destruction keeps up there will be good reason for having them constantly insured.

In anticipation of the competition which would result from the running of the Interurban Electric Railway Company's cars between Saginaw and Mackinaw the Flint and Pere Marquette, Michigan Central and Saginaw and Mackinaw, reduced their fares to fifteen cents a single trip, or ten tickets for $1.50. Formerly the single fare between these points was thirty cents, or fifty for the round trip.

Two explosions which bore a remarkable resemblance to pistol shots occurring in a New Orleans car one evening, caused the conductor and motorman to stop the car and demand who was the guilty party with the gun. Every man in the car produced a weapon with full cylinders, so that the trainmen are still in the dark as to who caused the commotion, but it must have been a gay crowd to have been so heavily garrisoned.

Hot coffee was served to the motormen and conductors on the Fairhaven & Westville Street Railway Company of New Haven, Conn., during the extreme cold weather, and a relief squad was on duty to take the place of those who became chilled in making the long runs. Besides this, one of the drug stores on the route was turned into an emergency hospital where those who had been nipped by the frost were treated. The public and employes are both said to have appreciated this humane conduct on the part of the company.

To deaden the noise caused by passing trains over elevated roads and bridges is a problem that has taxed the thinking powers of many railroad engineers. German engineers have, perhaps, been the most successful. After many experiments, the most effective device has been found to consist of a decking of one and a quarter inch planks between the girders upon which a double layer of felt is affixed. Over this four inches of slag or fine gravel is tightly rammed. The surface thus created is drained by tubing. The top surface is of asphalt. The principal drawback to the system is its weight, which, on the German roads, is found to average 600 pounds for each lineal yard, eleven feet wide.

PROSPERITY AT LACONIA.

The Laconia Car Company of Laconia, N. H., has been enjoying unusual prosperity recently, and we take pleasure in showing herewith the ground plan of its extensive system of works. They are located on the Winnepesaukee river, which stream supplies 1,000-horse-power to the works. This is supplemented by steam engines at distant points on the grounds. The plan makes plain the general arrangement. In the lumber department from two to three million feet of lumber is kept on hand constantly. The drying house into which the lumber goes after an air seasoning has a capacity of 40,000 feet. Oak is steamed under a pressure of 100 pounds, but the steam is allowed to enter very slowly. After steaming it is sent to the dry house, and after being there a week the moisture has all left it. All the street railway lumber passes through the dry house.

Not only are the wood-working shops of this company very complete, but the foundry and machine shops are of no small magnitude. Of course the machine shops are fitted up to turn out the Baker truck made by this company and the car-wheel foundry is extensive. The brass foundry has a capacity of a ton of bronze work per day.

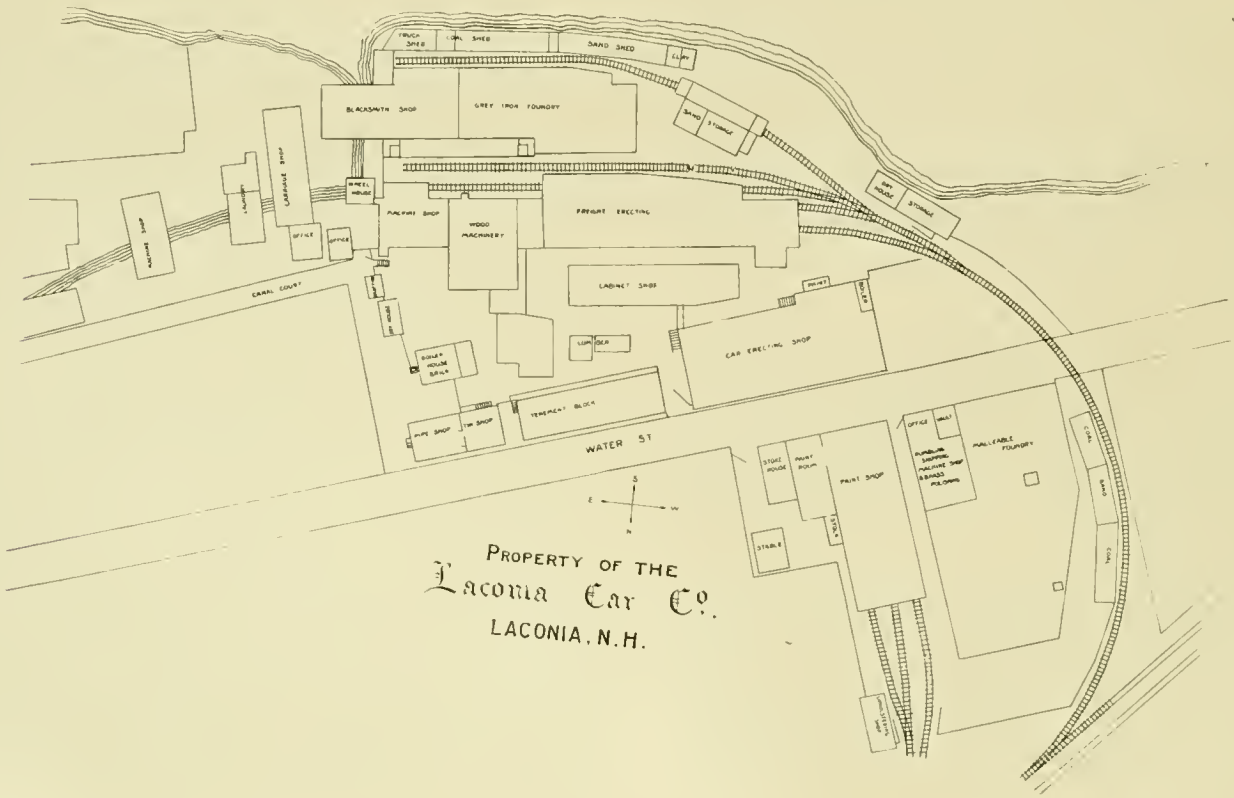
We show herewith one of a lot of twenty-four cars just built for the Lynn and Boston Railway. These cars are 27 feet 6¾ inches over platforms, 28 feet 6¾ inches over bumpers, 27 feet 9¾ inches over bonnets, length of body over panels 20 feet ¾ inch, length of monitor over all 21 feet 7½ inches, width of bottom over panels 6 feet ¾ inch, between seat rails 3 feet 1½ inches, of doorway 26 inches, of seat 16 inches, between heel boards 4 feet

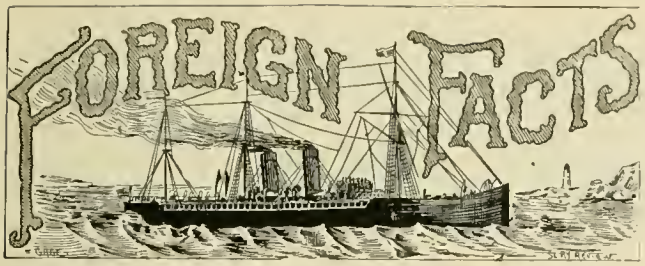
LACONIA CAR FOR LYNN & BOSTON.

2 inches, of monitor inside 4 feet, of roof at plates over all 7 feet 5½ inches, of monitor roof over all 5 feet 8½ inches, of platform 3 feet 9 inches, of body over posts 7 feet 2 inches; height from bottom of sill to top of trolley plank 9 feet ¾ inch, from top of floor matting to ceiling inside 8 feet ½ inch, of doorway 6 feet 4¾ inches, of seat 14¼ inches, from step to platform 13 inches, from platform to top of dasher rail 2 feet 9⅜ inches.

The same care is taken in construction and finish that has made this company's steam railroad cars so popular and attractive. No pains are spared to turn out highly creditable work, which shall not only be pleasing to the eye, comfortable to ride in, but whose lasting qualities under the severe conditions of street-railway usage, shall be its greatest recommendation.

The Big Consolidated, Cleveland, has contracted for 300 fenders.





An electrical tramway is to be constructed between Sara and Gustav pits of the North Hungarian Coal Mining Company at Baglias Alja, near Salgo-Tarjan, Hungary. The line will be about three kilometers long.

The work on the Douglas Head Electric Tramway, Douglas, England, is progressing rapidly. It was begun late in December and since then thirty men have been kept at work on it. Considerable excavation has to be done, and on the road there are three wooden bridges, which will be removed and replaced by steel girder ones.

The Liverpool Overhead Railway Company is a model of careful management. Within the past three years it has paid only $75 in damages. During the last half-year the company increased earnings $28,782 at a cost of $8,423, while the earnings per passenger increased from 3.34 to 3.94 cents. This increase was due to a larger proportion of first-class passengers, and the raising of workmen's fares.

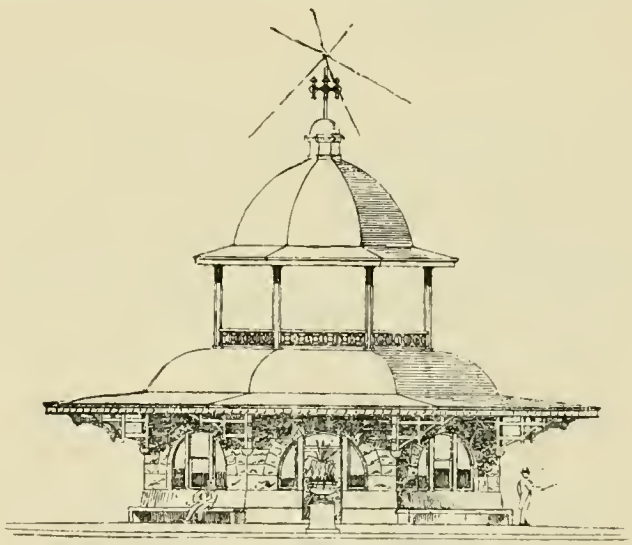
It is stated that seventy cog-wheel railways have been built since 1812, and that of these seventeen are in Switzerland, fourteen in Germany, twelve in Austria-Hungary, four in France, and three in Italy, the others being in England, Spain, Greece, Portugal, the United States, South America, Asia, and Australia. The total length of these lines is 500 miles, of which 188 are on the Abt system. These lines are worked by 300 locomotives, the heaviest of which weighs seventy tons.

The Isle of Man Electric Tramways Company applied for sanction from its shareholders to purchase Snaefell Mountain Railway for $362,500, the purchase money to be payable $162,500 in cash, $100,000 fully paid 6 per cent $5 preference shares, and $100,000 in $5 ordinary shares. The company has asked to increase its capital by the creation of 25,000 of $5 preference shares. This addition will extend the Company's system twelve miles from Victoria Pier to the summit of the Manx Monarch Mountain.

English prejudice against overhead electric wires is daily lessening as is evident by the fact that the city council of the town of Leeds, which in October last determined to insist on the use of the conduit system on certain lines to be equipped, has reconsidered their decision in favor of the trolley. February 12, the Highways Committee of the Leeds' Corporation, a very conservative body, recommended to the city council that the overhead wire system be experimentally adopted. The highways committee is to investigate.

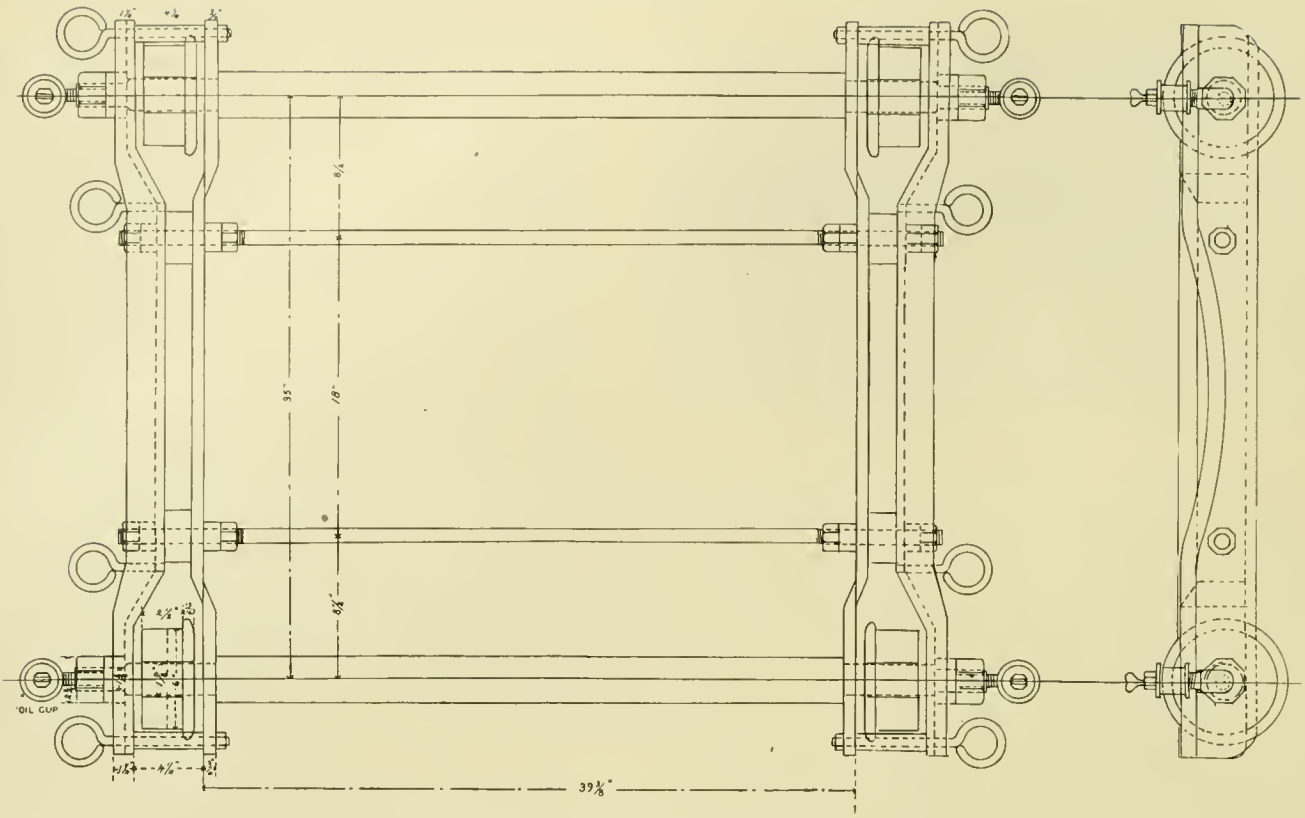
DECATUR'S NEW TRANSFER HOUSE.

In the center of the city of Decatur, Ill., is a public square and in the center of that public square is a circular loop around which all the cars belonging to the City Electric Railway run. In the center of this circular loop there has stood for some time a neat transfer house, but citizens, business men and electric railway company felt that something finer would be appropriate as the central figure in the city's array of architecture. A canvass was made to secure funds for the erection of such a building on the public square, with the result that on the evening of February 21 a new structure was opened to the public The interest taken in the new building was shown by the mass of people which for three hours filed through the new waiting room. The building is octagonal, thirty-six feet in diameter. The material is



TRANSFER HOUSE, LINCOLN SQUARE, DECATUR, ILL.

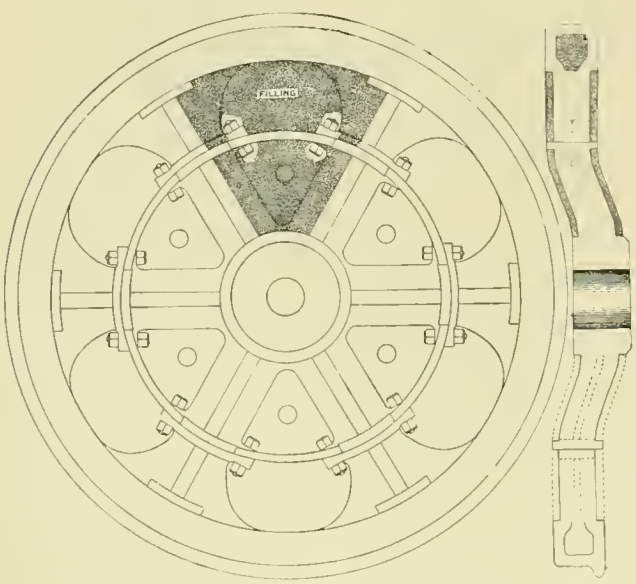
gray Bedford stone. Above the overhanging roof is a band stand. Doors and windows alternate on its eight sides. The interior finish is hard wood with tile floors and frescoed walls. The decorations are elaborate. There is a ticket office and seats for ninety people. On the evening of the opening, people were carried free on all the lines of the city, and it is hardly necessary to say that in spite of the cold night the road carried the biggest load in its history. There was not always room for one more on some of the cars. Tickets 30 for $1 were also sold from 7 p. m. until closing time, and the demand so far exceeded the anticipation of Superintendent W. L. Furguson that the supply of tickets ran out and orders had to be left to be filled later. The cost of the depot was about $3,000, and the city has made an appropriation of $1,500 to be spent on improvements of the ground surrounding it.



PLAN AND ELEVATION OF DENVER TRAMWAY WRECKING TRUCK.

A NOISELESS CAR WHEEL.

T. P. Murphy, of New Orleans, has recently been experimenting with a car wheel which is designed to deaden the sound usually made by the rolling of the wheels on the track. It has been tried on a line in that



MURPHY'S NOISELESS CAR WHEEL.

city. The wheels are spoke wheels with the outer rim a separate piece as shown in the accompanying drawing. The space between the spokes is filled with a patented sound-deadening composition, which is held in place by steel plates. This composition is cheap and is one of the chief features of the invention.

WRECKING TRUCK AT DENVER.

BY C. K. DURBIN, SUPERINTENDENT DENVER TRAMWAY COMPANY.

I noticed in your recent number an engraving of the skid for broken axles, as used in Minneapolis and Milwaukee, and for the benefit of those who may be troubled with broken axles, I send herewith a plan of a truck designed by our foreman, George Dalzell, and our superintendent of wrecking crew, Lew Ball, which we consider an improvement over the Minneapolis skid. We tried the skid, but found that the friction on the rail was so great, that we set about devising a truck which would roll instead of sliding upon the rail, and as a result we have developed a truck with 6-inch wheels, which we have been using for the past four months with great satisfaction. As far as I have been enabled to learn, we have been troubled more with broken axles than most other companies, but just why we have as yet been unable to determine. We think, perhaps, our rigid cable track construction may have something to do with it, as well as our narrow gauge, (3′ 6″) and the poor quality of the steel in the axles themselves. For the past year and a half we have been substituting hammered iron, as used by steam railroads, and as yet have had none break. We would like to compare notes with any other company so afflicted.

How the Seller Would Buy

The supply man, who in wet and cold, rain and shine must travel back and forth, and keep on the constant alert lest some more enterprising competitor gets there ahead of him, has abundant opportunity to study human nature. And he finds it is not the man who has the most time and the fewest cares, or the smallest road, who is always the most considerate. As a rule the larger the road and the more experienced the manager, the greater is that manager's readiness to look into the possible merits of new ideas and improvements; and his willingness to learn. On the other hand, the man who knows it all, who has nothing to learn and who assumes post graduate degrees in street railroading, is more often found among the smaller interests. Not that many managers of small roads are not progressive, enterprising men, who only lack the larger opportunities of their more favored brothers to make a record equally as good or better. The supply man as a rule is a keen observer, a close student and many are the good suggestions he has whispered into the manager's ear, which that official has speedily put into execution, and received great credit for his farsightedness and ingenuity.

The REVIEW recently requested a few of the supply men to give their ideas as to "How would you buy goods, if you were a manager?" and here are some of the replies:

In answer to your request, viz., "How I would buy goods if I were a manager" would say that first of all I would adopt a standard as near as possible, in everything where repairs are required from time to time. Second, I would endeavor to buy the best material regardless of price. Third, I would endeavor to ascertain what concerns are reliable in furnishing the best material and such concerns would be favored with my orders from time to time, thereby encouraging the manufacturer of first-class material. Fourth, if I needed any material when the traveling man representing such concerns, called on me, if prices seemed satisfactory, I would place the order with him instead of turning him away and telegraphing the concern a week later to send material by express, as is often the case, which may be verified by a great number of traveling men.

If I was a manager, and a traveling man called, I would not spend an hour telling stories with some chance visitor who evidently had more time than business. I would remember that the salesman came to my town for the express purpose of seeing me: that there was no one else in the place who could possibly be a buyer of his goods: and that if he did not get an opportunity to see me promptly he would miss the noon train, and have to remain over until late at night. I would not tell him I was too busy to see him that day, and to call tomorrow, when I could just as well give him fifteen minutes today, as then. I would not tell him that the X company were selling the same line of supplies at a price below the cost of the raw materials, when such was not the fact. I would not refuse to look at his samples, when I had never seen them before, and tell him I knew all about some new device which had not been on the market over a week. I would not tell him his concern had not treated me fairly when I had never had any business with it. I would not give him an order to "get rid of him," and then write the house the next mail and cancel it. I would not send him several miles out to a power house to explain things to the engineer, when the engineer had nothing to say as to what should be bought or used. I would not profess a thorough understanding of a subject I knew nothing about, and I would not expect to buy the best goods for the least money.

1st. I would treat the salesman with common civility, it costs nothing.

2nd. I would tie to no house or man.

3rd. I would buy of the man that offered his goods at the lowest price, quality considered, and goods guaranteed equal.

4th. I would be careful and not buy more than my wants required, no matter how cheap they were, unless I had money to spare.

5th. In buying merchantable goods I would buy those that were best known in your market.

6th. In buying machinery, I would buy that which had been tried and proven the most durable and economical as to repairs.

7th. In this age of improvement I would investigate and try a new piece of machinery, if the seller would allow me to do so on a guaranteed time, and if not satisfactory, have an option to reject it. I would have everything to gain and nothing to lose in making this trial.

8th. A good buyer hears and sees a great deal more than he tells. Truly yours. A SALESMAN.

The request contained in your favor strikes me as rather novel, and as I never looked at it from a purchaser's standpoint, I hardly know how to reply. I think if I were buying goods I should endeavor to keep thoroughly posted on the material being placed on the market, and I know of no better way of doing this than listening to the supply men. I should not mix my equipment more than was absolutely necessary, and purchase from the same concern as often as possible. I should expect the supply man to tell the truth and carry out all promises made by him, and if I should discover that he had been lying to me, deceiving me, or trying to take advantage of me, I should give him the "marble face" on his next and all following visits. I should endeavor to buy the best material, making price a secondary consideration. A purchaser who encourages a higher standard of material is a benefactor both to the consumer and the

manufacturer. I do not know anything about this, but without extended consideration the above shows my idea of buying.

If I were a street railway manager, wishing to purchase goods, I should look over the latest STREET RAILWAY REVIEW. If I did not find what I needed, I should write the Windsor & Kenfield Publishing Company, asking them to kindly put me in touch with the companies handling the wished for articles. I would then find out which of these companies sold the best appliance for the least money, i. e., I would try the cheapest, if in my judgment, it seemed as good or better than the others, as the cheapest is usually the simplest, and the simplest is always the best, as the chances of getting out of order are less.

"How would I buy goods if I were a manager?" Well, I would just like to exchange places with one for a few days—I think he would learn quite as much as I by the change.

In the first place, I would remember that the selling agent is a business man whose time is money, and who, if no business is possible, does not want to waste several hours in finding out the fact. On the other hand, I would never say "No" until I had looked into the nature of his errand sufficiently to judge understandingly that it was something I did not need.

If I were extremely busy and really could not spare a minute, or had previous engagements, I would pleasantly tell him so, but that I would do the best I could to help him out, and if ten minutes would be any use, or longer if circumstances would permit, then set a time later in the day, and when that time came give him his hearing, feeling that it was his time and belonged to him.

I would tell him I would appreciate any little points he might see in visiting other roads which he thought would be an advantage to me on my line, and I would return the compliment by putting in a kind word for him and his goods, if deserving, when I met another manager.

I would always accord the same gentlemanly treatment I would expect if I were the traveling man and he the manager. Oh, I would make the boys glad to see me, I would, even though I could not give an order every time they called.

If I were a manager there is one thing I would not do. I would not spend an hour or two in having explained to me some new appliance, and wind up by pronouncing it excellent and asking for a sample to be sent f. o. b. my office, and then when it came allow the office boy to file it away back on a high shelf in the store-room, and I would not let it remain there unopened and untried for two or three months, meanwhile forgetting to reply to the numerous letters of inquiry asking how the test was coming on. I would not try and save expenses by writing for every sample I saw advertised to be sent free on trial. I would buy only what proved satisfactory, and when I found a good supply at a fair price I would not go on experimenting every month. I would do my own buying and not allow some irresponsible subordinate to select the supplies. I would know how long supplies lasted and how long they ought to last, and I would not wait until I was all out before sending in an order for more.

AN EXTENSIVE PLANT.

Among the most extensive plants for the manufacture of street railway cars is that of the Brooklyn & New York Railway Supply Company, at Elizabeth, N. J. As announced in our last issue, this company has succeeded to the business of the Lewis & Fowler Manufacturing Company, late of Brooklyn, N. Y., and to that of James A. Trimble, formerly of New York City. The plant covers an area equal to forty-eight city lots, the buildings being substantially constructed of brick and in every way adapted for purposes of car construction. The equipment of machinery is both modern and complete and the general lay-out of the plant is such that rehandling of stock is reduced to the minimum, raw materials being received at one end of the works and following in line regularly from department to department passing through such stage of manufacture in each successively as to fit it for use in the next department without having to be returned to any through which it has already passed. This, of course, is accomplished by a careful and appropriate distribution of machinery and advantageous arrangement of the several departments, and when considered as an important factor in keeping down the cost of production (this saving of extra handling) it becomes a matter of import to the buyers of cars as well as to the manufacturer himself.

The means provided for drying lumber and timber and the proper storage of same are such as to insure that prerequisite in good car construction, sound and well seasoned wood.

Mr. Trimble personally inspects the work of construction from stage to stage, and himself a practical car builder it must indeed be a small defect that escapes his notice.

Besides all styles of street railway cars this company manufactures electric snow sweepers, car heaters, and a full line of bronze car trimmings. The Lewis & Fowler fare register is also manufactured here. This register has been in use many years and is known throughout the country as one of the most reliable fare registering machines ever produced. Recent improvements have been made, and the register now totalizes to 100,000. The company is now working on extensive orders for these registers, and the demand continues active. Many who have the old type of this register in use, registering only 2,000, are having them changed to register 100,000, and other late improvements added. This the company does at a comparatively small cost, making the registers equal to new.

The thoroughly practical management and well equipped plant possessed by the Brooklyn & New York Railway Supply Company gives it rank among the leaders and it will no doubt receive patronage accordingly.

How the Buyer Would Sell

While a few managers of street railways have at some been on the other side, and know what it is to try and get a purchasing agent to look into the merits of their goods, most of them have not; and it had never occurred to them that there are many thorns in the supposedly rosy life of the sales agent, or that they, perhaps unintentionally, were too often one of the briars. It was, therefore, a new experience to be invited by the "Review" to tell what they wanted to if the conditions were reversed. We recently addressed a number of inquires to managers of roads asking, "How would you sell goods if you were a supply man?" We select a few from among the replies.

"How I would sell goods if I were a supply man." Unless confident that I was adapted to the business I should hire a man that was.

Ability to sell goods can only be acquired by a few. Certain peculiarities might qualify a man for a successful manufacturer but will ruin him as a salesman.

Judgment of human nature so as to readily discover another's peculiarities and fit into them, rather than rub against them, is the essential qualification.

Handle only reliable and practical goods so manufactured that they can be sold at reasonable cost to purchaser.

Barnum's well-known precept about humbugging the public which had such a long and successful run in the electrical branch of this business will only work now in isolated spots.

Do not push new and untried articles; better give a few away where you feel sure that they will have a fair trial; then watch the results patiently.

Rely more on personal contact than on postage stamps.

Watch a busy manager open his morning's mail and note how much of it goes into the waste basket.

Always meet prices on goods of equal merit when it can be done without absolute loss. If your goods are better and will give more satisfactory results, hold prices at a living profit.

Watch collections closely, but never allow your house to send out any but courteous letters.

"How I would sell goods if I were a supply man." I would first become thoroughly familiar with all goods carried by firm represented and be able to present them in an understanding manner to customer.

I would sell goods in fair competition, not by underrating or belittling competitors. I would be brief as possible in making known my business and not make myself obnoxious by consuming several hours of manager's valuable time in talk that is of no interest to him.

I would study interests of customers as well as of firm thereby gaining confidence of one and securing business for the other.

I would never open a conversation to the manager or purchasing agent on the subject of the weather, or my own physical condition or the weight of my sample case. After a quiet and polite greeting, would inquire into his needs, and in a business-like manner quote him prices on the lot and amount required. Would do this so he wouldn't have to ask if "this is your best figure?" I would post myself each day on the fluctuations of market prices, and be thoroughly conversant with quotations from my house, avoiding that "fumbling act" for such information in a rude assortment of other letters. Should I find my customer not in need of anything in my line I would close my business with him promptly and not hang around until the poor man had to figure to get rid of me. I would refrain from offering him a cigar. The brand might not suit, resulting in bad feeling on his part, and then again he would be privileged to imagine I was attempting to buy him. It would be a hard life to live even with all these suggestions.

If I were a supply man, after presenting my goods to the purchasing agent, I would, if he informed me that he did not require anything in my line, take him at his word; believing he understood his business; and would not annoy and bother him by insisting on his purchasing something that he said he did not need, believing that if I would have regard for his time, if I respected his wishes, and knew that he had plenty of business to attend to, I would be more liable in the future when he was in want of anything in my line, of being able to sell him.

If I were the salesman how would I sell goods? Am afraid I wouldn't sell enough of anything in a town to enable me to pay fare to the next. The only selling I have done, was in disposing of some rare specimens of horse-flesh which averaged up exactly $12 a head, so you see I am no trader.

But if I had to attempt to sell street railway supplies I would first make as careful a study of the goods manufactured by the company I represented, and those of all its competitors, as possible. I would not run down the others, but would be in possession of every fact obtainable to show wherein mine excelled. I should lay great stress on quality and least on price and endeavor to show just what the expense of repairs amounted to, in all the details. I would never misrepresent matters as by saying my goods were standard on some large road when in reality the road has only put on a few experimentally, subject to payment in six months if found satisfactory at that length of time. I would not promise delivery at a certain date unless I was reasonably sure the house could fill the order as promised. I would not assure a buyer that a device had been thoroughly tested when it had not;

and I should not tell him I was making a lower price than any one else was getting, on account of the big advertisement it would be to have our stuff on his road, when the price quoted was the same as everybody else was buying at. But then, I probably could not sell goods anyway, and am content to stick to my "managing," and by an occasional filing of my eye-teeth try and be sharp enough to keep my end up.

NOVEL ADVERTISING CAR.

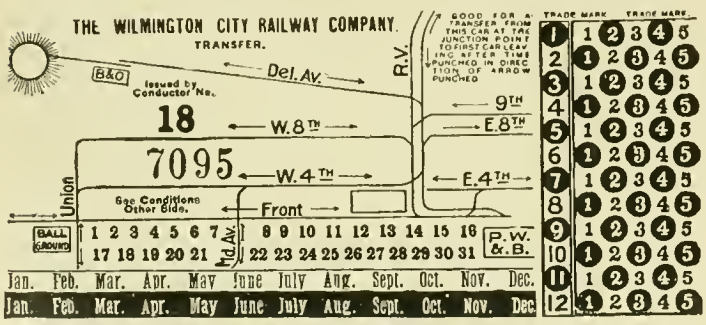
The Yankee spirit is entering into all departments of street railroading now-a-days. Hardly a week passes but some "new wrinkle" for inducing traffic or utilizing natural advantages is adopted on one line or another. The Denver Consolidated Tramway Company has utilized its repair car, a sort of hurry-up wagon, mounted on McGuire's double trucks, for advertising purposes.

REPAIR AND ADVERTISING CAR AT DENVER.

This car has been paneled off, nicely decorated, and space upon it sold to advertisers. Once a day it goes over the entire line, whether there are any repairs to be made or not, which is equivalent to giving advertisers a run for their money. It carries a full repair equipment, and aside from its usefulness, the scheme is said to pay well. The old power house of the company is also covered with advertising matter, nearly every prominent firm in Denver being represented upon its walls.

NOVEL TRANSFERS AT WILMINGTON.

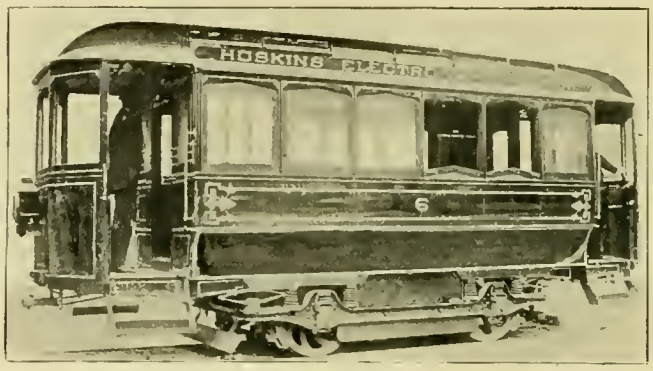
C. F. Hutchings, superintendent of the Wilmington City Railway, Wilmington, Del., has designed and put in service a transfer on which is printed a small map of the company's lines. The conductor in punching these before issuing punches the arrow indicating which direction he is going on his own line and the arrow indicating the direction and line that the passenger wishes. The a. m. and p. m. are denoted by the light and dark month and the time limit is the Stedman design. The transfer has been in use but a short time, but is giving satisfaction. The passengers readily understand it as well as the conductors.



WILMINGTON TRANSFER.

HOSKINS GASOLINE MOTOR AT SPRINGFIELD.

Experiments have recently been going on at Springfield, O., with a gasoline motor car which is the design of T. D. Hoskins. Two of the cars are illustrated herewith. Gasoline is carried under the seats sufficient for a twenty-four-hour run. Two gasoline engines furnish



HOSKINS GASOLINE MOTORS AT SPRINGFIELD.

the power and transmit to the axles through a friction gearing. The gasoline engines run continuously and in one direction, and starting and reversing is accomplished by the friction gear. Standard street railway trucks and appliances are adhered to as closely as possible, and no room in the car is taken up by the motors. Arrangements have been made to manufacture this motor at the shops of P. P. Mast & Co., of Springfield. A road is projected from Columbus to Sprinfield to use these motors.

Janesville, Wis., at a business men's meeting expressed sorrow that it had not supported its street railway line better—but it has no street cars now.

News From The Cities

California.

San Bernardino, Cal.—The Southern California Railway Company will apply for a franchise, it is said, for an electric road.

San Jose, Cal. John Center, of San Francisco, has foreclosed his $17,000 mortgage on R. H. Quince's Alum Rock Railway. It is said Mr. Center will discard the steam dummy and install electricity.

San Francisco, Cal.—The Tamalpais Railway Company has hired 300 men to construct the electric road up Mt. Tamalpias. Alfred Borel, Louis James, Sydney E. Cushing and A. E. Kent are among those interested.

San Francisco, Cal.—The Continental Motor & Traction Company has been incorporated to construct railways. Capital, $1,000,000; $35,000 paid; incorporators, W. R. Smedberg, Phillip La Montague, A. J. Bowie and others of San Francisco.

San Jose, Cal.—L. M. Hale has petitioned for a right-of-way in Santa Clara county, from the city of Jan Jose to Stevens Creek, the line passing through Saratoga, Congress Hall and several small settlements; the whole territory is thickly settled. The line seems in a fair way to go through.

San Francisco, Cal.—General Manager W. M. Rand of the California Railroad Company, better known as the Laundry Farm Road, says that the line, which is now a steam road, will be converted to electric if property owners will contribute $20,000. A portion of the sum has been subscribed.

San Francisco, Cal.—The contract for the Mill Valley & Mt. Tamalpais Scenic Railway has been awarded to the California Construction Company, San Francisco. Boilers and engines will be furnished by the Risdon Iron Works, and generators and motors by the General Electric Company.

Chicago.

Chicago.—The Chicago City Railway is adding to its electric power house.

Chicago.—The City Railway Company has leased the Southwest Chicago Rapid Transit Company's two-and-a-half miles of road and will equip with electricity.

Colorado.

Denver, Colo.—The Denver City Cable Railway Company contemplates a change from cable to electricity.

Cripple Creek, Colo.—C. M. Rice, president, and W. E. Bridgman, secretary, have applied for an increase of the capital stock of the Electric Tramway & Tunnel Company, from $1,250,000 to $2,000,000.

Denver, Colo.—The Tramway Company has decided to lengthen 22 of its 16-foot closed cars to 30 feet. They will be built on the plan of the San Francisco cable cars, open at forward end. The work will be done here.

Denver, Colo.—The South Platte Railroad & Power Company has been incorporated to build between Denver and Cripple Creek. Electric power will probably be employed. Capital, $1,000,000; incorporators, S. T. Smith, J. E. Rockwell, Norman Allen, George F. Dayton and J. H. Dayton.

Connecticut.

New Britain, Conn.—The Central Railway & Electric Company is considering an extension to connect with the Newington Tramway Company.

Shelton, Conn.—The Shelton Street Railway Company will soon begin construction so as to have the road completed by July 1, as provided in the franchise.

Enfield, Conn.—The Enfield & Long Meadow Electric Railway Company has applied to the Massachusetts legislature for permission to extend to Springfield. Judge Briscoe, of Thompsonville, is president of the company.

Greenwich, Conn.—The Greenwich Tramway Company, incorporated long ago, has just completed its organization, with David J. Pearsall, of New York, president; R. Jay Walsh, of Greenwich, secretary; Whitman S. Mead, of Greenwich, treasurer. Other subscribers to the $15,000 capital stock are Thomas S. Krutz, New York; W. G. Bushnell, New Haven; and John Dayton, Greenwich.

District of Columbia.

Washington, D. C.—The Mt. Pleasant & Zoo Gravity Railway Company has applied for a franchise to build in the suburbs. Capital, $1,000,000; W. B. Hibbs, Ethelbert Baier and Louis D. Wine are interested.

Washington, D. C.—R. Henry Phillips will extend his Washington & Falls Church Electric Railway from Arlington to Falls Church, by way of Ballston. Cars are now running over the completed portion between Rosslyn and Arlington.

Illinois.

Peoria, Ill.—A car barn 150 x 60 feet will be erected by the Central Railway.

East St. Louis, Ill.—The St. Louis & East St. Louis Electric Railway may be extended four miles.

Quincy, Ill.—The Quincy Horse Railway & Carrying Company is putting in new generators and making other improvements.

Kankakee, Ill.—The Kankakee Electric Railway Company has been granted an extension toward Bradley, which is the objective point.

Cairo, Ill.—Calvin V. Neff, representing bondholders, has purchased for $35,000 the street railway plant of the Delta Electric Company.

Rockford, Ill.—The Rockford City Railway Company has voted to increase its capital stock from $150,000 to $200,000. Several lines will be relaid with heavier rails, and additions will be be made to the rolling stock.

Indiana.

Hammond, Ind.—Hobart M. Godfrey has been appointed receiver of the Hammond, Whiting & East Chicago Electric Railway on application of Lazarus Silverman of Chicago, and Samuel M. Feckheimer and Alfred Seasongood of Cincinnati, who hold one-fourth of the stock. The company is solvent. Silverman procured the receivership to delay the $100,000 assessment for projected improvements.

Iowa.

Hamburg, Ia.—J. M. Hammond has applied for a street railway franchise.

Kentucky.

Lexington, Ky.—The Belt Railway Company will extend its electric line.

Louisville, Ky.—James S. McKenna and Judge Hoke have obtained $100,000 of stock subscriptions for the contemplated Louisville, Mt. Sterling & Fairfield Electric Railroad.

Erlanger, Ky.—Citizens have organized the Erlanger Electric Railroad Association, with Lew Merilla president, George J. Sheffelt secretary and W. H. Baker treasurer. Funds were subscribed for a survey.

GEORGETOWN, KY.—Subscribers to the stock of the proposed electric railway have appointed T. J. Barkley, W. Z. Thompson, S. C. Long and M. C. H. Williams, a committee to visit Louisville to investigate electric roads.

Maine.

SKOWHEGAN, ME.—The Somerset Traction Company, which was recently incorporated, is to build a branch of the present road five miles in length.

WATERVILLE, ME.—Having purchased 1,000-horse-power of water power at Fairfield, the Waterville & Fairfield Railway & Light Company will enlarge its power house. The additional generators will be driven by three powerful Hercules turbine wheels.

PORTLAND, ME. The Portland Extension Railroad Company has been incorporated to construct an electric railway between Westbrook and Gorham. Capital stock, $50,000; incorporators, William G. Davis and William R. Wood, of Portland; Edward A. Newman, of Deering, and William A. Wheeler, of Brooklyn, N. Y.

Maryland.

FAIRVIEW, MD.—J. M. Hood, president of the Western Maryland Railroad, is said to be back of a project to build an electric road up Mt. Fairview.

BALTIMORE, MD.—The Shore Line Electric Railway which is constructing a double track to Westport, is controlled by the Baltimore Traction Company.

MIDDLETOWN, MD.—Construction of the Frederick & Middletown Railway will be resumed as soon as the weather permits, the directors having purchased the 700 tons of rail required to complete the line.

Massachusetts.

NEWTON, MASS.—The Newton Street Railway will extend 8,000 feet.

BOSTON, MASS.—The West End Street Railway has petitioned for an extension in Newtown.

MIDDLEBORO, MASS.—A company is being formed to build between Middleboro and Lakeville.

CLINTON, MASS.—The Clinton Street Railway Company will extend its electric road to Lancaster Centre.

SOMERSET, MASS.—The "Herringbone Company" will extend through Swansea as early as practicable.

HOLYOKE, MASS.—The Holyoke Street Railway Company has applied for right to issue $150,000 of stock.

HANSON, MASS.—The franchise of the Hanson Electric Railway Company has been granted without opposition.

BRAINTREE, MASS.—The Braintree & Weymouth Electric Railway Company will apply for a franchise to extend to Holbrook.

NEW BEDFORD, MASS.—The Fall River & New Bedford Street Railway Company has petitioned for an extension of time to begin construction.

WEBSTER, MASS.—Chester C. Corbin, Cyrus Spaulding and Lyman R. Eddy, of Webster, and Josiah Perry, Elias P. Morton and Hezekiah Conant, of Dudley, have organized the Webster & Dudley Street Railway Company with $150,000 capital stock.

NEW BEDFORD, MASS.—The New Bedford water board will construct 4½ miles of single track electric railway between the pumping station and Braleys Station on the New York, New Haven & Hartford Railroad. The road is to be standard gage, with rails heavy enough to carry coal cars.

SOUTHBRIDGE, MASS.—The Southbridge & Sturbridge Street Railway Company, which was organized in October, has now been incorporated to build seven miles of electric railway. Capital, $60,000; directors, Thomas J. Robinson, Dedham; George W. Wells, Calvin D. Paige, Charles W. Hill, and F. L. Chapin, Southbridge.

BOSTON, MASS.—The West Roxbury & Roslindale Street Railway Company has been incorporated to construct six miles of track. Clifford Devens is president, and Thomas T. Robinson, of Boston, secretary and treasurer. Directors, Thomas H. Dunham, of Hyde Park, and Charles G. Davis and Joseph Holstrick, of Boston.

CLINTON, MASS.—Harry L. Pierce, of the Pierce Construction Company, representing a syndicate which is practically the Worcester North Street Railway Company, has purchased for $33,000 the 4 miles of electric road, operated by the Clinton Street Electric Railway Company. The purpose is to consolidate both companies later and build an electric line from Leominster to connect with the Clinton road at Lancaster.

BOSTON, MASS.—The Quincy & Boston Street Railway Company has leased the renewed franchise of the Randolph Street Railway, which was organized fourteen months ago. The franchise which was granted early in February to the Braintree Street Railway, has also come under the control of the Quincy & Boston. The latter has increased its capital stock by $300,000 for the new lines, construction of which will begin as soon as spring opens.

Michigan.

CHEBOYGAN, MICH.—D. J. Kennedy has been granted a street railway franchise, with 5, 6 and 10-cent fares.

OWOSSO, MICH.—A 2-mile extension will be built to the Owosso & Corunna Electric Street Railway which has just been placed in operation.

DETROIT, MICH.—George E. Currie, formerly superintendent of construction for the Detroit Railway, is getting right of way for a line to Ann Arbor.

SAGINAW, MICH.—The Beausejour Extension Car Step Company has been incorporated with $25,000 capital by Urgel Beausejour, G. W. Weadock and M. J. Purcell.

CHEBOYGAN, MICH.—George Silsby, who is interested in the Saginaw-Bay City lines, is looking over the Cheboygan Street Railway with a view to electrifying and extending to the inland lakes.

ANN ARBOR, Mich.—The Ann Arbor & Ypsilanti Street Railroad Company has been placed in the hands of William E. Parker as receiver, pending foreclosure proceedings. It is a dummy road.

GRAND RAPIDS, MICH.—The Consolidated Street Railway Company has increased its capital stock from $2,000,000 to $3,000,000, and retired $1,000,000 bonds, for which $1,200,000 in preferred stock will be issued.

DETROIT, MICH.—Harry B. Joy owns the Saline plank road over which the Detroit Railway was some time ago granted a franchise. Both parties want to build an electric road, and negotiations have been pending for either to sell out. When settled the construction will be pushed.

Minnesota.

WINONA, MINN.—The judicial sale of the railway and lighting plants of the Winona General Electric Company, will take place April 13.

ST. PAUL, MINN.—Fire February 22, destroyed an old frame barn containing nearly 100 cars and a quantity of supplies. Loss, $65,000; insurance, $28,250.

MINNEAPOLIS, MINN.—The report that the Minneapolis & St. Louis Railroad would electrically equip the Minnetonka line, is denied by Chief Engineer Crooks.

WINONA, MINN.—Judge Nelson, in the United States Court, has decreed that the bonds and interest aggregating $210,000, owed by the Winona General Electric Company, must be paid, otherwise the property will be sold by S. B. Livermore, master commissioner.

Mississippi.

BILOXI, MISS.—The new Gulf Coast Electric Railway Company has elected Hon. A. M. Dahlgren, president; J. B. Cable and G. W. Bennett, vice-presidents; and J. V. Ross, secretary and treasurer. Headquarters of the company have been removed from Biloxi to Long Beach.

Missouri.

ST. LOUIS, MO.—The Southern Electric Railroad has been given a permit to extend to Jefferson Barracks.

ST. LOUIS, MO.—Eugene Sweeney, promoter of the Central Railway Company, has organized another, the City Central Railway Company, with $50,000 capital stock.

Nebraska.

LINCOLN, NEB.—The first and second mortgage bondholders of the Lincoln Street Railway are negotiating for a reorganization of the company.

NEBRASKA CITY, NEB.—A change to electricity is contemplated by the Nebraska City Street Railway Company, operating seven miles of horse railway.

OMAHA, NEB.—The Omaha Street Railway Company is making changes in its power plants. A large engine is being moved from one station to another.

NIOBRARA, NEB.—An interurban electric railway, to be operated by artesian well power, is projected. The first line to be constructed will be between Niobrara and Verdigre, twelve miles apart.

OMAHA, NEB.—Walter Clark is interested in the proposed electric road to Florence. The right of way for a single track has been leased from the Omaha Street Railway Company, which will supply motive power also. The ordinance of the town of Florence granting the bonus of $13,000 requires that the Florence Company begin construction in May and have the road in full operation by July 17.

New Hampshire.

CHESTER, N. H.—C. S. Campbell, A. H. Wilcomb, G. K. Bartlett, George S. West, F. J. Shepard, Charles Bartlett and E. P. Jones have been elected directors of the projected Chester & Derry Electric Railroad.

CHESTER, N. H.—Officers of the Chester & Derry Electric Railway state that the assignment of W. H. Burgett, the contractor of Dedham, Mass., who was to build their road, will not seriously affect their plans for its early construction.

North Carolina.

ASHEVILLE, N. C.—A company is being formed to build forty-two miles of electric road to Rutherfordton.

New Jersey.

CAMDEN, N. J.—The Camden Horse Railroad Company has petitioned for a single track electric railway franchise.

PLAINFIELD, N. J.—Lemuel W. Serrell, Jr., of Plainfield, has been awarded the contract, it is said, to build the extensions of the Plainfield Street Railway.

HACKENSACK, N. J.—The Northern New Jersey Improvement & Construction Company has been incorporated to build trolley lines in Hackensack and connecting with Englewood, Ft. Lee and Rutherford. Incorporators, David A. Pell, president of the Hackensack Bank; Samuel Taylor, of Hackensack; M. C. Quimby and Alfred Speer, of Passaic, and John B. Lozier, of Oradell.

ASBURY PARK, N. J.—Samuel Thomas, Henry H. Rogers, of the Standard Oil Company; Thomas F. Ryan, of the Metropolitan Traction Company; Charles R. Flint and G. B. M. Harvey, are at the head of a scheme to operate a continuous trolley line from Point Pleasant to New York, taking in all the shore towns. Most of the route is over lines already built, a few remaining links only requiring to be completed.

New York.

ROCHESTER, N. Y.—The Rochester Railway Company has applied for a franchise over certain streets.

RHINEBECK, N. Y.—The bill extending the time limit of the Rhinebeck—Rhinecliff Electric Road has passed.

BROOKLYN, N. Y.—An electric freight road will be laid on the water front by the Brooklyn Wharf & Warehouse Company.

LITTLE FALLS, N. Y.—Rumor has it that the Dolgeville & Little Falls Railroad will be converted from steam to electric.

BROOKLYN, N. Y.—The Brooklyn Heights Railroad is considering a change from cable to electricity on its Montague street line.

SARATOGA, N. Y.—The Union Electric Railway Company has been ordered by the municipal authorities to remove all tracks from the street.

BROOKLYN, N. Y.—P. H. Flynn has completed his arrangements for the lease of the Atlantic Avenue Railroad by the Nassau Electric Railroad.

LONG ISLAND CITY, N. Y.—Car barns, shops, power house and offices are being erected at Woodside by the Steinway Railroad Company.

BROOKLYN, N. Y.—President Austin Corbin, of the Long Island Railroad Company, states that a change to electric power is contemplated.

CLYDE, N. Y.—Delancy Stow, postmaster, is interested in the proposed electric railway from Seneca Falls or Waterloo to Sodus Bay via Clyde.

SYRACUSE, N. Y.—Col. John F. Gaynor, is interested in the proposed electric road to Manlius. The application for a franchise will be renewed.

SYRACUSE, N. Y.—The Syracuse & Oneida Lake Electric Railroad Company has applied for an increase in its capital stock, from $300,000 to $500,000.

WATERPORT, N. Y.—Capt. Lina Beecher has a contract for a single rail line at Crystal Beach. He is removing the effects of the defunct electric road at this place.

YONKERS, N. Y.—The Yonkers Railroad Company is preparing plans for a two story brick power house, repair shop and car barn to cost about $40,000.

NEW YORK.—The Metropolitan Traction Company has obtained the consent of abutters on Sixth and Eighth avenues for a change from horse to conduit electric power.

YONKERS, N. Y.—The Yonkers & Tarrytown Electric Railroad Company, has been incorporated with $750,000 capital, to build thirteen miles of road between the two towns.

BROOKLYN, N. Y.—President Ambrose, of the South Brooklyn Terminal Company, is at the head of a movement to construct an electric railway in Long Island, parallel to Austin Corbin's road.

OSWEGO, N. Y.—A power house will be erected by the Oswego Street Railway Company, on a water power site just purchased. Besides turbines, the station will contain an auxiliary steam plant.

HICKSVILLE, N. Y.—A trolley road is wanted by the Long Island Farmers' Club to carry their produce to Jamaica. Wilbur R. Lewis, W. W. Cocks and T. E. Burtis are a committee to promote construction.

RICHFIELD SPRINGS, N. Y.—The Fort Plain & Richfield Springs Electric Railway may now be built, the Fort Plain interest having reached an agreement with the New York interest represented by J. C. Holden.

BINGHAMTON, N. Y.—The railroad commissioners have approved the application of the Binghamton, Lestershire & Union Street Railway Company, to increase its capital from $100,000 to $250,000, to make improvements.

BALLSTON, N. Y.—Thomas Craig, John H. Burke, Thomas Kelley, F. R. Barnes, John Leggett, Joseph Leggett, Rowland W. Hall and Robert J. Brice, have been elected directors of the Ballston Spa & Rock City Falls Electric Railroad, now under construction.

TROY, N. Y.—The Windsor Brake Company, has been incorporated to manufacture emergency and safety brakes for street railway cars. Capital stock, $10,000; directors, Daniel Gaffney and Morris Levy, of Troy, John T. Gorman, of Cohoes, and John Gibbons of West Troy.

YONKERS, N. Y.—The incorporators of the Yonkers & Tarrytown Electric Railroad are James M. Edwards, John H. Ingram, Frederick B. Hawley and Otto Ross, of New York; John F. Van Name, Edgar C. Moxham, Edgar P. Walker and Charles M. Calhoun, of Bridgeport, Conn.

BROOKLYN, N. Y.—Stockholders of the Brooklyn & Brighton Beach Railroad Company have authorized the lease of a portion of their road to the Kings County Elevated Railroad Company, and construction of the long contemplated connection, which is to cost $300,000 will be pushed.

PEEKSKILL, N. Y.—The Peekskill, State Camp & Mohegan Lake Railway Company has permitted its franchise to lapse, thus forfeiting its $10,000 deposit, and leaving the field open for some new company which will be granted a more liberal franchise, as Peekskill is eager for an electric road.

ILION, N. Y.—The Ilion Street Railway Company has been incorporated to build a mile of road. Capital stock $10,000; directors, Seth G. Heacock, Floyd S. Brooks, D. E. Walker, Lizzie G. Walker, William Heacock, Alfred E. Brooks, Abby Brooks, Floy D. Brooks and Ida M. Heacock.

BATH, N. Y.—The Bath & Lake Keuka Railway was granted a franchise February 3, to build a single track electric road and operate combination passenger and express cars. Wooden poles and seven-inch girder rail will be used. Construction must begin before May 1, and be completed within five months thereafter.

ALBANY, N. Y.—Stockholders of the Albany Railway Company, met March 14, to vote an increase of $500,000 in the capital stock. More cars will be purchased and new lines built. A 1000-horse-power engine and generator will displace the three engines and nine generators in one of the power houses. A car barn will be erected at North Albany.

KINGSTON, N. Y.—The Kingston & Lake Katrine Railway Company has been incorporated to build and operate a street surface railway for passengers and freight in the city of Kingston, Ulster county. The capital stock is $100,000, and the directors are: Richard Lanahan, James F. Dwyer, Dennis A. Kennelly, William J. Turck, Jr., James S. Winnie, Charles W. Crispell, Herbert W. Martin, James W. Lasher and Christopher F. Keefe.

Ohio.

CINCINNATI, O.—The Cincinnati Inclined Plane Railway Company may build to Hartwell.

YOUNGSTOWN, O.—The Youngstown, O., Street Railroad Company, will extend to Steelton.

CINCINNATI, O.—About twenty-five miles of track will be relaid by the Cincinnati Street Railway.

FINDLAY, O.—The Findlay Street Railway, which is being relaid, will be extended to Stuartsville.

MARION, O.—The Marion Street Railway Company's supplementary franchise has been granted.

AKRON, O.—The Akron Street Railway & Illuminating Company will double track its entire system.

DAYTON, O.—The Dayton Traction Company is expected to begin construction over the Springfield Road, so as to retain its franchise.

TOLEDO, O.—Officials of the Toledo & Maumee Valley Electric Railway Company have applied for a franchise through Bowling Green.

DAYTON, O.—The White Line Street Railroad Company has been granted a franchise for extension and improvements that will cost $300,000.

YOUNGSTOWN, O.—The Park & Falls Electric Railroad Company will extend its Youngstown and Lima line to Columbiana, Leetonia, Salem and Alliance.

AKRON, O.—General Manager Thomas F. Walsh confirms the rumor that the Akron & Cuyahoga Falls Rapid Transit Company will extend to Cleveland.

MENTOR, O.—An electric road between Mentor and Burton is projected. The promoters will ask aid of the Cleveland, Painesville & Eastern Electric Railroad Company.

TIFFIN, O.—For the fourth time the Tiffin & Fostoria Electric Road has been offered for sale by the sheriff. As before, there were no bidders, and it will be re-advertised.

SPRINGFIELD, O.—Jacob Olinger, Thomas D. Hoskins and others have been granted a franchise over the national road to Columbus for the Hoskins Gasoline Motor Railroad.

SIDNEY, O.—The county commissioners have declined to take any action at present upon the application of W. D. Davies, for a franchise for the Lima & Piqua Electric Railway Company.

YOUNGSTOWN, O.—A park will be established on the Mahoning Valley Electric Railway at a point between Girard and Niles. The work of erecting the power house at Niles will soon begin.

IRONTON, O.—Captain Cook has accepted the electric franchise and filed a $5,000 bond in behalf of the Ironton & Petersburg Street Railway, recently purchased by R. T. McDonald, of New York.

EAST LIVERPOOL, O.—The Savings & Trust Company, of Cleveland, has instituted proceedings to foreclose the $250,000 mortgage against the East Liverpool & Wellsville Street Railroad Company.

SANDUSKY, O.—Clark Rude and W. W. Graham have sold $270,000 of bonds in New York for the construction of the thirty miles of road of the projected Sandusky, Bellevue & Monroeville Electric Railway.

LIMA, O.—Rumor has it that a project, other than that headed by B. C. Faurot, is on foot to parallel the C. H. & D. Railroad to Cincinnati. The "Davenson Electric Company, of Hamilton" is said to be back of the scheme.

CHARDON, O.—The Lake & Geauga Transit Company has been incorporated with $10,000 capital stock to build an electric road to Mentor. Incorporators, S. S. Smith, H. H. Hollenback, William G. King, C. W. Orlene and H. M. Wells.

SIDNEY, O.—A company has been organized with H. T. Mathers, president; I. H. Thedieck, vice-president; Frank Hunter, secretary; and Charles Timeus, treasurer; to build an electric railway from Sidney through Shelby and Auglaize counties to St. Mary's, connecting Oren, Wynant, Loremies and New Bremen.

CLEVELAND, O.—S. T. Everett, E. H. Hammond, of Orlando, Fla., and T. J. Appleyard, of Sanford, Fla., met at Cleveland, February 14, to organize, it is said, a company to build street railways in Havana, Cuba. Messrs. Hammond and Appleyard are respectively vice-president and general manager of the Jacksonville & Tampa Bay Improved Railway Company, a project that has been incubating since April, 1895.

Oregon.

PORTLAND, ORE.—The Portland Railway Company, which was recently incorporated to acquire the consolidated lines, has elected O. F. Paxton, president; J. Y. Beach, vice-president; J. F. Batchelder, secretary and treasurer, and J. E. Thielsen, superintendent.

Pennsylvania.

FRENCHTOWN, PA.—Surveyors are mapping a proposed trolley line to Pittstown.

ERIE, PA.—E. D. Carter is interested in the street railway franchise which is in a fair way to be granted.

PITTSBURG, PA.—The Braddock Electric Street Railway Company has applied for a franchise in Rankin.

ASHLAND, PA.—The Ashland, Centralia & Locust Gap Electric Railway Company has been incorporated to build seven miles of road,

MEADVILLE, PA.—The Meadville Street Railway has notified the city council that the cash bond will be paid over as soon as the mayor signs the franchise.

ST. DAVIDS, PA.—Louis D. Erber, of this place, is president of the Philadelphia Rural Railway Company, incorporated with $100,000 capital, to build to Philadelphia.

PHILADELPHIA, PA.—The Union Traction Company will build an 80 by 100-foot power house at Willow Grove, to be equipped with four generators of 300-horse-power each.

NORRISTOWN, PA.—R. M. Douglass, general manager, writes that the Schuylkill Valley Traction Company contemplates an extension of about fifteen miles the coming season.

PITTSBURG, PA.—The management of the Castle Shannon Railroad has asked stockholders for $50,000 wherewith to change its six miles of steam road to electric for freight and passenger traffic.

ASHLAND, PA.—A. L. Laubenstein is president, James A. McCarthy treasurer, and Thomas Pepper, secretary, of the newly incorporated Ashland, Centralia & Locust Gap Electric Railway Company.

POTTSTOWN, PA.—A. G. Ash, treasurer and general manager, has opened an office here to take subscriptions to the capital stock of the proposed Pottstown-Westchester line, twenty-two miles in length.

PITTSBURG, PA. The Penn Avenue Cable line is being dismantled for a change to electricity. The present arrangements for power will be only temporary, as it is the plan of the consolidated companies to build one great central power house on the river bank.

POTTSVILLE, PA.—The Schuylkill Valley Electric Company has been incorporated ostensibly to build an electric railway in the Schuylkill Valley. Capital stock, $5,000; incorporators, D. B. Shepp of Reading; J. Hyde Clark and G. Henry Muum, of Philadelphia.

POTTSVILLE, PA.—Thomas H. Connell, has attached the assets of the Philadelphia Construction Company on a claim for $6,000 for work done and material furnished in the construction of extensions and branches of the Schuylkill Electric and Pottsville & Reading Railroad Companies.

PITTSBURG, PA.—The Valley Electric Street Railway Company has been incorporated to build. Capital, $16,500; incorporators, Charles P. Rankin, of Forward township, George D. Jenkins, John J. Rankin, Robert H. Robinson, of Monongahela, and George H. Rankin, of Pittsburg.

CARBONDALE, PA.—Jno. W. Aitkin, general manager of the Lackawanna Valley Rapid Transit Company, writes that he wants second-hand, in good order, at low price, one vertical press, about 30-inch swing, with flour face plate; one lathe, 20 to 30-inch, 7 to 8-foot, bed complete, chuck complete, and one jig saw, 14 to 20-inch stroke.

PHILADELPHIA, PA.—The Hillcrest Avenue Passenger Railway Company has been incorporated to extend the Germantown line of the Union Traction Company one and one-half miles through some property owned by President Welsh. Capital stock, $10,000; incorporators: John Lowber Welsh, William H. Shelmerdine, E. J. Matthews, Caleb F. Fox and R. N. Carson, all of Philadelphia.

CHESTER, PA.—The Chester & Marple Electric Railway Company has been incorporated to construct twelve miles of road connecting South Chester, Eddystone, Leiperville, Milmont, Swarthmore and Marple. Capital stock, $72,000; incorporators, W. I. Schaffner, district attorney; Josiah Smith, lawyer; Thomas H. Berry, alderman; W. C. Sproul, editor of the Times, and others. Warner H. Jenkins is president.

TOWANDA, PA.—The Bradford County Railway Company has been organized to construct a trolley road. Local capitalists will subscribe $100,000 of stock, and $500,000 of bonds will be issued. C. A. Innes, of Canton, is president; John M. Rahm, of Towanda, vice-president; and F. A. Sawyer, secretary and treasurer. Others directors are John A. Innes, of Canton; Gen. J. A. Hill, of Powell; Robert B. Drake, of Monroeton; George M. Gilbert, of Franklindale, and Benjamin T. Hale, of Towanda.

Rhode Island.

WOONSOCKET, R. I.—The Woonsocket Street Railway Company will extend a half mile.

Tennessee.

KNOXVILLE, TENN.—A power house will be erected by the West End Street Railway Company.

CHATTANOOGA, TENN. Capt. C. A. Lyerly, representing the second mortgage bondholders, bought in the Chattanooga Electric Railway, February 24, for $28,000, assuming the $550,000 first mortgage. A new company will be formed with $350,000 stock and an equal sum of bonds.

CLARKSVILLE, TENN.—The Clarksville Street Railway will relay seven miles of road and adopt electricity. Two 100-kilowatt generators, and two engines and two boilers of 150-horse-power will be purchased. W. R. Vaughan, late of Bowling Green, is the leading spirit in the enterprise.

CLARKSVILLE, TENN.—The Clarksville Electric Railway Company, which is soon to go into operation, has elected Capt. John F. Sheldon, of Clarksville, president; W. R. Vaughn, of Clarksville, vice-president; W. P. Davis, of Louisville, general manager; R. M. Kelley, of Louisville, secretary, and Capt. C. H. Clark, of Clarksville, treasurer.

Texas.

MASON, TEX.—Dr. D. J. Grandstaff contemplates building an electric road to Llano, thirty-six miles distant.

DALLAS, TEX.—Bondholders represented by George W. Davenport, of Boston, bought the Queen City Railway February 5, for $100,000 at receivers sale.

TEMPLE, TEX. A street railway franchise has been applied for by J. T. Gillett, D. S. Galligher, W. R. Branch, T. L. Hollingsworth and Otto K. Burwitz, all of Temple.

BONHAM, TEX.—The Bonham Electric Railway, Light & Power Company, has been incorporated with $25,000 capital by H. C. Alexander, William Lanius, R. B. Semple, Edward D. Steger, C. L. Bradford, J. W. Puder, T. E. Kennedy, R. J. Abernathy, F. M. Thompson, J. F. Arledge, J. B. Russell, J. W. Ramey, D. C. Russell, E. F. White and J. M. Russell.

SAN ANTONIO, TEX.—W. H. Weiss, president, writes that the San Antonio Street Railway Company is in the market for an Edison No. 32, 500-volt railway generator, a multipolar 80 Thomson-Houston generator; both with station equipment complete, second-hand, but in serviceable condition. Also one Armington & Sims engine, 10½ by 16½ by 12, to develop 100-horse-power when running 300 revolutions condensing; compound; with double disc crank and fly-wheels 58 by 14½ inches to serve as driving pulleys.

Vermont.

BARRE, VT.—The Barre Electric Railroad Company has accepted its franchise and will begin construction at an early date.

Virginia.

NORFOLK, VA. A receiver was appointed February 22, for the Norfolk & Ocean View Railroad.

RICHMOND, VA.—The Richmond Railway & Electric Company may electrify its Broad street mule line.

PETERSBURG, VA.—The Asylum Street Railway will be resold, Nelson T. Patteson having made an upset bid of $10,000.

BASIC CITY, VA.—The bill to incorporate the Basic City, Bridgewater & Piedmont Electric Railway Company has been vetoed.

PORTSMOUTH, VA. A mortgage to secure $500,000 of construction bonds has been given the Union Trust Company of Philadelphia by the Portsmouth Street Railway Company. G. G. W. Brubaker has the contract to lay the track.

PETERSBURG, VA. At auction, Feb. 12, the Petersburg Street Railway was sold to E. C. White of New York, Lloyd Nash of Westport, Conn., and others, for $60,000. At the same time the Asylum Street Railway was sold for $5,600 to W. M. Habliston and J. M. Williams & Sons, of Petersburg.

Washington.

SEATTLE, WASH.—A four mile extention to Renton has been petitioned for by the Seattle & Ranier Beach Railway Company.

SEATTLE, WASH. Dexter, Horton & Co., bankers, have filed a supplementary bill for foreclosure against the Front Street Cable Road.

SEATTLE, WASH.—The Seattle Consolidated Street Railway Company has leased for three years, the Green Lake Electric Road, owned by Mrs. Guy C. Phinney.

West Virginia.

MORGANTOWN, W. VA.—Local capitalists and wealthy farmers along the route, are forming a company to build thirty miles of electric road from Morgantown to Wadestown.

Wisconsin.

WAUSAU, WIS.—The franchise of the Wausau Electric Railway Company has been declared forfeited.

OSHKOSH, WIS.—Those interested in the electric road to Berlin via Omro and Eureka are Leander Choate, Thomas Wall, William Dichmann, Arthur Kellogg and John Martin.

LA CROSSE, WIS.—The LaCrosse, Black River Falls & Neillsville Electric Railway Company, incorporated May last, is showing signs of life, having placed a right of way agent on the ground.

ASHLAND, WIS.—The Ashland Lighting & Street Railway Company's property has been sold under foreclosure for $175,000 to Charles Quarles, of Milwaukee; R. C. Heydlauff, and A. E. Kanneberg, of Ashland, who have formed a new company.

MILWAUKEE, WIS.—The Milwaukee & Wauwautosa Motor Road will pass into the hands of a syndicate of New York and Detroit men, headed by John R. McDonald, of Detroit, who will complete the long-contemplated electric conversion and extension.

GREEN BAY, WIS.—Having agreed on a consolation with the Ft. Howard Electric Railway, the Fox River Electric Railway Company will extend three and a half miles to De Pere and double the capacity of its power house by adding a boiler, engine and generator of 400-horse-power.

MADISON, WIS.—Major F. W. Oakley has been appointed receiver of the Madison Street Railway on the suit of the New York Guaranty & Indemnity Company. This is the second receivership. The first, which was discharged only recently, was brought about by the electric light company which furnishes the motive power.

Canada

LANARK, ONT. A bonus of $10,000 has been granted the long talked of Perth and Lanark electric railway.

BELLEVILLE, ONT.—The Belleville Traction Company has received permission to construct one and one-half miles of electric road.

TORONTO, ONT.—The Toronto & Suburban Electric Railway is completing plans for a three-mile extension to Lambton and Islington.

HAMILTON, ONT. The Hamilton, Grimsby & Beamsville Electric Railway has been granted a franchise and will at once begin construction of the extention from Grimsby to Beamsville.

SUDBURY, ONT.—The Manitoulin & Pacific Railway Company has applied for a charter to build an electric road from Manitoulin Island to connect with the Canadian Pacific. The plan includes a ferry or bridge.

ST. CATHARINES, ONT.—The Port Dalhousie, St. Catharines & Thorold Street Railway Company has decided to build eight miles of overhead construction and two miles of track as soon as the weather permits.

TORONTO, ONT.—The Canadian Electric Railway & Power Company, in its application for a charter, has encountered the strong opposition of the Canadian Pacific and Grand Trunk Railways, with which it would compete for inter-provincial traffic. The project is to build a railway from Montreal to Windsor through Brockville, Kingston, Belleville, Cobourg, Toronto, Hamilton and London, and branches from Toronto to Suspension Bridge, Brighton to Campbellford, Port Hope to Peterboro', Pickering to Uxbridge, and London to Port Stanley. The incorporators are Castle Smith, London, Eng.; J. K. Osborne, T. M. Jones, C. W. Beardmore, W. H. Cawmra and Edmund Bristol, of Toronto, and E. F. Fauquier, of Ottawa.

NOT SO BAD AFTER ALL.

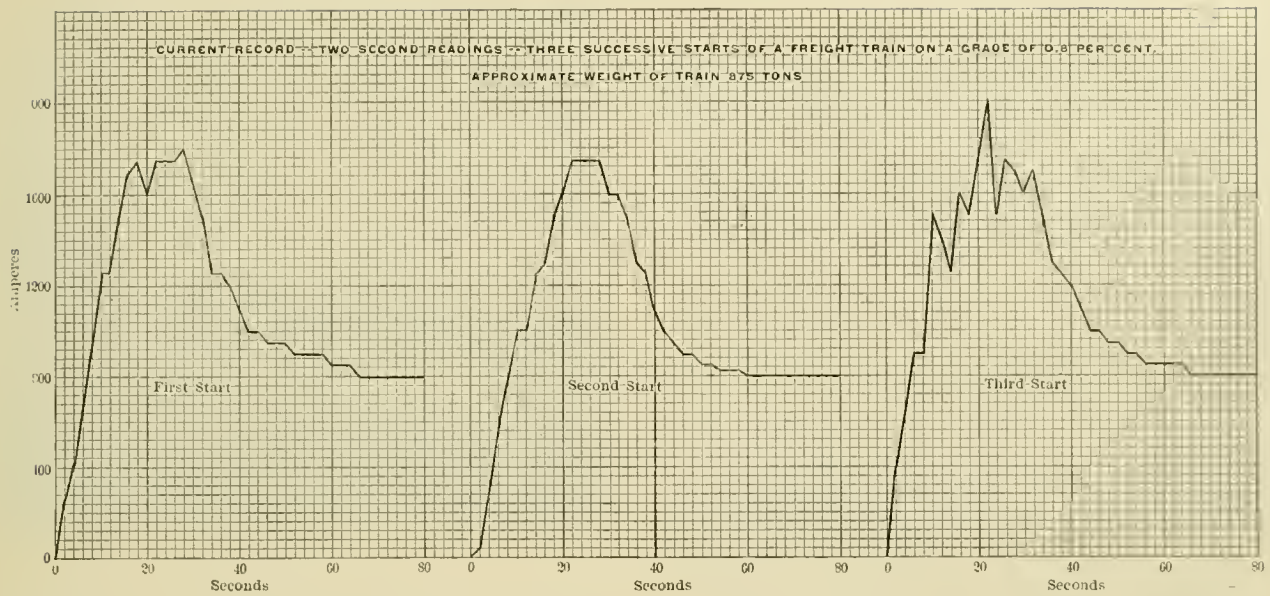
The Chicago Tribune has invented an improvement in

methods of fare collecting on crowded cars, which is fully explained in the illustration.

HOLD UP AT BUTTE.

The Meadville rapid transit car of the Consolidated Electric Company, of Butte, Mont., was held up by a highwayman, at 12:30 o'clock, on the morning of February 17. The motorman was shot and injured, and $32 of the company's money forcibly taken from the conductor. The hold-up took place at a lonely portion of the road, and the robber escaped. The frightened employes were able to give but a meagre description of the thief.

Even the daily press will occasionally see the eternal fitness of things, as this extract from the Brooklyn Eagle shows: "A man was struck in the knee by a New York street car, and his knee became tubercular in consequence. The tubercles worked up through him into his lungs and killed him, and the company that runs the car must pay $6,500 to his widow. If street cars keep on doing these wonderful things, they must be forced to stop running. That will encourage people to walk. Walking is healthy for other people."

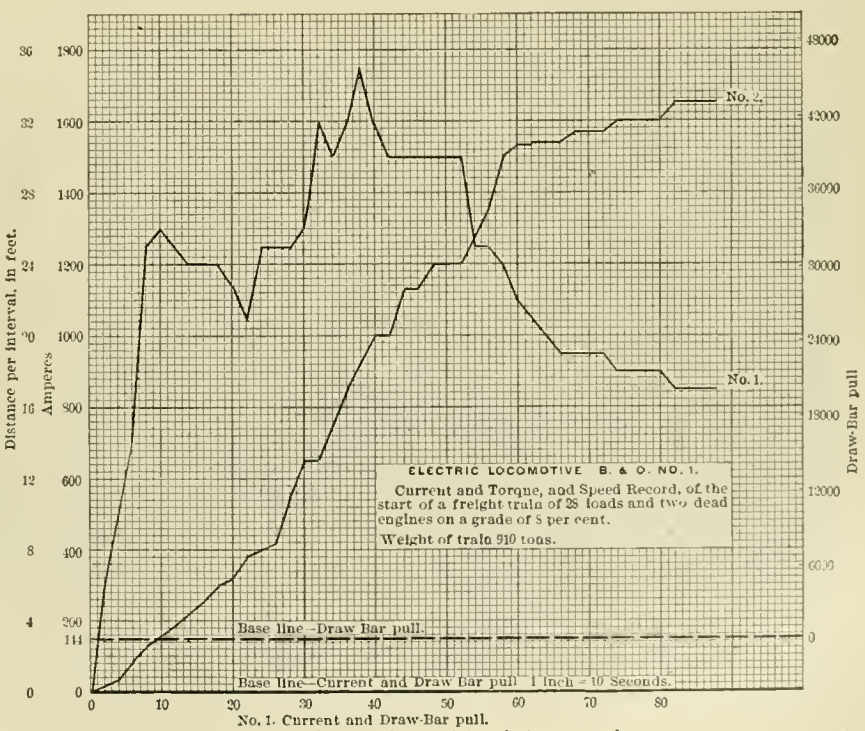


ELECTRIC LOCOMOTIVE PERFORMANCE AT BALTIMORE.

We have published from time to time reports of certain performances of the electric locomotives in the Baltimore & Ohio Railroad tunnel at Baltimore, Md. L. H. Parker who has had charge of the work since the beginning gives some interesting data regarding the methods used for determining the actual work done by the locomotives. One of the heaviest loads ever pulled was that when two trains and three steam locomotives (weight in all 1,900 tons) were coupled together and started on an eight-tenths per cent grade. The current taken in starting was 2,200 amperes and after the train was up to speed this fell to 1,800 amperes. All four motors were in series. From determinations previously made as to draw bar pull per ampere the pull was estimated at 63,000 pounds in this test. The draw bar pull per ampere was determined with the use of the Pennsylvania Railroad Company's dynamometer car. This car was coupled in between the electric locomotive and a train. This train was then hauled through the tunnel with motors in series and records of current and horizontal effort taken at short intervals. Six cars were then taken off the train and the same test repeated. Dividing the difference in draw bar pull recorded in the two tests by the difference in current recorded gave the draw bar pull in pounds per ampere with the motors in series. This was found to be 28.6 pounds per ampere. This of course takes no account of the current used to drive the locomotive. To determine how much this was, the draw bar pull in pounds recorded in the first test was divided by the pounds per ampere (28.6) and this gave the current which was required for train haulage. Subtracting this from the total actual current required gave the current used in moving the locomotive itself. This was found to be 144 amperes, which figure was verified by another test.

The records taken with the dynamometer car showed, as would be expected, that the pull of an electric locomotive was much steadier than a steam locomotive. The horizontal effort required to move a freight train on a level was found to be six pounds per ton. This is in accordance with previous figures. During cold weather when the axle grease is stiff this increases.

The accompanying diagrams are self explanatory.



No. 1. Current and Draw-Bar pull.
No. 2. Acceleration—feet per interval of two seconds.

DAVENPORT-ROCK ISLAND BRIDGE GOES.

At 12:30 p. m., February 25, the draw span of the government bridge between Davenport, Iowa, and Rock Island, Ill., was carried away by the ice. In addition to being a great hindrance to steam road traffic, the misfortune resulted in shutting down all the street railway lines in Davenport. The power house of the Tri-City Railway is on the Rock Island shore, and the carrying away of the span caused the breaking of the Davenport feeder lines which are carried over the bridge. The draw span was undergoing reconstruction and repairs at the time it fell, which fact accounts for it going so easily. The feed wires previous to the accident and during the repairs were supported on the tall pole shown in the engravings, instead of on the draw span. When the bridge fell a tall traveler, eighty feet high, which was standing over the last span fell up stream carrying down with it all the feed wires. The Davenport system was tied up forty-eight hours, until new feed wires were strung. We are indebted to J. F. Lardner, secretary, for the photographs.

DEATH OF L. D. McNUTT.

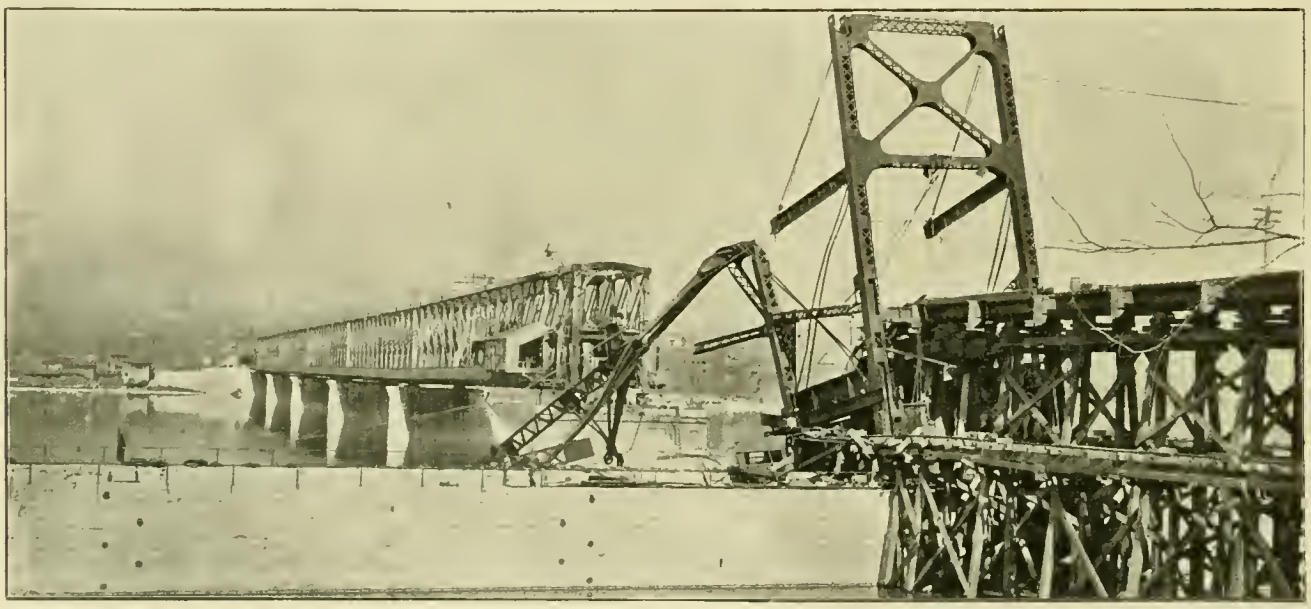
The news of the death of Lorenzo D. McNutt, superintendent of the Consolidated Street Railway Company of Fort Wayne, Ind., will be sad intelligence to his many friends and admirers in the street railway business throughout the country. Mr. McNutt died February 10, after undergoing an operation for obstruction of the bowels. He began his railway career as a driver, his merits and integrity carrying him up the ladder of success round by round. He held at different times important positions on the leading railway lines in many of the large cities. He was 47 years of age.

WRECK OF BRIDGE FROM DAVENPORT SIDE.

DISHONEST LAWS.

Louis V. Laws, a discharged conductor of the Denver Consolidated Tramway Company, was arrested one day in February charged with grand larceny. On December 20, the tramway barn was broken into and 4,000 transfer checks stolen. Since that date evidence was obtained to prove that Laws and some confederates have been riding on transfers, giving them away to friends, and selling them to conductors, who have been turning them in, in place of cash fares.

There is talk of changing some or all of the lines of the Denver city cable, to electricity. This will be determined later. If the volume of business increases the cable will be the cheaper power; if not, and extensions become necessary, electricity will be used.



WRECKED BRIDGE FROM ROCK ISLAND SIDE.

PERSONALS.

Carl P. Young is now electrical engineer and purchasing agent of the Galveston City Railway.

Robert E. Dunston, superintendent of the Cortland & Homer Traction Company, Cortland, N. Y., has resigned.

L. M. Erb, general manager of the Leavenworth lines, spent several days in Chicago, and visited the REVIEW office.

A. J. Nelles, superintendent of the Hamilton, Grimsby & Beamsville Electric Railway, Hamilton, Ont., has resigned.

It is reported that P. H. Flynn, is about to retire from the presidency of the Nassau Electric Railroad of Brooklyn.

C. E. Flynn, superintendent of motive power of the Central Railway, Peoria, and one of the most practical men in the business, was a REVIEW caller.

J. W. Himes, was elected president of the Cohoes City Railway Company, Cohoes, N. Y., succeeding Urban Weldon to the office of chief executive of the road.

John R. Graham, president of the Quincy and Boston Street Railway Company, was united in marriage February 10, to Mrs. Georgie H. Poole of Quincy, Mass.

Andrew Radel, president of the Bridgeport (Conn.) Traction Company, was presented with a miniature trolley car made of flowers, on the occasion of his thirty-ninth birthday recently.

M. G. Starrett, chief engineer of the steam and electrical departments of the Brooklyn Heights Railroad Company, has resigned to go with the Metropolitan Traction Company of New York, where he will be assistant engineer.

T. W. Meachem, president of the New Process Rawhide Company, Syracuse, N. Y., was a REVIEW caller when in Chicago. He reports a large and steadily growing demand for rawhide gears, which are in use on a large number of roads.

President J. B. Coffinberry, of the Loraine Street Railway Company, has resigned to devote his entire time to the Rawsom Electric Company, manufacturer of telephones at Elyria, O., in which he is heavily interested, the growth of which now demands his sole attention.

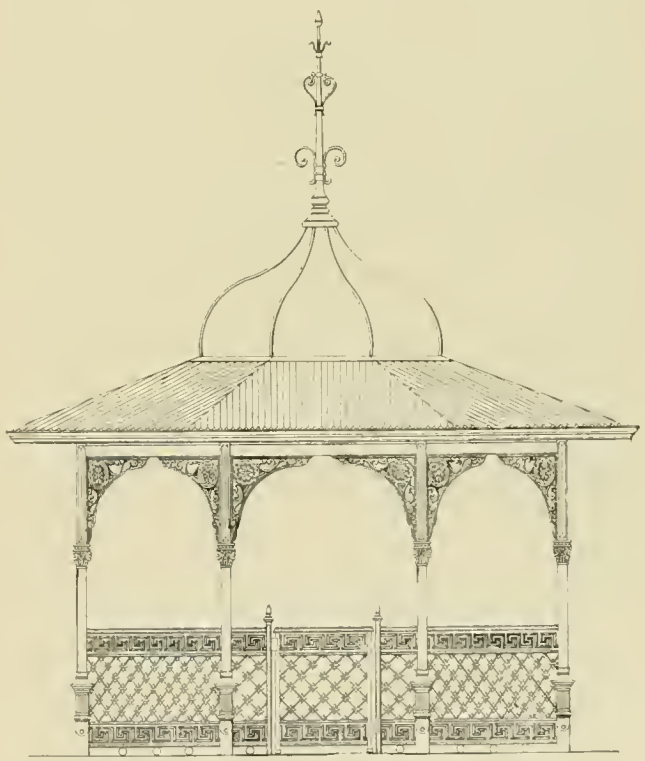
J. J. Walklate, who has been connected with Alfred Dickinson, the well known railway engineer of Birmingham, Eng.; called on the REVIEW and spent several days inspecting the power plants of this city. Mr. Walklate is en route to Australia, where he will install an electric road at Brisbane.

The Transportation Club, the leading railway club of New York, recently elected to membership General Manager C. D. Wyman, of the Milwaukee Street Railway Company. Of this organization Chauncy M Depew is president, and Cornelius Vanderbilt, T. L. James, H. Walter Webb and other prominent transportation magnates are active members.

James B. Hanna, one of the best known street railway men in the country, and whose friends are numbered by the hundreds in the fraternity, was married on February 26, to Miss Harriett Lucile Beggs, of Cleveland. A wedding reception which was one of the brilliant social events of the season, was given at the residence of the bride's sister. Mr. and Mrs. Hanna will be at home after May first, at the Lennox, Cleveland. Congratulations could not be more hearty or deserved than are extended by the REVIEW and their many friends.

PLEASURE RESORT PAVILION.

Our illustration which shows an ornamental pavilion recently erected as a band stand in Calcutta is suggested to managers who are improving their pleasure resorts,



as a good type of construction to follow in their parks. In the illustration the roof is of corrugated iron, but for park purposes, would probably be made of shingles.

A dozen or more conductors were discharged from the employ of the Milwaukee Street Railway during February for swapping transfer checks and turning them in as cash fares. The detectives of the company were at work but a short time when the "leak" was discovered.

IS YOUR TROLLEY OFF ITS BASE?

As we go to press the following is received from the General Electric Company in regard to the under running trolley suit. We print the article herewith:

An interesting and important decision has just been rendered by Judge Townsend, of the United States Circuit Court, for the district of Connecticut, upon the Van Depoele patent No. 495,443, for the under-running electric railway trolley system.

A few months ago Judge Townsend rendered a decision sustaining the validity of this patent upon final hearing in a suit against the Winchester Avenue Railroad Company. Shortly thereafter further infringement suits were brought in Connecticut against the Billings and Spencer Company of Hartford, and the Kelsey Electric Railway Specialty Company of New Haven. Judge Townsend has just decided these suits in favor of the Van Depoele patent, and granted motions for preliminary injunctions after full argument on both sides.

The decision is especially important because the court holds that the supply of essential or characteristic parts of the trolley system is a contributory infringement, and will be enjoined by the courts, even though the defendant may not supply or use the patented combination or system in its entirety. The court further held that an unlicensed maker of trolley bases could not be permitted to supply such bases even to railroads which had been originally fully equipped by the General Electric Company.

From the court's opinion, it appears that the defendants in this instance made and sold trolley stands or bases, they urged that such bases were not covered in detail by the patent as a separate article of manufacture, and further contended that they at least might be lawfully sold to or used by purchasers to repair or replace parts of original equipments furnished by the Thomson-Houston and General Electric Companies under the authority of the Van Depoele patent. But the court held that neither of these things could be lawfully done. First, because the supply of parts of the patentee's system is in reality intentionally aiding other parties in the unlawful making, selling or using of the patented system as a whole. Second, because the replacement of a lawful by an unlawful trolley base or stand is not a legitimate *repair* but a *reconstruction* of the combination patented.

In other words, infringement and injunction cannot be avoided by making up a complete system of parts gathered together from various sources, but on the contrary, all parties who contribute towards the infringement of the entire combination by supplying necessary and durable parts thereof are themselves infringers, and subject to injunction.

A large number of prior decisions were referred to by the court, where rulings of a similar nature have been made, which establish the general doctrine that any supply of parts amounting to the intentional promotion of the act of infringement by others will be restrained by injunction, and that the full scope of the Van Depoele patent cannot be avoided in this way, even if the parts so supplied or used are not claimed by themselves alone as specific and separate features of the patented invention.

In order that the scope and subject matter of the Van Depoele patent claims may be fully understood, we append a copy thereof as follows:

"6. In an electric railway, the combination with a suitable track and a supply conductor suspended above the track, of a car provided with a swinging arm carrying a contact device in its outer extremity and means for imparting upward pressure to the outer portion of the arm and contact, to hold the latter in continuous working relation with the under side of the supply conductor, substantially as described.

"7. In an electric railway, the combination of a car, a conductor suspended above the line of travel of the car, a swinging arm supported on top of the car, a contact device carried by one extremity of the arm and held thereby in contact with the under side of the electric conductor, and a tension device at or near the other end of the swinging arm for maintaining said upward contact substantially as described.

"8. In an electric railway, the combination of a car, a conductor suspended above the line of travel of the car, an arm pivotally supported on top of the car and provided at its outer end with a contact engaging the under side of the suspended conductor, and a tension spring at or near the inner end of the arm for maintaining said upward pressure contact, substantially as described."

"12. In an electric railway, the combination with a car, of a post extending upward therefrom and carrying a suitable bearing, an arm or lever carrying at its outer end a suitable contact-roller and pivotally supported in said bearing, and provided at its inner end with a tension spring for pressing the outer end of the lever carrying the contact wheel upward against a suitable suspended conductor, substantially as described."

"16. In an electric railway, the combination of a car, a conductor suspended above the line of travel of the car, an arm pivotally supported on top of the car, and provided at its outer end with a grooved contact wheel engaging the under side of the suspended conductor, and a tension spring for maintaining an upward pressure contact with the conductor, substantially as described."

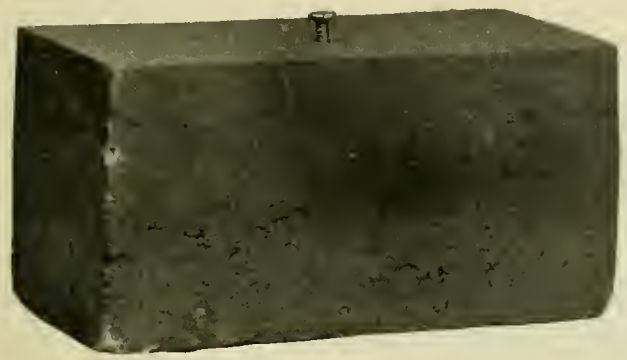
VULCANIZED PAPER.

A new material made from wood straw, or waste paper and rags, reduced to pulp by the same processes as for making paper, has been patented by William P. Emery, of Topeka, Kan. The material, of which we have a sample, is very compact and strong, while being about the weight of oak wood, takes a spike or nail and can be sawn like wood. It is designed for railroad ties, street and sidewalk paving and underground conduits for electric cables and wires. The process of producing this material is the reduction of the pulp to the consistency suitable to go on the rolls for paper making. At that point sulphate of zinc is introduced as a preservative of the fiber from decay, which impregnates every particle of the fiber. Chemicals are then introduced of a binding nature which are absolutely insoluble in water, which renders the material water proof and decay proof, as it holds the sulphate of zinc as a solid in the product. Mr. Emery writes us as follows:

"It is also frost proof, or not affected by freezing or thawing, or any change in the atmosphere from heat to extreme cold, being of the same degree of hardness under anything less than 250 degrees of heat. Being thus prepared, it is pressed into the desired form by hydraulic pressure from 2,000 to 10,000 pounds to the square inch. It is then subjected to heat of proper

degree and vulcanized, the heat producing a chemical action that forms a new combination, and results in a new, strong, cheap and indestructible material so far as climatic changes, moisture, or the attacks of insects are concerned.

It is not fire proof, but burns very slowly, being much harder to ignite than wood. For paving streets and walks, it is superior in the following respects to any pavement now in use. It is elastic, noiseless, smooth, decay proof, and being tough the particles are not forced off from abrasion, but compacted under the blows of hoofs and wheels. Being weather proof it can only be destroyed by wear. The railroad tie made from this



VULCANIZED PAPER PAVING BLOCK.

material will weigh about the same as seasoned oak standard dimensions; is practically a wood tie that cannot rot, will hold a spike as well, or better, than oak, will not cut under the rail, and will cost about the same as first class oak ties, and being decay proof from surface to center, will last as long as two oak ties to say the least. For city railroads where the ties have to be laid under pavements it would be especially desirable. The material being composed largely of material that goes to waste by millions of tons annually can be made cheaply enough to compete with any pavement that has any value, and with cheap wood ties, while it affords the best and cheapest material for underground wire work. It has been tested by the government engineer in charge of the jetty system at Galveston, Texas, and after six months test in the water was found to be Torredo proof."

NEW CATALOGS.

An interesting publication has been sent us from the Standard Boiler Company, of Chicago. It shows the parts and process of erection of the 4,000-horse-power boiler for the North Chicago Street Railroad Company.

The Wheeler Condenser and Engineering Company, No. 39, 41 Cortlandt street, New York, has just issued a very complete set of new catalogs of the specialties manufactured by it, which are as follows: "Wheeler-Standard," "Wheeler-Admiralty," "Wheeler-Lightall" surface condensers, "The Volz" patent combined feed water heater and surface condenser, "Wheeler's" light-weight jet condenser, "Wheeler's" improved evaporator and distiller, "Edmeston's" patent feed water filter, "Wheeler's" patent feed water heaters, and an improved separator. The company will gladly furnish information on any or all of these machines on application.

The paper on the Arnold Electric Power Station System, read before the Northwestern Electrical Association, at Milwaukee, by E. R. Cunningham, superintendent of the Fort Dodge Light and Power Company, has been published in pamphlet form by the Arnold Electric Power Station Company, 1540 Marquette Building, Chicago. The paper is fully illustrated by half-tone and diagram cuts.

The National Pipe Bending Company, New Haven, Conn., manufacturer of the national feed water heater, has compiled three booklets, a catalog, a list of customers, and a price current. It will manufacture for 1896, feed water heaters of twenty-five different dimensions, ranging from thirty to 6,500 pounds, with heaters especially adapted for use in hotels, hospitals, breweries, laundries, dry houses, etc.

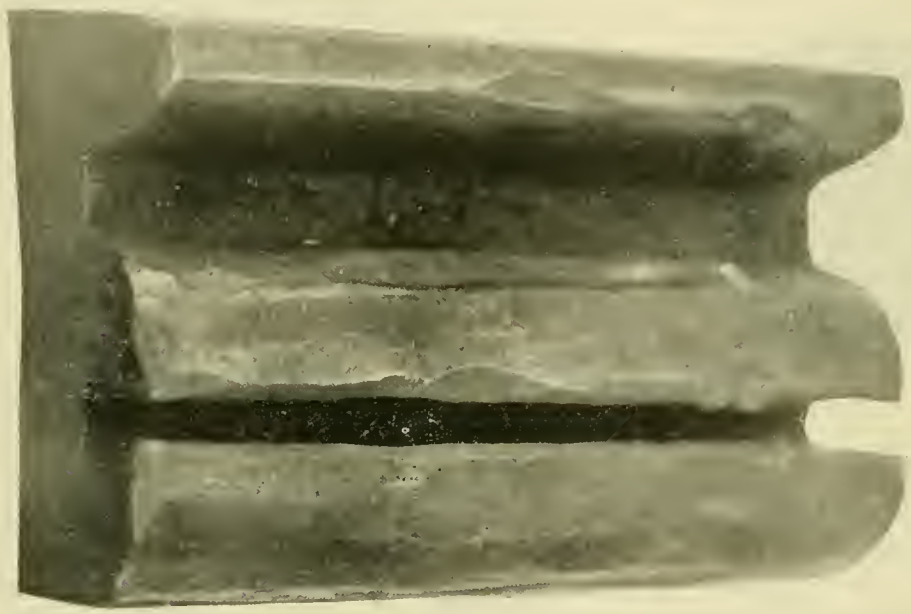
Hendrick's Architects' and Builders' Guide and Contractors' Directory of America is out for 1896, and is better than ever. It contains nearly 1,000 pages, set in three columns to a page, and catalogs over 200,000 names of persons engaged in all the construction industries. The classification is alphabetical under each state for each class or trade and involves an enormous amount of labor. It is the most complete work of its kind. Price, $5.00. Sam'l E. Hendricks Co., 61 Beekman street, New York City.

Besides an illustrated descriptive catalog of any instrument for recording pressure, temperature and electricity the Bristol Company of Waterbury, Conn., has issued a partial list of the different variety of instruments manufactured by it. The number is something over a hundred. This list is a handy reference for engineers, and they should not be without it. At the head of it two cuts, recording pressure gauge and volt meter, are shown, sufficiently large to illustrate their workings to those not familiar with the instruments.

That first-class illustrations go a long way in telling their own story was demonstrated by the great demand there was for the souvenir issued by the General Electric Company, of Schenectady, N. Y., for the Cotton States Exposition. Almost daily the company receives requests for this little pamphlet which consists of a series of half-tone cuts setting forth the company's achievements during the past few years. It is well worth possessing by anyone interested in electrical machinery and construction. The company made an exhibit of the Thomson recording watt-meter at the exposition, and its special catalog of that apparatus will be found of value to the craft.

NUTTALL MALLEABLE.

Our illustration represents a section of a gear made from the now famous Nuttall malleable stock. This section shows the teeth hammered over close to each other, showing the toughness of the material. Cutting into ordinary malleable iron destroys that upon which its toughness depends, namely, the outside skin; but in this case the process permeates the entire mass, the result being a material that stands all the practical tests given to steel. A railroad manager reports having a broken axle upon which one of these Nuttall special gears was



in service. The result was very badly bent teeth. As the gear was comparatively new, the manager reports that he decided to experiment on his own account, and with the aid of his blacksmith hammered the teeth back into position and again put the gear in service. A recent breaking test developed that it required a pressure of about forty tons to break out a tooth in one of these gears. As a result of these various good qualities, the records of service, and the fact that the price is much lower than steel, railroads in all parts of the country are fast adopting this as their standard gear.

TRIAL OF WAVE MOTOR AT CAPITOLA.

Since the article on the wave motor experiments at Capitola, Cal., which appears elsewhere in this issue, was written another trial has taken place which resulted successfully, as far as imparting a continuous motion to the fly wheel was concerned. No tests were made as to the power developed. As soon as the paddles touched the water, which was unusually smooth, the big wheel began to revolve, and for three hours ran at a speed of twenty revolutions a minute. It was found that as the tide rose, and the paddles were submerged deeper, their efficiency became less.

PORTABLE HOSE BRIDGE.

The portable hose bridge manufactured by the Portable Hose Bridge Company, of Detroit, Mich., is the only device of the kind that has given perfect satisfaction under the severest tests that could be applied by the different street railway companies who now have them in use, and it has so fully demonstrated its usefulness and convenience that it has now become a necessity to all street railway companies, as it fills a long-felt want to perfection.

The bridge is sixteen feet in length, weighing about 400 pounds, and is made in six sections, so that it can be easily handled by one man, who can place it on the track ready for use in less than three minutes.

It is made to fit any kind of rail or gauge, and two or more of the largest fire hose made can be used through the bridge. The electrical contact is properly maintained, and the rise of a car in going over it is so gradual as to be hardly perceptible.

The company has recently made shipments to the Troy City Railway, Troy, N. Y.; St. Charles Street Railroad, New Orleans, La.; Montreal Street Railway, Montreal, Que.; Los Angeles Railway, Los Angeles, Cal.; Atlanta Consolidated Street Railway, Atlanta, Ga.; and also Brooklyn Heights Railroad, Brooklyn, N. Y.; Newark & South Orange Railway, Newark, N. J.; Detroit Railway, Detroit, Mich.; Southern Electric Railroad Company, St. Louis, Mo.; Albany Street Railway, Albany, N. Y.; Chicago Electric Transit Company, Chicago, Ill.; Public Works Company, Bangor, Me.; Toledo Consolidated Street Railway, Toledo, Ohio; Detroit Citizens Street Railway, Detroit Mich.; New Orleans City & Lake Railroad, New Orleans, La., and Fort Wayne & Belle Isle Railroad, Detroit, Mich., and the prospects for the output for the coming season is very flattering.

Large orders have recently been received by the H. Channon Company, of 24-26 Market street, Chicago, for its Ajax transmission rope, from the following: The Boston & Montana Consolidated Copper & Silver Smelting Company, of Butte, Montana; the Helena Light & Power Company, of Helena, Montana; the Illinois State Penitentiary, at Joliet; the North Chicago Electric Street Railway Company, the Cleveland Linseed Oil Company, of Chicago; the Independence (Ia.) Waterworks; the Mankato (Minn.) Mills; the Minneapolis General Electric Company; the Syms & Dudley Paper Company, Vaterviliet, Michigan.

Echoes from the Trade

Robert Graham Woodward, of San Francisco, has invented a combination track and wheel brake.

The Johnson-Lundell Company is laying some of its closed conduit system on Thirty-fourth street, New York.

Stanley F. Russell, the Atlanta representative of the Q. and C. Company, Chicago, died February 13, of pneumonia.

J. H. McGill, the Chicago representative of Ohio Brass Company, has removed from 1302 Monadnock to 1129-1130 in same building.

Augustus Day, Detroit, has reduced the price on his well-known track scrapers, and also made a corresponding reduction on extra parts.

The Garton-Daniels Electric Company, Keokuk, Iowa, is having a large and rapidly increasing trade in its famous lightning arresters.

The Walker Manufacturing Company, Cleveland, has closed a contract for thirty car equipments for the West End Street Railway, of Boston.

M. B. Austin, representing the Chicago office of the Safety Insulated Wire & Cable Company, of New York, has opened new offices at 1129-1130 Monadnock Block.

The contract for 100 open car bodies for the Chicago City Railway has been let. The Wells-French Car Company of this city will build 70, the Pullman Company 30.

The J. G. Brill Company, Philadelphia, has received an order for twenty-six cars complete, including motors and trucks, for an electric railway to be constructed in Cape Town, Africa.

The White-Crosby Company, Baltimore, has been awarded the contract to construct two and a half miles of electric road to North Alton for the Alton, Ill., Railway and Illuminating Company.

Among the recent sales made by Frank Randall, western selling agent for the J. G. Brill Company, is one for seventy-six No. 28 pivoted trucks to the Metropolitan Street Railway Company of Kansas City.

The Simplex Electrical Company of Boston and Chicago, maker of insulated wires and cables has issued a handsome little book for the purpose of emphasizing the high quality of Simplex wire by presenting a few illustrations of important buildings in which it has been used. The buildings shown include many of the triumphs of modern architecture throughout the United States, among them being the Capitol and the Library of Congress in Washington.

Clift Wise of Chicago, has been awarded the contract for the overhead construction of the Clarksville, Tenn., Electric Railway. Engines, generators and motors will be furnished by the Electrical Supply & Construction Company, of Louisville, Ky.

The American Stoker Company of Dayton, Ohio, has secured the contract for forty stokers, for the electric line between Washington and Baltimore. Two power plants are being erected, one near Washington and the other near Baltimore.

The Metropolitan Electric Company, of Chicago, is putting on the market a double coil filament incandescent lamp for street car use. The lamp is said to be long-lived, without any appreciable blackening. As it resists jarring, the filament is said not to break easily.

The Denver City Cable Railway, which has been using Pintsch gas in its cars for some time, is so well pleased, the management has decided to equip the electric cars of the West End lines, which are leased by the City Cable Company, with a full outfit for burning gas.

The Brownell Car Company, St. Louis, is building fifteen cars for the Cincinnati, Newport & Covington road, which already has many Brownell cars in service. The new cars will have twenty-one-foot bodies with end doors placed in opposite corners of the car. The seats will be cross seats of the Brownell reversible pattern.

The Fuel Economizer Company, of Matteawan, N. Y., has recently sold through its western office 1,000-horse-power of economizers to the Grand Rapids Consolidated Street Railway; 2,500-horse-power on second order to the Detroit Railway; 2,500 to Armour Packing Company, Kansas City, and 350-horse-power to Chicago Athletic Association.

Daniel Webster, who for fifteen years has been associated with the Babcock & Wilcox Company has resigned and gone to the Aultman & Taylor Machinery Company, manufacturers of the Cahall boiler. Under his direction the company will soon build a watertube boiler of the B. & W. type, which will be handled by H. E. Collins & Co., Pittsburg, general sales agents of the Cahall boiler.

The Stever Rail Joint Company, of Canton, Ohio, reports that company as being favored with an unusual number of inquiries covering the spring business, and feels confident it will be fully repaid for last year's efforts in introducing the Stever joint. There seems to be a growing inclination on the part of street railway managers to install on their tracks a rail fastening that will

give them a minimum amount of trouble and expense in the future. The experience of users during the past six years with the Stever joint has demonstrated that very little attention is necessary after the joint is once in place. Prospects for a large business the coming season are extremely good.

The Fitzgerald-Van Dorn Company, Monadnock Building, Chicago, is presenting to the trade the finest brochure on automatic street car couplers ever published. We can say this with absolute confidence because the Van Dorn coupler is the only automatic street car coupler on the market, but even if it was not the booklet would be hard to beat.

The Metropolitan Electric Company reports recent large sales of P. & B. tape and compound. The spring construction has begun rather early. These goods are found to be as reliable as of old. The Metropolitan Electric Company is fortunate in having this agency, and has increased the business west since it has been in its hands very considerably.

The Rapid Railway Company, of Detroit, operating the Detroit & Mt. Clemens electric road, has awarded to the Phoenix Iron Works Company, of Meadville, Pa., the contract for a complete steam power plant, consisting of one 400-horse-power, direct connected compound engine, two 300-horse-power, belted compound engines, and the necessary boilers.

The R. A. Crawford Manufacturing Company, of Philadelphia, has just issued its 1896 fender catalog. This company is the maker of the Crawford automatic "Daisy," and automatic truck "Simplicity" fenders. Since January, '94, it has sold over 10,000 fenders, to forty-seven street railway companies. In Pittsburg, Pa., the Crawford fenders are in use on nine lines.

Green & Seeman, 23 Charles street, Baltimore, Md., have a new asbestos insulating paper for the insulation of motors. They seem to have overcome the difficulties in the way of impurities which have heretofore stood in the way of making asbestos a desirable insulator and now have a paper which is rather firm in texture, of good insulating qualities and suitable for use in winding armatures. It can take the place of other inflammable papers and cloths that have heretofore been used.

The Hoppes Manufacturing Company, Springfield, Ohio, reports the following recent orders for feed-water purifiers and heaters, secured through its western office, 512 Security building, St. Louis, Mo.: The St. Louis Dressed Beef Company, 750-horse-power purifier and 800-horse-power exhaust heater; the Christy Fire Clay Company, St. Louis, Mo., 400-horse-power purifier and 400-horse-power exhaust heater; the John E. Liggett building, two purifiers of 100-horse-power each, and also 200-horse-power exhaust heater. The following St. Louis concerns have also placed orders for various sizes of exhaust heaters: J. W. Peters & Co., 150-horse-power; the Laclede Laundry Company, 100-horse power; Globe Furniture Company, 150-horse-power; Leroi Furniture Company, 150-horse-power; Central Lead Company, 300-horse-power; the Liggett & Myers Tobacco Company, 75-horse-power.

The Bradford Belting Company is having phenomenal success with its "Monarch" insulating paint, and is kept busy filling orders. This paint is manufactured from a newly discovered valuable mineral that is extremely rich in its own natural oils, and has no equal as an insulating paint. It has all the good qualities of the famous Egyptian asphaltum, and contains valuable properties not found in any other mineral.

The power houses at Ilchester and Paint Branch, of the Columbia and Maryland Railway, the new electric line now in course of construction between Washington and Baltimore, will be equipped with the feed-water heaters and purifiers manufactured by the Harrison Safety Boiler Works, of Philadelphia. The engines will be 3,000-horse-power each. The Harrison people were awarded the contract for their apparatus, over a number of others.

Green & Son, limited, of England, have published a handsome volume, "Fifty Years' History of the Development of Green's Economizer," to celebrate the fiftieth anniversary of the invention of that apparatus. The work is far superior to the average trade publication, and is an interesting history of an important invention. The volume is not devoted exclusively to the Green apparatus, but contains copious notes on other economizers and early tubular boilers.

The St. Louis Register Company is pushing actively in the east as well as nearer home, and has closed a contract for 300 stationaries to go to Boston where 700 of these machines are already in operation. Its New York agent has also sent in an order for a full equipment for the Baltimore City Passenger Railway; and it has just finishing delivery for equipping the City & Suburban Railway, of Baltimore. The 100 new cars of the Missouri Railway, St. Louis, will carry St. Louis registers.

McIntosh, Seymour & Co., of Auburn, N. Y., since January 1, have captured some nice orders for slow speed engines. The Columbia & Maryland Electric Railway has ordered eight engines of 1,000-horse-power each for direct connection to Westinghouse generators of 700 kilowatts; the City and Suburban Railway, Baltimore, has contracted for two of 1,200-horse-power for direct connection, making six McIntosh & Seymour engines sold that company; The Cincinnati Street Railway also ordered two of the same size, making fourteen for that company. Two of 1,200-horse-power, direct connected, have been sold to the Municipal Electric Light

Company, of Brookly. A cross compound, vertical engine of 1,000-horse-power has been sold to the Atlantic Mills, of Lawrence, Mass. Buenos Ayres, South America, will soon have an example of the McIntosh & Seymour workmanship in the form of a 700-horse-power 4-cylinder, 3-crank vertical engine direct connected to two 200-kilowatt dynamos. The Auburn works have received orders for a lot of high speed engines also.

The foreign business of the Mica Insulator Company, 218 Water street, New York, has grown largely during the last six months, so that it has increased its facilities for manufacturing its well-known insulation, micanite. The company has made additions to its factory in London. European manufacturers of electrical machinery are using micanite largely in the construction of their various designs of apparatus, and the company is to be congratulated upon the success which its insulation has met with in foreign countries.

The Vulcanized Fibre Company, Wilmington, Del., reports its sales in 1895 over 20 per cent more than in 1894; and so far this year its business shows a similar increase over the corresponding months in 1895. Its business is very largely with electricians, and electric street railway companies, "Vulcanized Fibre" being known everywhere as a standard insulating material. The company was organized in 1873 and was the pioneer in this line of business in the world, and its trade extends over the whole civilized globe.

The Ontario Car & Truck Company has been incorporated at Oswego, N. Y., to manufacture cars, trucks, ventilators, heaters and the Thompson truck and fender. Incorporators, George Dexter, president; George Brooker, treasurer; Charles Thompson, Earnest Potter and Howard Wilcox, all of Oswego Falls. Of the $300,000 capital, $100,000 has been paid in. A site, 100x496 feet, has been purchased on which to erect the factory, machinery for which has been purchased. Mr. Thompson has already taken orders for $35,000 worth of trucks.

ATLANTIC AVENUE OF BROOKLYN LEASED.

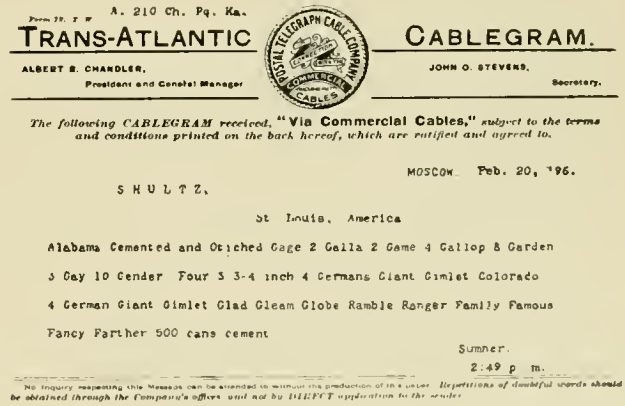
Another street railway deal has been added to the long list of negotiations which have taken place in Brooklyn. The Nassau Electric Railroad has leased the Atlantic Avenue Railroad for a term of 999 years. The Nassau company pays an annual rental of $150,000 for the first two years and $180,000 per year after that. The Nassau company further is to spend $500,000 on improvements of the Atlantic Avenue system one year from the date of lease. To succeed the Brooklyn Traction Company, which controls the stock of the Atlantic Avenue, the Kings County Traction Company has been organized with a capitalization of $4,500,000.

FIFTEEN TIMES AND STILL COMING.

When a street railway buys cars a second time of the same builder, it is pretty good evidence that the cars are about right. But when the railway people come back again and again until their orders have reached the fifteenth time, the testimonial is a strong and rare one. This is precisely what the Cincinnati Street Railway has done, and the Laclede Car Company, of St. Louis, is now at work filling the fifteenth order from this road. The order is for 100 open cars of the nine-bench pattern to be mounted on McGuire trucks. They are also building eight nine-bench opens for the Mt. Adams & Eden Park line, Cincinnati, which call for LaClede trucks; for the Ft. Pitt Traction Company, Pittsburg, thirty-five twenty-foot closed, vestibule cars, McGuire trucks; twenty-eight ten-bench opens with vestibuled front on Lord Baltimore trucks for the Second Avenue line, of Pittsburg; ten ten-bench open trailers with Baltimore Car Wheel Company's running gear, for the West End road, Pittsburg; twenty ten-bench opens for the Baltimore City Passenger; four combination passenger and smoking cars for the Pikesville road, Baltimore.

BIG BELTS FOR MOSCOW.

When the government and manufacturers in far away Russia send to America for leather belting, it is at once an indication that the belts are good; and when a single order is cabled for 17,000 feet, it further shows the Russians want a lot of a good thing. The cablegram reproduced herewith was received by the Shultz Belting Company, St. Louis, on February 20, and being interpreted calls for 17,000 feet of Shultz belting, assorted sizes. In the same month an order was received from Sweden for 4,200 feet, assorted sizes. The foreign trade of this



Form 77. T W A. 210 Ch. Pq. Ka.

TRANS-ATLANTIC CABLEGRAM.

ALBERT B. CHANDLER, President and Consltg Manager

JOHN O. STEVENS, Secretary.

The following CABLEGRAM received, "Via Commercial Cables," subject to the terms and conditions printed on the back hereof, which are ratified and agreed to.

MOSCOW Feb. 20, '96.

SHULTZ,

St Louis, America

Alabama Cemented and Otiched Cage 2 Galla 2 Game 4 Gallop 8 Garden

3 Gay 10 Cender Four 3 3-4 inch 4 Germans Giant Gimlet Colorado

4 German Giant Gimlet Glad Gleam Globe Ramble Ranger Family Famous

Fancy Farther 500 cans cement

Sumner.

2:49 p m.

No inquiry respecting this Message can be attended to without the production of it, or a copy. Repetitions of doubtful words should be obtained through the Company's offices and sent by DIRECT application to the sender.

concern is very large, and includes also distributing depots in London, Australia, Johannesburg, Africa, Brussels, Moscow, and Malmo, Sweden. There are also Shultz agencies in twenty of the leading cities in this country. The strictly high grade of the Shultz belts, their lasting qualities and uniform standard of excellence, have made them justly famous in all parts of the world.

ERB'S AUTOMATIC OVERHEAD SWITCH.

L. M. Erb, manager or the Leavenworth Electric Railroad, has invented an automatic overhead switch, which gives good promise of supplying a long felt want

ERB'S AUTOMATIC OVERHEAD SWITCH

in the electric railway field. It is shown in the accompanying engravings. The trolley wheel, in passing under the approach to a switch, pushes up a short section which throws the switch in the direction the car is coming, and makes a perfect unbroken surface for the trolley-wheel. There are no wheels or parts that need oiling. It is impossible for the trolley to take anything but the proper course with the device in operation. The switch does not have to be as carefully suspended

ERB'S AUTOMATIC OVERHEAD SWITCH.

with reference to the track frogs as other kinds, and a car can pass it at any rate of speed allowed by the condition of track. The operation of the switch is by a simple lever movement. The end of each lever strikes a cam, which throws the switch the desired direction.

ANOTHER FACTOR IN TROLLEY LITIGATION.

Another claimant of fundamental patents on the trolley is Benson Bidwell, of Logansport, Ind. Bidwell was a telegraph operator years ago, and claims to have patents antedating those owned by the General Electric Company by several years. He is sending out the following circular, which indicates self-confidence, to say the least:

"LOGANSPORT, Ind., March 6, 1896.—DEAR SIR: You are hereby notified not to pay royalties for the use of the trolley to the General Electric Company, as my patents for the electric trolley antedate theirs by three years, and if you pay them I shall re-collect the same of you at the close of suits now pending."

The Maryland Express Company has applied to the state legislature for incorporation papers to operate a general express business on the street railway lines in Baltimore and suburbs. The capital stock is fixed at $100,000, with a privilege of an increase to $500,000. The company asks to be empowered to construct, own, charter or lease vehicles, cars or motors, and use as a means of propulsion, horses, steam, cable, electricity, or compressed air, as it may need in carrying on its business. It will secure by traffic agreement, or otherwise, the exclusive right to operate on the various lines of street railway in city and county.

At the present rate of progress it looks as if New York's rapid transit would be a dream of the twenty-first century rather than a reality in the lives of any of us. So far the commission has taken 40,000 pages of typewritten testimony for and against the underground road. Perhaps the commission is using the time schedule of the Grant monument.

Leon Jewell, superintendent of time tables, Chicago City Railway, is issuing 50,000 copies each month of tables of all lines, bound in stiff cover—vest pocket size. In addition it gives Sunday schedules, night cars, and full information as to transfers, depots and public buildings. It is a most handy little booklet, and carries a good line of ads, which covers the expense of publishing.

A 3-year-old boy was one of the "finds" of the lost article department of the Milwaukee street railway recently.

The Wheeling, W. Va., Railway Company earned in 1895, $150,093 at a cost of $120,799, leaving $29,293 to the good.

The American hot water heaters, manufactured solely by the American House Heater Company of Hartford, Conn., are fully explained in its '96 catalog, and the latest price list is given. This list is intended to supersede previous ones. The heaters are now being generally placed in public buildings, dwellings and greenhouses.

Street Railway Review

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H. H. WINDSOR, Editor. **F. S. KENFIELD,** Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of street railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers.

This paper is a member of the Chicago Trade Press Association.

Entered at the Post Office at Chicago as Second Class Matter.

VOL. 6. APRIL 15, 1896. NO. 4.

Now is the time to get sprinklers ready for the season, and since we are on the subject it will do no harm to mention the fact that the street railway sprinkling business is on the increase. Some roads are finding it an advantage to put in electric pumps at available water supplies where city water can not easily be obtained, and one manager will carry his motor and pump on the sprinkler, so that it can take water from any stream or pond along the line.

A PHILADELPHIA publication which pretends to advocate street railway interests, but which in reality is nothing more than a weak excuse for printing advertisements, comes out as an advocate of lower fares. Lower fares can be given, but to do so on nineteen out of every twenty roads it can only be done by reducing the quality and quantity of the present service, and cutting down the wages of the employes; neither of which is desirable from any point of view.

WE publish elsewhere in this issue an account of a new method of testing the bonding of a piece of track joint by joint, in a short time, and without interrupting the regular operation of the road in any way. It is naturally a matter of much satisfaction to us who have been strong advocates of better methods and more thorough system in keeping track of the condition of return circuits to have such things as this brought out, and we take this occasion to again urge our readers to take steps to keep posted as to the exact condition of their return circuits.

THE idiotic extremes to which insurance men sometimes go in electrical matters is beautifully illustrated by an example which occurred not a thousand miles from Chicago. A company changed several of its barns from horse to electric traction. Naturally it wanted to put in electric lights run from the trolley circuit, but found on investigation that the insurance rates would be so high on electric lights run that way that it has adopted oil lights because they are cheaper in insurance rates and do away with the necessity of running the electric plant all night. Wonder if the insurance people see the humor of the situation?

AND now it is Quincy, Ill., (or certain of its citizens) that wants 3-cent fares. Any one acquainted with the enormous (?) dividends usually paid by roads in towns of 40,000 inhabitants, will at once see the supreme justice of this demand. Quincy had better profit by the lesson learned all too late by another small Illinois town, and spare the goose. The town that industriously puts in its time kicking its street railway is hurting itself and the company, while doing no one any good. There is a limit to human endurance, and there is a limit to the amount of pounding a street railway company in a small town can stand without giving up the ghost. Quincy people should read the Massachusetts report, and then congratulate itself the fares are not raised to six cents.

THE manager that encourages his employes to feel that suggestions are always in order has a mine of resources at his command, that the manager who knows it all, or who steals and claims the credit for every good suggestion he hears, can never hope to touch. A manager may be, and surely ought to be, a man of more breadth of vision and fertility of thought than his employes; but that does not mean that he has a monopoly on all the good ideas of benefit to the road. An employe may make suggestions that would not be made could he have the opportunity of looking at all sides of a question as a manager can; but the very fact that the employes are the ones that are brought into actual daily contact with the equipment and public, makes their suggestions of peculiar value.

SOME day, before many years, there is going to be another terrible drawbridge disaster. We can predict this with perfect safety that it will come true, because street railway men owning and controlling roads operating over drawbridges are not apparently awake to the danger they are in. The Cleveland, Milwaukee and Portland accidents have not taught their lessons, and it looks as if several more disasters would have to be added to the list. Why is it that managers are so indifferent to their interests in this respect. Apparently each one thinks that some special providence is watching over his road. Some morning one of them will wake up

from this dream with a suddenness that will be unpleasant. Let each one rather admit to himself the truth that his road may have the next accident and govern himself accordingly.

There seems to be every reason to credit the rumor, and quasi assent by the parties in interest, that some kind of a co-alition has been made by the General Electric and Westinghouse companies. Whether the union of these great factors in electric railway work will prove advantageous to themselves, or quite the reverse, will depend upon the policy to be adopted. If this agreement or whatever the trade, is to put an end to costly and ruinous and so far unprofitable litigation, so that the money heretofore wasted in the courts can be saved, that will certainly be desirable; if the deal will insure the maintenance of fair prices for apparatus, that is a good thing for everybody. If, on the contrary it is merely a stock jobbing scheme, or one to force prices above what is warranted by a fair and reasonable profit, the result will most surely prove a boomerang, for the street railways will not submit to such oppression very long, and the other builders of generators and motors, many of them concerns of which little is now ever heard, will wake up and receive the encouragement, assistance and patronage of the railway companies. While managers admit the desirability of maintaining a standard in equipments so far as possible, at the same time, this desire would not offset an increase of say one or two hundred dollars in the cost of motors. The day of a monopoly in electric railway materials is past, nor will it ever return. We are inclined to believe, however, that the combination is made to bring about conditions not unfavorable to their best and largest customers, the street railways, while advantageous to the General Electric and Westinghouse. The Bell telephone are wading in deep waters all over the country, and the lesson is so striking we cannot believe it will be unheeded.

There is no subject under general public consideration at the present time so thoroughly misunderstood as the popular cry for 3-cent fares. Strangely enough it has not grown out of an expressed public necessity, or even request or demand. It has been created purely by the daily press in its effort to pose as the defender of the public. From ocean to ocean it has gone, and for the people to take it up was both the natural and the logical result. But even the people, the dear oppressed, downtrodden people, have had vastly less to say about securing 3-cent fares than the daily press, and that army of conscienceless aldermen, with whom patriotism and public welfare is buried in the avalanche of personal cupidity. The papers have constantly insisted that roads can be run at a profit on 3-cent fares. There has been practically no denial outside of the street railway press; hence the public have accepted the statement as true. Figures are the telling shots, however, against which mere assertions to the contrary are armor proof. For the first time we have data, and data compiled by a commission none too friendly to the railway interests, which tell the story. Elsewhere in this issue we publish the statement of the Massachusetts Railroad Commission, in which it is shown that not one street railway in that state is operating at a cost less than three cents per passenger. There is one apparent exception; a small road of only four cars, which spent last year less than one dollar per week on repairs of every kind. If this system is continued it will readily be seen that very soon there will be no road left, or any cars or equipment to run. When it is repaired it will be by the entire reconstruction and purchase of new cars and motors. Every manager should secure the publication in his local papers of the whole or part of our article entitled "Three-cent Fare Fallacy Exposed." The public are not unreasonable if only they understand the facts in a case. The facts we offer are of the highest authority, and constitute the strongest refutation yet published.

JOHN A BEELER.

John A. Beeler, constructing engineer of the Denver Tramway Company, was born at Cincinnati, O., June 28, 1867, in which city he received his education in the public schools. In 1884, he entered into the street railway construction business, and held the position of assistant engineer, during the construction of the Vine street cable road, in Cincinnati, and with the Walnut Hills cable road, of the same city. In 1888, he went to Denver, Colorado, as assistant engineer upon the first cable lines built in that state, and in 1890, was elected constructing engineer to the Denver Tramway Company, which position he holds today. Mr. Beeler has made a special study of track construction, and is a firm believer that first cost is not the true criterion of economic construction. His design of girder T rail for electric road track in paved streets, has been largely used by street railways all over the United States. He has introduced many improvements in the minor details of track construction, giving especial attention to crossings, switches and curves. We are safe in saying that few street railway men in the country are as well posted and progressive in the matter of track construction as Mr. Beeler. If more companies would employ specialists like him when constructing track, millions would be saved every year in street railway maintenance in this country.

JOHN A. BEELER.

The beauties of the electric headlight were again illustrated the other day when an oil headlight at West Seneca, near Buffalo, exploded, burning the motorman, and creating a panic among the passengers.

The very general interest, greater this season than ever before, which managers are taking in the subject of pleasure resorts decides us in devoting an unusual amount of space to the subject. Music seems to be the one feature which is everywhere successful, and vaudeville entertainments next. The suggestion made by one manager not to start too high is an excellent one. As he says, the public will expect more each year, and it is bet- to start in such a way that further additions can be afforded than to begin at the top and simply hold one's own thereafter. As we have frequently stated, the question is always one subject to local conditions in making decisions as to what is most desirable, and each manager must study his people and furnish that which is likely to please the greatest number. What may be just the thing in one part of the city may fall flat in the other.

COLUMBUS, OHIO.

J. F. Barry, says:

We have on our line a beautiful park of 156 acres with lake of eight acres, pavilions merry-go-rounds, museum of ornithology, swings, scenic railway and other attractions. The other efforts we make to increase riding are as follows: Excellent roadbed, clean cars, short schedule and courteous treatment.

Please excuse the brevity of a busy man.

DENVER.

S. Roy Wright, superintendent of the West End road, writes:

On the line of our road we have two pleasure resorts, one a park and zoological garden, the other a lake resort and also a zoological garden. At each place is conducted a summer theater, with opera, comedy and variety. We found that on days when balloon ascensions were given that our travel was decidedly increased. We have not figured on any special features for this summer as yet.

YOUNGSTOWN, OHIO.

General Manager A. A. Anderson:

At present we have no parks or pleasure resorts located on our interurban line, but we are negotiating for some land which, if we secure it, will be fitted up with popular attractions, such as a boating equipment, refreshment pavilions, a summer theater, merry-go-rounds, switchback railroads, etc. Past experience teaches us that such resorts are a great benefit to the street railway business.

WHEELING, W. VA.

W. A. Shirley, secretary, reports:

We do not own or manage any pleasure resort on the line of our road, but there is a park located a short distance from our line reached by an incline plane which we derive considerable benefit from in the way of travel. We notice particularly at times when there are large picnics or concerts given that travel is increased considerable. The park mentioned is new, this being its third season. We were also benefitted to some extent from base ball games, base ball grounds being located along our line last season.

KANKAKEE, ILL.

C. H Cobb, general manager, says:

We ran in connection with our road here a private park, and advertised in outside towns for excursions and picnics, giving use of park free, and found it quite profitable last season. We also ran in connection with the park, a summer theater, charging a small admission; have a good orchestra, and give good clean entertainments. The theater can be made to pay its own expenses or a little better, and the traffic on the road greatly stimulated. We expect to follow the same lines this season on a larger scale. "Electric Park" is on the banks of the Kankakee river, ten minutes ride from the city. It is provided with a dancing platform, swings, row boats, lawn tennis court, an electric launch and other accessories for healthful sport. No liquor is sold on the grounds. The park can be had free of charge for large parties, by arranging with the railway company.

LOS ANGELES, CAL.

Fred W. Wood, general manager, says:

At the terminals of two of our lines are public parks. We maintain a band summer and winter in one, playing Sunday afternoons, and from time to time we have special attractions, such as balloon ascensions, high divers, fancy shooting exhibitions, etc. We find as good success with good music as anything else. I am convinced a great deal of money can be made by attention to this part of street railway work.

KANSAS CITY, MO.

V. W. Flowerrel, of the Metropolitan Street Railway, has had considerable experience in operating pleasure resorts, and writes:

This company operates two parks, one a city park, the other suburban. The city park is situated within twenty or twenty-five minutes' ride from most any part of the city. The features of the park constitute a beautiful floral display, small zoological garden, dancing pavilion, boating and other minor attractions. We also have a band for dancing every night, and Sundays, a full

brass band concert. Last summer we ran cheap vaudeville attractions, and found them to be good drawing cards and increased the travel very materially.

Our suburban park is about eight miles from the center of the city situated between Kansas City and Independence, on the electric line between these two cities, and contains 400 acres of very beautiful natural scenery, which we have improved with walks, drives, etc. The principal features are our lake, adapted to boating, fishing and bathing, (the latter feature being very popular in this city,) an elegant bath-house and artificial beach.

BOYNTON'S WOODS—ATLANTA.

flowers, music, etc. Last year we played high-priced vaudeville attractions, also light opera and celebrated bands and musicians. For the present season we contemplate, outside of beautifying the park, making music our special feature at both parks.

PATERSON, N. J.

The Paterson Railway Company, of which M. R. McAdoo is the well known manager, has just leased a piece of property and erected a grand stand, etc., for baseball purposes, and has secured the Atlantic League team for the city of Paterson, to play on these grounds. Mr. McAdoo says: We reserve the right on days when ball games are not played to use the grounds for any other purposes, and have so far succeeded in booking Barnum & Bailey's, Forepaugh's, Buffalo Bill circuses, and Paine's fireworks. We also are thinking of putting a bicycle track on these grounds, and letting the local bicycle clubs have their annual meets there. The place is situated on our main double track line, half way between the cities of Patterson and Passaic, and we can, therefore, handle an immense crowd of people, having necessary cross overs from either city. We have public parks, and several private ones on other lines in the city, and have, therefore, not gone into anything of that kind.

NEW BEDFORD, MASS.

Arnold G. Gardner, treasurer of the Dartmouth & Westport Street Railway tells of Lincoln Park, operated by his road, as follows: This park is situated on the line of the road about half way between the cities of Fall River and New Bedford, seven miles from either city. The park opens memorial day and closes the latter part of September. The park consists of a casino, theater, clambake pavilion, band stands, merry-go-round, ferris wheel, toboggan slide, and punch and judy house, which are nestled together in a deep grove, forming a very attractive spot on a summer's afternoon or evening. The casino contains a dance hall, small restaurant, and ice cream parlor. In the clam pavilion, which seats about five hundred people, clambakes are served Wednesdays, Fridays and Sundays and are a popular feature.

The catering and clambake privilege are let out by bids for the season. The theatre seats about five hundred. This is run by the railway company and light vaudeville shows are given daily at 3 and 8:30 p. m., Sundays excepted, change of bill weekly. A small admission fee of five cents is charged, which includes a seat. No trouble was experienced in obtaining good specialty artists for a week's engagement. On holidays continuous performances are given. This feature was introduced last season and proved a great drawing card. The merry-go-round, ferris wheel, etc., are always well patronized. Band concerts are given on Wednesdays, Fridays and Sundays and on all holidays. An orchestra, consisting of six pieces is in attendance daily and free dancing is furnished from 3 to 5 and 8 to 10 p. m.

The park is well policed and no liquor is allowed on the grounds. A noticeable feature is the large number of ladies and children in daily attendance without escorts. The park at night is aglow with arc lights and the fronts of the buildings are studded with red, white and blue incandescent lights giving a very pretty effect. The fare from either city to the park and return is twenty-five cents, for which, together with the admission to the theatre, five cents, one can obtain a cool ride of fourteen miles, indulge in dancing, witness an hour's performance in the theater, listen to the band concert, or roam about under the pine trees. There are swings for the chidren. A specialty of picnic parties is made. Trolley parties, riding from one city to the other in a special illuminated car, ending with a dance at the park, was another form of amusement which met with great favor.

BRANTFORD, ONT.

The Brantford Street Railway writes:

We quite agree with you that an exchange of ideas would be mutually beneficial. We are this year going to devote all our attention to Mohawk Park, which lies about two and one-half miles from the city and was opened for the first time last summer, and is one of the most delightful spots you could possibly wish to spend an afternoon in. There is a small lake in it and this sheet of water makes it doubly delightful. The people flocked out there in large crowds last summer, so much so that it taxed the road to its utmost. This year our carrying capacity will be improved and our list of attractions are very much improved as last year we had only

boating and a merry-go-round; this year we have built a bicycle track and athletic grounds, and put up new refreshment booths. We have also sold the privilege of erecting a shooting gallery, and a seperate building to be used as an Edison parlor containing phonograph, kinetoscope, graphophone and a little world.

WINNIPEG MAN.

G. H. Campbell, general manager of the Winnipeg Electric Street Railway, is an enthusiast on the possibilities of created travel. He says:

We have in connection with our road two parks situated about four miles from the center of the city, both on the banks of the Red river; the one on the west bank is called River park. In this park we have a splendid half-mile race course, large grand stand, a bicycle track and a capital field for ball, cricket, lacrosse and such other sports. We also have a large roller skating rink with cement floor, erected last year, and a very fine riding gallery, or merry-go-round, imported last year from Tonawanda, New York. In this park, also, we have a large building which we have named Edison hall. This is intended for picnic parties, dances, small concerts and theatricals. It is rather small for the ordinary theatrical company, but answers the purpose well for small plays, and seats about 350. If the business this season will warrant it, we will enlarge this building and make considerable improvements to the stage, and other arrangements in connection with it. The roller skating rink was erected last year, and an effort made to revive this old time craze, but it was not very successful. The season, however, was unfavorable, and we expect this year to have it boom. The merry-go-round was a bonanza, being of course somewhat of a novelty. We also look for good receipts from this source the coming season. The race course is not a success, but we hardly expected it would be, as there are two other good tracks near town, but we had ample grounds in our park, and we considered it would be incomplete without this, and so we kept it there for any occasion when it might be required.

Elm park is situated just across the river from River park, and is reached by a pontoon bridge. Our cars run to the approach to the bridge on the west bank of the river, and the passengers disembark and walk across the bridge to the park. This park is very beautiful. It is thickly studded with magnificent elm, oak and maple trees, and is a most delightful and refreshing spot in the hot summer afternoons and evenings. It is also fitted up with the necessary requirements for pleasure seekers, merry-go-round, shooting gallery, a pavilion, ball, tennis and lacrosse grounds, swings and other such arrangements for entertaining the people. This park is used largely by picnic parties, especially churches, Sabbath schools and societies; while the other (River park) is more particularly patronized by the general public, being more convenient for this purpose than the other park, as our cars run right through it from end to end. In both parks we have benches and tables and seats distributed at convenient places among the trees for families or small picnic parties to use as occasion may require. We have in connection with both parks the usual refreshment booths, etc. It may surprise you when I add that in neither of the parks do we allow liquors of any kind to be sold. There is an agitation on foot to have beer and other liquors sold in River park, but I do not think it will prevail as the city authorities are very strict in this respect.

I might just add that the traffic to these parks in the summer is very large, especially in the evenings, and we consider them excellent paying institutions, and no street car company should be without one such, at least.

EASTON, PENN.

F. H. Knight, general manager of the Easton Transit Company, says:

Two years ago we opened our "Island Park," a

U. S. LIFE SAVING STATION LAKEWOOD, ATLANTA.

beautifully wooded island in the Lehigh river three and one-half miles from Easton—west.

Occasional concerts, and bi-weekly dances were all we offered that year. Last year we added a "Casino" to the park buildings, and gave musical, dramatic, athletic and sleight-of-hand attractions, charging 5 cents per seat, with standing room free.

This year we propose to put the same money in the "Casino," as last year, but make the admission free, seats and all. We also propose to have Sunday concerts, which were the best money makers we had last year, and to continue the Wednesday and Saturday dances in a good-sized pavilion, which also drew well.

We propose to increase riding by making the Casino free, by the addition of a Shoot-the-Chutes and several other attractions of like character erected by concessionaries, by more frequent water carnivals when two steam launches tow a string of boats all lighted with Japanese lanterns. These draw well, and we are making a greater effect to bring to our park business from a distance—a picnic business—which paid us quite well last year. We think the prevailing tendency in park management is undue extravagance in providing and main-

taining attractions. We have aimed to do what we undertake creditably, but not to undertake too much at first for the public expect something better each year and you can add as the receipts justify from season to season and thus stand in better favor than by commencing busi-

LAKEWOOD LINE, ATLANTA.

ness on a scale so elaborate that subsequent additions cannot profitably be made.

The following roads maintain either directly or indirectly pleasure resorts or parks, as a means of inducing and increasing travel.

PLEASURE RESORT ROADS.

Davenport & Rock Rock Island Railway, Davenport, Iowa.
Dartmouth & Westport Railway, Fall River, Mass.
Duluth Street Railway, Duluth, Minn.
Twin City Rapid Transit Company, Minneapolis, Minn.
Hartford Street Railway, Hartford, Conn.
Inter State Electric Railway, Clinton, Iowa.
Paterson, Passaic & Rutherford Electric Railway, Passaic, N. J.
Binghamton, Railway, Binghamton, N. Y.
Easton Transit Company, Easton, Pa.
South Jersey Traction Company, Bridgeton, N. J.
Sheboygan City Railway, Sheboygan, Wis.
South Covington & Cincinnati Street Railway, Covington, Ky.
Consumers Electric Light & Street Railway, Tampa, Fla.
Atchison Railway, Atchison, Kans.
Consolidated Street Railway, Saginaw, Mich.
St. Louis & Suburban Street Railway, St. Louis, Mo.
Manchester Tramway Company, Hartford, Conn.
Wheeling Railway Company, Wheeling, W. Va.
Toledo Electric Railway, Toledo, Ohio.
Brantford Street Railway, Brantford, Ontario.
Citizen's Street Railway, Indianapolis, Ind.
Marinette Street Railway, Marinette, Wis.
Milwaukee Street Railway, Milwaukee, Wis.
Metropolitan Street Railway, Kansas City, Mo.
Gloucester & Rockford Street Railway, Gloucester, Mass.
Baltimore Traction Company, Baltimore, Md.
Consolidated Street Railway, Grand Rapids, Mich.
Cincinnati Street Railway, Cincinnati, Ohio.
Sutro Railway, San Francisco, Cal.
Electric Railway, Sedalia, Mo.
Joplin Street Railway, Joplin, Mo.
Lindell Railway, St. Louis, Mo.
W. Worth Bean, St. Joseph, Mich.
Seattle City Railway, Seattle, Wash.
West End Street Railway, Denver, Col.
Cleveland City Railway, Cleveland, Ohio.
Detroit Railway Company, Detroit, Mich.
Columbia Railway Company, Columbia, Pa.
Winnipeg Street Railway, Winnipeg, Manitoba.
Leavenworth Electric Railway, Leavenworth, Kan.
Los Angeles Consolidated, Los Angeles, Cal.
Highland Electric Railway, Pittsburg, Pa.
Bridgeport Traction Company, Bridgeport, Conn.
Aurora Street Railway, Aurora, Ill.
Nevada City Street Railway, Nevada, Mo.
Waukesha Street Railway, Waukesha, Wis.
Paterson Railway Company, Paterson, N. J.
Denison Street Railway, Denison, Texas.
Schuykill Electric Railway, Pottsville, Pa.
Bangor Public Works Company, Bangor, Me.
Second Avenue Traction Company, Pittsburg, Pa.
Hartford Street Railway, Hartford, Conn.
Anderson Street Railway, Anderson, Ind.
Camden, Gloucester & Woodbury Railway, Gloucester, N. J.
Danbury & Bethel Horse Railway, Danbury, Conn.
Fort Wayne, Electric Railway, Fort Wayne, Ind.
Atlanta Consolidated Railway, Atlanta, Ga.
Lowell Suburban Railway, Lowell, Mass.
Meriden Street Railway, Meriden, Conn.
New Jersey Electric Traction Company, Paterson, N. J.
Kankakee Electric Railway, Kankakee, Ill.
Russell B. Harrison, Pres., Terre Haute, Ind.
Utica & Mohawk Railway, Utica, N. Y.
Calumet Street Railway, Chicago.
Syracuse & Eastside Railway, Syracuse, N. Y.
Cortland & Homer Traction Company, Cortland, N. Y.
Columbus Central Railway, Columbus, Ohio.
Shamokin & Mt. Carmel Electric Railway, Shamokin, Pa.
Delaware Electric Street Railway, Delaware, Ohio.
Youngstown Street Railway, Youngstown, Ohio.
Oil City Electric Railway, Oil City, Pa.
Newburgh Electric Railway, Newburgh, N. Y.
Freeport Street Railway, Freeport, Ill.
Peoples Traction Company, Philadelphia.
Citizens Railway, Vincennes, Ind.
Woonsocket Street Railway, Woonsocket, R. I.
Rochester City Railway, Rochester, N. Y.
Winchester Avenue Railway, New Haven, Conn.
Rapid Transit Company, Akron, Ohio.
A. B. & C. Railway, Cleveland, Ohio.
New Haven Street Railway, New Haven, Conn.
Jasper County Electric Railway, Webb City, Mo.
Metropolitan Street Railway Company, Kansas City, Mo.
Bemington & Woodward Electric Railway, Portage, Manitoba.

MERRY-GO-ROUND.

It will be seen from the foregoing symposium that every manager who used a merry-go-round last season speaks of the attraction in highest terms. There is absolutely nothing which can be installed at resorts at so small expense, that can be operated so cheaply and which pays as well as this. We know of one case where the operating expenses were only $5.00 per day and the earnings ran as high as $300 and $400, on days when special efforts were made to draw the crowds. An electric motor run from the trolley circuit furnishes the cheapest kind of power, and the "riding gallery" lasts for years and is always popular. The Armitage-Herschell Company, North Tonawanda, N. Y., are practically the exclusive builders of these machines and no resort can really be said to be complete without one.

M. H. Crump, secretary of Park City Railway, Bowling Green, Ky., wants to correspond with street railway entertainment circuits for pleasure resort attractions.

ATLANTA RAILWAY'S FAMOUS RESORT.

Brass Bands—Bathing—Boating—Startling Effect of Submarine Colored Lights—Show White, Green and Red Fish—A Model Resort.

BY STEVEN H. BENNETT, TREASURER OF THE ATLANTA, GEORGIA, RAILWAY COMPANY.

Referring to your most excellent series of articles on "Pleasure Resorts for 1896," I take pleasure in responding to your request for the views and experiences of a southern railway man.

ATLANTA—AS SEEN FROM LAKEWOOD.

On the twenty miles of track we operate we have three principal resorts: Grant Park, belonging to the city of Atlanta, Fort McPherson, United States Government military post, and "Lakewood," and it is of this latter, which is owned by the railroad company, that I desire to speak. The park is situated on the line of the Atlanta Electric Railway Company, which road we operate, and is about four miles from the center of the city. The land is high and rolling and encloses a beautiful lake some 100 acres or more in area, and for natural beauty the park has no equal in this section. As we are an inland town this lake is considered very large indeed. The railroad winds round the hills in graceful curves and ends right on the shore of the lake. Situated in the ample grounds are numerous booths, and two dancing pavilions. One of these is probably the handsomest in the south, and in summer rarely a night passes that we do not have one or more trolley parties bound thither, bent on enjoying its glistening surface. A good band is kept in constant attendance: sometimes the United States military band, at other times visiting bands. Last summer the Mexican Typical Orchestra of over fifty pieces discoursed music here. Convenient to the dance halls is located a first-class catering establishment. On one side of the lake is a large, beautiful bathing house, and this delightful pastime is indulged in daily by the visiting throngs. This lake was formerly the source of the water supply for the city of Atlanta. Last year we furnished the lights for the grounds from our railway circuit, but this method of lighting was unsatisfactory, as, when the cars were approaching or departing with their heavy loads, the lights became very dim. A generator has now been installed on the grounds. It is operated by a turbine, and as there is a heavy fall of water, no further trouble has been experienced.

ATLANTA RESORT—LAKEWOOD, WHERE THE SUBMARINE ELECTRIC LIGHTS ARE PLANTED.

Adjoining the bath house is erected a Paul Boyton water chute, which is probably the only one south of Baltimore. This chute was secured from the company who ran it at the Cotton States and International Expo-

sition, where it was, undoubtedly, the greatest of all the attractions.

Just below the dam stands the enormous power plant of the old city water works. Along side the power house is the settling basin, and this basin is about to be used in a most novel way. A series of varied colored lights has been arranged in the bottom of the basin and these are turned on at night. The effect is strangely beautiful, in fact beyond description. Thousands of fish glide through these prismatic bands of light disporting themselves in piscatorial glee, if such a term

OUTLET FROM LAKE—ATLANTA.

may be allowed, now white, now green, now blood red, and the eye seems fascinated by the beautiful, ever changing scene. This form of attraction is entirely new to me and I feel it will be an unparallelled success. Liberal inducements are now being offered to the young men of the city and vicinity to form themselves into rowing clubs. This will make possible many contests and regattas which are always attractive, and in addition quite a revenue will be received from the members in their daily trips to practice.

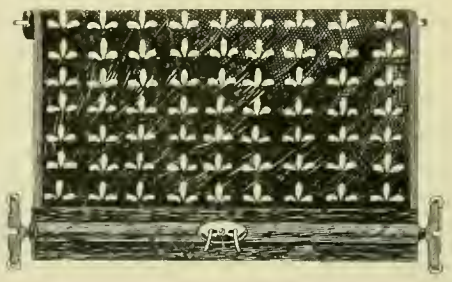
In an ideal part of the park we have a practical rifle range and during the summer we expect to have some of the military companies here during their annual encampment.

I believe we have in "Lakewood" an up-to-date resort, not one filled with velvety lawns and with the omnipresent sign "Keep off the grass," but one where the artificial attractions at their best are second to the natural.

A NEW CAR CURTAIN.

The Central Electric Company of Chicago is putting on the market a new car curtain and fixture, illustrated herewith, and of which it furnishes the following description:

This fixture is a radical departure from the former methods of overcoming the annoyances encountered in the use of car curtains, viz.—those of bent rods, cramped rollers and lack of self-adjustment. These curtains are self-adjusting. It will be noticed that the end of the fixture, which fits into the groove at the side of the window, is so arranged as to bring the leather shoes to bear upon the inside of the groove when at normal. At the end of the little arms which are attached to the ends of the spring rods, there are small rollers. The advantage of these rollers is that when the curtain is thrown out of line or one side is pushed up or pulled down, they will readily draw themselves back into line again; whereas, with other makes it is necessary to use



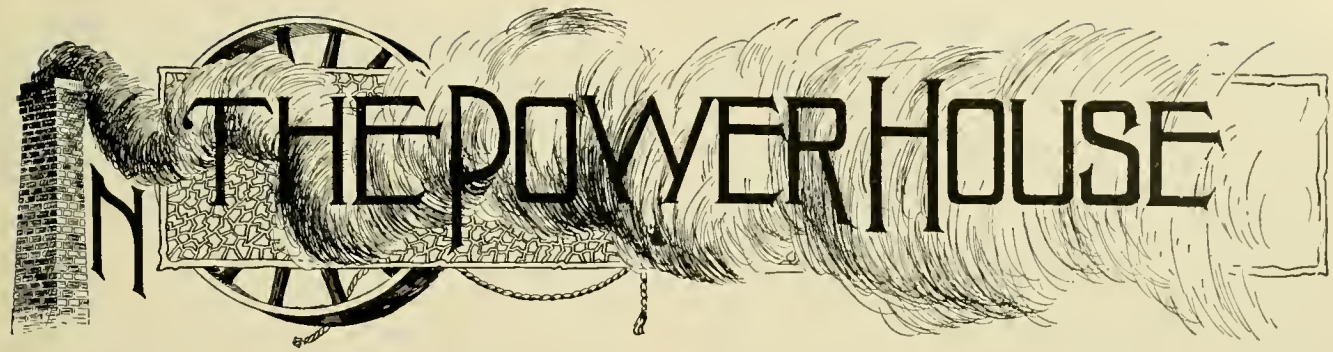
care in adjusting the curtain, or the fixture will become cramped and cause more or less trouble. These curtains are meeting with the approval of curtain users as it is claimed that these fixtures and curtains will materially reduce the expense of maintenance. These curtains are furnished for closed or open cars, for any width of window and are made from either sarinac, best cotton tapestry or highest quality of duck.

IF YOU ATTEND THE LIGHT CONVENTION, TAKE THE SPECIAL TRAIN.

Those of our readers who attend the National Electric Light convention, and any who intend going east to attend the Electrical Exposition, both of which will be held in New York city, should by all means so arrange their plans as to go on the electric special.

The convention opens May 5, and the Exposition will be inaugurated on the evening of May 4. With their usual progressive ideas, the Lake Shore & Michigan Southern have placed at the service of the western delegates and visitors, a superb special train of finest palace sleepers, diners, etc. A special fast run will be made and passengers landed in New York within 24 hours after leaving Chicago. An excursion rate of one and one-third fare for the round trip has been made, and passengers may stop off at Niagara Falls either going or returning as desired. Delegates may take the train at any prominent point along the line, by arranging with their local ticket agent. The Lake Shore and New York Central afford the finest railroad travel in the world, and a special agent will accompany the train to see that every want is supplied. The train will leave Chicago on Saturday, May 2, at 5 p. m. The party will be a very large one, including all the prominent electricians in the west, and none who intend going should fail to take the special.

For further particulars address C. K. Wilber, W. P. A., Chicago, or call at the city ticket office, 180 Clark street, Chicago.



This department is devoted to the construction and operation of electric railway power houses Correspondence from practical men is specially invited. Both the users and makers of power house appliances, are expected to give their views and experiences on subjects within the range of the department.

We present herewith in tabulated form the figures on power plant performance which have been received and published within the past six months. Those desiring fuller information about any of the plants reported in the table can obtain it by looking in the issue in which each report was first published. Reports numbered from 1 to 8 inclusive appeared on pages 639 and 640 of our October, 1895, issue; those numbered from 9 to 13 appeared on pages 715 and 716 of our November, 1895, issue; reports 14 and 15 appeared on page 787 of our December, 1895, issue; report 17 appeared on page 100 of our February, 1896, issue; reports 18, 19 and 20 appeared on pages 139 and 140 of our March, 1896, issue. In some cases they have been revised and corrected as far as possible because the reports as turned in to us and as first published did not all check up correctly. Although we have the promise of more reports in the future, we think best to summarize the reports so far received in a table because they can be more easily studied and compared. It represents the results of much labor on our part, but we feel fully repaid by the words of commendation we have received for undertaking this work, and by the knowledge that much good will come from it. The table as it stands certainly presents an interesting and valuable study notwithstanding the many unavoidable blanks. Reports 6 and 14 are from plants with mechanical stokers. Among the best reports is number 19. It shows the best evaporation of any on the list (it has forced draft and economizers in the stack), and in spite of the high price of fuel comes out with a total cost of power comparing favorably with many plants where fuel is cheaper, and this, too, without excessive fixed charges. The great economy of condensing is in all cases apparent. The most striking differences are in the water evaporated per pound of coal. Even allowing for the differences in coal there are still great variations, part of which no doubt can be accounted for by wet steam and errors in water meters. When the water consumption of the engine is low, however, there is no probability of wet steam. Allowing for all errors it is not too much to say that there is more chance for improvement in methods of burning coal than in any other step in the transformation of the energy between coal pile and line.

No of Report.	Description of equipment.	Output in e. h. p. hours per day.	Hours railway is operated per day.	Fuel consumed per e. h.p. hour (pounds).	Cost fuel per e. h. p. hour (dollars).	Water used per e. h. p. hour (pounds).	Water evaporated per pound of coal (pounds).	Cost station labor per e. h. p. hour (dollars).	Interest on cost of station per day (dollars).	Interest on cost of station per e. h. p. hour (dollars).	Water, taxes insurance, etc., per day. (dollars).	Water, taxes and insurance per e. h. p. hour (dollars).	Cost oil and waste per e. h. p. hour (dollars).	Total cost power per e. h. p. hour (dollars).	Total cost power per motor car mile (dollars).	Cost fuel per ton of 2,000 pounds at power house (dollars).	Kind of Fuel.
1	W. T. boil. Comp. cond. marine eng. Direct belt	15,267	21	6.14	.00316	22.	3 08	.00166	17 40	.00113	12.60	.00082	.00024	*.00759		1 02	Ohio lump and slack.
2	W. T. boil. Comp. high speed eng. Direct belt	2,508	24	4.30	.00645	28.	6.60	.00140			12 50	00498	00039	.00824		3 00	Pittsburg lump.
3	Hor. ret. flue boil. Comp. cond. h. s. eng. Direct belt	2,038	18	4.90	.00622			.00367					.00016	.01005	.00882	2.55	Soft lump.
4	Hor. ret flue boil. Simple corliss eng. Line shaft	3,150	18	8.00	.00800	35.	4.37	.00300								2.00	Soft screenings.
5	Lancashire boil Comp cond. corliss eng. Direct belt	46,000	24	2.78	.00308				110.00	.00239				.00470	.00940	2.22	Soft screenings.
6	Hor. ret. flue boil. Comp. cond. m. s. eng. Direct belt	4,500	24	3.00	.00118	20.	6.66	.00200	7.00	.00155	5.00	.00111	.00015	.00335	.00940	.79	Soft screenings
7	Hor. ret. flue boil. Simple corliss eng Direct con'ed	14,469	24	5.00		30.19	6.03								.01520		Soft lump
8	Hor. ret. flue boil. Simple cond. corliss eng. Dir. belt	2,188	17.5	5.00	.00250	23.	4.60	.00500					.00012	.00762		1.00	Soft screenings
9	Hor. ret. flue boil. Simple corliss eng. Direct belt	1,323	18	3.90	.00514			.00600					.00030	.01144	.01500	2.65	Soft run of mine.
10	Hor ret. flue boil. Comp. cond. corliss. Line shaft	2.560	16	3.06	.00307	20.6	6 75									2.40	Soft screenings.
11	Hor. ret. flue boil. Comp. cond. corliss. Direct con'd	7,700	20	2 62	.00340								000320	00500	.00800	2.00	Soft pea.
12	Water tube boil. Simple cond. corliss. Direct belt	7,100	24	.3 gal	.00400	27.	9 pr g	.00200	20.00	.00280			.00020	.00620	.01650	.015	Per gal. Oil fuel.
13	Water tube boil. Comp. cond. corliss. Direct con.	3,444	20.5	3.66	.00439			.00428	18.00	.00522			.00043	.00946	.01205	2.40	Soft lump
14	Hor. ret. flue boil. Sim. h. s. and corliss eng. Dir. belt	48,000	24	3.85	.00202	29.8	7.74	00102				.00019	.00010	.00335		1.05	Soft lump.
15	Water tube boil. Triple exp. cond corliss. Line shaft	14,250	19	.24gal	.00576	24.0	10pr g	.00140	45.00	.00315	4 50	.00031	.00010	.01080	.0280	.024	Per gal. Oil.
16	Water tube boil. Comp. h.s. eng. Direct connected	5,000				23.	9.00										
17	Hor. ret. flue boil. Simple h. s. eng. Direct belt	720	18	6.00	.00525			.00500			.85	.00110	.00050	.01185		1.75	Soft run of mine.
18	Water tube boil. Cond. comp. and simple eng. D't b't	21,862	20	4.39	.00460	35.56	8.33	.00293					.00019	.00782	.01267	2.10	Soft lump.
19	Water tube boil. Comp. cond. corliss eng. D't con.	5,021	19.2	2.14	.00428	21.4	10.00	.00349	18.50	.00368	3.25	.00061	.00035	.00812	.03132	4.00	Soft lump.
20	Hor. and upt. flue boil. Co'p.c'd corliss eng. D't con.	8,713	19	3 90	.00312			.00123	20.54	.00235	.80	.00009	.00019	*.00759	.01322	1.60	Soft nut and slack.

* Including fixed charges.

* * *

Considering the great gain in economy made by condensing engines it is strange that more attention has not been given in the past to means for providing water for condensing where the station is not situated on a natural body of water. The saving of fuel by condensing is from 20 to 30 per cent. This saving will pay interest

on a good sized investment, and make it worth while to investigate very closely the methods which have been used for cooling, and using over and over again the same condensing water. There is no experiment about these methods. It is merely a question of having spare room in which to put the cooling apparatus. The extremely large street railway plants probably do not have room for the extensive apparatus needed for cooling a great quantity of water, but there are a great number of smaller plants where there is more room in proportion to the water required and which could put in a water cooling plant to advantage. The amonnt of water required for condensing purposes under ordinary conditions is from twenty to thirty times that used by the engine the exhaust of which is being condensed. The Atlanta Consolidated, as will be remembered by '94 convention visitors, has a water cooling plant. It is a rectangular structure 16 by 20 feet and 20 feet high, filled with rough pine lumber laid loosely crisscross. The condensing water is pumped to the top of this and allowed to trickle down in thin sheets over the lumber so that by the time it reaches the cistern at the bottom it is cool. Four sixteen-foot fans at the bottom keep a circulation of air through the lumber in the cooler. This, if our memory is correct, is regularly cooling condensing water for about 500-horse-power. The Second District station of the Edison Illuminating Company at Brooklyn, N. Y., has a cooler made of tile stood on end with staggered joints. It is 15 feet in diameter 33 feet high and cools 1,000 gallons of water per minute from a temperature of 100 to 115 degrees to 50 or 75 degrees, according to the weather and load on engines. The air circulating fan puts 100,000 cubic feet of air per minute through the tower. Warm weather does not greatly affect the efficiency of apparatus of this kind, because the cooling effect of the air is due partly to evaporation, and warm air will absorb more moisture than cold air. There are certain districts in this country where boiler scale is an astonishing item of expense, and in such the employment of surface condensers which give distilled water for boiler feed would be a powerful incentive to the installation of condensing and cooling apparatus.

HIGH VOLTAGE ARMATURE TESTING AT INDIANAPOLIS.

In our last January issue we described the high voltage testing apparatus which was to be installed in the shops of the Citizens Street Railroad at Indianapolis, for testing armatures, and the materials entering into their construction. This has since been put in, and the results have been very satisfactory. The apparatus consists of a rotary transformer taking current direct from the trolley circuit, and giving at its other terminals an alternating current which is put through a static transformer. This static transformer gives any voltage desired up to 10,000, for testing purposes. Its use has resulted in a great improvement in the quality of work turned out of the armature winding department. It was found that there were certain weak places in armatures as they had been previously wound, and the high voltage test revealed these weak places so that they were remedied. When the high voltage test was first used some newly rewound armatures broke down with a pressure of only 1,200 volts alternating current between the windings and core. The particular trouble was found to be in the leads, and when tubes were substituted for the tape that had been used all armatures were able to stand the 2,100-volt test, which has been adopted as the standard for a completed armature. The use of this apparatus has made the armature winders extremely careful in their work, because they have the assurance that the test will bring out any imperfections there may be.

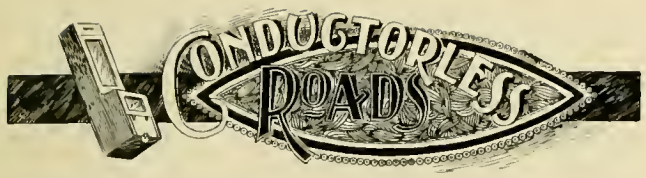
TEXAS ASSOCIATION MEETS AT GALVESTON.

The Texas street railway men held their second annual convention at the Hotel Grand, Galveston, March 18. The object of the meeting is set forth in the following preamble: The acquisition of experimental, statistical and scientific knowledge relating to the construction, equipment and operation of street railways, and the diffusion of this knowledge among the members of the association, with the view of increasing the accommodation of passengers, improving the service and reducing its cost: the establishment and maintenance of a spirit of fraternity among the members of the association by social intercourse, and the encouragement of cordial and friendly relations between the roads and public. The convention lasted two days. Col. W. H. Sinclair, the president, presided and delivered the opening address, which had the true Texas ring. Representatives from nearly all the street railway companies in the state were present, and the papers read were thorough and interesting. Track repairs were discussed at considerable length. It was generally conceded that the T rail is now the proper construction. Trolleys, and general overhead construction consumed considerable time of the convention, the style, size and other matters of interest being gone into. The question of fire insurance was also taken up, and a permanent committee was appointed to take action upon it. Street traffic stimulators, travel to public parks, etc., was freely gone into. The amusements and tastes of the people were discussed, and it was decided to investigate the matter more fully with a view of establishing a street railway amusement circuit.

Officers were elected as follows: Col. William H. Sinclair, president; Carl F. Drake, Austin, vice-president; C. L. Wakefield, Dallas, secretary. These, together with George P. Hendricks, of Fort Worth and A. H. Hayward, of Houston, will constitute the directory.

The president appointed the following a permanent committee on insurance: C. F. Drake, Austin, Chase of Houston and Sayle of Dallas.

Wednesday, March 3, 1897, was selected for the next convention. It will be held in Austin. The meeting was a great success; every courtesy was shown the visitors by the Galveston people.



We have been requested to compile a list of roads on which cars are operating without conductors; and while the list given below is undoubtedly far from complete, we have been surprised to learn how small the number is. We shall be glad to have the managers of any other lines operating without conductors advise us, in order that the corrected list may be reprinted in full.

In some of the larger cities municipal decree requires the presence of both driver and conductor on every car: in some others one conductor is allowed to have charge of both the motor and trailer when latter is attached. It may be given as a rule, however, that where travel is sufficiently heavy to crowd the trailer the company will find it is a good investment to put a man on both cars. On long runs and suburban lines, however, this argument has much less force. The following is a list of

ROADS WITHOUT CONDUCTORS.

Name.	Miles.
Dubuque, Ia., Street Railway	15
Dubuque Traction Co.	10
Richmond, Ind.	11
Hamilton & Lindenwald Electric, Hamilton, O.	9
Menasha & Neenah, Neenah, Wis.	4
Kankakee, Ill., Electric	6
Lorain, O., Street Railway	10
Louisville, Ky., Railway Co.	100
Streator, Ill., Railway	5
Fox River Electric, Green Bay, Wis.	6
Appleton, Wis., Street Railway	4
Merrill, Wis., Railway & Light Co.	2
Waterloo, Ia., Street Railway	2

ROADS PARTLY CONDUCTORLESS.

Anderson Electric Railway, Anderson, Ind.
Bloomington City Railway, Bloomington, Ill.
City Electric Railway, Decatur, Ill.
Consolidated Railway, Macon, Ga.
Eau Claire Street Railway, Eau Claire, Wis.
Logansport, Ind., Street Railway.
State Electric Co., Clinton, Ia.

In explanation of the above it may be added: the Richmond, Ind., road, does not use conductors except on big days, as they find the motorman can ordinarily look after the fares without taking any risk. The Fox river line, Green Bay, Wis., also uses conductors on Sundays in summer, and big days. The Anderson, Ind., Street Railway dispensed with conductors in the summer of 1894, but replaced them in the fall of the same year. They have one short line on which the motorman still does double duty.

The Kankakee, Ill., road, runs without conductors, finds no difficulty in doing so, and is enabled to give a correspondingly better car service, than the revenue would otherwise permit. Both the Dubuque, Ia., roads are conductorless, and no trouble is experienced in loss of fares from passengers trying to escape payment.

The City Electric Railway, of Decatur, Ill., is operating a majority of its cars without conductors, although on two of the divisions conductors run regularly, but on the balance of the road the traffic will not warrant the expense.

On the Hamilton & Lindenwald Electric Transit Company, of Hamilton Ohio, the cars are still operated with one man except on special occasions.

C. K. Minary, manager of the Consolidated Railway, Springfield, Ill., says: "You may strike us off your list of roads operating without conductors, as we do not concede that we are running without conductors. It is true the conductor on some lines drops off and comes back and the car goes to the end of the road without him, but then no fares are collected and we have no fare box."

The Eau Claire, Wis., Street Railway operates without conductors in the winter time, but replaces them during the summer months.

Probably the largest road in the country which is operating without conductors is the Louisville Railway Company, under the very successful management of T. J. Minary. They have over 100 miles of track and are operating without conductors.

The Macon Consolidated Street Railroad is one of the lines partly without conductors, and of the system employed there Superintendent Winters says: "I have three lines on our system on which cars are operated without conductors, or, in other words, out of seventeen regular cars we run conductors on only six of them. In this connection I will say that I was the first railroad manager in Georgia to adopt a fare box on electric cars. This was about four years ago, and it is needless to say that there were a great many uncomplimentary things said about me at the time, but I had to economize and retrench, in every other way we could think of, and was still unable to make the road pay as I thought it should. My experience in the past four years has fully sustained my action, for I have found it a great saving to dispense with the services of a conductor."

On the Appleton, Wis., road, conductors have never been used. The Logansport, Ind., line dispenses with conductors in the winter but uses them all summer.

The State Electric Company, running from Clinton, Iowa, to Lyons, Ill., uses two conductors at the Clinton end and one at the Lyons end, of the line. These men board the car as it approaches the heart of town, and remain until they meet the next incoming car, as they go out on the return trip.

Horseless mail wagons will probably soon be in use in all the large cities of the United States. The post office department at Washington has been studying the project for many months, and a model motor carriage is the outcome of its efforts, which will be put into service at once.

In San Francisco transfers will be issued by transfer men instead of conductors.

POWER DEVELOPMENT COMPANY, OF SAN FRANCISCO.

The Interesting and Promising Installation Under Way at Bakersfield, Cal.

In the Rockies, and among the snow covered Sierra Nevadas, much interest is being taken in the development and utilization of the hundreds of thousands of horse-power, which for ages have plunged down the mountain sides, and finally glided to the peaceful waters of the Gulf or Pacific. These perpetually snow-fed streams are waiting to be harnessed, and made to yield fortunes, but until the application and transmission of electricity it has been possible to utilize these magnificent powers in only a few isolated instances, and these chiefly for local mining purposes. The constantly enlarging possibilities of long distance transmission are now making possible many undertakings hitherto unpracticable.

One of the most promising, is the operation of the Power Development Company, of San Francisco, its directory and officiary including names that command respect, and indicate solidity to all familiar with the coast. The corporation is a close one and is unique among companies engaged in similar work, in that it has no bond issue, no stock for sale, and takes the cash discounts on all its purchases.

The company was organized in October, 1894, for the general purpose of developing natural water powers, and electrically transmitting the power to points of use. It began work here soon after its organization, has been continuously engaged to the present time, but delayed somewhat through inability to secure some needed sites, rights of way, etc. These difficulties are now surmounted, and everything possible is being done to complete its plant at an early date.

The power proposed to be transmitted to this town is to be obtained from the Kern river, at a point in a rugged canon about 16 miles away. The necessary head will be obtained by constructing a rectangular flume 6 feet by 8 feet, along the precipitous side of the canon, a distance of about 8,500 feet then dropping it 200 feet through about 600 feet of 66-inch wrought steel pipe, to impact wheels, to be direct connected to two 450-kilowatt generators. The grade for the flume has been completed at an expense approximating $20,000, the material for the flume is on the ground, where a steam plant has been installed to prepare it for the construction gang shortly to be put at work. The pole line is under way, all poles will be set in a few days, and the line wire, about 70,000 pounds of No. 4 copper, is in the warehouse.

The flume referred to will carry sufficient water to develop about 10,000 horse-power. The pipe line first installed, will provide water at the power-house, for about 3,000 horse-power. The electrical equipment specifications bids to be opened April 15, prox. call for two 450-kilowatt alternating generators, with necessary raising and lowering transformers, switch-boards, etc. Bids are in hand from the General, Westinghouse, Stanley, Allgemeine and other companies.

The active manager of the company's affairs is Carroll N. Beal, one of the directors, and also secretary and treasurer. Mr. Beal says that his company desires only to do a wholesale business, that is: that it has no desire or purpose to engage in lighting or street railway enterprises, preferring to furnish the current to other corporations engaging in those lines, and to manufacturers. Mr. Beal says the plant when completed will cost about $225,000, that it will be paid for and, having no interest charge, is in a position, as well as disposed to deal liberally with any consumer; that his stockholders do not expect any dividends for several years, being content to occupy a most promising field and wait while aiding in its development. The policy of the company seems wise. It is estimated that the cost of a steam horse-power there is above $125 per year of 300 ten hour days: also that if a demand can be created for the power which the Power Development Company can generate from its first installation of electric machinery, it can be delivered profitably at 60 per cent to 70 per cent discount on above figures.

Mr. Beal will gladly answer correspondents who may be looking for cheap power in the midst of a prosperous community of consumers, of manufactured articles now producing only those things that spring from the soil, these, however, in an abundance that is truly astonishing.

A DESPERATE SITUATION.

A manager of an eastern road which had changed to trolley, and could not dispose of his old horses, bethought him of a brilliant scheme, and wrote the congressman from his district, asking what was the chance to sell in Washington. The answer came, but it was full of grief, as follows: "The people of Washington ride bicycles, the street cars run by electricity and cables, and the government is run by jackasses. No demand for horseflesh."

MILWAUKEE BELL SIGNALS.

April 1 Milwaukee inaugurated a new code of bell signals for railway trainmen. The system is a very good one, simple and comprehensive, and should greatly facilitate the handling of cars, insure a better fidelity to the time schedule and lessen the per cent of accidents. It is as follows:

WHEN GIVEN BY CONDUCTOR.

1 Bell—Stop at next crossing.
2 Bells—Go ahead.
3 Bells—Stop at once, emergency.
4 Bells—Change ends, run back.

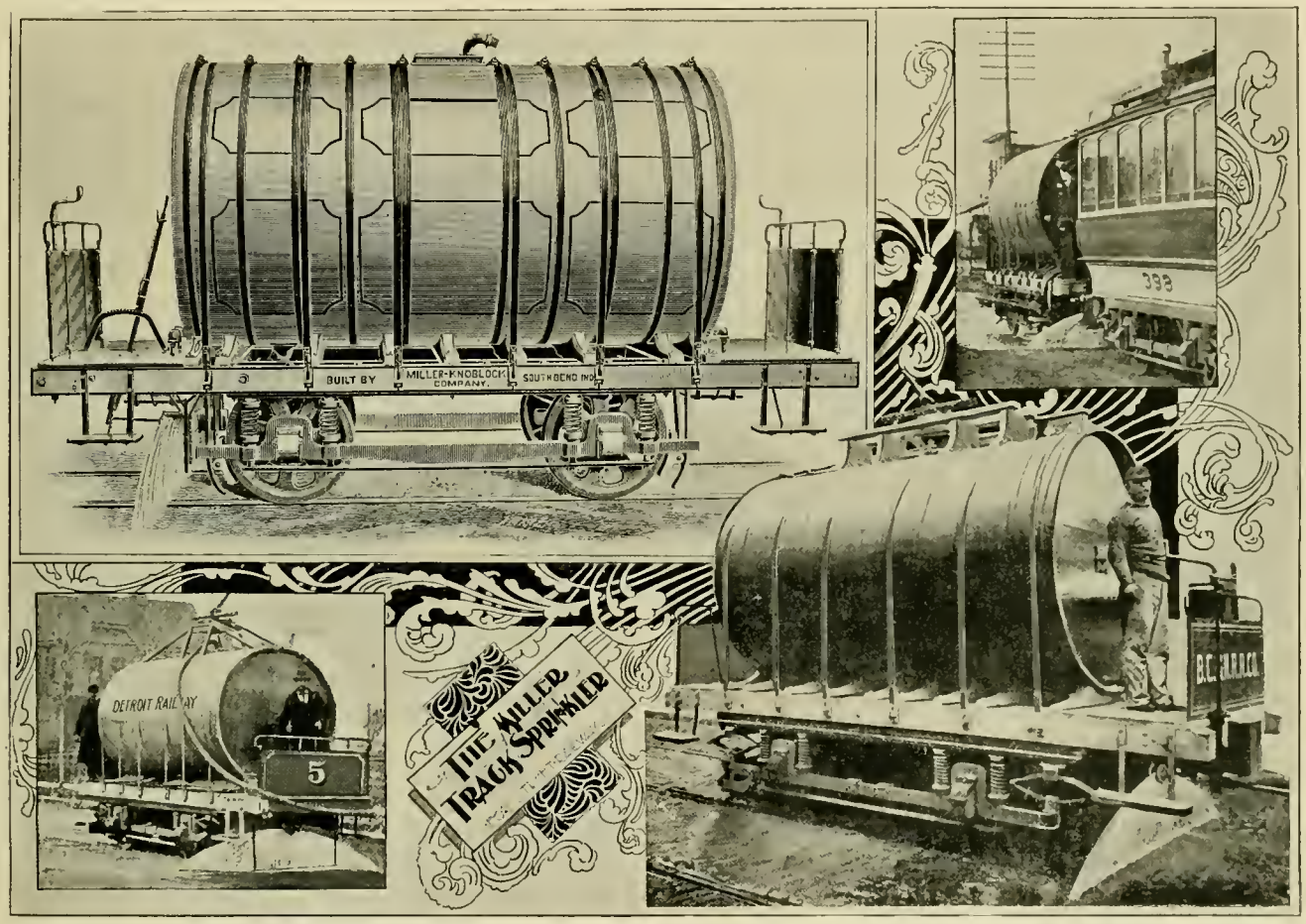
WHEN GIVEN BY MOTORMAN.

1 Bell—Fares on front platform.
2 Bells—Look out for trolley.
3 Bells—Set the rear brake, danger.
4 Bells—Change ends, run back.

The two bell signal, when given by the conductor, will not authorize the motorman to start his car when passengers are getting on the front platform.

CAR TRACK SPRINKLING.

As street cars, especially on electric lines are moved faster than formerly, resulting in the raising of much dust that is not only annoying to the passengers, but which hastens the wearing of journals and axles and motors, the sprinkling of the street between and adjacent to the rails is becoming a necessity. There are lines, on which the dust in dry weather was almost intolerable. The use of sprinklers, on these tracks has abated the dust nuisance, which is not only appreciated by the passengers, but results in a saving of machinery. We are told by some railroad men that the best investment on the line, is a sprinkler in summer. Some roads have sprinkled for years, the superintendent fixing up a home-made tank and using an old truck, resulting in most cases in a make shift at best, and one that lacks the essential features. We show in this issue illustrations of a very successful track sprinkler, built on lines suggested by experience, and furnished ready to operate. The Miller-Knoblock Company, of South Bend, Indiana is the pioneer in this branch of railway equipment, having the advantage of several years' experience in the building of these cars. They build either complete sprinkling cars, motor or trailer, or where railroads have trucks, they furnish the tanks and sprinklers. They use a patented brass telescopic, variable sprinkler head, which the operator controls by a lever from the platform. When the car starts up the operator pulls the lever back a notch in the ratchet index, sprinkling lightly, and as the speed of the car accelerates, he can open the head wider, adapting the flow of the water to the speed of the car, so that the ground is uniformly wetted, irrespective of the speed of the car, and making it possible to economize water by sprinkling less when the car is running slowly. By the proper arrangements of the sprinkler heads, any kind of work can be performed, and it is the desire of the company that parties contemplating putting on sprinklers should write and say what kind of sprinkling they want to do then the proper appliance will be suggested. The ordinary tank contains 2,500 gallons but that is varied according to track and motive power. Any standard make of truck will be furnished, either motor or trailer. One sprinkling head is sufficient for sprinkling the track and say two feet outside, but for wide sprinkling, two or more heads are necessary. The Miller-Knoblock Company invites inquiry and correspondence and is ready at all times to give anyone the benefit of its experience.



Twenty-five new cars are being built for the Mission street line of the Market Street Company, San Francisco.

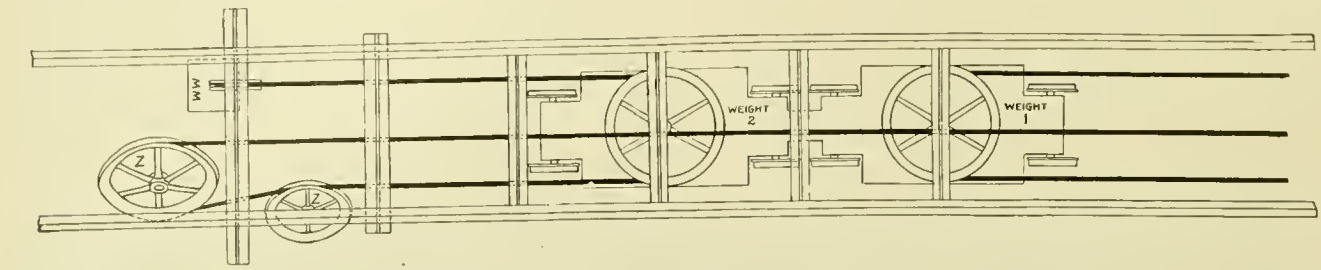
COUNTERWEIGHT SYSTEM AT PROVIDENCE, R. I.

BY M. H. BRONSDON, C. E., UNION RAILROAD.

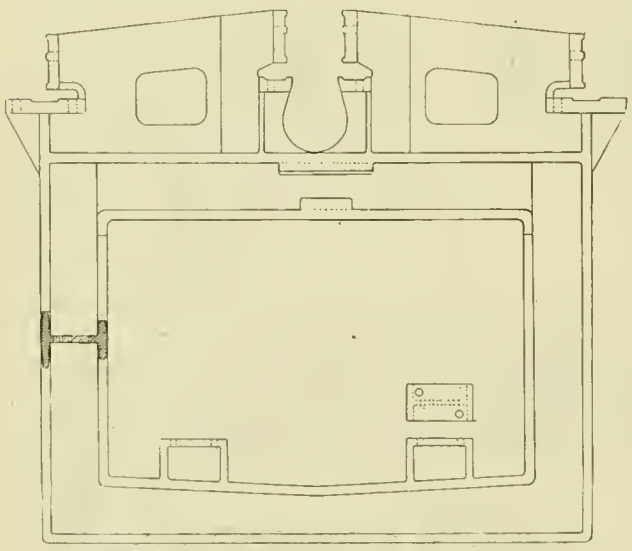
The system, as shown by the engravings, was designed and built to move electric cars over College street hill at Providence, R. I., when electricity was installed to take the place of the cable.

College street has an inclination of 15.2 per cent. It will be readily seen, therefore, that traction alone is not to be depended upon to move cars up and down this incline.

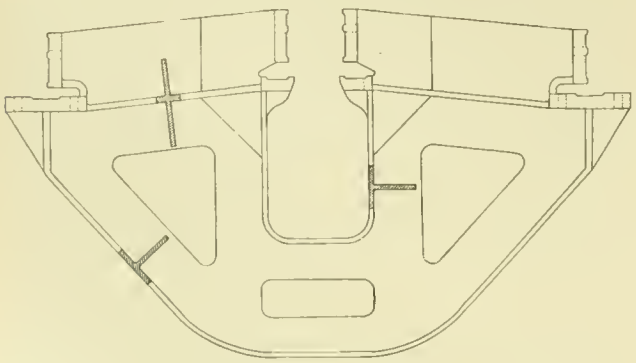
Several systems have been invented to move cars over grades, but none have fitted this case on account of a horizontal curve (with three verticals) on the incline.



ARRANGEMENT OF CABLES, SHEAVES AND WEIGHTS, LOWER END —(SEE OPPOSITE PAGE).



YOKE FOR GRIP AND COUNTERWEIGHT CONDUIT.



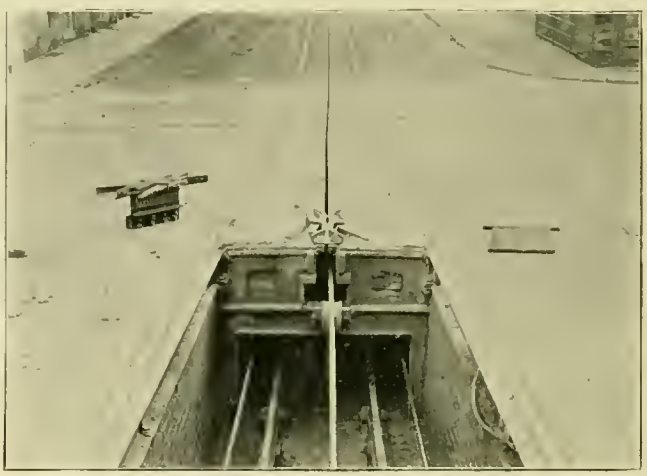
YOKE FOR GRIP CONDUIT.

Some of the systems invented have many comendable features, while others have none.

Any system of heavy weights to be run under the principal public streets must be noiseless and operated without shock or jar. The conduit must be ventilated, otherwise gas from leaky pipes will accumulate in the conduit and explosions are liable to happen, as instances have proven. The weights, also, should have as large wheels to carry them as may be used, economy of construction and operation considered. The weights should also be supported by springs, both steel and rubber, to avoid rumbling.

The construction of the road should be such that it will withstand heavy cross traffic, not be affected by snow or ice and the slot keep its proper opening under all conditions.

The griping device is one of the most important factors in any system, and should be positive in its action, otherwise the weights are liable to get away and run down the incline. It must be of such dimensions as will allow a car to pass over it without striking it and strong enough to withstand teaming over it in case it be left in the street over night.



GRIP TUNNEL—COUNTERWEIGHT TUNNEL—GRIP RELEASED FROM CAR AT LET-GO BLADE THAT FASTENS TO CAR AND GRIP READY TO BE PLACED ON CABLE.

With all the above in view I have worked out the system as shown.

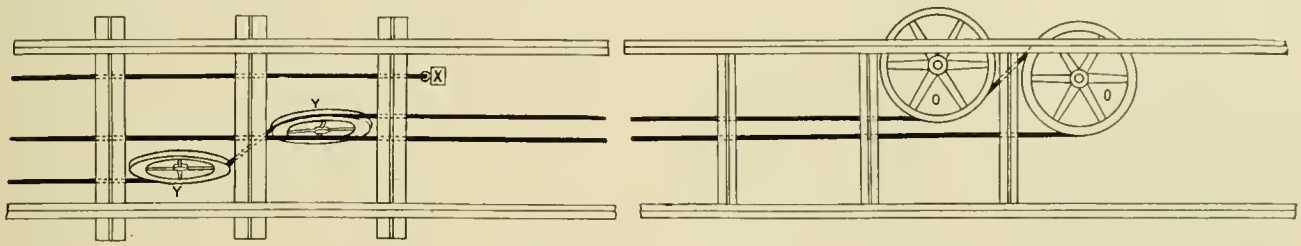
The yokes are made to receive Johnson 70-pound Z bar slot rail, which is fastened with four ¾-inch bolts at each yoke. This slot rail has good wearing

surface, and readily receives paving, although any slot rail can be used in this system. For wheel rail we have used Wharton 90-pound girder fastened at each yoke with six ¾-inch bolts, suspended joints, although any size or shape of rail may be used.

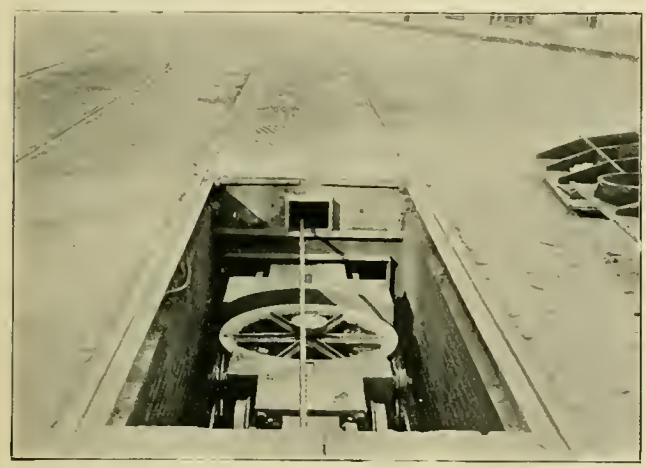
For the counterweight rails we have used Johnson 4-inch T rail. It is obvious that these three sets of rails when bolted to the yokes make a very rigid and strong construction.

The yokes in this case have been set in Atlas cement concrete. The sides of brick and the street surface of sea stone or cobble paving. The division between the counterweight and grip tunnel is made of 5-inch creosoted hard pine, except at street crossings, where I beams set in concrete are used. Loads of twenty-two tons have been carried across this construction without the least particle of closing of the slot.

The large yokes were tested to see what strain they would carry, and were found to break at sixty-seven tons.



ARRANGEMENT OF CABLES, SHEAVES AND WEIGHTS, UPPER END—(SEE OPPOSITE PAGE.)



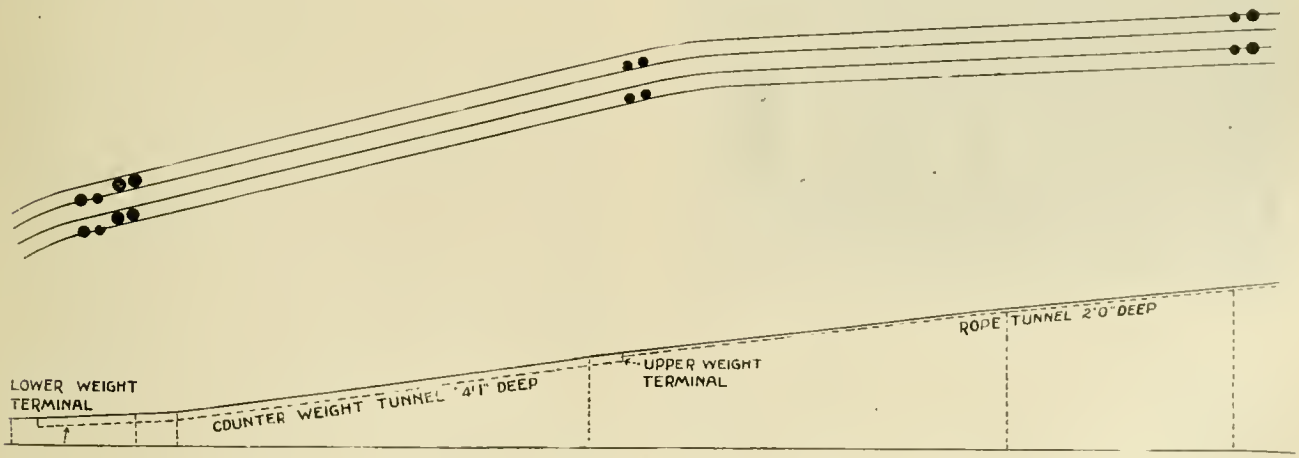
ONE OF COUNTERWEIGHTS WITH HORIZONTAL SHEAVE—SWITCHES AND PLATES OVER LOWER TUNNEL.

The grip is arranged to open automatically to guard against thump or shock should a motorman not use judgment as to speed in releasing at "let go" places.

TRAIN ON GRADE SHOWING GRIP CAR.

We are running eighteen cars per hour, cars from seven different lines, up and down the hill at six-notch speed. On this line we use a grip car, thus obviating the necessity of equipping the eighteen or more cars with a griping device. In this way any car of any line may be put over College street hill.

It will be seen by the photos that we have two systems installed. Either one of these will handle the eighteen



PLAN AND ELEVATION OF 15 PER CENT GRADE.

cars per hour, excepting when the cars become blocked or get off time. One particular object of the grip car is that in case of a blockade a string of cars may all be carried up or may be carried down the hill. In other words, alternating of cars up and down the hill is not necessary to make this system operative.

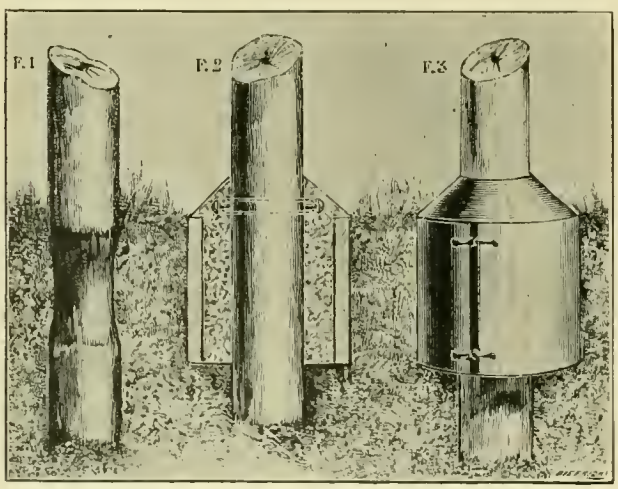
The principle of the new system will be readily understood by referring to the general plan. One end of the cable is fastened at *x* and passes down the lower or counterweight tunnel to No. 1 weight around a sheave set therein, and back through the same tunnel to deflecting sheaves, yy, at Benefit street, where it passes into the grip tunnel; along the grip tunnel to top of the incline; around the sheaves oo back through the grip tunnel to the foot of the incline; around the sheaves zz; into the counterweight tunnel and up and around the sheave set in No. 2 weight back to the tension weight. The object of the tension weight is to keep the cable taut and is regulated as necessity demands.

The system has been in operation since last October, having passed through the snow and sleet storms of the winter without any slipping or sliding of cars. Patrons of the road were loth to have the cable road removed, contending that electricity would be dangerous on College street hill, but they are now completely won over to the new system.

(Mr. Bronsdon advises us he will gladly furnish estimates and plans to any road desiring to install this system.—Editor.)

PRESERVATION OF WOODEN POSTS.

The conduction of the electric current for various purposes, necessitates the use of an immense number of wooden posts as supports for the conducting wires and cables and the preservation of these posts, which are set



PRESERVATION OF WOODEN POSTS.

in the ground, is a question which has caused electric and other engineers a large amount of thought.

According to La Nature great interests are involved for it is estimated that in Europe alone there are about 20,000,000 posts in use for carrying electric wires. The wood where it is set in the ground, "betwixt wind and water" is very soon destroyed and a number of posts have to be replaced each year. It is estimated that in Europe alone the maintenance of the posts costs nearly $4,000,000 per year.

Attempts have been made to prolong the life of the post by the injection of metallic, as sulphate of copper and iron, or creosoting and a certain measure of success has been obtained, but in time rains dissolve and carry away these substances. It is now proposed to protect the weak point of a post by a stone-ware cover. This has been tried and has given good results.

Numerous observations have shown that a post is attacked for a length of from ten to twelve inches from the surface of the ground, which is the depth to which rains usually penetrate. This distance is covered with two half cylinders of salt-glazed stone-ware joined together, and the space between the stone-ware and the post is filled with a damp resisting cement, such as Portland cement with sand, or gravel. A ring is fixed onto the post just above the level of the stone-ware coat and the top is made up of cement laid at an angle so that the rain will run off. Fig. 1 shows an ordinary unprotected post rotted by damp. Fig. 2 is a section and Fig. 3 an external view of a post protection.

Very careful experiments go to show that this method of preserving a post will increase its life by more than five times and the cost would be very slight in comparison to the benefits obtained.

AMMONIA MOTOR AGAIN.

The Standard Fireless Engine Company, of New Orleans, which has been experimenting for several years with an ammonia motor, announces it is now a working success. The ammonia gas is generated at the station and the car charged therefrom. A run of one and a half miles was made in five minutes, and the local papers state the objectionable odor has been overcome.

If, on further tests the car works as well as on its initial trip, the company will place the motors on the market.

CITY OF MEXICO DEAL.

The lines in the City of Mexico, comprising an extensive system have finally changed hands, and are now owned by English capitalists. Selling price was $3,500,000. Conversion to the trolley system will be made as soon as the work can be accomplished. The chief engineer is Henry A. Butters, whose address is Hotel del Jardin, City of Mexico. Mr. Butters goes from Berkeley, Cal. The consulting engineer is T. W. Orbison, of Appleton, Wis., who has just returned from Mexico and will be at Appleton for a week or ten days.

A cylinder head went through the roof of the Covington road's power house, March 6.

INTERURBAN EXPRESS AT BINGHAMTON, N. Y.

BY J. P. E. CLARK, GENERAL MANAGER BINGHAMTON RAILROAD.

The introduction of freight and express service upon suburban and interurban electric roads is attracting wide spread attention. Is it practical; and, will it prove profitable, are paramount questions, both of which have been answered in the affirmative, wherever a freight or express service has been introduced under anything like favorable circumstances.

One of the most successful freight lines in New York state is operated by the Albany railway, between Troy and Albany, and intermediate points. The business, which was inaugurated in a modest manner, with one small freight car, has developed within a few months to a traffic of large proportions, requiring a number of cars to transport the immense shipments of freight, and roomy freight depots in each city for the storage thereof. This business has developed in the face of the competition of two or three steam roads connecting the two cities. Shippers patronize the electric freight line in preference to the steam roads for obvious reasons—principal among which are prompt shipments and frequent service, offering all the advantages of an express service, excepting the collection and distribution of merchandise. Furthermore, the freight depots are centrally located in the business portion of both cities, making them accessible and convenient. There are numerous other freight lines in practical operation in New York, and adjoining states, all yielding fair returns and in several instances handsome profit.

The introduction of express service upon electric suburban roads is more of an experiment. The only line in practical operation in New York state at present is upon the Binghamton, Lestershire & Union extension controlled by the Binghamton Railroad Company This division is nine miles in length, connecting Binghamton, a city of 45,000 inhabitants, with the village of Union comprising about 2,000 population, and passing through two or three smaller villages or hamlets.

J. P. E. CLARK.

The express route is controlled by the National Express Company under contract made with the Binghamton Railroad Company, November 22, 1895. Agencies were appointed in each of the villages with money order departments and all facilities provided for transmission to all local and through points. A regular messenger runs between Binghamton and Union, making four round trips daily, in fact the entire system is conducted upon the same plan as upon steam roads. The regular service was started December 19, 1895, and notwithstanding that it was not an auspicious season of the year and that the United States and Wells Fargo Express Companies have established routes of long standing between Binghamton and Union, the results thus far have been gratifying to both the express and railroad companies. We have succeeded in securing nearly all of the local traffic and a fair percentage of the through business from Union and other villages.

The arrangement between the express company and our company is on a percentage basis, of both the local and through business, the express company defraying

EXPRESS TRAILER, BINGHAMTON, N. Y.

all expenses and incurring all risks of every name and nature; we furnishing car and transportation: the express company submitting to us a detailed statement of the business at the close of each month. Pending the construction of a combination freight and express car we have devoted to the express service a small trail car attached to one of our regular passenger cars, which has served the purpose well.

A question has been raised by some roads operating freight service whether, or not, the same could be successfully carried on in conjunction with express business on the same route. Contemplating making the freight business an important factor in the operation of the Union extension we gave the matter careful consideration prior to arranging with the National Express Company and from various standpoints decided that the two operated in conjunction would prove an advantage.

In the first place, the rates are widely at variance and a railroad company operating a short suburban line could not conduct upon its own responsibility a full fledged express service, such as the collection and distribution of merchandise, carrying of valuable packages, the handling of through shipments, or a commission business. Therefore, if a more efficient and complete service can be rendered the public and an equitable arrangement can be entered into between the express and railroad companies, whereby neither company is prohibited by the other from carrying any class of merchandise, it can be safely said that the two lines, although subserving the public in the same direction, can be operated jointly to the mutual advantage of both companies and the public at large. In fact, so confident were the representatives of the express company that the above conditions were true they consented to the construction of a combination car, for freight and express, and agents in the various villages and other employes are to be employed jointly, materially reducing the local expenses of each company.

The combination freight and express car which will be used upon our Union extension was manufactured for us by the Jackson & Sharp Company, and is a model of beauty and convenience. It is thirty-seven feet in length; equipped with double trucks, air brakes, vestibule ends and two G. E. 800 motors. This car will be placed in service immediately. Our plans are perfected for the introduction of our freight service which will be conducted in a similar manner to the freight departments of steam roads, the merchandise being classified and way billed in regular form. A regular schedule will be maintained and new cars of a similar pattern to the one described above will be added as increased traffic demands. Every assurance is offered us by shippers and we enter this particular field with great confidence in its ultimate success. The much more frequent freight service offered by electric roads and the delay of making up trains and other causes in steam railroad freight service commends the former to the attention and patronage of shippers, especially between cities and villages only a few miles apart.

EXPRESS CAR, BINGHAMTON, N. Y.

The rapid development of suburban and interurban electric roads is bringing the question of freight and express service thereon prominently before the eyes of, not only the builders of electric roads, but of the express companies who are eagerly seeking to control express routes on newly equipped suburban roads, especially if it opens up new territory for them and allows them to parallel competitive lines. The steam railroad companies are also opening their eyes to the fact that suburban trolley lines are becoming an important factor and they recognize them as competitors to the extent that in some localities they have reduced freight rates between local points.

There is no question that a freight and express service can be profitably and advantageously operated on an electric line connecting two or more cities or villages interchanging business to any extent. This particular branch of traffic will develop to a great magnitude.

A NEW METHOD OF TESTING RAIL BONDS.

BY HAROLD P. BROWN.

The beautiful "Gorge Road" at Niagara Falls was equipped with the plastic bond, which was applied when the road was built last August. Although J. K. Brooks, the superintendent of the road, never had the slightest trouble from a single joint, and although he had once every month removed plates and examined the bonds, always finding them in perfect condition, the president determined to have a test made of every bond on the line now operated from the Whirlpool Rapids to Lewiston.

With seven miles of track and rails thirty feet long, it was thought to be a difficult matter to get an accurate reading of the current drop at each bond, but a novel method, suggested by the writer, enabled the superintendent to complete the work in two hours. The test was a great triumph for the plastic bonds, and for the men who applied them, since it showed that not a single bond was defective, and that the drop on each joint with 100 amperes current was but 0.005 volts, or one-eighth that of a new copper bond eight inches long and 0.42 inch in diameter.

Two large double truck cars were placed twenty feet apart, and on their projecting bumpers was laid a strong wooden beam, twenty-one feet long, and 6x8 inches in section. This was firmly lashed in place with ropes. The draw bars were then joined together, and a strain put on their springs with a block and tackle, so as to take up any lost motion between the cars and the beam. This arrangement left just twenty-eight feet between the rail contacts of the rear wheels of No. 1 car and the front wheels of No. 2 car. These trucks were then connected by an insulated wire in which was interposed a very low reading voltmeter. A high reading voltmeter was placed between trolley and rail, and an ammeter put in series with the motors. Then the motors of No. 1 car were started, and brake set on car No. 2 until 100 amperes were required to run the cars at about three miles an hour. It is evident that as the train moved away from the power house, with No. 1 car ahead, the low reading voltmeter would indicate the drop in pressure due to the resistance of the rails and joints between the cars. The rail joints are placed in the center of the opposite rail, and therefore during a movement of two feet the rear truck of No. 1 car and front truck of No. 2 car were on the same rail, while there was a joint between them on the other rail. During the next thirteen feet there was a joint in each rail. The consequent variation in the voltmeter's reading represented the increase of drop due to one joint. At its lower point, which would be held for about one-half second, the reading represented the drop due to twenty-eight feet of unbroken rail, in parallel with a similar length of rail having one joint and a pair of plastic bonds. For the next 3¼ seconds the reading was higher, since there was a joint in each rail. Knowing the drop per foot of rail with a given current, the readings were easily verified by calculating the total drop, and comparing it with the indications of the high reading voltmeters on the car at end of line and at the power house. This is believed to be the first time that a test has been made of each joint on an electric railway, and the results are certainly remarkable.

THE FIRST STREET RAILWAY GENERAL PASSENGER AGENT.

The rapid evolution going on in the street railway field as a result of mechanical traction was never better illustrated than by a move recently adopted by the Brooklyn Heights Railroad, viz:—the inauguration of a general passenger agent's department. This is we believe the first road to create such a department. In horse car days people only rode because they had to. When electricity came in managers soon found that pleasure riding and induced traffic formed an important part of their business, and it is but the logical outcome of this fact that a general passenger agent should be appointed on the larger roads and that the manager should assume such duties on the smaller ones.

H. MILTON KENNEDY.

The new office of general passenger agent on the Brooklyn Heights Railroad is filled by H. Milton Kennedy, formerly general passenger agent of the South Jersey Railroad and the youngest member of the American Association of General Passenger and Ticket Agents.

The first object of this department is to create new business which does not now exist and which would not unless developed: such as the "trolley party" excursions in illuminated special cars, in the summer time: special "theatrical and dinner parties" to sea shore points, also in the summer; in the winter months "theatrical parties;" "trolley receptions," where a gentleman gives a reception to a party of friends, including a musical programme and supper served on board the car: euchre parties, when can be accommodated six sets (twenty-four persons) in each car; and "skating" and "dancing" parties, when a party is taken either to a lake for skating or to an inn for dancing, and supper served on the return. For all this special service are specially built cars, which are the largest and finest yet built for any street railway company. They are finished in mahogany, carpeted with axminister, with double draperies for each of the large french plate windows and furnished by roomy rattan chairs upholstered in plush velvet, in tints all of which are harmonious according to the decorations of each particular car. Each car has an ample buffet and the porter which accompanies each is

of Pullman or Wagner experience. This special service also has a tendency to popularize the road in a general way and to acquaint the public with routes which they knew not of. This department will also take up the question of attractions at terminal points of general advertising and will take care of the press as to news items. It is also the purpose to place tickets, in a convenient form, on sale throughout the city for the accommodation and convenience of the public.

Besides this the general passenger department includes the regular ticket department and will systematize things about on the same principles as in steam railroading.

WILLIAM A. HOUSE.

A man who by his own deserving efforts has steadily climbed the ladder to success, is William A. House, of Baltimore.

In 1879, at the age of nineteen, he entered the service of the People's Railway Company upon the completion of that line, and passed up through nearly all the positions possible, until, in 1883, at the time of the reorganization of the company, when he was elected secretary and General superintendent.

W. A. HOUSE.

Upon the consolidation in 1889 of the People's Railway Company and the Citizens Railway Company, under the merger name of the Baltimore Traction Company, he was elected general manager of the entire system. Since that time the North Baltimore Passenger Railway Company, Pimlico & Pikesville Railway Company, Baltimore & Curtis Bay Railway Company, Walbrook, Gwynn Oak and Powhatan Railway Company, have been absorbed by the Baltimore Traction Company, increasing the mileage until it has reached the one hundred mile mark.

At the meeting of the newly elected board of directors on February 7, for the election of officers, Mr. House was elected vice-president of the company in addition to his re-election as general manager.

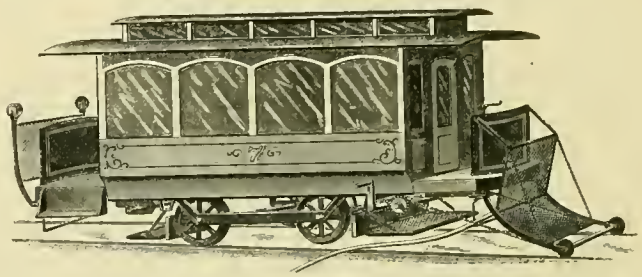
He is a practical, progressive man, a good disciplinarian, but one who at the same time commands the esteem and respect of his men.

The Cleveland lines use a thick canvas curtain at night which drops down and covers all the glass at front end of car. This gives the motorman better use of his headlight.

AND NOW THE MILLENIUM.

A Philadelphia inventor who assures us he has solved the problem sends us the following description of his fender and hose-jumper. He says:

"The sketch shows a section of fire hose crossing the rail, thus stopping travel as to the present street cars; but not so if the cars are equipped with the improved fender, as the car may be elevated as the above sketch



shows, passed over the hose and allowed to proceed on its way. In case a car should be derailed, which quite frequently occurs, it may be elevated in the same way, and by using a chuck at the wheels it could be replaced in a very short space of time."

He also adds, "any further comment on this combination is hardly necessary" in which we fully agree, and, "improvements pending."

PITTSBURG CONSOLIDATION.

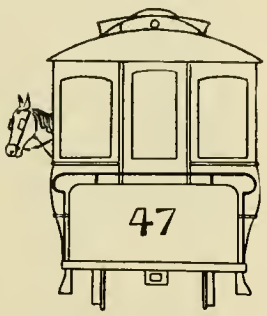
With the exception of the Second Avenue Traction Company's lines and the Birmingham Company's lines, all the street railways of Pittsburg are consolidated under the name of the Fort Pitt Traction Company, and negotiations are now being conducted by the combined company, for the street railways in Allegheny City, comprising the Pittsburg and Manchester Traction Company and the Pleasant Valley Traction Company, which are to be taken into the fold. This will give the Fort Pitt company lines covering every main thoroughfare of what is known as "the greater Pittsburg." G. F. Greenwood, who is now general manager of the Pittsburg and Manchester Traction Company is expected to be general manager of the allied lines.

In Pittsburg the trolley has almost entirely superseded the cable. The Citizens Traction road, which was mainly a cable system, last month commenced changing the cable to the overhead wires.

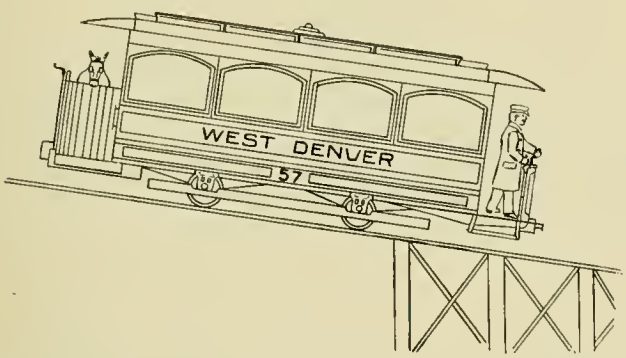
J. B. McClary, superintendent of the Birmingham Railway & Electric Company, Birmingham, Ala., believes that if the people do not come, that steps should be taken to bring them hence he has organized the Birmingham Excursion Company, which during the next few months will arrange with the steam roads centering in that city to bring excursions from points as far distant as Memphis, and in that way advertise his own city, and indirectly get to carry a good many of the people on his cars.

DENVER'S GRAVITY ROADS.

Denver enjoys the proud distinction of two roads where the horses ride down hill. One, the Cook line, has been described and illustrated in these columns, on which the horses ride down in a small box car attached to the passenger car and preceding it. The trip of one-and-a-half miles is frequently made in less than three minutes.



The other road is still more novel. It is known as the Clifton Car Company, and extends two miles from the terminus of the South Broadway line to a pleasure resort. This line also is practically a continuous grade, but only one horse is required to draw the car up the hill. The rear platform has been enlarged to make a small box stall, the horse standing at right angles to the car, and the effect from a short distance is extremely curious, the horse's head apparently projecting from a window. An unloading platform is provided at each end of the route. The car is fourteen feet long and made by the combination of parts of two old cars. As the "company" has no repair shop and was short on paint, the car numbers have never been changed. Hence, on the side panels is seen an attractive "57" and on the dashes a large and distinctive "47." In reporting the driver passengers are allowed to take their choice of numbers.



IS YOUR CAR LIGHTING GOOD?

Managers have come to fully realize that it is the poorest possible policy not to provide some means of heating their cars, when the weather requires it, and on the same line of reasoning the car lighting ought to be as good as possible. One of the leading dailies, in one of our largest cities, comments as follows on the subject of street car lighting:

A correspondent justly complains of the poor lighting in some of our street cars. It was expected that as soon as electric lights were put into the cars the lighting would be adequate and reliable. On a few lines, owing to proper methods, this has been the result, but on other lines there is great room for improvement.

It is very annoying and trying to the eyes, whether one is reading or not, to have the lights continually jumping from extreme brightness to almost darkness, as they have a habit of doing on a great many of the street cars. Not only when the trolley is off the wire, but every time the car varies in speed or rocks on its springs the lights quiver and waver, until it is impossible to read or think of anything but the lighting.

This is a source of worry to nervous people and ought to be remedied. If steadiness and sufficient light can be maintained on one line of cars, why not on all? It would be better to adopt some other system of lighting, such as the Pintsch gas lamps, than to continue the present inadequate method.

PINGREE POST-GRADUATE COURSE IN STREET RAILROADING.

Mayor Pingree, of Detroit, whose bump of presumption is as big as a Kansas pumpkin, sets himself up as the great and only authority on street railroading, and as often as possible gets himself invited to tell what he don't know about the business, from the public platform. Now there is just as much difference between running a street car from a public platform and the front platform, as there is between sailing a ship and some land lubbers' stories of how it should be done.

A few days ago E. S. Fassett, the assistant general manager of the Albany lines, and who has forgotten more about street railroading than Pingree is ever likely to know, visited Detroit among other cities, while making an inspection trip; particularly to study brick paving, of which there is considerable in Detroit:—and very good it is, too. Among other sights he was shown the mayor, and after his escape, said to a reporter:

"I saw Mayor Pingree. I found out that the only way to do was to let him do the talking. He told me what fares my company ought to charge and how we ought to run our business. So my visit hasn't been in vain."

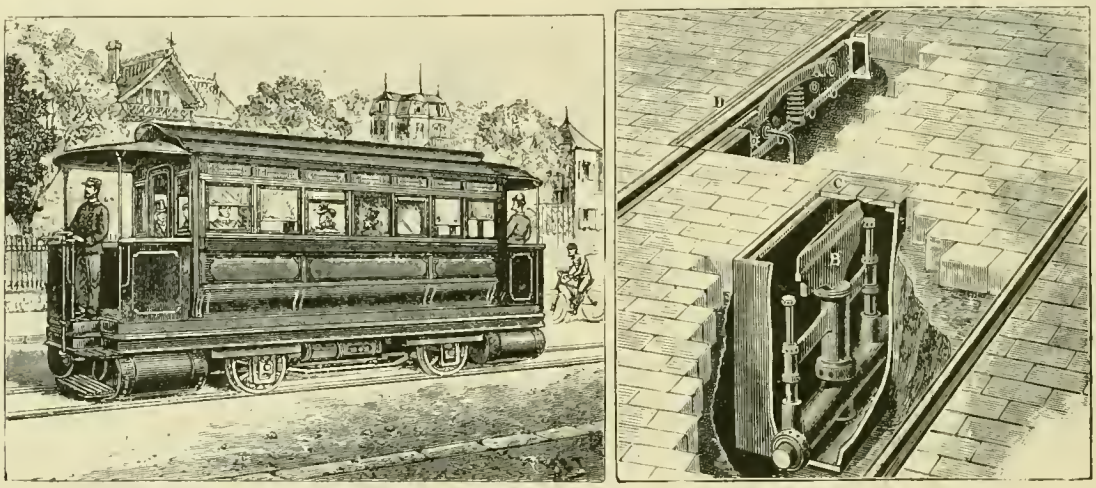
For such beginners as C. T. Yerkes, H. M. Watson, John Kilgour, the Thomases, Lowry and Johnson, and a few others who cannot attend upon the words of wisdom on tap in Detroit, we suggest a correspondence school as the next best thing; and the prospectus might read something like this:

"Easy Lessons in Railroading; Superintendent's Complete Course by mail, in five lessons, $3; President's course, eight lessons, $5. Satisfaction guaranteed. Diploma frames, gilt edges, forty cents extra."

Comptroller Fitch, of New York, has discovered that if the proposed rapid transit tunnel is built under Broadway the city will forfeit $150,000 a year now paid by the surface road for a monopoly of the street. Now the officers are engaged in trying to find a loop hole whereby the city may violate this contract and still have the $150,000.

COMPRESSED AIR MOTORS.

La Nature describes and illustrates the system of compressed air in use at Nantes, France, and which it states has met with a very reasonable degree of success. The illustrations will give a good idea of the exterior appearance of the car and also of the underground arrangement located at suitable intervals along the track and connected with the power house by underground pipe, from which the car can secure a fresh supply of stored air as needed. It has been found possible to store the air in reservoirs through a pressure of eighty atmospheres, but it has been done at the expense of weight, as the reservoirs are quite heavy. On the Nogent line in Paris, well known to Parisian Sunday excursionists, the reservoirs are of wrought steel, nine in number, and weigh four tons. The cylinders are one-half inch in thickness and tested to 20,000 pounds to the square inch, but require metal of exceptional qualities. The high pressure system is used for the self contained cars that must carry sufficient to bring them back to the power-house before recharging; but for the cars which run on such lines as are piped for supply at frequent intervals from eight to ten atmospheres is all that is attempted. The connection of the car with the underground pipe for drawing a supply of air is automatic and requires but a few moments.



COMPRESSED AIR SYSTEM, AT NANTES, FRANCE.

FUN WITH A FRANCHISE AT ATLANTA.

We related last month the farce which was acted by the city of Santa Ana, Cal., in which the city tried to dictate terms to the street railway company when that company was asking no favors save to withdraw entirely from the field. Another case of much ado about nothing has occurred at Atlanta. The Atlanta Consolidated had some tracks on certain streets which were bringing in very little revenue. The district they served was also served by other of the company's lines, and when the council passed an order for the repaving of certain streets the company concluded it had better get in out of the rain and remove its tracks before the street was repaired and it was obliged to pay its share of the cost of paving. In other words the company did not think its franchise was valuable enough to make it worth the cost of paving, so one morning a gang of employes removed the tracks in question. Immediately there was a great hue and cry. The citizens along the line were "outraged at the high-handed act of lawlessness." A restraining order was issued against the company and at a sensational meeting of the council committee on electric railways, resolutions were passed calling on the company to replace the tracks within forty-eight hours under penalty of being made defendants in a suit to forfeit the franchises on the streets from which the tracks had been removed. To this the directors calmly replied by making a formal surrender of franchise to the mayor, and asked permission to repair the paving left in bad shape by the removal of the tracks. The latest news from the seat of war is that the city has begun a suit against the company on the grounds that by forfeiting its franchise on part of a street it has forfeited it on the entire street.

READING ROOM FOR EMPLOYES AT YOUNGSTOWN.

General Manager Anderson, of the Youngston, (O.,) Street Railway Company, has established a reading and game room for the employes of the road, which was formally dedicated last month. After the cars had stopped running the men assembled in the newly furnished rooms, and had a most enjoyable time until three o'clock in the morning. Friendly bouts with soft gloves furnished part of the entertainment. Cards and billiards were indulged in, and refreshments were served under the direction of the Tod house caterer. Walter Roseman, in behalf of the employes tendered a vote of thanks to the company which so kindly furnished the rooms, the cost of equipping which reached nearly $1,000. About half of that amount was contributed by James Parmelee, the president, who presented the employes with an unusually fine billiard table.

A NORMANDY INTERURBAN.

An interesting interurban line connects Caen and Dives, Normandy, and while doing a good business in light freight and country produce, finds its chief revenue

SECOND CLASS CAR.

in pleasure riding during the summer months. The track is laid with 30-pound T-rail of 30-inch gage. For the most part the track is laid at one side of the country road, and for some distance along the sea shore. Rails

THIRD CLASS CAR.

are riveted to steel ties weighing twenty-four pounds each. During harvest month temporary sidings are run into the fields, and the grain loaded direct into the cars for shipment. Small steam dummies furnish the motive power. We illustrate the second and third class open cars.

DEATH OF NAT. W. PRATT.

Another evidence of man's mortality is the death of Nat. W. Pratt, president of the Babcock & Wilcox Company, and consulting engineer of the Dynamite Gun Company, which occurred March 10 at his residence in Brooklyn. In the midst of his active, useful life, in the prime of his years, and the zenith of his successful career, Mr. Pratt was called. In the field of practical science and engineering his place will be hard to fill. Born in Baltimore in 1852, of parents descendent from Puritanic stock, Mr. Pratt inherited all the activity of the New Englander, though his mechanical tastes were directly from his father, William Pratt, who during the war was superintendent of the armories, in Providence, R. I. At eighteen years of age young Pratt entered the employ of the firm of Babcock & Wilcox, where his integrity, his engineering ability and remarkable business qualifications, won for him the highest office in the concern that of president, to which he was elected in 1893, on the death of George H. Babcock. Prior to then he was treasurer and manager of the company, assuming those offices when it became a corporation. To his effort was largely due the wonderful success of the Babcock & Wilcox boilers throughout the civilized world. Always deeply engrossed in engineering subjects, Mr. Pratt in 1884 associated himself with the Dynamite Gun Company, and under his designs and patents the first successful dynamite gun was built. It was with this gun, eight-inch caliber and sixty feet long, that the experiments in throwing aerial torpedos were conducted at Fort Lafayette, N. Y. Mr. Pratt leaves a wife and three children and an aged father and mother to mourn him, besides a host of sorrowing friends. He was a member of the American Society of Mechanical Engineers, American Institute of Mining Engineers, American Naval Institute, also a member of the Engineers' Club, of New York City. But aside from his achievements over material things Mr. Pratt held a place in the affection of his fellow men by his charity and goodness of heart which will long survive him, and which in life made him generally admired and beloved.

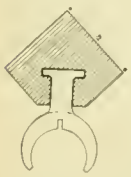
SPRINKLERS AT CINCINNATI.

The Cincinnati Inclined Plane Railway, of which H. P. Bradford is general manager, is one of the sensible companies that sprinkles its right of way during the summer months, for the purpose of making its patrons more comfortable and consequently more numerous. The coming season it will use a sprinkler with a capacity of 3,500 gallons. Failing to make satisfactory arrangements with the municipality at the outer terminus of the line for water supply, Mr. Bradford is erecting a four-inch centrifugal pump operated with a fifteen-horse-power electric motor. This will fill the tank in three minutes. The pump is located at the end of the line and filling does not interfere with the operation of the cars. If the tank should become empty on the line the company has permission to fill from the hydrants. The sprinkler is not allowed to hold regular cars to do this, but must fill between cars. The ordinary headway of cars during the summer is three minutes.

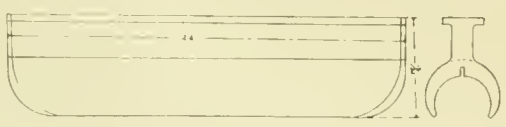
Some of the leading English journals are bemoaning the fate of two English towns where the much-needed and greatly desired electric traction has been wrecked through official effort to municipalize the under-taking. One paper says: "Two of the most ambitious tramway schemes which have been brought forward in recent years have been wrecked by the action of the local authorities."

A GERMAN SUBSTITUTE FOR GUARD WIRES.

The trolley wire guard, shown in the accompanying drawing, has been used to a considerable extent in Europe, more especially in Germany and Belgium, and has largely taken the place of the ordinary guard wires. In both of these countries, the telephone and telegraph systems are in the hands of the government, and the requirements with respect to the guarding of overhead wires of high voltage are very rigid. The ordinary form of guard wire, as used in this country, consisting of two or three steel or bronze wires over a single or double track respectively, is not considered by them as affording sufficient protection. Three guard wires over each trolley wire are demanded, and these must be very carefully separated and accurately adjusted in accordance with rules laid down after numerous experiments. For a double track construction, six guard wires are therefore necessary, which materially increases the cost of construction, not only because of the increased amount of wire, but also because of the increased size of the poles necessary to withstand the extra strain. At crossings and switching points, where the cross construction is complicated, the use of three guard wires for each trolley wire, would make a very objectionable tangle of guard wires.

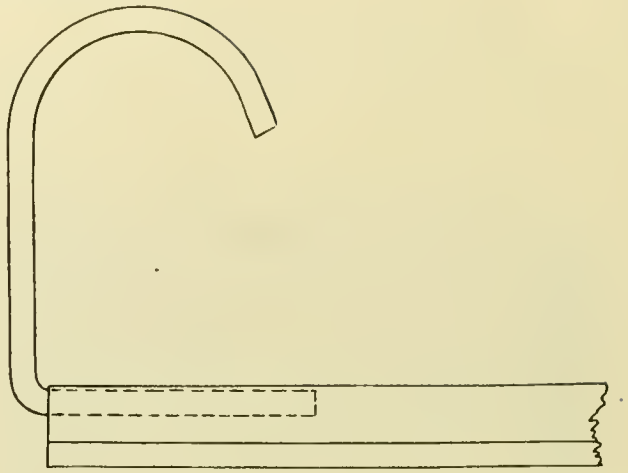


SECTION OF STRIP AND CLIP.



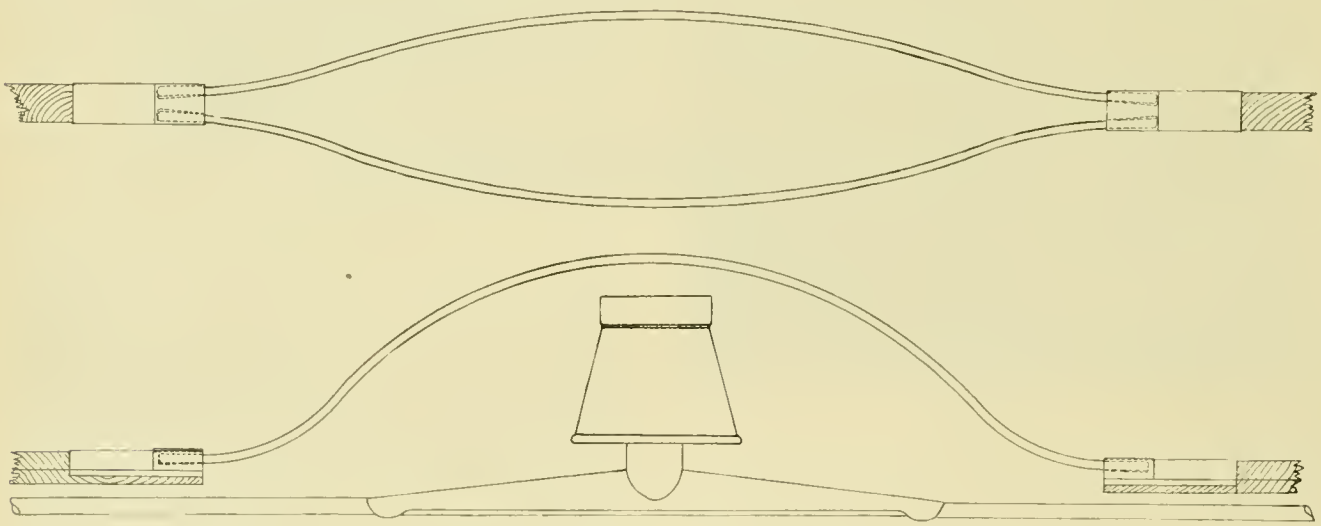
PLAN AND SECTION OF CLIP.

American street railway men may thank their lucky stars they do not have to be hampered with any such cranky regulations, but they may be interested in the substitute for guard wires which has been devised and which, clumsy and undesirable as it is, is probably better than such numerous wires.



HOOK WHERE GUARD ENDS.

It consists of a wooden strip, one-half by one-half inches, having one of the corners flattened, and exposing a sloping surface on the top, which will not collect snow. This covering is made usually of yellow pine, impregnated with creosote, and thoroughly painted with waterproof paint. These guard strips are made up in lengths of about fifteen feet and joined by means of small tinned sleeves bent into the shape of the strip. At intervals of three and one-half to four feet a small brass clip with a "T" shape head is attached to the wire by being driven down over it. The under side of the wooden strip is provided with slots to receive the heads of these "T" shaped clips, and by them the strip is firmly held in position. At points where the trolley wire is supported by means of the usual trolley ears, a bridge consisting of two pieces of wire, fastened by clips to the ends of the adjacent wooden strips is inserted. These wires prevent the telephone or telegraph wires from falling on the wooden strips and sliding along them and coming in contact with the trolley ear.



WIRE BRIDGE OVER TROLLEY HANGERS.

The German and Belgium postal authorities do not

demand that the whole length of the trolley line be so protected, but only that this protection extend to a certain distance on each side of every crossing wire. As the telephone and telegraph wires in general cross the streets in groups of from fifty to 100 and as these groups are separated by considerable distances, it is not necessary to guard more than a small portion of the actual length of the trolley wires. The ends of these protected lengths are guarded by means of hooks shown in the drawing and attached to the guard strips. These are to prevent the wires sliding along and slipping over the end of the guard strips on to the trolley wire in case they have fallen and come in contact with the guard strips.

It has been shown experimentally that this form of guard strips assures a far better protection than the system of guard wires proposed, and it has therefore been adopted as standard by the German postal authorities. It was originally designed for use on curves and at switching points, where the overhead construction is complicated, and it proved so satisfactory in practice, and its appearance is so much better than the usual network of guard wires, that it has now been largely adopted.

There are many miles of this capping in use in Hamburg and other German and Belgian cities, and so far as our information goes, it has never given any serious trouble.

ANNUAL REPORT FROM MINNEAPOLIS AND ST. PAUL.

The report of the Twin City Rapid Transit Company, of Minneapolis and St. Paul, as made by Auditor J. F. Calderwood, through President Thomas Lowry, has for several years past been a model of completeness, and something to be looked forward to as a source of valuable information. This year brings no disappointment in this regard. The following were the expenses per car mile :

General expense	$ .0055
Repairs to motors	.0047
Repairs to car bodies	.0032
Maintenance of way and structures	.0056
Conductors' and motormens' wages	.0366
Inspectors and transfer agents	.0008
Conducting transportation	.0084
Cost maintaining power station	.0149
Machine shop expenses	.0021
Total general operating expense	.0818
Insurance	.0013
Injuries and damages	.0078
Legal expenses	.0014
Contingent expenses	.0022
Total operating expenses	.0945
Interest on bonds, and 6 per cent certificates	.0628
Interest on floating debt	.0050
Taxes	.0048
Total expense	.1671
Gross earnings per car mile	.1901

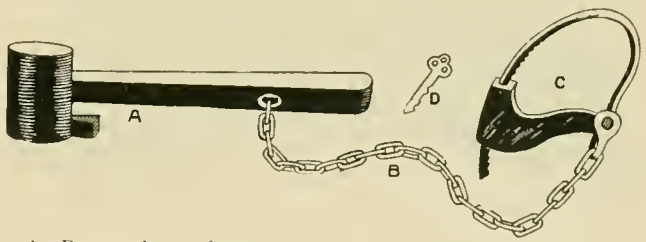
The reports of this company have showed a steady decrease in operating expenses for the past three years. There are several causes for this, of which consolidation of management, and the improved and less expensive methods of removing snow are important ones. The rebuilding in the company's shops of almost the entire motor equipment has resulted in a marked reduction in repair expenses since it was accomplished. A decrease in the maintenance of way and structures is due to special joint construction put in in 1892.

Although the system is at somewhat of a disadvantage through being one of the earlier installed, it has fully demonstrated itself to be on a sound earning basis.

One noticeable thing in President Lowry's report, is the statement that during the past year $18,000 had been spent on the equipment of cars with fenders and gates. He says: "The saving in this expenditure although we have had the use of the gates but a part of 1895, has resulted in a saving in the item of injuries and damages, as shown by the foregoing statements, and during the present year will save us more than twice the total cost." Our regular readers will remember that the gate system used there is the one in which no one can get on or off a car, until the car is stopped, and the motorman opens the gates.

OUR LATEST AND BEST INVENTION.

At last we've struck it; and instead of rushing to the patent office and securing a monopoly on our ideas we give them out freely to our readers. Every superintendent knows how difficult it is to make motormen at all times and places live up to the rule to always turn the controller to "off" and take the controller handle with them when they leave the front platform, and how



A=Reverse lever of controller.
B=Chain.
C=Steel bracelet with lock.
D=Key to bracelet; held by barn foreman.

many accidents have resulted from a disregard of this rule. We have hit upon a way of absolutely preventing trouble from this cause. Our method is explained by the accompanying illustration. To the reverse lever of the controller is attached a chain, the other end of which is fastened to a steel bracelet. Said bracelet is fastened to the motorman's left wrist and provided with a lock and key—the key being held by the barn foreman. When a man is sent out with a car the foreman chains the handle to him, and he "can't lose it," or leave his car without shutting off the current and taking it with him.

P. S.—We do not guarantee this to be popular with the motormen.

NEW CASTLE CONVERTIBLE CAR.

F. A. Hover, general manger of the New Castle Car Manufacturing Company, has designed and applied for a patent on a new style of convertible car, which seems to be decidedly different from anything in this line yet placed on the market. Several of these cars were recently built by his company for the Knoxville, (Tenn.) Street Railway Company, and are giving excellent satisfaction.

These cars, as will be seen by the accompanying cuts, are built with square sides, with cross seats and aisle in

CONVERTIBLE CARS FOR KNOXVILLE—OPEN.

center, and are so constructed as to overcome the objections usually made to cars of this type. They are very strongly constructed, and when equipped with panels for winter use, are even warmer than the ordinary concave car body; they can be very quickly and easily changed from closed to open cars, there being nothing to remove to effect the change, except the panels and sash, which

CONVERTIBLE CARS FOR KNOXVILLE CLOSED.

are so arranged that they can be taken off or put on in a few minutes. The same curtains are used both for summer and winter, and are so arranged that they can be drawn down to truss-plank, and thus give protection from storms. The cars are equipped with spring seats, having reversible backs, covered with woven cane; the interior finish being of solid cherry with ornamental work of the same wood. Electric push buttons are placed on the side posts within convenient reach of the passenger.

The cars furnished the Knoxville people are painted "royal blue," the striping and ornamentations being in gold; a combination which gives them a rich and handsome appearance.

The plan of giving prizes to the motormen and conductors keeping their cars in the best condition has been adopted by the West End road of Pittsburg.

TROLLEY CARD PARTY.

One of the very latest things on trolley car lines is the giving of card parties. This method of entertainment and enjoyment was instituted on the Niagara Falls and Buffalo Electric Railway, on Friday evening, March 13, when Mr. and Mrs. H. J. Pierce, of Buffalo, chartered a car and gave a whist party, taking the guests to the Falls and return.

The car left the corner of Main and Seneca streets about 7:30 P. M. It attracted considerable attention in its run through the streets of Buffalo, owing to the fact that across the front of the car in colored electric lights was the word "Special." About an hour and a quarter were consumed in the run down to the Falls. The party alighted at the corner of Falls and Second streets, and walked to the famous Prospect House, kept by David Isaacs, at the corner of Jefferson avenue and Second street. There an elaborate dinner was served, and enjoyed, when the party again boarded their special car, and returned to the Queen city.

The guests were all extravagant in their praise of the delightful affair, and it seems highly probable that similar outings will form a feature of the summer season at the Falls.

The Niagara Falls & Buffalo Electric Railway, has a new superintendent in the person of C. R. Marshall, who has been appointed to succeed J. A. Wilson, resigned. Mr. Wilson returns to the service of the White-Crosby Construction Company. Mr. Marshall has been in the employ of the General Electric Company of Schenectady.

Brill, of Philadelphia, is making some new cars for the Buffalo-Falls road. The number will be fifteen, and thirteen of them will have smoking compartments, separated from the main body of the car by glass partitions. The other two of the fifteen cars, will have baggage compartments fitted up to carry lunches, etc., for it is expected that this line will do a heavy excursion business the coming summer. These last mentioned cars, are designed to cater to parties of Buffalonians, who desire to spend the day or evening at the Falls, and they will be run over the Buffalo tracks to any point desired to accommodate the persons who charter them.

A NEW TEXAS ROAD.

W. F. Ryon and D. J. Byrd have secured a franchise for a street railway in Greenville, Texas, an enterprising and rapidly growing city of 10,000 inhabitants, situated in the famous black land part of the state. They will at once build four miles of electric line and push the construction of the road rapidly. They have a ten year contract with the city which operates the electric light plant, for their power, and simply furnish a generator and the city plant furnishes the power. They will at once build an amusement park and pleasure resort in connection with the road, and the future of the enterprise seems bright and promising.

STREET RAILWAY LAW.

EDITED BY FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Right of Passage of Street Railway—Vehicles Must Give Way to Approaching Cars.

Although persons in vehicles have the right to drive upon or along a street railroad track, yet in doing so they are bound to keep a lookout for approaching cars and to give way so as to cause no unnecessary hindrance to them.

When a vehicle is upon the track of a street railway with a car behind going in the same direction, the persons in the charge of each are charged with the duty of reasonable care and caution to avoid injury.

(Supreme Court of Missouri. Hicks vs. Citizens' Railroad Co., 27 Southwestern Reporter, 542.)

Horse Frightened by Electric Car—Duty of Motorman.

The motorman of an electric car is not bound to take precautions against the fright of a horse at the sight of his car, until he has some evidence of the fright, and if he stops his car so soon as he becomes aware of the condition of the horse, he is not chargeable with negligence.

(Supreme Court of Pennsylvania. Yingst vs. Lebanon & A Street Railway Co., 157 Pennsylvania State Reports, 438.)

Failure to use Fender on Electric Car.

It is not negligence in an electric railway to run its cars without a fender when the use of fenders was unknown except by one Boston railway, and was in that case experimental only.

A motorman will not be held to have acted negligently in running over a boy who had jumped from a wagon and gone on the track, when the car was running only from four to six miles an hour, and did not see the boy.

A boy jumping off a wagon in front of an electric railway car, and stepping on the track, when he was cautioned to look out for an approaching car, contributed to his injury from being run over and killed, and no recovery can be had therefor, in negligence from the railway company.

A single track of the defendant's electric railway was laid through the middle of the street. The driver sat on a seat at the forward end of the wagon, driving a single horse, and he had no knowledge of the presence of the boys who got upon the wagon without the permission of anybody. The plaintiff's intestate was upon the wagon when Rivers first saw it, and they afterward sat with their backs to the driver and their feet hanging over the tail board. Mullen was on the left hand side of the wagon next the track, and there were empty boxes between the boys and the driver. As the team was going at an ordinary rate of speed, on the right hand side of the street, it met an electric car. The distance between the curbstone and the nearest rail of the track is given by estimate as high as eight or ten feet. Both boys were intending to go up Franklin street, Mullen to a school which he attended, and Rivers to the house of his uncle on that street. They met the car at Greenwood street, which is the next street to Franklin street, and very near it. The horse, which was not much accustomed to electric cars, shied a little, but was easily controlled. Either because they were so near the place where they were to turn from Chestnut street, or for some other reason, the boys jumped out, and the driver went on without knowing until long afterward that they had been upon his wagon. When they jumped, the car was very nearly opposite the horse's head. Rivers jumped on the right hand side of the wagon, and ran along to the right of the horse on the sidewalk, or between the curbstone and the wagon. Mullen jumped to the left of the wagon, went up the track just forward of the car, and was run over and killed. The action is brought under the statute of 1866 c. 140, and the plaintiff contends that his intestate's life was lost through the negligence of the defendant, or the gross negligence of its servants or agents. Plaintiff had judgment and defendant accepted.

Knowlton J.—There is hardly more than a scintilla of evidence to sustain this case. To show negligence of the corporation he relies upon the fact that there was no fender upon the car: but the accident happened on June 2, 1893, and the evidence tended to show that of the numerous corporations in the different parts of the state that had begun to run cars by electricity, the West End Street Railway Company in Boston was the only one that had then used any fenders upon its cars, and the defendant offered to show that the use of fenders by that corporation was then only experimental. It is hard to see how the motorman was at fault. The great weight of evidence was that the car was going at about four to six miles an hour, and there was nothing to indicate that it was going much faster than that. The testimony was that the motorman did not see Mullen while he was on the wagon, and there is nothing to indicate that he did. He certainly had no reason to expect that anybody would jump from the hind end of a wagon as it was about to pass the car, and step upon the track. Even if he was negligent the defendant is not liable for his conduct in this action unless he was grossly negligent.

But if we assume that there was evidence for the jury on this part of the case we find no evidence of due care on the part of the plaintiff's intestate. Rivers testified that just before they jumped off he told Mullen to look out for the car, and that Mullen heard him. If, being warned to look out for the car, he immediately stepped upon the track before it, he certainly was careless. He was a tresspasser upon the wagon, and his conduct in stealing a ride and in getting on and off the wagon when it was in motion, gives color to his conduct in going upon the track immediately before the coming car. When he left his father's house he was sent to school, and when he was next seen riding with this team he was at a considerable distance from the line of travel to the school-house.

(Supreme Court of Massachusetts, Mullen vs. Springfield Street Railway, 41 North Eastern Reporter, 664.)

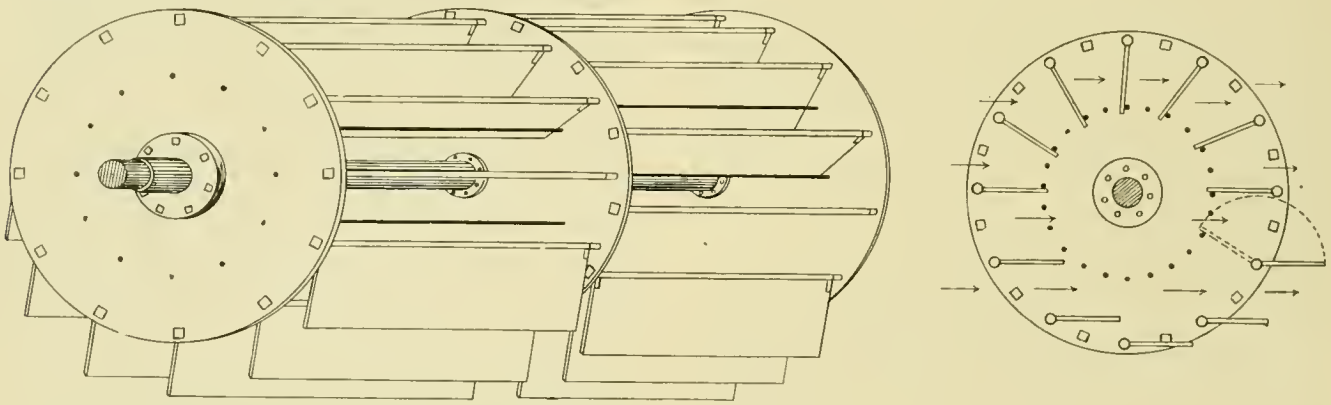
Horse Railway Company American and English Railroad Cases, N. S. 132 Ed.

WATER CURRENT WHEEL.

About once in so often inventors renew the attempt to harness water powers now going to waste. Where there is a heavy fall the problem is a simple one, but where there is a strong current, and dams cannot be built, the thinking engineer cannot but look with regret upon the thousands of horse-power actually going to waste before his eyes.

Therefore, the efforts to utilize tide waves have been chiefly along the line of pumping water to as great an elevation as possible, and using the head thus artificially produced in driving turbines. Electricity, however, has now made the problem a much easier one, for the power can be connected to a generator at places unsuited to use the power, and by transmission several miles it can be marketed. The wave motor illustrated in these columns last month, near Santa Cruz, Cal., already gives much promise of success, and is being watched with intense interest.

The latest device to utilize river currents, is the invention of Capt. M. P. Thatcher, United States consul at Windsor, Canada. Capt. Thatcher has long gazed with wistful eyes upon the swift current of the Detroit river, as thousands have done, and wished some means could be found to utilize its magnificent power. Of course, a dam is out of the question, and surface wheels would interfere with navigation. Hence, he set to work to invent a submerged wheel, and our illustration will explain at a glance the result. The wheel he has already constructed is five feet long by six feet diameter. Two sets of buckets are constructed on the inside of it, and they are so arranged that they catch the current at right angles, and then turn so as to present a thin edge when returning. It has been placed in the river off Stony Point, Grosse Isle, where the current is three and one-half miles per hour. It makes eight revolutions per minute, and gives nearly eight horse power. The amplification of the idea, to have wheels either on the same shaft, or connected in series to a shaft which can be brought ashore and connected to a generator, is a matter of easy accomplishment, as is also the storage of the power and transmission for use.



THATCHER UNDER CURRENT MOTOR.

It will be seen the cost of installation, as compared with the expense of dams, and such plants as Niagara, is merely nominal, and if the scheme on further experiment is demonstrated as practical, the field for the Thatcher wheel will be enormous.

WARNING SPITTERS IN A WHISPER.

The following order has been issued to the conductors of the Lindell Railway, St. Louis, and may contain a suggestion as to a very good way to deal with a very big nuisance.

NOTICE TO CONDUCTORS.

The attached clipping from the Post-Dispatch of Sunday, March 15, is indicative of the general interest manifested by the public with reference to spitting on the floors of street cars. Conductors should observe more strictly violations of our rules in this respect, and where it becomes necessary to direct attention to the same, do so in a whisper without attracting the attention of any other person in the car. A quiet, courteous request will not fail to meet with prompt compliance on the part of the person spoken to, and if this rule is generally observed by conductors, this growing evil will soon be eradicated.

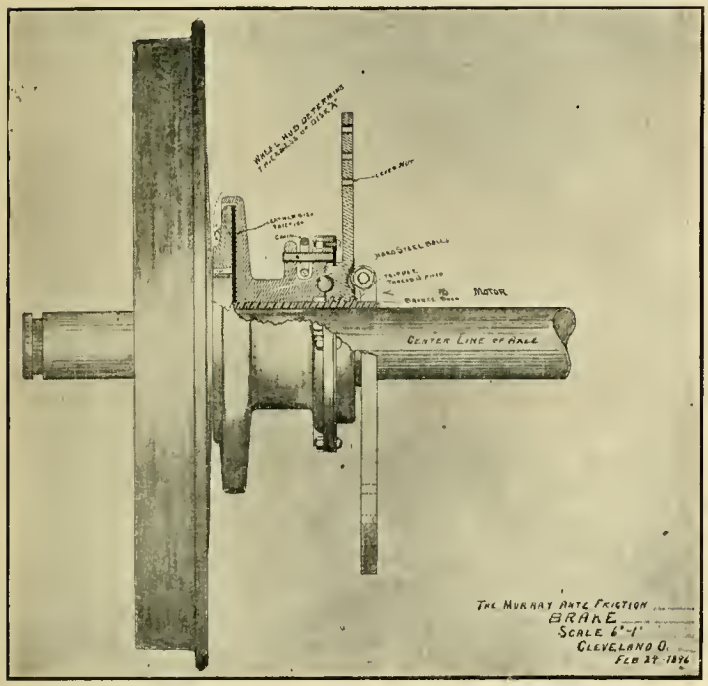
GEORGE W. BAUMHOFF,
Superintendent.

NEIL McLERTY MEETS SUDDEN DEATH.

A distressing accident, which terminated in the death of Electrician Neil McLerty, occurred last month. Mr. McLerty, who was the retiring superintendent of the Ouray Electric light system at Ouray, Col., was caught in the belt while explaining the workings of the system to his successor, and received injuries from which he died. He was a young man, thirty-eight, well known by railway men throughout Colorado, and for some time was chief electrician for the Colorado Springs Rapid Transit Railway Company. He was to have left for Denver, where his wife and two children resided, when the ill-fated accident befell him.

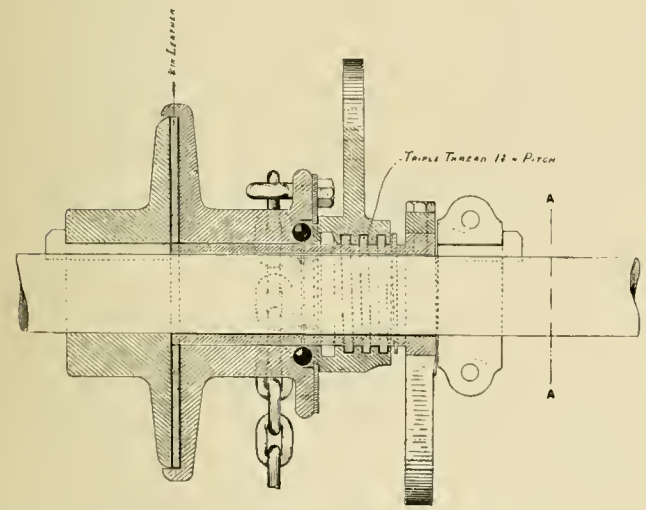
THE MURREY BRAKE.

A brake that has quietly been making its own way for the past few years with very little flourish, and one which is not generally known of outside of the few roads which use it in great numbers, is the Murrey, now handled by Alfred G. Hathaway, of Cleveland. It is used on the Blue Island Avenue line of the West Chicago Street Rail-



MURREY BRAKE AS APPLIED TO ELECTRIC CARS.

road, the Missouri Railway cable lines of St. Louis, and the Third Avenue cable line, New York. Although in use principally on cable roads, it is well adapted to electric service. It is of the friction winding drum type,



MURREY BRAKE AS APPLIED TO CABLE CARS.

the friction being obtained in this case, as is seen from the engraving, from the friction between the winding drum, a leather disk and a collar fixed on the axle. The brake drum is mounted on a brass sleeve, filled with graphite and paraffine wax, so that it never needs oiling. There is a ball bearing which takes the pressure applied by the motorman, and which enables him to make a smooth stop. It is evident to any mechanic on inspecting the drawings that this brake is specially constructed for long wear. On double truck cars the brake will not set, as a sliding box and universal joint on the oscillating shaft, operated by the brake lever, keeps always in line with the axle. The space required on the axle is seven inches.

Now that Mr. Hathaway has control of the brake it will be properly pushed and introduced. The fact that so good a brake is in no more general use, is strong evidence of the fact that even a good thing, in these days of many good things, can remain practically unknown, and hence unused for want of being advertised and introduced. That Mr. Hathaway will push its introduction, his friends well know, and they also realize he would not do so, unless he was satisfied the brake possessed very desirable qualities. It was illustrated in our March issue as applied to the Third Avenue cable trains in in New York.

PICTURESQUE PALATKA.

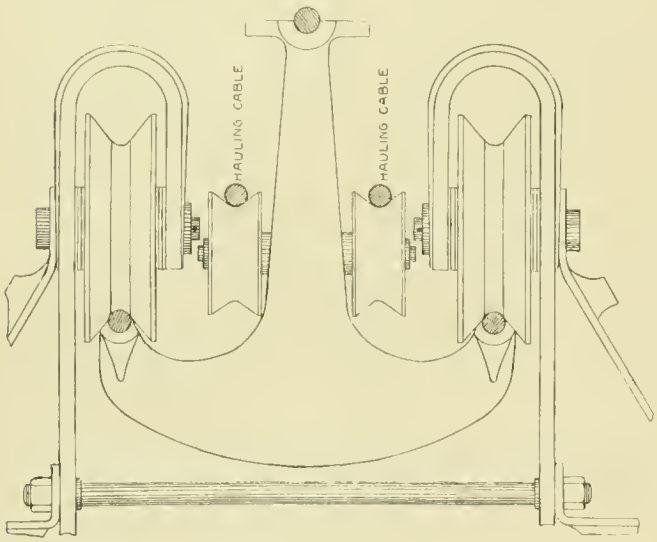
The extension of the Palatka and Heights Railway Company's, system, of Palatka, Fla., to the Heights by a semi-circular track of three miles, and by an incline of gentle grade to an altitude of 140 feet above the city, has made that line one of the most picturesque in the South. Its fame for scenic beauty has quickly spread among the tourists who seek Florida in the winter, for since the completion of this branch of the line the observation cars are always filled with pleasant junketing parties. After traversing the principal streets of Palatka proper, passing the palatial homes of distinguished citizens, the gardens, the orange groves budding into beauty, the cars reach the Heights, where, 140 feet below, like a gem in an emerald setting, nestles the Gem City, with its shops, its mills and factories, while east is seen the St. Johns, the king of rivers.

PEOPLE'S RAILWAY, KANSAS CITY, SOLD.

The Tenth Street Cable Line, better known as the People's Cable Railway, and which was built during the boom days at a cost of $750,000, was sold at auction on March 14 for the nominal price of $185,000. J. H. Lucas, a local attorney, bid the road in, it is said in the interest of the chief creditors, the Broderick & Bascom Wire Rope Company of St. Louis. The road was built by Chicago capitalists, who were interested in real estate near the terminus of the line, and from which it was expected big profits would be obtained to make the enterprise a profitable one. The road was built in 1887 and went into a receiver's hands two years later. It has cost $90,000 to operate the road during the seven years it has been in the receiver's hands. The line will now probably be absorbed by some of the other roads and converted into an electric line.

BREWER'S AERIAL TRAMWAY.

W. J. Brewer, of London, Eng., has invented an aerial railway, several of which are already in operation, designed to transport passengers and freight over places otherwise inaccessible. The system can be adapted to many summer resorts with probably good results, as the expense of installation is not great. The line which has been built at Brighton, Eng., cost $15,000 complete. The system consists of two wire cables from which the car depends, and an endless cable furnishing the power to the car and driven by a small oil gas engine at one end of the line. The line at Brighton carried 720 people at a cost for oil of only a few cents, and the transportation was effected in two hours and fifteen minutes, using two cars. Twelve passengers and one conductor were carried in each car each trip. The distance between the columns is 650 feet and from station to station 1,150 feet.



BREWER AERIAL TRAMWAY TRUCK.

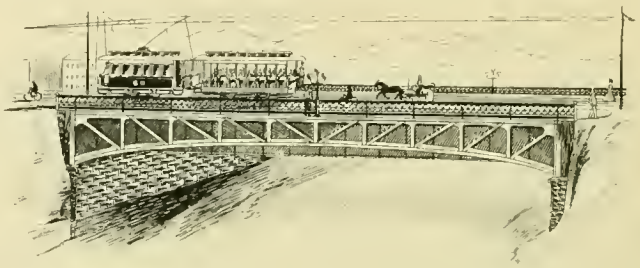
For street railways having pleasure resorts located where there are high bluffs spanning river or water, it would seem that such a line might be installed at a nominal expense and operated with an electric motor, by current taken from the trolley wire. The novelty of the scheme and the height of the car in its passage over the ravine would lend interest and excitement to the trip, all of which is so dear to the hearts of the American pleasure seeking public.

ROCKS FALLING ON THE EAST LIVERPOOL & WELLSVILLE.

The East Liverpool & Wellsville (O.) Street Railroad has had considerable trouble from the falling of rocks on its track. Three or four have come down the mountain side and blocked traffic. On one occasion a rock three or four times as large as a street car came down with a fall of 200 feet and lit on the track. The last one that fell was about 10 by 15 feet. Of course the only way to clear the track of these obstructions is to blast them away.

NEW DENVER BRIDGE.

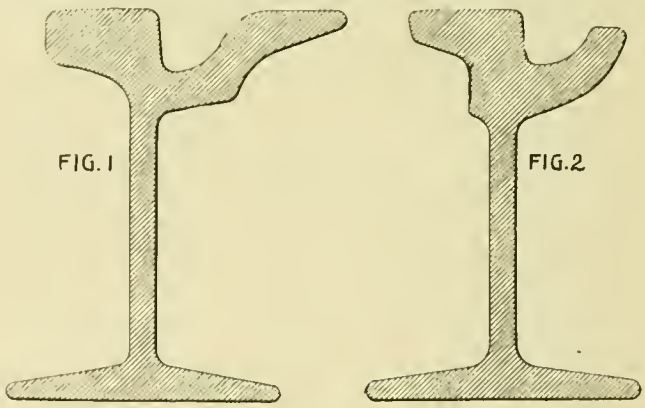
A handsome new steel bridge has been built across Cherry Creek, on Broadway, in Denver, and on this structure the Denver Tramway Company has just finished laying its tracks. The bridge is 122 feet long



and 100 feet in width, of which sixty feet is given up to the roadway and street railway tracks. The extreme length of the girders is 125 feet and the roadway is paved with asphalt. Its entire weight is 880,000 pounds and its cost was $50,000.

NEW YORK'S STANDARD RAIL.

The Department of Public Works, New York City, has adopted as standard rail for use in that city, the section marked Fig. 1. The section now in use on Broadway is shown in Fig. 2, and as will be discerned, the groove has occasioned considerable trouble to light



vehicles when turning out of the track. The new section has sufficient slope to give a better climb to the wheel, but in our judgment the groove under almost any conditions is less desirable than the standard girder with tram head.

The society young ladies of Pierre, S. D., had a "mule day" in lieu of the "trolley day" in other cities, and drove the cars and collected fares in aid of a local charitable institution.

The Toledo Electric Street Railway is compelled by its ordinance to carry children under eight years of age for 1 cent. To aid conductors in taking these fares each is provided with a fare box into which all children's fares are dropped.

EARNINGS AND OPERATING EXPENSES OF CONNECTICUT STREET RAILWAYS.

Never before in the history of the electric railway has it been possible to publish the earnings and expenses of a majority of the roads in a state. That we are now able to do this in the case of Connecticut is due to the fact that all the street railways in that state must now make reports to the railroad commissioners of the state. These reports contain statements of operating expenses, earnings, car mileage and other items that it is not necessary to enumerate here. In order to get these figures in shape, so that they would be of interest to the managers for comparative purposes, we have gone through the commissioners' reports carefully, and calculated the expense per car mile for the different items. In a few cases the car mileage was given for only a part of the year. When this happened, the mileage for the rest of the year was figured by proportion. While this is not absolutely fair, it probably in most cases comes very near the correct mark. The reports are for the year ending September 30, 1895.

The Central Railway & Electric Company, of New Britain, owns 9 closed and 18 open cars, 13.65 miles of track, and employs regularly forty-eight persons. The company operates an electric light plant, and charges the railway department for power at a very high rate, as will be manifest from the report. The earnings and operating expenses, per car mile, were as follows:

Repairs of roadbed and track	$ .0172
Repairs of cars	.0181
Repairs of electric equipment of cars	.0015
Removal of snow and ice	.0020
Horses, renewal, fodder, care	.0008
Electric motive power	.0400
Trainmen's wages	.0524
Salaries and other wages	.0159
Insurance	.0050
Legal expense	.0021
Total expense per car mile	.1551
Gross earnings per car mile	.2175

The Danbury & Bethel Street Railway Company operates over 11.15 miles of track, owns 10 closed and 20 open cars, and employs regularly about 45 persons. Its car mile earnings and expenses were:

Repairs of roadbed and track	.0012
Repairs of cars	.0029
Repairs of electric equipment of cars	.0012
Removal of snow and ice	.0012
Electric motive power	.0140
Provender and care of horses	.0180
Wages of trainmen	.0443
Salaries and other wages	.0060
Insurance	.0059
New construction	.0013
Other expenses	.0011
Total expenses per car mile	.0971
Earnings per car mile	.1350

The Derby Street Railway owns 6.29 miles of track, 10 closed and 15 open cars, and employs regularly about 38 persons. It will be noticed that the pleasure resort is a large item of expense, but the earnings are also large per mile.

Repairs of roadbed and track	.0036
Repairs of cars	.0076
Repairs of electric equipment of cars	.0065
Removal of snow and ice	.0009
Repairs of buildings and fixtures	.0011
Repairs of electric line construction	.0019
Electric motive power	.0143
Trainmen's wages	.0569
Salaries and other wages	.0107
Loss, damages, gratuities	.0061
General expenses	.0075
Insurance	.0017
Pleasure resort	.0155
Total expense per car mile	.1736
Gross earnings per car mile	.2477

The Fair Haven & Westville Railroad Company owns 20.5 miles of track, 55 closed cars, 44 open cars, and employs regularly about 169 persons. Report is as follows:

Repairs of roadbed and track	.0355
Repairs of electric line construction	.0023
Repairs of cars	.0133
Repairs of electric equipment of cars	.0019
Removal of snow and ice	.0011
Repairs of buildings and fixtures	.0002
Stable expense, care, fodder, etc.	.0117
Electric motive power	.0152
Trainmen's wages	.0697
Salaries and other wages	.0081
Loss, damages, gratuities	.0006
Insurance	.0018
Heating car barn	.0003
Sundries and other expenses	.0081
Total expense per car mile	.1701
Gross earnings per car mile	.2253

The Hartford Street Railway owns 60.7 miles of single track, 96 closed cars, 104 open cars, and employs regularly about 481 persons. The earnings are rather low per car per mile for so large a road, and this goes to show that the people of Hartford are getting fully as good, if not a better service than the size of their city justifies. Report is as follows:

Repairs of roadbed and track	.0130
Repairs of electric line construction	.0007
Repairs of cars	.0082
Repairs of electric equipment of cars	.0053
Repairs of buildings and fixtures	.0013
Removal of snow and ice	.0032
Electric motive power	.0175
Horses, their renewal, care and provender	.0222
Trainmen's wages	.0728
Salaries and other wages	.0027
Damages, losses and gratuities	.0016
Insurance	.0013
Other expenses	.0082
Total expense per car mile	.1581
Earnings per car mile	.2046

The Hartford, Manchester & Rockville Tramway owns 6.30 miles of track, 6 closed cars, 8 open cars, and employs about 45 persons. It has a park. While the operating expenses are high, the earnings are also very high. Report is as follows:

Repairs of roadbed and track	.0153
Repairs of electric line construction	.0053
Repairs of cars	.0095
Repairs of electric equipment of cars	.0083

Repairs of buildings and fixtures	.0062
Electric motive power	.0343
Trainmen's wages	.0788
Salaries and other wages	.0300
Loss, damages and gratuities	.0014
Insurance	.0018
Other expenses	.0153
Total expense per car mile	.2066
Gross earnings per car mile	.3663

The Hartford & West Hartford Horse Railway Company, (electric) owns 10.5 miles of track, 8 closed and 13 open cars, and employs about 21 persons. The operating expense on this road is the lowest of any given. Report is as follows:

Repairs of roadbed and track	.0018
Repairs of electric line construction	.0004
Repairs of cars	.0023
Repairs of electric equipment of cars	.0007
Repairs of buildings and fixtures	.0001
Removal of snow and ice	.0053
Electric motive power	.0267
Trainmen's wages	.0437
Salaries and other wages	.0063
Damages, losses and gratuities	.0008
Insurance	.0008
Other expenses	.0076
Total expense per car mile	.0965
Earnings per car mile	.1409

The Meriden Electric Railroad owns 16.5 miles of track, 22 closed cars, 25 open cars and employs about 87 persons. Report is as follows:

Repairs of roadbed and track	.0012
Repairs of electric line construction	.0018
Repairs of cars	.0043
Repairs of electric equipment of cars	.0090
Repairs of buildings and fixtures	.0001
Removal of snow and ice	.0010
Electric motive power	.0103
Wages	.0653
Insurance	.0071
Park	.0079
Other expenses	.0062
Total expense per car mile	.1242
Earnings per car mile	.1721

The Middletown Street Railway owns 4.5 miles of track, 5 closed cars, 9 open cars and employs about 15 persons. Report as follows:

Repairs of roadbed and track	.0013
Repairs of electric line construction	.0002
Repairs of cars	.0000
Repairs of electric equipment of cars	.0004
Repairs of buildings and fixtures	.0004
Removal of snow and ice	.0010
Provender, hay, etc	.0000
Electric motive power	.0404
Trainmen's wages	.0618
Salaries and other wages	.0127
Insurance	.0073
Car house	.0051
Other expenses	.0034
Total expense per car mile	.1367
Earnings per car mile	.2022

The New Haven & Centerville Street Railway owns 11 4 miles of track, 10 closed cars, 10 open cars, and employs about 33 persons. Report is as follows:

Repairs of roadbed and track	.0001
Repairs of electric line construction	.0000
Repairs of cars	.0014
Repairs of electric equipment of cars	.0005
Repairs of buildings and fixtures	.0002
Removal of snow and ice	.0005
Electric motive power	.0146
Stable, care of, provender, etc	.0118
Trainmen's wages	.0628
Salaries and other wages	.0066
Other expenses	.0000
Total expense per car mile	.1003
Earnings per car mile	.1936

The New London Street Railway owns 6.96 miles of single track, 6 closed cars, 12 open cars, and employs 20 persons. Report is as follows:

Repairs of roadbed and track	.0089
Repairs of electric line construction	.0012
Repairs of cars	.0066
Repairs of electric equipment of cars	.0057
Repairs of buildings and fixtures	.0001
Removal of snow and ice	.0006
Electric motive power	.0414
Trainmen's wages	.0497
Salaries and other wages	.0163
Insurance	.0075
Other expenses	.0095
Total expense per car mile	.1476
Earnings per car mile	.2517

The Norwalk Street Railway owns 5.5 miles of single track, 10 closed cars, 6 open cars, and employs 29 persons. Report is as follows:

Repairs of roadbed and track	.0003
Repairs of cars and their electric equipment	.0083
Repairs of buildings and fixtures	.0043
Removal of snow and ice	.0005
Electric motive power	.0301
Trainmen's wages	.0642
Salaries and other wages	.0191
Loss and insurance	.0205
Other expense	.0308
Total expense per car mile	.1775
Earnings per car mile	.2333

The Norwalk Tramway Company owns 10 miles of track, 8 closed cars, 15 open cars, and employs 25 persons. Report is as follows:

Repairs of roadbed and track	.0051
Repairs of electric line construction	.0014
Repairs of cars	.0025
Repairs of electric equipment of cars	.0030
Repairs of buildings and fixtures	.0002
Removal of snow and ice	.0008
Electric motive power	.0322
Trainmen's wages	.0482
Salaries and other wages	.0158
Loss, damages and gratuities	.0007
Insurance	.0062
Other expenses	.0117
Total expense per car mile	.1282
Gross earnings per car mile	.1865

The Norwich Street Railway Company owns 12.4 miles of track, 13 closed cars, 12 open cars and employs 45 persons. Report is as follows:

Repairs of roadbed and track	.0138
Repairs of electric line construction	.0017
Repairs of cars	.0078
Repairs of electric equipment of cars	.0120
Removal of snow and ice	.0011
Electric motive power	.0386
Horses, provender, and care of	.0014
Trainmen's wages	.0605

Salaries and other wages	.0221
Other expenses	.0132
Total expense per car mile	.1800
Earnings per car mile	.2766

The Southington & Plantsville Tramway Company owns 1.57 miles of track, 2 closed cars and employs 5 persons. It operates also an electric light plant. For such a remarkably small road it makes a good showing as to operating expenses although the earnings do not cover the cost of operating. Report is as follows:

Repairs of roadbed and track	.0062
Repairs of electric line construction	.0011
Repairs of cars	.0031
Repairs of electric equipment of cars	.0063
Repairs of buildings and fixtures	.0070
Removal of snow and ice	.0011
Insurance	.0023
Trainmen's wages	.0355
Salaries and other wages	.0353
Other expenses	.0305
Total expense, per car mile	.1284
Earnings per car mile	.1178

The Stamford Street Railway owns 7.3 miles of track, 6 closed cars, 7 open cars, 20 horses, and employs from 25 to 30 persons. Part of the road is operated by horses, so that the following report is a mixed one.

Repairs of roadbed and track	.0045
Repairs of electric line construction	.0004
Repairs of cars	.0032
Repairs of electric equipment of cars	.0002
Repairs of buildings and fixtures	.0014
Removal of snow and ice	.0008
Horses, their provender and care	.0348
Electric motive power	.0223
Trainmen's wages	.0491
Salaries and other wages	.0207
Damages and losses	.0001
Insurance	.0012
Other expenses	.0273
Total expense per car mile	.1660
Earnings per car mile	.1770

The Waterbury Traction Company owns 10.6 miles of track, 18 closed cars, 26 open cars, and employs 75 persons. Report is as follows:

Repairs of roadbed and track	.0051
Repairs of electric line construction	.0022
Repairs of cars	.0040
Repairs of electric equipment of cars	.0065
Repairs of building and fixtures	.0002
Removal of snow and ice	.0030
Electric motive power	.0342
Trainmen's wages	.0636
Salaries and other wages	.0071
Horses, one team	.0009
Damages, losses and gratuities	.0007
Insurance	.0041
Transportation	.0065
Other expenses	.0058
Total expense per car mile	.1439
Earnings per car mile	.2361

The Westport & Saugatuck Street Railway is a horse road operating over 1.8 miles of track, owning 4 cars and 7 horses and employing 5 persons. Report is as follows:

Repairs of roadbed and and track	.0038
Repairs of cars	.0008
Repairs of buildings and fixtures	.0006
Removal of snow and ice	.0050
Harness, horse-shoeing and veterinary care	.0071
Provender, hay, etc	.0435
Trainmen's wages	.0995
Salaries and other wages	.0070
Insurance	.0028
Coal and other supplies	.0024
Total expense per car mile	.1726
Earnings per car mile	.2051

The West Shore Street Railway of West Haven owns 4.11 miles of track, 3 closed cars, 2 open cars and employs 8 persons regularly. The item of exchange tickets enters into this report and raises both expenses and earnings. Report is as follows:

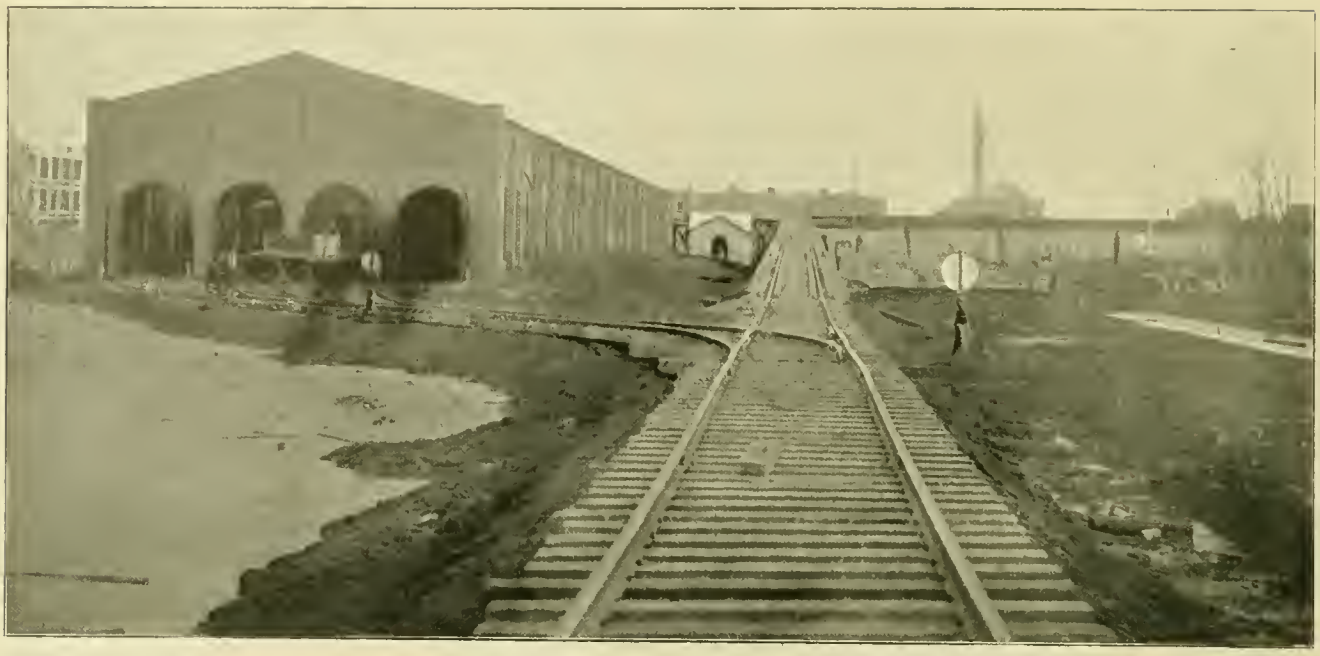
Repairs of roadbed and track	.0279
Repairs of electric line construction	.0001
Repairs of cars	.0005
Electric motive power	.0332
Trainmen's wages	.0630
Exchange tickets	.1136
Rent of cars	.0014
Damages	.0011
Other expenses	.0043
Total expense per car mile	.2446
Earnings per car mile	.3522

The Winchester Avenue Railroad, of West Haven, owns 16.77 miles of track, 34 closed cars, 47 open cars, and employs an average of 125 persons. Report is as follows:

Repairs of roadbed and track	.0059
Repairs of electric line construction	.0019
Repairs of cars	.0080
Repairs of electric equipment of cars	.0064
Repairs of buildings and fixtures	.0003
Removal of snow and ice	.0007
Horses, their care and provender	.0019
Electric motive power	.0159
Trainmen's wages	.0687
Salaries and other wages	.0122
Damage, losses and gratuities	.0003
Insurance	.0066
General expenses	.0173
Transportation	.0088
Maintenance	.0117
Total expenses per car mile	.1666
Earnings per car mile	.2730

GENERAL ELECTRIC - WESTINGHOUSE AGREEMENT.

The long talked of agreement between the General Electric and Westinghouse Electric & Manufacturing Companies in regard to the joint use of certain disputed patents was brought to a successful issue last month and was announced March 12. This puts an end to the expensive litigation which the companies have been carrying on against each other for several years. Both had very strong positions in regard to fundamental patents, and it was recognized that both would be the gainers by coming to a peaceful agreement. Each company is now licensed to use the patents of the other except a few that are excluded. The patents are to be managed by a board of control of five members, two appointed by each company, and the fifth by the four so appointed.



SHOPS AND INCLINE TO STRUCTURE—LAKE STREET ELEVATED.

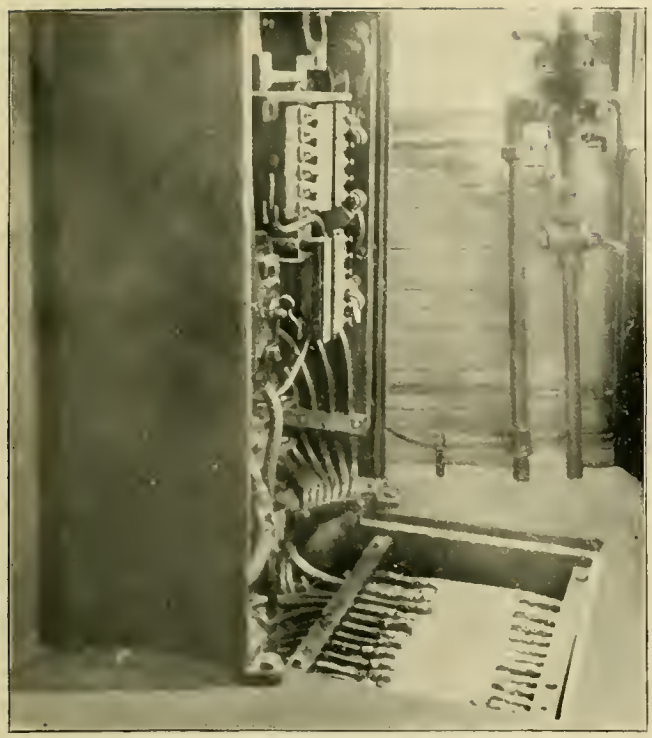
LAKE STREET ELEVATED MOTOR CARS AND SHOPS.

The work of electrically equipping the Lake Street Elevated Railroad of this city, is progressing rapidly. The third rail and feeders are nearly all laid (plans of which were shown in the March REVIEW) and the motor cars and car shops are practically completed. The car shops are something of a novelty for an elevated road, as they are situated on the surface and are reached by an incline 550 feet long, having a 2.75 per cent grade. The arrangement of shops and incline with reference to the structure is shown in one of the accompanying engravings.

The motor cars are rebuilt steam passenger coaches, used before on the road. They are mounted on McGuire elevated motor trucks. The work of putting the motorman's cab in the front right hand corner of each was done in the Wells and French car building shops. No material change was made in the under frame of the car. The motor equipment of each car consists of two G. E. 2,000 motors. An L 4 General Electric controller and central station type of circuit breaker is put in each cab as on the Metropolitan elevated. An improvement introduced in the wiring of these controllers consists in putting a type of patent connector where the controller wires join the car wiring under the cab floor. These connectors are covered with short pieces of hose and arranged in a neat pile just under a trap door in the cab floor. This makes a very safe and convenient arrangement, and is

LAKE STREET ELEVATED MOTOR CARS.

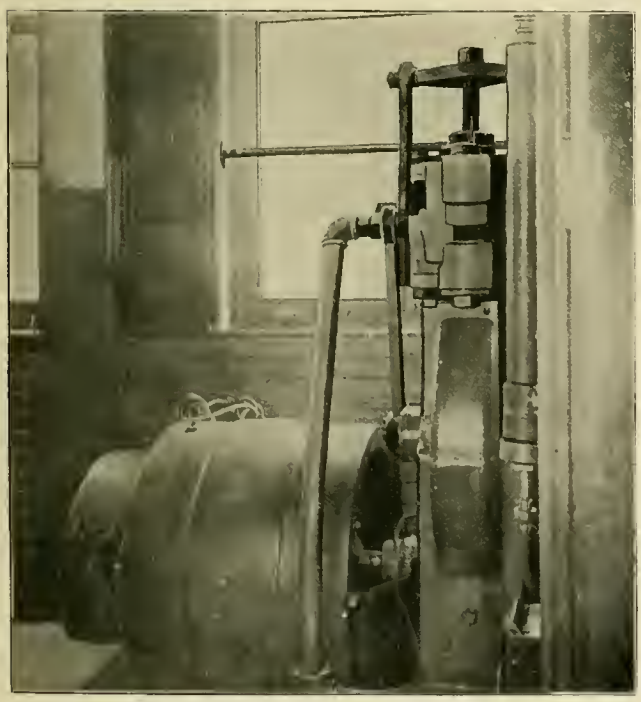
LAKE STREET ELEVATED MOTOR CAR CAB.



CONTROLLER WIRING—LAKE STREET ELEVATED.

shown in the engraving. The Westinghouse air brakes are to be used on the road, and an electric pump in one cab will furnish the air supply.

The car house is 450 feet long and four tracks wide. It is the intention to bring all the motor cars down the



AIR PUMP IN CAB—LAKE STREET ELEVATED.

incline for storage and inspection every day. The barn will hold thirty-six cars (six more than the present motor equipment) and has pits the full length of each track. The machine shop will be located at one end and two traveling cranes (one for each two tracks) will carry armatures and heavy parts from the cars to the shop.

COMMENDS THE REVIEW STYLE.

The Review has always believed in positive opinions. Our readers may not always concur fully in our position on some particular question, but they never fail to know exactly where the Review stands on every question of any importance, and at least must respect the honesty of our views. On the other hand the Review has always been extremely modest in repeating the many kind and complimentary words which are highly appreciated, and which go so far toward encouraging the workers on the publication to constantly better efforts. In this instance we depart from our usual custom and print a letter from a Massachusetts street railway official, who is a thoroughly practical, thinking and progressive man. What he says in the last paragraph is eminently correct, and cannot fail to meet the approval of every street railway man in the country—outside of Detroit. He says:

"Turning from some of the street railway magazines, to an examination of the Review, almost repays one for the time devoted to the other representatives of street railway interests. I say this to emphasize my satisfaction at your decided stand on the question of three-cent fares, while with deep and logical reasoning many other publications established themselves safely on the fence.

"Papers issued in the interest of this industry should be well informed before removing their weight from the negative side of the scales to the center of the beam when so dangerous an experiment is being weighed. I take pleasure in enclosing an extract from the Massachusetts Railroad Commissioners' report for the fiscal year ending September 30, 1895, which shows the cost of operation per passenger on most of the seventy-five street railways in this state. As the figures do not include interest or taxes, no further comment need be made."

The table referred to will be found in another part of this issue, and should be carefully studied by every street railway man. It is altogether the strongest argument ever presented against the adoption of three cent fares.

TROLLEY AMBULANCE FOR DETROIT.

The Detroit Citizens' Street Railway Company has a scheme which, if the city co-operates, will result in the establishing of a trolley ambulance service in that town. An ambulance with a motor car will be stationed near the soldiers' monument and provided with a telephone. Side tracks will be laid to all the hospitals, and considerable time will be saved in conveying injured persons to where they can receive prompt treatment. To facilitate matters, connections will be made with all the street railway lines in the city. The railway company asks that the city agree to pay the crew.

STANDARD ELECTRICAL RULES.

The National Conference on Standard Electrical Rules, recently formed of representatives of the underwriters and all the organizations and large companies interested in any way in electric wiring, held its first meeting last month. The object is to formulate a new code of rules which shall be satisfactory to all concerned. The next meeting will be June 25 and 26. We have received the following from Frank R. Ford, who represents the American Street Railway Association:—

"The undersigned, as representing the American Street Railway Association has been requested to secure suggestion from the members of the association, and from all other street railway companies, engineers and allied manufacturing interests, with respect to such changes or additions to the present rules as may seem advisable.

The importance of this work, in its bearing upon street railway construction and the opportunity now offered to street railway interests for the first time to participate in a movement in which they are so vitally concerned, should not be overlooked. The committee on rules depends upon the active co-operation of all parties at interest in order to secure a full presentation of all changes that might be beneficial in the formulation of a new code.

The present rules relating to electric railways are as follows:

RULES FOR SAFE WIRING.

37. All rules pertaining to arc-light wires and stations shall apply (so far as possible) to street railway power stations and their conductors in connection with them.

38. POWER STATIONS:

Must be equipped in each circuit as it leaves the station with an approved automatic "breaker," or other device that will immediately cut off the current in case the trolley wires become grounded. This device must be mounted on a fireproof base, and in full view and reach of the attendant.

Automatic circuit breakers should be submitted for approval before being used.

39. TROLLEY WIRES:—

a. Must be no smaller than No. 0, B. &. S. copper or No. 4, B. & S. silicon bronze, and must readily stand the strain put upon them when in use.

b. Must be well insulated from their supports, and in case of the side or double-pole construction, the supports shall also be insulated from the poles immediately outside of the trolley wire.

c. Must be capable of being disconnected at the power house, or of being divided into sections, so that in case of fire on the railway route the current may be shut off from the particular section and not interfere with the work of the firemen. This rule also applies to feeders.

d. Must be safely protected against contact with all other conductors.

40. CAR WIRING:—

Must always be run out of reach of the passengers and must be insulated with a waterproof insulation.

41. LIGHTING AND POWER FROM RAILWAY WIRES:—

Must not be permitted, under any pretense, in the same circuit with trolley wires with a ground return, nor shall the same dynamo be used for both purposes, except in street railway cars, electric car houses, and their power stations.

42. CAR HOUSES:—

a. Must have the trolley wires properly supported on insulating hangers.

b. Must have the trolley hangers placed at such a distance apart that in case of a break in the trolley wire, contact cannot be made with the floor.

c. Must have cut-out switch located at a proper place outside of the building so that all trolley circuits in the building can be cut out at one point, and line circuit breakers must be installed, so that when this cut-out switch is open the trolley wire will be dead at all points within 100 feet of the building. The current must be cut out of the building whenever the same is not in use, or the road not in operation.

d. Must have all lamps and stationary motors installed in such a way that one main switch can control the whole of each installation (lighting or power,) independently of main feeder switch. No portable incandescent lamps or twin wire allowed except that portable incandescent lamps may be used in the pits; connections can be made by two approved rubber-covered flexible wires, properly protected against mechanical injury; the circuit to be controlled by a switch placed outside of the pit.

e. Must have all wiring and apparatus installed in accordance with rules under Class B.

f. Must not have any system of feeder distribution centering in the building.

g. Must have the rails bonded at each joint with not less than No. 2 B. & S. annealed copper wire; also a supplementary wire to be run for each track.

h. Must not have cars left with trolley in electrical connection with the trolley wire.

43. GROUND RETURN WIRES:—

Where ground return is used it must be so arranged that no difference of potential will exist greater than five volts to 50 feet, or fifty volts to the mile between any two points in the earth or pipes therein.

At the meeting of the National Conference a number of topics were suggested that might advantageously be incorporated into new rules. Some of these are here presented for the consideration of street railway interests merely as an indication of general lines upon which there may be necessity for revision, and with the hope that they may evoke a very general expression of opinion from all concerned:—

Increased protection of lighting circuits.

Method of grounding generators.

Double insulation for trolley wires with iron pole construction.

Car wiring in moulding and interior conduit.

Automatic magnetic circuit breakers for cars.

Electric brakes.

Electric car heaters.

Use of lights from railway circuits in buildings operated by street railway companies, such as amusement pavilions, repair shops, waiting rooms, etc.

Rail bonding.

Arc lamps on railway circuits.

It has been suggested that the new rules should cover very fully the subjects of car wiring and outside construction. They should deal not only with construction objectionable from the standpoint of fire hazard, but also with respect to personal danger.

All suggestions should be forwarded at an early date in order to secure full discussion, as the committee has but a limited time in which to consider and report upon recommendations to the conference.

Very truly yours,

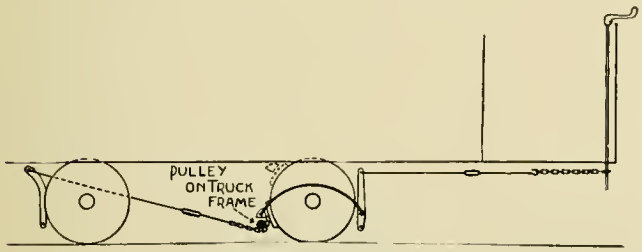
FRANK R. FORD,

203 Broadway, New York

The Schuylkill Valley Traction Company now gives a ride of two miles over certain portions of its route for three cents.

THE MASTERMAN BRAKE.

A brake which has been adopted on the Alameda, Oakland & Piedmont Electric Railway of Alameda, Cal., and which is being tried on a car of the Calumet Electric Railway of this city is shown diagrammatically herewith. It is the invention of W. H. Masterman, now of Chicago. It is a friction brake, but instead of depending on any kind of friction disk arrangement on the axle for drawing up the brakes a shoe is put on the periphery of one wheel. The car brake rig is not materially changed as

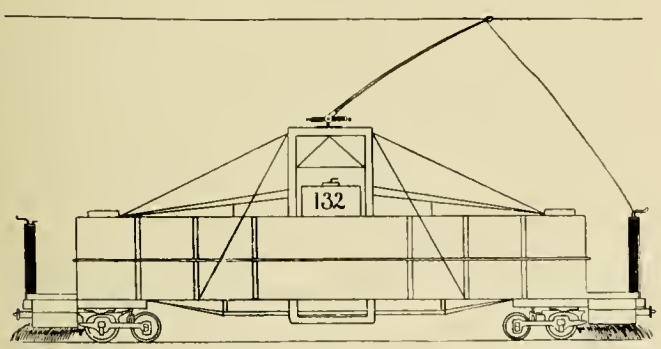


MASTERMAN BRAKE.

the shoe acts simply to draw up the ordinary brake. The diagram shows it as applied to a McGuire brake. The lower end of the lever to which the rod from the brake staff chain is attached is pivoted on the brake beam of the truck. An arch bar goes over the axle from the lever to the brake shoe and when the shoe is brought against the rim of the wheel by the winding of the brake staff it assumes the position shown by the dotted lines and draws up the brakes. It is very cheap in maintenance as practically all the wear comes on the cast iron brake shoe, which is cheap and easily renewed. One of these shoes is provided for each end of the car.

HOME MADE SPRINKLER.

The Denver Tramway has just completed at its shops a new sprinkling car, twenty feet long, with tank five feet in diameter. The tank is boiler iron and was made



DENVER TRAMWAY'S SPRINKLER.

in Denver. The car carries a double equipment of G. E. motors, is mounted on McGuire double trucks, and will run over each line twice each day.

In Denver a 14-mile street car ride may be had for five cents.

HOW I WOULD BUY.

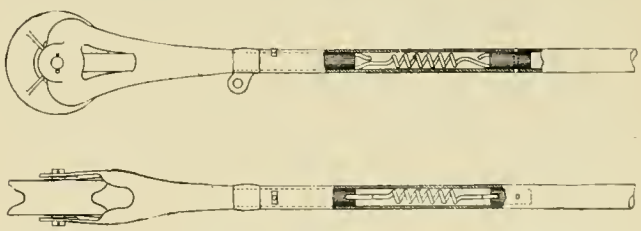
The following was received too late to insert with last month's symposium, but is too good to be lost, and we print it herewith, as it contains a lot of good hard sense in few words.

"As a seller, my advice as buyer, to a manager, would be a thorough system for knowing that what was being bought was giving the best results. My assistant in the practical department, be his title superintendent, mechanical engineer, master mechanic, or what not—should be encouraged and aided in making tests of all kinds to determine length of life, stability, reliance in emergencies, and any other points desirable to know. As I should hold this officer responsible for his portion of the work, his recommendations as to quality of supplies to be purchased should have great weight.

My assistant in the purchasing department, purchasing agent or clerk, should first be made to feel that his position was not dependent upon his ability to purchase cheap goods (any person can do that), but rather should be given to understand that he would have my entire support in securing the lowest prices consistent with purchasing the best goods. Between these two officers I would encourage perfect working harmony, and having shown my confidence in appointing them to their positions, would not impair their usefulness by interfering without very grave reasons. Practical results demonstrating that I could rely upon the goods furnished, the promises made, and the guarantees of a manufacturer. I would have to be thoroughly convinced of the advisability of such a move before making a change."

THE MOUNTAIN TROLLEY HARP.

The accompanying drawings show a trolley head invented by J. H. Mountain, of Atlanta, Ga., which has seen some service. It is practically a swivel trolley.



THE MOUNTAIN TROLLEY.

The head is allowed to turn slightly with reference to the pole—the amount of movement being governed by the spring inside the pole.

The Yosemite Valley & Merced Company, of Yosemite, Cal., has been incorporated. The incorporators are: O. D. Baldwin president, James Cross, vice-president; Thedore Reichert, secretary; A. L. Stetson, general manager; G. A Wulkep, Traffic manager, and C. F. Preston, general attorney. The American Bank & Trust Company is treasurer.

THE TAUNTON SPRINKLER.

The development of the modern street railway has brought about the introduction of new appliances or an extension and enlargement of appliances which have heretofore been used only in a very crude form. Not only has this development of street railway business given great impetus to manufacturers of cars and trucks, but appliances for increasing the comfort of patrons and for the better preservation of the whole plant are found necessary.

Until recently, the snow plow was a thing of shreds and patches, speaking in a broad way, but it has now become a matter of careful design, and the next feature to be brought forward seems to be the street railway sprinkler, which shall embody the same careful work at the drafting board that is given to machinery with which the world is more familiar. No one can tell at the present writing just what will be the outcome of the study which the sprinkling problem is now receiving. In certain cases, railway managers are looking for an opportunity to take up this work in co-operation with cities and towns. In certain other cases, managers are afraid of it and express a desire to let the thing alone, but whatever may be the individual preference, there seems to be no doubt but that street sprinkling is sure to be a feature of street railway operation, and the manager who recognizes this at an early day will in the future have the reputation of being a far-sighted man.

There is little difference among street railway managers as to the value of sprinkling on the roadway. A better contact is secured, and the motors are protected from dust which of course increases the life of these appliances. It is a question yet as to how much trouble it is worth while taking to secure a sprinkling car which shall be attractive, and as much like an ordinary passenger car as circumstances will permit. Up to this time, a plain cylindrical tub or tank mounted on wheels has answered every purpose, but a more complete and attractive device is evidently required, and enterprising manufacturers are already beginning to enter the market with something to meet this demand.

The sprinkler which we illustrate above is one offered by the Taunton Locomotive Manufacturing Company and is intended to be so nearly in appearance like a summer car with the curtains down as to cause no disturbance on the street by frightening horses. Of course, the jet of water may disturb nervous horses, let it be thrown from whatever it will, but quick acting valves which will allow the operator to shut off the stream instantly will remedy this difficulty. All these points and many more have been carefully considered by the Taunton Company in the sprinkler which we illustrate herewith.

TAUNTON LOCOMOTIVE MANUFACTURING COMPANY'S SPRINKLER.

Two of these sprinklers were put into operation last season; one on the Nassau Road in Brooklyn, and one in Bridgeport, Ct. Two more have already been sold this season for use on the Steinway Road in Brooklyn, and inquiries from all parts of the country are coming in.

Establishment of suburban postoffices will probably result in the introduction of street railway mail service in Baltimore, Md. Postmaster Warfield is working toward that end.

The gallant southern street railway man of Tallahassee, Fla., is nothing if not accommodating. A lady recently persuaded the driver of the Capital City line to turn "special" and drive her to her home.

DEVELOPMENT OF ELECTRICAL TRACTION APPARATUS.

H. F. Parshall, the designer of much of the machinery now turned out by the General Electric Company, and now the advising engineer for the British Thomson-Houston Company, recently read a paper before the Foreign and Colonial section of the Society of Arts in England, on the Development of Electric Traction. While this paper is chiefly of interest to English engineers who have not had opportunity to watch electric railway progress, Mr. Parshall touched on a few points in regard to the electrical features of apparatus which are not generally known among electric railway men even in this country, outside of electrical manufacturers. He opened the paper with the statement that at the commencement of his experience six months was taken to construct forty street car motors. At the present day in the same works, 150 motors are regularly constructed per week, and in some cases of extreme demand, as many as 500 street car motors have been constructed in a week.

He further says:—

The tramway motors first constructed in the United States were but little suited for the work of electrical traction. Engineers but little understood the great strain, both mechanical and electrical, to which this machinery would be subjected. In general, the motors were designed on much the same lines as central station dynamos and stationary motors had previously been. The speed, the work, and the torque, at different speeds of the motors, in general, did not agree to the speed and resistance of the car at different speeds. Special attention was paid to the efficiency at full load, but, inasmuch as the mean working point was greatly less than the full load of the motor, efficient results were not obtained until power measurements as to the average work required for the propulsion of a car were made, and the motor so designed that the efficiency was towards a maximum at the average working point of the motor.

Another point that was not clearly recognized related to the torque per ampere best suited to such a motor. In starting the car, the torque per ampere should be a maximum. As the car becomes accelerated, the torque per ampere requires to be less, and should fall off according to the maximum speed to be attained. In the first motors the torque per ampere, owing to the proportions of the motor, was approximately constant, so that an excessive starting current was required, this being so great that, frequently, there was a great heating of the windings, and the durability of the motor was greatly impaired. At the present day, in well-designed street car motors, the effort at the car wheel is about forty pounds per ampere in the armature, and, when running at full speed, from twenty to twenty-five pounds. In thus varying the range of torque per ampere, the efficiency of the motor has been increased, and, likewise, the durability of the parts in which the electrical losses occur.

In order to lessen the deterioration of the controlling mechanism, which is either a commutating switch or a rheostat, it was found necessary to design the motor so that the torque per ampere, at a given speed, coincided with the resistance of the car for a given acceleration and speed. Increasing the efficiency of the motor, that is, lessening the amount of current for which a given torque and acceleration was produced, greatly lessened the deterioration of the controlling apparatus, so that advancement in the design and efficiency of the motor was accompanied with a corresponding durability of the controlling apparatus.

Turning next to the appliances in the station, I would say that these also have been subjected to great improvement. Perhaps the most noticeable improvement is that of the substitution of direct connected generators for the belt-driven generators some time ago used, and I may here state that I do not consider large belt-driven dynamos suitable for electric traction work. The average work is greatly below the maximum work, so that if the belt is given sufficient tension to satisfactorily avoid slipping at the maximum load, the loss in the bearings is excessive for the average load. This objection, however, is entirely secondary to the mechanical objections of a belt connecting an engine with a dynamo subject to greatly fluctuating loads.

The largest belt-driven dynamo that has been constructed in the United States is of 500 kilowatt output. The use of this machine is, however, becoming exceptional. The trouble experienced with the bearings, together with the considerable floor space, and the greater cost of the machine as a whole, with no compensating feature in its operation, has led to its substitution by direct connected machines.

From 150 kilowatt capacity and larger, the belt-driven dynamos should not be used. In the extreme case, dynamos of more than 200 kilowatt capacity should not be driven by belts.

The transmission of power at a distance by means of multiphase currents, and the distribution by means of motor-generators, or by so-called rotary converters (which is a machine running as a synchronous motor, but with closed circuit armature windings, the conductors being arranged so that commutation is effected), is now receiving considerable attention.

On account of the problems connected with the commutation of the currents, the maximum size of a rotary converter is limited to the periodicity, *i. e.*, for comparatively high periodicities only rotary converters of comparatively small output can be constructed. A sub-station was shown in which are operated two 500 kilowatt rotary converters, the current being transformed down to suit the electro motive force in the rotary converter. The ratio of the 3-phase voltage to the continuous voltage of the machine is fixed by the extent of pole arc of the field magnets. The ratio is generally about .612. It may, however, be varied by varying the percentage of the pole arc of the field magnets. Experience with such machines show that best results are secured when

the currents are delivered in phase with the electro motive force. Either a lagging or leading current, with respect to the electro motive force of the rotary converter, occasions more or less sparking.

Recently, the writer has been designing the multiphase system for the distribution of power to electric tramways in Dublin. The object of the use of the three-phase, in this particular case, is to comply with the Board of Trade requirements as to the drop in the earth return from a given point of operation, which is necessarily fixed. In this case, I have preferred to use synchronous motors driving commutating machines, the particular advantage in this being that the phase of the current, in respect of the electro motive force, may be regulated by the excitation of the synchronous motor. In the case of the rotary converter, this may not be done without varying the pressure in the consumer's circuit. There is also, in the writer's opinion, some advantage in the use of a synchronous motor over an ordinary static transformer, the one being more easily repaired, and less liable to give way under the overloads that are frequent in tramway systems. It is not necessary to mention that the 3-phase system is only used as a convenient means for transmitting power at a high tension. The 3-phase synchronous motors have the advantage of being self-starting, and there is also another advantage in that the amount of copper required is about three-quarters of that required in a simple alternating current system of transmission.

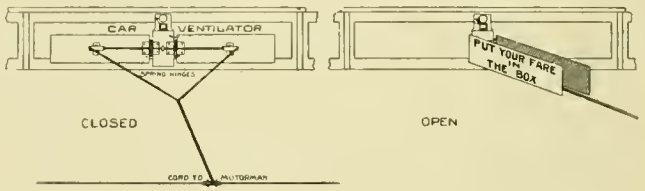
BIG POWER PLANT, AT OGDEN, UTAH, A GO.

Now that Joseph Bannigan, a Providence, R. I., capitalist has succeeded in floating the bonds of the Pioneer Electric Power Company, Ogden, Utah, work on the big plant will be pushed with all possible speed. The purpose for which Mr. Bannigan has secured $1,500,000 is a scheme to utilize the fall of the waters of the Ogden river and make it generate electricity by means of immense dynamos. This electric power will be distributed over the surrounding country and sold at a very low rate per horse-power, for manufacturing purposes. There is also an irrigation enterprise connected with the undertaking, the idea being to supply arid lands with the waste water. The plant will be an immense one, consisting of a large power house, a reservoir to hold 2,000,000,000 cubic feet of water, and many miles of tunnels, about 700 feet of which will be through solid rock. C. K. Bannister is the engineer who designed the plant. George O. Cannon, one of the leaders in the Mormon church is president of the company, and Wilfred Woodruff, the head of the church, is the heaviest stock holder. Senator Frank J. Cannon is to be the manager of the new company.

Later: While preparing a blast, on the evening of April 8, in a canon four miles from the city, seven of the company's men were killed by a premature explosion, and several others severely injured.

A GENTLE REMINDER.

The cars of the Norway & South Paris Street Railway, Norway, Me., are run without conductors. Some trouble was experienced getting people to pay fare, and to serve as a reminder to the absent-minded passengers, F. B. Lee, superintendent, has arranged a swinging



A GENTLE REMINDER.

sign which is put up in the dome of the car as shown in the illustration. If a passenger does not deposit his fare in the box soon after entering the car, the motorman pulls at the string, which makes the sign open up and at the same time rings an electric bell.

LUCKY LAWS AND LAX LAW.

Last month's REVIEW told of the arrest of Louis V. Laws, a Denver Consolidated Tramway Company conductor, for stealing transfer checks. An attempt was made to hold Laws on the charge of burglary, as the evidence indicated that he entered one of the company's cars, and carried away transfer tickets. Still Justice Crane dismissed the charge of burglary, on the ground that the place where the alleged theft was committed was not one of the places mentioned in the statutes, or in the legislative act of 1889, defining burglary. The point at law was whether a passenger car was a "railroad" car. As Webster defines a passenger car as a railway car filled with seats and other conveniences for the accommodation of passengers, the court held that had the legislature that made the law meant passenger car, it would have been very easy to have said so in unmistakable language. The justice, however, denied a similar motion to discharge Laws, on charge of larceny and bound him over for trial. In this case the ex-conductor is accused simply with stealing $200 worth of transfer checks from the company.

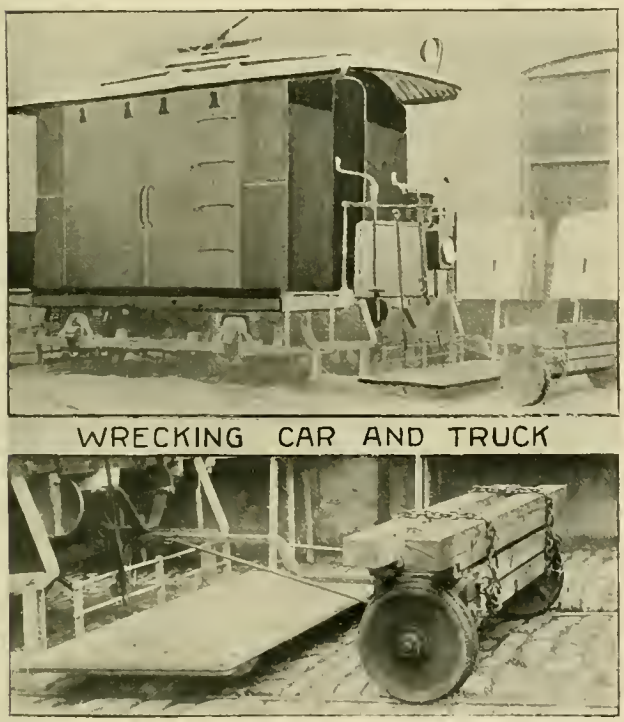
"ELECTROCUTED" TWELVE SHEEP.

An electric car on the Center avenue line of the Duquesne Traction Company, Pittsburg, ran over and killed twelve sheep, the property of a Pleasant Valley butcher one night last month. The flock consisting of thirty-nine sheep, was being driven along the track. The car bore down on them at a high rate of speed, and before it could be stopped had despatched the twelve. Parts of animals were scattered along the track the distance of several hundred feet, and as the moon was shining brightly, and the arc lights on the line were burning, it presented a ghastly spectacle.

WRECKING TRUCK AT LOUISVILLE.

BY W. O. MUNDY, SUPERINTENDENT SHOPS, LOUISVILLE RAILWAY.

In the February and March numbers of the REVIEW have been shown methods used at Milwaukee and Denver for handling cars with broken axles. As the system in use here is radically different, an account of it will probably be of some interest to your readers. As we have some five or six different styles of trucks in service it was almost impossible to get out a device to be connected directly to the truck. We, therefore, constructed one to take its bearing under the car sills, and applicable to either end by using suitable blocking. As shown by the accompanying photograph this device consists of a small temporary truck to carry the end of car having the break, the car being raised sufficiently for the wheels on the broken axle to clear the rail. Owing to the breadth of the top of truck there is no tendency



WRECKING CAR AND TRUCK

for it to topple over even if the tongue were removed. In case the break occurs on a single motor car the wreck is towed by using the tongue of the temporary truck as a draw-bar, attaining thus the double purpose of drawing the car while keeping the wheels in the best position for easy running, especially on curves, as the truck top is pivot mounted, and thus allows a radial motion. With the double motors the method differs slightly in that the remaining good motor is made to run the car to the shop, the temporary truck in the meantime being kept from turning by means of chains from the end of the tongue to the edge of platform. For ease of handling the truck is constructed with one loose wheel working between collars, and this facilitates matter considerably, especially in cutting around from one track to the other when placing in position under car.

Although not necessary for our system of wreckage, we have built a special wreck car of the freight type, in the cab of which are kept jacks, chains, blocks and all tools useful for such work.

Since adopting this method (in all somewhat over six months) we have had almost no trouble with delaying the regular lines except for placing truck wheel, which occupies about two or three minutes. Afterwards it is able to travel as fast as the rest.

H. B. NILES' NEW CONNECTION.

H. B. Niles, with whom most of our readers are doubtless familiar as the electrician of the Citizens' Street Railroad at Indianapolis, who has planned and carried out so many important improvements in the testing and care of motors, has resigned as electrician of that road, and become associated with the Yawger Construction Company. This company has been working principally in the steam road field, and is very fully equipped for good and rapid construction work. Now that Mr. Niles has become identified with the company, it will take up electric railway and especially interurban work, and his electrical knowledge, together with the thorough organization for track construction of the company as it now stands, make a strong combination. He has been engaged in construction and operation ever since the first Sprague road at Richmond, and has a keen insight into electric railway problems, besides being one of the best fellows, socially, that ever was. The first week's work of the new combination was the capturing of the contract for the ten miles of road to be built from Elgin to Geneva, Ill., for the Carpentersville, Elgin & Aurora Electric Railway.

MORE TROLLEY, LESS STEAM.

It is announced that the Niagara Central Railroad, which heretofore has been operated by steam, will adopt electricity as a motive power and that it will this spring be transformed into a trolley line. The Niagara Central runs from St. Catharines, Ont., to Niagara Falls, Ont., a distance of about twelve miles. When the change is made it will make it possible to travel all the way from St. Catharines to Queenston by electric railways. It is at Queenston the steamer can be taken for Toronto. It is understood that, while operated by steam the Niagara Central has not been a paying venture, but as an electric road the revenue is expected to largely increase. With the construction of the new steel arch bridge across the Niagara gorge and the laying of electric railway tracks on it, it will be possible to make the run from St Catharines to Buffalo on a trolley car.

THREE-CENT FARE FALLACY EXPOSED.

An Absolutely Convincing Argument Against Three-Cent Fares —Official Report from Every Road in Massachusetts— Not One Can Carry for Three Cents and Exist.

Massachusetts has a Railroad Commission, whose province it is among other things, to secure and compile statements of earnings and expenses of the railroads and street railways of that state and the reports made to the commission are in reply to a long list of very leading, direct and detailed questions. These questions are so framed, and the powers of the commission are such that no road would dare to doctor the returns, even were they so disposed. In no other state has the matter ever been handled in so comprehensive and thorough a manner. This report is now before us, and from it we select the figures as to those points of most vital importance. Nearly every road in the state is quoted, and the report includes a statement as to each of 124 points, required by the commission. Hence there can be no possible question as to the reliability of the figures stated.

Before taking up the figures, let us look at the existing conditions for street railway operation in Massachusetts. It will readily be conceded by every street railway manager, that in Massachusetts exist the ideal conditions to the making of a successful street railway operation. The state, in especially the eastern half, is thickly covered with cities, towns and hamlets. These are so numerous that in hundreds of places a stranger could not determine where one town ended and the next began. This is strikingly illustrated in the case of every interurban line, where it has been necessary to secure municipal consents from six or more distinct town or city governments in the construction of a line even a few miles in length. Even outside of the town limits the settlement is dense. In all these places manufacturing is the occupation which employs the masses. In no other state is this true to the same extent.

This being the case, the conditions are highly ideal for street railroading. Thousands upon thousands of mill and factory operatives must use the cars night and morning in going between their homes and places of employment. But even this vast army of street car riders are but a part. As everyone knows, who is familiar with the methods of New England manufacturing, there are thousands more of operatives who do their work at home. Each morning they must visit the factory where they receive a given amount of piece work which is taken home and brought back the next day, finished so far as their portion of the work is concerned. These people use the cars to an enormous extent. Both these and the mill operatives proper are not a class to keep a horse and vehicle of their own, nor do they patronize livery stables to any extent. When they ride, be it to their work, or on the Saturday afternoon and Sunday outing, it is always in the poor man's carriage—the street car.

It will be seen, then, that to an extent not found in any other state the local conditions which go to furnish a large volume of street railway patronage, exist here. Now, given the business, how does the cost of operation compare with other states.

In the western half of the state fuel is a little high, in one place running $4 per ton, but for coal of good quality; and the fuel is not the most important item in expenses anyway. Wages, always the big charge to operating expenses, average astonishingly low, and for western roads the figures will be simply startling. The report shows a total employment of 8,048 men in the various capacities. These received in wages for the year ending September 30, 1895, a total of $3,607,881, or an average yearly wage of $448.29. Assuming that each man worked 300 days in the year, allowing fifty-two Sundays and thirteen days off for sickness or otherwise, and this allowance is too high (thirty days would be nearer right); but even at 300 working days, the average daily wage was $1.16 per man, on all the roads in the state. Of course, the Boston, and some few other scales, were much higher, but $1.16 per day, per man, was what the state averaged. A reduction in fares in Massachusetts, would force the companies to cut this already low wage scale still further. It would not be a matter of choice or sentiment with them; it would be a dire necessity.

	Operating Expenses per Passenger.	Operating Expenses per Car Mile.	Receipts per Car Mile.
Athol and Orange	.0310	.1338	.2185
Braintree	.0762	.2197	.1410
Braintree and Weymouth	.0280	.0659	.1131
Brockton	.0264	.1475	.2541
Clinton	.0493	.1624	.1659
Conway Electric	.1554	.2735	.2066
Cottage City	.0306	.1127	.2911
Dartmouth and Westport	.1400	.2678	.3070
Dighton, Somerset and Swan ea	.0473	.2091	.2565
East Wareham, Onset Bay and Pt. Ind.	.1522	.6302	.5607
Fitchburg and Leominster	.0425	.1544	.2298
Framingham Union	.0395	.1680	.2194
Gardner Electric	.0431	.1912	.2215
Globe (Fall River)	.0309	.1616	.2740
Gloucester	.0313	.1695	.2726
Gloucester, Essex and Beverly	.0356	.0988	.2509
Gloucester and Rockport	.0369	.3182	.4477
Greenfield and Turner's Falls	.0210	.1176	.2718
Haverhill and Amesbury	.0454	.1732	.2754
Holyoke	.0337	.1672	.2703
Hoosac Valley (North Adams)	.0409	.1785	.2387
Hull	.0297	.2098	.3566
Lowell, Lawrence and Haverhill	.0324	.1943	.2983
Lowell and Suburban	.0304	.1263	.2090
Lynn and Boston	.0305	.1603	.2814
Marlborough	.0300	.1201	.1824
Montague	.0241	.0798	.1903
Natick and Cochituate	.0326	.1689	.2644
Newburyport and Amesbury	.0316	.1298	.2064
Newton	.0338	.1720	.2484
Newton and Boston	.0309	.1328	.1777
Newtonville and Watertown	.0385	.1473	.1692
Norfolk Suburban (Hyde Park, etc.)	.0284	.1538	.2464
Northampton	.0282	.1167	.2108
North End (Worcester)	.0530	.1478	.1323
North Woburn	.0459	.1866	.2121
Pittsfield Electric	.0306	.1675	.2804
Plymouth and Kingston	.0377	.1493	.2201
Quincy and Boston	.0280	.1635	.2852
Rockland and Abington	.0360	.1541	.2099
South Middlesex (Natick)	.0347	.1613	.2297
Springfield	.0330	.1538	.2453
Taunton	.0287	.1312	.2085
Union (New Bedford)	.0284	.1904	.2943
Wakefield and Stoneham	.0315	.1247	.1964
West End (Boston)	.0363	.2539	.3492
Worcester Consolidated	.0368	.1851	.2512
Worcester and Surburban	.0314	.1826	.2716
Woronoco (Westfield)	.0508	.1539	.1534
Average	.0349	.2082	.3020

By reference to the table printed with this article, it will be seen nearly all the operating roads in the state, are reported. One column gives the operating cost of carrying each passenger. This does not include either interest on bonded indebtedness or taxes—both large items, and of course dividends are not included. Of the fifty roads, only nine show a transportation cost of less than 3 cents per passenger. All the others are considerably in excess of 3 cents, and to this must be added the fixed charges of interest and taxes.

It is well worth while to examine the situation as to these nine roads which report at less than 3 cents, and in every case but one, it will be seen from the following table, what condition they are in to haul passengers at 3 cents, after paying interest and taxes.

Road.	Cost of operation per passenger.	Interest and taxes per passenger.	Total cost per passenger.
Braintree and Weymouth	.0280	.0054	.0334
Brockton	.0264	.0085	.0349
Norfolk Suburban	.0284	.0047	.0331
Northampton	.0282	.0035	.0317
Quincy and Boston	.0280	.0027	.0307
Taunton	.0287	.0132	.0419
Union (New Bedford)	.0284	.0043	.0327
Hull	.0297	.0115	.0412
Montague	.0241	.0011	.0252

The Montague road makes a regular Pingree showing, and were the reader to stop with the table he might suppose he had discovered some great secret of operation. But the road has only four cars, and absolutely no money was spent upon the property. At this rate the whole road will have to be rebuilt entire, for during the whole year only $51.88 was spent in repairs;—less than a dollar a week! On the track and building repairs was spent $13; on repairing the cars $28.38 and repairs to the electrical equipment $10.50! We challenge the world to show an equal record anywhere; at any time; under any conditions. No wonder the "cost per passenger" is abnormally low, and we can easily imagine the employes were satisfied with board and lodging. The necessary men to operate the four cars, and do the other necessary work, such as cleaning, sweeping, etc., did, however, receive all told the munificient sum of $1,120.09, or at the highest calculation about seventy-five cents per day, per man. If fares on other lines are to be reduced to three cents, the Montague road should carry for about ten cents a dozen.

Twelve roads aggregated a deficit during the year of $29,888; while thirteen roads had an accumulated deficit of $136,794.

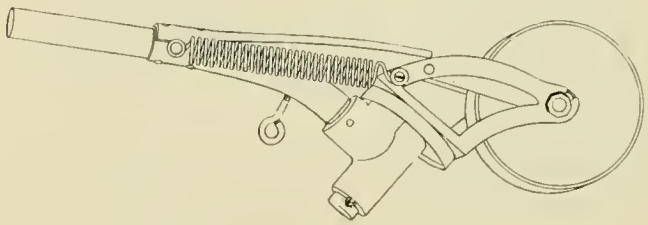
Of the entire number of roads only four are exclusively horse lines, and these aggregate only twenty-one miles; the balance, seventy-one, are electric with 1,002 miles of track.

The table explains itself and constitutes a simply irrefutable argument why a 3-cent fare is not only impracticable, but impossible.

The Denver Consolidated Tramway Company has announced that nine-tenths of all cars built for it in the future will have double trucks. It considers them not so hard on the rail joints.

A NEW SWIVEL TROLLEY HEAD.

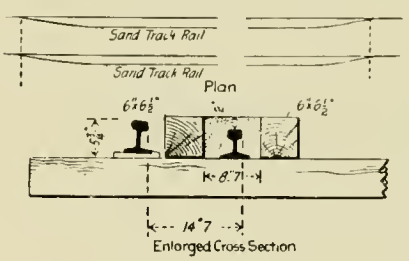
A Bath, Me., concern is putting out something new in the way of a swivel trolley. The principle of the swivel trolley is not new but it has never been put in the exact



form here shown. The object of course, is to allow the wheel to conform to the direction of the wire going around curves, thereby lessening wear, and the liability of the trolley coming off.

SAND TRACK FOR RUNAWAY CARS.

A sand track for stopping runaway cars on heavy grades is in use on some roads in Germany, and it has been found of great service in preventing accidents. The tracks are laid with main line rails on iron tie-plates, and have a short length of gantleted track laid with branch line rails resting directly upon the ties, there being thus a difference of about 1.05 inch between the levels of the rail heads. A guard timber along each side of the gantlet track rails and the space between the timber is filled with sand, giving a depth of about two inches over the rail. When a car starts to run away, one of the switchmen throws the switch of the sand track, and the car is quickly and easily stopped, while there is no difficulty in getting it back to its place.



ATTEMPT TO SUPPRESS ADS IN CARS.

The courts have been asked to declare the advertisements carried by one of the Pittsburg roads in its cars, as illegal. The judge refused to grant the desired injunction and the case will be called up again soon.

As this is the first instance of its kind we have investigated the matter and find the party who instituted the suit is a very small stockholder, having only a few shares, and that these were purchased after the papers in the case were all drawn, and the stock evidently bought for the express purpose of enabling the suit to be brought. In financial circles the whole proceeding is pronounced as a part of an attempt to bear the stock by unfriendly interests, and the scheme appears to have been a complete fizzle. The claim made was the company's charter does not authorize the carrying of advertisements in the cars.

PROPOSED IOWA LEGISLATION.

A bill has been introduced into the Iowa House, which contemplates the placing of all electric, and street railways other than those operated by animal power, under the jurisdiction of the railroad commissioners of the state; this board of railroad commissioners to have jurisdiction covering practically the entire operation of the road. The bill provides, among other things, that the commissioners may establish the maximum rate of speed and make rules for the lighting and heating of cars and compel the adoption of any such safety devices as in the judgment of the commission, may be desirable.

They may also require the vestibuling of cars, said vestibules to be approved by the commission. The bill further provides that where extensions to present lines or construction of track by new companies is intended, they must first secure a hearing by the commission, which shall decide as to whether public convenience and necessity requires the construction of such lines; and in no event shall any street or electric railway be authorized upon such portion of a street as is already occupied by another; and no railway shall be built in any town or city without consent in writing of the owners of at least two-thirds of the property abutting on the line so to be constructed. In lieu of taxes as at present assessed, the bill provides that all roads shall pay a percentage of gross receipts amounting to 1 per cent on the first $250.000; 1½ per cent on earnings from $250.000, to $500.000; and 2 per cent on all amounts over $500.000. This license, as it is called, is to be paid to the treasurer of the city in which the road is located, and where a line operates in more than one city a division of the percentage is to be made on a mileage basis. Three-fourths of the proceeds of such licenses are to be used by the city in repair of streets, and the remaining one-fourth is to be equally divided between the state and county. All accidents of a personal nature are to be fully reported to the commissioners who shall decide whether the same was the result of mismanagement or neglect on the part of the company.

While the provisions of the act would at first reading seem to the average citizen to perhaps be a good thing, it will be at once evident to every practical street railway man that the bill is not only extremely unjust to street railways, but could not fail to react to the disadvantage of the citizens and property owners. In the first place street railways are taxed very heavily at present, and there really is no justice in adding to their burden more than to any other property owner. Most companies, moreover, are already doing more to keep up the streets of the cities in which they operate than they should really be required to do, as in most places they voluntarily keep in repair that portion of the street that is occupied by their tracks, and in this way bear a heavy burden which if the tracks were not in the street would fall upon the abutting property owners.

We have frequently shown how impractical it is for any board to intelligently decide what is best in the several and scattered cities of a state; as what is good practice in on one city is entirely impractical in another owing to the very greatly different local conditions which prevail. The street railway man in his own town studies the situation and operates his cars for the best interests of both the public and his company, but to be obliged to follow out an iron-clad set of rules emanating from the office of a board of commission at the state capital, would not only be very severe upon the company, but would prevent it from doing many things which it would like to do for the convenience and advantage of its patrons.

A street railway is strictly a local institution, and if any board of management outside of its own board of directors were to act in the matter of its conduct, it should be the city officials of the town in which it is running, and not a state board located many miles away. It is not a parallel case with a steam road which runs through rural districts and where the same steam railroad passes through many different cities. In the case of a street railway, it is doing business in one town and if any special legislation is warranted at all, the local authorities are in the best position to know what that legislation should be, and it should not go beyond them. We have repeatedly shown in these columns that where even municipal authorities have undertaken to legislate the operation of street railways, it has uniformly been unsatisfactory and disastrous to every one. We have shown places where the cities have compelled the companies to lay a certain kind of rail at great expense, against which the companies protested, as being entirely unsuited to the wants of either the public or the company; and where after the track had been down a few months, the city acknowledged its error, and compelled the company at great loss, to take up the track and put down the type of rail which it desired to lay in the first place.

We have also called attention to the fact that in a number of cities during the past year, the city council has passed an ordinance requiring cars to stop at the near crossing to receive and discharge passengers, and in every such case the law has soon been repealed and in one case within twenty-four hours after it went into effect.

These and many other things which we could quote, go to show that even the municipal authorities are not competent judges of what constitutes the best operation of a street railway, and certainly a state board having control of steam roads as well as street roads, is going to confuse the two; and the chances are that any ruling which it would make for street railways would be unfortunate and impracticable and an unreasonable burden upon the operating company. The citizens of every town in which a street railway is operating should be interested in promoting the interests of the company to the greatest possible extent; as the success of the company has very largely to do with the reputation of the city. In cities where the street railways are the most successful, the property owners and the public generally, receive the greatest amount of benefit and are afforded more privileges and a better service by far, than in those cities

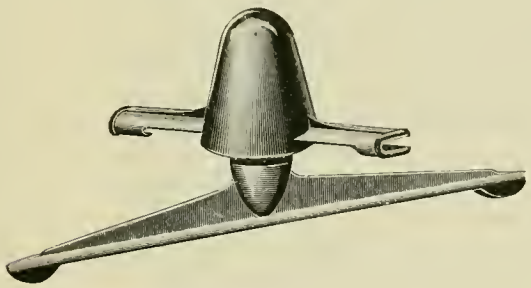
where the requirements are severe and the company is hedged about with all sorts of restrictions which hamper them in the operation of their road, and prevent their furnishing that service which they otherwise would be glad to do.

We have frequently called attention to the fact that the managers of street railways are fully alive to the fact that their success, and the success of their road, depends upon the giving of such a service as will please and satisfy the public, and no board of state control can possibly be as good a judge of what constitutes a good service for any particular city as the manager of the road in that city, who night and day, week in and week out, makes it his special study and effort to better his service and to make his road just as near the ideal as is possible with the business at hand.

It is not a question of legislation, it is simply a question of ability, and that ability must depend upon the patronage which any given road receives.

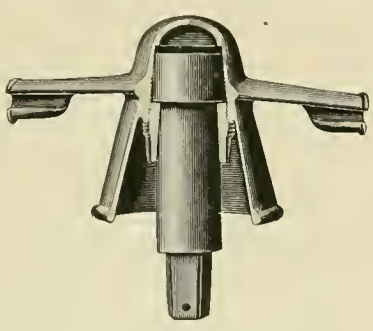
BADGER OVERHEAD LINE MATERIAL.

The Badger straight line hanger, of which an external and a section view are shown, is designed as an improvement over the well known "West End" type. Instead of having the usual screw cap on top of the bell, where it is exposed and liable to be lost if it becomes loose from



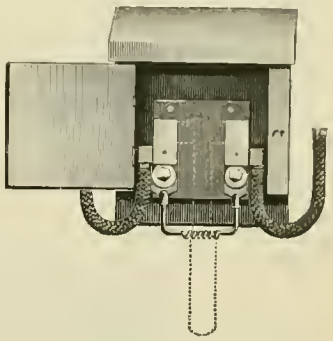
EXTERIOR STRAIGHT LINE HANGER.

the continual jar of the trolley, it is screwed in from below. This not only avoids it being lost but will prevent the effect of the weather on the threads and leaves the outside shell of the bell a continuous casting. This bell will do away with the mysterious short circuits which occur from a cap falling off of the old style hanger and the trolley wheel pressing the clip up against the shell of the bell, thereby grounding it unless the span is well insulated. As soon as the car has passed, the ground is gone and is very difficult to find. With the thread from beneath the head of the insulated stud will prevent the collar from falling to the ground and the trolley wire will sag from the hanger, notifying the motorman instantly that something is wrong. The bells are made to fit the standard sizes of insulated studs and any kind of insulation can be used with them. The sectional view of the hanger shows the insulated stud



SECTION OF STRAIGHT LINE HANGER.

MECHANICAL CLAMP.



SECTION FUSE BOX.

with a taper shank (instead of the standard screw end) to fit the specially designed mechanical clamp shown in another one of the engravings. This clamp avoids screw threads entirely and holds the wire in a vice like grip by the taper wedge in the stud. This not only assures greater strength than a screw stud but holds the wire very firm without the use of wrench or screw driver, simply a few blows from a hammer being necessary. This clamp is especially well adapted to the pear shaped trolley wire now coming into use. The Badger section fuse box for use in feeders or between sections is shown. This material is all made by the Badger Manufacturing Company, 525 Cedar street, Milwaukee.

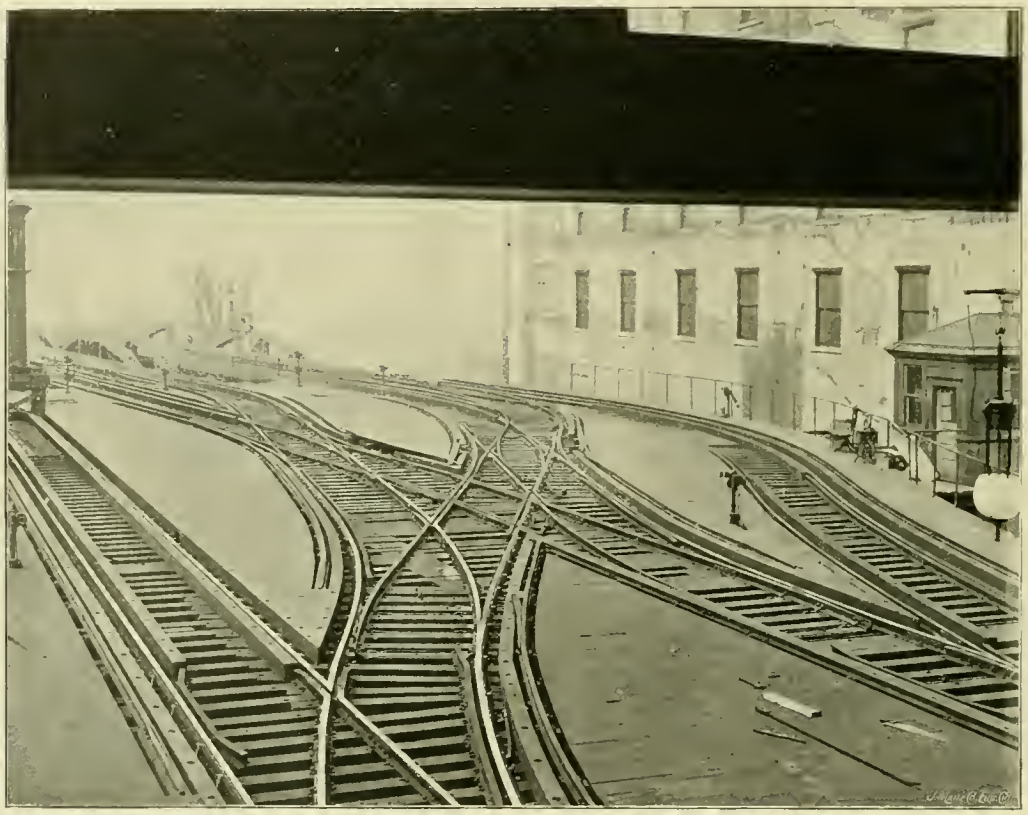
PINTSCH GAS IN KANSAS CITY.

The trial of the Pintsch light on a Northeast electric car at Kansas City, one night last month, was a very successful one, and should be exceedingly flattering to Clarence H. Howard, secretary of the Safety Car Heating and Lighting Company, New York, who conducted it. Mr. Howard promised to the street railway men of Kansas City something that would eclipse anything that they had yet seen in car lighting. A car equipped by the Pintsch Company, at its own expense, was run down along side of a Fifth street cable car lighted with coal oil, and an Independent avenue car, lighted with electricity, and proved an eminently satisfactory test. It dimmed to a considerable degree the coal oil lamps, and gave as brilliant and much more uniform light than that taken from the trolley. On the following evening a second exhibition of the light was made for the benefit of those who could not be present at the first, and it is the general opinion that the Pintsch gas will soon be adopted on all the lines in the city.

A dynamite explosion on the Ellicott City, (Md.,) Electric Railway Company's line, in course of construction, one day last month, caused the death of Lee Williams, a colored laborer, and John Clagett, a bystander, besides greatly damaging the surrounding property for some distance. The explosive was used for the purpose of blasting, and had become frozen. Williams was endeavoring to thaw it out over a fire, when it became ignited.

METROPOLITAN ELEVATED TERMINAL.

Celerity in train movement and limitations as to space are two of the factors that confront the engineer who attempts to solve a problem of elevated special track construction. In these days when elevated roads are compelled to reach the heart of a city, by the most circuitous routes, and terminal facilities have to be provided for trains coming in on short headway over four tracks, more than ordinary skill in construction and manufacture of special parts is necessary. To this branch of railway construction the Paige Iron Works of Chicago, have been devoting their energies and one of the recent successful achievements in this line we have chosen for illustration.



SPECIAL WORK AT METROPOLITAN ELEVATED TERMINAL, CHICAGO.

The cut represent an intricate piece of special work, located on the Metropolitan West Side Elevated Railroad, Chicago, between the Franklin street terminal station and the four track bridge over the river. While it is not the largest, it is the most complicated lay-out on the structure. The problem was to arrange it so, that trains could pass from any one of the four tracks on the bridge, to either of the two station tracks and return from either of the two station tracks to any of the four bridge tracks without backing up and to provide track for relay motor. As the distance from station to the bridge was limited and the center of the north station track was about in line with the center of south bridge track, but not parallel with it, the engineering problem was a very difficult one. The lay-out consists of two slip switches of different radii, one curved crossing and five turn-outs (one on a reverse curve). In addition to this, provision had to be made for the trolley or feed rail, which had to be movable in some places, to be out of the way when not in use. All of the switches, contact rails, signals and interlocking appliances, are moved from tower partly shown at the extreme left of the picture. Eighty pound T rail was used throughout the construction, which was as near the railroad standards as the short radii of the curves would allow.

There are many other fine pieces of special work on the line, all of which were made by the Paige Iron Works, Chicago.

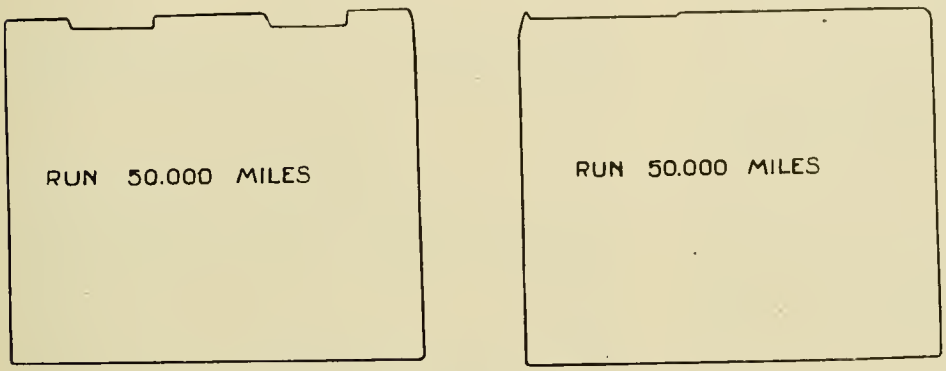
DIED FROM GRIEF.

Notwithstanding the cruel natures that motormen and gripmen are depicted as possessing, facts occasionally arise showing these men to have hearts, and sensitive feelings in common with the rest of humanity, as in the case of John Brazil, a motorman, of the Union Traction Company, Philadelphia, who died from grief, consequent on causing the death of a boy while operating his car. Brazil, who was only twenty-three years old, never recoverd from the shock which he received at the time of the accident, and though the coroner's jury exonerated him of all blame, he went into a speedy decline, and died in about six weeks.

FIFTY-THOUSAND-MILE RECORD FOR MOTOR BRUSHES.

The Partridge Carbon Company, Sandusky, Ohio, is justly pleased with a letter from the South Jersey Street Railway, of Point Pleasant, N. J., which states:

"I send you today two motor brushes made by you and bought by us from the Westinghouse Electric & Manufacturing Company in July, 1894. These two brushes have been in use seven months during which time the car motors from which brushes were taken have made a mileage of from 48,000 to 50,000. The brushes sent are about the worst worn of a set of ten that I have in my possession. To me this is something extraordinary as I have had the experience of seeing new carbon brushes put on motors every other night. We are using Westinghouse No. 12, 20-horse-power motors. I would say that I originally bought 100 brushes and I have them all now. The two mentioned are good for another 50,000 mile run. I do not think there is another such brush on earth as the Partridge, for long life, wear on commutators, etc. I believe, in showing appreciation of a good thing, hence, my letter. I might also add that our line runs along a beach front where sand and dust is in plenty."



PARTRIDGE BRUSHES—ORIGINAL SIZE, 2¾ BY 2⅝ BY ½ INCHES.

SHOOTING THE CHUTES.

In connection with a study of pleasure resort attractions a description of this wonderfully fascinating amusement, practically unheard of two years ago, but now the most popular attraction in America, will undoubtedly be interesting.

The chute consists of an inclined roadway of wood or iron, starting at height of about sixty feet, which, with a run of about 300 feet, descends to the surface of the water. On this roadway are tracks, upon which boats, each holding eight passengers, glide rapidly down. When the boat strikes the water it is traveling at the rate of seventy-four miles an hour, and the impetus acquired in the descent causes it to proceed in a series of bounds (like a stone thrown by a boy in "ducks and drakes" some 300 feet across the lake to a landing stage, where the passengers are disembarked. The boats are so constructed that it is impossible for the riders to get wet. The sensation during the descent and upon the impact of the boat with the water is most novel and thrilling.

Passengers are carried up the incline to the top of the chute in cars, while empty boats are taken up by an endless chain, to which are attached especially designed carriers, making it automatic. The chute, boats and entire apparatus are covered by patents, which are owned exclusively by the Paul Boyton Company, of 112 Dearborn street, Chicago.

Street railway companies have been instrumental in introducing the chutes in many cities, and have invariably found them highly remunerative. The patronage they have received is almost incredible, it having reached as high as 30,000 people at a single chute in one day.

The coming season will find chutes running in Chicago, Coney Island, Boston, St. Louis, Baltimore, Kansas City, Buffalo, Nashville, Washington, Atlantic City, Knoxville, Cincinnati, San Francisco and Rockaway Beach, and probably in Detroit, Cleveland, Pittsburg, Rochester, Toledo and Milwaukee.

The capacity of a chute is forty people a minute—2,400 an hour.

NO FREIGHT IN NEW JERSEY.

It is with a feeling of pity as well as one of disappointment that we learn that the bill has become a law in New Jersey which prohibits street railway companies from doing a freight business. The people of New Jersey are evidently laboring under the impression that this carrying of freight by electric roads is a threatening evil which they have headed off just in time to avert a great calamity. Some day when New Jersey sees its neighbors enjoying the benefits of a street railway freight service, which will cheapen and facilitate local freight transportation and relieve streets from much heavy teaming, it will perhaps realize the fact that by its recent bill it laid to rest a most promising and desirable infant industry.

ADDITIONAL MAIL SERVICE AT ST. LOUIS.

The street railway mail service of St. Louis was added to April 1, by the inauguration in regular service of two mail cars on the lines of the Union Depot Railroad, or Scullin lines of that city. This company's lines reach all parts of the city. Probably other of the numerous roads of St. Louis, will begin such service before long.

Three hundred pounds of copper wire stolen from the Leavenworth, Kan., Electric Railway, have been found and turned over to the company. It was on a car ready for shipment when the police located it.

PERSONAL

William Finnegan, superintendent of the Cohoes City Railway, has resigned.

J. W. Mooney has taken the management of the Cortland & Homer Traction Company.

James Newell succeeds D. J. Duncan as superintendent of the Carbondale (Pa.) Traction Company.

Geo. H. Hammond has taken charge of the Waterville & Fairfield (Me.) Electric Railway & Light Company.

G. H. Campbell, general manager of the Winnipeg Electric Street Railway, was a visitor in Chicago this month.

A. C. Pond, of Boston, president of the Winchester Avenue Electric Railroad, of New Haven, Conn., died March 29.

Chas. Wood, New England agent for the R. D. Nuttall Company, cheered his many Chicago friends with a friendly call.

W. S. Jewell, general manger of the Toledo Traction Company, made us a very welcome and pleasant call this month.

E. B. Gunn, general manager of the Lafayette Street Railway, made a purchasing trip to Chicago last month and called on the REVIEW.

R. S. Ives, superintendent of the Chicago North Shore Electric Railway, was married March 25, to Miss Mary Kate Russel, of Evanston.

W. S. Blauvelt, formerly of the Superior Rapid Transit Company, has recently become master mechanic of the Calumet Electric Railway, Chicago.

H. F. Arnold, secretary of the Galesburg Electric Motor & Power Company, Galesburg, Ill., was a visitor to the REVIEW office one day this month.

S. F. Hazelrigg, superintendent of the Youngstown Street Railway and Mahoning Valley Railway, has resigned to take the management of the Staten Island (N. Y.) Electric Railway.

O. L. Stanton, assistant superintendent of the Cleveland City Railway, has been appointed superintendent of the Fort Wayne Consolidated, in place of L. D. McNutt, deceased.

C. L. West has accepted the position as superintendent of the Park Railway, of Rochester, formerly the Glen Falls, narrow gage line, which has been bought by a syndicate of local capitalists.

H. M. Grant, whose largeness of heart is truely proportioned to his commanding physique, and who as general traveling agent for the Vulcanized Fibre Company, Wilmington, Del., goes up and down the land making new friends, made the REVIEW glad with a recent call. Mr. Grant has been identified with the concern from its inception, and can relate some intensely interesting incidents of the early days of practical electricity.

J. C. Duncan, for some time manager of the Knoxville, Tenn., Street Railway, has resigned and taken a position as general manager of the People's Telephone & Telegraph Company of that city.

W. E. Haycox, president of the Fulton Truck & Foundry Company, Mansfield, O., has been seriously ill for several weeks past, but his many friends will be glad to learn he is now in a fair way to recover.

Matthew Slush, one of the prominent residents of Mt. Clemens, Mich., and interested in the road there was a REVIEW caller. Mr. Slush is now pushing the line which is to connect the chain of Wisconsin lakes.

A. W. Tucker, of the Western Electric Company, this city, becomes manager of the supply department of that extensive concern. Mr. Tucker is one of the most thorough electricians in the west, and the promotion is one well deserved.

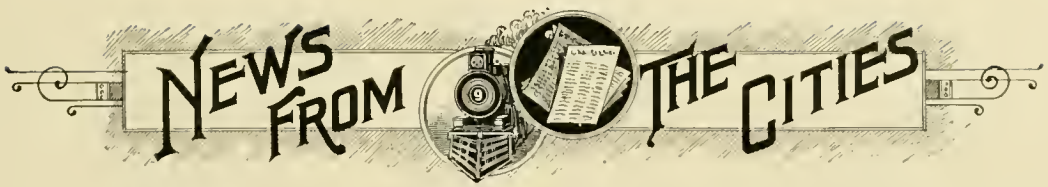
J. C. Shaffer has resigned as president and treasurer of his Asbury Park road, although retaining all his interest, in order to give his entire time to his Chicago enterprise. He is taking a few weeks rest, and with his family is now en route to Europe.

H. M. Barnet, who has been the lessee of the Lake Harriet Park pavilion, owned by and operated in connection with the Twin Cities Street Railway, Minneapolis, visited the REVIEW on his return from an extended trip of inspection of street railway pleasure resorts. Mr. Barnet is one of the oldest and most successful pleasure resort managers in the country.

J. F. Hill, the comptroller of the Montreal Street Railway Company, last month severed his connection with that concern to associate himself with a number of prominent gentlemen of Chicago, who have in hand a large business enterprise. Before Mr. Hill left Canada, he was the recipient of a handsome gold watch and chain, presented him by his corps of assistants as a token of their esteem.

A. C. Vosburg, secretary and treasurer of the New Process Rawhide Company, Syracuse, N. Y., paid the REVIEW a pleasant call while on his recent western trip. Mr. Vosburg counts his warm friends in the street railway fraternity by the number of his acquaintances. "New Process" is making a steady and large increase every month, and continues to give the same certain and highly satisfactory results everywhere and under all conditions.

C. E Flynn, superintendent of motive power of the Central and Ft. Clark Railways at Peoria, resigned April 1. He has made himself very popular with the employes, and when they learned that he was to leave the service, they promptly got together and presented him with a pair of handsome diamond studded gold cuff buttons. He will rest for a while having been steadily at work for the last ten years. He has been with the electric railway since the beginning and was one of Chas. J. Vandepoele's assistants.



Alabama.

BIRMINGHAM, ALA.—The Birmingham, Powderly & Bessemer Street Railway will be sold by order of court, to pay receiver's certificates, aggregating $40,000. The road is a dummy line, twelve miles in length.

BIRMINGHAM, ALA.—Robert Jemison, general manager Consolidated Electric Light Company, 301 North Twentieth street, is in the market for a General Electric, multipolar, 300, railway generator; second-hand, but in good order.

Arkansas.

EUREKA SPRINGS, ARK.—A movement is now on foot to equip the Eureka Springs Street Railway with electricity.

PINE BLUFF, ARK.—At auction, March 10, the Citizens' Street Railway was sold by order of court to A. C. Stewart, of St. Louis, representing the St. Louis Trust Company and bondholders. Electricity will be introduced.

California.

SAN DIEGO, CAL.—The San Diego Cable Railway was sold March 11, for $55,000, to a local capitalist and two eastern men.

SAN JOSE, CAL.—Jacob Rich has mortgaged his real estate for $75,000 to get funds for the improvement and extension of his First Street Railroad.

REDLANDS, CAL.—The Redlands Electric Light & Power Company has been granted a franchise for an electric line to Colton and Riverside.

LOS ANGELES, CAL.—The Workman electric franchise is soon to be sold. The Los Angeles Traction Company is believed to be back of the application.

OAKLAND, CAL.—The Oakland Consolidated Street Railway Company will expend $25,000 to extend over Fortieth street. The power house capacity is being doubled.

SAN DIEGO, CAL.—George B. Kerper's cable road will be changed to electric, five citizens having agreed to put in $45,000 for the purpose, in exchange for a four-fifths interest.

OAKLAND, CAL.—The East Oakland Street Railroad Company has been given permission to issue $15,000 of receiver's certificates to pay for overhauling the track and making other improvements.

SAN JOSE, CAL.—The San Jose & Saratoga Electric Railway has been granted its franchise, which will be sold, as required by law, October 14. Nearly the whole of the $42,000 bonus has been subscribed.

SAN JOSE, CAL.—Surveyors are routing the electric road to Congress Springs and Saratoga, for which a franchise has been granted L. M. Hale. Abutters have subscribed a bonus of $50,000, and eastern men will invest $250,000.

SANTA ANA, CAL.—Paul Seegar, of Tustin, Leo Daft, of Seattle, Wash., and K. P. Cullen, of Los Angeles, and M. L. McCormick and James Ryan, of Grand Forks, N. D., are interested in the project to construct a belt electric railway, encircling Santa Ana.

Chicago.

CHICAGO.—The Metropolitan Traction Company has applied for an underground railway franchise.

CHICAGO.—The Calumet Electric Railway Company has been granted a franchise for an extension.

CHICAGO.—The Chicago & Worth Street Railway Company will apply for a change of route, consents having been obtained.

CHICAGO.—John E. Wilkie & Co., have been awarded the contract to construct fourteen miles of track for the General Railway.

CHICAGO.—The City Railway directors, March 19, authorized $2,000,000 bonds for improvements and a number of short extensions.

CHICAGO.—The Union Consolidated Elevated Railway Company has been incorporated to build in Van Buren street for the down-town loop.

CHICAGO.—The companies controlled by the North Chicago Street Railroad, this spring will construct five and one-half miles on Lawrence avenue, five miles on Montrose boulevard, and three miles on Robey street.

CHICAGO.—The Midland Transit Company has been incorporated to build a cheap fare line running west fourteen miles from the Nineteenth street terminus of the Metropolitan Elevated Railroad. Capital stock, $100,000; incorporators, John E. Wilkie, Herman J. Reiling, Malcomb McDonald, Alfred E. Janes and Fred T. Conklin.

Colorado.

DENVER, COLO.—The Denver Tramway Company has been granted a franchise for six miles of road to connect with Berkeley. Construction is to begin without delay.

SOUTH PLATTE, COLO.—The West Creek Electric & Toll Road Company, has been incorporated to build along the South Platte River, from South Platte through Pemberton and Woodland Park, to Divide Station on the Colorado Midland Railroad. Capital stock, $100,000; incorporators, B. B. Clawson, Arthur O. Williams and Sidney Williams.

DENVER, COLO. The Union Railroad Company has been incorporated by stockholders of the Denver City Cable Railway Company to build, lease or purchase street railways in Denver and vicinity, and operate in connection with their company. Capital stock, $1,000,000; directors, Marsden I. Perry and H. A Jackson, of Providence, and Samuel P. Colt, of Bristol, R. I.; Henry A. Cary, of New York, and Richard J. Bolles, of Colorado Springs. Incorporators, Benjamin A. Jackson, William W. Field, Harlan P. Parmalee, Herman H. Dunham and George C. Preston.

CRIPPLE CREEK, COLO.—Cripple Creek is the objective point of three independent railroad projects. Electricity is proposed as the motive power in each case. One is the South Platte Railroad & Power Company, incorporated in February by Sill T. Smith, Eben Smith, J. E. Rockwell, Norman Allen, George F. and J. H. Dayton and L. E. Campbell. Another is the Denver, Cripple Creek & Southwestern Railroad Company, of which Col. Cyrus W. Fisher is president. J. Q. Barlow is surveying the last named road. The third enterprise will connect Pueblo with Cripple Creek, and is backed by James B. Orman, James N. Carlile, H. S. Currie, Thomas M. Bowen, George E. King, W. H. Hunter, Whitney Newton, C. B. Schmidt, George H. Hobson, F. L. Capers, T. Wilson and G. F. Patrick, all of Pueblo.

Connecticut.

SOUTH NORWALK, CONN.—An extension of the Norwalk Electric Railway to South Wilton is being surveyed.

HARTFORD, CONN.—The Hartford Street Railway Company contemplates purchasing 40-foot summer cars.

MIDDLETOWN, CONN.—Superintendent E. W. Goss, of the Middletown Street Railroad has applied for permission to extend.

NEW BRITAIN, CONN. The Central Railway & Electric Company and the Newington Trolley Company will build to Hartford.

GREENWICH, CONN.—The Port Chester & Glenville Tramway Company will apply for a franchise to build an electric freight road.

HARTFORD, CONN.—A four-mile extension to Talcottville has been granted by the village of Vernon to the Hartford, Manchester & Rockville Tramway Company.

BRIDGEPORT, CONN.—The Bridgeport Traction Company has under consideration the extension of its lines to Black Rock village, the double-tracking of Seaview and Park avenues, and the further improvements of Avon Park.

SOUTH NORWALK, CONN.—The Norwalk Tramway Company will extend through Darien and Noroton to Stamford, Judge Wheeler, of the Superior Court, having decided that the road is a public necessity, although it will parallel an existing 4-track steam road.

Delaware.

WILMINGTON, DEL.—The Wilmington City Railway Company is rebuilding its summer cars.

WILMINGTON, DEL.—New York men are negotiating for the purchase of the franchise granted in 1893 to the Wilmington & New Castle Electric Railway Company with a view to beginning construction this summer.

District of Columbia.

WASHINGTON, D. C.—The Glen Echo Railroad will be sold, the court having dissolved the injunction which prevented the sale last fall.

WASHINGTON, D. C.—The Georgetown & Tenallytown Railroad Company has issued $30,000 more of six per cent bonds.

WASHINGTON, D. C.—Compressed air motor cars are promised by the Eckington & Soldiers' Home Railroad if additional right of way is granted as petitioned.

WASHINGTON, D C.—The Washington & Great Falls Street Railway Company has applied for a charter for additional lines and to increase the capital to $650,000.

WASHINGTON, D. C.—The new Capitol Railway Company, which is to build to Congress Heights, has elected the following directors: A. E. Randle, W. Fred Snyder, J. B. Lewis, H. C. Longnecker, Augustus Burgdorf, William Blackwood, E. H. Way, O. T. Thompson and W. H. Randle.

WASHINGTON, D. C.—The commissioners have reported a bill looking toward a division of territory among the street railways. The Capital Traction Company is to have extensions on Eighteenth street, Capital and Pennsylvania avenues; the Brightwood Railroad, extensions south of Kenyon street; the Belt Line, representing the Eckington system, extensions on Eleventh and L streets, and the Metropolitan Company, an extension on Connecticut avenue. The commissioners report in favor of consolidating the Columbia and Metropolitan roads.

Florida.

PENSACOLA, FLA.—The Pensacola Terminal Company has requested permission to change from horse and dummy to electric power.

Georgia.

ROME, GA.—The City Electric Railway Company contemplates extending in South Rome.

AUGUSTA, GA.—Hon. Patrick Walsh addressed the council in behalf of a franchise for the Augusta Railway Company. It was taken under consideration.

Illinois.

GALESBURG, ILL.—The Galesburg Electric Motor & Power Company will extend to Knoxville.

CENTRALIA, ILL.—The Centralia & Central City Street Railway will add some open cars to its equipment.

BELLEVILLE, ILL.—The St. Louis, Belleville & Southern Railroad Company has been granted a franchise for an extension.

ELGIN, ILL.—A forfeit of $10,000 has been put up by the Elgin City Railway to guarantee construction according to the terms of its franchise.

ELGIN, ILL.—The Elgin City Railway has been granted additional franchises, and has promised to complete the road this summer to Geneva.

ELGIN, ILL.—W. J. Ferris, of Cedar Rapids, Ia., has purchased the Elgin Electric Illuminating Company, formerly the Dundee Rapid Transit Company.

PEORIA, ILL.—C. E. Flynn, electrical engineer, Central Railway Company, writes that he is in the market for a new or second-hand (in good condition) stationary motor, 220 volts and about 10 or 12 kilowatts, ring armature preferred.

ALTON, ILL.—The White-Crosby Company will sub-let portions of the construction contract recently awarded by the Alton Railway & Illuminating Company. New cars will be procured in place of the old equipment, which will be disposed of.

MOLINE, ILL.—Col. J. Wesley Hartzell is promoting a standard-gage electric railway connecting Rock Island, Moline and East Moline with Gilbert and Davenport on the opposite side of the Mississipi river, over which a bridge is to be constructed.

Indiana.

TERRE HAUTE, IND.—Work has begun on the Terre Haute & Brazil Electric Railroad.

TERRE HAUTE, IND.—The Terre Haute Electric Railway will be extended the coming summer.

DECATUR, IND.—Willard Steele will build an electric road round his park and extend same to the city.

VINCENNES, IND.—B. G. Hudnut has sold the Vincennes Street Railway to residents of Louisville, Ky., who will make improvements.

TERRE HAUTE, IND.—It is said the Vandalia is figuring on an electric road between Terre Haute and Indianapolis over its present right of way.

FT. WAYNE, IND.—C. E. Everett has applied for another franchise in the city of Ft. Wayne, promising to forfeit $25,000 if construction is not promptly begun.

LAFAYETTE, IND.—Ground for a pleasure resort has been purchased by the Lafayette Street Railway Company. The place will be improved and track laid to it.

ELKHART, IND.—Marion Proctor and T. J. Woodard have won their suit for recognition as first mortgage owners of the Elkhart Electric & Railway Company's plant.

HAMMOND, IND.—The receiver of the Hammond, Whiting & East Chicago Electric Railway has been discharged by the court, thus leaving the management free to carry out the improvements.

WASHINGTON, IND.—The Washington Street Railway Company, which contemplates a change from mules to electricity, has recently elected W. N. McMahan, president; Joseph Wilson, vice-president, and A. F. Cabel, secretary and treasurer. Other directors are, Zack Jones, Cicero Eskridge and Z. F. Graham.

Iowa.

BOONE, IA.—Gas engines, it is said, will be put on cars of the Boone & Boonesboro Street Railway.

TAMA, IA.—L. H. Ong has purchased the interest of Smith Bros. in the Tama & Toledo Electric Railway & Light Company.

HAMBURG, IA.—J. W. Hammond has been granted a franchise to build and operate any kind of railway over any or all of the streets or alleys.

WATERLOO, IA.—The Waterloo & Cedar Falls Electric Railway has been financed. Construction of sixteen and a half miles of track will begin as soon as bids can be received. Those largely interested are J. H. Rafferty, of Oelwein; L. S. Cass, of Sumner; C. J. Fossellman and J. H. Bowman, of Waverly.

BURLINGTON, IA.—Walsh Bros. have interested J. C. Hubinger, of Keokuk, in their street railway and lighting enterprises, which will be extended.

SHENANDOAH, IA.—The Street Railway Company's ordinance has been modified, giving it the right of way on Argyle street. It also prohibits horse as motive power.

Kansas.

TOPEKA, KAN.—All of the right of way for its proposed line has now been obtained by the Topeka Electric Railway Company.

LEAVENWORTH, KAN.—L. M. Erb, superintendent, is fitting up a complete car repair shop for the Leavenworth Electric Railroad Company.

Kentucky.

COVINGTON, KY.—A cylinder head was blown off an engine in the Newport power house of the South Covington & Cincinnati Street Railway, doing $8,000 damage.

Louisiana.

NEW ORLEANS, LA.—Captain Pickles, who has the franchise for an electric road, connecting Algiers and Gretna, is corresponding with supply men.

NEW ORLEANS, LA.—The franchise for the extension of the Orleans Street Railway has been sold by auction for $1,000 to Alfred C. Greene, of 828 Commom street.

NEW ORLEANS, LA.—Robert R. Zell, Albert E. Sprengall, Alfred Bonnabel, H. L. Zell and Morris De Pass have petitioned for a franchise to build six miles of electric or other railway through Jefferson and Orleans, using 56-pound T rail.

Maryland.

BALTIMORE, MD.—The 3,500-foot extension of the Belt Railroad's electric construction is soon to begin.

ANNAPOLIS, MD.—The Washington & Potomac Electric Railway, has asked an extension of time for construction.

BALTIMORE, MD.—A double-track steel viaduct will be built over Gwynn's Falls, by the Columbia & Maryland Railway.

CAPE MAY, N. J.—Mayor J. H. Edmunds has leased the Delaware Bay & Sewell's Point Railroad (electric) and will place it in working order.

ELKTON, MD.—The bill giving a $50,000 subsidy to the Cherry Hill, Elkton & Chesapeake Electric Railway Company, has passed the senate.

HAGERSTOWN, MD.—The Hagerstown Railway Company has deposited $5,000 cash as a forfeit. The road must be completed within six months.

ANNAPOLIS, MD.—The Baltimore & Washington Transit Company has applied for an amendment to its charter permitting the use of electricity as a motive power.

BALTIMORE, MD.—The Maryland Traction Company has applied for an electric franchise over Lafayette avenue. The company proposes to build to Mt. Washington.

HAGERSTOWN, MD.—Christian W. Lynch, John A. Herman and William Jennings, of Harrisburg, Pa., have been awarded the contract to construct the Hagerstown Railway.

BALTIMORE, MD.—The Columbia & Maryland Railway has contracted with the Barney & Smith Company for eight combination motor cars, ten closed motor cars, six closed, and eight open trailers.

BALTIMORE, MD.—The Lake Roland Elevated Railway franchises have been conveyed to the City & Suburban Railway Company, which guarantees principal and interest on $50,000 of the Lake Roland bonds.

BALTIMORE, MD.—The Baltimore & Gunpowder Railroad Company has obtained franchises from the county commissioners, completed the survey and will begin work on three or four miles in a few weeks, on a line to Herring Run racecourse. Office, 304 East Baltimore street.

ELKTON, MD. The Cherry Hill, Elkton & Chesapeake City Electric Railway Company has been incorporated by J. O. Price, R. A. Duhamell, John Banks, George S. Woolley, Manley Drennen, Charles H. Smith, W. J. Smith, Frank H. Mackie and T. Taylor Reynolds. Dr. Mackie is president and Charles H. Smith secretary and treasurer.

BALTIMORE, MD.—E. D. Smith & Son have asked the appointment of a receiver for the Baltimore & Catonsville Construction Company and the Columbia & Maryland Railway Company alleging that the bonds taken in pay for work done are invalid. The firm is composed of Erskine D. and E. Eldridge Smith, of Philadelphia. For work done during the past few months they have received $140,805, part cash and part bonds.

ANNAPOLIS, MD.—The Rising Sun, North East & Elk River Electric Railroad Company, of Cecil county, has been incorporated. The capital stock is to be $50,000 and may be increased to $100,000. The incorporators are: Andrew Anderson, Geo. W. Cosden, Joseph T. Reed, Levi O. Cameron, John M. C. Carhart, William L. Mearns, Ellis L. Duykinck, Aaron L. Duykinck, M. E. Kirk and James Mallen, all of Cecil.

HAGERSTOWN, MD.—The electric railway franchise finally has been granted to the Hagerstown Railway Company which agrees to put up a forfeit of $5,000, begin work in sixty days and complete the road inside of eight months. The road will extend to Williamsport, Funkstown and other nearby towns. The company has been incorporated with $200,000 capital stock by Lyman D. Gilbert, John A. Herman, William Jennings, Christian W. Lynch, all of Harrisburg, Pa., and Justice J. I. Bitner, Albert J. Eyerly, John Blake and McKinley Embrey, of Hagerstown.

Massachusetts.

BROCKTON, MASS.—Open double-truck cars will be purchased by the Brockton Street Railway.

BROOKLINE, MASS.—The Brookline Street Railway Company has been granted a franchise in Newton.

MILLBURY, MASS.—Another electric road is talked of by Dr. W. Irving Thayer and Clarence Pratt of Grafton.

BOSTON, MASS.—The Quincy & Boston Street Railway Company will relay its track on Hancock and Washington streets.

BROCKTON, MASS.—The Brockton Street Railway Company has a bill before the legislature authorizing an extension to Easton.

FALMOUTH, MASS.—At the town meeting an informal vote favored the granting of a franchise for an electric road through the town.

SHELBURNE FALLS, MASS.—A franchise through Colrain has been unanimously voted the Shelburne Falls & Colrain Street Railway Company.

HAVERHILL, MASS.—The Haverhill, Georgetown & Danvers Street Railway has increased its capital stock $60,000 and voted to build to Georgetown.

SPENCER, MASS.—The contract for building the fifteen miles for the Warren, Brookfield & Spencer Street Railway has been awarded the Worcester Construction Company.

WARREN, MASS.—Work has begun on the Brookfield power house of the Warren, Brookfield & Spencer Street Railway. The Slater Engine Company, of Warren, will furnish part of the equipment.

SHELBURNE FALLS, MASS.—The Shelburne Falls & Colrain Street Railway Company has organized with David W. Temple, president; Lorenzo Griswold, vice-president; Herbert Newell, treasurer; Clifton L. Fields, secretary, and Edwin Baker, C. A. Marcy and Freeman L. Davenport, directors.

FITCHBURG, MASS.—The Fitchburg & Leominster Street Railway Company has been voted franchises in Lancaster for six miles of electric railway. The plan calls for two wooden bridges. The company will petition also for right of way from Hudson to Fitchburg and Clinton.

HOLYOKE, MASS.—The Holyoke Street Railway Company has voted to extend two miles to Fairview, and three miles to South Hadley. The company will take up its floating debt by an issue of stock, expend $40,000 on a second track to West Springfield, and $10,000 for additional rolling stock.

WAKEFIELD, MASS.—The Mystic Valley Street Railway Company has been incorporated to build the three miles of electric road between Winchester and Stoneham. Capital stock, $40,000; incorporators: Albin Coffin and A. E. Whitney, Winchester; Onslow Gilmore and C. H. Brown, Stoneham; Charles F. Woodward, Wakefield, and J. F. Shaw, Newburyport.

AMHERST, MASS.—The Amherst & Sunderland Electric Railroad Company has organized with Levi Stockbridge, president; T. L. Paige, vice-president, and David Barry, secretary and treasurer. It has been voted to leave the construction of the road to the directors, who are the foregoing and C. Fred Deuel, of Amherst; W. D. Cowls and Henry L. Ufford, of North Amherst, and F. L. Whitmore, of Sunderland.

HANOVER, MASS.—Charles H. Killam, president, and Richard F. Jenness, treasurer of the Hanover Street Railway Company, have contracted with Marcus A. Coolidge, of Fitchburg, Thomas F. Carey, of Boston, and Fred C. Hines, of Newton, for the immediate construction of five miles of electric railway through Norwell to Hingham. A car house will be built at North Hanover. Some of the material and cars have been purchased.

WARREN, MASS.—A company is being formed to construct ten miles of electric railway between Warren, Ware and Gilbertville. Capital stock, $150,000; subscribers, I. L. Currier, of Worcester; Charles A. Richardson, of Worcester; George A. Murch, of Westboro; Henry M. Clark, Edward McBride, David C. Robertson, George E. Utley, Augustus Tierman, Henry C. Davis, Pierre O. L'Heureux, J. A. Jendron, Felix Bombard and John A. Storrs, all of Ware. The stockholders will apply for franchises from Warren, Ware and Hardwick. The power house is to be located at Ware.

Michigan.

FAIRGROVE, MICH.—McLuney Bros. will put in a street car and lighting plant.

OWOSSO, MICH.—Caledonia township has granted additional right of way to the Owosso & Corunna Traction Company.

GRAND HAVEN, MICH.—Ithiel J. Cilley, of Grand Rapids, is promoting an electric railway to connect Grand Haven and Grand Rapids.

DEARBORN, MICH.—An electric railway franchise has been asked for by Albert Pack, Henry A. Everett, John B. Corliss and George E. Currie, of Detroit.

ROYAL OAK, MICH.—Franchises for an electric street railway have been granted to F. A. Baker and W. H. Elliott of Detroit, Nelson E. Springstein, Royal Oak, and Charles A. Dean, Detroit.

DETROIT, MICH.—Lester B. French, general manager, says the Detroit & River St. Clair Railway is in the market for steel rails and cars, etc. Grading has been completed over the entire line.

DETROIT, MICH.—Directors of the Fort Wayne & Belle Isle Traction Company have decided to increase the capital stock from $300,000 to $400,000, for the relaying of its tracks with 96-pound rail.

GRAND RAPIDS, MICH. The Grand Rapids, Spring Lake & Grand Haven Rapid Transit Company has filed twenty-eight quit-claim deeds of right of way for its proposed line, with the Ottawa county recorder.

DETROIT, MICH.—Royal Oak Township has granted a franchise to F. A. Baker and W. H. Elliott, of Detroit; Nelson E. Springsteen, Royal Oak, and Charles A. Dean, to build an electric railway to Southfield and Farmington. It must be completed within nine months.

DETROIT, MICH.—A syndicate comprising H. C. Burke, A. E. Riopelle, Charles W. O'Brien, Jas. T. Keene, are securing franchises for an electric road between Detroit and Monroe, and probably to Toledo. Frenchtown and Berlin townships have already granted franchises.

KALAMAZOO, MICH.—Local capitalists, J. B. Wyckoff, L. M. Gates, J. W. Osborn, D. B. Merrill, Fred M. Rowley, L. M. and E. E. Downs, have purchased the Citizens Street Railway, owned principally by B. E. Sunny, J. W. Johnson, T. P. Bailey and George Kobush of Chicago. E. E. Downs will again be manager. Improvements and extensions are contemplated.

DETROIT, MICH.—The Monroe, Dundee & Lake Erie Electric Railway Company has elected W. H. Cowles, president; W. H. Johnson, vice-president; Vincent Field, treasurer; G. L. Strong, secretary; Oscar B. Marx, auditor. A. B. Bragdon, Geo. A. Marr, Judge H. H. Hatch, A. T. Knowlson and F. H. Humfrey are also interested in the enterprise. Construction will begin this spring.

Minnesota.

WINONA, MINN.—The Winona Railroad & Light Company has been incorporated by Frank B. Kellogg, Frank A. Seymour, and C. A. Severance, of St. Paul.

ST. PAUL, MINN.—C. J. Buell, Joseph Elsinger, Gov. McGill, W. M. Liggett and other citizens of St. Anthony Park, are actively interested in a project to construct another interurban electric railway.

ST. CLOUD, MINN.—Receivers C. S. Benson and E. E. Clark have agreed that the latter shall take possession of the City Street Car Company. If the road pays expenses during the first ninety days its operation will be continued.

ST. PAUL, MINN.—The St. Paul & Suburban Railway Company has been incorporated in West Virginia, to build an electric road in St. Paul. Capital, $200,000; incorporators, E. W. Peet, Ambrose Tighe, Frank B. Kellogg, C. W. G. Withee and C. A. Severance, all of St. Paul.

Mississippi.

MERIDIAN, MISS.—T. A. Hall is in the market for stationary fare registers and would like to hear from all good dealers in this line.

BILOXI, MISS.—The Biloxi Street Car Company has been granted a franchise for a horse railway.

Missouri.

ST. CHARLES, MO.—Congress favorably reported a bill authorizing the construction of a bridge over the Missouri river.

KANSAS CITY, MO.—The People's Cable Railway was sold for $185,000 at auction March 14, to J. H. Lucas, an attorney.

KANSAS CITY, MO.—A receiver will be appointed for the Waldo Park Motor Railway, which has not been in operation for some time

ST. LOUIS, MO.—The King's Highway Electric Railway Company, of which Festus J. Wade is president, proposes to begin construction.

KANSAS CITY, MO.—The Citizens' Street Railway Company, backed by J. C. Shaffer of Chicago and the storage battery people, has applied for extensive franchises

JOPLIN, MO.—Stockholders of the Joplin & Galena Electric Railway Company will meet April 23, to increase the capital stock from $120,000 to $200,000, and issue $200,000 of bonds. An extension will be constructed.

KANSAS CITY, MO.—General Manager Walton Holmes says the Metropolitan Street Railway Company will soon change from horse to electric cars on Prospect avenue. The company has received a franchise to build through Rosedale, Kan.

OREGON, MO.—Oregon & Forest City Electric Railway Company, of Holt County, incorporated. Capital stock, $60,000. Incorporators: James E. Cummins, F. C. Oakley, Robert C. Benton, Shannon C. Douglass, and James B. Harden.

ST. LOUIS, MO.—The Southern Electric Railway Company has decided to build a double instead of a single track extension to Jefferson Barracks. D. G. Hamilton, president of the National Railway Consolidation, is said to be negotiating for the purchase of the Southern, popularly known as the Green line.

KANSAS CITY, MO.—The Brooklyn Avenue Railway Company has been incorporated. Capital stock, $200,000; incorporators, W. J. Smith, James Lillis, William J. Johnson, James H. Frost and John H. Lucas. The last mentioned is the attorney who recently purchased the People's Cable Railway.

Nebraska.

SOUTH SIOUX CITY, NEB.—Work is about to be commenced on the electric line extension of the South Sioux City Traction Company.

New Hampshire.

KEENE, N. H.—The state railroad commission has reported favorably on the proposed Keene Electric Railroad.

New Jersey.

POINT PLEASANT, N. J.—Q. W. Evans has purchased for $102,900 the South Jersey Street Railway.

CAMDEN, N. J.—The Camden Horse Railroad Company has been granted a cross-town franchise.

NEW BRUNSWICK, N. J.—The Brunswick Traction Company has been granted franchises for extensions.

COHOES, N. J.—The Cohoes City Railway Company has made application for a franchise to extend its tracks to the Congress street bridge at West Troy.

HACKENSACK, N. J.—The Northern New Jersey Construction Company has been incorporated to build a trolley line from Carlstadt to Park Ridge by way of Hackensack. William B. Smith, of Park Ridge, is the leading spirit.

ATLANTIC CITY, N. J.—The Brigantine Beach Railroad Company has been reorganized as the Philadelphia & Brigantine Beach Railroad Company, with $300,000 capital and George H. Cook, president; James B. Van Werts, treasurer, and R. D. A. Parrott, general manager.

NEW BRUNSWICK, N. J.—Stockholders of the single-track Millstone Railroad favor the adoption of the trolley system. It is controlled by the Pennsylvania Railroad. New directors were elected April 1 as follows: President, C. B. Thurston; L. Perrine, Jr., Lewis T. Howell, John A. Anderson, F. Wolcott Jackson, Samuel Rea, R. D. Barclay, N. S. Wilson, Matthew Suydam.

BELMAR, N. J.—The Belmar, Spring Lake, Sea Girt & Manasquan Railway Company has been incorporated to construct nine miles of road in time for the summer traffic. Incorporators, George F. Kissam, J. D. Lindsay, G. W. Van Vranken and A. B. Wilgus, of New York; W. B. Price, of Newark; B. B. Price, of Manasquan, and George B. Kirkbridge, of Philadelphia. General offices in Newark.

New York.

COHOES, N. Y.—The Cohoes City Railway Company has asked a franchise in Colonie.

OGDENSBURG, N. Y.—Heavier rails will be laid on the State street line of the Ogdensburg Street Railway.

STATEN ISLAND, N. Y—The Staten Island Midland Railroad has certified an increase of capital stock from $150,000 to $1,000,000.

MARION, N. Y.—The citizens of Palmyra have given the Marion & Palmyra Electric Railway free right of way through that village.

SYRACUSE, N. Y.—W. Judson Smith and E. B. Judson, Jr., have been appointed receivers of the Syracuse Street Railway Company.

PORT RICHMOND, N. Y.—The Staten Island Electric Railroad Company is pushing the construction of a branch to Mariner's Harbor.

ROCHESTER, N. Y.—The Glen Haven Electric Railroad Company has reconsidered its plan to lease power and may erect a steam plant.

GREAT NECK, N. Y.—B. E. Hicks and H. Newkirk will apply for electric railway franchises for lines to Port Washington and Roslyn.

TOTTENVILLE, N. Y.—Consents for the electric road to Rossville Richmond and Kreischerville have been obtained by H. W. Putnam.

YONKERS, N. Y.—The Yonkers Railroad Company will build extensions to Hastings-on-Hudson, Dobbs' Ferry, Irvington and Tarrytown.

KINGSTON, N. Y.—The contract for building the Kingston & Lake Katrine Railway is said to have been awarded Malloy & Co., of New Brunswick, N. J.

ALBANY, N. Y.—The Albany, Helderberg & Schoharie Electric Railway Company has employed engineers to immediately survey the most practicable route.

COHOES, N. Y.—Permission to extend through West Troy has been granted the Cohoes City Railway. The cost will be defrayed by an issue of $20,000 capital stock.

STATEN ISLAND, N. Y.—An extension of time until September to complete the road has been granted the Staten Island Electric Railroad by the village of New Brighton.

NORWICH, N. Y.—A. D. Harrington, of Oxford, is interested in the project to build an electric railway between Norwich and Oxford, which it is estimated would cost $100,000.

MARION, N. Y.—Engineer Le Grand Brown, of Rochester, represents the capitalists who have been obtaining franchises to build the electric railway between Newark, Marion and Palmyra.

ALBANY, N. Y.—The Albany, Helderberg & Schoharie Railroad Company has been granted permission to build a thirty-mile electric railroad from Albany over the Helderbergs to Schoharie.

PORT JERVIS, N. Y.—A franchise has been granted for an electric road from Seelyville through Honesdale to White Mills, Pa. W. J. Rief, W. J. Ferber and M. B. Allen are among those interested.

SARATOGA, N. Y.—Charles D. Haines has been appointed receiver of the Union Electric Railway Company. A mortgage for $175,000 is being foreclosed by the Central Trust Company of New York.

NEW YORK, N. Y.—The aldermanic railroad committee have decided to report in favor of granting to the Metropolitan Traction Company franchise for four extensions to its routes in the lower part of the city.

WATKINS, N. Y.—The Watkins & Havana Railroad Company proposes to increase its capital stock from $50,000 to $300,000. The Elmira & Seneca Railway Company is expected to be the name of the new corporation.

BROOKLYN, N. Y.—The franchise just granted by the village of Far Rockaway gives the Long Island Electric Railroad Company a continuous right of way from East New York. President Hart says that construction will be pushed.

ROCHESTER, N. Y.—Surveyors are routing the Irondequoit & Lake Shore Electric Railroad as far as Sea Breeze. A franchise is expected from the town of Irondequoit. When granted contracts will be let for track and rolling stock.

SYRACUSE, N. Y.—A franchise for an electric road to Long Branch has been applied for by John S. Kaufmann, A. C. Belden, A. C. Chase, Bruce S. Aldrich, W. Judson Smith, P. R. Quinlin, E. P. Powell and W. H. Gallup. Right of way has been obtained.

BROOKLYN, N. Y.—The Kings County Traction Company has been incorporated with $4,500,000 capital, to succeed the Brooklyn Traction Company as owner of the Atlantic Avenue Railroad stock, and to receive the $150,000 rental to be paid annually by the Nassau Electric Railroad Company for the Atlantic Avenue Railroad.

SYRACUSE, N. Y.—The consolidation of the Syracuse Street Railway and the Syracuse Consolidated Street Railway has been completed. Of the $2,500,000 bonds, $600,000 will be exchanged for bonds of the Consolidated Company, $75,000 will be used for reorganization expenses, $1,575,000 for other purposes, and $300,000 for reconstruction and betterments.

BALLSTON, N. Y.—The Ballston Terminal Railroad Company has been incorporated to operate an electric railway between Ballston and Middle Grove. Capital stock, $300,000. Incorporators: A. N. Chandler, C. E. Leict, A. S. Chandler, J. H. Nobbit and C. H. Latimer, of

Philadelphia; C. H. Stanton, Brooklyn, and S. C. Medbery, E. T. Grove, J. C. Royal, A. B. Paine and J. H. Morris, of Ballston.

GLOVERSVILLE, N. Y.—The Mountain Lake Electric Railroad Company has been incorporated to construct and operate a line from Gloversville to Carpenter Lake in Johnstown, Fulton County. Capital stock, $60,000; directors, Charles King, George Hendrie and Richard Ansell, of Johnstown; J. G. Haggard and Samuel M. Foster, of Bleecker, and Robert J. Williams, D. R. Bartlett, M. Hills, and Myron Hills, of Gloversville.

OSWEGO, N. Y.—The Lake Ontario & Riverside Railway Company has been incorporated to operate the consolidated Oswego Street Railway and Fulton & Oswego Falls Railway. Capital stock, $300,000; directors, George Noyes Burt, G. D. Hart, F. S. Failing, Michael McGowan, M. B. Richardson, James B. Henderson, of Oswego, and N. N. Stranahan, G. H. Dexter, and P. Bradshaw of Fulton.

YONKERS, N. Y.—The consolidation of the Yonkers Railway Company, the North & South Electric Company, and the Yonkers & Tarrytown Electric Railroad Company has been effected. The new Yonkers Railroad Company has $1,000,000 capital stock and the following directors: Albert L. Johnson, J. M. Edwards, R. T. Wilson, Jr., John H. Ingram, and M. C. Wilson, of New York; J. F. Van Name and Albert Crolius, of Brooklyn, and Channing Burnz, of Scarsdale.

NEW YORK, N. Y.—Agreement of consolidation of the Thirty-fourth Street Railroad Company and the Thirty-fourth Street Ferry and Eleventh Avenue Railroad Company, forming the Thirty-fourth Street Crosstown Railroad Company, has been filed. Capital stock, $1,000,000. Directors: E. R. Lynch, William P. Davies and Geo. P. Warden, of Brooklyn; Frederick Viewig, Avondale, N. J.; John F. Little, Jr., Ambrose F. McCabe, W. C. Kimball, and H. A. G. Taylor, New York; J. Brownson Ker, Undercliff, N. Y.

BROOKLYN, N. Y.—The trustees of the New York and Brooklyn bridge have authorized President Howell to contract for sixteen motor cars, each equipped with four motors of 62½-horse-power, 8,000 feet of copper wire, and a power plant consisting of three generators of 800, 500 and 300 kilowatts, three engines of 1,000, 750 and 500-horse-power, boilers of 2,000-horse-power, feed pumps, heaters and steel smokestack. Chief Engineer C. C. Martin has been instructed to prepare plans and specifications for the improvement, which is estimated to cost $300,000.

North Carolina.

SALISBURY, N. C.—F. J. Murdock, John S Henderson, Theodore F. Kluttz and A. H. Boyden, are interested in the project to construct ten miles of electric road. Application has been made for charter and right of way.

Ohio.

NORFOLK, VA.—O. Emmerson Smith is the receiver appointed for the Norfolk & Ocean View Railroad.

COLUMBUS, O.—The Columbus Central Railway Company has received a franchise for an extension over High street.

LANCASTER, O.—The Lancaster Traction Company has been incorporated to operate the reorganized and rebuilt street railway.

TOLEDO, O.—H. S. Redmond, of New York, is negotiating with the Robisons for the purchase of the Toledo Electric Street Railway.

FRANKLIN, O.—The street car line has been sold for $62, and the city authorities have enjoined the purchaser from taking up the track,

COLUMBUS, O.—The Worthington & Westerville Street Railway Company has sent a committee to examine the Hoskins gasoline motor.

LIMA, O.—The Lima & Piqua Electric Railway Company has been granted right of way between Lima and Wapakoneta. Construction is to begin without delay.

NEW PHILADELPHIA, O.—Major Charles E. Mitchener has obtained right of way through Uhrichsville, and is organizing a company to build the ten miles of road.

NEWVILLE, O.—N. C. Manner is interested in a project to build an electric railway from Mansfield to Mt. Vernon, through Newville, Davis, Brownsville and Amity.

LIMA, O.—John N. Hutchinson has been appointed receiver of the Lima Electric Street Railway on application of President Amos E. Townsend, who says the company is insolvent.

DAYTON, O.—Dayton Traction Company has executed a mortgage for $250,000 for the completion of its interurban line between Dayton and Miamisburg, a distance of twelve miles.

AKRON, O.—The Akron Street Railway & Illuminating Company has purchased a 600-horse-power Corliss engine. The main street line will be double-tracked. Bids will be received for new cars.

DAYTON, O.—John T. Knoop, W. R. Thompson and Frank Worman have applied to the county commissioners for right of way for the "Interurban Electric Railway Company. It will probably be granted.

CLEVELAND, O.—A car house 520 by 120 feet is planned by the Cleveland Electric Railway Company. Architect Richardson has planned a steel, brick, and slate roofed structure surmounted by a clock tower.

DELAWARE, O. F. P. Welch, manager, writes that the Delaware Electric Street Railway Company is in the market for 768 pounds of No. 4 B & S tinned copper bond wire and 4,000 steel bond caps to fit No. 4 wire.

DAYTON, O.—The Wayne & Fifth Streets Railroad Company, which contemplates changing from horse to electricity, will first experiment with a gasoline motor car to be furnished by a Springfield inventor.

CINCINNATI, O.—The Cincinnati Street Railway has asked permission to extend its route No. 18. The Mt. Adams & Eden Park Inclined Railway Company has asked permission to extend its routes Nos. 10 and 16.

LANCASTER, O.—W. F. Kelly, of Columbus, H. B. Peters and Andrew Bauman have selected and purchased a site for the Lancaster Electric Street Railroad Company's new power house, which is to be of brick with slate roof.

CLEVELAND, O.—The Cleveland City Railway will relay its tracks on West Madison, Franklin and Gordon avenues, and will extend the Willson avenue crosstown line. A removal of the Detroit street barns to Rocky River is contemplated.

AKRON, O.—The Akron, Bedford & Cleveland Electric Railroad Company has given up for the present the plan to build a separate road between Akron and Cuyahoga Falls. The company will double track its Second street line to Silver Lake in time for the summer traffic.

CLEVELAND, O.—A franchise over the Wooster pike has been granted the Wooster, Medina & Cleveland Electric Railroad, in which Joseph W. Roof, of Cleveland, C. V. Hard, of Wooster, and R. T. McDowell, of Medina, are interested. The company will lay forty-four miles of track, connecting with the Big Consolidated at South Brooklyn.

CLEVELAND, O. Jay E. Latimer, secretary, writes that the Cleveland & Chagrin Falls Electric Railroad Company is about to construct fifteen miles of electric road between Cleveland and Chagrin Falls, O., and will be ready to contract for the same between April 1 and May 1. Correspondence with builders and supply men is solicited. Office, 141 Society for Savings building.

LORAIN, O.—The Lorain County Electric Company has been incorporated to operate a railway connecting Oberlin, Wellington, Lorain, Elyria and Amherst. Capital stock, $300,000; all held in Elyria, by W. E. Miller, E. K. Musey, W. G. Sharp, W. A. Ely, H. H. Claugh, George W. Sharp, A. L. Garford and others. Contracts have been let for construction, which must be completed by July 16, under penalty.

CLEVELAND, O.—The Cleveland Electric Railway will relay its Prospect street tracks in the early spring and will also double-track the Euclid Beach Park line for a distance of five miles, from Lake View to Euclid Beach. The company will spend $100,000 in building

and equipping the new car barns on Euclid avenue, east of Lake View, and will have sixty-five new cars, an equal number of trucks, and fifty new motor equipments.

TIFFIN, O.—R. E. Brown, who has been struggling for several years to build an electric railway between Tiffin and Fostoria, and who was forced by the panic to leave the road half completed, says that the Tiffin & Fostoria Electric Railway & Power Company, composed of capitalists from Massachusetts, Tiffin and Fostoria has been formed and will soon be incorporated with sufficient ready cash to buy the road at receiver's sale next month, and to complete and thoroughly equip it.

Oregon.

PORTLAND, ORE.—The Puget Sound, Mount Tacoma & Eastern Railway Company has been incorporated. Capital stock, $2,000,000. Incorporators: Geo. L. Holmes, Philip V. Caesar, Lucius P. Manning, Isaac W. Anderson, Truman V. Enos, and William C. Wheeler.

ASTORIA, ORE.—The Astoria Street Railway, which is one of the the most prosperous in the northwest, will this year be extended to Uniontown.

Pennsylvania.

HARRISBURG, PA.—The Harrisburg Traction Company is considering an extension to Rockville.

CARBONDALE, PA.—The Carbondale Traction Company has absorbed the Carbondale & Forest City Passenger Railway.

WASHINGTON, PA.—The Washington Electric Street Railway Company will make improvements and establish a pleasure resort.

HANOVER, PA.—An extension to Conewago Chapel will be constructed by the Hanover & McSherrystown Street Railway Company.

PHILADELPHIA, PA.—Charles McCaul has been awarded the contract to build the Union Traction Company's one story power-house at Willow Grove.

BRADDOCK, PA.—The Braddock Electric Street Railway has secured the right of way through Rankin, and will construct a single track line to that place.

PITTSBURG, PA.—The Versailles Traction Company will extend through Boston, Buena Vista and Industry. An additional track will be laid through Christy Park.

NORRISTOWN, PA.—R. M. Douglass, general manager, says that the extension of the Schuylkill Valley Traction Company's lines from Trooper to Collegeville will soon begin.

WARREN, PA.—President Woodward, of the Warren Street Railway, says that construction of the seven miles of electric road, for which a franchise was given, will begin at once.

MCKEESPORT, PA.—Right of way having been obtained the McKeesport Electric Railway Company will extend through Riverton, Demmler and Saltsburg to Port Perry.

PITTSBURG, PA.—Attorney Noble and J. M. Bailey have been appointed by the directors of the Pittsburg & Castle Shannon Railroad to receive bids on a change from steam to electricity.

PITTSBURG, PA.—The Second Avenue Traction Company has purchased the McKeesport, Duquesne & Wilmerding Electric Railway at a cost of $500,000. The line to Wilmerding will be double-tracked and other improvements made.

PITTSBURG, PA.—Having completed the consolidation of their lines under the Consolidated Traction Company the different companies will inaugurate a comprehensive scheme of improvement and extension at an estimated cost of $4,000,000.

MEADVILLE, PA.—Secretary Frank R Shryock has been in New York conferring with the Meadville Street Railway Company's general contractor for the construction of the road. The work will be divided to give sub-contractors an opportunity to bid.

DELTA, PA.—An electric road to Stewartstown is projected by T. J. Brooks, L. K. Stubbs, W. Scott Whiteford, Henry Merryman, W. R. Webb, John Marsteller, A. M. Strawbridge, Milton E. Smith, C. Shaw and John C. Wiley. John Marsteller, R. W. Anderson and M. W. Bahn, are a committee to procure a charter.

PHILADELPHIA, PA.—The Darby, Lansdowne & Philadelphia Electric Company has been incorporated to construct six miles of road from Collingsdale through Darby, Yeadon and Lansdowne to Cobb's Creek. Capital stock, $36,000; incorporators, William Simpson, Jr., William P. Simpson, W. Lane Verlenden, John J. White and George G. Howell.

Tennessee.

NASHVILLE, TENN.—The Overland Electric Railway Company has been sold to W. C. Shaw, representing the Baltimore Trust & Guarantee Company.

CHATTANOOGA, TENN.—S. W. Divine's proposal to build an electric line, from Market street to the Chattanooga National Park, is meeting with general approval. The project will probably be carried out.

MEMPHIS, TENN.—The Citizens' Street Railroad is to have a great pleasure resort. Col. A. M. Billings has purchased 500 acres for the purpose. Stockholders of the Memphis Street Railway will vote June 4, on a proposition to purchase or lease the Citizens' Street Railroad.

Texas.

HOUSTON, TEX.—Ten second-hand No. 26, Bemis trucks with elliptic springs, 7-foot wheel base, and 4 feet 8½ inch gage, are wanted by the Houston City Street Railway Company.

DALLAS, TEX.—Steel springs, eleven inches long, to hold advertising cards in racks, are wanted by the Dallas Consolidated Street Railway Advertising Company. Samples of brown or black enameled springs may be submitted.

HOUSTON, TEX.—The Houston City Street Railway will be sold, May 5, by Receiver John Henry Kirby, for not less than $100,000. The sale is ordered by the United States Court, on petition of the American Loan & Trust Company, of Omaha, Neb.

GREENVILLE, TEX.—D. J. Byrd and W. F. Ryon have been granted a franchise and will soon construct four miles of electric road. They will contract for track and overhead construction and four 16-foot motor cars. Generators will be wanted, but not engines, as power will be leased from the city.

Utah.

SALT LAKE CITY, UTAH.—The Little Cottonwood Water-Power & Electric Company has been incorporated. Capital stock, $1,000,000. Incorporators: Frank Gillispie, James Maffat, R. E. F. Hayward, John W. Burton, and George D. Loomis.

SALT LAKE CITY, UTAH.—The Salt Lake & Ogden Railway Company, to build and operate forty miles of railroad, has been incorporated. Capital stock, $800,000. The incorporators are: C. K. Bannister; E. M. Allison, Jr., of Ogden; E. W. Duncan, J. S. Critchlow and Cansten Browne, Jr., of Salt Lake. E. W. Duncan is treasurer. The Pioneer Power Company of Ogden is said to be back of the enterprise.

Vermont.

BARRE, VT.—The Barre Street Railroad Company has accepted its franchise.

BELLOWS FALLS, VT.—The project to construct five miles of electric railway, between Bellows Falls and Saxton's river, has been revived.

Virginia.

MANCHESTER, VA.—Heavier rails will be laid on the street car line. The adoption of the trolley is being considered.

SALEM, VA.—The Salem-Blacksburg Electric Railway Company has been incorporated with $300,000 capital stock, by J. F. Allemong, J. C. Langhorn and others.

RICHMOND, VA.—The Capital Electric Company has been incorporated to build electric railways. Incorporators, Nelson Perin, William Habliston, John W. Middendorf, R. Lancaster Williams, and Philip B. Shield.

PETERSBURG, VA.—The new owners of the Petersburg Electric Street Railway have surveyed and will build an extension. Officers have recently been elected as follows: President, Edward C. White, of New York; general manager, W. J. Newton, of New York; superintendent, Lyman J. Hart, of Petersburg; electrician, Mr. MacQuestion, of New York.

Washington.

OLYMPIA, WASH.—The East Side Railway Company has been incorporated with $1,500 captital, by C. H. Springer, G. S. Allen and Allen White.

NEW WHATCOM, WASH.—E. J. Hill has been appointed receiver of the Fair Haven & New Whatcom Street Railway. Norman Tucker was also appointed receiver the same day at Seattle on petition of other parties. To add to the complication an intervening suit has been filed by Mrs. Teresa Eldridge, as the representative of $130,000 of stock.

West Virginia.

PARKERSBURG, W. VA.—The Park City Street Railway, it is said, will be changed from horse to electricity. W. R. Hurd, an eastern man is interested.

WHEELING, W. VA.—Howard Hazlett has been appointed receiver of the Moundsville, Benwood & Wheeling Railway Company, on petition of Frank Pearson, of Pittsburg, principal contractor for the construction. Failure to float a loan was the immediate cause of the receivership.

WHEELING, W. VA.—Anton Reymann, Paul O. Reymann, Gilmore Brown, Robert Hazlett and George R. E. Gilchrist have organized a company, applied for incorporation and a franchise to build the long contemplated road between Elm Grove and Tridelphia. Motive power will be furnished by the Suburban Electric & Water Company.

Wisconsin.

MILWAUKEE, WIS.—The Milwaukee & Wauwantosa Electric Railway Company will apply for franchises in Milwaukee.

WAUKESHA, WIS.—The Milwaukee & Waukesha Electric Railway Company has applied for a franchise for a single track line with iron poles.

MADISON, WIS.—The Madison City Railway Company will relay its track, put in new switches, enlarge its power house and put on a complete equipment of open motor cars.

OSHKOSH, WIS.—The contract for building forty-one miles of road for the Central Wisconsin Electric Railway Company, is said to have been given to Smith H. Bracey, formerly of the Bracey-McNair Construction Company.

SUPERIOR, WIS.—The newly elected officers of the Superior-Cloquet Electric Railway Company, which is to build between these two cities, are: Michael Bright, president; C. E. Bissell, chief engineer; Geo. Hudnall, secretary; John Bardon, treasurer.

FOND DU LAC, WIS.—Gaines A. Knapp has been appointed receiver of the Fond du Lac Light, Power & Railway Company, the court holding that the purchase by Elihu Colman at foreclosure was as an individual and not as a trustee of the company.

JANESVILLE, WIS.—The Janesville Street Railway Company, which is about to resume operations, has elected George W. Blabon, Philadelphia, president; James Shearer, vice-president, and Edward L. Blabon, Philadelphia, secretary and treasurer.

FOND DU LAC, WIS.—H. F. Whitcomb, Ex-Gov. Merriam of Minnesota, and F. B. Hoskins have formed a new company, in which Elihu Colman and W. G. De Celle are not interested, to operate the railway and lighting plant. Improvements will be made.

Canada

HULL, QUE.—The Hull Electric Company has obtained water power for the operation of its road.

BROCKVILLE, ONT.—Electric cars will be placed on Main street, the ordinance having passed the city council.

OTTAWA, ONT.—The Huron & Ontario Electric Railway Company charter has been passed by the railway committee.

HAMILTON, ONT.—President B. B. Osler, of the Hamilton & Dundas Street Railway, is arranging to adopt electricity.

HAMILTON, ONT.—A right of way to Grimsby Park will be purchased by the Hamilton, Grimsby & Beamsville Electric Railway Company.

HAMILTON, ONT.—John M. Lake and M. Hopkins are the promoters of an electric railway from Hamilton via Hall's Corners, York, and Indiana to Cayuga or Dunnville, with a spur to Caledonia.

QUEBEC, QUE.—The H. J. Beemer is arranging with United States capitalists to immediately push work on the new Quebec Electric Railway.

THOROLD, ONT.—Thorold Street Railway is to be practically rebuilt this spring by the introduction of the trolley electric system and T rails.

MONTREAL, QUE.—The Montreal Park & Island Railway Company expects to begin the construction of a line to Lachine at once, and later to extend the Outremont line to Ste. Laurent. An extension to Ste. Rose is contemplated.

OTTAWA, ONT.—The bill to incorporate the Canadian Electric Railway has been defeated because the road, if built, would compete with the Grand Trunk and the Canadian Pacific.

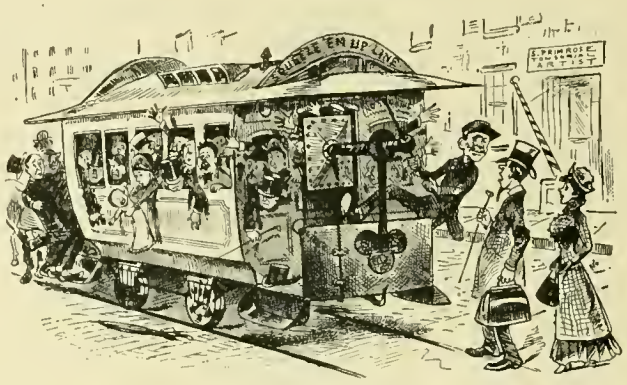
SOUTH ESSEX, ONT.—Application is to be made to the Ontario legislature to incorporate the South Essex Railway Company to construct an electric railway between Amherstburg and Harrow, and to amalgamate with the Windsor railway.

CHATHAM, ONT.—Dr. King, of Kingsville, J. C. Leggatt, of Windsor, and George C. Rankin, of Chatham, are forming a company to build an electric railway from Chatham to surrounding towns. A Toronto syndicate is making surveys for a similar project.

HULL, ONT.—The Hull Electric Railway Company, which is changing to electricity, has leased the Aylmer branch of the Canadian Pacific Railway, over which freight will be drawn by electric locomotives. Four open and four closed cars have been ordered.

OTTAWA, ONT.—The Ottawa & Aylmer Railway & Bridge Company, composed of the leading stockholders of the Ottawa Electric Street Railway Company, will begin the building of an electric railway to Britannia. It is to be completed by June.

HAMILTON, ONT.—The Hamilton Radial Electric Railway Company is in the market for the entire equipment of twelve miles of suburban road, including two 200-horse-power boilers and engines, condensing; two 150-kilowatt generators and outfit, wiring, etc.; two 8-wheel motor cars, 45 to 50 feet, with two 100-horse-power motors each, geared to fifty miles per hour; two 8-wheel, 50-foot trailers and some smaller ones. The road is to be running by June 1, and will be extended ten miles during the summer. Office of construction department in Bank of Commerce Building, Hamilton.

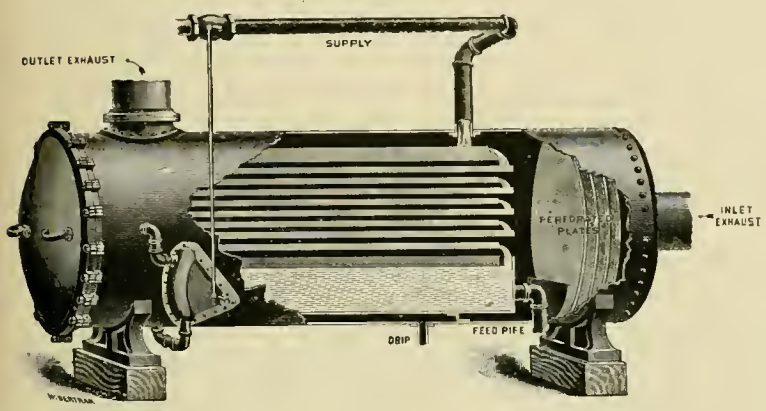


A CONGESTED LINE.

BARAGWANATH NEW OPEN HEATER.

The new steam jacket open heater, manufactured by Wm. Baragwanath & Son, Chicago, the subject of this illustration, is an apparatus of considerable merit. Its special points are: 1. The oil separator, which consists of a series of perforated plates through which the exhaust passes and which proves very efficient in removing the oil of the exhaust.

2. The reservoir in the heater is surrounded by steam, thus maintaining the full temperature acquired in its passage over the shelves. Ordinarily in open heaters the steam is simply in contact with the surface of the



BARAGWANATH NEW HEATER.

water in the reservoir, which simply obliterates its heating efficiency, besides exposing the water to radiation through the shell of the heater. Minor points are the outside connected float so arranged as to be easily accessible in all parts in case of derangement.

The removable head is made very light but strong, with hinged bolts. The gasket is of molded rubber stretched over a boss on the heater ring, where it remains when the head is removed and can be reused indefinitely. Any ordinary sized head can be taken off and replaced in five minutes. The pans are of steel, light but strong, and easily removable for cleaning, as also is the bottom reservoir in case it becomes necessary. This heater is placed on the market to meet the demand for an efficient, low-priced open heater with the best possible arrangements for accessibility in cleaning and with the most improved arrangement for removing oil.

THE CONSTRUCTION OF WESTINGHOUSE ENGINES.

The Westinghouse Machine Company gives some interesting information regarding the methods used for testing materials and insuring good workmanship in the manufacture of Westinghouse engines. From each heat run off in the foundry four standard test bars 4½ feet long by 1 inch square are cast. These bars are broken in a screw press so arranged that the breaking strain is measured with an ordinary platform scale. An entry is made of each test, thus giving a complete record of the comparative strength of every individual heat taken off in the foundry. Two mixtures of iron are cast. One a hard mixture for cylinders, pistons, rings and valves, and the other a soft mixture for other parts not subjected to wear. The cylinder mixture averages from 25 to 30 per cent above the usual government requirements. For convenience in machining the other mixture is kept just hard enough to fill the specifications. By watchfulness as to test pieces any inferiority in the iron bought or undue amount of sulphur in the coke used is sure to be found out before the iron gets to the machine shop. The steel used for crank shafts and connecting rods is forged for the company to a specified chemical analysis which insures its being of good quality. The records show who made the steel used in each engine. If a broken crank shaft comes back it is known who furnished the steel in the billet from which it was forged. The company employs the Pittsburg Testing Laboratory to make tests of broken parts as it has not enough to make it worth while to do it itself.

Excellence of workmanship is insured by the unique system of inspection in operation at the shop. The Westinghouse Machine Company has no dealing direct with the users of its engines, but the entire product is marketed through independent concerns which purchase the engines for cash, and become directly responsible to the customer. By agreement a resident inspector is kept at the works under the sole pay and control of these selling agencies, and by virtue of his position he is interested solely in the quality of the work turned out, not in its quantity or cheapness. The company has no workmen that know anything about "scant thirty-seconds" and "full sixty-fourths" but there are plenty who know how big one-thousandth of an inch is.

QUICK REPAIR OF A BIG SHAFT.

Not quite five hours were required to remove and replace with another the big shaft of the "idler" wheel in the Illinois street power house of the North Chicago Street Railroad Company, which broke down one day this month, and the company is to be congratulated that an accident which might have delayed its lines several days was by mechanical skill and precaution so quickly remedied. The shaft which broke, but which fortunately did not allow the wheels to fall to the pit below, was thirteen feet six inches in length, fourteen inches in diameter, and weighed over four tons. It required over thirty men to remove the old shaft, and replace it with the new one that had been made but three weeks before by Willard Sons & Bell of this city. The work was done under the direction of Master Mechanic Gleason, George Locke, superintendent of ropes, and General Manager Roach, and undoubtedly broke all record of its kind in the history of cable roads throughout the country. The accident happened at 1:50, and the line resumed traffic at 6:35.

A street railway mail car on the Pennsylvania avenue cable road at Washington, was burned when in service.

CHICAGO'S STORAGE BATTERY ROAD.

Peckham Trucks—St. Louis Cars—Arnold's Power House System.

Rapid progress has been made on the Chicago & Englewood line, and our readers have only to be reminded that J. C. Shaffer is the president and moving spirit in the enterprise, to understand how thorough that progress is. Construction will now be pushed at once and carried out to completion as rapidly as men and money can accomplish the undertaking consistent with good workmanship. President Shaffer has ordered forty 18-foot cars of the St. Louis Car Company, which are promised to be the finest in Chicago; twenty are open and twenty closed. They will be mounted on Peckham trucks, which were adopted as specially adapted to the increased strain required by the extra weight of the batteries. The battery is the Electric Storage Battery Company's, Philadelphia, and will be carried on the trucks instead of in the car as has usually been the practice.

The power house will be a model and built on the Arnold electric power system, of which B. J. Arnold is inventor. Mr. Arnold is consulting engineer for the Chicago & Englewood, and will personally superintend the power house construction. M. C. Bullock & Company, Chicago, will build a Willians engine for the plant, and C. E. Loss & Company, this city, will do all the track work. G. H. Condict of the railway department of the Electric Storage Battery Company, will be chief engineer.

KALAMAZOO LINES SOLD.

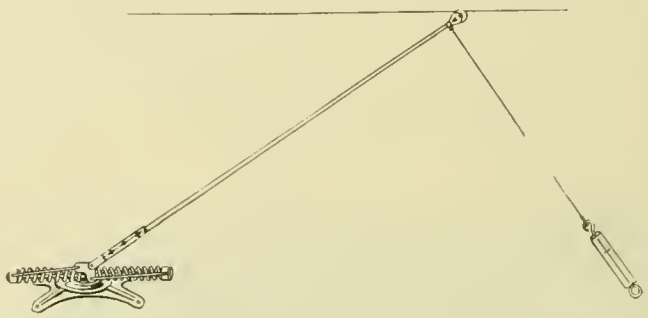
Major L. N. Downs, Frederick N. Rowley, and others have become owners of the Citizens' Street Railway's Company system at Kalamazoo, Mich. The transfer was made by the General Electric Company, which has controlled the road for some time, through its agents in that city one day last month. There will be some changes and improvements in the manner of operating the line. E. E. Downs, the popular and efficient railway manager who constructed the road will be general manager of the new company. Fred N. Downs, will be president; L. N. Downs, vice-president and secretary, and L. M. Gates, treasurer. The board of directors are F. N. Rowley, L. N. Downs, E. E. Downs, L. M. Gates and Joseph Wyckoff. The sale of the road is looked upon with much favor by Michigan people, as the gentlemen who purchased it are all local capitalists with extensive street railway interests in that state.

The Lenox avenue conduit road at New York, came through the winter successfully. As this is on a wide well drained street without much team traffic the result is as we anticipated. The next thing in order will be for a conduit to be built on some of the congested streets of our big cities.

TO DETERMINE TENSION ON TROLLEY.

President Estep, of the R. D. Nuttall Company, and who is an acknowledged authority on trolleys, calls our attention to the method recently described in these columns, for ascertaining the tension of the trolley on the wire, and offers a better plan.

In the article referred to, a weight, say twelve pounds was suspended from the trolley wheel, and the base springs adjusted until the wheel had a secure contact on



TO DETERMINE TROLLEY TENSION.

the wire. In this it will be seen the line suspending the weight hangs as a plumb from the wheel but at an acute angle to the pole.

Mr. Estep has experimented in every conceivable way and has found the only true method is to use a spring scale, the eye of which may be held in the hand while a light rope connects the hook of the scale with the trolley head. Then pull the spring and set the trolley, but in doing so be sure that the rope forms a right angle to the pole. When set in this way, the tension may be absolutely depended on as correct the whole secret is in making the test pull at a right angle to the pole. In our illustration we have exaggerated the relative size of the scale to better illustrate the principle.

DEATH OF W. S. BEATTY.

The many friends of Wm. S. Beatty, of the Pittsburgh office, of the General Electric Company, will be pained to learn of his death, April 7, in New Orleans. Mr. Beatty was obliged to give up his work some weeks before, on account of failing health, and to seek a more congenial climate in Florida, and later in Arizona. Finding no improvement, however, he was on his way home, but on reaching New Orleans, was unable to proceed further. Mr. Beatty was a comparatively young man for the position he filled, and had marked abilities, which gave great promise for a brilliant future. His agreeable and obliging manners made him friends every where, and his sudden death comes as a great shock to them all.

NOT IN A COMBINE.

The Consolidated Car Heating Company reports that it has not entered into any combination or agreement with other electric heating companies and it does not have any intention of so doing.

LIFE OF RAILS UNDER ELECTRIC SERVICE.

I.

The amount which should be set aside for the renewal of electric track is very much an unknown quantity. The item of track construction is, of course, the largest one in the first cost of road and there seems to be good reason to believe that the maintenance and renewal of track will amount to a larger per cent of the first cost than on any other item of street railway equipment. Electric traction has not yet been in use long enough so that any very reliable figures are obtainable as to what sum directors should set aside for this item, but as this is such an important factor in the management of any street railway property we feel that such information should be collected at the earliest possible moment, and we have begun by writing some of the largest and oldest electric roads as they are the ones which have had the best chance to observe the wear on rails. The questions asked were all as to rails laid and worn out since electric traction was adopted.

THE CINCINNATI STREET RAILWAY

by its mechanical engineer, Bert L. Baldwin, reports some fifty-two pound girder worn out after six years. It was taken up on account of broken rails, crushed web and weak joints. From 240 to 260 cars went over the track daily. The cars averaged 17,000 pounds with load. The track was laid in macadam. The ties were two and a half feet between centers and the joints supported on a 6 by 12 inch tie. The street was a residence one and teaming not heavy. The same rail under cable service broke down in ten years.

DENVER TRAMWAY.

John A. Beeler, constructing engineer of the company, reports that a stretch of ten miles of the Lawrence street line, consisting of 30-pound T rail was taken up after two and one-fourth years, on account of bad joints and generally bad surface. It was not worn out but it was found to be cheaper to pay interest on heavier rail than to keep the light rail in ordinary fair surface. This track took the traffic of 180 trains per day. Motor cars weighed 10,000 pounds and trailers 3,500. The track was laid on sandy loam and ties were two feet between centers. The street was not paved and, of course, the factor of teaming did not enter in. The company has some 30-pound T rail that has been in use about six years with one-third to one-half the amount of travel on the above line, and as far as the life of the rails is concerned it will last four to six years yet. Mr. Beeler's experience is that it is almost impossible to maintain 30-pound rail in good surface and that nothing less than 48-pound T or 60-pound girder should be laid under any circumstances.

A LARGE ROAD

which by virtue of its size and age, has probably had as good an opportunity to know what the life of rails under electric service is, as any other, reports a case where a 72½-pound girder was taken up after three years, because the rail was worn out. The daily traffic was 2,400 motor cars weighing six to ten tons, and moving very slowly. The track was laid on a 4½ by 5-inch stringer, with ties, four feet between centers, gravel ballasted. It was on a business street with heavy team traffic. The gentleman who makes the report, says:—

"While we have been obliged in some special spots to take up individual rails, and special work which have worn a less time than the instance which is here reported, yet it would be entirely unfair to say that any considerable portion of our system, in fact, of any one's system, would wear out in three years' time. I would place the life of track on our streets of heaviest traffic, if properly laid, and track properly constructed, at certainly not less than five years, and probably longer. While I do not believe that the depreciation of track of any system as a whole, would amount to 20 per cent per annum, (five years' life), I nevertheless feel that the maintenance of track account, is something which has very largely been lost sight of by promoters of electric railroads.

"So long as municipal authority limits and controls the height of the head of the rail above the tram, it is obvious that the life of a girder rail in a street is very limited. In a city like ours, we think the wear of teams on the rail in many of our streets, exceeds that of cars. This matter has already so strongly attracted our attention that we are this year having rolled some rails of a special chemical composition with reference to securing greater hardness and durability, than we have heretofore been able to get with our girder rails, and they will be laid in places of very heavy traffic. A very few years time will determine whether there is much to be gained by working in this direction."

A MISSOURI ROAD

has worn out girder rail of from sixty-four to seventy-eight pounds, in five and one-half to seven and one-half years. It was taken up both on account of worn heads and joints. The service was from 300 to 500 cars over the track daily. Motor cars were of 12,000 to 16,000 pounds weight, and trailers 4,800 pounds. The ties were laid 27 inches between centers on broken rock, the streets were paved, and the teaming on the track was heavy.

MINNEAPOLIS AND ST. PAUL.

W. J. Hield, general manager of the Twin City Rapid Transit Company says:

"Of the original rail put down at the time of the change from horse to electric power, none has yet been removed because of being worn out. We have relaid quite a percentage of our track, but this work has been done largely because of paving, sewers, water mains, and similar city improvements of a permanent character, and it was deemed advisable to reconstruct our lines at the same time."

The Walker Company of Cleveland, Ohio, will establish a branch factory at New Haven, Connecticut, in the near future.

C. H. Johnson has been appointed receiver for the Complete Electric Construction Company, of 121 Liberty street, New York.

The Metropolitan Electric Company, of Chicago, is now handling the Eyanson and Armpriester's knife switches. It has issued a special addition to its catalogue No. 3, which illustrates and gives the prices of these switches.

The Porter-Allen engines, manufactured by the Southwark Foundry & Machine Works, of Philadelphia, are fully described and illustrated in the company's latest catalog. The pamphlet is likewise a very handsome typographical piece of Work.

We have received the finest calendar of the season from the American Wire Works, of Providence, upon which is shown a bird's eye view of the company's extensive works at Phillipsdale, the new town started by it. It is just out of Providence, and has been named for the company's popular president.

The Falk Manufacturing Company, of Milwaukee, Wis., has just issued an instructive and artistic pamphlet, describing the Falk cast-welded rail-joint, entitled "One Rail." A brief account of the process of casting and the use and merits of the rail joints are given, and illustrated throughout with half tones.

E. P. Morris, who will represent the Bradford Belting Company, of Cincinnati, manufacturer of the Monarch insulating paint, has a surprise in store for the company's patrons at the coming Electrical Exposition, in New York. He will distribute a handsome souvenir, whom all that visit the exposition should be sure and secure.

The P. & B. tape and compound is meeting with a steadily increasing demand in the west since the Metropolitan Electric Company of Chicago has been its agent here. The company is also making a great success of, and receiving numerous orders for ship core carbons, manufactured by the Standard Paint Company, another specialty which it handles.

A good idea may be gathered of the extent to which transmission of power by electricity is gaining ground in this country by the statement, that in the long distance plants installed by the General Electric Company during 1895, over 1,200 miles of copper wire for transmission purposes alone, were used, amounting to twelve hundred thousand pounds of copper.

N. W. Harris & Co., bankers, Chicago, on April 1, increased the number of the firm's membership by admitting to its ranks Elmer E. Black and Albert W. Harris. Both of these gentlemen are widely known, and esteemed in financial circles, and they have the entire confidence of the company and its patrons, having been connected with the business for many years.

A copiously illustrated catalog has been issued to the trade by the New Castle Car Manufacturing Company, New Castle, Pa. The company is the manufacturer of electric, horse and cable car bodies, its products being in use on many of the large roads throughout the country. The company solicits correspondence, and will gladly furnish information on application.

The Haddon Hall Hotel at Atlantic City, N. J., has recently been equipped with three 100-horse-power return tubular boilers for 125 pounds working pressure manufactured by the Kensington Engine Works, Limited, of Philadelphia. The company has also just sold a 200-horse-power feed-water heater, of special design, to the Atlantic Refining Company, of Point Breeze, Pa.

The sample card of Eugene Munsell & Co., 218 Water street, New York, importers and wholesale dealers in India and amber mica is ready for the trade. It shows a variety of forms of mica for electrical insulation—stamped solid mica segments for all the standard railway motors, mica washers, etc. On the lower part of the card is given a list of the company's agencies in the principal cities.

Bi-metallic wire, composed of two metals, copper and steel, is daily growing in popularity and use for electrical construction, and has many points of merit—the copper supplying its conductivity, the steel its tensile strength. It is sold by the Bi-Metallic Electric Transmission Company, Havemeyer Building, New York, and is the product of the John A. Roebling's Sons' Company, of Trenton, N. J.

Frank H. Ball, a popular and widely known designer of steam engines has assumed the business management of the American Engine Company, of Bound Brook, N. J. The company will begin immediately manufacturing engines of Mr. Ball's design especially adapted for direct connected electrical work, and for special use with the company's dynamos, thus making complete and symmetrical units.

The Paige Iron Works, of Chicago, which have just completed the contract for the entire special work of the Metropolitan Elevated, have issued a booklet in which their achievements in track construction are shown. As the company is doing a large amount of work on various electric roads, some requiring the most intricate construction, which is shown in the pamphlet, it will be found of much value.

The Englewood & Chicago Electric Street Railway of Chicago, the storage battery road which will have fifty-four miles of roadbed at a cost of about $600,000, is to be constructed by C. E. Loss & Co., of the Windy City, who was awarded the contract. Work on the line was started March 1, and must be completed August 15 of this year. Twenty-five miles of the road will be laid by the first of June.

While the Central Electric Company's calendar for '96 is among the last to reach us, it is by no means least in point of beauty or excellence of arrangement. At the top of the

calendar is the figure of a Gibsonesque young woman, representing electricity, and surrounded by several cupids bearing in their hands telephone transmitters and incandescent lamps. Directly over the head of the woman is the Okonite trade mark.

Daniel Higgins, 1719 W. Lombard street, Baltimore, Md., manufacturer of street railway badges, is now making a new cap badge which has appropriately been named the "common sense" badge, inasmuch as the figuring and lettering are large, and can be read at considerable distance. Mr. Higgins believes there is a place for such a badge as he is making, and looks for its speedy adoption by enterprising railway men.

H. E. Collins & Company, of Pittsburg, feel quite proud of the results of a test made at the plant of the Carrie Furnace Company, Keating Station, Pa., by the Pittsburg Testing Laboratory, to determine the relative efficiencies of a bank of Cahall and a bank of another make of water tube boiler, which resulted very much in favor of the Cahall. They will mail you a pamphlet giving a full account of the test on request.

The Stilwell-Bierce and Smith-Vaile Company of Dayton, Ohio, closed a contract for sixty-six large Victor turbines of the latest pattern, and all the connecting machinery needed for transmitting the power of these turbines to electric generators, for the new water-power plant which is being installed at the Lachine Rapids on the St. Lawrence river, near Montreal. The plant is second only to Niagara Falls in importance and size.

The following is a list of roads at present being equipped with fenders by the Consolidated Car Fender Company, of Providence: The Hartford Street Railway Company, Hartford, Conn.; the Central Railway & Electric Company, New Britain, Conn.; the Plainfield Street Railway Company, Plainfield, N. J.; the Toledo Electric Railway Company, Toledo, O., and the Staten Island Electric Railway Company, New Brighton, S. I.

H. E. Collins & Co., of Pittsburg, sole sales agents for the Cahall vertical water tube boiler, manufactured by the Aultman & Taylor Machinery Company, Mansfield, report the sales of the Cahall boiler to go merrily on. The following is a recent list of purchasers: The Pillsbury Plate Glass Company, Kokomo, Ind., 2000-horse-power; Brown & Company, Pittsburg, 109-horse-power; Jones & Laughlins, Ltd., Pittsburg, 500-horse-power.

The new and improved machine shop of the Falk Manufacturing Company, of Milwaukee, Wis., was completed last month and the company installed in it. The building throughout, which is 60 feet by 160 feet, costing several thousand dollars, will be given up entirely to the manufacture of the Falk portable cupolas, and tools and appliances used in the company's system of cast welding rail joints. A spur of railroad, connecting with the main line runs the entire length of the building.

The use of Wood's Safety Gate, manufactured by the R. Bliss Manufacturing Company, Pawtucket, R. I., seems to be growing more and more in favor with the railroad people. The West End Road, of Boston, is equipping seventy-five more new cars with these gates; the Pullman Palace Car Company is equipping thirty steam cars; the South Covington & Cincinnati Street Railway is putting them on its cars and the Boston & Maine Railroad is steadily going forward equipping the road.

Although the season has scarcely opened, the demand for Wurts lightning arresters that is being made on the Westinghouse Electric & Manufacturing Company bids fair to be phenomenal. How popular this lightning arrester has become, and how well it has proved its efficiency, may be gathered from the fact that during 1894 the Westinghouse company sold nine thousand arresters, and in 1895, twelve thousand, while every indication for the present year promises to double the sales of last year.

The Bates Machine Company, of Joliet, Ill., the maker of the well known Bates corliss engines, has purchased the patents on the Cookson combination feed water heater, purifier, filter, oil separator and condensation receiver. The heater department will be under the management of F. J. Cookson, the inventor, 59 South Canal street, Chicago. The company rightly feels that in this device it has obtained something of great merit. It combines the functions of so many pieces of apparatus that the desirability of its use appeals strongly to all steam users.

The Q. & C. Company, Chicago, manufacturers of railway specialties and special machinery, has invaded South Africa with its Perfection oil purifier, orders for its apparatus having been received from that country during the past month. The company also announces the selling progress of a new portable rail saw which it has recently brought out. This machine is the result of a large demand from railroad people for a saw making straight cuts only, consequently it has begun the manufacture of one of the best and cheapest machines on the market. While the machine is but a few months old, already quite a number of them have been sold.

A hand book of facts and figures for electric railway construction has been compiled by the Badger Manufacturing Company, Milwaukee, manufacturing overhead and conduit railway line material. The book is arranged for ready reference, and can be carried in the vest pocket. It will be found invaluable to anyone engaging in line construction, as the data required in such work is fully given. For instance in the matter of ties and spikes per mile, the "number of ties per rail, number per mile, number of spikes per mile and number of kegs of spikes per mile" are accurately figured.

G. G. Arthur, who for a number of years has been conducting a large hardware business, has purchased an interest in the Dorner & Dutton Manufacturing Company, of Cleveland, and will devote his time to it, having the title of vice-president and secretary. The company has increased its capital and is now putting in additional new machinery and will be in better shape than ever to take care of its largely increasing trade. The product of the Dorner & Dutton Company will continue to be of the same good qualities of workmanship as in the past and they are in better shape than ever to take care of their old customers and meet the wants of new ones.

A new concern to embark in the manufacture of air brakes is the National Air Brake Company, at 15 Cortlandt street, New York. The apparatus is especially designed for street railway cars. The compressor can be bolted to the floor of the car or to channel bars on the truck, and is automatically cut out of action by a special design of governor when the pressure in the reservoir reaches a certain amount. The compressor is automatically cut into service again, when the minimum allowed pressure is reached. The average power required to operate the brake, it is said, is not to exceed 1/8 horse-power per mile operated in street service with the average number of stops.

The Mica Insulator Company, of New York, sole manufacturers of "micanite" are sending to all manufacturers of electric machinery, electric repair companies and street railways in the United States a large sample card tastefully and conveniently gotten up, showing samples of micanite commutator segments, rings and slot insulation for motors and power generators. Nine different grades of micanite and empire insulating cloth and paper are exhibited. These materials are now largely used for insulating armature cores and fields. The card also states that estimates will be cheerfully given on insulation for special designed machinery when sketch or blue prints are furnished.

The change of the Claiborne Street Railway Company of New Orleans from mule to electric traction means the disappearance of the car mule entirely from the streets of New Orleans. Contracts for the entire equipment of the road have been placed, and the work will proceed at once. The General Electric Company will furnish the electrical apparatus, which is to consist of two 300-kilowatt generators and switchboard, and thirty double G. E.-800 motor equipments. The American Car Company of St. Louis will supply the cars which are to be equipped with Lord Baltimore trucks. The E. P. Allis Company will furnish the engines and the Edgemore Iron Company, of Edgemore, Del., the boilers.

The Ohio Brass Company, Mansfield, Ohio, reports having lately secured a number of large contracts for overhead material, in which the Walker trolley ear, manufactured by the company, is specially specified. This device is being adopted largely by electric roads in various sections of the country, and is meeting with general indorsement. The ear is so designed that it offers no obstruction to the free passage of the trolley wheel, therefore reducing the sparking to a minimum. No solder is required to hold it in position, and when placed on the line a perfectly straight underrunning surface is presented to the trolley wheel. The company also reports doing a nice business in motor repair parts and car repair appliances.

A large increase in business has necessitated the Manufacturers Advertising Bureau, of New York, which for several years has been located at 111 Liberty street, looking for more commodious quarters, and on the fifteenth of April it will move to 126 Liberty street, where the accommodations are much superior. As is well known, Benj. R. Western, is proprietor of this concern, which takes entire charge of the newspaper work and advertising for manufacturers, relieving them of the responsibility, and bringing to the work a vaster experience in that line than they possess. Mr. Western is an acknowledged expert in this form of advertising, and for that reason many large manufacturing concerns have entrusted their business to his care.

The Providence Steam Engine Company, of Providence, R. I., builder of the improved Green engine, reports, notwithstanding the general slow times, its shop full of work. Its engines, which are especially adapted for direct connected railway work, are proving very satisfactory where they have been installed; recent contracts for this line of work cover one 500 and one 350-horse-power tandem compound engine for the Suburban Railroad, Chicago; two 750-horse-power tandem compounds for the Second Avenue Traction Company, Pittsburgh; two 400-horse-power simple engines for the New London Street Railway, New London, Conn.: one 300-horse-power simple engine for the Hampton & Old Point Railway, Hampton, Va.; two 700-horse-power, for the Washington, Alexandria & Mt. Vernon Railroad Company, Washington, D. C.

The Stirling Boiler Company, of Chicago, is always rushed with business. It reports the following recent orders: Detroit Railway Company, Detroit, second order, 2,500-horse-power; Passaic Lighting Company, 600-horse-power; People's Power Company, Moline, 500-horse-power; Suburban Electric Light & Power Company, East Orange, N. J., 125-horse-power; Betz Brewery, Philadelphia, second order, 100-horse-power; Suburban Railroad Company, Chicago, 750-horse-power; Cleveland & Elyria Railroad Company, Cleveland, second order, 700-horse-power; Cincinnati, Newport & Covington, second order, 500-horse-power; New Albany Water Works, New Albany, Ind., 200-horse-power; Houston Ice & Brewing Company, Houston, Texas, 300-horse-power; Eagle Iron & Steel Company, Ironton, Ohio, 200-horse-power.

The feedwater purifiers and heaters, made by the Hoppes Manufacturing Company, of Springfield, Ohio, are meeting with much favor in the west, as the report of its western office, St. Louis, Mo., testifies. It is as follows: St. Louis Dressed Beef Company, 750-horse-power purifier and 800-horse-power exhaust heater; the Christy Fire Clay Company, 400-horse-power purifier and 400-horse-power exhaust heater; the John E. Liggett building, two purifiers of 100-horse-power each, and also 200-horse-power exhaust heater; J. W. Peters & Co., 150-horse-power exhaust heater; Laclede Laundry Company, 100-horse-power exhaust heater; Globe Furniture Company, 150-horse-power exhaust heater; Leroi Furniture Company, 150-horse-power exhaust heater; Central Lead Company, 300-horse-power exhaust heater; Liggett & Myers Tobacco Company, 75-horse-power exhaust heater.

The works of Warren Webster & Company are run to their fullest capacity, as that concern has recently received a large number of orders for the Webster vacuum system of steam heating. The following are among some of the institutions which will be equipped with this excellent apparatus: Bullitt Building, Philadelphia; Cheney Bros., South Manchester, Conn.; Pope Manufacturing Company, Hartford, Conn.; Pullman Atwood Company, Waterbury, Conn.; Winchester Repeating Arms Company, New Haven, Conn.; Excelsior Needle Company, Torrington, Conn.; H. L. Judd Company, Wallingford, Conn.; Silk Exchange Building, New York; Syndicate Building, New York; Lord's Court House Building, New York; St.

Charles Hotel, Atlantic City, N. J. The company also reports a good business in the sale of its vacuum feedwater heaters and purifiers. For the United States Sugar Refinery at Camden a special heater, with a capacity of 25,000 gallons of water, is being manufactured.

The Automatic Circuit Breaker Company, Newaygo, Mich., successor to the Sweet Electric & Manufacturing Company, and manufacturer of automatic circuit breakers and electric cut-outs, is making great progress with its electrical specialties which are daily growing in favor, and wherever they are in use highly recommended. The automatic circuit breaker, or limit switch, made by the company, is not only meeting with the approval of the best electrical and mechanical engineers, but the Boards of Underwriters in various cities have recommended it as a protection against an overload or excessive flow of current. The limit switch, or circuit breaker, is made to work on any voltage, and is adjustable to one-hundredth of an ampere, and the current cannot exceed the amount to which the switch is adjusted without opening the circuit. The breaking of the circuit is between carbons, in such a manner that when the metal contact is broken the contact is made on carbons, one rolling on the other, throwing in a resistance which, before breaking the final contact, reduces the current volume, and thus the circuit is broken.

William H. Hansell, who for the past three years has been manager of the street railway department of the Charles Scott Spring Company, has become president of the Keeler & Hansell Company, successor to the Keeler & Cook Company, manufacturer of springs of all descriptions and other specialties. Mr. Hansell has made many friends among the street railway fraternity during his connection with the Charles Scott Company, and previous to that was with the Baldwin Locomotive Works. Associated with him is Charles Cook, who is superintendent of the works, and a thoroughly practical man; and Louis M. Keeler, the secretary, who has been in charge of a large spring concern for the past twelve years. They have enlarged the plant, adding new machinery, and will carry a considerable stock of steel on hand. They are in a position to manufacture high grade springs, and at the same time purpose to do so on as close margins as possible. The general office of the company is at 166 Elm street, New York, and the Philadelphia office at 378 Bourse building.

The McGuire Manufacturing Company, of this city, is again finding it necessary to run both day and night to keep up with its truck orders. It reports the following late orders: Norwalk Tramway Company, Norwalk, Conn.; Madison City Railway Company, Madison, Wis.; General Power & Quick Transit Company, South Bend, Ind.; Fort Pitt Traction Company, Pittsburg, Pa.; Shelton, Railway Company, Bridgeport, Conn.; Richmond City Railway Company, Richmond, Va.; Mt. Adams & Eden Park Inclined Railway Company, Cincinnati, Ohio; Hammond, Whiting, & East Chicago Railway Company, Hammond, Ind.; Los Angeles Railway Company, Los Angeles, Cal.; Holmesburg, Tacony & Frankfort Railway Company, Tacony, Pa.; Mahoning Valley Electric Railway Company, Youngstown, Ohio; Toledo Traction Company; Interstate Consolidated Street Railway Company, Attleboro, Mass.; Dartmouth & Westport Street Railway Company, New Bedford, Mass.; Jasper County Electric Railway, Carthage, Mo.; Pasadena & Pacific Railway Company, Los Angeles, Cal.; Norwalk Street Railway Company, Norwalk, Conn.; St. Charles Street Railway Company, New Orleans, La.; Cincinnati Street Railway Company; Central Railway Company, Peoria, Ill.; Calumet Electric Street Railway Company, Chicago; Chicago General Railway Company; Chicago City Railway Company. It has completed delivery of the "L" trucks for the Lake Street Elevated Railway Company, and they have proved satisfactory in every particular, the easy riding qualities being particulary noticeable. The Brooklyn Bridge Railway, of Brookly, has had a pair of these trucks in competitive service for the past thirty days, with the result that the McGuire trucks have been adopted, and the directors have ordered the purchase of twenty equipments. The McGuire Company has among its orders quite a number of duplicate orders for double trucks, from which it would seem that long cars are rising in popularity. The orders on hand for its ratchet brake handles indicate that they are being generally accepted and endorsed.

Those who are contemplating the installation of steam and electrical apparatus, should send for the handsome catalog issued by the J. H. McEwen Manufacturing Company, 27 Cortland street, New York. This company reports having recently closed contracts for the following apparatus:

Two railroad generators 150 kilowatt capacity, direct connected to 12 x 23 x 28 tandem compound engines, for the Hingham, Mass., Electric Railroad; one 150-kilowatt generator, direct connected to 18 x 18 simple engine, for the Morris Coal Company, Jobs, Ohio; one 85-kilowatt belted generator, and one 15 x 16 simple engine for the Carbondale Fuel Company, Des Moines, Iowa; one 13 x 14 simple engine for Miner-Hillard Milling Company, Miner's Mills, Pa.; one 15 x 16 simple engine for O'Neill & Patterson, Bunola, Pa; one 16 x 16 simple engine for Ellsworth-Morris, Sutterville, Pa.; one 16 x 16 simple engine for W. J. Smith, Mount Pleasant Mines, Scranton, Pa.; one 16 x 16 simple engine, New York & Pennsylvania Company, Johnsonburg, Pa.; two 200-kilowatt generators, direct connected to 14 x 28 x 20 tandem compound engine, for Frankford & Tacony Street Railroad, Tacony, Pa.; one 10 x 10 simple engine for Charles S. Solomon & Company, St. James Hotel, Washington, D. C.; one 10 x 10 and one 12 x 12 simple engine for Dr. J. S. Gilbert, Bordentown, N. J.; one 30-kilowatt generator, direct connected to 9 x 8 simple engine, Kunkle Bros., Pittsburg, Pa.; one 8 x 10 simple engine, American Glue Company, Springdale, Pa.; one 8 x 10 simple engine, Chicago Hardware Manufacturing Company, Chicago; one 25-kilowatt generator, direct connected to 8 x 10 engine, Lea & Carroll, Pittsburg, Pa.; one 25-kilowatt belted generator, H. W. Johns Company, New York; one 100-kilowatt belted generator, Link-Belt Machinery Company, Chicago; one 80-kilowatt belted generator, Westinghouse Light, Heat & Power Company, York, Pa.; one 50-kilowatt generator, direct connected to 12 x 12 engine, German-American Brewing Company, Buffalo; one 75-kilowatt generator, direct connected to 13 x 14 simple engine, Monongahela House, Pittsburg; one 200-kilowatt belted generator, Armour Company, Chicago; one 60-kilowatt generator for V. Henry Rothschild & Company, for factory at Trenton, N. J.; one 120-kilowatt belted generator for Jeffrey Manufacturing Company, Columbus, Ohio.

The Sterling Supply & Manufacturing Company of New York has increased its capital stock to $100,000, all of which is fully paid. This addition to the working resources of the concern is the result of a rapid and healthy growth of business. There will be no change in the management of the company. J. H. Carson will retain his controlling interest, and continue the office of president and general manager as heretofore. Perry Tiffany, the recently elected vice-president, and a new recruit to the company's forces, brings with him to his new office, a wide business experience and connections that will greatly increase the interest of the company. Joseph M. Stoughton will be its secretary and treasurer. The Sterling Company report an increased activity in business. It has recently received a number of large orders for its brake, the Buffalo Railway Company being among the concerns to adopt it.

Garton-Daniels Electric Company of Keokuk, Iowa, is in receipt of the following very complimentary letter from W. J. Kelly, general manager of the Columbus Street Railway, Columbus, Ohio:— "In reply to your favor of the 13th relative to lightning arresters, we are glad to say that we consider them the best lightning arrester in the market for use on feed lines. We have one in use in the circuit of our shop motor, where it can be readily observed, and during a thunder storm the discharges through it are frequent and it has never failed to fully protect the motor. We have never given your car arrester a trial, but are so well pleased with the feed wire arrester that we see no reason why it would not prove equally as satisfactory on the car, providing it is of suitable shape and properly protected. Inasmuch as we are now ready to equip our new cars, we trust you will make a special effort to ship our order at once."

The Hamilton Corliss Engine Company, of Hamilton, O., was awarded the contract for the new engine for the Akron Street Railway and Illuminating Company. The construction of the mammoth 600-horse-power Corliss compound condensing engine will commence at once. The weight of it will be 250,000 pounds. The fly-wheel is eighteen feet in diameter, and weighs 65,000 pounds. The driving shaft is seventeen inches in diameter. The total length is twenty-nine feet, and the width twenty-three feet. The engine will be in direct connection with a new 500-horse-power dynamo, which will be placed in the power house. It was decided at the directors' meeting to purchase another 600-horse-power engine during the present year. Ultimately the horse power will be increased to 3,600. The double tracking of Main street, from Thornton street to the car barns, will be commenced very soon. Bids will be received for new cars and the contracts awarded shortly.

A NEW ARMATURE COMPOUND.

Better insulation has been the motto held up before the workers in the electrical field since the beginning and although many improvements have been made we are always ready to welcome a new one. The monarch armature compound, made by Witherspoon & Wray, 16 Cotton Exchange Building, St. Louis, is something new for armature insulation in which it is claimed that the qualities of high resistance and non susceptibility to the action of heat, oil or water are combined with sufficient elasticity and comparative cheapness of cost. These claims are supported by the testimony of many who have used it. The compound is applied in the form of paint of rather heavy consistency, but when it is dried it becomes very hard, yet not brittle, and holds the wires firmly in place, preventing loosening through vibration. It effectually isolates each individual wire from contact with its neighbor as the paint is thin enough to soak into the cotton insulation, forming a mold around the wire when hardened. Another point claimed for it is that it does away with the use of mica and linen in winding armatures, substituting therefor a much cheaper material. Though the compound has but recently been placed regularly upon the market it has created a large demand and will well repay a trial.

Many of the most troublesome matters may be easily corrected—if one only knows how. Probably a blueprint, which has been energetically rolled and folded and crumpled, is about as obstreperous a thing as there is. But the print can be quickly subdued by soaking in water until the kinks come out, and then laying it flat to dry.

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F. S. KENFIELD, Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of street railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers.

DOES THE MANAGER WANT ANYTHING?

If you contemplate the purchase of any supply or material, we can save you much time and trouble. Drop a line to THE REVIEW, stating what you are in the market for, and you will promptly receive bids and estimates from all the best dealers in that supply. We make no charge for publishing such notices in our DAILY BULLETIN.

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WE can not help commending to other cities the very sensible way in which the council committee of Quincy, Ill., acted in regard to the proposed lowering of street car fares at that place. The committee decided that it would be foolish to enter into costly litigation against the company and against the best interests of the city. It would, the members considered, have a bad effect on all lines of investment and retard the city's growth, and such agitation against a home company would be harmful to all.

DISPATCHES from Worcester, Mass., would seem to indicate that the street railway business is about to be paralized and electric cars relegated to the scrap heap by the system of horseless omnibuses operated by compressed air which the "Metropolitan Traction Company" proposes to inaugurate in that city. The omnibuses are to cost $3.50 per day to operate against $20 for an electric car, fares are to be cheaper than on electric street cars and sundry other miracles worked. Some people believe the day of miracles is past but "the suckers still bite."

THE tendency of American practice is towards standardization and simplification and cheapening of manufacture and maintenance, and to this is partly due no doubt the rapid growth of the electrical business in this country. The European engineer on the other hand must have everything technically correct and suited to each particular case, thereby giving rise to a great diversity of practice and complication of apparatus. An example of the latter was furnished the other day when an examination of a trolley base sent from Germany and considered the proper thing over there, revealed the fact that it had something over 100 parts.

IN spite of the conservatism of European engineers the fact remains that to them is due the honor of being the first to try many new things. We have in mind now especially the road at Lugano, Switzerland, which is the first commercial street railway to use the three phase system. It is to be hoped that it is the forerunner of many more, for the practical success of this system means not only a simplification of motors and generating apparatus, but the building of long suburban and interurban roads served from one power plant. The three phase system is not going to drive out the direct current plan of distribution but has a field of its own to develop.

THE carrying out of the project, now fully decided on, for an express service on the lines of the Brooklyn Heights Railroad will be watched with intense interest by every manager of a city railway system. Express service is no longer a novelty on interurban roads but for a large city system like that at Brooklyn it is entirely new. There is no good reason why a street railway company in a large city should not make use of its plant during what are now idle hours, to haul express and freight, thereby not only relieving the streets of much teaming, but cheapening the cost of haulage to the consumer. The project is one which has made less progress in cities than it should, while the interurbans find in an express service a source of large revenue. St. Louis and Albany have put the scheme into successful operation, but many roads have hesitated through fear of overstepping the limits of their charter and others have waited until the success of the experiment had been demonstrated. The Brooklyn Heights will now try the experiment. The conditions are somewhat more favorable in Brooklyn than in other cities, it is true, but it is safe to say that now the start is made others will follow the example.

SECRETARY PENINGTON, of the American Street Railway Association, has issued a bulletin announcing the selection of place of holding the meeting and for exhibits. The building is the mammoth structure erected for the National Republican Convention. There will be plenty of space for everybody, and sufficient room left for aisles, so that the exhibits can be seen. Price for space is less than last year. An arrangement which exhibitors will appreciate is that the business sessions are to be held in a room at the further end of the building, entrance to and exit from which can only be had by passing through the exhibit hall. Every possi-

ble facility for affording exhibitors every opportunity to have their displays seen will be provided, and the result will be the assembling of the finest and most extensive line of supplies and machinery ever brought together. Space should be secured at once, and exhibitors plan to have their display in readiness on the night of the 19th. It takes just so long to arrange a display, and those who are not in shape until the convention is half over suffer a needless loss, and reflect no credit on the promptness with which they do business. So let every one begin now to get ready, and have a part in the biggest, the best, and what will be a record-breaker convention.

Altogether the most important feature of street railroading this year is that of pleasure resorts, and the future of this branch of created travel is full of promise. As the Review has urged so earnestly ever since its first number, there is no road but can increase its business profitably by working some kind of pleasure resort feature, either directly or in connection with existing parks and resorts. The resort business is also bringing with it new elements in the operating department. Already quite a number of roads have made a special department of this work and placed it in charge of a general passenger or press agent or excursion agent. The steam roads also, in not a few places, are beginning to get down from their tall steeds, and are glad to run excursions from surrounding towns in conjunction with electric lines on days of special attractions. There is an almost unlimited volume of business to be developed from out-of-town passengers, all of which is, of course, strictly created business. Managers who have resorts should lose no time in completing arrangements for securing the greatest amount of business possible. As one of the ramifications of the new business it may be mentioned that a strong combination has been formed in Chicago, of successful and experienced theatrical managers, who will operate a bureau and furnish all kinds of theatrical entertainments and artists exclusively for street railway resorts.

The National Electric Light Association still casts longing eyes on the American Street Railway Association, and that desire grows no smaller as one report after another comes from St. Louis of the magnificent convention which will occur in October. The Street Railway Association is much more exclusive in its membership, only railway companies being allowed to join, while the Light has opened its doors very wide in a frantic effort to let in almost anybody who had the price of initiation and one year's dues. True, the Railway was in debt once, but it was only because its treasurer neglected to collect the dues, and as soon as the deficiency was known the amount was raised in a few hours and money to spare. While the financial support of the Railway Association would be very acceptable to the depleted treasury of the Light Association, and the membership of railway managers would be no less strengthening to the power of the latter organization—so far as an amalgamation is concerned—it would be about as helpful and desirable to the Railway Association as would be the annexation of the Dutch Republic to the United States. The proper solution of the whole question simmers down to this: Let the few railway managers who also operate lighting plants join the Light Association and attend its meetings, which always occupy several days. Then the large majority of railway men who are but little or not at all interested in lighting need not have their time consumed at the railway meeting with such matters.

It is the superintendent of the small street railway property that has the really "hard row to hoe." His brother who manages the big city system may think that he has to practice economy and probably he does, but it is under no such necessity as exists on the small roads. The conditions which the managers of the majority of roads in small places have to face to-day are these, heavy capitalization and fixed charges, due either to the financial folly or dishonesty of the original builders of the road or to engineering mistakes, avoidable or unavoidable, that have had to be rectified; small receipts due to the fact that riding is not the necessity it is in larger places; and lastly the fact that it costs more proportionately to carry on a business on a small scale than it does on a large. The one thing in favor of the smaller road is that labor and many other expenses are less than in the large cities. It may be argued that the stock ought not to have been watered, that the engineering mistakes ought not to have been made, and that it was folly to build an electric road in such a small place anyway. Nevertheless that does not change the hard facts of the case. We are speaking now of a majority of the small roads, not of the minority, built by men who understood the business and the possibilities of the locations and which pay fair interest on the money actually invested. The facts that some small roads can be made to pay, that their operating expenses can be reduced to a very low point and that traffic can be induced, go to prove that the same thing can be done on other roads. There is a great field for managers who can take hold at the present day and pull these small properties "out of the mud." It has been done in many cases but there are plenty in need of a doctor. The mistakes in equipment and construction of some small roads (and large ones too) are something ridiculous, and nothing but the best management can straighten matters out. On one electric road we have in mind the one thing desirable above all else was to have small light cars which would not take much coal and which could make frequent trips at a minimum cost. The cars would never be filled. But no, the cars must be the finest and biggest that could be bought. It is operating to-day with horses. So we might go on through the list and enumerate the mistakes that have been made both in the way of improper equipment for the service and in the way of overestimating the possible profits but it is unnecessary to name them. Our readers know them too well already. We hope and

expect to see the day not far distant when by good management these properties will be put on a firm basis.

If there was no appeal to the higher courts, where fact and law are given due consideration, the prejudiced verdicts of irresponsible juries of the lower courts in corporation damage cases would soon drive many street railways out of business Of late there has been a startling increase in the wholesale awards of large damages for personal injury claims against railway companies. The situation grows worse every day. Damages are awarded in some cases without the slightest regard as to whether the railway is in any way to blame or not. As a matter of justice the damage occasioned by a wealthy corporation should receive no greater award than the same injury arising from being run over by a grocer's wagon or a peddler's cart. With the average jury it does not seem to be a question of making the punishment fit the crime, but rather basing the amount of the verdict on what the jury think the defendant can be made to give up. There is neither reason or justice in such decisions, especially when we know how large a percentage of the cases brought against street railways are based on absolute fraud, or a magnifying of minor injuries into major ones. The discouraging feature in these blackmailing schemes to bleed railways is that even when the companies are able to prove conclusively collusion and fraud on the part of the claimant, there is seldom ever any penalty imposed, and while the jury reluctantly relieve the company of liability, it seems prone to look upon the attempted fraud as a huge joke which simply failed. We believe that companies may blame themselves largely for allowing these frauds to escape when discovered and exposed, and simply being content to let the matter drop with a favorable verdict. It costs money to follow these cases up and secure conviction, for if it is done the companies must take the initiative and secure an enforcement of the law in such matters. The state and county officials seldom ever bother themselves, and it is to be conceded an unpleasant undertaking, attended with expense at best. But nevertheless, we believe it is only by making some prominent examples all along the line, and by a more or less concerted action, that the evil will ever be checked or suppressed. In most states the bringing of a damage suit for any amount desired, is attended with only a few dollars' expense, and in all the larger cities there are shyster lawyers who are only too glad to furnish the sinews of war, in the hope that even on a compromise of a few hundred dollars, they will make a good fee. Such people and their clients look upon the game as one in which they have nothing to lose, and anything they get out of it is clear gain. The question is one which might well engage a very thorough discussion at one of the executive sessions of the next annual national convention.

The Walker Manufacturing Company, Cleveland, announces a change in its corporate name to the Walker Company and requests correspondence to be so addressed.

STREET RAILWAY ASSOCIATION OF CALIFORNIA ORGANIZED.

The street railway men of California met and perfected a state organization at Maple Hall, Palace Hotel, San Francisco, April 21. Much of the credit of the promotion of the plan is due to S. B. McLenegan, superintendent of the San Francisco & San Mateo road, who voluntarily took on himself most of the labor connected therewith. The officers are, Col. C. F. Crocker, of San Francisco, president; S. B. McLenegan, of San Francisco, vice-president; J. E. Morris, of Oakland, secretary. The executive committee consists of the officers together with E. P. Vining, of San Francisco; F. W. Wood, of Los Angeles, and L. N. Wheeler, of Alameda. The papers read were as follows: "Ascending Grades by Electrical Force," by S. L. Foster, Market Street Railway, San Francisco; "Transfers," E. P. Vining, Market Street Railway; "Registration of Fares and Transfers," S. B. McLenegan, San Francisco & San Mateo Railway; "Long Distance Transmission of Electric Power," by T. A. W. Shock, Sacramento Electric Railway; "Fenders," by M. D. Stein, Market Street Railway. The following were present: Walter Tiffany, Piedmont & Mountain View Railway; F. P. Burke, San Jose & Santa Clara Railroad; E. P. Vandercook, East Oakland Street Railway; H. A. Green, Montery & Pacific Grove Street Railway; C. F. Crocker, E. P. Vining, M. D. Stein, A. W. Barron, G. H. Fairchild, H. A. Iddings, J. C. Skinner, S. L. Foster and C. J. Kaighin, of the Market Street Railway, San Francisco; T. A. W. Shock, Sacramento Electric Light & Power Company; E. M. Van Frank, Sutro Railway, San Francisco; S. B. McLenegan and G. A. Loring, San Francisco & San Mateo Railway; G. Gustafson, Oakland, San Leandro & Haywards Electric Railway. It was announced that the San Diego Electric Railway, the Los Angeles Railway and the Alameda, Oakland & Piedmont Electric Railway would become members, although not represented at the meeting. The association promises to be one of the best of the state organizations.

TWO-STORY ELEVATED ROAD AND BICYCLE PATH.

The plans for a double-decked elevated road with bicycle paths upon each side, which Lawson N. Fuller proposes to erect in New York city, have been laid before Mayor Strong and are under consideration by him. The plans are those suggested by the Taxpayers Alliance of the Twenty-third and Twenty-fourth wards and contemplate the assumption by the taxpayers of all damages. They are not those of the Manhattan Elevated Railway Company, which will probably also be presented to the mayor by Messrs Gould and Sage, though Mr. Fuller is quoted as saying that they are willing to go ahead provided the question of damage exemption is satisfactorily settled.

THE MILWAUKEE STRIKE.

The conductors and motormen of the Milwaukee Street Railway went out on a strike at 4 a. m., on Monday morning, May 4; the next morning most of the power house men went out also. The strike was as ill-timed and senseless as any in the history of street railways, and was entirely due to the operations of professional labor agitators of the Amalgamated Association, which announced a similar strike to occur at the same time in Philadelphia, Buffalo and other places. The agitators were in Milwaukee and succeeded in getting a strike on there, but at the other places the scheme fell flat. The only point really at issue was the demand to raise wages from 19 to 20 cents an hour. Every street railway manager who knows anything of the Milwaukee situation, knows the inability of the road to pay more than it has been doing. At the time the road was built, like many others, the materials, construction and equipment used, were considered good; but experience has shown they were too light or inadequate, and later improvements and invention and the natural wear, have made necessary an enormous amount of reconstruction which has absorbed a large amount of money. Other managers have always felt that the company was giving a much better service than the patronage and size of the city warranted, and has continued to do so up to the present moment. While this is a good thing for Milwaukee, and furnished employment to a large number of men which would not have been needed with decreased service, it has been a heavy burden on the company. In June '95, the road went into receivers' hands through failure to meet interest charges, and on January 29, '96 was taken out through reorganization. Mr. Payne stated the situation fully when he said that the company did not expect to realize more than the operating expenses and its fixed charges. It was well known that the creditors of the road had not received a cent of interest in three years, that its indebtedness had been compromised and that its present capitalization would not pay for the construction and equipment of the road. At the present rate of fare, the company wanted to furnish first-class service, improve its cars, continue the transfer system and pay wages to its employes as high as or higher than in other cities where the cost of living was not much greater than in Milwaukee and the cost of power not much less.

No two men in all the American Street Railway Association are better known, or stand higher in the fraternity, for high ideas of honor, fairness and kind-heartedness, than President Henry C. Payne and General Manager C. Densmore Wyman; hence the weak attempt of Agitator Mahon to make it appear the men had a "grievance" was an absolute failure, and found nothing to stand upon; and it is anything but creditable to the strikers that they have been lead away by this man Mahon, who is trying to glorify himself and make a show of earning his salary by stirring up strife. As a matter of fact not one in ten of the strikers can at present earn 19 cents an hour at anything else. Mr. Wyman has been unusually thoughtful in so arranging the hours and runs and relief crews as to make the work as uniform as possible, and allow sufficient time at meal hours for the men to rest and eat.

BLOCKADED TRACK—FIFTH TIME IN ONE DAY.

On May 1, 1893, wages were raised from 18 to 19 cents, and the 19-cent rate has been maintained all through the hard times. The following table of wages in other cities shows the Milwaukee men are well paid, receiving more that the men in all except three cities—Chicago, Brooklyn and Detroit:

Providence, R. I.—$2 per day; day's run, eleven to eleven and a half hours.

Rochester, N. Y.—14 cents first three months; 16 cents next nine months; 18 cents thereafter.

Toledo, O.—15 cents first three months; 16 cents next three months; afterwards 17 cents.

Cincinnati, O.—16⅔ cents; day's run, twelve hours.

Denver, Col.—17½ cents to 20 cents; day's run, eleven and a half hours.

Columbus, O.—15 5-12 cents first three months; 15 5-6 cents next nine months; 16⅔ cents after one year.

New Orleans, La.—14 cents.

Toronto, Can.—16⅔ cents; extras, 15 cents.

Detroit, Mich.—19 cents for first ten months; 21 cents thereafter.

Atlanta, Ga.—12 cents; day's run, twelve hours.

Pittsburg, Pa.—16⅔ cents.

Springfield, O.—12 cents.

Indianapolis, Ind.—14 cents first three months; 15 cents six months; 19 cents thereafter.

DERAILED TRAILER IN FRONT OF PFISTER BUILDING.

Minneapolis, Minn.—16 cents, except interurban and cable lines in St. Paul; 17 cents interurban and cable lines in St. Paul.

Montreal, Can.—14 2-7 cents.

Buffalo, N. Y.—15 cents the first three months; 16 cents next nine months; 18 cents after one year's service.

Ft. Wayne, Ind.—14 cents first six months; 15 cents second six months; 16 cents after one year; 17 cents after two years; 18 cents after three years.

Troy, N. Y.—17 cents.

Baltimore, Md.—15 cents.

Memphis, Tenn.—14 cents.

Jersey City, N. J.—$1.75 per day first six months; $1.85 per day second six months; $2 per day after one year; day's work, twelve hours with thirty minutes for dinner.

Washington, D. C.—$2 per day; day's work, eleven hours.

Kansas City, Mo.—Electric men 15 cents; cable men 17 cents.

New Haven, Conn.—19 cents.

Brooklyn, N. Y.—20 cents.

New York City.—$2 per day; ten hours platform work in twelve.

Philadelphia, Pa.—16⅔ cents; day's run, eleven hours and thirty minutes.

Chicago, Ill.—Electric service, 21 cents.

St. Louis, Mo.—$2 day; nine and three-fourths to ten and a half hours; day's run, twelve hours.

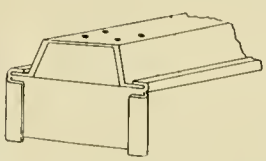
The leaders, when they found the company would not yield, and new men were hired to take the places so foolishly thrown up by the strikers, tried to force arbitration, although it is hard to see anything to arbitrate. Certainly no arbitrators would make up the extra cent an hour, out of their own pockets, and the company absolutely cannot afford to do so.

With the exception of some blockading of tracks, and the derailing of cars, there was no serious violence. Our illustrations show a wagon of bricks, with one wheel removed so as to block both tracks; and a trailer derailed in front of the Pfister building.

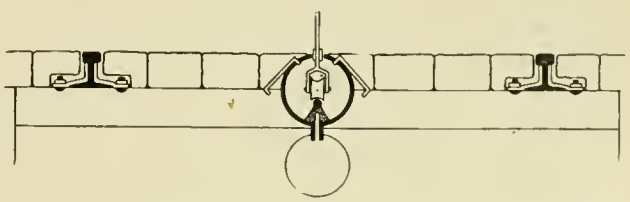
The strike has proved a flat failure, and the company has nearly its entire car service in operation as we go to press (13th).

SANDERS' METALLIC TIE AND UNDERGROUND CONDUIT.

The accompanying illustrations represent a new form of metallic tie and conduit for underground conductors, of which A. M. Sanders, of Reedsburg, Wis., is the inventor and patentee. As shown, the tie consists of two parts, a base plate having its ends turned down to serve as anchors and its side edges folded over to form grooves into which flanges on the upper part slide. The upper part of the tie is in the form of an inverted trough with inclined sides and a flat upper surface upon which the rails rest. Both parts are of steel, the base plate and the upper side of the the tie being ¼ inch and the inclined sides ⅜ inch in thickness.



The conduit is tubular in form with the necessary slot in the upper side. The conductor is mounted upon insulating supports in the bottom of the conduit and the connection with the car is insulated from the edges of the slot by means of glass plates secured to the trolley arm. The conduit is supported in a curved recess formed in the tie and strengthened by braces upon each side whose lower ends are secured to the face of the tie. The rails are secured to the tie by angle plates having



extending base flanges which are bolted through the upper face of the tie. The inventor states that it is the intention in street railway work to substitute for every other tie a short section of 14 or 16 inches in length of the same construction.

The employes of the road at Adrian, Mich., struck April 23, not for higher wages, but just for wages.

THE POWER HOUSE

This department is devoted to the construction and operation of electric railway power houses. Correspondence from practical men is specially invited. Both the users and makers of power house appliances, are expected to give their views and experiences on subjects within the range of the department.

Another street railway plant using water coolers for securing condensing water, not being near a sufficient natural water supply, is the San Francisco and San Mateo Electric Railway at San Francisco. The engine is a 400-horse-power, triple expansion condensing corliss. The water is raised about 15 feet from the overflow of the condenser and is sprayed by a horizontal plate, fixed over the outlet. It then falls to a wooden platform and from there into a pool 50 by 20 feet. The water is cooled about 40 degrees.

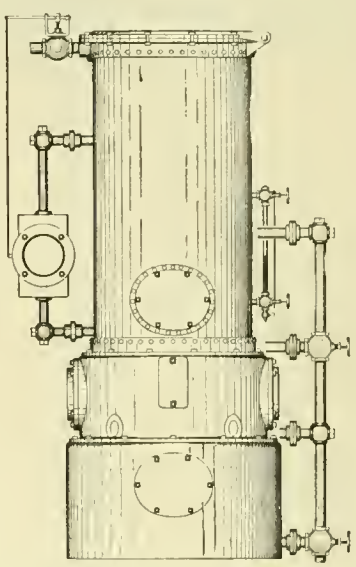
* * *

The little road now building at Lancaster, O., and of which W. F. Kelly, superintendent of the Columbus Street Railway has charge, is to employ a gas engine in its power station. As this will be the first electric road in the United States to have a permanent gas engine power station, no little interest and importance attaches to it. The smallness of the road and the fact that Lancaster is in the midst of the finest natural gas belt in the state were the reasons which governed the selection of this prime mover. Natural gas costs only 10 cents per thousand cubic feet at Lancaster. It is expected that the gas engine station will make a good showing in economy over a steam plant for doing the same work, not so much on account of fuel as because of the fact that the labor and incidental expenses of the small gas engine plant will be very low. The engine is to be one of a type used with success in England and now for the first time being made in this country. It is to be put in under the most rigid guarantees by its manufacturers as to close regulation, economy and general performance. While there is, no doubt, very much to be learned about the proper construction of gas engines for street railway power stations there does not seem to be much doubt about the success of this plant, in view of the extensive applications of the gas engine to large work in Europe. The strong hold of the gas engine is its saving in power station labor. Although from a purely scientific standpoint it leaves the steam engine far behind in the race for fuel economy, it by no means makes so good a showing in actual commercial economy expressed in dollars and cents. The reason for this is that the figures of low gas engine fuel consumption are from engines using producer or water gas requiring hard coal or coke. Everyone knows the prices of hard coal and coke as compared with soft coal, and much of the apparent economy disappears when prices are reduced to a common basis. Bituminous coal is available for making gas only by being first made into coke or by the manufacture of the old fashioned coal gas, which latter is, we are informed, not as well suited to gas engine work as water or producer gas. The hope of the gas engine lies as said before, in saving of labor. Probably in some cases the use of gas engines and gasoline will be economy. In other places, as at Lancaster, natural gas is very cheap. There are numerous special places where gas engines will get a foothold and the results obtained will determine how far they will displace steam.

* * *

The Cookson Combination Heater.

The value of an efficient feed water heater and purifier for power plants and heating systems, is too well understood to require any argument. The compact and comprehensive device herewith illustrated, seems to combine the features most desirable in apparatus of this class. It is manufactured by the Bates Machine Company, of Joliet, Ill., under the patents of Thomas J. Cookson. The steam in entering the heater first strikes a baffle-plate by which its force is broken, and the oil and water of condensation removed. It then passes into a chamber into which the water is introduced in the form of a spray, by which means the two are thoroughly mingled and the water heated. The steam thence descends through pipes with which the water is closely in contact, and is exhausted at a



COOKSON FEED WATER HEATER.

point opposite its entrance. A partition extends from the upper chamber to a point below the water level, and seals the passage to the steam. The water descends through a filtering chamber filled with excelsior, or similar material. The water thus becomes heated to a high temperature by its thorough mingling with the steam, and its constant contact with pipes and passages, around or through which the steam must pass to the exhaust, while the steam is purified before coming in contact with the water, and the water is further purified by filtration. The heater is made in two styles, A and B, the only difference in style B being that the filtration chamber is converted into a condensation receiver, in which a low water level is maintained.

The splendid record of the Bates engines for years is a sufficient guarantee as to the ability of these heaters to do all the manufacturers claim.

EXHIBIT SPACE AT ST. LOUIS CONVENTION.

Plenty of Room—Arrangement for Space now Complete—Secure Reservations at Once.

The fifteenth annual convention of the American Street Railway Association will convene in St. Louis, October 20, and continue four days. The following bulletin has been issued by Secretary T. C. Pennington:

The building, which is the one erected by the Republican National Convention is 260 x 180 feet. About 80 feet of the length of the building will be partitioned off for the sessions of the convention, leaving 180 feet square for exhibits, and all entrance to and from the convention hall, will be through the exhibition hall. There will be no choice of space, every place on the floor being equally desirable. Exhibits of like character will be grouped together, and space will be assigned in the order of application. Wires carrying currents will be brought into the building from the street railway circuit, the voltage being 550, so that all mechanical devices may be operated. The income from sale of space will go to the American Street Railway Association: the executive committee of the association has fixed the price at ten cents per square foot, and ruled that no space of less than 100 square feet will be assigned, but applicants may have as many multiples of this quantity as they may wish, all in one body. Payment for space should be made to T. C. Pennington, secretary and treasurer of the American Street Railway Association, 2020 State street, Chicago, Illinois, on or before October 1st, 1896. Application for space should be made to George W. Baumhoff, chairman committee on exhibits, Park and Vandeventer avenues, St. Louis, Mo. We hope to have you with us, with an extensive display. We are encouraged to believe, from information already received, that this will be the most extensive exhibit of street railway supplies ever assembled at one time and place. Come and see our beautiful city, and enjoy our hospitality.

"Space must be applied for by August 15th. Assignments will be made as promptly as possible after that date, and exhibitors notified of their location.

"It is earnestly requested that all exhibits shall be in place and all work finished by Monday evening, October 19th, which is the evening prior to the opening of the convention. Possession of the hall can be had on Friday, October 16th, thus giving ample time for preparation. Watchmen will be in charge of the premises, so that exhibits will be safe."

TRIPLE SECTION TROLLEY WIRE.

Something new in the way of trolley wire for high speed roads or those with unusually heavy cars is being manufactured by the Washburn & Moen Manufacturing Company. It is called the triple section and its form is apparent from the accompanying engraving. The greatest difficulty found with the special forms of trolley wire heretofore used is that it is difficult to get the kinks out when unreeled. The triple section can be kept smooth and straight when reeled and unreeled as easily as common round wire, as it is symmetrical in cross section about its axis, and when reeled rests with one of its grooves resting on one of the ribs of the convolution next below. There are consequently no lateral waves or kinks. The triple section also gives a long line of contact with the trolley wheel, amounting to as much as one inch when the wheel is cast or has become worn to fit the wire. We trust our readers are already sufficiently acquainted with the advantages of the heavier forms of wire in the way of increased conductivity and absence of clips on the contact portion of the wire, so that we do not need to enlarge on those general features.

THE ELECTRICAL EXPOSITION AT NEW YORK.

The Electrical Exposition at New York, the most extensive exhibit of electrical apparatus and its historical development ever brought before the public, was opened Monday, May 4, by Governor Levi P. Morton, who used in signaling the opening the same gold key as employed by President Cleveland in opening the World's Fair. The exposition is held under the auspices of the National Electric Light Association, and the annual convention of that body was held May 5, 6 and 7. Besides the exhibit of modern commercial apparatus the loan exhibit of historical apparatus is very complete, owing mainly to the efforts of T. C. Martin. A matter arousing much popular interest is the transmission of a small amount of power from Niagara over telegraph lines, and with telephone connections which enable visitors to hear Niagara's roar.

EXHIBIT NOTES.

The Weston Electrical Instrument Company, of New York, has a good space well filled with its specialties.

H. L. Shippy, manager of the New York office of the John A. Roebling's Sons' Company, has a fine display of its wire and electrical specialties, which are very handsomely arranged and attract much

attention. In connection with this exhibit William M. Miner has charge of the display of bi-metallic wire, which is also attracting much attention.

The Cutter Electrical & Manufacturing Company, of Philadelphia, has an interesting exhibit in charge of S. L. Nicholson, its electrical engineer.

Eugene Munsell & Company, and the Mica Insulator Company, have a fine display of their specialties, well arranged, and in a good location.

R. K. Dana is in charge of the large exhibit displayed by the Washburn & Moen Manufacturing Company, including a large variety of wires for all electrical purposes.

The Okonite Company of New York, has an extended line of its feeder wires arranged in a very tasteful manner, and a crowd of visitors can be seen around its booth at all times.

The Phoenix Carbon Company, of St. Louis, shows its well-known street railway carbons, as well as specialties in lighting goods. The company is represented by General Manager Booker.

The Columbia Incandescent Lamp Company, St. Louis, manufacturer of incandescent lamps for all systems, has a nice exhibit which is being taken care of by President J. H. Rhotehamel.

One of the favorite stopping places for visitors is at the exhibit of the Standard Paint Company, of New York, which has a large line of its paints and compounds in charge of its general sales agent, Frank DeRonde.

The Bradford Belting Company, Cincinnati, sole manufacturer of the Monarch insulating paint, has a large and very fine exhibit which is in charge of General Manager O. M. Hubbard and Elmer P. Morris. These gentlemen have already taken orders for a large quantity of their goods.

The R. D. Nuttall Company, Allegheny, Pa., has a complete line of its specialties, gears, pinions and trolleys, and has the only exclusive street railway supply manufacturers' exhibit. It is attracting much attention, and is a very creditable display.

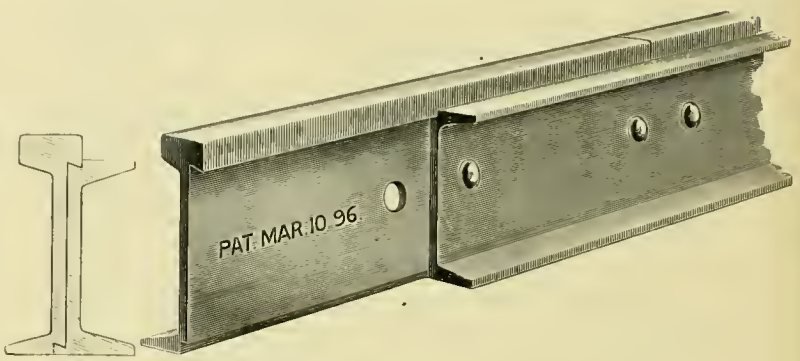
A STEAM MERRY-GO-ROUND.

The popularity of the merry-go-round or carousel at summer resorts has become so great as to lead to many improvements in designs and modes of operation. Messrs. Norman & Evans, Lockport, N. Y., have designed what should prove a very satisfactory form for both proprietors and patrons. It is propelled from an upright engine mounted upon trucks by a cable passing around the outer edge of the machine. This is completely under the control of the engineer and out of the way of the riders. The machine can be taken apart and transported in any ordinary box car. It is forty feet in diameter, and has a seating capacity of fifty-six people variously arranged upon galloping horses, carriages and chariots. The horses are finished in a life-like manner, with comfortable saddles, and the four-seated conveyances have landscape-painted panels. Music is furnished by an organ, which appears to be operated by a colored youth. The whole is covered with a fifty-foot tent.

The firm indicates the profitable nature of investments in these machines by figures showing receipts at various times and places, the amount in some instances running upward of $300 per day, and it is a natural inference that improved methods of operation should increase the popularity of the amusement. The apparatus runs on a steel track, and is equipped with modern safety appliances. Street railways would, of course, use a motor with power from the trolley current.

A NEW FORM OF COMPOUND RAIL.

The compound rail herewith illustrated is designed to obviate the breaking down of joints and give a continously smooth bearing surface for the wheel tread. The design is the invention of R. L. Caldwell, of 42 Lindus street, Cleveland, O., and the construction is clearly shown in the illustration. The part carrying the head of the rail rests upon and is partially supported by



CALDWELL'S RAIL.

the other section which is substantially a channel having a semi-dove-tail fit with the base of the head, while at base of the rail the tread section rests upon a projecting lip of the girder section making a similar kind of joint. The two parts are fastened together by rivets passing through the web of each section. It is claimed that this construction will reduce the cost of maintenance since the wear comes entirely upon one section and this is the only part to be removed in making repairs. The sections are laid so as to break joints and the solidity of the supporting section assures a solid joint without the use of splice-bars. The manner of interlocking makes the rail practically continuous and it is said that the rivets will allow for expansion and contraction without danger of breakage or buckling.

W. H. Weiss, president of the San Antonio, Tex., Street Railway, wishes to correspond with parties having electric or naphtha launches for sale. State price, operation and full particulars.

The conductor on one of the south side cars has our sincere commiseration. A few mornings since he was employing the time between stations in counting up his own private stock of personal cash. Just as the count was completed it was necessary to throw open the car door and call the street. That "out of the fullness of the heart the mouth speaketh" was exemplified in his case by a stentorian shout of "A dollar 'n a half!" A more sheepish looking man never called "Thirty-third street" than he a moment later.

Cost of Motor Maintenance

PART 1.

There are some questions in regard to motor maintenance which can only be settled in one of two ways: by months of experiment, or by an exchange of information as to the results obtained on various roads. To serve our readers we have taken up the task of collecting information with the idea of settling various questions as to the most economical methods of maintaining motor equipments. The questions we have asked the various roads have in view the solution of the following problems: (1) Are roads spending too much or too little on inspection to save repairs? (2) What is the reasonable life of various parts of an equipment? (3) What methods of motor care give the best results for the least money?

The first of these, is perhaps, of the most vital interest to all roads at the present time. While the "stitch in time saves nine" policy is undoubtedly the true one in taking care of any kind of machinery there is such a thing as carrying it too far and it is quite possible to spend an unnecessary sum every month on taking apart and looking over motors when they do not need it. There are managers who are making mistakes in both directions. We have reports from a large number of roads. A synopsis will be given of each in this series of articles and the results finally tabulated at the end.

(1) THE CLEVELAND & ELYRIA ELECTRIC RAILROAD

operates 6 double equipments of Westinghouse 50-horse-power motors on Dorner & Dutton trucks. All the cars are housed at one barn. Motors and trucks are taken care of by 5 men. Two of these are on night inspection and the other three which work day time consist of 1 electrician, 1 assistant electrician and 1 blacksmith. The pay roll of these five men is $300 per month or about $50 per car per month. The average monthly mileage of motor cars is 6,000 as it is a high speed interurban line. This makes the labor amount to about $.0083 per car mile. The equipment is new. The motors are thoroughly looked over every night. Each man is responsible for certain cars.

(2) THE SPINGFIELD (MASS.) STREET RAILWAY

operates 71 motor cars, all with double equipments. All are single reduction motors though of a great diversity of makes. They are kept at 3 car houses. Motors and trucks are taken care of by 22 men. Of these 4 are engaged in day inspection at the car houses and 7 in night inspection. The remaining 11 are in the shops, 3 being armature winders, 2 blacksmiths, 1 a machinist and 5 on general repairs. The monthly pay roll for these 22 men is $1,200 a month or about $16 per car per month. The cars average 3,000 miles each a month so that this labor amounts to about $.0056 per car mile. The total cost of motor and truck maintenance per car mile including materials is $.0077. Motors are inspected once every day, every available part being looked over thoroughly. This work is divided among the men by cars. Once a year cars are taken off the trucks and every part of motors and trucks thoroughly overhauled. The average life of axle bearings is two years for both brass and babbitt. Armature bearings of brass or babbitt last six months or 18,000 miles. Armatures average a life of 2½ years before rewinding. Steel gears last 1 year, and pinions 6 or 7 months. New armatures run about a year and a half before trouble from breaking of wires begins.

(3) THE NASHVILLE STREET RAILWAY

operates 49 cars, all equipped with 2 G. E. 800 motors and type K controllers. They are kept in 2 houses and taken care of by 12 men. In the repair shops there is 1 machinist, 1 helper, 1 armature winder, 1 helper and 1 blacksmith, or 5 men. There are also 2 men on day repair in the car shed and 1 foreman and 3 inspectors on night work. An inspector is kept on the road also. The work is apportioned among the men by parts of equipment. The foreman looks after controllers and trolleys. The inspectors examine and oil motors, renew brushes, and make necessary repairs. The report says: "Motors are thoroughly cleaned and inspected every night, the same as locomotives in a round house, and cars put in condition to run one day without further attention except that we have one road inspector that examines cars on the road. He gets over all the cars once every two days and sends them to the shops when necessary. This is a good thing to make the night men do their duty." Motors are only repaired and overhauled when necessary. They average 3,000 miles per month. Axle bearings are of brass and babbitt and last about 18 months. Armature bearings are of babbit and last from 6 to 12 months. They judge the average life of their armatures to be 18 months. Cast steel gears wear from 12 to 18 months. Steel pressed pinions last 9 to 12 months. No trouble has been experienced with broken armature wires.

(4) THE OGDEN CITY STREET RAILWAY

has 8 cars with Edison single reduction motors and 4 with Westinghouse double reduction motors. The regular schedule calls for 8 cars so that there are 4 extras. They are taken care of by 6 men, of which 1 works on night inspection and the other 5 on day shop work. The shop force consists of 1 armature winder, 1 blacksmith and 3 repairers. The pay roll of these men is $325 per month or about $40 per car in regular service. The mileage of regular cars averages 3,843 per month, so that the inspection and repair labor is in the neighbor-

hood of $.0105 per car mile. Motors are inspected daily and overhauled only when necessary. Some motors have run 12 months without overhauling. Babbit metal is used on the axle bearings and last 6 months. Armature bearings are of magnolia metal and last 6 to 8 months. Gears last 1 year and rawhide pinions 6 months.

(5) THE MONTGOMERY (ALA.) STREET RAILWAY

runs daily 11 double equipments of G. E. 800 motors and K controllers and has 3 extra equipments. Nine are kept at one house and 2 at the repair shops. Three men are employed to keep up motors and trucks, 2 in the shops and one on the road. The pay roll of these men is $127.50 per month or about $11 per car. The average monthly mileage of each motor car is 4,900 so that the labor amounts to $.0023 per car mile for cars in service. Motors are looked over daily as to commutators and bolts. Once a month they are taken apart and coated with armalac and controller contacts fitted and lubricated with vaseline. Axle bearings are of babbit and last 4 months. Armature bearings are babbit and last 3 months. As to life of armatures all the company can say is that it has run its G. E. 800 equipment two years and has had no trouble except by accident. Cast iron gears last 120 days; hot pressed steel pinions 150 days.

(6) THE MADISON (WIS.) CITY RAILWAY

operates 9 motor cars during the summer months and 8 during winter. They each have 2 W. P. 30 motors with various types of controllers. Three men do all the maintenance and repair work on trucks and motors. Two of these are on day duty and one on night. The night man inspects all the cars on the street between 7 and 9 p. m. and again after they have been turned in at the car house. The pay roll is $114.75 a month or about $12 per car. The mileage of the cars is about 3,300 a month. On this basis the cost of labor is about $.0048 per car mile. Motors are inspected every day to ascertain whether commutator is arcing or armature is heating. The electrical equipment of a car is overhauled once a month. Axle bearings last about 20 months and are of the composition used by the General Electric Company. Armature bearings last 14 to 18 months. The company has had its W. P. 30 armatures in use since October 1, 1892 without having rewound one so that no estimate can be made of their average life. Gears and pinions last 10 to 12 months.

(7) THE SALT LAKE CITY RAILROAD

has in operation 27 double motor cars of which 7 are Westinghouse single reduction, 2 Westinghouse double reduction, 3 S. R. G Thomson-Houston, and 15 Sprague No. 6. There are also other extra and summer equipments which it is unnecessary to mention. There are 13 men engaged in maintenance of motors and trucks, of which three are on night inspection. The ten day men are: 1 winder, 1 connector and repair man, 1 man looking after controllers and brush holders, 2 men in the pits attending to electric troubles, 1 man on brakes, 1 machinist, 2 machinist's apprentices, 1 blacksmith and 1 blacksmith's helper. The monthly pay roll, including master mechanic and electrician, is $1,000. This amounts to $37 per car per month. The monthly mileage of each car is about 3,700, so that the cost per car mile of maintenance labor is about $.01. The work of the three night men is divided by putting one on oiling trolleys and helping the other two men who are on general inspection and repairs. They aim to have each car inspected every other night. Bearings are examined, the condition of commutators looked into, bolts tightened and controllers examined. To help in discovering defects, each motorman has to report on a book kept in the motormen's room, any repairs necessary on his car, which book is looked over by the night man. Motors are not overhauled at any regular time and when they are the extent of the overhauling depends on the condition of the motors. Babbitt metal is used in axle bearings and its life is about 6 months. Armature bearings which are also of babbitt last 3 to 6 months. Some armatures have been running ever since the road started six years ago and some have given out almost immediately. The actual average life is not known. New armatures generally run about one year before trouble from breaking of wires begins. It is intended to improve on present methods by keeping a closer watch of small things.

(8) THE MERIDEN, (CONN.,) ELECTRIC RAILROAD

operates daily 13 double G E. 800 motor equipments with K controllers. They are kept in two houses and taken care of by 6 men. Of these 2 are on night inspection. The other 4 which are on day work consist of 1 armature winder, 1 blacksmith, 1 machinist and 1 general helper. The pay roll of these men is $325 per month or $25 per car. Each car averages 3,692 miles a month so that the cost per car mile is $.0067. Motors are looked over every night and overhauled every four months. In the overhauling process motors are taken entirely apart, bearings looked after and fields and armatures gone over with insulating paint. Brass axle bearings are employed and last about 8 months. Armature bearings are babbitt and last 3 months. The company's experience is that new armatures generally need some kind of repairing after one year of use. Gears last 6 months and pinions about the same.

(9) THE BUTTE CONSOLIDATED RAILWAY

operates daily 7 equipments of Sprague No. 6 motors, of which 6 are double and 1 single. Three men take all the care of them. A machinist and general repair man help each other during the day and one man cleans motors and cars at night. The pay roll is about $300 per month or about $43 per car. The mileage of each motor car is 3,180 per month, making the cost of repair and inspection labor $.013 per car mile.

(10) A SMALL ROAD

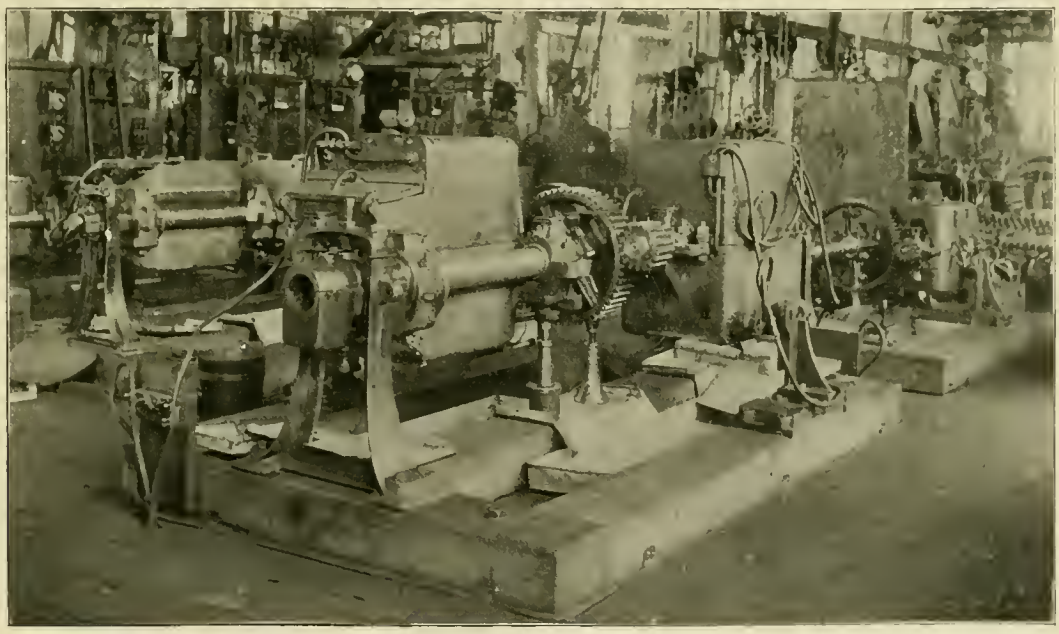
operating 3 cars with double G. E. 800 equipments has its motors taken care of by one man working about

half time with occasionally a helper and a night man who puts in a part of his time looking after motors, but most of it cleaning cars, so that an equivalent of one man's full time is put on trucks and motors. The labor amounts to $60 a month or $20 a car. Cars make 2,400 miles a month bringing the cost of maintenance labor to $.0083. A cursory inspection is given every night. The day repair man puts in part of his time as motorman and runs each car himself once every two days so he is familiar with the working condition of each equipment. Every two months motors are taken apart and worn parts renewed as necessary.

(To be continued.)

TESTING MOTORS AT SCHENECTADY.

The accompanying engraving shows some G. E. 2,000 motors undergoing the regular shop test in the General Electric Company's factory at Schenectady. They are tested two at a time, one running as a motor and supplying power to drive the other as a dynamo. The dynamo in turn gives its energy back to the mains, so that the only power taken is that required by the internal losses in the machines. The fields of the motor which is being driven as a dynamo, must of course be separately excited, as it must have a counter electro motive force strong enough to overcome that of the mains.



TESTING MOTORS AT SCHENECTADY.

Furthermore, by varying the field strength the load on the two machines is varied The method has very great advantages, especially where the machines tested are large, because it takes only about 20 per cent of the power that would otherwise be required. For example, to test a 200-horse-power motor by other methods would take the full 200-horse-power. By coupling two machines together, and driving one as a dynamo, 200-horse-power is taken from the line, but about 160 is returned to it by the dynamo. Furthermore the labor of mounting for a test is very small, as there is no belting or shafting.

SAN FRANCISCO AND SAN MATEO ROAD SOLD.

The San Francisco & San Mateo Electric Railroad was sold last month to John A. Buck and Nicholas Ohlandt, of the firm of Ohlandt & Co., for $300,000, the purchasers admitting that they secured the property at a comparatively moderate figure. This ill-starred road, inaugurated a few years ago, cost $925,000 to build and equip and nearly ruined its promoters. Behrend Joost declares he lost nearly $425,000 of his own money in the enterprise. The road was sold under a decree of the court. There are bondholders to the amount of $1,100,000; but before these can receive a dividend, there are $150,000 worth of preferred claims to be settled, as well as the attorneys' and receiver's fees, which may amount to $25,000 more. So there will be not more than $125,000 to divide among the bondholders, or less than eleven and one-half cents on the dollar.

As both Mr. Buck and Mr. Ohlandt are associated in business with the Spreckles, the impression was gained that they were the real purchasers of the road, but this report was positively denied by the new owners. As there is an unsettled legal question as to the right of the old bondholders to redeem the property, no improvements will be made in the road until the court has definitely passed upon it. When, however, the sale is fully ratified the line will be improved in many ways.

A REGAL RESORT.

Sutro Railway,
Sutro Gardens,
Sutro Baths.

But a meagre idea can be gained from a description of the extent and beauty of that most wonderful of street railway pleasure resorts, situated at the outer terminal of the Sutro Railroad, San Francisco, and comprising the Sutro Baths, Sutro Heights, and the new Cliff House. It must be seen before its greatness can be appreciated. Hardly a man or woman of letters, from any country, and there have been many, who have visited California, but have been inspired by its exquisite surroundings. But vast and magnificent as is this retreat, it is more wonderful because it represents the dreams and realizations of one man—Adolph Sutro, who struck, as with the wand of a magician, the forbidding rocks, and fractious sands and made them yield their beauties.

Adolph Sutro, the present mayor of San Francisco, is a man of tremendous achievements. In the early seventies in the face of intense opposition and prophesied failure he planned and built the Sutro tunnel on the Comstock lode in Nevada. With this success came fame and fortune, and Mayor Sutro settling in San Francisco, bought what was then considered the worthless sand hills: these hills are now covered with costly mansions.

For his home he selected the promontory rising several hundred feet above the Cliff House. Today it is "The Heights," a garden of recreation for the people of California, or those who seek its clime for health or pleasure.

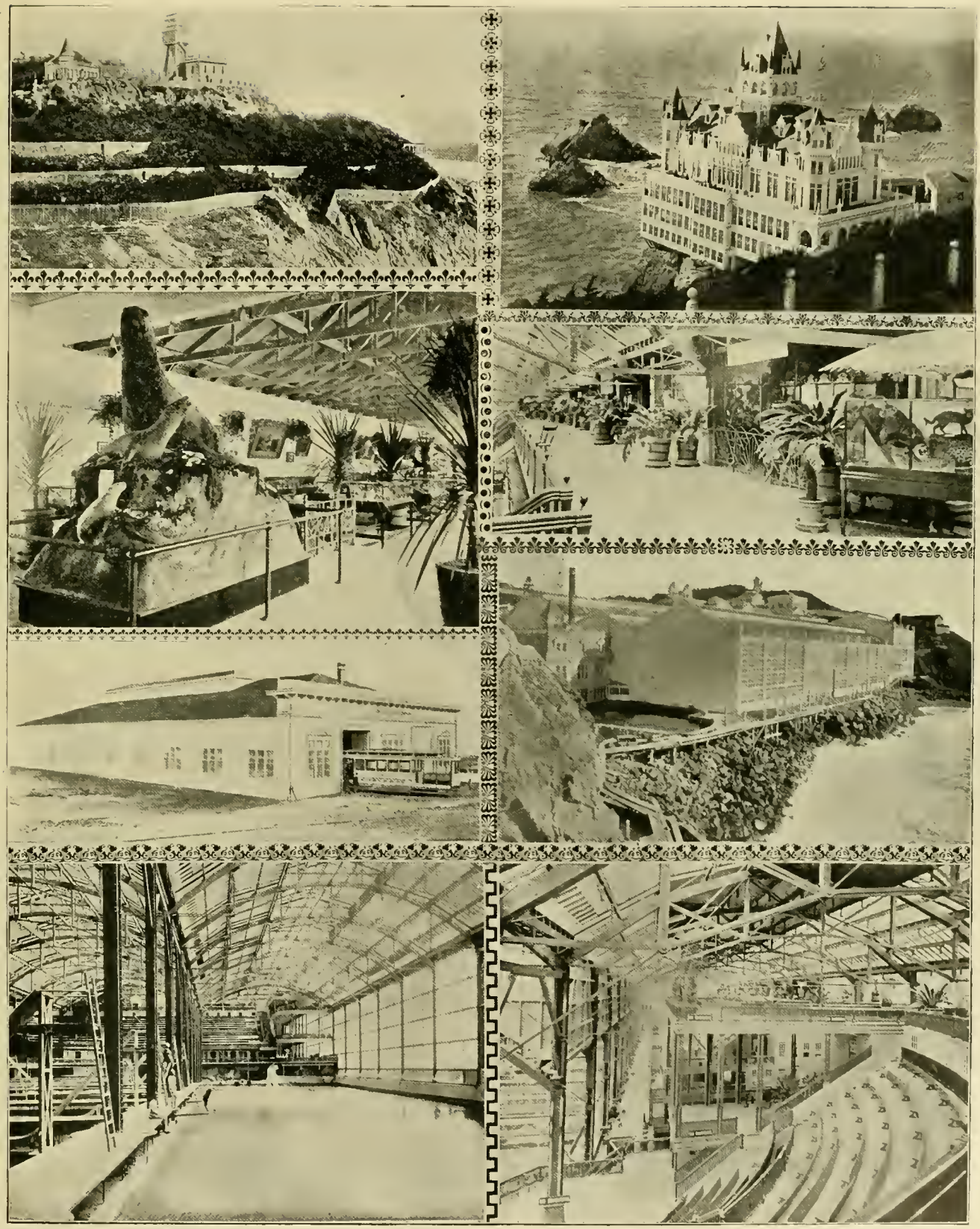
While the scheme of the pleasure resort stretches back over a number of years, many of its features are comparatively new. In January of this year the Sutro Railroad, an electric line to the Cliff House and baths, was opened, while the new Cliff House was built during the summer of '95, the old house, an historical building, having been destroyed by fire December 25, 1894. The new structure is modeled after a French chateau of the seventeenth century. It sits out on the lap of the rock, its isolated position appears from the beach to add to its size and beauty. The building consists of four stories and an attic, while from the Point Lobos road there are only two stories and the attic. The lower floor is given up to the manufacturing of curios and shell polishing, sleeping rooms for the attendants and the electric plant necessary for supplying the house with light and power. The second floor contains twenty dining rooms, also shell and curio rooms. The main parlor, dining-room, principal kitchen and bar are all on the third floor, and by means of folding doors they can be diminished or enlarged at pleasure. The fourth floor and attic are fitted up with ladies' parlors, private and public, billiard room and bars, and contain the largest camera obscura west of Chicago. A great veranda sixteen feet wide surrounds each floor, where the pleasure seekers can enjoy the sea air and watch the seals.

The bath building is situated somewhat west of the Cliff House. It stands on a cape of rocks extending into the sea about 300 feet, and against which the waves beat. A basin hewn out of the solid rock catches the crest of the waves which are dashed against the rocks with terrific force, and the baths are supplied with water in this manner. That it is adequate is proved by the fact that as much as 200,000 cubic yards of water, it is estimated, are thrown into the basin by some waves. As a general thing this water is clear, but in time there is an accumulation of sand which has to be disposed of. This is done by means of a tunnel and about 150 feet of masonry canal, which conveys the water into a settling reservoir, where at low tide the sand is drawn off from the bottom through sluice gates placed therein. The catch basin is twelve feet at high tide, which is ample to supply the baths and allow the latter to be drained by gravity at low tide. There was, however, a problem to be met with the emptying of the bath tanks; it was to prevent the return of the once-used water. The refuse water is piped hundreds of feet to the other side of the headlands, hence passes into the tidal current away from the baths.

The bath building is entered from Point Lobos avenue. It is a small classic temple and it resembles the Puck building at the World's Fair. A broad stairway meets the gaze of the visitor as he enters, on both sides of which is a profusion of shrubs and flowers. By these stairs the museum gallery is reached, and from there the visitor can reach the baths either by staircase or elevator. Tiers upon tiers of raised seats surround the swimming tanks enabling everyone to see, and while the building is immense, much of its oppressiveness is dispelled by the airiness of the structure. In the museum gallery of the baths is contained archæological and other collections of Mr. Sutro, consisting of innumerable curiosities and art works from all over the world. Attached to the baths is a restaurant, with a capacity at one time of 1,000 people, a kitchen where 6,000 visitors can be provided for, and a laundry completely fitted up with latest machinery, and a capacity of 40,000 pieces a day. The length of the baths is 500 feet, the width 254 feet. Their seating capacity is—ampitheatre, 3,700; promenade, 3,700—7,400; holding capacity, 25,000; capacity of tanks, 1,804,962 gallons; total dressing, private, and club room capacity, 1,627. The baths are perfectly illuminated. Fifty general electric incandescent inverted arc lamps provided with reflectors rival daylight for clearness and brilliancy. The buildings, themselves, are amply protected from a heavy sea by an enormous breakwater 400 feet long, 20 feet deep, 25 feet at the top and 75 feet wide at the base, that contains 450,000 cubic feet of rock.

The power house furnishes current both for the road and the resort buildings, the generators having been furnished by the General Electric Company. The boilers are of the new wrought steel sectional safety type, made by the Babcock & Wilcox Company.

In equipping the road Walker Company's motors prevail, there being 15 No. 10 double equipments of 50-horse-power each. The Westinghouse Electric &



Sutro Heights.
The Museum
Car House.
The Big Tank.

New Cliff House.
Promenade in Baths.
Bath House from the Ocean.
Amphitheatre Overlooking Big Tank.

Manufacturing Company has placed 6 style No. 12-a 25-horse-power equipments, while there has also been installed 6 G. E. 800's. The Walker motors are all of the spring-mounted suspension type; and series parallel controllers of the familiar form, with the exception that the road is the first to be equipped with the Walker three barrel controller.

Of "The Heights" above the Cliff House and the Baths volumes might be written. Their natural and

GRAND STAIRWAY, VESTIBULE SUTRO BATHS.

artificial beauties reminds one of an enchanted garden. Those who visited the California Midwinter Fair will find many of its Midway novelties there. The Firth wheel, the mirror maze, the haunted swing have all been restored, and it is understood the electric tower is to be set up in the open space above the baths. On these grounds are held every Saturday and Sunday afternoon and evening band concerts, athletic events and other outdoor amusements. As a pleasure resort it has not its equal in the world.

The Dayton Traction Company, of Dayton, O., has contracted with Stern & Silverman, of Philadelphia, Pa., for the building of the line from Dayton to Miamisburg, a distance of twelve miles. The contract calls for the furnishing of the roadbed, complete with bridges, cars, trucks and motors, Corliss engines, boilers, dynamos and the erection of steel and brick car-barn and power station, all to be in operation by July 1, 1896.

INSURANCE AGAINST ACCIDENTS.

Street railway managers have at last organized a mutual company for the purpose of caring for their own losses. A mutual organization has been a much-talked-of necessity but no one cared to devote the time necessary to the organization of a company, until a few weeks ago, when a number of managers in New York and Pennsylvania organized the Electric Mutual Casualty Association, with home office at Scranton, Pa. The association is directly under the supervision of the insurance commissioner of the state. No large and hazardous roads are admitted to membership; only well-managed roads with a good record respecting casualties are accepted. The management being in the hands of the roads themselves, and everyone having at heart the welfare of the organization, success must certainly crown the efforts of its promoters. The expenses of the management will be less than 7 per cent of the premium receipts, while stock companies average more than 60 per cent. The rate charged for insurance by the association is 2 per cent of the traffic receipts, and the entire liability of any member is limited to 3 per cent additional. The president of the association is Horace E. Hand, president of the Ithaca Street Railway Company, and Cortland & Homer Traction Company; vice-president W. B. Rockwell, treasurer and general manager of the Middletown-Goshen Traction Company, and Staten Island-Midland Railroad; treasurer, Geo. M. Hallstead, of the Delaware, Lackawanna & Western Railroad; secretary, Newton Jackson. The legal board consists of the best legal talent in Pennsylvania, and the services of skillful adjusters and detectives are engaged. Any who may be interested in joining the association, should write the secretary for further information.

STREET RAILWAY LAW.

A Valuable Book for Presidents, Managers and Claim Departments—350 Pages, Covering a Great Variety of Cases.

The volume entitled Street Railway Law, and just issued from the press, is a digest of decisions covering every kind of litigation met with in street railway management; decisions on unusual cases involving fine points in personal and other damage cases, both to passengers and employes, charters, ordinances, rights of way, franchises, transfers, etc., etc. It has been compiled with the greatest care by a prominent member of the Chicago bar, who has made a special study of railroad litigation. It is just the reference work the manager and claim department need in making decisions as to how the courts have ruled in similar cases. The book has been indexed as to the fact, thus making it specially available for the use of others than the legal profession.

The price of the book is two dollars, and will be sent express charges prepaid by the publishers of the STREET RAILWAY REVIEW, the Windsor & Kenfield Publishing Co., Chicago.

STREET RAILWAY LAW.

EDITED BY FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Cable and Electric Cars—Degree of Care Required in their Operation—Greater than those Drawn by Animals.

The Court reasoned as follows: "There is, to begin with, no possible analogy between a case growing out of an injury caused by a street railway car to a person rightfully upon that public thoroughfare and a case involving an injury inflicted by a steam railroad train on a trespasser wrongfully upon the latter company's right of way. And this is so because the citizen has the same privilege to use the street for travel that the street railway has, apart from its franchise to lay its rails, no right to the use of a street for a highway, superior in any degree to that possessed by the humblest individual. The franchise to lay its rails upon the bed of a public street gives to the company no right to the exclusive use of that street, and in no respect exempts it from an imperative obligation to exercise due and proper care to avoid injuring persons who have an equal right to use the same thoroughfare. It is bound to take notice of, recognize, and respect the rights of every other pedestrian or other traveler, and if, by adopting a motive power which has increased the speed of its cars, it has thereby increased, as common observation demonstrates, that risk and hazard of accidents to others, it must, as a reciprocal duty, enlarge, to a commensurate extent, the degree of vigilance and care necessary to avoid injuries which its own appliances have made more imminent. This is so self-evident and manifest that no argument is needed to support it. Negligence is essentially relative and comparative, not absolute. It is not even an object of simple apprehension apart from the circumstances out of which it grows. As these circumstances necessarily vary in their relations to each other under different surroundings, they inevitably change their original signification and import. Hence it is intrinsically true that those things which would not, under one condition, constitute negligence, would, on the other hand, under a different, though not necessarily an opposite condition, most unequivocally indicate its existence. Thus an act which would have been neutral or indifferent, when street cars were drawn by horses at a comparatively low rate of speed, and could consequently be readily brought to a stop as occasion required, would become culpably negligent since the change of motive power, and the great acceleration of speed incident thereto under the rapid transit system. The existence of negligence is, therefore to be sought for in the facts and surroundings of each particular case. But there will generally be found standing prominently out in many instances of this character a disregard of the safety of others, want of caution to avoid injury where the duty to use that caution is incumbent, and a reckless or heedless use of dangerous agencies in localities where the peril from their use is obvious. When these conditions, or any of them, are presented, and an injury is inflicted in consequence upon another, a case of actionable negligence has been made out, provided the plaintiff is himself free from contributing blame."

(Supreme Court of Maryland, Cooke v. Baltimore, Traction Co. 31 Atlantic Reporter 328.)

Collision at Crossing.—Care Required of Company.—Ringing Gong.—Duty of Motorneer.

The degree of care required of one in attempting to cross a street railway track is not the same as that required in crossing steam railroad tracks. What would amount to negligence in the latter case, may not be so regarded in the former. Where, therefore, there is a conflict of evidence as to whether the bell on an approaching street car was sounded before reaching a crossing, and as to whether the plaintiff looked and listened for the bell before attempting to cross the tracks, and also regarded the speed at which the car was going, the jury should determine whether plaintiff was negligent.

Where, in an action for injuries, the judge in his charge to the jury, defines "negligence" abstractly there is no harmful error where, by subsequent charges, as directs the jury to consider all the special circumstances in the case, in determining the question of negligence

It is error in an action for injuries resulting from an alleged negligence of the motorman on an electric street car, to permit a witness to state that he "supposed" the gong rang more than once, and that so far as he had knowledge, the gong was not cracked.

In an action upon the collision of an electric street railway with a passing vehicle, where the evidence is conflicting as to the speed of the car at the time the collision occurred, it is improper to admit testimony that the company has contracted for cars that could run twenty miles per hour.

The duty of the motorneer of an electric street railway towards others than passengers, is to use ordinary care to avoid accident from collision therefrom, and where a motorneer sees a party approaching the track, when the car is a block from the crossing, but fails to use ordinary care to avoid accident, the railway company is liable for injuries which result to the plaintiff, although the plaintiff was himself in failing to notice whether a car was approaching.

(Supreme Court of Iowa, Orr v. Cedar Rapids, etc., R. Co. Am., & Eng. R. Cas. (N. S.) 239.)

Sounding Gong at Other Place than Crossing.

In the absence of statute or ordinance requiring the same, there is no obligation upon street railway companies to signal the approach of its cars by sounding a bell

or whistle at other points than at street crossings, they having no knowledge that there were other travelers upon or near the track.

(Supreme Court of New York, Donnelly v. Brooklyn City R. Co., 109 N. Y. 16.)

Duty of Gripman Towards One Approaching Track—Negligence of Person Injured.

The gripman of a street car operated by cable, is not required to check or stop the car on seeing a pedestrian merely approach the track, as it is the duty of one approaching the track of a railroad operated by steam, cable or electricity, to use reasonable precautions to avoid danger from approaching cars, and a gripman may rightly presume that a pedestrian will use such precaution.

But the gripman of a cable car, must keep vigilant watch for persons on, or approaching, the track, and when such persons are discovered in danger, he must use every possible effort consistent with the safety of passengers to avoid a collision with such pedestrian.

Where cars are approaching a pedestrian in full view, and he either neglects to see them, or seeing them recklessly assumes the risk of crossing the track in safety, in front of them, he is guilty of negligence; and whether the gripman could have seen the danger and avoided the injuries by proper care, is a question solely for the jury.

(Supreme Court of Missouri, Bunyan v. Citizens Railway Co., 1 Am. & Eng. Ry. Cas. (N. S.) 246.)

(Note in Cooke v. Baltimore Traction Co., 31 Atlantic Reporter 328, the Court held that the operation of cable and electric cars in cities, is attended with greater danger than the operation of cars drawn by horses, and consequently a greater degree of care is required in the former case than in the latter. -ED.)

Municipal Control of Streets.—Tearing up Street Railway Tracks.—Injunction.

Where a street railway company has been duly authorized by a city, to construct its road, and in pursuance of such authority has properly laid its tracks, it cannot be compelled by an ordinance of the city, to remove its tracks in order to permit a sewer to be constructed under it, it appearing not only that the company has incurred large expense in constructing its roadbed, but that its receipts would be seriously diminished, and that the convenience of the public would be disturbed, and no reason being shown why the sewer cannot be laid on one side of the track.

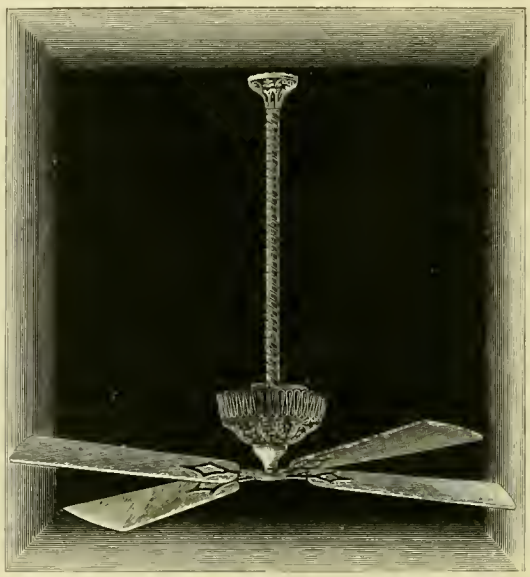
Under the above facts an injunction will lie on behalf of a street railway company to prevent the city authorities, even though acting under a duly enacted ordinance, from rendering it to tear up its tracks.

A municipal ordinance, or by-law, to be valid, "must be reasonable and constant with the general powers and purposes of the corporation, and not inconsistent with the laws or policy of the state." Where, therefore, an ordinance is partial, unfair, or oppressive in its effect, it is unreasonable, and may be declared void by the courts.

(Supreme Court of Iowa, DesMoines City Railway Co. v. City of DesMoines. 1 Am. & Eng. Ry. Cas. (N. S.) 215.)

THE BATES FAN.

Those of our readers that are selling power for stationary purposes may be interested in the Bates fans, made by D. L. Bates & Brother, Dayton, O. They are made for any voltage from 110 to 500. Two 250-volt fans run in series make a good combination. The motors are put in the metal basket and the fan is very ornamental in appearance. They are free from the objections which hold against belt fans and have simply to be hung from the ceiling like an ordinary chandelier. They are finished in either nickel plate or oxidized copper. Some forms are furnished with revolving lights and perform the double office of chandelier and fan.



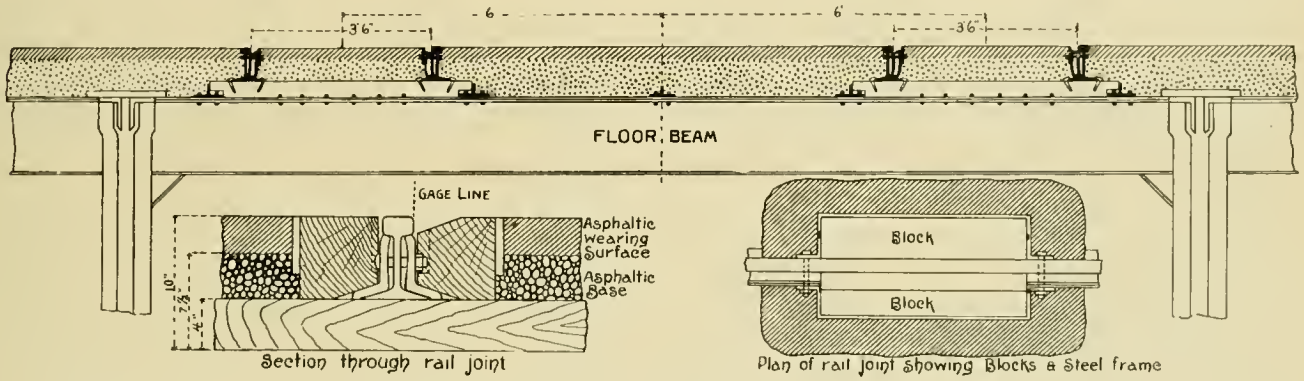
ONE STYLE OF BATES FAN.

REASONS FOR SHUNTED FIELD CONTROL.

The use of a shunt around the field coils on the G. E. 800 motor and controller, for the purpose of giving a motor increased speed by weakening its fields, has been adversely criticised by a certain street railway publication and to a great many others the object of controlling a motor's speed in this way does not appear to be plain. Indeed it does seem at first thought that the old "loop" method practiced by the General Electric Company of cutting out a part of the turns on the fields would be better. The reason for adopting the shunt, however, is a good one and is an attempt to reduce the heating of the field coils. Under the loop method the full current was maintained in a portion of the field, the reduction in field strength coming from a reduction in turns only. With the shunt method the full number of turns are always in circuit but the current is reduced by shunting part through a resistance. The present tendency however is to operate upon the full field and the larger type motors of the General Electric Company are so controlled.

TRACK CONSTRUCTION ON BROADWAY BRIDGE, DENVER.

The accompanying drawings show the track construction on the new Broadway bridge, Denver. The high 72-pound T rail is transformed into a grooved girder for the length of the bridge by means of a sleigh shoe steel guard bolted every two feet through a special shaped cast iron fillet. The intervening space is filled with a hollow cast-iron fillet which gives it the appearance of a grooved girder rail. The joints are bonded with the Edison-Brown plastic alloy bond and also the small copper bond in the ends of the rails behind the angle plates. Joint blocks surrounded by steel frames are placed at all joints to provide for easy examination and tightening of the joint. The ties are Texas heart pine 4 by 7 inches, 5 feet long, accurately shaped on a bed planer and placed three feet center to center with holes bored wherever nuts project from the floor as shown. The ties were boiled in liquid asphalt and imbedded in the same material. The pavement consists of 2½ inches of asphaltic wearing surface and 7½ of bituminous asphaltic base.



TRACK CONSTRUCTION ON BROADWAY BRIDGE, DENVER.

ANOTHER USE FOR COMPRESSED AIR.

A fat and bibulous passenger fell asleep in a Third avenue cable car, New York, and after many futile attempts to awaken him, the conductor could do nothing else than extract a nickel from his vest pocket and permit him to remain another trip until he reached the end of the line. At Harlem another attempt was made to rouse the 300-pound passenger who continued to snore in one corner of the car, but the only sound that could begotten out of him was an "ump g-r-r-r-h." The gripman and conductor shook him, trod on his toes and used every legitimate means known to awaken a sleeping man but to no avail. Finally the starter was appealed to. He ordered the car shunted into the yard, and the blower used for cleaning cars turned on him. A moment later the sleeper was the center of a miniature blizzard which fairly carried him through the car and thoroughly aroused him. Now the yard crew have discovered another use for compressed air.

NATIONAL ASSOCIATION OF MANUFACTURERS.—ITS AIMS.

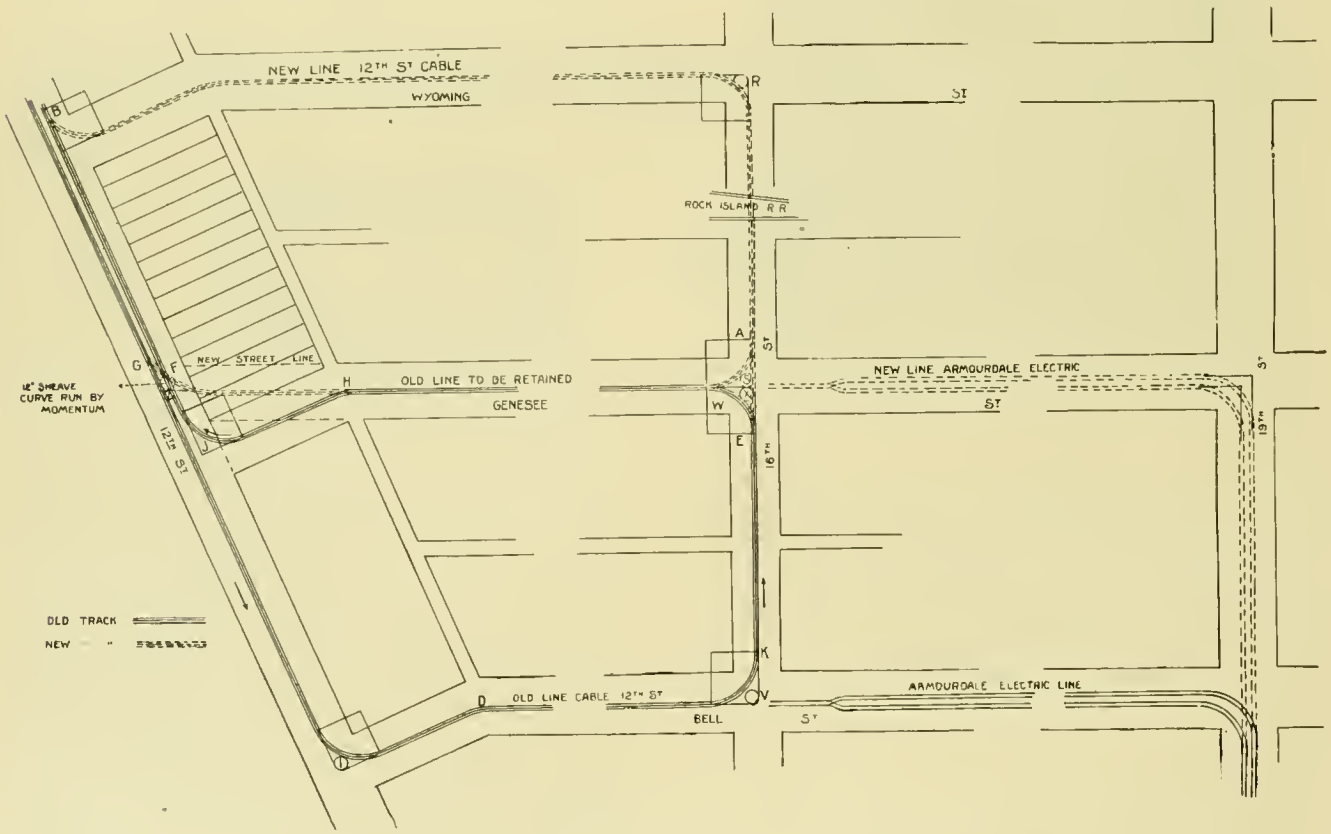
It behooves all business men to know something about the National Association of Manufacturers of the United States, and for those who are not conversant with the aims of this excellent institution we give a brief synopsis of its purposes. The organization is one of business men for business purposes. They are associated together simply for the purpose of extending and widening the avenues of trade and commerce, and for removing the obstacles in the way of fair competition in our own markets, and for improving the conditions governing our trade with other countries. Every question with which the association has to deal is to be considered from a purely business and practical standpoint. It is the aim of the association to represent every class of manufacturing interest, without regard to political or sectional lines. The following are some of the principles of the organization: Conservation of the Home Market. Extension of Our Foreign Trade. Expert Commercial Agents Abroad. Promotion of Spanish-American Trade. Re-Establishment of Reciprocity Treatise. Extension of Our Merchant Marine. Improvement of Waterways. Construction of the Nicaragua Canal. Department of Manufacturers and Commerce. Uniform Freight Classification. National Bankruptcy Laws, and a Bureau of Publicity. The chief office of the association is at 1748 North Fourth street, Philadelphia. The officers and their addresses are: President, Theodore C. Search, Philadelphia; Treasurer, Robert Laidlaw, Cincinnati; Secretary, E. P. Wilson, Cincinnati.

MILK IN THE TROLLEY COCOANUT.

The Cortland and Homer Traction Company will for the next ten years' carry the milk from McGrawville to Cortland. It has just concluded negotiations with the D. L. & W. Railroad Company to that end. The minimum number of cans of milk to be carried a day is 200. The powerful electric equipment of the traction company enables it to haul three loaded steam railroad cars at a speed of fifteen miles an hour.

A PROBLEM IN STREET RAILWAY CONSTRUCTION.

The accompanying map shows the streets of a portion of Kansas City, Mo., lying in the southwest part of the city, near the state line of Missouri and Kansas. The Kansas City Stock Yards Company has for years owned all the property fronting east on Bell street, from Twelfth street to Nineteenth street. About two years ago the live stock business of Kansas City had assumed such proportions as to make it necessary for the Stock Yards Company to extend its yards. With this end in view, all the property bounded on the north by Twelfth street, on the south by Nineteenth street, on the west by Bell street, and on the east by Genesee street was purchased by the Stock Yards Company, and Bell street and all the streets and alleys between Twelfth street and Nineteenth street and all the alleys between Bell street and Genesee street were vacated so as to admit of the proper extension of the stock yards.



MAP OF TRACKS CHANGED TO ACCOMMODATE STOCK YARDS AT KANSAS CITY.

It happened that the Metropolitan Street Railway Company owned and operated a line of cable railway on Bell street from Twelfth street to Sixteenth street, on Sixteenth street from Bell street to Genesee street, and on Genesee street from Sixteenth street to Twelfth street, forming a loop, as is shown by the map; the cars running south on Bell street, east on Sixteenth street, and north on Genesee street, as is shown by the arrows. The said railway company also owned and operated a line of electric railway on Bell street from Sixteenth street to Nineteenth street. Both these lines of street railway were being operated under long-time franchises and the vacation of the streets mentioned was made subject to the rights of the Metropolitan Street Railway Company. The Metropolitan Company signified its willingness to remove its tracks, provided the Stock Yards Company would procure the necessary franchises over certain other streets and pay the total expense involved. Accordingly franchises were obtained authorizing the removal of the Metropolitan Company's cable tracks from that portion of Twelfth street lying between Genesee and Bell streets, from Bell street, and from that portion of Sixteenth street lying between Bell and Genesee streets; and authorizing the construction of a new cable line in lieu thereof on Sixteenth street from Genesee street to Wyoming street, on Wyoming street north to Twelfth street, and the straightening of the line of Genesee street from the alley north, as is shown by the map. Also franchises authorizing the removal of the electric line from Bell street to Genesee street.

The removal of the tracks of the electric line presented no difficulty whatever, with the exception of some slight complications resulting from the construction of several steam railroad crossings; but with the cable line the case was different.

The cable line originally consisted of a double track on Twelfth street from the east city limits to Genesee street, thence of a single track west to Bell street, south to Sixteenth street, east to Genesee street, and north to Twelfth street, forming a loop, as has been stated. At

Twelfth and Bell streets, Sixteenth and Bell streets, Sixteenth and Genesee streets, and Twelfth and Genesee streets the cable was released from the grip and the cars were run around the curves by momentum. In order to facilitate picking up and releasing the cable, sheaves I, V, and X, twelve feet in diameter, had been placed at Twelfth and Bell streets, Sixteenth and Bell streets, and Sixteenth and Genesee streets, respectively, as shown on the map. But, owing to the construction of the grips, the cable at Twelfth and Genesee streets was carried around on the regular curve pulleys.

The problem of changing the cable line involved the construction of new cable tracks at the corner of Twelfth and Genesee streets, along the line G F H, for the purpose of straightening Genesee street, as has been stated, the Stock Yards Company having purchased lots 11, 12, and 13, in block 2, of Depot Addition, and dedicated portions for street purposes in exchange for a portion of the ground occupied by Genesee street; the object being to obtain as much ground west of Genesee street as possible The problem of changing the cable tracks also involved, as has been stated, the construction of a new cable track on Sixteenth street and Wyoming street, along the line A M B. The problem also required the duplication of the previous construction as nearly as the new conditions would permit. This required the installation of a 12-foot sheave at Z, one at S, one at R, and the construction of a regular curve at B. The cars on the new line were to run south on Genesee street, instead of north, as formerly, east on Sixteenth street to Wyoming street and north on Wyoming street to Twelfth street. The problem also involved the making of these changes with no interruption to the traffic.

It will be observed that the new track crosses the old at F, and connects with it at H W and B. The necessity of constructing the new line, and making all the necessary connections with cars running at intervals of four minutes, from 5:30 a. m., till 12:30 a. m., with no interruption of traffic, presented many difficulties. This was particularly the case at the point G, where it was necessary to connect the new curve with the old tangent; at the point F, where the new curve intersected the old tangent, at the point W, where a new curve connects with the old tangent, at the point S, where it was necessary to install a new 12-foot sheave which interfered with the one already in position, and at the point B, where it was necessary to build a regular curve, containing all the curve pulleys and machinery necessary thereto, and connect the same to the old tangent.

The problem of changing these cable tracks under the the foregoing conditions, and with no interruption to the traffic of the cable line, was intrusted to R. J. McCarty, civil and mechanical engineer, member of the American Society of Civil Engineers, who was given entire charge of the work. The plan adopted by him was as follows:

The new track on Sixteenth street, between Genesee and Wyoming streets, and on Wyoming street, between Sixteenth and Twelfth streets, was constructed in the ordinary way. The curve B, at Twelfth and Wyoming streets, was built as close up to the old track as possible, with the ordinary construction. Sectional yokes were then used of such a form as to admit of their being concreted into position to receive the curve pulleys without interfering with the passing grips. At Sixteenth and Genesee streets, it was necessary to get the 12-foot sheave X, out of the way before placing the sheave S, in position, since the rims of the two interfered by several inches. At Twelfth and Genesee streets, it was, as has been stated, necessary to build the curve F, and install the 12-foot sheave Z, without interference with the cars. Owing to the difficulty of doing the necessary work at either of these places in five hours, it was advisable to keep the cars off Genesee street, for a time, if possible, without stopping the traffic. This was accomplished by building a temporary track at Sixteenth and Genesee streets, from E, to A. The curve B, was made ready for a quick connection with the old track, as was also the temporary track made ready for a quick connection with the old track at E. A cable was placed in the conduit from E, east on Sixteenth street to Wyoming street, and north on Wyoming street to B. At night, after the cars had stopped running, the old cable was cut at E, and B, and the new piece spliced in, while the track connections at E, and B, were being made. The cars then were run south on Bell street, east on Sixteenth street to Wyoming street, and north on Wyoming street to Twelfth street. The new track H F G, was then constructed and made ready for a quick connection at G. The 12-foot sheave Z, was placed in position, the curve W A was made ready for a quick connection at A, and the sheave X, was shifted to the position S; the pulleys on Genesee street were changed to accommodate the new position of the cable which had been shifted 3 inches to the west; the cable was then cut at A and G, and the original piece was spliced in while the track connections at those points were being made. The old tracks H J B, and G I C E W, were then taken up.

Active operations in the field was begun on the 20th of last March. On the 12th of April, the first change was made, and the cars were run south on Bell street, east on Sixteenth street to Wyoming street, and north on Wyoming street. On the 19th of April, the second change was made, and the cars were run south on Genesee street, to Sixteenth street, east on Sixteenth street to Wyoming street, and north on Wyoming to Twelfth street.

The plan adopted by Mr. McCarty, was entirely successful in every respect, all the work having been done, and all changes having been made with absolutely no interruption of traffic.

The total length of the new line construction is 2,640 feet. And notwithstanding the fact that a great portion of the expense was incurred in the construction of the curves and pits, the necessary machinery therefor, and in the disadvantages under which it was necessary to conduct the work, owing to the constant interference of the cars, the total cost of the whole work was only about $30,000.

AND THE CARS DIDN'T STOP.

During the past month there were two hot fires burning at the same time a block apart, in the heart of the business district in Chicago. Some thirty steamers were bunched within a radius of two blocks, and at one time there were no less than twelve leads of hose across the State street cable line. We say across, though over would be more accurate, as the hose bridge wagons of the City Railway were on the ground early, and as fast as the department pulled a line of hose across the cable tracks the boys had it up on the bridges. As the fires lasted nearly two hours, and occurred at noon, the importance of keeping the main arteries of travel open can readily be understood, as the earnings every fifteen minutes more than paid for the entire hose bridge equipment. The fire to which the hose shown in our illustration was run, is just around the corner to the right, and that portion of our picture is blurred by the smoke. Four steamers were bunched at the left, though only one shows in the cut. The bridges are made of best quality

HOSE BRIDGES OVER STATE STREET, CHICAGO.

tubing, galvanized and painted, and quite light weight. It can be erected in a few moments, and after it is up, additional lines of hose can be also carried if desired. The fire department are always glad of the bridges, as there is no occasion to hurry and disconnect hose when fire is under control. The bridge will be sold outright, or companies allowed to build them on a reasonable royalty, by the inventor, C. J. P. Heims, 40 Park Gate, Stony Island avenue, Chicago.

A runaway horse plunged through an open trailer of a Fourteenth street cable car at Washington, D. C., clearing the car and landing on the opposite side of the thoroughfare. It was so badly injured it had to be shot. Fortunately no one was in the seat at the time, though those immediately in front and back were occupied.

THE WAVE MOTOR.

Recent reports of the wave motor, which San Francisco capitalists have installed at Capitola, near Santa Cruz, at an expense of $60,000; are less encouraging. It is stated that while the motor is running daily and developing as high as 180-horse-power, the location in the bay is less favorable than would have been on the beach of the open sea. The company in now considering the change.

As there are strong tide waves in the bay it would seem the demonstration has been made under very fairly favorable circumstances. The Santa Cruz Press, says:

"The plain truth is that the Gerlach wave motor, so far, is an unqualified failure. The most that has been shown is that in a heavy tide the wheels can be made to spasmodically revolve. But no power that could be transmitted has been evolved, and for the most of the time the motor will not run itself.

Yesterday was a day of ideal conditions. There was a succession of long heavy swells, and utter absence of wind. The big wheel of the motor, under these conditions, would revolve at intervals, and at intervals only, three or four times. There was no power that could be utilized. Mr. Gerlach may yet make his motor work. But he hasn't done it yet."

We regret the experiment has not been more satisfactory, as the possibilities of the scheme, could it be made to work successfully can hardly be estimated.

The Turtle Creek branch of the Pennsylvania Railroad which runs to the works of the Westinghouse Electric & Manufacturing Company at Brinton, is to be electrically equipped as an experimental track. It will have the Westinghouse electro magnetic contact pin system, and also the overhead system.

THE ALBANY-TROY ELECTRIC EXPRESS SERVICE.

Special Freight Houses—An Hourly Service—Fifteen Men Employed—Collection by Teams—Special Newspaper Service—The Business Warrants Extension of Present Lines.

When the Albany Railway Company several years ago decided to establish a system of freight transfer in connection with its already successful passenger lines, the railway magnates of the country looked upon the theory of an "electric express" as rather one more fitted to be talked about than to be put in practical operation. But few cities in the whole United States had tried the experiment, and in none was it a great success, considered from the financial view of the companies interested. Besides, it was said that the operation of a "freight line" on tracks used for the regular passenger traffic would cause delay and impair the efficiency of the railway lines. These and other arguments were brought forth against the idea when the question was discussed at the meeting of the directors of the Albany Railway.

The company is a conservative one, and is conducted by exprienced railway men. They discussed the idea, and after mature deliberation decided that notwithstanding the non-success of other "electric express companies," run in connection with regular street railway lines, there was no good reason why such a line in Albany would not meet with success. Troy, six miles above Albany on the east side of the Hudson, was already connected with Albany by the Watervliet Turnpike line, and this line had been merged into the Albany Railway. Besides there were other places in the vicinity of Troy to which freight from Albany and Troy could be transferred. That there was a good field for the express there was little doubt in the minds of the directors; and as for the merchants and residents, they approved of the project, and the former welcomed the advent of the idea, for with it would come quicker and cheaper transportation and other facilities not to be derived from trucks.

Plans were made and perfected for the operation of the "Electric Express," and on September 1, 1894, the new freight transfer line was put in operation. It was one of the first lines of its kind in the country and the first in the eastern states. The success that it met with should certainly dispel all doubts in the minds of directors of companies in other cities who are uncertain as to

ORIGINAL Albany, N. Y., _____ 1896.

Received from _____

By THE ALBANY RAILWAY,

The property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned and destined as indicated below, which said Company agrees to carry to the said destination, if on its road, otherwise to deliver to another carrier on the route to said destination.

Consignee _____

Destination _____

MARKS	ARTICLES	WEIGHT Subject to Correction.

NOT NEGOTIABLE.

The conditions upon which the above mentioned property is received for transportation are printed on back hereof.

THE ALBANY RAILWAY,

8891. Per _____

SHIPPING ORDER. Albany, N. Y., _____ 1896.

To THE ALBANY RAILWAY.

Please ship the packages enumerated below, which are in good order, marked, consigned and destined as below, to be carried to said destination, if on your road, otherwise to deliver to another carrier on the route to said destination.

Consignee _____

Destination _____

MARKS	ARTICLES.	WEIGHT Subject to Correction.
	Cr. Eggs,	
	Cheese,	
	Tubs Butter,	
	Boxes Fruit,	
	" Poultry,	
	Bbls. "	
	"	
	"	
	"	

THE ALBANY RAILWAY TAKE THIS.

The delivery of said article to and its receipt for transportation by The Albany Railway, are on the express conditions as printed on the back hereof, which are accepted and approved by the shipper.

Name of shipper. _____

CHARGES.

PREPAID.	COLLECT.	ON ACCOUNT.

FOR CONSIGNEE:

Received from The Albany Railway, in good order, the packages referred to and set forth in the foregoing shipping order.

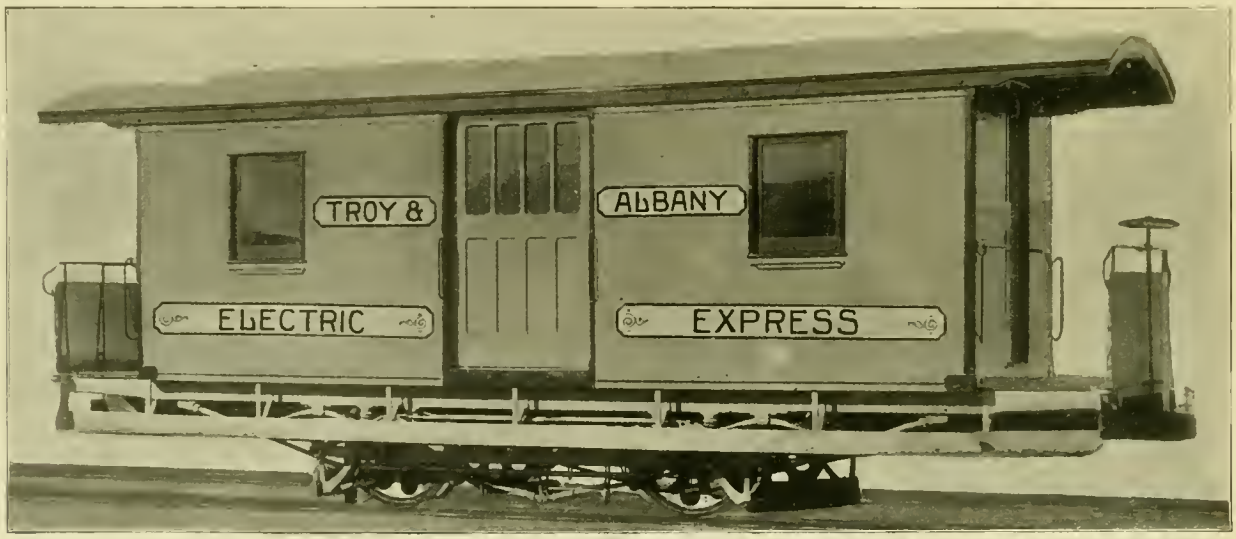
_____ Consignee.

the practicability of the idea. Albany, however, has Troy, Cohoes, Lansingburgh and Green Island within a radius of twelve miles, and other cities may not have such thriving places connected by their lines or branches.

The Albany Railway after it first decided to operate an "electric express" looked about for two suitable buildings for freight purposes, one in Albany and one in Troy. At about this time the general offices were moved to the building on the southeast corner of Broadway and State street, opposite the postoffice and federal building. It was a streak of good fortune that just then a building on State street, on the corner of Dean, a short block below the general offices, was for sale. The company took advantage of this opportunity and purchased the building and fitted it up as a freight and transfer house, and secured the permission of the common council to lay tracks over the sidewalk so that their cars could run into the building. Another building was purchased in Troy, on the corner of River and Congress streets, in the heart of the business section of the city. This also was fitted up similarly to the Albany transfer house. Cars run right into the buildings, and platforms have been erected high enough on one side to easily load the cars with freight. Offices are in each building for the transfer, receiving and shipping clerks and freight superintendents.

Three special express cars are in operation. They were constructed by J. G. Brill & Company, of Philadelphia. The cars measure 21 feet body, with platforms 3 feet 6 inches at each end. There are two windows on a side and a 4-foot sliding door on each side for the admission of freight and baggage. The running board extends from end to end on each side. The car is sheathed inside to top plate with tongued and grooved boards. The width of the car over sides is 7 feet 3 inches. The car is mounted on Brill No. 13 independent rigid motor truck. Their capacity is 20,000 pounds. They are elegantly painted in brown and lettered with silver leaf. The inscription on each car is "Troy and Albany Electric Express." The car, of course, is run the same as passenger cars, by the overhead trolley system. There are also large headlights and several incandescent lamps inside. Fenders are also in use. A driver and a messenger are in charge of each car. All kinds of freight are carried, and special attention and provisions are made when the freight is of a destructible and perishable kind. The express cars run entirely separate from the passenger cars and on a time schedule that interferes in no way or manner with the regular passenger service. There are fifteen men employed in the express department of the company. Cars are operated from Albany and Troy each hour, one leaving each place.

A perfect system of collection and deliveries is in operation at the termini. Trucks deliver from the transfer houses to the merchants' places of business, and also carry freight from their stores to the transfer houses This is done gratis, or rather included in the regular charges for transportation. The service has given the greatest of satisfaction, and a merchant who has, for instance, 1,000 or 15,000 pounds of freight to deliver to Troy, can have it transported from Albany to Troy in half an hour, the distance being six miles. All told, the time taken for collection, transportation and delivery would hardly be more than an hour which, as any one can readily imagine, is "lightning express" time. Merchants always patronize the line, and but very few trucks are going to and from the places connected by the electric express line now, for the business men have learned that by patronizing the electric express they can secure quicker delivery at cheaper rates than by any other means of transportation. Indeed, not a few truckmen have given up this branch of the business, and many merchants have disposed of their horses and trucks on account of the advent of the new mode of transferring freight by means of electricity.



The cars are operated on six miles of double track. The company is now making arrangements to extend its lines to other places in the vicinity of Albany, mostly because of the freight traffic which would accrue if the places were connected by the Albany Railway. The proposition to increase the capital stock of the company from $1,500,000 to $2,000,000 has been adopted, and one of the reasons for the increase is because of the proposed extension of their freight service. From Troy trucks convey Albany freight to Lansingburgh and Cohoes.

Newspapers are carried by the express, a special car being sent up the road at 4:30 each afternoon for the purpose of delivering packages of newspapers to newsdealers at Green Island, West Troy and Troy and other smaller places along the line. The rate charged for

CONDITIONS.

This Company is not to be held liable for any loss or damage, except as forwarders only, nor for any loss or damage by fire, by the dangers of navigation, by the act of God, or of the enemies of the Government, the restraints of Government, mobs, riots, insurrections, pirates, or from or by reason of any of the hazards or dangers incident to a state of war. Nor shall this Company be liable for any default or negligence of any person, corporation or association to whom the above described property shall or may be delivered by this Company, for the performance of any act or duty in respect thereto, at any place or point off the established routes or lines run by this Company; and any such person, corporation or association, is not to be regarded, deemed or taken to be the agent of this Company for any such purpose, but, on the contrary, such person, corporation or association shall be deemed and taken to be the agent of the person, corporation or association from whom this Company received the property above described. It being understood that this Company relies upon the various Railroad and Steamboat lines of the country for its means of forwarding property delivered to it to be forwarded, it is agreed that it shall not be liable for any damage to said property caused by the detention of any train of cars or of any steamboat upon which said property shall be placed for transportation; nor by the neglect or refusal of any Railroad Company or Steamboat to receive and forward the said property.

It is further agreed that this Company is not to be held liable or responsible for any loss of, or damage to, said property, or any part thereof, from any cause whatever unless in every case the said loss or damage be proved to have occurred from the fraud or gross negligence of said Company or their servants; nor in any event shall this Company be held liable or responsible, nor shall any demand be made upon them beyond the sum of Twenty-five Dollars, at which sum said property is hereby valued, unless the just and true value thereof is stated herein; nor upon any property or thing unless properly packed and secured for transportation; nor upon any fragile fabric, unless so marked upon the package containing the same; nor upon any fabrics consisting of, or contained in, glass. If any sum of money besides the charges for transportation is to be collected from the consignee on delivery of the above described property, and the same is not paid within thirty days from the date hereof, the shipper agrees that this Company may return said property to him at the expiration of that time, subject to the conditions of this receipt, and that he will pay the charges for transportation both ways, and that the liability of this Company for such property while in its possession for the purpose of making such collection, shall be that of Warehousemen only. In no event shall this Company be liable for any loss or damage unless the claim thereof shall be presented to them in writing at this office within ninety days after this date, in a statement to which this receipt shall be annexed. And it is also understood that the stipulations contained herein shall extend to, and inure to, the benefit of each and every company or person to whom, through this Company, the above described property may be intrusted or delivered for transportation. Deliveries at all points reached by this Company are only to be made within the delivery limits established by this Company at such points at the time of shipment, and prepayment in such cases shall only cover places within such delivery limits. The party accepting this receipt hereby agrees to the conditions herein contained

newspapers is 10 cents for each package, the packages of course being less than 100 pounds in weight. The express car is met by the newsdealers and the packages handed to them at the different points along the line.

The regular freight rate is 10 cents per 100 pounds. Special contracts are, however, made with heavy patrons.

The schedule of tariff charged for carrying express is as follows:

For 100 pounds regular freight rate from Albany to Troy	10 cents
For 100 pounds to Cohoes and Lansingburgh from Albany	15 cents
For packages under 80 pounds to or from Troy	5 cents
From 80 to 130 pounds	10 cents
From 130 to 200 pounds	15 cents
From 130 to 200 pounds	20 cents
From 200 to 275 pounds	25 cents
Packages over that weight 10 cents per 100.	

The business that the freight department does amounts to over $3,000 monthly.

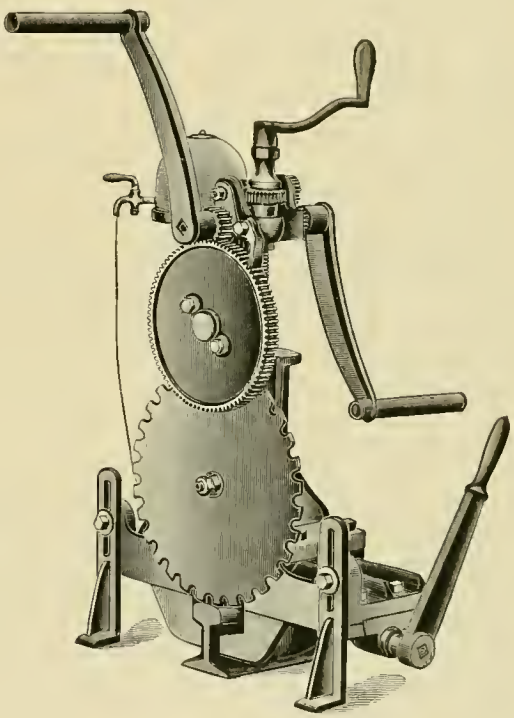
There is a probability that Syracuse will have an electric express system soon. The leading men of the Albany Railway Company are about to reorganize the company of that city, and among other features it is likely that an electric express will be introduced.

The officers of the Albany Railway are: President, Robert C. Pruyn; vice-president, Anthony N. Brady; secretary, James McCredie; treasurer and general manager, John W. McNamara; assistant general manager, Edgar S. Fassett.

NEW STRAIGHT-CUTTING PORTABLE RAIL SAW.

The demand for a portable rail saw making straight cuts only has resulted in the Q & C Company of this city, putting on the market a new machine to supply the want.

The new saw is designed for street and steam railroads, and will cut rails, beams, channels, or other metals up to seven inches in height, leaving square ends without detriment to the metal. Although generally needing two men to operate the machine, one can do it, the power required being applied direct to the periphery of the saw blade, giving the operator the greatest advantage and requiring minimum exertion. The time it takes to cut an ordinary rail is from seven to ten minutes. With this machine continuous cutting can be done



Q & C STRAIGHT CUTTING PORTABLE RAIL SAW.

with but little effort owing to its easy action. The saw blade with which the machine is provided is hollow ground and acts on the same principle as a rotary planing cutter, as can be seen in the illustration, hence the leaving surface of the metal cut perfectly true and smooth.

The machine is provided with automatic feed and quick release and can be attached to a rail in thirty seconds so as to enable its use on the line without obstructing traffic. It will thus be almost indispensable to track men, and its value is apparent in making crossings, switch lay-outs, etc. The tool has already met with a large sale, though on the market but a few months. It is furnished complete, ready for work, and sold at about one-third less than any portable rail saw heretofore offered.

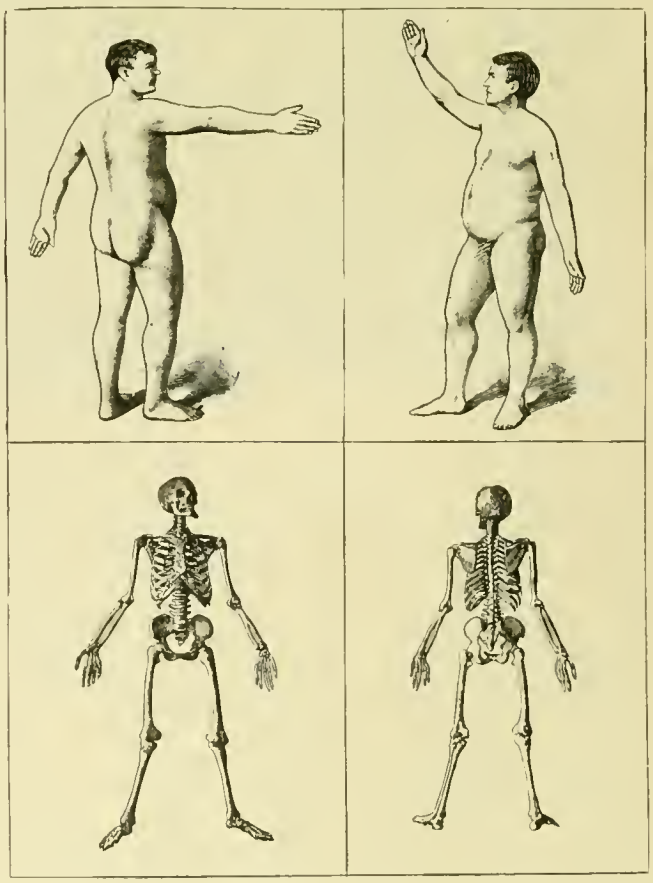
A prominent road which has one of the best equipped claim departments in the country, has adopted the rule of requiring all claimants to fill out a blank, the questions on which are as follows:

(City and date).....189

I hereby present claim for $ Damages, on account of an accident occurring to me as set forth below.

Date of accident Time, M.
Place of accident,
Were you passenger on car?
Where did you get into car?
Kind of car?
Direction car was going?
Speed of car?
Was train running smoothly?
How far did car run after you fell?
Were you dragged; if so how far?
Were you getting on or off?
Front or rear platform?
Did you take hold of car?
What part of car?
With which hand?
What part of running board did you stand on?
Which foot did you put on ground first?
What side of car?
Did you have anything in either hand? If so what, and in which hand?
Which way were you facing at time of accident?
Who was present? (Give full names and addresses of all persons you remember.)
Did you make signal to stop?
What kind of a signal?
When made and how often?
Was gong ringing?
Where was driver?
Where was conductor?
On which side did you fall?
Were you under the influence of intoxicating drinks or narcotics at time of accident?
Nature of injuries?
Previous condition of health?
How long were you actually confined to bed?
When did you first begin, after your injury, to attend to any part of your business?
For what length of time do you claim indemnity?
What medical attendance have you had, if any?
Family Physician?
Are you married or single?
How many children?
Occupation?
Place of business?
Amount of salary?
Loss of time on account of accident?
Amount of Physician's bill?
Additional particulars.
Name?
Residence?

The same road has for several years used a surgeon's report which is a good model for other lines. Plenty of blank lines are left under such questions as are likely to require most space in replies. The blank fills four pages, one of which contains a large cut which we reproduce. The first two are used by the surgeon to indicate the location of flesh wounds, bruises, etc., and the skeletons showing front and back views for the location of fractured bones. When the company's surgeon



has made his examination, he draws a pen line pointing to the exact location of the injury or fracture, and this, with his accompanying report on the same sheet, goes in as a part of the history of the case, and is of very valuable assistance to the claim department in forming an opinion as to what kind of settlement to make.

The questions to which the surgeon replies are as follows:

SURGEON'S REPORT.

Name?
Residence?
Occupation? Where employed?
Married or single? Age?
Habits? Circumstances?
Place of accidentate Date A. M. P. M.
How long will patient be disabled?
Particulars of cause of injury?
Was the claimant intoxicated or under the influence of narcotics or intoxicants when injured?
Full description of pathological condition?
What surgical attendance was rendered?
Previous condition of health, and evidences of old injuries, disabilities or disease?
Where lived for past five years?
Former Physicians?
Hereditary influences?
Witnesses to accident, and their addresses?
Remarks?
Date of first visit? Date of Surgeon's Report?
Please fill out this blank promptly and forward at once to claim agent.

THREE HUNDRED FARES ON ONE TRIP.

Who Can Beat This Record?—How Five Passengers Rode for Five Cents.

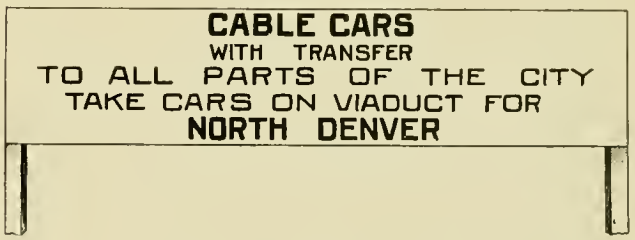
A. J. Wilson, conductor on the Athol & Orange Street Railway, Mass., sends in the following interesting letter. He writes:

"Being very much interested in some items in your valued publication, I will mention a few happenings in connection with the Athol & Orange Street Railway by way of comparison. In your December issue an item refers to a lady boarding a car having with her five children, the oldest being four years old. I think I had a case more than a parallel a short time since, where a lady boarded my car with her five children, which had been born to her in three years of married life, two sets of twins and a single one. Another item in the same issue is in regard to a double-decker car which has a load of 175 passengers. I wonder what that conductor would do with a load of 140 people on a single-decker open car. Such was one load I took from Orange to Athol on July 12 of last year. A circus at the latter town attracted the crowd, and as we collect two 5-cent fares, one in each town, I had 280 fares on reaching Athol, and got twenty more on going to the upper town; three 5-cent fares for the whole trip, or, in a forty-five-minute run I had collected an even 300 fares. Who can beat that for a record while for the whole day I would submit a record of 1,769 fares.

We feel, I think, a just pride in our road, as it is well equipped and nicely managed. It is a seven-mile road, connecting the thriving manufacturing towns of Orange (population 6,000) and Athol (population 8,000). Besides the regular business we have a pleasure park midway between the towns called Central Park, which attracts large crowds during the heated season. About the largest crowd of last season there, was on labor day, when it was estimated to be 6,000 people in attendance at the ball games, dances, bowling alleys, etc. Our line runs parallel with the Fitchburg Railroad, but as we run on 30-minute time they do not interfere much with us. We expect the grade of our roadbed will be much changed the coming season to correspond with the grade of the section of state road which is being built beside the track. Our great need seems to be for vestibuled cars, as we have a very much exposed territory to pass through."

ADVERTISING AT DEPOTS.

Many companies can use advertising signs at depots to good advantage. If the average traveler only knew the street car would carry him to his hotel, or if he did not have to hunt around to find out what car to take, in most cases he would give the car the preference over a bus or carriage. The Denver Tramway has just erected several such signs at the Union depot. On two



RAILROAD DEPOT SIGN AT DENVER.

of these the reading is painted on colored glass, which is illuminated at night. The color corresponds with the color of the car which the sign directs travelers to take to reach certain hotels. Two others are large sign boards, the background being painted blue on one and yellow on the other to correspond with the car color. The sign illustrated is eighteen feet long. The suggestion is a good one for companies which have not already provided something of the kind.

DEPARTMENT OF MANUFACTURES AND COMMERCE.

A House bill has been introduced providing for the creation of a new department to be designated as above, and in charge of a secretary who shall be a member of the Cabinet. With our stupendous and ever increasing manufacturing and commercial interests, which are the wonder of the world; there should be but one opinion not only as to the desirability, but necessity of the new department. The bill has the endorsement of the National Association of Manufacturers of the United States. If a Department of Agriculture is warranted, this department most assuredly is, for the value of our manufactured products is almost five times that of our agricultural.

Madgeburg and Frohse, frontier towns of Saxony, are considering an electric railway.

Sheffield, Eng., has decided to acquire and operate the street railway when the lease of the company expires next July.

Irish tourists will be catered to by the projected electric railway from Larne to Cushendall and, possibly, Portrush.

The electric road at Cairo, Egypt, which is being built by a Belgian company is expected to to be completed in July.

Dr. John Hopkinson is spoken of as the probable superintendent of the construction of the Leeds, Eng., electric railway.

Horseless carriage makers have applied to the Paris municipality for leave to place their vehicles for hire on the public hack stands.

Schuckert & Co., the Nuremburg engineers, have applied for an electric railway franchise between Velbert and Steinbeck, Germany.

Hundred of Manhood & Selsey Tramways Company is the name of a light railway project which will operate between Selsey and Chichester, Eng.

Portsmouth, Eng., will purchase the street railway and lease it back to the company, also supplying power for the operation by electricity as proposed.

Orel, an important town in the Czar's domain, has granted an electric railway franchise to a German firm, so that its 55,000 inhabitants may get about.

For delaying an electric car, Robert Turvey, a teamster, was fined $5 and costs, at Bristol, Eng. Presuming on his privilege as mail driver he continued on in front of the car for half a mile, answering the motorman's rings of the gong with an easy flow of profanity. The judge thought it was high time to stop this kind of annoyance, hence the fine.

Middlesborough, Thornaby, Stockton and Norton, Eng., are to be connected by electric railway. The project includes a consolidation of the Imperial Tramway Company of Middlesborough with the Darlington & Stockton Tramway Company, and the building of a connecting line. The promoters threaten to leave Stockton out in the cold if the town does not cease objecting to the overhead trolley.

Korbisdorf, Germany, has completed a half mile of trolley road, from the coal mine to the sugar refinery. An electric locomotive draws twelve small cars.

Sydney Morse and S. Sellon, representing the British Electric Traction Company, are promoting seven miles of electric railway to connect Oldham and Hyde.

Belfast people will be able to take a trolley ride through some of the greenest spots in the Emerald Isle if the Belmont and Holywood line is built as proposed.

Liverpool's elevated electric railway extension will be ready for operation by August. Motors and controllers are furnished by the Electric Construction Company, Wolverhampton; generators and switchboard by Thomas Parker, limited, Wolverhampton; and engines by Hicks, Hargreaves & Co., Bolton.

The Anglo-Argentine Tramways Company in its last statement reports a prosperous year, having carried 1,000,000 passengers more than in 1894. A dividend of 43 cents per share of common stock has been declared, making 72 cents for the year. Horses cost 12 cents per day for fodder, as against 15 cents during the preceding year.

MURDERER OF BIRCH TO HANG.

The murderers of Cash Receiver Carey B. Birch, who was cruelly shot down on the night of June 23, in the Armitage avenue car house of the West Chicago Street Railroad Company, while attempting to save the money of his employer, were brought to book in Judge Horton's court one day last month. As will be remembered, on that night two men boldly entered the receiver's office, where Birch was alone counting money, and ordered him to throw up his hands. Instead of doing so the brave employe reached for his revolver, but before he could use it was shot twice by his assailants. Joseph Windrath, who did the shooting, was found guilty and sentenced to be hanged. Julius Mannow, his accomplice, during the trial confessed his part in the crime and threw himself on the Court's mercy.

JOHANNESBURG TRAMWAY.

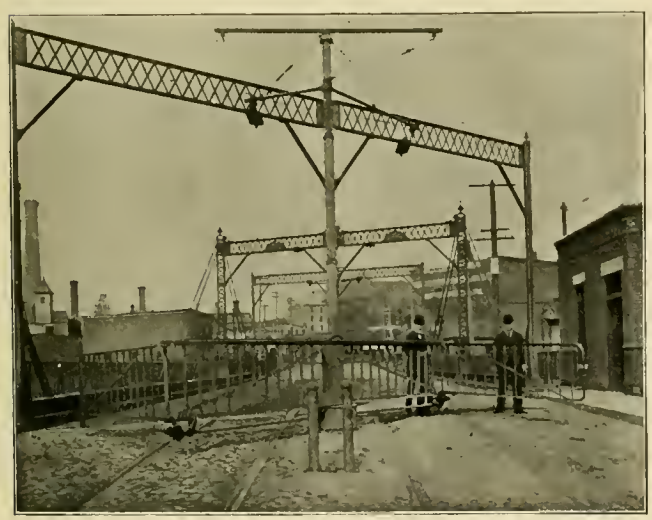
Johannesburg has been so much in evidence the past few months, it is no more than fair to mention that its street railway is a thriving institution, having paid dividends of four per cent in 1894 and six per cent in 1895. The road had 23 cars and 118 horses but has now increased to 35 cars and 155 horses. Passengers carried, 1,833,327—an increase of 600,000; car miles run 272,880. Postal letter boxes are attached to all cars. The manager is Dr. Tyrrell; secretary Mr. Danckwerts.

GATES FOR WALLABOUT DRAW AT BROOKLYN.

The accompanying illustrations are of a new form of gate used at the Washington avenue draw bridge over the Wallabout canal at Brooklyn, N. Y. Although in its present form it is hardly strong enough to be any

GATES OPEN.

protection to street cars it might be made so. The gates were designed and erected by Augustus Smith, of Brooklyn. They have great strength in a minimum of space. The limited room at the approach made it very desirable to have a gate such as this which would fold up in line with the central girder of the bridge. The gate proper is in three parts. The main or central part is simply an iron frame turning on a central post. At each end are

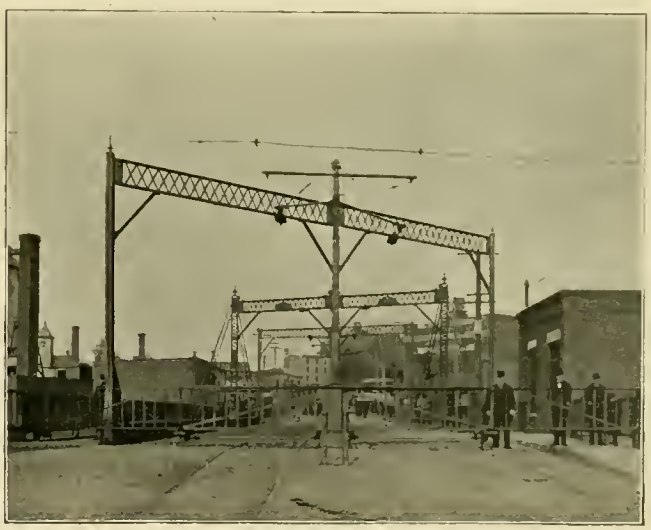


GATES PARTLY CLOSED.

wings operated by a bevel gear as can be seen. The motion of the main gate around the center post turns the gearing and swings the wings out. When the gate is closed the wings are folded up against the gate as shown. When the gate is opened out across the street the outer ends of the wings are against two posts which take the strain and relieve the gears. The central post turns on a ball bearing and the central gear is protected with an iron case.

TOO MANY ELECTRO MAGNETIC TRACTION COMPANIES.

A bill in equity has been filed in the United States circuit court at Philadelphia by the Electro-Magnetic Traction Company, incorporated in West Virginia, and having its principal place of business in Washington, D. C., against the Electro-Magnetic Traction Company, incorporated in Pennsylvania and having its principal place of business in Philadelphia, asking for an injunction to enjoin the defendant company from doing business under the name it has adopted. The proceedings seem to turn wholly upon the matter of identical names, though the bill also asks for an accounting of the Philadelphia concern's profits. The West Virginia concern



GATES CLOSED.

is the one which laid a section of track in Washington and which later sold its system to the Westinghouse Electric & Manufacturing Company.

CHEVRONS FOR TIME SERVICE.

Manager J. M. Roach, of the North Chicago Street Railroad Company, May 1, decorated the sleeves of the uniformed employes of the company with chevrons for time service. This has been the vogue in the Chicago Police Department for several years, but is an innovation in the street railway business. All conductors, gripmen, and motormen in the employ of the road were given a blue stripe for every five years of service as a badge of honor. Those receiving the bars number about 200 men, and they have become known by the patrons of the road as the "old guard."

CARE OF COMMUTATORS OF STREET RAILWAY MOTORS.

BY WALTER C. SMITH, IN MILWAUKEE STREET RAILWAY BULLETIN.

The commutator has a more difficult position to fulfill than any other part of the electrical equipment.

It has to carry on its work accurately and uniformly, and is affected not alone by trouble occurring in itself, but also by derangement of the other parts of the motor and by error in their design. The breaking of one of the armature coil wires, or of the leads which connect this coil with the commutator segment, will cause a violent flashing at every half revolution whenever that coil passes under the brush. This will not only burn the bar nearest the one to which the broken wire is attached, but will also heat and probably injure the insulation and damage the entire armature.

Should one of the field coils become detached the field strength would of course be weakened, which would allow the armature to revolve at a greater speed. This would cause sparking, and consequently a rapid wearing away of the commutator. If the brushes are not set at the neutral point, or point of least sparking, the commutator will be subject to heat, become gummy and will spark badly. Sometimes, if the rocker arm is not properly adjusted, the current will not pass through the armature, but will jump across the brush holder insulator to ground on the motor frame. When this occurs the rocker arm should be raised by placing a thin shim of sheet copper between it and the motor frame.

The brush holders must be set properly, *i. e.*, so that the lateral play in the armature will not permit the end of the commutator to strike the brush holders, which would make a temporary short circuit. The brushes must be set so that they are parallel with each bar, and must not cover more than two segments of the commutator at once. If the brush holder springs are too strong they will cause heat by friction, and wear away the bars unnecessarily. If the springs are too weak, or if the vibration of the motor causes the brushes to make poor contact with the commutator they will spark. Sparking may occur by either a high or low bar, made by allowing the brush holder hammer to strike the brush too heavily, and drive it into the commutator shell, which will cause a bad spark at every semi-revolution.

Brushes not properly adjusted, or touching the corners only when the commutator is worn concave, will both damage the commutator and heat the armature. They should be fitted by placing a strip of No. 2 sand paper between the commutator and the carbon brush, with the brush holder hammer down. The sand paper should then be drawn back and forth until the brush has an even contact with the commutator.

When the commutator has a deep chocolate color and is bright and glossy, which indicates good working order, it should never be sand papered, but should only be wiped off with a piece of oily cloth or waste, carefully removing any oil or dirt that may accumulate on the ends where the brush does not come in contact with the commutator. If this dirt is not removed it will cause a leakage between the bars, and however small this leakage may be, it will in time cause heating in the armature coils. In a number of cases when armatures were examined in the shop it was found that the burning out of coils was due to this cause. The commutators were in excellent condition where the brushes made contact, but at the ends, over the mica rings, there were found several bad short circuits, caused by the excellent conductor formed by mud from the street, combined with oil from the amature boxes and carbon dust from the brushes.

When the commutators are black and gummy it may be necessary to sand paper them several times a day in order to get them down to their normal condition. If this cannot be effected by sand papering they should be sent to the shop to be turned down in the lathe.

Sparking once started is very difficult to stop, but if the commutator is kept clean from the beginning it will require but little work to keep it in good condition.

The commutators of some classes of motors cannot be kept from sparking and becoming black no matter how good care they may receive. The defect lies in the motor itself, and not in the commutator.

LIGHTING UP THE GLOOM.

Rochester, N. Y., has long been famous for the excellence of a number of manufactured articles produced in that city, and for none more deservedly than the lighting specialties of the C. T. Ham Manufacturing Company. This concern has for years been known as the maker of all kinds of lamps, lanterns, and signal lights for domestic, government and railroad purposes, hence it was to be expected that when to its other departments was added a line of street railway headlights, it should in a remarkably short space of time take the lead over all others in supplying oil burning headlights to the street railways of the country. While the manufacture of headlights is but one of its many departments, the same facilities and experience that have won success in the steam road field are given to the street railway branch, and to the superior equipment for this work may be added a progressive liberal management. The Ham Company's 10-inch square motor headlight is undoubtedly the most desirable oil headlight in the market for street railway use. It gives a strong light, which will not blow out in high winds or jar out in crossing switches, frogs, etc. It can be instantly placed in position and as easily removed. They are fitted with a regular locomotive headlight burner, producing a powerful light. The company has, during the past year, equipped one of the roads in Chicago with over 300 of these lamps, and as fast as lamps of other manufacture give out, they are replacing them with this lamp. It has also sold a large order to the Buffalo Railway Company, and many other street railways in different parts of the country.

SCHOOL TICKET AT WILMINGTON.

The Wilmington, (Del.) City Railway, of which C. F. Hutchings is superintendent, sells school tickets in books of 100, for $3.50. The conditions are explained on the inside and outside of the front cover, which is reproduced

Issued 189
Expires ... 189

The Wilmington City R'y Co.

In consideration of the reduced rate at which this ticket is sold, I agree to use it only on conditions named on the cover.

SIGNED:

.....

.....

School.

Not good unless signed by the Superintendent.

Superintendent.

No. 1100

SCHOOL TICKET.

THE

Wilmington City R'y Co.

This ticket is sold subject to the following conditions:

It is for the use of School Children and Teachers only and will not be issued unless request is accompanied by a Certificate from the School Principal. It is not transferable and will be taken up if found in other hands. It carries a transfer privilege.

The coupons in this book are void and irredeemable after

189

No School Tickets issued after April 1st.

INSIDE AND OUTSIDE OF FRONT COVER.

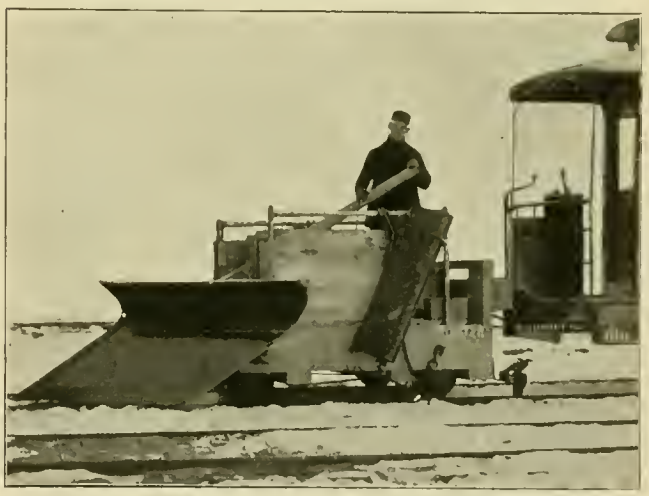
herewith. The books are non transferable, good for teachers and pupils, and carry the transfer privilege. Each book is good for three months after date of issue only, and no books are issued after April 1.

TROLLEYS RECOMMENDED FOR GLASGOW.

Glasgow bids fair to accept the trolley system, which is an encouraging indication of the gradual yielding of the bitter prejudice in England against overhead wires. The London Electrician says: At the last meeting of the sub-committee of the Glasgow Corporation on tramway motors, the report upon mechanical motors drawn up by Councillor Crawford and John Young, general manager of the Corporation tramways, from investigation on the Continent, was submitted. In carrying out the remit made to them, the two gentlemen named spent three weeks in making an inspection of a number of the chief mechanical methods of tramway traction on the Continent. In their general remarks the deputation report that the overhead system is admitted to be both best and cheapest, and in their opinion the overhead system can be extended over all existing routes in Glasgow without any disadvantage, the one great, and practically the only serious objection being the appearance of the wires. Starting with considerable sympathy for that objection, the deputies say that what they have seen has quite removed it from their minds. The wires, where the system is carried out in the most approved manner, give only the very slightest offence to the eye, and a few hours' familiarity removes the objection entirely. The report favors the system of span wires across the streets for the support of the trolley wires, fixing the span wires to the buildings where practicable.

SNOW PLOW AT NORWAY, ME.

The accompanying engraving shows a light home made snow plow built by the Norway & South Paris Street Railway, Norway, Me., of which F. B. Lee is superintendent. It is intended to be pushed by an ordinary motor car. It is not very expensive as $250 covers all the labor and material bills. The point is 38 inches high with an angle of 45 degrees, and having a skeleton iron frame with ¾-inch birch bolted on and shellaced.



SNOW PLOW AT NORWAY, ME.

The nose is so supported on the truck that the point does not have a tendency to rise when going through hard drifts. The weight loaded is about 2½ tons and it does good service on a small road. In connection with it a road leveler or wing is sometimes attached at the side which spreads the snow out so as not to leave a ridge. The snow plow season is decidedly over for this year but as many of our readers will no doubt be building plows this summer we publish the description for their aid at this time.

The attempt recently made to prohibit the employment of boy conductors on the East Oakland Street Railway was not successful.

Every street car in Knoxville, Tenn., was tied up for one entire day last month on account of an abnormal rise in the creek. The water in the Knoxville Street Railway Company's power house was fully eight feet deep.

RAPID TRANSIT IN A FLUME.

While the first cost for construction was high, doubtless the cheapest operating expense in the country for strictly rapid transit transportation, is that described in the San Francisco Journal of Electricity. A lumber company in Fresno county, California, has built a lumber flume fifty-two miles long, which in places has a grade of 23 per cent. and which, as shown in our illustration crosses the Kings river on a suspension bridge 451 feet long. The bridge is built of Roebling cables. The flume is V-shaped, and in addition to carrying lumber is utilized for the transportation of passengers—one way—for, like the road to ruin in the old temperance books, the line only runs one way, and that down. The boat in

SUSPENSION BRIDGE FOR FLUME.

which the passengers travel, or shoot, is a V-shaped box about sixteen feet long and which is roughly knocked together with boards, since it is "good for one trip only." The front end is left off as the velocity of the water is such that it will not run back into the boat. A plank is placed along the bottom, on which the passengers rest their feet while sitting single file on cross seats. When all is ready the spikes by which the boat is held while loading are pulled out and away it goes on its fifty-two miles journey, in some cases attaining the terrific velocity of seventy or more miles per hour.

For the road which has a long steep hill with plenty of water at the top and bottom, this kind of a "chute" would make an admirable attraction for people who love excitement.

ANOTHER BIG ELECTRIC LOCOMOTIVE.

The last of the three great electric locomotives for the operation of all trains on the main line of the Baltimore and Ohio railway, has been shipped from the Schenectady works of the General Electric Company. These locomotives will handle the entire freight and passenger traffic of the B. & O. road, passing in and out of Baltimore from the north, through the belt line tunnel which passes under the city, and which is the longest soft earth tunnel in the world.

Each of these locomotives weighs 96 tons, and while almost equal in size to the largest steam locomotives, greatly exceed them in power—that of each equalling nearly 1,500-horse-power. The first was put into service in August last and the second in December, since which date they have been handling the entire freight traffic of the B. & O. through the tunnel without accident of any kind.

The arrangement of the controlling levers in the cab has been made as like that of the steam locomotive as possible, and the engineer accustomed to the latter has but to pull a lever to start his electric engine with the same ease as he formerly did his steam locomotive.

In appearance these gigantic electric machines resemble a large locomotive cab with sloping shield fore and aft. The cab contains the controlling mechanism, and the shields enclose the air compressors and tanks.

No limit of speed has yet been reached with these engines. Eighty miles an hour has been easily attained

As soon as the third locomotive reaches Baltimore, it will be assembled and placed on the tracks. They will then undertake the passenger service as well as the freight traffic, and the present coke-burning engines used with the passenger trains running through the tunnel will be shut off before entering the tunnel.

TROLLEY LINES REQUIRE MAP.

Robert H. Derrah, secretary to President Little of the West End Street Railway, Boston, has prepared a very interesting map showing the extent of street railways in Massachusetts. Very few people understand that a continuous journey can be made from Gloucester, Massachusetts, or Nashua, New Hampshire, on street railway lines not only to Boston, but through Boston to Brockton and with the completion of lines proposed to Bridgewater, to Taunton to Fall River and Fair Haven upon the south shore of Massachusetts. The trolley lines already extend southwest to Milford only a few miles from the eastern terminus of the Worcester Street Railway now ending in Grafton, and with this gap filled a continuous trip can be made from Boston to Spencer. Developments on account of the electric road have been very extensive around Braintree and Brockton on the south, and Woburn, Wakefield and Beverly on the north. The valley of the Connecticut river has also developed a considerable trolley system of its own, with promise of more in the no distant future.

BROOKLYN HEIGHTS RAILROAD TO CARRY EXPRESS.

First Large City System in the World to Take up this Branch of the Service—Probably the Forerunner of Many More.

We have received the following communication from Clinton L. Rossiter, president of the Brooklyn Heights Railroad, which we can safely predict will be read with intense interest by a large number of street railway men:

"This company, after having been urged by a great many different ones in the city, has arranged to put in effect an express service for the carriage of high class express matter in a manner similar to our carriage of United States mail, and which we have been doing in special post office cars constructed for that purpose, since last fall.

"The service is to be performed in such manner as not to interfere with our regular passenger traffic, as we will keep the cars on the routes where the passenger traffic is lightest and owing to the easier movement and larger load carried, of course, it will remove considerable trucking from the streets. We expect to confine it to the handling of parcels and food products, and matter usually handled by express companies, and the idea has been received with a great deal of favor on the part of every one in the city. Owing to the fact that Brooklyn is situated on an island and therefore has no through railroad connections, it has been at a disadvantage compared with other cities. We expect to have the cars in operation by the 15th of June."

The Brooklyn Heights Railroad is to be congratulated on the fact that this service was asked for by the Manufacturers Association of Kings and Queens counties, and the company was thereby saved the pioneer work of educating traders and citizens to the desirability of this move. John H. Schuman, chairman of the committee on commerce and transportation of this association, at the annual meeting of that body on April 20, made the following address, which explains much in regard to the new move:

Brooklyn always has been materially hampered by the dilatory and expensive methods in vogue for the distribution of all the natural and manufactured commodities on which the physical and commercial welfare of a community depends. The Brooklyn manufacturer has been discriminated against by purchasers in other cities because orders placed with his competitors in New York, or even in Newark, N. J., could be more quickly filled and frequently reached Chicago and other western points about the same time those shipped by Brooklyn manufacturers would get started from New York. The Brooklyn merchant desiring patronage from contiguous points has been at a disadvantage because he cannot make as quick delivery to his customers at those places as can his competitors elsewhere. This inadequate service has, in fact been felt by all classes. Improved facilities have heretofore been impracticable because of the long and expensive wagon hauls in Brooklyn. In January last the committee on commerce and transportation of the Manufacturers Association of Kings and Queens counties took up the question, with a view of ascertaining if the plants of the suburban railroads could not be utilized for the quick and economical transportation of high class express matter, small parcels for delivery at residences, etc., on somewhat the same system by which the United States mails are so successfully carried with such beneficial results to every individual in the city.

The companies were at first inclined to believe that the establishment of such a system would entail too large an advanced expense for equipment, etc., to warrant their putting it into operation, but expressed their willingness to take hold of the matter when it was clearly shown to them that every business interest in the city required better facilities for development. After looking the project over carefully it was ascertained that quick and economical distribution and collection of such business could readily be made in the entire territory covered by the surface lines by the use of a few express cars to start simultaneously several times a day from one central station, each running over a prescribed route, along which, at convenient points, should be located depots into which cars could be switched while loading and unloading their express matter; the local collections and distributions to be made by wagons working from these depots.

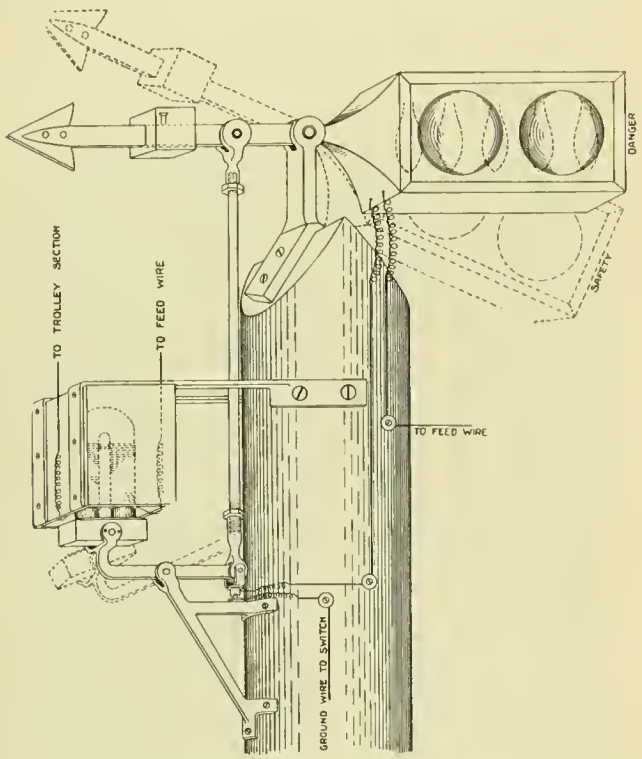
In connection with the express service elsewhere a very comprehensive system is contemplated under which from three to five collections and deliveries a day will be made in all parts of the city by cars running between the East River and Coney Island, Ft. Hamilton, Bensonhurst, Jamaica, Flushing and Newtown. All kinds of high class express matter can thus be carried between Brooklyn and neighboring cities much more expeditiously and economically than it can possibly be done with wagons, and this will be done without the the slightest interference with passenger traffic. The service will enable Brookyn retailers to make deliveries to their customers in Brooklyn at a nominal cost several times a day soon after purchase is made, and will also enable them to deliver to their patrons in suburban towns beyond New York, as quickly as their competitors do. Express goods shipped by Brooklyn manufacturers to western points will be delivered at destination as quickly as New York city or Newark manufacturers can have their express shipments delivered in such places.

Fresh vegetables and fruit from Long Island points will be delivered at Wallabout Market in much better condition than it now arrives after its long and dusty journey by wagons, while all Brooklyn food products which are now brought into New York markets by rail will be taken direct to Brooklyn and by this comprehensive system all be distributed and delivered in Brooklyn, fresh and in prime condition every week-day morning before breakfast.

Cleveland capitalists are considering the advisability of electric road building in Cuba.

SIGNALS ON LOS ANGELES TRACTION LINES.

J. S. Hill, superintendent of the Los Angeles Traction Company has designed and put in operation the electric semaphore signal illustrated herewith. The ideas, of course, are not new, but Mr. Hill has combined them in a practical form for reliable every day use, as is evidenced by the fact that those on the road have been working perfectly for five months past, operating every three or four minutes. The signal is intended for turnouts, railway crossings or any kind of block signal system. At night, the switch on the ground wire from the lamps is thrown in and the action of the signal makes and breaks connection with them as shown. The five lamps in series are entirely enclosed in the signal. The weight is adjusted to pull the signal up to danger by gravity when there is no current in the magnets. Mr. Hill is designing one which will show white light when the signal is at safety and red when at danger, instead of the red danger signal only as in the one shown.



SEMAPHORE ON LOS ANGELES TRACTION LINE.

GENERAL ELECTRIC COMPANY—ANNUAL REPORT.

The fourth annual report of the officials of the General Electric Company indicates that in spite of the prevailing depression in business the past year has been one of a fair degree of prosperity. The business for the year was not quite 10 per cent in value above the value of the sales of the previous year though the actual increase in output was more than 30 per cent greater. It is stated that the reduction in selling price was met by a corresponding curtailment in cost of manufacture and other expenses.

Other interesting features touched upon in the report are brief accounts of the successful operation by electricity of roads hitherto operated by steam; the introduction of electric power upon elevated roads and the work of conductors in underground conduits in New York and Washington. Reference is also made to the installation of several plants for the transmission of power to considerable distances in several localities. The report as a whole shows such a condition of affairs as should be encouraging to the stockholders and a source of congratulation to the management.

FIRE AMONG OUR INDIANAPOLIS FRIENDS.

A large fire which destroyed the Wright building, adjoining the power and car houses of the Citizens Street Railroad Company, Indianapolis, damaged that concern's property to the extent of about $3,000, and stopped traffic on its lines for several hours, early one morning last month. The falling walls of the burning building fell on the distributing wires of the road, and carried them to the ground, burying them beneath a mass of hot bricks. The roof of the boiler-room became ignited, and being of wood, was entirely destroyed. Electrician J. L. McCready appeared early on the scene and, as soon as the fire was under control, began straightening out the tangle. The fire occurred at 4 a. m., and at 10, all the lines were in operation as if nothing had happened. The Commercial Electric Company, located in one of the burned buildings, lost about $15,000, mostly covered by insurance. The railroad's loss was entirely covered.

HARD ON CONDUCTORS.

The Railway World, London, in speaking of the Glasgow Municipal Street Railway says:

Tramway employment seems to be made no easier for conductors under municipal management than under the direction of private companies. In fact, in some respects the employes find their position decidedly less comfortable now that the casual passenger considers himself part proprietor, if not, indeed, an assistant manager. An evening paper draws attention to the "great increase of late in the number of fussy persons of both sexes who cannot enter or leave a car without attempting to pick a quarrel with the conductor in regard to the execution of his duty. This they do under the mistaken impression that because the conductor is in the service of the corporation he is also for the time their private lackey. Yet these same people," observes the journal, "would be the last to apply that line of reasoning to a policeman, who is also a corporation servant." Quite so! The reason is obvious and also the remedy.

The offices of the Harrisburg, Pa., Traction Company have been changed to No. 9 South Market square.

FIRST THREE PHASE ELECTRIC RAILWAY IN THE WORLD.

The electric tramway just completed at Lugano, Switzerland, by Brown, Boveri & Company, the well-known Swiss electrical manufacturers, is of great interest as being the first commercial electric road in the world to employ three phase motors and the three phase system of distribution. A truck equipped with a three phase motor was exhibited here by a German firm at the World's Fair, and the larger electrical manufacturing companies of the world have been experimenting considerably with motors of this kind for railway work; but up to this time none have been put in actual service. If the Lugano road is successful its opening will mark an era in electric railroading, for it means an emancipation from the limitations of direct current apparatus. While the direct current is the best, and probably always will be for many cases, there are also many cases, (too many to enumerate and explain here), where the use of alternating current apparatus would be more economical if the supposed minor difficulties are overcome.

The power to run the road at Lugano is generated seven and a half miles away, at a waterfall, by an alternating current generator of 150-horse-power, giving 5,000 volts pressure with 40 cycles per second. This three phase current is taken over three wires at 5,000 volts to the center of distribution of the tramway system where it is transformed down to 400 volts, at which latter pressure it is fed to the trolleys and track. As three wires are necessary to conduct the three phase current two trolley wires are used in addition to the ground return. Each car has a single reduction motor of the three phase type. These motors have no commutators, and the fields only are connected with the line. There are, however, three contact rings on the axle for cutting resistance in and out of the armature circuit in starting and varying speed. The simplicity of this arrangement makes its desirability apparent to all. In fact, it would seem that the greatest obstacle to the three phase system is in the complication of the double trolley system and not in the motors or generating apparatus, which latter are much more simple than those for direct current.

The cars on this road are on trucks with a 4½-foot wheel base and seat eight people with room for eight on each platform.

The insulators on the trolley line bear the familiar "Aetna" trade mark of A. & J. M. Anderson, of Boston, and the same firm also supplies the Boston pivotal trolleys employed. We are indebted for our illustration to the London Electrical Review.

FIRST THREE PHASE ROAD IN THE WORLD, LUGANO, SWITZERLAND, DOUBLE TROLLEY AND GROUND RETURN.

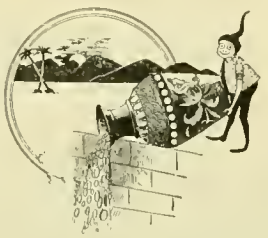
BALTIMORE TRACTION COMPANY'S PLANS.

The stockholders of the Baltimore Traction Company, at a special meeting held on the 30th ultimo, ratified the action of the directors in the matter of issuing $800,000 of five per cent gold bonds. New extensions and improved equipment are proposed in the immediate future. It has been decided to change the Druid Hill avenue cable line to run by electricity, and to extend it so as to connect with the line running to Sparrow's Point. New barns and a large repair shop are also included in the list of improvements. It is expected that the decreased cost of operation and repairs will more than compensate for the additional fixed charges, resulting from the bond issue.

REMINISCENCES OF PALMY DAYS.

How Things Were Run in the Infancy of the Electric Railway —Scientific Methods of Securing Orders—Money Flowed Freely Then—How Spies Spied.

The palmy days when money flowed like water for all electrical enterprises, and rattle trap apparatus sold for several hundred per cent profit are over. Peace be to their ashes—but no, before they are consigned to oblivion let us pull out a few choice stories for the benefit of some of the younger generation. It does seem rather strange to talk about the younger generation in a business only ten years old, but it is, nevertheless true, that some of the best and leading men in the business today have entered within the last few years, and to them the tales of early days, not very far back, are as full of interest as if they happened one hundred instead of ten years ago.



MONEY FLOWED LIKE WATER.

As the chief actors in all the following series of dramatic incidents have long ago sought other fields of usefulness, and as the companies mentioned are no longer in business it can do no harm to relate the facts; changing names for obvious reasons.

The Kilowatt Electric Railway & Motor Company had put in its first road, and while its working could in some respects be called literally a "howling success," it was doing well enough so that numerous street railway men were beginning to seriously consider the adoption of the new motive power and the aforementioned Kilowatt Company was working hard for new contracts. The Horse-Power Electric Company had entered the railway field some time after the Kilowatt Company and had not done much work, but was making a strong effort to secure business as later events will show.

A HOWLING SUCCESS.

About the time that the wheels were fairly turning on the Kilowatt Company's first installation at Jericho, along came a European nobleman who owned a horse tramway, and who was looking up the subject of electric motive power. To make a long story short, the Kilowatt Company secured the contract to equip said nobleman's road and he returned to his native country.

It was just at this point that the conspiring villain came upon the stage of action in the form of the Horse-Power company. While as said before, the Kilowatt Company's first road at Jericho had been on the whole a success, there was yet much to be desired and the management was not of the best so that an unfriendly critic on the ground could pick plenty of flaws. It does not need to be said that the Horse-Power Electric Company had representatives on the ground to watch the workings of the road at Jericho for the express purpose of reporting such flaws so that the salesmen of said company would not have to manufacture lies out of whole cloth when they told of the numerous defects of the other company's apparatus. Such being the case it was an easy matter to fix up an associated press report and scatter it broadcast over the country, telling of the grand fizzle of the electric road at Jericho; and it was a still easier matter to get together a collection of the numerous papers in which the report appeared, mark them, and send them, express prepaid, to the European nobleman who had given his contract to the Kilowatt Company.

When the reports appeared "all was excitement" at the offices of the Kilowatt Company. They knew that the nobleman would doubtless be over on the next steamer. They also knew that if he visited Jericho at that time he would very likely feel like canceling his contract. Therefore, said the officers among themselves, "whatever happens we must keep the count away from Jericho," and a deep plot was laid. In the first place they reasoned that the count would probably report at the Kilowatt offices as soon as he landed, but as a safety precaution a man was assigned to the duty of watching every steamer that came in. This was only the preliminary step however. Once in the Kilowatt Company's offices he was not to be lost sight of until safe again on a homeward bound steamer.

As was anticipated, the next boat from across the pond brought the count, and he soon appeared at the Kilowatt company's offices. Of course the general manager was delighted to see him, "come just at the right time," etc., etc. As soon as the effusive greeting was over, the general manager said: "Now, count, I know you want to look over some of our installations, and we will be most pleased to have you do so. We have planned a three weeks' trip for you, which includes a visit to all the roads we have put in since you were here before. Our Mr. Sellquick will go with you and see that you are properly entertained. When you get back here we

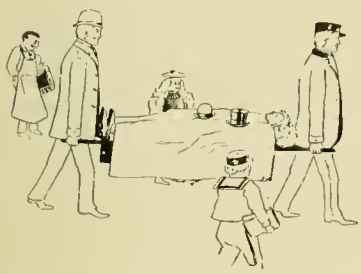
want you to take a trip to Jericho, as you no doubt want to see how things are running there before returning home. We hope you can make this trip. We have made all the arrangements, and it will be a great disappointment to us if you cannot." The count answered that this would be very satisfactory, indeed. How soon could he start? Well, he had a little private business to attend to, which would take him three days. Then he would be ready for Mr. Sellquick to escort him on his three weeks' trip. Arrangements were made accord-

ingly. Now, Charlie Sellquick was the company's crack salesman. He was one of those fellows that could start out with a tea kettle and sell it for a steam engine from one end of the country to the other. His instructions for this trip were that he was to keep the count moving. Ever night possible was to be spent on a sleeping car, and the count was to have a berth over the trucks if possible. Further than this, and what was still more essential to the plan, was that he was to have plenty to drink, and if possible, not allowed to get sober during the entire three weeks. When he returned he was to be so utterly tired out that he would not listen to the proposition of a trip to Jericho, but would take the first steamer home.

The count transacted his private business, and the start was made. No one knows the history of that entire trip (not even the participants in it), but one of the Kilowatt boys, who ran across the pair when about the fourth day out, reported that Charlie Sellquick was fullfilling his part of the contract to the letter, as neither one was sober enough to tell a motor from a controller. When they appeared at headquarters they bore every semblance of physical wrecks, and Sellquick felt that he had done a good job.

THE FOURTH DAY OUT.

"Now, count," said the manager, when they settled down in the private office after the return, "I want you to go to Jericho to-night. We have railroad tickets bought"—"I don't want to go there," snapped the count. "I'm going to take the next steamer home." "But, count, we do not want you to go back without visiting Jericho; I insist that you go down there." "Why should I want to go there," retorted the count, "I was there when I first came over."



THE RETURN.

—! ! !—

When the general manager had recovered the breath lost by the shock he inquired meekly: "And you want to countermand your contract?" "No, sir;" replied the count, "I do not. When I received all those papers with the adverse reports in I did not know the workings of the American press and naturally felt uneasy and came over to investigate. The private business I had the first three days was a trip to Jericho. I saw your game and thought I would let you work it. You Americans are very sharp, very clever, very shrewd, but after all we foreigners are not nearly as big fools as you think we are. I don't want to cancel the contract because as near as I can learn your work and apparatus is as good as any. Good day, sir."

THE KILOWATT OFFICES AFTER THE COUNT LEFT.

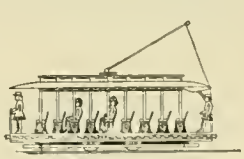
AU REVOIR.

Can any one tell exactly how the manager and Sellquick and the rest of the boys in the scheme felt? It was a "funny feeling" to say the least.

* * *

HOW TWO SPIES SPIED.

And it came to pass in those early days (for the reign of the single reduction motor was not yet come) that a certain great and mighty corporation by name the Kilowatt Electric Railway & Motor Company, did construct and equip several roads to run by lightning, yea even "juice." Now it came to pass also that another great conglomeration of filthy lucre, by name the Horse-Power Electric Company smote its hands together and swore a great swear that it too would equip roads with juice. Therefore was there much strife between these two companies. And the Kilowatts sent spies into the lands of the Horse-Powers and the Horse-Powers sent spies into the lands of the Kilowatts, and as to which had the most spies no man knoweth only that the land was full of them. Now among the spies which the Kilowatts did send forth was one Nilus (Son of the Nile) who did go forth unto an exceeding small road in the land of the Horse-Powers. And he did conduct himself with great caution even unto taking food and shelter at another city not far distant. And it came to pass before he had tarried many days as he stood at the intersection of the streets when it was evening that he saw a sight which filled his heart with exceeding great joy. For behold a chariot run by juice was coming down the street, and Nilus saith to himself "Lo, there will be trouble before this chariot proceedeth many miles on its journey for I see signs of a great sickness among the wheels of this chariot. Therefore will I gird my loins and mount upon this chariot, that I may see what great sickness smiteth the apparatus of our enemies the Horse-Powers." And Nilus mounted up upon the chariot and paid his shekel unto the conductor. And behold as he rode there mounted another on the car, and this other was one of the tribe of Experts, of the nation of the Horse-Powers. And Nilus smiled unto himself, thinking that the Expert knew him not. Now soon it came to pass, as Nilus had thought, that the workings of the chariot did become confused, so that the chariot did stop. And the charioteer and the one of the tribe of Expert, did tear up the floors of the chariot, and search diligently, but the trouble they

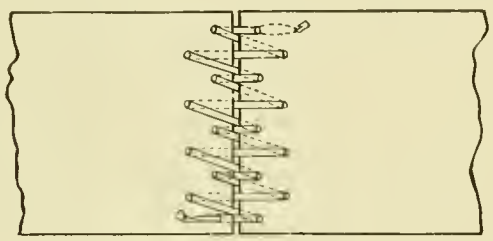


NILUS MOUNTED THE CHARIOT.

found not. And the charioteer was sore puzzled and amazed, that the trouble could not be found, but the one of the tribe of Expert, saith unto him, fear not, be not afraid, be of good courage, for verily I say unto you there is one on this car who can fix it, for he knoweth more than all of us put together. Then did Nilus feel very cheap, yea, he would have sold himself for two small measures of meal, but he saith unto him of the tribe of Expert, "verily, must thou have been at Jericho," and him of the tribe of Expert, answered "yea." So felt Nilus not so cheap, after all.

BELT LACING.

Chas. Lewis in the Railway Master Mechanic, describes a method of belt lacing which he once designed to meet the requirements of a difficult case. The machine was a heavy sand-papering machine having a vertical shaft carrying a wheel four feet in diameter. The belt was ten inches wide and the conditions were such that it lead from the line shaft direct with a quarter turn. Few lacings or fasteners of any description could be made to last longer than a day or two until the form



shown in the accompanying illustration was devised. The holes were punched "staggered" and of a diameter equal to the width of the lace, and the lace was passed alternately from one side of one end to the opposite side of the other, forming a sort of double-action hinge. The theory was that a greater amount of freedom was given to the belt to enable it to adjust itself to the twist. The lacing is said to have lasted two or three weeks against as many days with systems previously tried.

AN AERIAL TROLLEY LINE.

A Berkeley, Cal., capitalist, Richard P. Thomas, proposes to build a trolley line consisting of double tracks of cables supported upon trestle work thirty feet high from which the cars will be suspended. The motive power will be electricity and a speed of 150 miles per hour on level is promised. It is said that an experimental line will be built to connect Berkeley with San Francisco by way of Goat Island.

Police Superintendent McKelvey, of Brooklyn, N. Y., has issued an order to his subordinates, instructing them to prevent as far as possible boys from running in front of moving trolley cars, and children from playing in streets traversed by electric lines.

NO STRIKE IN PHILADELPHIA.

The widely published strike which was to occur on the Philadelphia lines, May 1, never materialized. The Philadelphia Times says there was a strike—of the car men against labor agitator control, and adds: "The car men's strike was a decided success because it struck out that band of organized labor agitators whose mission in life is to fatten upon the misfortunes of their dupes. It is not often that labor offers such a dignified rebuke to labor agitators as it has done in this case, and the thousands of working men who are making a decent living by continuing in control of their cars, are much better off than they would have been prowling around at the heels of autocratic walking delegates, whose sinecure positions depend upon their ability to lead their dupes into trouble and to stir up fights between capital and labor."

The Amalgamated Association in Philadelphia is dead—very dead. April 30 it had 4,000 members; May 1, it virtually had none, as members refused to go out and so forfeited all "rights." The treasury is empty and the men have come to see that the labor leader agitators are their worst enemies instead of their best friends.

STEALING CURRENT FROM FEED LINES.

A Brooklyn saloon keeper was arrested April 21, on the charge of stealing current from the Brooklyn Heights Railroad. There were also about twenty other offenders. It was found that these saloons had been wired for electric lights with lamps five in series and a connection made with the railway feed wires at points where it would not be readily noticed. It seems that the work was done by a former employe of the railroad company, who went to the various shop owners along the street, representing himself to be connected with an electric light company, and offering to take the contract for lighting at a very low rate. He came in monthly and collected the bills. The discovery was made by Henry M. Brockbank, superintendent of electrical construction of the company. In order to prove that the current was being stolen from the railway company's wires, and to locate other offenders, the current was momentarily cut off that section several times in an evening at preconcerted times, the police inspectors being on the watch.

TWO ROADS RAISE WAGES.

Two "soulless corporations" have voluntarily raised wages the past month. The Suburban Traction Company, of Orange, N. J., of which Watson Whittlesey is receiver, announced that the wages of men employed at the time the receiver took charge would be raised from $1.75 to $2 per day, and at the end of six months, the balance of the men will be raised to the same figure.

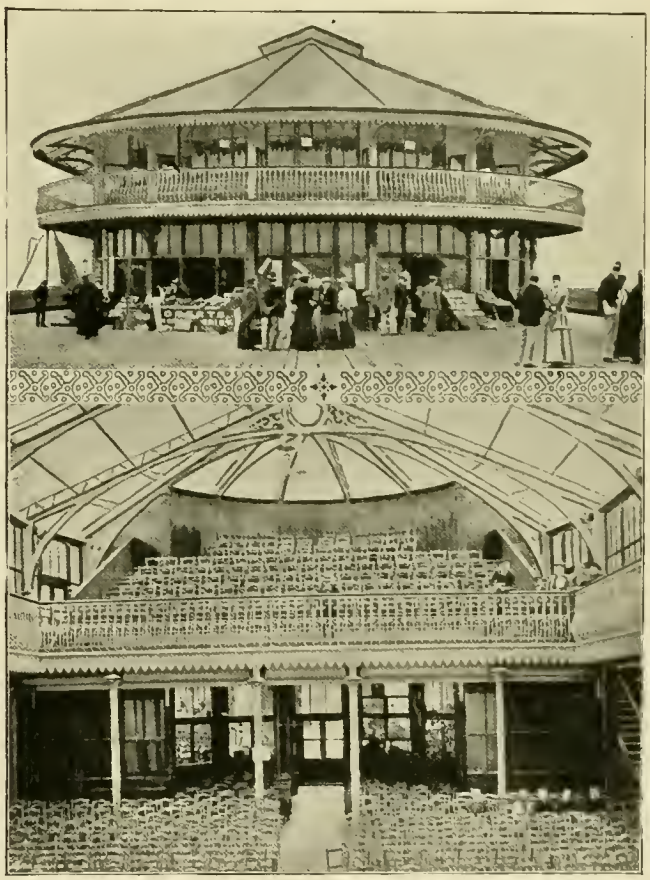
The Akron Street Railway & Illuminating Company advanced conductor's and motormen's wages from $1.50 to $1.60 a day.

Pleasure resorts have come to stay. There can be no doubt about it, and the rapidity with which progress is being made in this direction is simply remarkable, and it is a question of only a few years when every street railway in the country will have either its own pleasure resort operated directly under its own control, or will provide some kind of attraction in city parks which they can advertise and to which they can draw the pleasure seeking public during the summer months. The series of articles in the REVIEW on pleasure resorts has attracted wide spread attention, and greater interest is being given to the subject than ever before. The reports below from managers of roads which have operated resorts for one or more years will give a fair idea not only of the possibilities of this business, but as to what attractions have proved most profitable and successful on their lines. Music of all kinds is uniformly found to be a drawing card, and light vaudeville and specialty artists are as a rule better than the higher priced comic operas, except for very large resorts which can draw upon the population of the large cities for support. It has been a surprise to many managers to find at how comparative small expense they could convert properties near their lines which have always been looked upon as worthless grounds into attractive pleasure resorts. Of course, where nature has provided picturesque surroundings there is much less to do, but even the most prosaic places can be made attractive and pleasant; for after all, what the people want is plenty of fresh air and sunshine, trees and green grass, with music and other simple amusements to while away the time.

At least one good pavilion should be provided for shelter in time of sudden rain; and to furnish facilities for the restaurant and other concessions, which if properly handled can be rented out for the season at a sufficient revenue to largely pay the cost of operating the park. One thing should be borne in mind and that is the refreshments and other articles on sale and the price charged for all of the amusements—unless they are free—should be just as cheap as possible consistent with good service. Five cents seems to be the popular price for a ride on the merry-go-round, or admission to the theatre, although an extra nickel may be charged for a reserved seat; but there is nothing which will more quickly kill a resort than fancy prices for lunches and the amusements which the people desire to enjoy. As a matter of fact, if a company can operate a resort and furnish a nice line of attractions and make the resort pay for itself, it is doing well, for it will make a good profit on the business hauled to and from the park; but where the line of amusements is handled judiciously it is quite possible to show a good surplus over and above the operating expenses of the resort.

PAVILIONS.

We have had several requests to publish designs for cheap but attractive pavilions, to be erected at pleasure resorts. The illustration shows one well suited to this purpose containing a second story promenade extending



all the way around the building, while the protection thus afforded by the floor of promenade becomes a roof to shelter concession stands on the ground floor. The interior is fitted up as an auditorium, with gallery at one end. The interior view shown is taken from the stage. An iron skeleton frame supports the roof, which may contain as much glass as necessary to light the auditorium, without making the interior too warm in hot weather. A pavilion of this kind may be erected at comparatively small cost, while admitting of as much ornament and expense as the builder desires.

REPORTS FROM RESORTS.

Continuing our reports from the various roads begun in our April issue, we find great activity.

MARINETTE, WIS.

President H. S. Higgins says: "We have two parks, Higgins Park and Lakeside. Higgins Park is inland and being close to the city, it is convenient for theatricals and dances. We have in this park quite a zoological display of the smaller animals, such as bears, deer, monkeys and quite a variety of birds, which makes it attractive for ladies and children. The park is well filled with stately pines and maples, among which are scattered many seats and swings, where lovers can languish in each others smiles, or sweethearts can be swung as high as their nerves will allow, without being at all bothered by others, as the grounds are spacious. We have in this park a pavilion 80 by 100 feet well fitted with folding opera seats and a well equipped stage. We have had theatricals here during much of the park season for the past four years, and have found it paid fairly well and shall continue the same course this season and now have theatricals already booked for half this season.

"There is no liquor sold upon or near the grounds. Our Lakeside line was built last year. Lakeside park is on the shore of Green Bay, is two miles from town and the beach affords an excellent place for bathing. The street railway company owns the land along the beach for over a mile, and we carried thousands of people there in the short time we ran the road last summer, not having opened the line for travel until the first of August. The company has built a hotel, "Lakeside Inn" at this place, also docks, bathing and boat houses.

DAVENPORT AND ROCK ISLAND.

"We opened our resort May 1. As you are aware, we have twenty acres of ground on the summit of a high bluff on Rock river, at its junction with the Mississippi. In addition to our large pavilion, with its dancing hall, dining hall and broad verandas, we have beautified our grounds with open picnic pavilions, broad walks and flower beds. We propose to have concerts every afternoon and evening during the summer, and have engaged different musical organizations as permanent fixtures at the resort, such as Hungarian Band, Viennese Orchestra, Ladies' Military Band, etc.

"During June, July and August, we will give performances every evening, with Sunday, Wednesday and Saturday matinees, in our open air theatre. The performances will consist, mainly, of high class vaudeville and musical attractions.

"We have on our grounds, in full view of the large pavilion, a home made electric fountain, which plays for one hour, Tuesday and Thursday evenings. The fountain gives all the beautiful light effects, same as the Chicago fountains, but on a smaller scale.

"Our electric toboggan slide, or "shooting the chutes," has lost none of its old-time popularity. We vary the summer amusements with some of the sensational work, such as balloon ascensions and parachute leaps, high diving and high wire performances over the river, etc.

"We propose, this year, to make a specialty of working up excursions from the interior towns to our Black Hawk Watch Tower, as an objective point. We are sending out extensive advertising matter, and propose to send out an agent to work up all interior towns on the different railways, and river towns reached by the steamboat lines. An experiment in this direction last year yielded good results."

AKRON AND CUYAHOGA FALLS.

"We think we have the most perfect railway summer resort in Randolph Park that there is in northern, if not the whole state of Ohio," said Mr. Randolph, for whom the park has been named. "It is, of course, no small adjunct to the Akron and Cuyahoga Falls Rapid Transit Company, considerable revenue being derived by transporting pleasure seekers to and from the grounds.

"The park is located at the northwest end of Silver Lake, and also on the beautiful Crystal Lake, a fine body of water covering about thirty acres. The route from Akron, the main terminal of the railway, through Cuyaghoga Falls, along the Cuyaghoga river, through picturesque scenes, forest groves and glens, and extending into the grounds, cannot be described. Its beauty is all the heart can wish. Sloping back from the lake the grounds rise to a height of fifty feet above the water, and being perfectly level for a distance of several hundred yards form the most complete picnic grounds. On this elevation is located a large pavilion, complete in every way. It is one of the biggest in the State, covering more than 10,000 square feet of surface, and will seat 6,000 people. In this pavilion is given a vaudeville entertainment during the season. This we have found a very fetching form of amusement. This summer we will no doubt enter the circuit with the pleasure resorts of Johnston's Island, Put-in-Bay and Cleveland, playing their attractions at Randolph Park. Besides there is to be a large hotel, with upwards of 100 rooms, built on the grounds, and as the bathing, fishing and boating is of the best, it is expected many persons will spend the entire summer there. Summer cottages and camping parties add to the gaiety of the place. The "child's delight," a bathing beach fenced in and made free for children, we have found a first rate attraction. It makes the children perfectly safe, and the mothers are consequently happy with that assurance. The park is well supplied with swings, teeter boards, and a herd of deer is to be added to it. The water is excellent. It is pumped seventy feet by electricity and piped over the grounds. No intoxicating liquors or games of chance are allowed in the park. The park is well lighted by electricity, and in a word there is nothing which could add to its completeness that has been left undone."

CALUMET ELECTRIC.

The Calumet road, Chicago, enjoys all the advantages of the numerous resorts along the lake shore.

which have been built and are operated by private concerns. The road has a fine grove—Calumet Grove—and already has booked a large number of picnic parties. One booking alone calls for a special car service to move 3,000 persons at one time. Special cars are being built for small trolley parties of which the Calumet makes a great feature; and 80 new cars for the excursion business. The work of conducting these excursions, as well as working them up has become so heavy a special department has been established, in charge of E. H. Fox, whose experience and ability well fit him for the work.

SEATTLE, WASHINGTON.

"Five years ago," writes A. F. Haas, superintendent of the Seattle City Railway, "this company in order to secure additional travel, fitted up at Lake Washington, Leschi Park, which has proved a good investment. Besides the various shrubbery and flowers we have plenty of swings, cozy places for the young people to enjoy, boating on the lake; also a fine zoological collection. The park is the most largely patronized of any in the city, and looks very fine with its green lawn and bright flowers. We also, on Sunday afternoons, have the First Regiment band give an open air concert. These are well patronized. Later when the weather becomes warmer the band will give a concert on Wednesday nights, when the park is illuminated with Japanese lanterns. This makes a fine effect as the cars come in sight of the park. After three years' trial we conclude the music is the best attraction."

ASHLAND, KY.

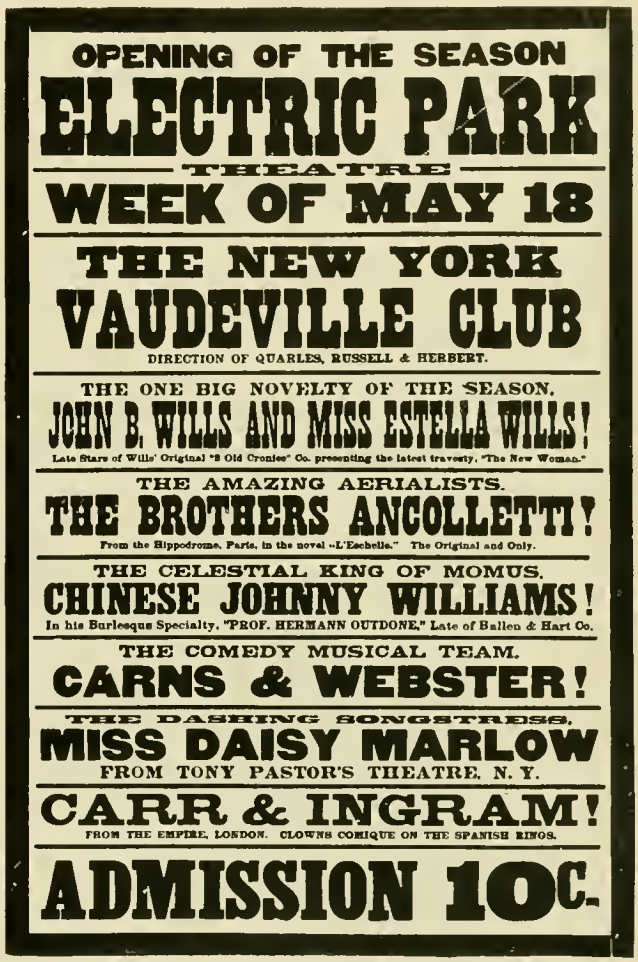
Superintendent Wellman, of the Ashland & Catlettsburg, is making special inducements to Sunday schools, lodges, etc., and publishes in his advertising matter an extract from one of Talmage's sermons on outdoor sports. Clyffside park is midway between the two towns, covers 30 acres and a lagoon of 17 acres, all lighted with electric lights.

BOWLING GREEN, KY.

Manager Crump, of the Park City Railway, has two parks, one at each terminus, and also uses the Warren County fair grounds, and park of 40 acres, where he has arranged for 50 games of base ball this season. At the river terminus is a 15-acre park and amusement grounds from which excursions on the river steamers are run three times a week. Row boats are provided, and a large building seated for concerts, with restaurant facilities attached. A small steam launch seating 25 persons, does a good business. During the past winter, many trolley parties were given by the church societies, in which the company allowed them 25 per cent of the receipts. For this season a riding gallery is being installed; balloon ascensions will be given; fireworks, etc. This line makes a round trip fare of 10 cents, against 50 cents on the steam road, and naturally carries pretty much all the business.

KANKAKEE, ILL.

General Manager Cobb is fully up to the times and last year furnished some good entertainments in Electric Park, belonging to his road. The reproduction herewith is of the mammoth poster which announces the inauguration of the pleasure resort season in Kankakee.



As will be seen the bill is an unusually strong one, and is a fair sample of the attractions offered by the Street Railway Park Amusement Company, of Chicago, which furnished the artists and will furnish the Kankakee road all summer.

WAUKESHA, WIS.

The line opened last season to Pewaukee Beach, did a big resort business. All kinds of boats for rowing, sailing and fishing are provided. When the extensions of the Milwaukee and Waukesha road are completed, 12 lakes will be connected. A large number of amusements will be provided.

COVINGTON, KY.

T. M. Jenkins, superintendent of the South Covington & Cincinnati Street Railway expects to handle 25,000 to 30,000 people a day at the company's resort, the Ludlow Lagoon, which, with the grounds, covers nearly 200 acres and on which $200,000 has been spent. A fine club house, theatre where high grade vaudeville is given.

and a scenic railway are among the features. The theatre seats 2,000. An artificial lake of fifty acres with forty feet of water, affords good boating and fishing. The company is spending $100,000 this year in improvements and providing amusements. The big wheel at the Atlanta Exposition has been erected here, and "chutes" have been installed. The resort is one of the most complete and successful in the country.

PORTLAND, MAINE.

H. R. McLeod, general manager of the Portland & Cape Elizabeth Railway, says:

"We have completed a large Casino building at the cove terminus of our line, a picture of which I send you. The main building is 50 x 110 feet, with large portico and bays on front side, also two balconies the full width of the building extending twenty feet on the shore end of Casino. The first floor is divided into an office and check room, two bicycle store rooms and 30 bath rooms. The second floor is intended for large assemblies and for dancing purposes, having a hardwood floor composed of first quality rift maple. It also contains a stage in one end 25 feet wide and 25 feet deep, with suitable dressing rooms on either side. There is also a gallery floor extending round the entire building some 12 feet in width. The building has also a deck roof where visitors can promenade, affording a splendid view of the ocean and the islands in Casco Bay. There will be an orchestrion in the main Casino hall which was manufactured in Germany, and will be operated by means of a small motor. The building and surroundings will be lighted by means of a storage battery which we shall charge from our trolley circuit. As our road is comparatively new I cannot give you any data as to the most profitable attractions furnished for the general public. Provision is being made now to introduce other features of amusement at this pleasure resort."

PORTLAND CASINO.

ROCHESTER, N. Y.

Superintendent West, of the Rochester & Irondequoit Park Railway has finished changing the gage of the old Glen Haven road from narrow to standard and will have the line open for traffic about May 25. At the terminus work is being pushed to put the resort in order for the summer business; flower beds are being laid out and five groves will be provided with picnic facilities and pavilions. A Dutch oven will be put in for the accommodation of picnics, and stationary stoves will be placed in each of the pavilions. Special attention will be paid to picnic parties. Eighteen amusement companies have been contracted for to furnish out-door attractions, and ten cars built by the Stephenson company will be operated.

SAGINAW, MICH.

The resort of the Union Street Railway will be made more attractive than ever this year. Bathing will be free, and the deer park and menagerie have been enlarged and additional animals purchased. Several portable cottages have been erected and a five-cent fare will be made from all parts of the city. Special attention will be paid to picnic parties, and a string band has been engaged.

THE A. B. C. ROAD.

This splendid interurban, the Akron, Bedford & Cleveland, has several resorts on its line.

The most important is Silver Lake, which is situated six miles north of Akron, and thirty-two miles south of Cleveland. This is one of the most popular resorts in the state for Sunday schools, lodges, etc.

As this is its first year, the management are, of course, making a big effort to get all the business they can to go there, and will run special trains for Sunday schools, lodges, etc.

The other resort on the line is Boston Ledges. It is situated twenty-four miles south of Cleveland and twelve miles north of Akron.

At Silver Lake are all picnic facilities, base ball grounds, bicycle track, grand stand, merry-go-round, dancing pavilion, shooting gallery, tennis court, bathing and water toboggan slide, row and small steam boats and an animal show. No intoxicating liquors are sold on the grounds. J. C. Mengensdorf is general passenger agent of the A. B. C. road, and has charge of the resort features.

OTTAWA CANADA.

The Ottawa Electric, J. E. Hutcheson, superintendent, has at the eastern terminus of its line a very pretty resort called Rockliffe Park, to which place, during the past three seasons, it has carried thousands of people, the only attractions being a military band giving open air concerts, afternoon and evening, a merry-go-round, and the picturesque surroundings of the place. Last fall the tracks were extended to a park in the western suburbs, where attractions will be given in the evenings, making a small charge for admission.

Manager Belden of the Aurora, Ill., Street Railway, will build a park resort this summer.

One of the features of the suburban line at Allentown is the duck farm—the largest in the world.

The Altoona & Logan Valley Electric Railway is erecting a summer theatre to seat 600 people.

F. W. Pierce, of Atlanta, Ga., will erect a pleasure railway to cost $10,000, for a Philadelphia resort.

The road at Greensburg, Pa., has closed dates for nearly all the days in July and August for picnic parties at its railway park.

The winter garden of the Lehigh Valley Traction Company at Allentown, Penn., was struck by lightning and burned. Loss $10,000.

The Rapid Transit Company, Akron, O., has engaged Geo. M. Watt, formerly employed in the White House conservatory, as landscape gardener, to beautify Randolph Park, its resort.

Superintendent McClary, of the Birmingham, Ala., Railway, will make a drawing card of his base ball park, where he is also building a bicycle track for racing. The company is erecting a fine grand stand to seat 3,000 people.

The street railway at Venice, Ill., has built a dancing pavilion and laid out a summer garden on its grounds near the car house and will give moonlight picnics during the summer; also established a base-ball park to be one of the finest in the west.

At Minneapolis Vice-President Goodrich has arranged with the commissioners for the boats at Lake Harriett, and will take all the receipts over $3,000, and in return will furnish music and other attractions which will cost not less than $7,000.

At Marinette, Wis., President Hinsggi of the street railway has closed contracts for the erection of a dock which will lead out 500 feet into the lake, at the end of which will be a large band stand, where afternoon and evening concerts will be given. Additional boats have been added to the fleet and the summer theater will be a prominent attraction.

The Kirkwood electric line at St. Louis will shortly have an added attraction in a summer playhouse which is about to be erected at Meramec Highlands near the end of the line. It will occupy a ground space of 175 by 200 feet and is promised to be one of the finest summer theaters in the west. The enclosure will contain a promenade and refreshment room and a stage 30 by 40 feet in size. The material will be entirely stone and iron and the cost is estimated at $60,000.

AQUATIC ATTRACTIONS.

Captain Paul Boyton, who enjoys a universal reputation as an aquatic sportsman, has reorganized his world's water show for the season of '96, and it will be found to be an excellent attraction for any resort possessing a lake, lagoons, or water site. The captain returns to the United States after spending three years in Europe, where he made a special study of aquatic exhibitions. His address in America is 173 Broadway, New York. While in the old world Captain Boyton secured some of the best water performers of London and Antwerp for his show, every member of his troupe being an expert in this line. He is particularly catering to street railway resorts, and his acts—some twenty-five are all selected with a view of attracting and entertaining large crowds. Among these may be enumerated "The Walrus Hunt," a laugh-provoking English pantomime, the great monkey boat race, with monkeys at the oars, showing the only rowing monkeys in the world, water bicycles, canoes, boats, clowns, log rollers, rubber suit performers, fat policemen, handsome girl swimmers, quaint games on the patent pneumatic water shoes, thrilling feats of diving, aquatic fireworks and ocean distress signals, working torpedo boat and grand naval battle. It will be seen that such a unique form of entertainment will be a great attraction with the public which is always seeking novelty. The performance lasts over two hours, the company appearing twice a day, if necessary during its engagement.

AMUSEMENTS FOR RAILWAY RESORTS.

What can be safely termed a greatly felt want by the managers of the street railway parks throughout the country, has at last been supplied by three enterprising young men, Messrs. Quarles, Russell and Herbert, who have recently embarked in a business which is known as the Street Railway Park Amusement Company. Their object is to form a circuit of street railway parks, and on very reasonable guarantees, furnish companies throughout the summer season, varying if desired from vaudeville to comic opera or drama.

The promoters of the scheme are practical theatrical men, with an extensive and varied career, having been connected with some of the leading theatres and traveling companies of the country, and possessing a thorough knowledge of everything pertaining to things theatrical through actual experience. This company though in its infancy has made rapid strides, and has already enlisted in its circuit seven of the street railway parks in flourishing cities.

There are various advantages to be offered managers by this firm through the fact of its doing a general theatrical business and having on its books the names of some four hundred artists all of whom it can vouch for as regards their ability, besides being in constant correspondence with all the greater and higher salaried vaudeville artists.

The advantage to park managers can readily be appreciated when it is considered that in booking an artist or company of artists, Messrs. Quarles, Russell and Herbert offer them from five to ten weeks engagement which serves as a big inducement, thereby securing them at a much lower figure than they would otherwise demand in the case of a one week engagement. This firm deals only with the very best of artists, consequently any company it would arrange for could be relied upon as being in every point capable of giving entire satisfaction.

The offices of the Amusement Company are located in the Old Stock Exchange Building, Monroe and Dearborn street, Chicago, where they would be pleased to have representatives of street railway parks call and make their offices their headquarters while in the city. Correspondence is solicited from park managers and any information or particulars desired will be cheerfully given. The company is in a position to furnish any style of amusement on short notice. There is no specified average of a guarantee required by this company as the figure depends entirely upon the length and strength of the program required by the park management. High class vaudeville appears to be in demand by the majority of the parks, and the amusement bureau prides itself on having a thorough acquaintanceship with the better element of that branch of the theatrical profession and is also working in direct conjunction with the leading vaudeville houses of New York, Boston and Chicago.

PHILADELPHIA'S NEW SUMMER RESORTS.

Philadelphia will have during the coming summer some notable additions to its number of pleasant resorts for outing-loving people. The Union Traction Company at an estimated outlay of $500,000, will open a new park of 100 acres at Willow Grove, in Montgomery county, and a syndicate will open another attractive spot to be known as Torresdale Park.

The Willow Grove site is naturally beautiful, being about one-third woodland, and extensive landscape gardening has already been done. The amusement features will include a "shoot-the-chutes," a scenic railway, 1,500 feet in length, running partly through the woods; a carousel, bicycle track, tennis courts and grounds for baseball, football and other games. Ennis' military band of forty pieces has been engaged and will be installed in a pavilion located in the middle of an extensive tract capable of accommodating five thousand people. A large electric fountain will be placed in the center of the largest of three lakes which furnishes all together about ten acres of water for boating purposes.

The buildings will consist of a casino of two stories, with a restaurant capable of seating 200 people, surrounded by open porches in the form of a horse-shoe and which will seat several hundred more. The building will be fitted with every convenience, the cost being upwards of $25,000. A second handsome pavilion will be devoted to the use of women and children only, and an ornamental lodge house will be erected at the entrance to the park for the use of the superintendent and keepers. The trolley cars of the Willow Grove line make a circuit of the park, and waiting rooms will be provided at convenient distances. McClellan Hersh, formerly for a long time general agent of the People's Traction Company and now of the Union Traction Company in the same capacity, will act in the capacity of superintendent, with competent assistants. The grounds are to be free to the public, the traction company expecting to get its return from the increase of traffic over its lines, for which, we understand, 150 new cars have already been provided.

Torresdale Park is situated at the extreme northeastern end of the city. It has been projected by a syndicate of local capitalists and about $200,000 will be spent in improvements, and in providing amusement features. The site is a beautiful one, on the banks of the Poquessing creek, the land sloping gently back from the creek. The tract is about 100 acres in extent, one-third of which is wooded.

One of the attractions proposed is a decided novelty, in the shape of an artificial whale which will swim about and spout water as naturally as if he had been doing it since the days of Jonah. The creek will afford ample facilities for boating, and a number of large buildings will furnish room for a great variety of the usual attractions.

A STRICTLY PLEASURE RESORT ROAD.

Shuts Down in Winter.
Old Mill Converted Into a Theater.
200-Horse-Power Motors.
Forty Miles an Hour.
400 Passengers in a Train.

The Bennington & Woodford Electric Railway connecting the two cities named in Vermont is one of the few exclusively summer roads, and makes no attempt to operate during the winter months. The line paid 12 per cent last year on only six weeks business, and as General Manager Martin says, "If some other roads could shut down in winter they would pay dividends where now they pay none." This spring $30,000 has been spent in new equipment. The line opens May 15.

ALONG THE LINE OF THE BENNINGTON & WOODFORD.

At the Casino a large theater has been built. The performances given this summer, which will be regular and changed each week, will be by the best New York vaudeville artists, and will be first-class in every respect. A good orchestra of seven pieces has been engaged for the season, and the price of admission will be but 10 cents.

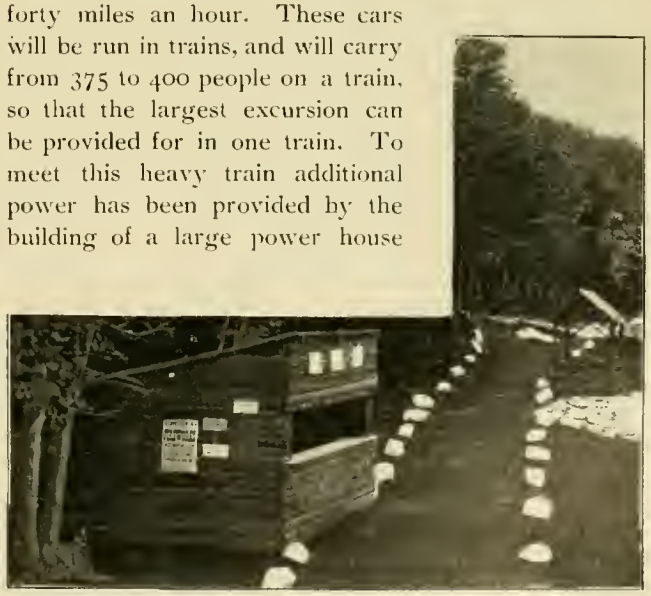
The order of the day will be one open air free band concert every afternoon at 1:30 and every evening at 7:30. The performance, which will last for two hours, will commence immediately after the concert. The manager of the theater will be the successful manager this last winter of Miss Fanny Davenport.

The railroad is being extended to Glastonbury, and will be in operation about June 1st. Much building has been done there this winter. The old mill building, 50 feet wide by 150 feet long, has all been made into a large building designed as an amusement hall for excursionists and picnic parties; the lower floor has been divided off into bowling alleys and games, with a large reception room for excursionists, with tables and all conveniences for their free accommodation; on the second floor it has been equipped with kitchen and dining room and a large lounging room, which is also designed for dancing parties. This will be under the management of a well-known party who will be prepared to serve trout dinners and suppers. Trout hatcheries are being built at this point, and it is designed to thoroughly stock the streams so that good fishing will always be obtainable under proper restrictions. The company having obtained control of the streams fishing may be entirely prohibited this year in order to get a good foothold and give the trout a size that will conform to the law.

It is the intention to make Glastonbury a regular mountain resort, where everything pertaining to the mountains can be obtained at a moderate price. The elevation there is 2,700 feet, and the ride on an electric car to that point will be sufficiently novel and enjoyable to draw people from a long distance. The round-trip fare for the eighteen miles will be but 25 cents. The railroads have taken up this new place for excursion business, and a very large number of excursions at low rates will be taken from Troy, Albany, North Adams and intermediate points.

To provide for this increased business regular trains of electric cars have been purchased. These cars are are 45 feet long and, while open, are built very much like the elevated railroad cars.

The cars are equipped with air brakes, and the motors are 200-horse-power, capable of forty miles an hour. These cars will be run in trains, and will carry from 375 to 400 people on a train, so that the largest excursion can be provided for in one train. To meet this heavy train additional power has been provided by the building of a large power house



A BIT OF THE BENNINGTON & WOODFORD PARK.

at Woodford Two large engines, four large generators and three large boilers have been provided; also an electric light generator so that the grounds at the Casino will be lighted fully with not only incandescent but also arc lights. A telephone will be put in from Bennington to Glastonbury, with call boxes at every mile, and all trains will be run by orders.

The road is using Brill cars, Taylor trucks and General Electric electrical machinery. The new train for high speed is fitted up much as the Intramural Railway at the World's Fair. These cars were made by Jackson & Sharp, and the motor car has four G. E. 1,200 motors geared to run fifty miles an hour. The New York air brake is used. This equipment will be run in trains of three cars except that sometimes the motor car will be attached to a regular excursion train of steam cars delivered to the electric road by the Bennington & Rutland.

FIFTY YEAR FRANCHISES IN OHIO.

The Rogers Street Railway bill, permitting cities to grant street railway franchises good for a period of fifty years, passed the house. The attempt to exempt Cleveland roads and include suburban lines was defeated. The passage of the bill very materially increases the value of franchises granted under the long term, and will result in making possible the placing of bonds, and the construction of lines in certain places much sooner than would otherwise have been possible.

HONDURAS ELECTRIC RAILWAY SCHEME —VERY FISHY.

The daily press throughout the country have had long stories of Fryer and Ritter, two Washington promotors, who with sixty million dollars back of them announce they will build an electric railway in Honduras, extending from Port Cortez back 250 miles into the interior. The scheme has a very fishy appearance, and even with abundant water power, it is impossible to believe that at the present time so long a line in such a country could hope to compete with the steam locomotive.

CRUTCH LINE THE FASTER.

It is related in Texas Siftings that in a certain city which still indulges in the time-honored horse car, a car driver was discharged for refusing to stop for a cripple. The man who made the complaint had been in the habit of riding on the street cars before he was laid up with paralysis. The first time he was able to get out on crutches he signaled to the street car driver, but the latter drove on. The car driver owned up that he saw the man, but he didn't know that he wanted to ride.

The cripple proceeded to the office of the company and made complaint. The driver was ordered to appear before the president of the company.

"Did you see that crippled man?"

"Certainly, I saw him."

"Did he signal to you with his crutch to stop?"

"I saw him shake his crutch at me, and holler something or other."

"Why didn't you stop the car?"

"Because I don't think he wanted to ride on the car, for he could go faster on his crutches than on the car. When he shook his crutch I thought he was making fun of me for going so slow. I thought he was bantering me for a race, so I put the whip to the horses and made them go as fast as I could, and somehow won the race."

BENNINGTON & WOODFORD PARK.

USING "U. S. MAIL" SIGNS.

Managers must be careful about using the words "U. S. Mail" on their cars. One of the St. Louis lines, which runs postal cars, had its cars all lettered with the words mentioned, although mail was actually carried in the postal cars only. The department at Washington, took the matter up and required the title to be removed from all cars except those actually used in transporting the mail.

The only advantage that we see to be gained by carrying the legend would be in case of strikes, and even then federal protection could only be demanded for cars with mail on board; so while the use of the title has been denied, we do not see that companies are losing any advantage by the order.

HALF FARES

Interesting Bits of Information from all Parts of the Country, Boiled Down for Busy Readers.

The Lincoln (Neb.) Street Railway has been forced by its financial condition to abandon the use of conductors.

The Consolidated Street Railway of Grand Rapids has decided to try the experiment of selling six tickets for 25 cents.

C. E. Loss & Co., have secured a verdict for $9,523 for rails used in constructing the Central Wisconsin Electric Railway at Oshkosh.

The Newton, Langhorne & Bristol Street Railway, running between Langhorn borough and Langhorn station, Pa., commenced operations last month.

An Irvington trolley car of Newark, N. J., collided with a hook and ladder truck one day last month, badly injuring two of the firemen. No damage was done to the car.

A speed of fifty-one miles an hour was attained with a motor car on the Buffalo & Niagara Falls Electric Railway, during tests made by some Cornell University students.

The Senate Committee on Territories reported adversely last month on the bill to grant a franchise for an electric railway through Yellowstone Park. The vote stood 3 to 5.

The Tramway Company of Denver will issue book passes to women health inspectors. The men inspectors were allowed to ride free when in uniform, but as the women are not costumed the pass is necessary.

An account of the street car lines of Rome, Italy, in the New York Journal says that, "The cars, like all rolling stock on European trolley lines are model vehicles." Yes, just about the size of models.

The new car house of the Toledo Traction Company, to be erected on Dorr street, Toledo, will be equipped with a library, a reading and an assembly room for the use of its employes. Offices for some of the officials, will also be located on this floor.

The attorney general of Pennsylvania will bring suit against a number of street railway companies for neglect to file a report of their operations for the fiscal year ending June 30, 1895, in accordance with a corporation law of that state. The penalty is $5,000.

The Wardwell Brothers Company has been organized at Danbury, Conn., for the purpose of building electric railways, roads, bridges, etc. The capital stock is $20,000. The subscribers are Fred S. Wardwell, Linda B. Wardwell and Victor P. Wardwell.

This was not a REVIEW editor:

"He's a great editor, isn't he?" said one reporter to another.

"I should say so. Why, he gets so used saying 'we' that he often pays two fares on the street car."

A trial of coke burning locomotives was recently made in the belt line tunnel in Baltimore, in place of the electric locomotives built for that purpose. The experiment was abandoned after six hour's trial, as the accumulation of gas forced the trackmen to stop work.

The Brooklyn Avenue Railway Company, with a capital stock of $200,000, was incorporated in Kansas City, last month, for the purpose of taking the Tenth street cable line. The company is empowered to operate electric, cable or horse car lines, subject to the city ordinances and franchises. The directors are William J. Smith, ex-president of the Kansas City Railway Company; James Lillis, James H. Frost, auditor of the Kansas City, Osceola & Southern Railway; William T. Johnson, attorney; John H. Lucas, attorney, as trustee.

Svengali, or some one with hypnotic powers seems to have been at work in the office of the Alameda, Oakland and Piedmont, at Alameda, Cal., early one morning last month. $310 was extracted from the receiver's closet, apparently without a hinge or a lock being turned. When night receiver Dupern left the car house at one o'clock in the morning he put away $310 in a box in the receiver's closet, which day receiver Penberthy failed to find on coming on duty later. The cash box was empty, though shut; the closet door was also shut and locked with a Yale lock, and the office door was locked. There were no marks of the use of chisel or "jimmy."

ROBISON LINES, TOLEDO, CHANGE HANDS.

The Toledo Electric Street Railway, commonly known as the Robison road, has changed hands. The purchasers are Blair & Co., bankers, of New York. Although the control of the road has changed hands James J. Robison has been retained as general manager as it was recognized that a better man for the place would be hard to find. The other officers are as follows: James A. Blair, of New York, president; John B. Dennis, of New York, vice-president and treasurer: Willard Robison, secretary. David Robison, Jr., the former president, retires from street railroading, and has opened a real estate office in Toledo. He bears the title of the father of Toledo's street railways. Some improvements and extensions will be made.

The Scranton, Pa., Traction Company has taken the first steps toward relaying some of its old line and building double tracks by securing permits for the purpose. Operations will be begun as soon as special material can be obtained.

PERSONAL

John H. Beckley, president of the Rochester Railway, has been making a southern trip.

E. J. Evans has been appointed manager of the Waukesha Beach, Wis., Electric Railway Company.

A. A. Anderson, general manager of the Youngstown and Mahoning Valley roads called on the REVIEW last month.

Warren P. Bristol, of the Meriden (Conn.) Street Railroad, was married April 21, to Miss Minna Gillette, of Meriden.

G. B. M. Harvey and G. G. Haven, Jr., were elected president and treasurer of the Staten Island Electric Railway last month.

H. A. Fitzsimmons, of North Adams, Mass., has become superintendent of the Cohoes City Railway Company, Cohoes, N. Y.

H. J. Thomas, at one time assistant editor of Power, died April 24, at Pleasanton, Tex., where he went for his health several months ago.

E. D. DuBois, recently superintendent of the Calumet Electric Railway, this city, goes to Muncie, Ind., to occupy a similar position on the road there.

W. F. Kelly, superintendent of the Columbus Street Railroad has returned from a trip to the Pacific coast. He called on the REVIEW when in Chicago.

Robert A. Johnson has resigned his position as superintendent of the Lorain Street Railway Company, Lorain, O. He is succeeded by Patrick Griffin.

William Gummo, of the Greensburg, Jeannette & Pittsburg Electric Railway, recently fell from the top of a moving car onto the track and had his left arm run over.

Dr. Henry Yeagley has been elected secretary and treasurer of the Pennsylvania Traction Company, Lancaster, Pa., to fill the vacancy caused by the resignation of John Hertzler.

H. W. Martin, of New York, who spends his summers operating his pleasure resort road, the Bennington & Woodford Electric, made the REVIEW a pleasant call when in Chicago this week.

H. S. Newton, of the Syracuse Street Railroad, is one of the directors of the Insulator Company of New York City—a new corporation organized to manufacture insulators for electrical purposes.

Carroll N. Beal, secretary of the Power Development Company, San Francisco, which is installing a 10,000-horsepower transmission plant at Bakersfield, Cal., called on the REVIEW on his way east.

Secretary Charles L. Stinson, of the General Electric Railway, Chicago, and Miss Lorena Hanna were married at the home of the bride's brother-in-law, Randolph Smith, of Flora, Ill., one day last month.

Thomas Craig, secretary and treasurer of the Geneva Waterloo, Seneca Falls and Cayuga Lake Traction Company has sold his interest in the road to William C. Gray, of Chester, Pa., who becomes manager.

William J. Fordney has succeeded W. A. Armstrong as superintendent of the Pennsylvania Traction Company, Lancaster, Pa. Mr. Fordney has been with the company some time and is familiar with its system.

John R. Blackhall, who for six years has been connected with the Woodbridge & Turner Engineering Company, of New York city, as superintendent of overhead construction, goes to the Portland, Maine, railway company.

Matthew H. Dunbar, who has held various responsible positions with several New England roads for some years past, has been appointed superintendent of the Laconia & Lakeport Street Railway, Laconia, N. H., to fill the resignation of B. S. Kenniston.

George H. Wheeler, president of the Chicago City Railway Company, has met with a great bereavement in the death of his wife, Alice Lord Wheeler, which occurred last month. The deceased, an ardent Episcopalian, was buried from the Church of the Ascension with simple but impressive service.

J. C. Cameron, a very successful and efficient street railway man, is the new superintendent of the New Jersey Electric Railway, Paterson, N. J. Mr. Cameron was formerly superintendent of the Brooklyn Heights Railroad Company, and more recently of the Atlantic Avenue Railroad Company, Brooklyn.

Robert N. Wallis, treasurer of the Fitchburg & Leominster Street Railway, and his newly wedded wife, gave a reception at their home last month to the employes of the road. The night men were entertained from 3 to 5 and the day men from 8 to 10 P. M. It is needless to say the men left with the very best wishes for the happy couple.

George B. Kerper has returned to Cincinnati after spending a year in California. While there on a pleasure trip he purchased a street railway which he has just disposed of at a good advance. He made the REVIEW a most enjoyable call on his way east, and his old time friends will be pleased to learn that he will attend the St. Louis convention in October.

Almeric Hugh Paget has been elected treasurer of the Metropolitan Traction Company, New York. Mr. Paget is the son-in-law of the Hon. William C. Whitney, and his wedding, during the winter, was one of the events of the New York season. Charles E. Warren, who has been secretary and treasurer of the company, will retain the post of secretary.

Matthew H. Dunbar, of Concord, N. H. has been appointed superintendent of the Laconia & Lakeport street railway. Mr. Dunbar has risen from the ranks, having served as a driver of a horse car in Concord for ten years. When the use of electricity was inaugurated, Mr. Dunbar was placed in charge of the car repair shops, and has since filled a similar position at Norfolk, Conn.

The Nassau Electric Railroad, of Brooklyn, N. Y., unwent a change of management last month, President P. H. Flynn, Treasurer George S. Studwell and Secretary Fred Cocheu retiring. Albert S. Johnson, of Cleveland, O., succeeds Mr. Flynn as the chief executive officer of the road; ex-Congressman Tom L. Johnson, of Ohio, becomes treasurer, and James C. Church, a lawyer, secretary of the company.

A discharged employe recently shot and dangerously injured Harry English, master mechanic of the Birmingham Railway and Electric Company of Birmingham, Ala. English discharged the man for breaking some rule of the company. The fellow returned several mornings afterwards, and without warning fired two shots at his former employer, both taking effect, one in the leg, the other in the thigh.

WALKER COMPANY BUSY.

When the Walker Company, Cleveland, shortened its name recently, by dropping the word "manufacturing" from its title, it was no suggestion that the concern was letting up in the slightest degree in its progressive, energetic management, or contract taking. On the contrary the company has recently closed some very important contracts, which are in fact, some of the largest placed in several years; and the management congratulates itself that the excellence of the machinery has been a prominent consideration with the buyers in making the decision.

The Chicago City Railway Company, placed an order with the Walker Company last week for six 800-kilowatt rope driven generators. These machines will run at a speed of 220 revolutions per minute, and are the largest belt driven machines in the world. To give an idea of the size of these machines, it is only necessary to say that the rope wheel which drives them is about 8 feet in diameter, and 8 feet face. Two of these machines will be driven from two engines, the engines having a capacity of 2,500 horse-power.

After a thorough examination of all the generators manufactured, the Walker Company was selected to build these machines, because of the excellent performance of its generators now in operation.

The Walker Company has also received during the last ten days, an order for the first large storage battery road in the world. The Chicago & Englewood Railway Company will operate about fifty storage battery cars, the motors, controllers, etc., being of the Walker make. The storage batteries will be charged from a central station containing four large direct coupled Walker generators. The Walker motors and generators were both selected by this company, because of their high efficiency and especially excellent design for high economy. This road will be one of the most interesting ever built, the Electric Storage Battery Company, of Philadelphia, furnishing the batteries. The Arnold system of generator drive will be used. Everything about this plant and equipment will be high grade. All the machinery and apparatus will be highly finished. The road will have about fifty miles of track constructed in the best possible manner.

The Metropolitan Street Railway Company, of Kansas City, also placed an order for a large generator of 1,200 kilowatt capacity, direct coupled to an Allis tandem compound engine, for its station in Kansas City, the Walker generator being selected after an examination of the various machines in operation in this country.

Other orders received during this month are for a large number of motors, and complete car equipments from the following companies: Rapid Railway Company, Detroit, Mich.; Pittsburgh, Crafton and Mansfield Street Railroad Company; Second Avenue Traction Company, Pittsburgh, Pa.; Newburgh Electric Railway Company, N. Y.; Union Railway Company, New York City; C. E. Loss & Company, Chicago, Ill.

INSULATING OF RAILS.

Some experiments have been carried out at the Reichsanstalt in Germany, to determine the practicability of insulating street railway rails sufficiently to prevent electrolysis in that way. Rails put in concrete were found to be well insulated when the concrete was dry but when it was wet the resistance fell so that the leakage from rails to earth was greater than when there was no concrete. Experiments were made with asphalt which seemed to show that rails might be insulated by embedding in that material but the desirability of so insulating rails, aside from any questions of cost is by no means settled.

MOTORMAN NOT TO BE ARRESTED.

The New York city ordinance regulating the speed of electric cars has been decided by Justice Walsh, of the Adams street police court, not sufficient to warrant the arrest of motormen who violate its provisions. The ordinance provides that any corporation whose officers, agents or servants shall willfully violate any of its provisions shall be liable to a penalty in the sum of $25 for each offense. Under this interpretation of the law a motorman who was arrested for fast running was discharged, and it is said that in all future cases of a similar nature the corporation will be made defendant.

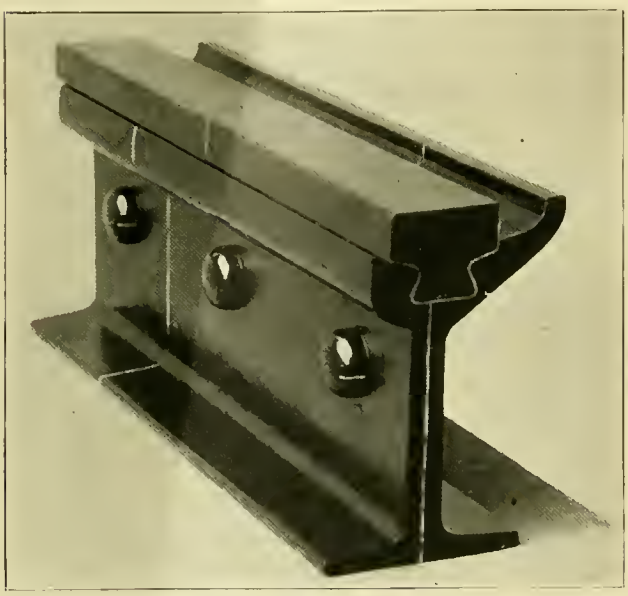
ST. LOUIS & KIRKWOOD RAILWAY LEASED.

The St. Louis & Kirkwood Electric Railway has been leased for a term of twenty-five years to J. B. Houseman, Jr., who was the promoter and largest stockholder in the company. The value of the property is placed at $650,000, and upon this value Mr. Houseman agrees to pay a rental of three per cent and five per cent of the net earnings. The amount of two years' rental is to be expended in the construction of a double track. There will be no change in the management of the road. An effort will be made to compromise litigation now pending.

A COMBINATION JOINTLESS RAIL.

A continuous rail with joints every ten feet but without welding is something of a paradox, as the inventor says, but an inspection of the accompanying engraving will make the explanation simple. The rail is made in three sections, the part embracing the web and flanges being split vertically through the web and the tread being in a separate piece. The parts are rolled in thirty-foot lengths and overlap each other one-third of their length. The tread section is held between the other two parts by a dove-tail joint and the two lower or web and flange sections are riveted together to constitute a practically integral rail.

It is claimed for the rail that the same results are



COMBINATION JOINTLESS RAIL.

secured as would be the case with an absolutely continuous rail, that all welding, bonding and the use of fish-plates and bolts is done away with and that the cost of maintenance is greatly reduced since a worn-out tread section can be replaced with a new one by simply shearing off the rivet heads and separating the base sections, making virtually a new rail at the cost of one section. A special punch and clamp have been designed for the purpose of holding the parts in position while the rivets are driven after the holes in one section have been punched while laying. In inserting a new tread it is not necessary to disturb cross-ties and only a few inches of pavement upon one side need be removed. The rights in the invention are held by S. G. Howe & Co., 17 Woodbridge street East, Detroit, Mich.

Accidents from motors falling are not very uncommon but it is not often that one undertakes to go in the opposite direction, as at Pittsburg the other day. The passengers thought their last day had come when the motor came crashing up through the floor although no one was hurt.

A BIG UNIFORM ORDER.

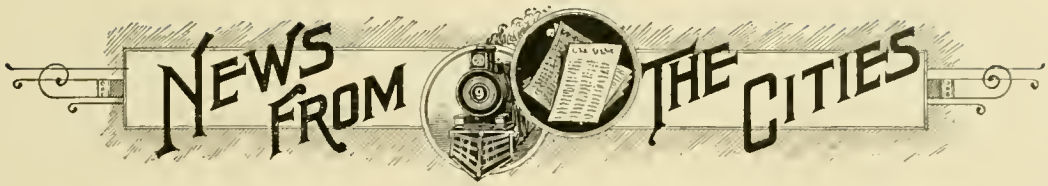
What is probably the largest single order for street railway uniforms has been given by the Chicago City Railway to the extensive uniform manufacturers, C. F. Orr & Co., of this city. The contract calls for all the uniform suits and overcoats for both conductors and drivers for one year and will require over 1,500 suits. As this order was awarded against a large number of competitors and as C. F. Orr & Co., have been making the greater portion of the City Railway uniforms for the past ten years, the compliment to the excellence of the work, and high grade of materials used, is a flattering, though well deserved testimonial. The same firm also makes the bulk of the uniforms of the West Chicago Street Railroad, and North Chicago Street Railroad. Many other corporations and firms are also long time patrons.

Unlike most concerns manufacturing uniforms, each garment is cut and made from individual measurement, and the same care taken as is expected of high class tailoring establishments in custom work. At the extremely low price at which these uniforms are sold, being less than half what tailors ordinarily charge for a common business suit, the cost to the men is below that at which they could possibly purchase ready made suits, while the cloth being expressly manufactured to order for this special purpose, is of most excellent quality. The low prices at which these uniforms are delivered is only possible by an enormous business, which admits of close buying of all materials and the economy growing out of the employment of a large number of workmen.

SLEEPING CARS FOR TROLLEY LINES.

If one had suggested such a thing as a sleeping car for an electric line ten years ago, his friends would have looked at him with a look of mingled surprise and pity. But a proposition to put on theater cars with buffet compartment; or to run street railway post offices, would have fared about as badly.

The Review makes the prediction that sleeping cars for electric service will be one of the surprises in the near future. Not for service on city lines, for a passenger would scarcely have time to retire, before he reached his destination; but for use of hunting and fishing parties on interurban lines reaching lakes and other pleasure resorts, the scheme is entirely feasible. The steam roads have for years had special excursion cars for hunting parties, fitted up with all the facilities for eating and sleeping, and such cars have earned large dividends on their cost. As interurban lines increase and are carried to good fishing and hunting resorts, the time will come when such roads can use to good advantage sleeping cars in which the party can live while out on the trip; spending a day or two at one point, and then be hauled to the next, when a change of scene is desired.



Arizona.

TUCSON, ARIZ.—C. F. Hoff has been granted a franchise requiring the commencement of an electric railway within ninety days.

KINGMAN, ARIZ.—An electric railway from Kingman to the White Hills and mining camps is contemplated, with a power house at Kingman.

California.

LOMPOC, CAL.—George H. Long is promoting an electric railway.

SAN FRANCISCO, CAL.—An electric road to San Andreas is projected by the California Exploration Company.

SANTA ROSA, CAL.—Col. N. W. Griswold, of Kenwood, says that an electric road will be built from Santa Rosa to Sonoma.

SAN FRANCISCO, CAL.—The Market Street Railway contemplates an immediate change of several lines from horse to electricity.

SAN FRANCISCO, CAL.—The San Francisco & San Mateo Electric Railway has been sold by Receiver Bennett for $300,000 to John A. Buck.

FORTUNA, CAL.—An electric road between Fortuna and Ft. Kenyon is proposed by F. Nelson, owner of the Ferndale lighting plant.

SAN DIEGO, CAL.—Owners of the San Diego Cable Railway have organized the Citizen's Traction Company, to carry out the change to electricity.

LOS ANGELES, CAL.—The Los Angeles Traction Company, of Jacksonville, Ill., has certified an increase of capital stock from $100,000 to $250,000.

SANTA BARBARA, CAL.—The Consolidated Electric Street Railway will push its incompleted road to Summerland. The bonds have been taken by Henry S. Luster, of Cincinnati, and C. W. D. Miller, of Cleveland, O., president of the Cleveland & Berea Street Railway.

SAN FRANCISCO, CAL.—The contemplated change of the California Railroad Company's Laundry Farm Road from steam to electricity, already reported in the DAILY BULLETIN, is now a certainty. An extension will also be built to Alameda. Bracket construction and a single track will be put it. Three cars with heavy motors are being built.

SACRAMENTO, CAL.—The Sacramento Electric Gas & Railway Company, has been formed to consolidate the Sacramento Electric Power and Light Company, and the Folsom Water Power Company. Capital stock, $2,500,000; incorporators and first board of directors: L. P. Drexler and Albert Gallatin, Jr., of San Francisco; Charles R. Lloyd, of Oakland, and J. W. Hall and L. T. Hatfield, of Sacramento.

Chicago.

CHICAGO.—A franchise has been granted the Central Electric Railway.

CHICAGO.—The Ogden Street Railway will issue $1,500,000 of bonds.

CHICAGO.—The Jefferson & Urban Transit Company is pushing work on its down town terminus.

CHICAGO.—The South Chicago City Railway has purchased the right of way of the Grand Crossing & Windsor Park Street Railway.

CHICAGO.—The Chicago North Shore Street Railway has been granted a franchise to extend north from Evanston to Wilmette. The line is leased by the North Chicago Street Railroad.

CHICAGO.—The Calumet Electric Railway Company on May 5 re-elected John Farson, president; H. B. White, secretary and treasurer, and H. M. Sloan, general manager. The capital stock was increased from $50,000 to $5,000,000. The proposed extensions were approved.

Colorado.

CRIPPLE CREEK, COL.—C. R. Ross and C. E. Mackay have been granted an electric railway franchise, putting up $500 forfeit to guarantee beginning work within sixty days.

PUEBLO, COLO.—The Pueblo, Victor & Cripple Creek Railroad has been incorporated with $1,500,000 capital, by James B. Orman, James N. Carlile, H. S. Currie, C. B. Schmidt, A. T. King, George F. Patrick, George E. King, Paul Wilson, Chris Wilson, W. H. Hunter, F. L. Capers and W. W. Allen, all of Pueblo. The 100 miles of road, if feasible, will be operated by electricity.

TELLURIDE, COLO.—The Telluride Tramway Company has been incorporated to construct and operate an aerial bucket tramway for transporting ore and merchandise. Electric power will be used on the line and sold to stamp mills. The terminus of the aerial tramway will be Pandora, from which point the promoters expect later to build an electric railway. Capital stock, $200,000; incorporators, Walter Beam, Telluride; David Swickhimer, Denver; A. J. Clark, Denver; William Bayly, New York, and Oliver P. Posey, Denver.

Connecticut.

NORWALK, CONN.—Gov. Waller has purchased control of the Norwalk Tramway.

HARTFORD, CONN.—The Hartford Street Railway is fitting up a complete repair shop.

DERBY, CONN.—The Derby Street Railway track in Ansonia is being relaid with 8-inch 80-pound T rail.

MERIDEN, CONN.—Heavier rails will be laid on the Pratt street line of the Meriden Electric Railway Company.

BRIDGEPORT, CONN.—The Bridgeport Traction Company has petitioned to extend one line and double track another.

WATERBURY, CONN.—The Waterbury Traction Company will not extend to Waterville, the exactions of the city being too onerous.

WESTPORT, CONN.—The Westport & Saugatuck Street Railway Company will issue $15,000 bonds for the proposed extension to Cedar Point.

NEW HAVEN, CONN.—The Manufacturers' Street Railroad has finally obtained its right of way, and construction will begin this summer.

SHELTON, CONN.—Grading has begun for the Shelton Street Railway, in which Allan W. Paige and Gen. T. L. Watson, of Bridgeport, are interested.

ROCKVILLE, CONN.—The Rockville & Ellington Street Railway, of which A. M. Young, of Waterbury, is president, will apply for a franchise to build between Rockville and Talcottville. The line will connect with the Hartford, Manchester & Rockville Tramway extension to Talcottville, which is now under construction.

Delaware.

WILMINGTON, DEL.—Additional track is being laid by the City Railway.

District of Columbia.

WASHINGTON, D. C.—E. Saxton, 123 G street, northeast, wants 350,000 secondhand granite blocks.

WASHINGTON, D. C.—The Falls Church & Potomac Railway has been granted its franchise. The trolley is prohibited.

WASHINGTON, D. C.—The commissioners have denied a franchise to the proposed East Washington Heights Traction Railway Company.

WASHINGTON, D. C.—Heineman Klien, who has a judgment for $3,000, alleges that the Anacosta & Potomac River Railway is insolvent. He wants a receiver.

WASHINGTON, D. C. Work will begin on the Brightwood Railroad's extension to Forest Glen, Md., as soon as the present condemnation right of way is concluded.

WASHINGTON, D. C.—Edwin Baltzley, president Glen Echo Railroad, wants to buy secondhand open cars, fully equipped, for use in an emergency for this summer's business. Office, room 9, Sun Building.

Florida.

PENSACOLA, FLA.—Sterritt Tate represents New York capitalists who want a franchise to build an independent electric railway.

FEDERAL POINT, FLA.—William L. Door, of Federal Point, and William A. Evans, of Jacksonville, are promoting eight miles of electric railway between Federal Point and Hastings. Generators will be driven by artesian well power.

KEY WEST, FLA.—E. M. Martin, secretary of the Tropical Electric Company, writes that the company is just organizing. Contracts for an electric lighting and power plant and eight or ten miles of road will be given out in a couple of months.

Georgia.

MACON, GA. The Macon Consolidated Street Railway will extend one mile.

ATLANTA, GA.—The Atlanta Electric Railway Company has taken up its floating debt by an issue of $21,000 bonds.

SAVANNAH, GA.—The Savannah & Isle of Hope Railway has petitioned for franchises to extend. Capt. D. G. Purse, is president of the road, which was built four years ago. This road must not be confounded with its rival, the Savannah, Thunderbolt & Isle of Hope Railway.

Illinois.

BELLEVILLE, ILL.—The company will extend its tracks this summer.

SPRINGFIELD, ILL.—The Springfield Railway will be extended to Mildred.

FREEPORT, ILL. Extensions are contemplated by the Freeport General Electric Company.

BELVIDERE, ILL.—The Belvidere Electric Street Railway Company is getting ready to build.

PRINCETON, ILL.—Charles Sims, of Chicago, asks a franchise for a street railway other than electric.

OTTAWA, ILL.—F. C. Baird has been inspecting Ottawa with a view to installing the conduit electric system.

HARVEY, ILL.—The Harvey Transit Company promises to make improvements in exchange for the concessions granted by the city.

QUINCY, ILL.—Fire, April 29, destroyed the north car house of the Quincy Horse Railway & Carrying Company. Loss, $12,000; insurance, $8,600.

ALTON, ILL.—An extension will be built by the Alton Railway & Illuminating Company to the 16-acre tract which it has purchased for park purposes.

PEORIA, ILL.—John S. Stevens, attorney, says that the Seiberlings and eastern capitalists are interested in his project to build an independent electric railway.

CAIRO, ILL.—The purchasers of the railway and lighting plant of the Delta Electric Company, have incorporated the Egypt Electric Company. Capital stock, $40,000; incorporators, Calvin V. Neff, William Kluge, Henry Hassenjaeger and Albert Lewis.

Indiana.

ELKHART, IND.—The Indiana Electric Railway Company's franchise is in a fair way to be granted.

MARION, IND.—The street railway have decided to erect a new power house within the next twelve months.

TERRE HAUTE, IND.—The Terre Haute Electric Railway Company is installing wood-working machinery for building cars.

FT. WAYNE, IND. C. E. Everett has given up for the present his project to build the Columbia City & Ft. Wayne Electric Railroad.

HAMMOND, IND. A site for car barn and repair shops has been purchased by the Hammond, Whiting & East Chicago Electric Railway.

INDIANAPOLIS, IND.—Fire in an adjoining building damaged the power house of the Citizens' Street Railroad. The switchboard was destroyed.

INDIANAPOLIS, IND.—John A. Polk, president, and Henry L. Smith, general manager, are getting ready to build the Indianapolis, Greenwood & Franklin Electric Railway.

Iowa.

OTTUMWA, IA.—J. H. Merrill has been appointed receiver of the Ottumwa Railway, Electric & Steam Company.

Kentucky.

COVINGTON, KY.—A 750-horse-power engine and 500-horse-power generator will be placed in the Eleventh street station of the South Covington & Cincinnati Street Railway.

LOUISVILLE, KY.—Judge W. B. Hoke, John T. Allen and Lafe Dewitt have petitioned for right of way in Louisville for the Louisville, Mt. Washington & Fairfield Electric Railway.

Louisiana.

NEW ORLEANS, LA.—Bids for the construction and equipment of the river front power-house of the Canal & Claiborne Street Railroad are being received. Ford & Bacon are the engineers.

Maine.

PORTLAND, ME.—The Portland & Cape Elizabeth Railway will complete its double track to Simonton Cove.

BANGOR, ME.—An extension to Great Works will be built, it is said, by the Bangor, Orono & Oldtown Railway.

PORTLAND, ME.—Westbrook has approved the route proposed from Westbrook to Gorham by the Portland Extension Railroad.

PORTLAND, ME.—Extensions are contemplated by the Portland & Cape Elizabeth Railway Company. A large engine is being erected at the power house.

BIDDEFORD, ME.—Judge C. H. Prescott and John F. Nourse have purchased control of the Biddeford & Saco Railroad, and will expend $20,000 to make it a paying enterprise.

LEWISTON, ME. The Lewiston & Brunswick Street Railway Company has been incorporated to build and operate twenty-one miles of road via Lisbon and Topsham. Five per cent of the $200,000 capital stock has been paid in by Norton Q. Pope, of Portland; Frank W. Dana, of Lewiston; Henry W. True, of Lewiston; William T. Smart, and Orland S. Ham.

Maryland.

HAGERSTOWN, MD.—The Hagerstown Railway has been granted a franchise in Williamsport.

BALTIMORE, MD.—A car barn of brick, 140 by 550 feet, is planned by the City & Suburban Railway.

FREDERICK, MD.—Construction of the Frederick & Middletown Electric Railroad has been resumed.

BALTIMORE, MD.—The Gwynn's Falls Electric Railroad Company has asked the right to lay tracks in Baltimore City and County.

BALTIMORE, MD.—Electricity may be adopted on the incomplete Drum Point Railroad, recently succeeded by the Baltimore & Southern Railroad Company.

FREDERICK, MD.—The Frederick & Middletown Electric Railway will construct its own power plant, the bids received for renting power being considered too high.

BALTIMORE, MD.—The Baltimore Traction Company has negotiated $800,000 of collateral trust 5 per cent gold bonds to take up its floating indebtedness and provide for extensions of its lines. The Druid Hill line, ten miles long, the last to be operated by cable, will be changed to electricity. Large repair shops and a car barn will be built at Westport.

CATONSVILLE, MD.—Stockholders of the Edmondson Avenue, Catonsville & Ellicott City Electric Railway, now under construction, have elected George Yakel, president; John Hubner, vice-president; Louis Yakel, treasurer; William L. Layfield, secretary; W. Kesley Schoepf, general manager; and Messrs. John Hubner, David M. Newbold, Bernard N. Baker, W. Kesley Schoepf, Louis Yakel, Wm. L. Layfield and George Yakel, directors. The line from Baltimore to Ellicott City, and from Washington to Laurel, will be completed about the middle of July. The grading of the line from Baltimore to Ellicott City has been practically completed.

Massachusetts.

CLINTON, MASS.—The Clinton Street Railway has accepted its Leominster franchise.

MARLBORO, MASS.—The Marlboro & Westboro Street Railway has been incorporated.

DEDHAM, MASS.—The West Roxbury & Roslindale Street Railway will extend to Dedham.

PITTSFIELD, MASS.—The Pittsfield Street Railway has changed the route of its proposed line.

DALTON, MASS.—Dolan Bros. have obtained an electric railroad franchise with privilege of using T rail.

CLINTON, MASS.—The Clinton Street Railway has begun work under the franchise granted by Lancaster.

MILLBURY, MASS.—Right of way to West Millbury is asked by the Millbury, Sutton & Douglas Electric Railway.

TAUNTON, MASS.—The Brockton, Bridgewater & Taunton Street Railway has applied for a franchise in Taunton.

NATICK, MASS.—An extention to West Newton is contemplated by the Natick & Cochituate Street Railway Company.

NORTH ABINGTON, MASS.—A pleasure resort on Island Grove is contemplated by the Rockland & Abington Street Railway.

HOLYOKE, MASS.—The Holyoke Street Railway has accepted the franchise granted by South Hadley, and will at once begin work.

SHELBURN FALLS, MASS.—Surveys are being made of the proposed Shelburn Falls & Colraine Street Railway which was incorporated in February.

GLOUCESTER, MASS. A Corliss slow-speed engine of 400-horse-power will be placed in the power house of the Gloucester Street Railway.

PALMER, MASS.—A franchise having now been granted by Monson, it is expected that work will begin this season on the Palmer & Monson Electric Railway.

ROCKPORT, MASS.—Work will begin very shortly on the four miles of road for the Rockport Street Railway, which is to connect with the Beverly, Essex and Gloucester lines.

WORCESTER, MASS.—Negotiations for the lease of the Worcester & Shrewsbury Street Railway Company's dummy road by the Consolidated Street Railway Company, have nearly been concluded.

SOUTHBRIDGE, MASS.—The Southbridge & Sturbridge Electric Street Railway Company has contracted with the Southbridge Electric Light Company, to furnish power for its proposed seven miles of road.

SPRINGFIELD, MASS.—Judge Smith, Judge Loomis and Dwight S. Fuller, of Suffield, and L. L. Whitman and H. S. Kelsey, of Agawam, are interested in the project to build an electric road from Suffield through Agawam to West Springfield.

TEMPLETON, MASS.—The Templeton Street Railway Company has been incorporated. Capital stock, $50,000. Incorporators: Isaac Bourn, Sewell F. Greenwood, John E. Chamberlin, George W. Bourn, Eugene Lincoln, Charles E. Ingalls, and Henry J. Right.

DEDHAM, MASS.—The Norfolk Central Street Railroad has been incorporated to build ten miles of road to Walpole, via Norwood. Capital stock, $75,000; incorporators, T. T. Robinson, John A. Bullard, Henry C. Delano, John W. Chase, F. F. Favor, Dedham; Francis Doane, Norwood; A. R. Whittier, Boston.

HOW TO STOP A CAR.

1—Miss Slowfoot—Won't you please stop that car for me.

2—Cowboy—(Drawing revolver)—Why, certainly, Miss. Bang! Bang!! Bang!!! Don't mention it, good evening.

Michigan.

SAGINAW, MICH.—Carl, Emil and William Roethke have applied for a franchise to build an electric railway.

PORT HURON, MICH.—The City Electric Railway is negotiating for forty acres to be improved as a pleasure resort.

DUNDEE, MICH.—Right of way through Dundee has been granted the Monroe, Dundee & Lake Erie Electric Railroad. Bridges will have to be built.

BATTLE CREEK, MICH.—Maj. L. M. Downs, of Lansing, confirms the report that the Citizens' Street Railway of Battle Creek, will build to Kalamazoo this season.

SAGINAW, MICH.—The Saginaw & Bay City Rapid Transit Company, now constructing, will operate with leased power the first year. Manager George Silsby expects to begin running cars by June.

NILES, MICH.—F. E. Lee, of Dowagiac, is said to be the prime mover in an enterprise to connect South Bend, Ind., with Benton Harbor, Mich., via Niles, Buchanan and Berrien Springs, by an electric railway.

DETROIT, MICH.—Van Buren township has granted Albert Pack, John B. Corliss and others a franchise for the electric road which is to run to Ann Arbor and Ypsilanti. The only franchise now lacking is that of Canton township.

ANN ARBOR, MICH.—President Junius E. Beal, of the Ann Arbor & Ypsilanti Street Railway, writes: "We are going to change our steam motor road from Ann Arbor to Ypsilanti over to electricity, and will want wire, poles, bonds, brackets, etc."

Minnesota.

ST. CLOUD, MINN.—Receiver E. E. Clark of the City Street Car Company, will replace rotting poles and ties and repair the cars immediately.

WINONA, MINN. Frank A. Seymour, for bondholders, purchased the plants of the Winona General Electric Company, and the Winona City Railway Company, at the receiver's sale. The plants will be operated by the recently incorporated Winona Railway & Light Company, of which C. A. Severance, is president; F. B. Kellogg, St. Paul, vice-president, and M. B. Webber, of Winona, secretary and treasurer.

Mississippi.

MERIDIAN, MISS.—W. R. Hall, general manager of the Meridian Street Railway, has leased the electric plant of the Meridian Gas Light Company.

JACKSON, MISS. Dr. P. W. Peeples will equip his Jackson City Railway with electricity. Marcellus Green and Capt. W. W. Stone have taken an interest.

MERIDIAN, MISS.—T. A. Hall, of the Meridian Light & Power Company, is in the market for alternating fans and fan motors to be run by single phase alternator, also wattmeters.

Missouri.

ST. LOUIS, MO.—Right to adopt electricity is asked by the Fourth Street & Arsenal Railway.

KANSAS CITY, MO.—A telephone system will be installed by the Metropolitan Street Railway.

ST. LOUIS, MO.—The bill authorizing a change of the People's Railway from cable to electricity has been favorably reported in the House.

TRENTON, MO.—J. W. Mitchell, of Gallatin, has leased the North Side Street Car Company's line. He will repair the cars and give improved service.

KANSAS CITY, MO.—Riverview has been selected as the site of the mammoth central power house of the Metropolitan Street Railway. Ground has already been broken.

NEVADA, MO.—The Nevada Electric Railway, Light & Park Company, in which George Dudley is largely interested, has obtained eastern capital, and is ready to build.

SEDALIA, MO.—The Electric Railway, Light & Power Company has begun work on the road to Brown Springs, which is to be completed by June. A bridge will be contracted for.

ST. LOUIS, MO.—J. D. Houseman, Jr., has leased the St. Louis & Kirkwood Railroad for twenty-five years. Two years' rental will be expended for the construction of a double track.

ST. LOUIS, MO.—Ernest P. Bell, Charles Robyn, Louis Bierman, Charles Fredericks, Julius Erickson and Philip Deuser have applied for a franchise to construct twenty-five miles of electric railway encircling the western city limits.

ST. JOSEPH, MO.—Superintendent W. T. Van Brunt, of the St. Joseph Street Railway, Light, Heat & Power Company, has purchased some summer cars, and is negotiating for more. Heavy rails have been purchased, and other improvements have been decided on.

WEBB CITY, MO.—The Joplin & Galena Electric Railway has arranged with the Southwestern Electric Railway of Webb City, to supply power for the new road. The Southwestern will enlarge its power house at an expense of $50,000 for generators, engines, boilers and steel stack.

Nebraska.

FALLS CITY, NEB.—Col. John Hilton has formed a company to construct three miles of electric railway between the city and Henton's park.

LINCOLN, NEB.—The city has brought suit against the Lincoln Street Railway to collect $40,000 taxes, and asks that the company's property be sold.

New Jersey.

MT. HOLLY, N. J.—The Mt. Holly Street Railway will be extended.

PLAINFIELD, N. J.—Right of way through Dunellen is wanted by the Plainfield Street Railway.

RUTHERFORD, N. J.—The Union Traction Company now asks franchises in East Rutherford.

NEWARK, N. J.—The Consolidated Traction Company asks leave to lay double track on Elizabeth avenue.

MORRISTOWN, N. J.—A horse car franchise is asked by a company of citizens represented by Augustus W. Cutler.

ORANGE, N. J.—The Suburban Traction line is said to have passed into the control of the Newark & South Orange Railway.

NEW BRUNSWICK, N. J.—The Brunswick Traction Company will apply for franchises to extend to Metuchen and Bound Brook.

TUCKERTON, N. J.—John B. Conklin, of Catskill, N. Y., has been elected president of the proposed Tuckerton & Egg Harbor Electric Railroad.

RAHWAY, N. J. Negotiations are pending for the purchase of the Rahway & Middlesex Electric Railway and its extension to Sewaren and Woodbridge.

RED BANK, N. J.—Right of way through Red Bank has been practically obtained by the Atlantic Highlands, Red Bank & Long Branch Electric Railroad.

HOBOKEN, N. J. After working hard for two years the Jersey City, Hoboken & Rutherford Electric Railway has at length won its franchise from the city of Hoboken.

BELMAR, N. J. Lysander E. Watson wants to have a receiver appointed for the Asbury Park & Belmar Street Railway, alleging that the other stockholders are trying to freeze him out.

POINT PLEASANT, N. J.—Capt. R. A. Clark wants a good, second-hand, double reduction, railway motor, with resistance starting box and automatic circuit breaker, to operate riding gallery.

BLOOMFIELD, N. J.—The North Jersey Street Railway will make a strenuous effort to secure a franchise through Bloomfield, which is the missing link that prevents the immediate completion of the whole road.

BRIGANTINE, N. J.—The Brigantine Transit Company's line has been leased to the Philadelphia & Brigantine Beach Railroad Company, which agrees to pay $5,000 for the season and to put the road in good repair.

POINT PLEASANT, N. J.—The Point Pleasant & Bay Head Electric Railroad is in the market for 45-foot cedar poles, with 10-inch and 8-inch butts, and 8-inch and 6-inch tops; also 6-foot cross arms for four pins, and 1½-inch locust pins.

CAMDEN, N. J.—The Camden & Suburban Railway has been incorporated with $1,0000,000 capital by S. Fred Hall, Charles H. Chew, E. C. Leeds, of Camden; Francis R. Fithian, of Bridgeton, and Alonzo B. Barrett, of Haddonfield. The new company will control the West Jersey Traction Company and will also operate the Camden Horse Railroad. Work on the new crosstown line will be pushed.

New York.

BUFFALO, N. Y.—The Traction Company's bill has passed the legislature.

OSWEGO, N. Y.—An electric franchise has been granted the Oswego Street Railway.

ROCHESTER, N. Y.—A machine shop has been fitted up by the Rochester Railway.

AUBURN, N. Y.—The City Railway contemplates extending seven miles to Brinkerhoof.

OXFORD, N. Y.—The plan to connect Oxford and Norwich by trolley has been given up.

AMSTERDAM, N. Y.—The Amsterdam Street Railroad will extend to Johnstown and Gloversville.

STILLWATER, N. Y.—The Stillwater & Mechanicsville Street Railway has been granted a franchise to extend.

OSWEGO, N. Y.—Having filed a $5,000 bond the Oswego Street Railway Company will begin work on its extension.

LEWISTON, N. Y.—A bridge across the Niagara will be constructed for the electric road in which W. Caryl Ely is interested.

AUBURN, N. Y.—The city has received a $10,000 bond to guarantee construction of the Auburn Interurban Electric Railway.

OSWEGO, N. Y.—The Lake Ontario & Riverside Railway is erect a barn, oil house and blacksmith shop on a site just purchased.

WATKINS, N. Y.—The Watkins & Havana Railroad Company will change its name to Elmira & Seneca Lake Railway Company.

ROCHESTER, N. Y.—Construction of the Irondequoit & Lake Shore Electric Railroad is postponed on account of difficulty in getting right of way.

ALBANY, N. Y.—The Albany Railway is said to contemplate a line from Greenbush to Troy, passing through East Albany, Bath and Blooming Grove.

LEWISTON, N. Y.—William T. Love, projector of Model City, will build an electric road to connect with the Lewiston & Youngstown Frontier Railway.

LOCKPORT, N. Y.—W. C. Reed, superintendent, says that the Lock City Electric Road will be extended to Olcott if local parties will subscribe $50,000 of stock.

TARRYTOWN, N. Y.—Having accepted its franchise, the New York, Elmsford & White Plains Railroad will begin work on its trolley line from Elmsford to Tarrytown.

PORT RICHMOND, N. Y.—The Staten Island Electric Railroad has executed a mortgage for $2,000,000, part of which will be expended for extensions and equipment.

SYRACUSE, N. Y.—A franchise has been granted the Syracuse & Suburban Railway. A bond of $10,000 is required to guarantee work will begin July 1, and be completed December 1, 1896.

CLYDE, N. Y.—C. E. Pruyn, of Syracuse, is financing and George F. Chism, of Buffalo, is engineering an electric road to Sodus Bay. George O. Baker and D. L. Stow, of Clyde, also are interested.

PORT RICHMOND, N. Y.—A franchise for a single track between Richmond Terrace and Mariner's Harbor has been granted the Thomas syndicate. The road must be double-tracked by August.

NEW YORK, N. Y.—The Empire City Traction Company's appeal for a review of the Railroad Commissioners refusal to grant a certificate of public necessity has been decided adversely by the court.

PORT CHESTER, N. Y.—A railway franchise has been granted the Port Chester Electric Company, in which the Krutz Company, of New Haven, Conn., is interested. Work must begin within ninety days.

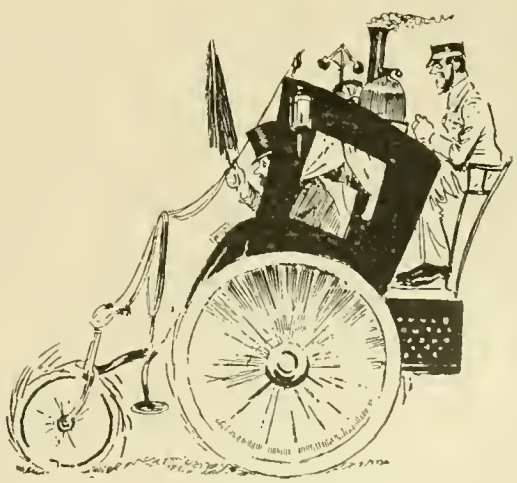
CORINTH, N. Y.—An electric road is planned from Corinth to the Champlain Canal, by members of the Hudson River Pulp & Paper Company, for whose plant at Palmer Falls it would serve as an outlet.

BROOKLYN, N. Y.—Benjamin Norton promises that construction of the trolley line between Jamaica and Hempstead will be begun by Long Island Electric Railroad Company within thirty days from the granting of the franchise.

BROOKLYN, N. Y.—The Brooklyn Heights Railroad will build a car repair and machine shop. The building will be 350 feet by 100 feet, and two stories high. The work now done at four different points will be concentrated in the new shop.

CATSKILL, N. Y.—Daniel W. Sharpe, secretary, and Louis E. Robert, president, have certified to the secretary of state their intention to extend the Catskill, Cairo & Windham Street Railroad from Cairo to Windham and from Cairo through Freehold to Oak Hill.

PORT JERVIS, N. Y.—Surveys are being made for the Stroudsburg-Port Jervis Railway which is to be built this summer. It will be 42 miles long. Capital, $600,000; bonds, $600,000; directors, Edward F. Lukens, W. H. Metcalf, G. F. Macrae, H. C. Breese and Irving Hibler.



A POSSIBILITY OF THE FUTURE.

TONAWANDA, N. Y.—The barn of the Buffalo, Tonawanda & Niagara Falls Electric Railroad was burned April 28, together with four cars. That the fire was of incendiary origin is certain, as it started shortly after midnight and in two different places. Loss, $20,000; no insurance.

BROOKLYN, N. Y.—Patrick H. Flynn, Fred C. Cocheu and George S. Studwell have resigned the positions of president, secretary and treasurer, respectively, of the Nassau Electric Railroad. In their stead have been elected, respectively, Albert L. Johnson, James C. Church and Tom L. Johnson.

ORIENT, N. Y.—Two enterprises are on foot; one to build an electric road from Orient to Riverhead, and the other from Orient to Greenport. The road would be eight miles long, and would displace the primitive stage which makes one trip a day. Right of way has been asked of Road Commissioner E. W. Taber, of Orient.

SIDNEY, N. Y.—A railway connecting Sidney and Franklin may be constructed by the Ouleout Electric Light & Power Company, recently incorporated with $25,000 capital by H. McGonegal and James C. Holden, of New York; Walter F. Randall, Syracuse, N. Y.; Fred C. Ward, Franklin, N. Y.; and H. S. Sewell, Walton, N. Y.

PLATTSBURG, N. Y.—The Plattsburg Traction Company has been granted a franchise for six miles of road. Construction will soon begin. Incorporators; H. M. Pierson, president; H. E. Barnard, treasurer; A. E. Reynolds, secretary; George M. Cole, S. M. Weed, H. G. Runkle, D. F. Dobie, T. F. Conway, W. H. Chappel, J. O. Smith, George S. Weed, M. B. Snevily, S. D. Curtis, J. H. Bagg, John B. Riley, W. L. Pattison and T. F. Mannix.

UTICA, N. Y.—The Utica Suburban Railway Company has been incorporated to build four miles of electric railway between Whitesboro and Oriskany for summer operation. Capital stock, $50,000; incorporators, Camille Wendenfels, of Oyster Bay; James F. Gardiner, of Albany; W. B. Putney, E. Peckham, of New York; Charles E. Smith, John S. Capron, John W. Boyle, of Whitesboro, William Kernan and P. H. Yale, of Utica; D. J. Vedder, J. S. Davis, E. S. Jones, and R. G. Young, of Utica.

Ohio.

SPRINGFIELD, O.—The Springfield-Urbana Electric Railroad is reviving.

FREMONT, O.—The Fremont Street Railway will apply for right to extend.

CLEVELAND, O.—The Crosstown Street Railway will extend its Willson avenue tracks.

NEWARK, O.—The Newark & Granville Electric Street Railway has passed into the hands of a receiver.

PUT-IN-BAY, O.—Arbuckle, Ryan & Co., have leased the Put-in-Bay Electric Road for a rental of $750 per year.

BOWLING GREEN, O.—A franchise is asked by the recently incorporated Toledo, Bowling Green & Fremont Railway.

TIFFIN, O.—Samuel B. Sneath has purchased for $8,000, at sheriff's sale, the incomplete Tiffin & Fostoria Electric Railway.

WADSWORTH, O.—The Rev. F. G. McCauley, of Wadsworth, is president of the proposed Wadsworth Electric Railway.

SIDNEY, O.—The Sidney Electric Railway Company has changed its name to Piqua, Sidney & St. Mary's Railway Company.

ALLIANCE, O.—The city marshal has levied on the Alliance Street Railway to satisfy a $300 judgment held by R. G. Williams.

TOLEDO, O.—The sale of the Toledo Electric Street Railway to New York and Philadelphia bondholders has been completed.

NEW PHILADELPHIA, O.—Major Charles E. Mitchener says that work will soon begin on his proposed electric road to Uhrichsville.

MANSFIELD, O.—The Mansfield, Savannah & Wellington Electric Railroad has been granted a franchise requiring completion by June 1, 1898.

TOLEDO, O. The Robisons will build another line to their Casino pleasure resort, the present one being inadequate to handle the immense crowds.

AKRON, O.—The Cleveland Construction Company, of Akron, is in the market for two 175-horse-power engines, two generators and two boilers and stacks.

MANSFIELD, O.—The Mansfield, Savannah & Wellington Electric Railway has been granted another franchise by the county commissioners at Ashland.

LORAIN, O.—Having failed to deposit the $5,000 bond the franchise of the Lorain, Elyria, North Amherst & Oberlin Electric Railway has been declared void.

YOUNGSTOWN, O.—The grant to the Youngstown Park & Falls Street Railway having been declared invalid, the council will advertise the franchise for sale.

WADSWORTH, O.—The proposed Wadsworth Electric Railway Company has changed its name to Cleveland, Wadsworth & Southern Electric Railway Company.

NORTH AMHERST, O.—The failure of W. G. Sharp to raise funds for the proposed electric railway has not discouraged the citizens committee, which has renewed its efforts to interest capital.

CINCINNATI, O. Citizens having subscribed funds, the Cincinnati Street Railway will extend to Madisonville. The Main Street Electric Line has passed into the control of the Consolidated.

NEWARK, O.—The appointment of J. F. Lingafelter as receiver of the Newark & Granville Electric Street Railway was made at the request of President R. Scheidler on account of pressing claims which he expects soon to satisfy.

WARREN, O. Construction of the North Trumbull Rapid Transit line has been deferred until the proposed road from Cleveland to Chagrin Falls shall have been completed. E. M. Yeomans, proector, has had his franchise extended a year.

SPRINGFIELD, O.—The Springfield & Urbana Electric Railway Company has elected Col. F. Colburn, president; J. S. Harshman, vice-president; John G. Webb, secretary and treasurer; H. T. Matthews, general solicitor; W. H. Hanford, manager.

TOLEDO, O.—Parks Foster, president, says the Toledo, Bowling Green & Fremont Electric Railroad, "Will let contracts very soon." "We don't mean to lose a minute in getting the road in operation, and unless we have trouble in getting our engines, we will have things running in full swing by July 15. The right-of-way has not yet been determined upon. We will either cut straight through from Perrysburg, not touching any towns on the way, or else we will go by the way of Waterville, through Maumee."

TOLEDO, O.—The Toledo, Bowling Green & Fremont Railway Company has been incorporated. Capital stock, $500,000; incorporators, Parks Foster, of Elyria, O.; Thos. H. Walbridge, Dean V. R. Manley, John A. Moore, Edward D. Libbey, M. I. Wilcox, R. S. Parker, William B. Taylor, S. C. Schenck, Alvin W. Woolson, S. R. Maclaren, Ferdinand Welch, William Hardee, Thomas H. Tracy, Edwin Jacoby, H. A. Tobey, F. J. Hoag, George W. Barnes, George G. Metzger, J. B. Breymann; James A. Huston, Robinson Locke, L. Black, W. H. Milliken, of Bowling Green, O.; J. L. Wolcott, Herbert Baker, Eugene Breymann, Robert E. Hamlin, Walter E. Terhune, E. K. Mussey, of Elyria O.

Pennsylvania.

ERIE, PA.—The Erie Motor Company will extend to a park.

DELTA, PA.—The project to build an electric road to Stewartstown is very much alive.

SCRANTON, PA.—A franchise for an extension has been granted the Valley Passenger Railway.

WARREN, PA.—The Burgess' veto of the ordinance extending the street railway has been sustained by the council.

BEAVER FALLS, PA.—The engine of the Beaver Valley Traction Company broke down, crippling the car service.

CONNELLSVILLE, PA.—New cars are being purchased by the Connellsville, New Haven & Leisenring Street Railway.

BRADDOCK, PA.—Right of way through Braddock and Rankin is asked by the Homestead & Braddock Street Railway.

POTTSTOWN, PA.—Right of way through North Coventry Township has been granted the Pottstown & West Chester Electric Railway.

CHESTER, PA.—Franchises have been granted the Chester, Media, Middletown & Aston Electric Railway and the Philadelphia & Delaware Street Railway.

WASHINGTON, PA.—The Washington Electric Street Railway Company has let the contract for the grading and rebuilding of its tracks to A. V. Purnell, of Pittsburg.

HANOVER, PA.—The Hanover & McSherrystown Street Railroad Company will extend, having voted to increase the capital stock from $30,000 to 50,000 for the purpose.

PHILADELPHIA, PA.—Thomas Heger, of Jenkintown, has been awarded the contract to erect the new power house of the Philadelphia Traction Company at Willow Grove.

PITTSBURG, PA.—The Monongahela Passenger Railway Company has been incorporated to build in Greenfield avenue. Capital $12,000; president, James D. Callery, of Pittsburg.

NORRISTOWN, PA.—James Rawle, a director, has purchased forty acres, which will be improved as a pleasure resort for the Roxborough, Chestnut Hill & Norristown Railway.

MIDDLEBURG, PA.—Maj. E. C. Hamilton says the electric road from Sunbury to Selinsgrove, and the bridge over the Susquehanna, will surely be built as soon as he gets the right of way.

ASHLAND, PA.—Work is to begin in June on the proposed road of the Mahanoy Valley Electric Railway between Ashland and Gordon. A pleasure resort, with an artificial lake, etc., will be created.

TAMAQUA, PA.—The Tamaqua & Lansford Street Railway Company will resume the construction of the electric railway through the Panther Creek valley begun by the Inter-county Street Railway.

PITTSBURG, PA.—Mayor McKenna has signed the six ordinances giving the Consolidated Traction Company the right to use all streets it needs to knit Pittsburg's street car lines into one compact system.

TOWANDA, PA.—The Bradford County Railway Company is about to construct thirty miles of electric road. C. A. Innes is president, J. M. Rahm, vice-president, and F. A. Sawyer, secretary and treasurer.

PITTSBURG, PA.—Work will be pushed on the Greensburg, Jeannette & Pittsburg Electric Railway, Judge McConnell having dissolved the injunction against crossing the Pennsylvania steam road.

SCRANTON, PA.—Trial of the new Pittston line having developed a lack of power, the Scranton & Pittston Traction Company is considering whether to install an additional generator at the Scranton power house or to build a plant at Pittston.

POTTSTOWN, PA.—Charles J. Eberle, promoter, says nearly all the right of way has been obtained for the Pottstown, Boyertown & Reading Electric Railway. The road will pass through Black Horse, Yellow House, Earlville and Amityville. Judge Hegeman, of Reading, is president; Daniel D. Rhoads, vice president; Dr. T. J. B. Rhoads, treasurer; Mahlon G. Taylor, secretary, and Charles Spatz and Frank Esterly, directors.

PHILADELPHIA, PA.—William Wharton, Jr., says that work will begin at once on the eight miles of track of the Fairmount Park Transportation Company's proposed road, for which he was granted the franchise, the Supreme Court having recently affirmed its validity. The officers of the company are: President, George S. Gandy; secretary and treasurer, Ellsworth H. Hults; directors, James Rawle; Albert L. Register; Frederick S. Dickson, J. H. W. Chestnut, John W. Henderson and Anthony R. Kuser.

Rhode Island.

PAWTUCKET, R. I. A car barn will be built by the Inter-State Electric Railway.

WOONSOCKET, R. I.—The Woonsocket Street Railway has been granted a franchise through Cumberland Hill.

WOONSOCKET, R. I.—The Woonsocket Street Railway will extend its Park avenue line in time to have it in operation before July.

Tennessee.

CHATTANOOGA, TENN.—Right of way to Chickamauga Park, twelve miles distant, has been granted the Chattanooga & Chickamauga Electric Railway Company.

CHATTANOOGA, TENN.—The project to build a steam railroad from Chattanooga to Murphy, N. C., has been revived, but as an electric line. A great power plant at the Hiawasse River falls will supply current for the 100 miles of road. The enterprise will be pushed by S. W. Divine as soon as he has completed the electric road to Chickamauga Park, for which he was recently granted a valuable franchise.

Texas.

DALLAS, TEX.—The Dallas City Street Railway has been mortgaged to secure $350,000 of bonds.

Vermont.

HOOSIC, VT.—The Hoosic Electric Railway Company has notified the secretary of state that it will extend.

BENNINGTON, VT.—A number of improvements are being made by the Bennington & Woodford Street Railway. Contracts have been made for 67-pound rails, new bridges, three 100-horse-power boilers, one 150-horse-power engine, two generators, etc. A motor car and three trailers will be added to the equipment.

Virginia.

NORFOLK, VA.—Permission to extend to Brambleton has been granted the Norfolk Electric Street Railway.

RICHMOND, VA.—The Fairmount Traction Company has been incorporated to build and operate street railways. Capital stock, $100,000. Incorporators: Samuel H. Pulliam, John H. Dineon, William T. Heckler, William J. Westwood, and F. C. Bauer, Jr., Richmond, Va.

Washington.

FAIR HAVEN, WASH. E. J. Hill, receiver, is improving the Fair Haven & New Whatcom Railway.

West Virginia.

BENWOOD, W. VA.—Receiver Howard Hazlett has been authorized to issue $55,000 of certificates, to immediately complete the Benwood & Moundsville Street Railway.

MARTINSBURG, W. VA.—E. P. H. Harrison, receiver of the Martinsburg Street Railway, has sold 3 motor cars and 3 trailers for $900, to the new Hagerstown, Md., Street Railway Company. Nothing now remains of the enterprise on which $35,000 has been expended.

Wisconsin.

GREEN BAY, WIS.—Work has begun on the Fox River Electric Railway extension.

OSHKOSH, WIS.—Omro has granted a franchise to the Oshkosh, Berlin & Omro Railway.

WAUKESHA, WIS.—The Milwaukee & Waukesha Electric Railway has been granted its franchise in Waukesha.

KENOSHA, WIS.—The Milwaukee, Racine & Kenosha Electric Railway has renewed its application for a franchise.

OSHKOSH, WIS.—F. H. Josslyn has been appointed receiver of the Central Wisconsin Electric Railway on petition of creditors.

JANESVILLE, WIS.—The Janesville Street Railway contemplates abandoning its power house and leasing power of the Bower City Light & Power Company.

MILWAUKEE, WIS.—The formal transfer of the Wauwautosa Motor Road to the syndicate represented by J. R. McDonald, of Detroit, has taken place. The syndicate is known as the Milwaukee & Waukesha Railway Company, and was incorporated in May, 1895.

Canada

CHATHAM, ONT.—George C. Rankin says that work will soon begin on the twelve miles of electric railway for which he has the franchise.

MONCTON, N. B.—Citizens and outside capitalists have subscribed $50,000 of stock in the proposed Moncton Street Railway, Heat & Power Company.

OTTAWA, ONT.—John Moodie, who owns the right of way, contemplates constructing an electric railway from Bell's Corners to Richmond West, a distance of ten miles.

CORNWALL, ONT.—The Cornwall Electric Street Railway Company has been incorporated with $150,000 capital to operate the street car line which is being rebuilt for electricity.

SHERBROOKE, QUE.—J. E. Flood and J. W. Burke, of New York, have arranged with the city council and R. W. Hencker, for the immediate construction of the electric road.

VICTORIA, B. C.—F. S. Barnard, representing the Consolidated Electric Railway & Lighting Company, has purchased for $340,000 the property and franchises of the Victoria Electric Railway & Lighting Company.

NEW PUBLICATIONS.

Through the courtesy of W. F. M. Goss, professor of experimental engineering, Purdue University. We have received a copy of the current annual catalog of that institution. Purdue has for several years held a high rank among the technical schools of the country, and the present number of students in attendance (635) indicates that its advantages are appreciated.

Economical Designing of Timber Trestle Bridges, is the title of a pamphlet by A. L. Johnson, C. E., prepared under the direction of B. E. Fernow, chief of the division of forestry in the United States department of agriculture. We can recommend this to all contractors and railway men, as it deals with subjects brought up with almost every construction job of any size. It is a government publication.

"The Electric Motor, its General Principles and Construction," by James F. McElroy, consulting engineer of the Consolidated Car Heating Company, of Albany, was an address before the New England Railroad Club, February 11, 1896. It has been put in pamphlet form and the result is now before us. It takes up the matter scientifically but plainly, and in a somewhat original manner upon which we congratulate the author most heartily.

The Home Magazine, a monthly of literature and general information, is making an unquestionable success in the field which it has chosen for itself. Although but a comparatively new publication, it has a large and constantly growing circle of readers. This is as it should be, as aside from its many literary and artistic merits, it is really a great benevolent work, as every dollar of profit realized from the publication is devoted to erecting a national home for commercial travelers, at Binghamton, N. Y., under the auspices of the Commercial Travelers' Home Association of America.

The Westinghouse Electric and Manufacturing Company of Pittsburgh is sending out its circular No. 20, entitled Current Practice in Protecting Electrical Apparatus Against Lightning. It is by Alexander J. Wurts, the company's well known specialist in that line. After several pages of introduction by the author is a symposium on lightning arrester practice, contributed to by about twenty-five electric railway light and power men of the country. A brief account of the methods of protecting different classes of circuits is then given. It should be in the hands of every one operating electric circuits, and is by far the most complete thing of the kind yet published.

The Economist, published at 115 Monroe street, Chicago, has just issued a handsomely printed and bound volume of 96 pages, as a "Street Railway Supplement." The work contains a complete history of each of the street railways of Chicago, with maps of their lines, showing the nature of each and indicating those proposed or now under construction. It is somewhat startling to be reminded that ten years ago there were but four street railway companies in the city with a capitalization of $11,437,000, while now there are twenty-nine distinct corporations with a capitalization of $187,208,500. The steps of this wonderful growth are fully set forth in this book, and it is therefore well worthy of being in the hands, not only of those interested simply in street railway matters, but of those to whom the growth of Chicago itself is a matter of interest.

The W. J. Johnston Company, New York, has issued its Electrical and Street Railway Directory for 1896. It is the most complete electrical directory published. Besides its street railway directory, it gives a list with officers of the central electric light stations, the isolated electric light plants, electric mining plants, telegraph, telephone and district messenger companies, and manufacturers and dealers in electrical and street railway apparatus, machinery and supplies. It includes besides the United States, Canada, Mexico, Cuba, Central and South America. The arrangement and classification of these various lists is very convenient. According to the figures given in the directory, there are in the United States and territories, Canada, Cuba and Mexico, 2,711 electric light central stations, with an aggregate paid up capital of $320,049,518, and 1,140 street railways, with a total paid up capital of $890,828,120. Of these street railways, 828, with a mileage of 14,850, are operated by electricity, and 312, with a mileage of 2,300, by horse, steam or cable power. The directory also publishes a list of 7,150 manufacturers, dealers, electrical engineers, etc., engaged in or catering to the electrical business, and arranged in three different ways: geographically by states, cities and towns; classified according to lines of business, and alphabetically as a finding list.

LONG DISTANCE TRANSMISSION OF ELECTRIC POWER.

READ BEFORE THE STREET RAILWAY ASSOCIATION OF CALIFORNIA, APRIL 21, 1896, BY T. A. W. SHOCK, GENERAL SUPERINTENDENT SACRAMENTO ELECTRIC POWER AND LIGHT COMPANY.

It has been the study of hydraulic as well as electrical engineers for years past as to the best and cheapest methods of utilizing the vast water powers which have been running to waste and transmitting this power long distances. The problem has at last been solved and water powers within reasonable distances of great cities are at a premium. The Sacramento Electric Power and Light Company was the pioneer of the world to transmit power in large units over a long distance. Thirty years ago the idea of building a dam across the American river for irrigating and power purposes was thought of by H. G. Livermore, the father of H. P. Livermore, the present general manager. The work has been continued under Albert Gallatin and H. P. Livermore, and to-day at Folsom may be seen one of the most extensive hydraulic works in the world. The dam contains 37,000 cubic yards of masonry. It is fitted with a shutter operated by five hydraulic rams, and when shutter is raised reservoir back of the dam is formed holding 13,000,105 cubic yards of water; thrust of dam, 1,911 tons; stability, 7,979 tons. A canal 50 by 40 by 8 feet conducts the water from the dam to the power house, distance a mile and three-quarters. The power house is a substantial brick structure, built on granite foundations, and contains four 1,200-horse-power horizontal McCormick turbines, coupled direct each to a General Electric 750-kilowatt three-phase generator. The generators are excited by thirty kilowatt 500-volt multipolar generators which are direct coupled to their individual wheels. The Faisch & Piccard water governor is used, and on a test regulated within 4 per cent from no load to full load. The generators at full speed of 300 revolutions run at a pressure of 800 volts, which is raised to 11,000 volts through step-up transformers. There are nine step-up transformers in the station, of 260 kilowatts capacity each. The power is transmitted to Sacramento over two pole lines. The poles are 40-foot round Washington cedar set six feet in the ground, and a large standard General Electric porcelain insulator is used, which has a factory test of 30,000 volts before shipping. Each pole line has six wires, and each set of three wires has a capacity of 1,000-horse-power. The necessity of a double line has often been demonstrated, as the service during the twenty-four hours cannot be interrupted. By means of switches at Folsom and Sacramento the power can be thrown to any line or any set of transformers, so that in any event an interruption to the service can only be a matter of a few seconds. The line has stood the severe gales of the past winter, only a few minor repairs having to be made.

At the substation in Sacramento the current is transformed down through step-down transformers of 125 kilowatt and 40 kilowatt capacity to 1,000, 500, 230 and 115 volts for power and incandescent lighting.

In this station are three 325-horse-power synchronizing motors, which are coupled by means of friction clutches to a counter shaft, to which are belted one M. P. 200 an M. P. 90 and two Edison 80 kilowatt 500-volt generators for operating twenty miles of street railway owned by the company and for small 500 volt motors. To this countershaft are also belted three 100-light Brush arc machines and two 125-light machines of the same type for city and commercial lighting. The company has in operation 234 city lights, 117 commercial arcs and 3,000 incandescent lights, 150-horse-power in small direct current motors and 100-horse-power in small three phase induction motors, also operating twenty-two regular cars on its street car system. Electrical machinery is now being placed in the Buffalo brewery, Phœnix mills and other institutions, and recently a contract was closed with the Southern Pacific company for electric power for its shops. The plant both at Folsom and Sacramento is duplicated throughout, thus avoiding any possibility of a shut down.

The low tension distribution is laid out on the standard four-wire "Y" system, the three wires of the three phase and neutral system for incandescent lighting and small motor work. Motors can be operated successfully on this system without any apparent change of voltage to the lamps. In addition to the low tension distribution for incandescent lighting a 1,000-volt line is run, stepping down to 104 volts at the transformer for residence lighting and outside motor work.

The plant commenced operation July 16, 1895, and has been operating constantly ever since. This proposition is the pioneer for similar propositions in this state, which are now being installed, and proves to the world that it is a success electrically and financially. To commemorate the coming in of electric power an electrical carnival was given on the night of September 9, 1895, which in splendor could not be beaten the world over. Ten thousand incandescent lights, in the form of circles, towers, May pole and signs were burning on that night, and those who saw it will have the satisfaction of knowing that that they were able to see one of the grandest exhibitions of the nineteenth century.

Another achievement in the electrical field, and which is co-incident to the entrance of electric power, is the successful operation of long distance telephone over a pole line carrying 10,000 volts.

Since the installation of the long distance line, by the Capital Telephone and Telegraph Company of Sacramento, it has been in successful operation.

A test of the power plant showed 97 per cent efficiency of transformers, 90 per cent in the line, and the water wheels 80 per cent. All the machinery has come up to guarantees and in the case of transformers and generators have exceeded the guarantees one and two per cent.

PLEASURE RESORTS OF THE BROOKLYN HEIGHTS RAILROAD.

BY H. MILTON KENNEDY, GENERAL PASSENGER AGENT.

We are pleased to note that the STREET RAILWAY REVIEW, with its usual progressiveness, has given attention in a series of articles, to the question of pleasure traffic on street railways and of pleasure resorts founded by the various railway corporations concerned, to increase special traffic. The Brooklyn Heights Railroad system being located, as it is, in a city with a shore front on the Atlantic ocean, Long Island sound, East river and New York bay, is more fortunate than some of our inland cities in having seashore and other resorts so easily accessible to its vast population.

Besides the world-renowned Coney Island, as well as Brighton beach and Manhattan beach, its near neighbors, but in tone whose patrons are graduated upon a more elegant scale as you ascend the shore, there have sprung up other resorts, the advantages of which capital has seen with keen foresight and which, drawing their patrons from other portions of the city, give the railroads a decided advantage in distributing traffic. The first mentioned of these new resorts is North beach on Bowery bay, Long Island sound. Its location is directly opposite the upper section of the city of New York. Its topography is well adapted for a pleasure resort of this class. It is located upon a high bluff, fringed with a beautiful grove, and affording a magnificent view of the lower portion of Long Island sound. There are located there a hotel with spacious dancing pavilions, cafe, etc., a band of music, a garden and pavilions, with free vaudeville continous performances, toboggan slides, carousels, and with all side shows natural to such places, and in addition the shores of the sound afford ample facilities for bathing, boating and fishing. This resort was a source of large revenue to the company last year. The company has this year constructed a large loop with increased facilities in the shape of a terminal station. The North Beach Improvement Company has also increased its attractions and spent much money in otherwise beautifying the place.

The other new resort which is not yet opened, but will be in the very near future, is Bergen beach on Jamaica bay. This resort which has formerly comprised a quiet cottage colony, is an island of 150 acres, of which about 30 are woodland. The Brooklyn Heights Railroad Company is now extending its tracks from the town of Flatlands near this resort, to the shore front of Bergen beach, where is located probably the largest loop ever constructed for trolley cars. It comprises four tracks with sidings and crossovers, so that in any event it will be almost, if not quite, impossible to block travel. The owners of this resort, Percy G. Williams, of New York City, and Thomas Adams, Jr., of "Tutti Frutti" fame, have already contracted for an expenditure of over $1,000,000, to make this a select pleasure rendezvous in the vicinity of New York City. On the opening day, May 15, 1896, a panorama of numerous pretty buildings of Moorish architecture will greet the sight of those who assemble at its opening event. An avenue, 220 feet in width, faces the bay and extends for two miles along the water front, and immediately back of this swings in the loop of this railroad, with a convenient terminal, in architecture harmonious with the other buildings of this picturesque pleasure village. Immediately in front of the avenue is an esplanade 26 feet in width and a mile in length, besides the broad pier extending into the bay 175 feet for a promenade. One of the especially delightful features of the beach is a handsome casino, in size 115 by 90 feet, with spacious verandas extending around it, and a gilded dome, an exact copy of the mosque of St. Sophia, Constantinople, surmounting the whole. Turkish architecture will prevail in the interior, while a commodious gallery will add to the capacity of the edifice. The management will present a high class vaudeville entertainment, afternoons and evenings. The scenic railroad of the Atlanta Exposition is among one of the attractions that will be especially appreciated, while for the children one of the largest carousels ever built in this country, will be in operation. Then there is a Ferris wheel 200 feet high, a mystic maze building, music pavilions, and all other accessories which go to make up a model outing resort convenient to all portions of the city. Thirty acres of stately oak woodland has also been set apart for a play ground and for picnic purposes, while as a special convenience, a "Bureau of Comfort" is provided for parents with their children and attendants and the lunch basket, etc. From the pier to the beach, and about the bay will be operated the electric launches that achieved such pronounced success at the World's Fair in Chicago.

The brilliantly illuminated Ferris wheel, the buildings, the esplanade and the procession of launches decorated with Japanese lanterns all aglow, will give the brilliant night effect of a Venice.

Then we have Ulmer Park on Gravesend bay, where there is a large hotel with spacious verandas and a dance hall. The annual singing festivals of the various German musical societies are given in this park. There is a cafe connected with the hotel and wine and beer is served in an open garden.

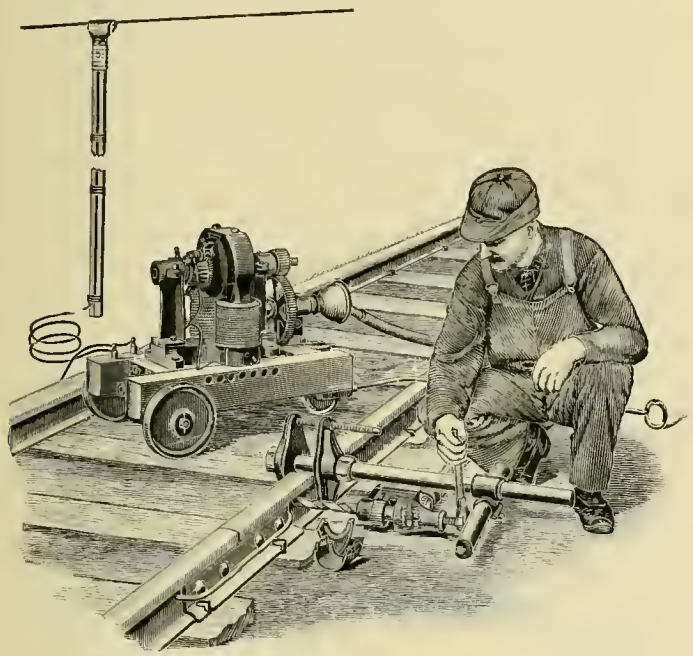
Fort Hamilton on New York harbor, with Bay Ridge and the yachting center on this line, is also a favorite route for pleasure riders, although various amusements places which once existed at Fort Hamilton have been destroyed by fire. These resorts may be reached for a single fare of five cents, by the transfer system, from any section of the city. Another form of pleasure traffic which has been inaugurated by us, is that of card parties, musical parties, and others, in our private palace cars, for those who enjoy more particularly a trip to the historical old inn at Jamaica. This is a long run on our line and affords all the pleasures of a country ride. We are adding to our special equipment decorated and illuminated open cars for summer business and anticipate a large season with this class of travel.

HAY RIDES.

"Our Latest," is a straw-party car for the young folks. This car is arranged as a flat car with sides like a hay wagon, the floor being strewn with straw. There are no other seats. It is illuminated and decorated.

PORTABLE DRILLING PLANT.

The combination shown in the accompanying illustration has proven itself so useful that the manufacturers believe that the time is not distant when it will be considered indispensible as a part of the mechanical equipment of a street railroad. The combination consists of the Stow flexible shaft and an electric motor especially adapted for street railway work. The company has for many years been manufacturing boring machines of different kinds operated through the medium of a flexible shaft, but the design shown has been constructed to



STOW ELECTRIC DRILL.

meet the special requirements of street railway work in that the gearing is compact and covered and therefore not exposed to dust and grit. The whole apparatus weighs but twenty pounds, the gearing is 5½ to one, and it will drill holes up to one-inch in diameter. The motor is similar to the company's well-known "Standard" and is wound for 500 volts unless otherwise ordered. With the outfit are furnished a truck, rheostat, starting and stopping box, reduction gear, wire sufficient to make connection with the trolley wire, and a box of either metal or wood to cover the motor. The metal is naturally preferable for the work for which the outfit is intended. The Stow Manufacturing Company of Binghamton, N. Y., is the manufacturer.

The contractors of the Lewistown and Youngstown electric road announce that they expect to have the line in operation by July 4.

NEW AIR BRAKE.

The National Air Brake Company, 15 Cortlandt street, New York, has just put on the market an air brake especially designed for the service of street railway cars. The compressor is operated from the axle by gearing and a plunger. One of the principal features claimed is that when a certain degree of pressure is reached the compressor is automatically stopped and operation is again resumed when the pressure has reached a predetermined minimum. The maximum and minimum limits may be regulated by changing the tension of the valve springs which control the operative connection. An indicator in view of the motorman shows the amount of pressure carried at any time. As would be expected the latest in this line has numerous improvements over others, and profiting by the mistakes of its predecessors, the National is promised to combine all advantages of the best, without any of the undesirable features.

BIG EXHAUST STEAM HEATING SYSTEM.

The American District Steam Company, of Lockport, N. Y., having a system of utilizing exhaust steam from electric power plants, and using it for heating purposes, has begun work on a very extensive installation. Indeed, the contract, which is with the Pennsylvania Heat, Light & Power Company, of Philadelphia, calls for the largest system yet put in anywhere. On a considerable portion of the lines the underground pipes are of fourteen inches diameter.

The company has also equipped a number of street railway plants, among which are the roads at St. Joseph, Mo.; Danville, Ill.; Terre Haute, Ind., and Ottumwa, Iowa. The De Kalb, Ill., Electric Light Company and the Sycamore, Ill., Electric Light Company are also using the American system. The Dubuque Electric Light Company is another. All these companies find the selling of heat in this way not only very successful from the standpoint of the consumer, but quite profitable, as earnings are thus made from what would otherwise go absolutely to waste. As our readers may recall from the complete description already published in these columns, the pressure on the service pipes is wholly automatic.

SHOOTING IN A STREET CAR.

A fatal shooting affair occurred on the 6th instant in a crowded Louisville, Ky., street car on its return from the races. A colored gambler in charge of an officer opened fire probably fatally wounding him. The fire was, however, returned by the officer who brought his man down with five shots after he had jumped from the car. The gambler fell dead in the street, the motorman was shot in the heel, and the hats and dresses of passengers were miscellaneously punctured by the bullets that missed the officer. It might be well—in Kentucky—to insist upon a search for firearms before admitting passengers to cars.

A PINION WITH A RECORD.

"Ran 23,000 miles without gearcase, and through mud, slush, and water, carrying 20-foot cars up grades from 6 to 12 percent. Taken out on account of failure of armature." Such is the legend which appears on a New Process Rawhide pinion, and bears the signature of H. S. Cooper, superintendent of the Schenectady Railway Company. Probably if there had been more room for correspondence on the pinion in question Mr.

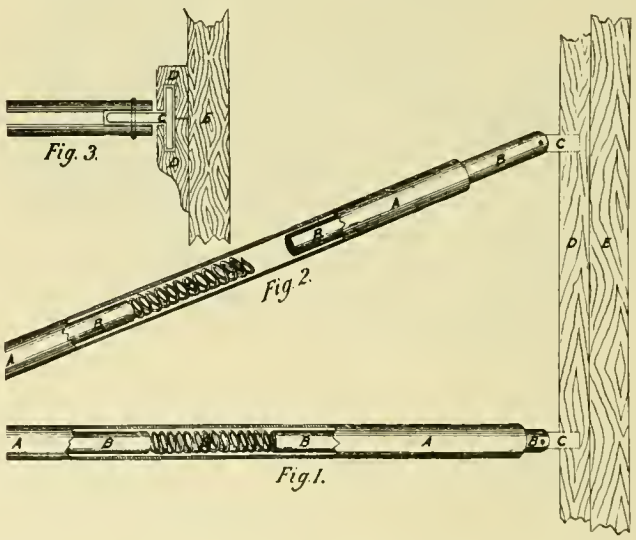
Cooper would have added what he wrote in a letter to the maker of this interesting gear, the New Process Rawhide Company, of Syracuse, that the pinion in question was far from being worn out, though it surely has earned retirement, and now forms one more relic in the interesting collection which adorns the company's office. The success which has attended the New Process gear and pinions is fully deserved, and is the natural result of the policy of the manufacturers to use none but the highest grade materials, and to strictly maintain that standard. That the orders for April, 1896, were largely in excess of any previous month's business tells its own story of present user sending for fresh supplies, and new customers who are falling in line.

One of the longest and heaviest grades in the country is that on Capitol Hill, Albany, which carries the heaviest traffic of any of the Albany lines. The following letter, therefore, from Edgar S. Fassett, assistant general manager of the Albany Railway, is a remarkably strong endorsement:

"We have not made any experiments with any new kind of rawhide pinion, but are using on all our cars rawhide pinions made by the New Process Rawhide Company, of Syracuse, N. Y. These pinions we find wear from eight to twelve months. We are perfectly satisfied with them, and specified them on new equipments ordered from the Westinghouse company this spring. In this connection I would say that we have gears which have meshed with rawhide pinions for twenty-four months, and on which there are practically no signs of wear. I believe that we will get four years wear out of these gears. The average daily mileage of these gears has been one hundred and eighty-six, and I do not believe that the car has lost more than ten days in the two years."

THE "PERFECT" SELF-ADJUSTABLE CURTAIN FIXTURE.

The Brussels Tapestry Company of Chauncy, N. Y., is putting upon the market a new form of curtain fixture which seems to be admirably adapted to use upon both open and closed street cars. The accompanying illustration conveys a good idea of the construction and operation of the fixture. It consists of an outer tube A, which is sewed into the lower edge of the curtain leather, and two rods B of such a size as to slide readily inside the tube though fitting the latter snugly. Pivoted guides C attached to the outer ends of the rods B, slide either in a groove in the casing stop E, or in a double-rabbeted groove in a strip D, attached thereto. A spring S, placed in the tube between the inner ends of the rods B, is arranged with sufficient tension to press the guides against the casing so as to hold the curtain at any desired height and prevent rattling. But slight force is required and the tension of the spring roller at the top will retain the curtain in its natural position. The curtain is raised in the same manner as in the case of the ordinary Hartshorn roller with no fastenings to be released and so



SELF ADJUSTABLE CURTAIN FIXTURE.

easily that a child can operate it. By holding the tube at an angle as shown in Fig. 2, the bars can be removed for cleaning purposes—a feature which commends itself. The claims made for the fixture are durability and simplicity, and an examination of its operation warrants the belief that the claims are so well borne out as to merit a trial. The company claims to be the largest manufacturer of curtain material in the country, and furnishes the curtains made up complete, either with or without the fixture or the materials separately. The parts are all of metal and if properly adjusted should not get out of order or require attention.

Echoes from the Trade

The Worcester Construction Company has the contract for the electric road between Wenham and Ipswich, Mass.

J. L. Reed, of Philadelphia, has the contract to construct the electric road connecting New Castle with Wilmington, Del.

The Ball Engine Company, of Erie, Pa., has removed its Chicago office from the Rookery to 1526 Monadnock Block.

The Phoenix Iron Works Company has moved into its new and very attractive offices at 1105 Rookery Building, this city.

Macartney, McElroy & Co., of New York, have the contract for the new construction on the Meriden Street Railroad.

F. T. Ley, of Springfield, has the contract for the Rockville extension of the Hartford, Manchester & Rockville Tramway.

Sanderson & Porter, of New York, have been awarded the contract to construct six miles of electric road in Plattsburg, N. Y.

The General Agency Company, handling the "Dragon" and other specialties, moves May 1, into new quarters at 168 Broadway, New York.

The Standard Railway Supply Company, Garson Myers, president, removes from the Monadnock to room 1400-2, Fisher building, Chicago.

C. W. Blakeslee & Son, of New Haven, Conn., are building the Elm street extension of the Portland & Cape Elizabeth Railway, Portland, Me.

The Okonite Company, of New York, has removed from 13 Park Row, to 253 Broadway, where it occupies suite 412, in the Postal Telegraph Building.

Brown & Hazlett, of Wheeling, W. Va., have been awarded the contract to construct two miles of electric road for the Wheeling Suburban Railway.

George H. Knebel & Co., of Chicago, have been awarded the contract to construct and maintain a street railway and lighting plant for the city of Madison, Ind.

The Lakon Company, manufacturer of the Lakon transformer, has removed its Chicago office, which is in charge of F. S. Terry, to suite No 1509-10-11 Monadnock Block.

The Barney & Smith Car Company, of Dayton, O., is engaged upon an order of cars for the Mt. Clemens Electric road. The order includes three closed and fourteen open cars.

The American Electrical Works, Providence, R. I., has just issued one of the novel advertising cards for which it is noted, in the shape of a map of Cuba and a brief history of the island.

James G. Biddle, manufacturer's agent and importer, Drexel Building, Philadelphia, has issued recently a catalog of the line of testing instruments made by Elmer G. Willyoung & Co.

The New Haven Car Register Company is now running its factory nights to take care of an unusually large business; all of which is satisfactory to the company and complimentary to its machines.

Abendroth & Root boilers have been installed as one of the exhibits at the electrical exhibition, New York. The battery is an exact duplicate of the boilers used at the B. & O. tunnel plant, Baltimore.

The Wadhams Oil & Grease Company of Milwaukee has a trade in graphite curve grease and motor lubricants extending to all parts of the United States. It has made a specialty of this class of supplies.

The Sunbeam Incandescent Lamp Company, Chicago, has removed its offices from the Title & Trust Building to suite No. 1509-10-11 Monadnock Block, where it will have much more commodious quarters.

The Cutter Electrical & Manufacturing Company, manufacturer of the C. S. flush push switches and the I. T. E. circuit breakers, has removed its western office to suite No. 1509-10-11 Monadnock Block, Chicago.

James McLaughlin, recently with the Philadelphia Engineering Works, limited, has been elected secretary and treasurer of the Barr Pumping Engine Company of Philadelphia, of which W. W. Lindsay is the general manager.

Clift Wise, general contractor, has moved his office to suite 1406-12 Manhattan building, this city. Mr. Wise has a number of construction contracts on which work has already begun, including considerable work for the Chicago City Railway.

P. A. Hover, manager of the New Castle Car Manufacturing Company, New Castle, Pa., favored the REVIEW with a pleasant call during his recent western trip, and reports that his company is extremely busy and with a large amount of work in sight.

The Self-Contained Equipment Company has been organized at Portland, Me., for the manufacture and sale of electric railway equipments. The capital stock is $500,000, and Arthur C. Libby, of Portland, is president, and George H. Drew, of Boston, treasurer.

The Scientific American will issue, July 25, a special souvenir number commemorative of its fiftieth anniversary. The first edition will be 100,000 copies, and will contain a resume of the world's progress in science and invention during the period of the paper's existence. The scheme of the work is to trace different typical inventions from their inception to their present stage of development.

Crage & Tench, of Buffalo, N. Y., have been awarded the contract to construct and equip the Lewiston & Youngtown Frontier Railway. They will place 400 men at

work as soon as the rails, ties, posts, poles, crushed stone and overhead material are on the ground. The new road is an extension of the great scenic Gorge Road, also built by Crage & Tench.

Not all original advertising is good; nor is all good advertising original; but the new catalog, No. 16, of the Central Electric Company, Chicago, announcing the inauguration of the electric fan season, is both good and original. If you have not seen it send for one.

A. O. Schoonmaker, 158 William street, New York, who is one of the largest importers of India mica in the United States, reports an excellent business in his line. He makes a specialty of stamped mica washers of any shape or size, and also deals in sheet mica, cut or uncut.

F. S. Terry, 100 Washington street, Chicago, in addition to his extensive manufacture of electric lamps and other specialties, will act as western manager for the Cutter Electrical and Manufacturing Company, Philadelphia. A better representative could not have been selected.

The National Water Tube Boiler Company, Orosco C. Woolson, New York, manager, has found it necessary to have more extensive facilities for the transaction of its business, and has therefore removed its New York office to the Havemeyer building, Cortland and Church streets.

A. N. Loper, of the New Haven Car Register Company, has returned east after six weeks at Colorado Springs, where he went to recover from a severe attack of grip. Mr. Loper says there will be a big representation of western men at the St. Louis convention, many of whom seldom attend.

The Abendroth & Root Manufacturing Company, 28 Cliff street, New York City, has closed contracts for its Root improved water tube boiler, for the electric light and power plant of the East River bridge; Munsey's new building; and the Electrical Exposition, New York City.

Vogan Brothers Manufacturing Company of New Castle, Pa., reports that the demand for its sanders and draw-bars is better than it has ever been and the outlook points to a splendid summer's business. The satisfaction which users find in the Vogan sand-box leads to numerous second orders.

The Simonds Manufacturing Company, Pittsburg, Pa., has recently added to its list of specialties a new mixture of babbitt metal, adapted for use on street railways. It is now in use on many large roads in different parts of the country, and is said to be giving the best of satisfaction. It is known as the "Electric."

C. E. Loss & Co., Pullman Building, Chicago, have just closed a contract for building and equipping 14 miles of road for the Cleveland & Chragin Falls Street Railway. The order covers the furnishing of five cars and the fitting up of the power house with engines, generators and every appliance necessary.

Eugene Munsell & Company, importers and wholesale dealers in mica, 218 Water street, New York, have opened a branch house at 153 Lake street, Chicago, where they will carry a full line of all grades of mica for electrical insulation. The business will be under the management of Chas. E. Coleman, whose previous connection with the New York house and familiarity with the electrical trade give assurance that western customers will receive prompt and careful attention.

The Crane Company, Chicago, has the contract for the piping and extra heavy valves for the railway power house of the Belleville Gas Light & Coke Company, Belleville, Ill. G. A. Hurd, who looks after the street railway trade for the Crane Company, and who is one of the best informed men in the business, secured the order.

The Simonds Manufacturing Company of Pittsburgh has added to its list of representatives, E. H. Van Vleet. Mr. Van Vleet has located at 15 Cortlandt street, New York, where he will be pleased to see all his friends. This company is about to add new machinery which will more than double its present output of gears and other railway material.

J. G. Brill & Co., of Philadelphia, have given up their office at 1038 Monadnock block and will for the present have no western office. F. C. Randall, who has been in charge of this office will travel through the west in the interests of the firm, making Philadelphia his headquarters. The firm is reported as having orders ahead in car work for several months' business.

The catalog of A. L. Ide & Son, Springfield, Ill., builders of the ideal high art engines, is one of the most artistic that has reached us this year. The cover is embossed and printed in four colors, and the half tone work throughout is exceptionally fine. Many of the cuts of the catalog are duplicated, showing first the engine in its entirety and then the mechanism in shadow and relief outline.

W. W. Whitcomb, of Boston, president of the Composite Brake Shoe Company, spent several days in Chicago, looking after his western interests. The composite shoe has made a really remarkable record, and never fails to win under the most severe competitive tests. Nearly 90 per cent of all the shoes bought by New England street railways the past year, has been these composite shoes.

The Metropolitan Electric Company has just taken the agency for the Diehl Manufacturing Company of Elizabethport, New Jersey, and will carry in stock a complete line of its ceiling fan motors. The Diehl Manufacturing Company is the oldest manufacturer in the country of ceiling fan motors in their various shapes and styles, and the Metropolitan Electric Company is fortunate in securing this agency.

The St. Louis Register Company has closed some good orders during the past two weeks, among which are the Cincinnati Street Railway Company, to equip its entire line with the double or transfer register, which means between 600 and 700 machines. It has in use now on the Eden Park line 125 of the same style. It has also closed with the City & Suburban, of Baltimore, for the entire equipment of its line with the single fare register.

Stanley Green, who as manager of the Chicago office, of the Green fuel economizer, has been very successful in the introduction of that appliance in the West, reports the following sales during the past few days; Armour Packing

Company, Kansas City, 2,000-horse-power; Detroit Railway, second order of 2,500; Lake Cities Railway, Michigan City, Ind., 500; Englewood & Chicago Electric Railway, 500; Goebel Brewery, Detroit, 300; and 500—the fourth order—from Russell B. Harrison, Terre Haute, Ind.

John Gorman, for twenty years practical electrician and dealer in electrical apparatus in St. Paul, will represent the Metropolitan Electric Company in handling N. I. R. wire, metropolitan lamps, "Mac" tape, P. & B. compound varnish, etc. Mr. Gorman is prominently identified with electrical interests in St. Paul and Minneapolis, and has done a large share of the electrical work in that section during the last twenty years. The Metropolitan Electric Company can be congratulated in getting Mr. Gorman to handle its goods.

The Bradford Belting Company, of Cincinnati, manufacturer of "Monarch" insulating paint, reports very large sales for the past month, and expects a still larger business as soon as spring opens. This paint has undergone all kinds of tests, and has proven itself to be a wonderful article, as in every case it has done more than was claimed for it, and as it has no offensive odor about it at any time, it is rapidly coming into favor. It will distribute a very attractive souvenir at the Electrical Exposition to be held in New York, in May.

Mica Insulator Company, manufacturers of "Micanite," has opened a branch house at 153 Lake street, Chicago, and announces that there will be carried at this place a full line of "Micanite" plates, commutator rings and segments and slot insulations for all the standard railway motors and power generators. The business will be under the management of Chas. E. Coleman. The move will doubtless be appreciated by western customers on account of the greater degree of promptness with which orders can be filled.

Chas. S. Fee, general passenger and ticket agent, Northern Pacific road, has just issued the 1896 edition of "Wonderland," a handsomely executed pamphlet devoted to a description and illustrations of the country reached by that road. The book contains 110 pages within highly artistic covers, and the numerous illustrations from photographs do full justice to the magnificent scenery along the line. Much of the space is naturally taken up with matters relating to Yellowstone Park, but the growing towns upon the road and side scenes by the way have not been neglected.

Edward P. Sharp, of Buffalo, N. Y., is doing an extensive business in the matter of second hand supplies for street railway work. He has on hand at the present time a number of railway motors of different classes, gravity car gates, rheostats, ring armatures, gongs and sheet mica strain insulators. He is also the local representative of a number of prominent houses, including the Taunton Locomotive Works, the American Mica Company, the Partridge Carbon Company, the R. D. Nuttall Company, and other well-known firms. Mr. Sharp is one of the best known supply men in western New York.

Franklin Brooks, junior member of the firm of Eugene Munsell & Co., has just returned from a six months' business and pleasure trip, in which he covered in the vicinity of 40,000 miles travel. The trip included London and Paris, the Mediterranean Sea and the Suez Canal to India, where two months were spent in the mica fields. The firm imports its mica direct from the mines, and Mr. Brooks completed arrangements whereby it is enabled to supply the material to the electrical trade in larger quantities than before. The return trip was by way of China and Japan to San Francisco. A large collection of photographs attests the thoroughness with which Mr. Brooks studied the countries through which he passed.

The Ohio Brass Company has recently distributed to the trade two descriptive circulars and price lists, that commend themselves for their neatness of design and the exceedingly plain way in which the prices and merits of the goods are set forth. One is a revised list of the genuine bell metal motor bearings, manufactured by the company, which gives in addition to the bearings mentioned in the previous circulars those used on the latest types of motors. The other is devoted to steel and copper bonding caps, which is one of their principal specialties. The Company reports an increasing business every month over the preceding one since the first of the year, and its factory is now running over time to fill the orders on hand.

The Walker Company, Cleveland, has established branch offices as follows; New York, 913-914 Postal Telegraph building; Boston, 8 Oliver street; Philadelphia, 1120 Betz building; Pittsburg, 1012 Carnegie building; Chicago, 1645-6-7-8 Monadnock building; Minneapolis, 470-475 Syndicate Arcade; St. Louis, 715-717 North 2nd street; Dallas, 310 Trust building, San Francisco, 13-15 Fremont street.

European countries and North African states represented by Exploitation Des Procedes Electriques Walker J. Laveissiere, president, 6 Rue Boudreau, Paris, France.

South African countries represented by W. G. Gammon, Johannesburg, S. A. R.

The Universal Construction Company, a new organization, which was incorporated in Chicago last month, has leased the "North Works" of the Illinois Steel Company and has begun the manufacture of structural steel and special shapes. For several years the officers of the Illinois Steel Company have felt that on account of the constant attention required by its five other plants, sufficient time has not been given to the structural business, and therefore deemed it preferable to lease the plant to a responsible corporation, which would naturally become a large customer for its finished and raw product. The personnel of the new company is as follows: W. R. Stirling, president; Fred Heron, general manager, and Edward Haupt, secretary. These gentlemen have all had years of experience in the iron and steel business, and stand high in the financial world.

The Hoppes Manufacturing Company, of Springfield, Ohio, has just published a very comprehensive booklet, exploiting its live steam feed-water purifiers and exhaust steam feed-water heaters. In it not only the advantages but the directions for operating and cleaning the apparatus are clearly set forth. To any engineer this little book will pay perusal. The pamphlet, aside from its contents, is tastefully arranged. The design on the cover, which illustrates the idea on which the Hoppes apparatus is built, will certainly prick curiosity to seek further for an explanation of it. The

designer of the Hoppes purifier and heater, observing the formation of stalactites in natural caves, conceived the idea of applying the same principle in a machine for the purification of water for boiler purposes. This discovery is the subject of the cover picture.

At this season of the year it is not good practice to be short of jacks for raising and lowering car bodies and for new construction work. Those made by the Duff Manufacturing Company, of Allegheny, Pa., have proven themselves well adapted for all work of this kind. They are constructed with especial adaptability for use on cable and electric lines and in car barns, taking up but little room and having a good working range in lifting and lowering.

The Goubert Manufahturing Company, 14 and 16 Church street, New York, has opened a western office at 1403 Monadnock block, which will be in charge of E. Webster, who is a well-known expert in the matter of steam appliances, having been for many years with the Stillwater-Bierce & Smith-Vaile Company. The company manufactures a large line of feed-water heaters, condensers for engines and ice machines, steam traps and Stratton separators.

The General Manufacturers' Display Bureau, 90 and 92 West Broadway, New York, has perfected a scheme which should prove of great value to manufacturers outside of New York, who wish to be represented there, but have not sufficient business to warrant the maintenance of a special representative. The representation is on a commission basis by managers who have had a long, practical experience in the work. Large and light display rooms covering over 37,000 square feet have been secured in a good locality. Complete lines of samples may be displayed for the examination of buyers who visit New York but do not go elsewhere.

The Paige Iron Works of Chicago have issued a notice of warning to all who manufacture, purchase and use railway crossings, against infringement upon their patent rights covering the use of supplemental or easing rails. These rails are now in general use for railway and steam road crossings. As is well understood, the wear of the wheel tread is on that part next to the flange, leaving what is termed a "false flange" on the outside of worn wheels, which in passing strike the cross construction, and subject the crossing to undue wear and pounding. With the use of the auxiliary or easing rails, a supplemental support is provided for this "false flange," the cross construction is removed beyond its reach, and the life and alignment of the crossing preserved. A monopoly is claimed by the Paige Iron Works in the manufacture of these rails.

The Standard Underground Cable Company has recently made a number of important changes in the personnel of its home office at Pittsburg, in order the better to facilitate its already large and constantly increasing business. P. H. W. Smith, who was formerly superintendent of construction for the western sales department, and more recently assistant to J. W. Marsh, vice-president and general manager, has now been appointed assistant general manager. Mr. Smith's training in electrical matters was received at Lehigh University, of which he is a graduate. He has been actively connected with the Standard Underground Cable Company for a number of years in the construction and sales departments, and the advancement is well merited and will be appreciated by his many friends. F. S. Viele, formerly of the Buffalo Railway Company, but for several years past superintendent of construction for western sales department, and temporarily in charge of the latter, has been transferred to Pittsburg, as manager of the conduit and general construction departments. In addition to the general construction work, Mr. Veile will have under his immediate charge and supervision, the conduit sales department, and rubber sales department. Mr. Viele is a graduate of Massachusetts Institute of Technology in electrical engineering, and his recognized ability as a trained expert in matters pertaining to insulated wires and cables, makes him a valuable man to the company, and his many friends will be pleased to learn of his promotion.

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H. H. WINDSOR, Editor.
F. S. KENFIELD, Business Manager.

CORRESPONDENCE.

We cordially invite correspondence on all subjects of interest to those engaged in any branch of street railway work, and will gratefully appreciate any marked copies of papers or news items our street railway friends may send us, pertaining either to companies or officers.

DOES THE MANAGER WANT ANYTHING?

If you contemplate the purchase of any supply or material, we can save you much time and trouble. Drop a line to THE REVIEW, stating what you are in the market for, and you will promptly receive bids and estimates from all the best dealers in that supply. We make no charge for publishing such notices in our DAILY BULLETIN.

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THE bill mentioned in our April number, as pending in the Iowa legislature, and which was intended to place the street railways of the state under the jurisdiction of the steam railroad commissioners, was defeated. We congratulate our Iowa friends, and all who hold stock or bonds in Iowa roads; and also the street car riding public of Iowa; all of whom are better off without this extra and wholly unnecessary censorship.

MAHON, the Milwaukee labor agitator, in one of the churches in that city stated the object of the strike was "the still further improvement of the condition of street railway employes, by securing the recognition of the union." This sounds very fair, but where has Mr. Mahon made his improvement? He has succeeded in getting 1,500 well-paid men—in these times—out of a job. His union has sought "recognition" by cutting wires and poles, and otherwise damaging property which did not belong to it. By throwing dangerous chemicals at cars as they were running in the street; by throwing stones and bricks; by coercing business men into its way of thinking, with an ultimatum of that or having their business wrecked. All this Mahon and his misguided followers have done in their efforts to secure "recognition" and its consequent "improvement." This man Mahon has undone in a few weeks the efforts to build up Milwaukee, which have been put forth in the past ten years.

UNDERGROUND rapid transit in New York City is at last buried. Its emaciated remains have been dead a long time, and now the appellate division of the supreme court has furnished the shroud in a decision which settles the scheme for one generation at least. We have always maintained the scheme was impractical on account of its enormous expense, which contemplated the outlay of several hundred million dollars, and the greatly superior transportation to be had on the surface or by double decking the present L roads. Its promotors have made a prodigious fight and spent several hundred thousand dollars, but conditions present and prospective were all against it, and now it is no more. It was a wonder that the people ever voted to authorize the 50 millions asked for construction, and that the legislature and governor sanctioned the outlay; for the amount named would have to be multiplied several times to bring the work to completion. A comparison of the statements of the City & South London (underground) and the Liverpool Overhead both electrically operated ought to convince any sane person that underground transportation, even in densely populated New York, is not a commercially successful venture.

THE advocates of 3 cent fares will find food for meditation in the case of the Indiana Electric Railway, of Goshen, Ind. This road began several months ago to sell 40 tickets for $1. This move was made for the benefit of storekeepers who might want to sell their employes tickets at reduced rates. The sale was not limited to such employes, but was available for practically the entire riding public. The company itself sold its 40-for-$1 tickets in nothing less than $50 lots, but the regular cash fare remained at 5 cents, and one of those who bought tickets of the company by the wholesale retailed them in $1 lots to street car patrons at a small margin, so that really the low fare was available to everybody. The conductors' returns each night show how much the people really care for lower fares. The returns showed that for every person paying fare with a cheap ticket there were more than two who paid the regular 5 cents. Rather than invest the small sum of $1 and get the reduced rate they paid full fare. This shows how bad the riding public really wants the reduction of fares. It must not be forgotten that this too was in a small town where riding is largely a matter of choice, where distances are short, and where a reduction in fares would probably be made the most use of.

Two more cable lines are to be abandoned and changed to electricity—the Fifth avenue and Citizens' lines in Pittsburg. The change is occasioned partly by the consolidation and partly the advantage of having but one system of operation—the electric lines, now in the overwhelming majority in Pittsburg, having been

built since the cables there were constructed. This suggests a backward glance. In 1884 and '85, when every manager was earnestly seeking some means of relief from the thralldom of animal power, the cable was the only system which offered any positive relief. The San Francisco roads had been in operation upwards of ten years, and the initial construction of 20 miles in Chicago was even a greater success, and was earning big dividends for its owners. Steam dummies, compressed air, soda motors, gas engines, fireless locomotives—all had been tried time and again—and all were found sadly wanting. Of these steam alone was reliable, but the public would not accept steam. The astonishing saving in operation of the cables over horses in the early 80's seemed to warrant the heavy first cost for construction; and there are cables running to-day at a cost for operating expenses which electricity has never been able to displace. These lines are, however, trunk lines, the great arteries of big cities where the volume of travel is great, and trains of two to four cars run on 60 seconds headway. Had the development of the electric street car motor been delayed even two years, there would unquestionably have been hundreds of miles of cable construction decided on. As it was, the trolley in 1885, while very crude, gave such promise of future possibilities that managers deferred decision on the cable for a year or two, and when that time had elapsed saw in it the long-looked for solution of their troubles. We often hear the inquiry why the cable lines in Chicago are not converted into trolley lines. The answer has already been given—with the volume of business handled, the cable is still cheaper than electric operation.

The time has come when, if the street railway companies of this country are awake to their interests, they will take some concerted action toward the investigation of the best form of wheel tread and rail head for electric railway use. At first this may seem like a trivial subject, but a little study will show that it affects directly two very large items in the expense of operating a street railway, viz.: track depreciation and wheel wear. At present there is the greatest diversity of practice in the shape of wheel treads, and to some extent in the shape of wheel flanges. Now many of these combinations must be wrong. The question of heads and treads should not be confused with other matters. Whether a rail is grooved girder or T, and whether a wheel flange is large or small makes no difference. The point at issue is: What is the proper form to give the line of contact between wheel and rail? It is at this place that the great wear takes place, and there is less knowledge of what goes on there than at any other. Our articles somewhat over a year ago on the practicability of a standard wheel tread and flange showed that there was no sort of agreement as to these matters. One road runs a beveled wheel tread with a beveled rail head to match. Another taking the other extreme has wheels with absolutely no bevel, thereby fitting the usual flat rail head. Which is right? A good many roads do not pay any attention to this detail. The "way out of the woods" is for the American Street railway Association to appoint a committee which will do some actual hard work in studying the results attained by different forms of heads and treads. It will be necessary in this work to go into the shops and over the lines of many roads, and will require something more than a cursory study. It will also mean considerable expense, but what money will be spent on this work will not be a drop in the bucket to what it will save members in the next few years. Committee work of this kind is more common among steam road societies than in the American Street Railway Association, but the latter must soon begin such work if it is to keep pace with the demands of the industry and maintain its greatest usefulness.

The latest in Pingreeism appears in a paper by that gentleman, read at the Baltimore Municipal Reform convention. Few of our readers will be surprised at his admission as follows:

"While I do not profess to see the material difference between a street car or a railroad car and a dray, a coupe or a hack, and fail to see why the proprietor of the car gets a franchise or a charter, and the proprietor of a hack or other carriage gets a license, although both are doing the same business in the same street, it is evident the courts see the difference between the documents, as they declare the franchise to be a contract which cannot be disturbed, although such contract makes it possible for private combinations to practically control the government that enters into it."

So long as he confined his attention to hob-nailed shoes and potatoes he was all right, but when it comes to comparing a street car system involving the investment of millions, and a hansom cab costing a few hundreds of dollars, he readily admits his incapacity to distinguish any difference. He utterly fails to comprehend that the price of a single trolley car or two would equip a very fair sized livery stable; or that one mile of double track costs as much as all the omnibuses in Detroit; that in order to make possible the securing of necessary capital to install a car system there must be absolute guarantee as to definite term of operation and under fixed conditions: for, while the cabs and hacks and omnibuses can pull up stakes and resume in twenty-four hours in another city, tracks, power and car houses are fixtures and useless for any other purpose; that the street railways pay enormous taxes to provide streets for the horse-drawn vehicles to use, and where the latter pay one dollar in taxation and licenses, the company pays ten; that, further, street railways largely assist in the expense of paving a good portion of the street on which it has already paid taxes; and also sprinkle and sweep; that the railway develops new territory, bringing it into touch with the business districts, and by enhancing the value of both, increases the city's revenue from taxation on the increased valuation; that the street railway carries passengers many miles in comfort for five cents, where the hack and omnibus demand from 50 cents to several dollars for displacing one's internal organs; and so on indefinitely. Oh, No; he can't see any difference; and none are so blind as those who won't see; but most people have better sense than to confess to such ignor-

ance in this the year of our trolleys, one thousand eight hundred and ninety-six.

Failing absolutely, because there were no conditions which warranted a strike, the former employes of the Milwaukee Street Railway seemed determined on revenge. Trolley wires were cut, bricks, bottles of vitriol and muriatic acid thrown at the cars, obstacles piled upon the track, trolley poles sawed, and a gigantic boycott put in operation. Business and professional men rather than incur the ill will of the strikers and their friends allowed themselves to be dictated to to a most unaccountable degree. Strikers said who should and who should not be allowed to sell or buy, and the result has been a demoralization of trade in that city. But as the Milwaukee Sentinel aptly says, "the boycott is a dangerous weapon and may turn against those who use it. It demands that people shall take sides in quarrels with which they have no concern; it disorders business, it works manifold injustice, and it is doubtful if the community will long endure its perpetual encroachments upon the rights and liberties of citizens." That the strikers' cause was a manifestly weak one is acknowledged by their resort to the boycott, and the verdict of the State Board of Arbitration, which, after visiting Milwaukee and carefully studying the situation decided that the strike was "ill-timed." Indeed, the strikers admit their own weak position by agreeing to return to work at the old rate—19 cents—if they can all come back. The company certainly cannot accede to this, after having given ample notice of its intention to import men, and having already secured about 1,000. It offers to complete its complement of men with old men as far as it can find places, but will retain and stand by the men who came to it when the former employes threw away good jobs and went out. Mahon, the agitator, has a great deal to answer for. Even Gompers, who was sent for, could not find sufficient justification for the strike to order out the other union labor organizations in the city, after reaching there and looking over the situation. It is unfortunate all around; for the company which was doing all it could; for the men and their families, who will not find as good positions for months to come; for the city, which has been heralded far and wide as hostile to capital interests, and whose local trade has temporarily been demoralized. The people who have boycotted the loudest will some day have cause to repent bitterly, for new industries in seeking a location, will give Milwaukee a wide berth, and property owners, business men and all the labor classes will have to take the medicine they themselves prescribed.

When suit was brought, nine months ago, against the Omaha Street Railway, by the trustee of the water works company of that place, for $250,000 damages to the pipes of the water works system by electrolysis, the interest of the entire street railway fraternity was aroused, as this was the first suit ever brought of such a nature. At first thought it seems rather strange that considering the length of time the damage possible from electrolysis has been known, that some suit should not have been started before. The fact that all has been so peaceful between the electric railway and water works companies, can only be accounted for by the willingness usually displayed by electric railway managers to remedy the evil, and by the relatively small amount of the actual damage done. But now even the Omaha case has been dismissed by the plaintiffs, an event on which the electric railway industry may justly feel cause for congratulation. The history of this case is as follows, and is one in which both the Omaha and every other street railway in the country may be well satisfied: The Farmers' Loan and Trust Company, which had the water works in hand, became alarmed by the reports of certain experts regarding the effect of electrolysis on the pipes, and probably honestly believed that they were badly damaged. Suit was brought for $250,000. It was not an easy matter to prove absolutely to the contrary, as the pipes were all buried, and the particular point near one of the power houses, which had not been properly connected, showed damage for a block or more from electrolysis, and had to be relaid, making it look, of course, as if the trouble might soon extend over a large territory. But by great good luck it happened that in compromising some other matters with the city and insurance people, the water works company agreed to relay with larger pipe nearly all its mains in the business part of the city. This was all done last fall, and of course the uncovering of the pipes in all that district which was thickly covered with street railway lines was watched with intense interest by all parties concerned. Experts from both sides were constantly on hand. The result was satisfactory to everybody, as it was clearly developed that there was no electrolytic action except at one or two spots, and even there it was doubtful whether it was electrolysis. It was but natural when the water works people found that they had practically no grounds for damages, that they should ask to have the suit dismissed, as they probably felt that the slight injuries they had sustained could be adjusted without recourse to the courts. The outcome will have a beneficial effect in quieting the fears of many a water-works man, and enabling electric railway managers to "sleep better o' nights."

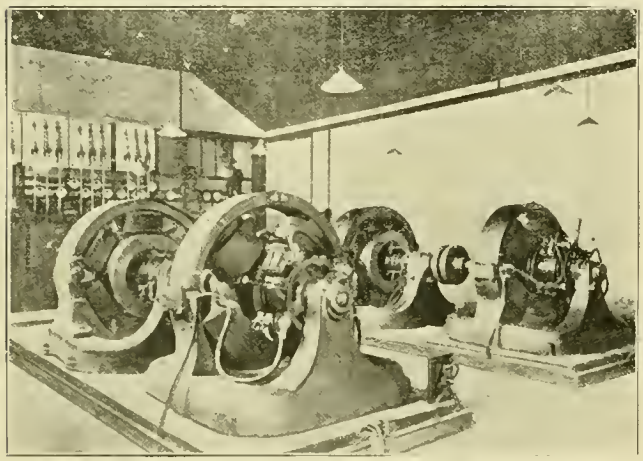
CONSOLIDATED TOLEDO MANAGEMENT.

The past month has seen the completion of a deal which brings the management of the two roads there—the Toledo Traction Company and the Toledo Electric Street Railway—under one roof and one set of operating officers. The way this was said to be brought about was by an exchange of stock between the owners of the two companies. The stockholders probably reasoned that they could make more money and give better service by operating one system than by operating two, especially where there are parallel lines. In the change we are glad to note that Winfield S. Jewell remains in the position of general manager.

NEW ROAD AT DUBLIN, IRELAND.

Three Phase Transmission—A Novel Piece of Electrical Engineering.

The road just started at Dublin, Ireland, is of interest to American electric railway men, chiefly because it is a peculiar piece of electrical engineering, and the present description will be confined to these novel features. The work has been carried out by J. Clifton Robinson, manager and electrical engineer and H. F. Parshall, now with the British Thomson-Houston Company, formerly of the General Electric Company.



ONE OF THE SUB STATIONS, DUBLIN.

The novel part of the undertaking is the transmission by 2,000 volt three phase alternating current of the greater part of the power for the road. The line consists of one almost straight route over 10 miles long. The power station is located ½ mile from one end. That part of the line near the power station is fed by direct current from the power house. Instead, however, of supplying the further end by the common method of feeders some 2,000-volt three phase alternators have been put in the power house, which alternators supply current to two substations where rotary transformers fed from the alternating mains supply a 500-volt direct current to the trolley line. The accompanying diagram shows the arrangement. The trolley line itself is divided into half mile sections. There is, however, a continuous feeder of 105,500 circular mils running the length of the trolley line. This feeder is connected to the trolley wire sections by means of the switch pillars put at the foot of a post every half mile. The feeder is in turn fed at the three places, viz:—the power station, a substation 5 miles distant and a substation 9½ miles distant. All the feeders are armored cables laid directly in the ground. The cables are lead covered and the armoring consists of two layers of steel tape strong enough to resist any probable blow. The factory lengths of cable are joined in cast iron joint boxes, so that a continuous iron sheath is provided throughout. The alternating high tension feeders are what are known as triple concentric. Concentric cables are used considerably in England though comparatively unknown in this country. A triple concentric cable consists of a central conducting wire surrounded by two conducting tubes, insulated from each other and from the central wire. At each of the substations two 60-kilowatt rotary transformers are used, consisting of 60-kilowatt synchronous three phase motors direct coupled by flexible coupling to 500-volt direct current machines. In starting up the substation the transformers are started by running the 500-volt generators as motors until full speed is attained. Then when the switchboard apparatus indicates that the alternating current end of a transformer is in synchronism with the generators at the power house it is connected to the three phase mains, when by proper adjustment the direct current machine begins to act as a generator to feed the trolley line. The alternating current generators at the main power house are to be run usually in parallel, but they can be worked independently if desired as separate feeders run to each substation. But the American engineer is asking: why all this complication and investment when the distance is

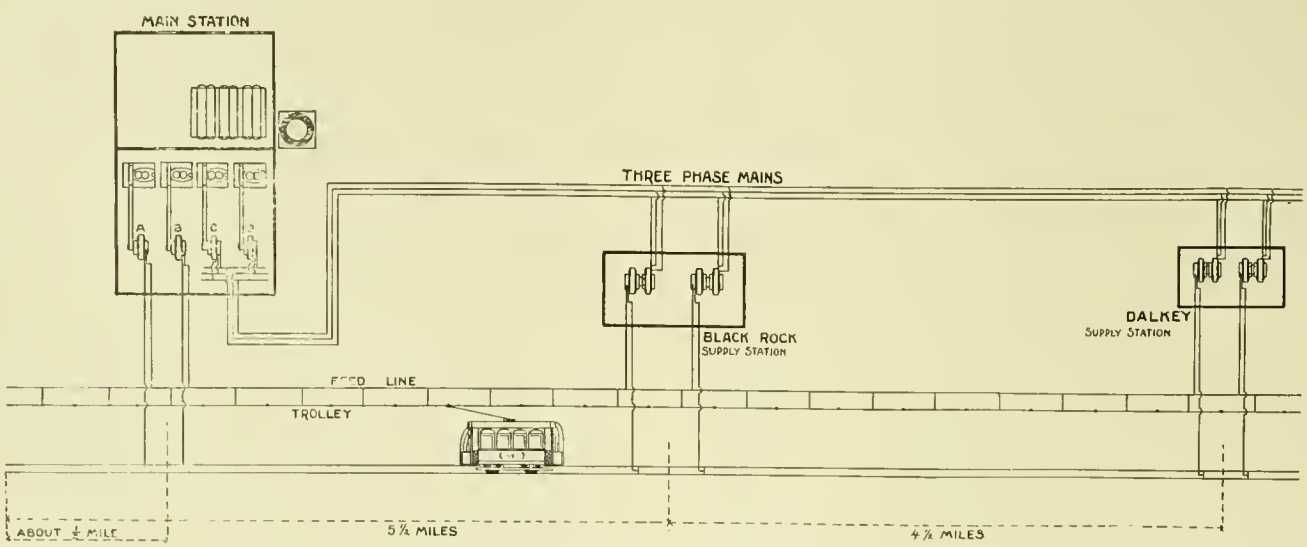
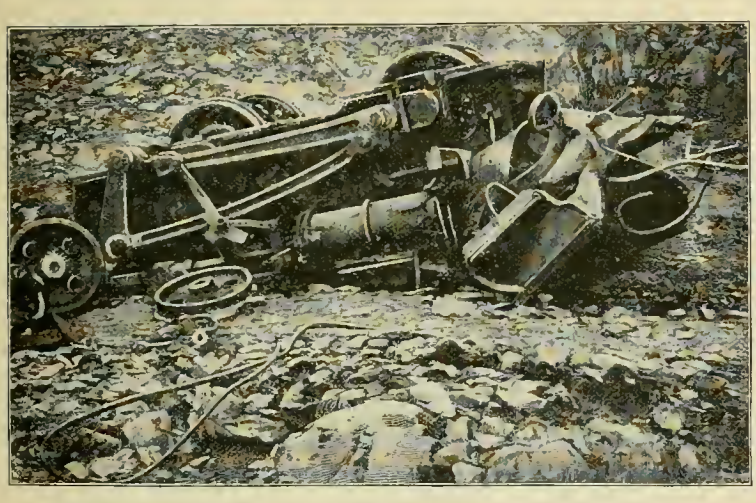


DIAGRAM OF FEEDERS AND CONNECTIONS.

no greater than is fed by direct current in many places in the United States? The main answer is that the English Board of Trade rules require that the total drop of potential in the ground return shall never exceed 7 volts. To preclude any danger of failing to meet these requirements the substation system was adopted. As to the actual difference in the investment between the new and old methods we are not informed. Another interesting feature is that the pumps and stokers in the power house are driven by G. E. 800 motors. For these particulars we are indebted to the London Electrical Engineer.

THE SNOWDON MOUNTAIN RAILWAY ACCIDENT.

It is exceedingly unfortunate that the completion of so great an enterprise as the construction of a railway up Mt. Snowdon in North Wales, should have been signalized on the opening day by an accident of such a nature as to have a tendency to destroy confidence in mountain railways. From all accounts, however, it appears that the accident was not due to any fault of the system on which the road was constructed, but to



ACCIDENT ON SNOWDON MOUNTAIN RAILWAY.

the yielding nature of the roadbed at this particular point.

The system used is the well-known Abt, which many roads in Europe and some in the United States have found well adapted to the purposes of mountain climbing; but it appears that the rack in which the teeth of the traction pinion engage had settled to such an extent as to release the parts from engagement. The average gradient of the road in climbing to a height of 3,200 feet is 1 to 7½, in some places reaching as high as 1 to 5½. The guage is 2 feet, 7½ inches. The locomotives are 166-horse-power, and each is calculated to push two carriages with 112 persons at an average speed of five miles an hour, making the total running time to the summit 56 minutes.

In the accident referred to the locomotive mounted the rack, became derailed, broke loose from the train and rolled down the mountain side, its condition after the plunge being well shown by the accompanying illustration, which with most of the particulars given, we take from London Engineering. The boiler was left about 200 feet from the frame and cylinders. The cars did not leave the track and the only persons injured were two who jumped from the car, one of whom has since died.

OPENING OF THE OGDEN STREET RAILWAY.

The Ogden Street Railway, Chicago, was formally opened May 28, and the southwestern suburbs now have equal transportation facilities with other sections of the city. The line reaches Hawthorne, La Vergne, Morton Park, Clyde and Berwyn. The opening was made the occasion of general rejoicing on the part of the company and the citizens of the suburbs reached, with addresses and refreshments. The company will operate six and one-half miles of new double track from 48th avenue to the terminus, and will run cars on a ten-minute schedule. This will enable citizens of Berwyn, by transferring to the Madison street line to reach the city in one hour and fifteen minutes. The fare to the city this way will be ten cents. The road taps the territory of the C. B. & Q. railroad suburban service.

CHICAGO ELECTRICAL ASSOCIATION DINNER.

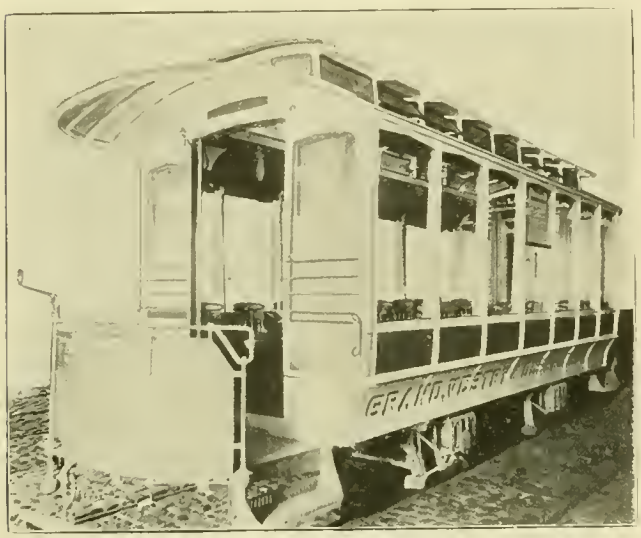
The Chicago Electrical Association held its annual dinner at the Bismark hotel May 29. This event as is usual, marks the suspension of the regular semi-monthly meetings until October. Shop talk was largely dispensed with for the evening and the affair was mainly informal. Toasts were responded to by Albert Scheible, Thomas G. Grier, W. Clyde Jones, S. B. Jamieson, F. A. Muschenheim and J. R. Cravath. S G. McMeen, assistant engineer of the Central Union Telephone Company presided as toastmaster. The association is composed chiefly of the younger members of the electrical engineering profession in and around Chicago, and has experienced a great increase in membership and interest during the past year, as it is the only organization of the kind in the city.

The San Jose, Cal., Railroad Company passed May 18 into the hands of James W. Findlay and Henry B. Alvord as receivers, in the interest of bondholders, holding bonds to the amount of $350,000.

The Knoxville, Tenn., Street Railway Company is making good progress in rebuilding and equipping its road. Crossings have been put in and offices, repair shops and power house have been fitted up. It was expected that the entire work would have been completed by June 1, but litigation has delayed progress.

A UNIVERSAL, SANITARY STREET CAR.

The Dry Dock, East Broadway and Battery Railroad Company, of New York city, has just turned out from its shops and put in service a car built from the design of their master mechanic, C. E. Garey. It is now running on the Grand street line and has been appropriately christened with the above title. The car can be used at all times, in all kinds of weather, hot or cold, clear or stormy, without taking from the road to make changes necessary to adapt it to the kind of weather on hand, and it has been so improved over the old style of building cars that it has none of the objectionable features of some of those now in use which have rendered them liable to become unhealthy for the traveling public.



UNIVERSAL STREET CAR.

The principal features of the car from an outside view are its comparative lightness in construction, its abundance of light by reason of its large windows and its well designed proportions. The interior view shows the radical change made in the seating arrangements provided for the comfort of its occupants. On each side are arranged ten comfortable chairs with ornamental bronzed iron backs, spring seats upholstered in leather, each mounted on a bracket pedestal, pivoted in the center and connected by a mechanical arrangement so that they may be turned all together on an angle of forty-five degrees and remain in that position facing in the direction that the car is moving. At the end of the route the mechanical attachment is brought into action and the seats are changed in the opposite direction instantaneously. The object attained by the chairs being placed in this position is that each passenger has one seat with plenty of room for elbows and shoulders without crowding or interfering with his neighbor. The feet are also out of the way of those obliged to stand in the aisle. The carrying capacity of the car is increased at least twenty-five per cent without discomfort to any one.

The windows are large, running from top edge or plate to the point of the elbow of a person seated. They are double and the rail dividing the sashes is in such a position when closed that the line of vision of a passenger either standing or sitting is not obstructed. By a peculiar device the windows drop out of sight, thereby creating an open car with all the light and air possible to get in any other form of construction, and much safer for passengers than any kind of open car now in use. By raising or lowering the windows—in two minutes—it can be made a closed or an open car. This feature does away with the requirement of a double equipment of closed and open cars, and thereby saves one-half the space required for storage or housing the same. The doors are double, operated by a single handle peculiarly fitted so as to permit doors to open to within one inch of the edge, gaining thereby an opening four inches wider than the ordinary door allows and facilitating the egress of passengers.

The register—New Haven pattern—is operated by a square bar within the strap handle rod by means of wheels working through the brackets supporting the rod, which are conveniently located. On the opposite side the bells are worked by a similar device, turning the wheel one way ringing the bell at one end and turning the other way ringing the bell at the opposite end.

The upper or monitor deck runs the entire length of the car, and the sides are sloped inward at the top giving it a neat and graceful appearance. A new style of wheel guard has been provided, which though light and simple,

UNIVERSAL STREET CAR—INTERIOR.

is considered to be the most desirable thing of the kind yet applied for that purpose. It is mounted from the box so as to be stationary, of spring steel, having an oblong plate fastened diagonally so that meeting an obstruction on the track the plate is pressed downward

to the rail, effectually preventing the object from passing under the wheel. These guards are on both sides of each wheel, thus protecting anything falling in front of either wheel. The handles—both dash and body—are of new design and adapted to the convenience and safety of the passenger using them, he being able to retain his hold on the body handle from the time he takes hold of it from the street until he passes within the door.

Much thought and care has been bestowed on sanitary features in the construction of this car, and many favorable comments have been expressed on the success obtained in this respect. The entire floor of the car is covered with linoleum laid with white lead. This protects the flooring from dampness, and the absorption of anything detrimental to health. The whole floor space is exposed from side to side, and is easily accessible for cleaning. Steel strip mats in four sections are used in place of wood or matting, and afford a safe and cleanly surface for the feet. They are easily removed for cleaning. The hand straps are of a new design, and are made of ⅜ inch cord fastened into each end of a polished wood handle, shaped and fitted for the hand. They are a non-absorbent of perspiration, or grease from the hand, and will not become soiled or accumulate dirt.

Ventilation has been fully considered and abundantly provided for. In addition to the large double windows and double doors when open for summer use, four large ventilators on each side of the upper deck opening in pairs, and one at each end of same deck, have been provided. There is also an invisible "ventilator that ventilates" all the time. It is concealed on the inside by the slanting mirror over each door. This opens out underneath the bonnet and prevents a draft upon the heads of passengers.

A double, center draft lamp of seventy candle-power, furnishes an abundance of light for all parts of the car.

The present car is constructed for horse power, but it can be readily adapted for any other kind of motive power.

WHY NOT TROLLEY CARS?

The visitors to Buckeye Park, Delaware, O., were treated to a novel exhibition on the opening day, May 30, in the form of a collision between two worn out steam locomotives, each having three coal cars and a caboose attached. The throttles were pulled wide open and the engines came together at full speed in the presence of 20,000 spectators. The engines were smashed and the cars piled up in a mass of wreckage. The materials for the show were furnished by the Columbus, Hocking Valley & Toledo Railroad, which handles the excursion business to Buckeye Park. It is suggested that some electric roads have enough worthless, worn out rolling stock to make several good sized demonstrations. We fear, however, that the public taste and the company's pocketbook would soon tire of such amusement.

IS THIS TO CATCH SUCKERS?

It seems strange that the inventors of some new systems persistently keep on making such preposterous claims that they drive away the support of all intelligent technical men, whereas if they would but let their systems rest on their real merits they might make some progress in the way of getting them introduced. The inventor of the Boynton elevated railroad system (a scheme not without some merit in itself) is quoted in a newspaper interview as giving utterance to some of the most amusing statements in regard to electric power transmission for his electric railway system that it has been our fortune in recent years to read.

"Not only are the poles and wires banished from the streets or from the railroad," he says, "but the marvelous fact is demonstrated, by actual use of my system, that, with 20 per cent of loss only, these high tension conductors will deliver power at a distance of 113 miles in every direction from the generating station. In other words, a central station in Boston would supply a circle around Boston embracing all of Rhode Island, most of New Hampshire and as far east as Portland, and taking in all the principal cities and most of the population in Massachusetts. To reach New York, of course, a halfway generating plant would have to be established. Where 2,000 steam trains are now running they could with this system and these newly patented motors, substitute Mr. Whitney's cheap fuel gas in Boston harbor, derived from his $2 coal or culm, converted into electric energy by economical low pressure engines, saving fully one-half over the high pressure locomotives, so that the railroads would find it for their interest in the vicinity of Boston to use his cheap fuel and electric energy, thus conducted safely and with little expense."

Leaving aside for the moment the question of how there is to be any economy in low pressure engines and fuel gas under the boilers, the great problem for science to answer is why Mr. Boynton set the limit at 113 miles. Why did he not make it an even 110 or 120 while he was about it, or go still further and make it 1,113. It would have been just as cheap and would have given him a still greater opportunity to enlarge on the possibilities. Perhaps there is some hocus pocus about the number 13, but if he had that idea in mind he should have chosen 13 times 13, or something like that. And why too, did he choose 20 per cent loss when he might just as well have made it one half of 1 per cent. No, the truth of the whole matter is that any amount of electric power can be transmitted any distance with any desired loss if only money enough is spent in metal for conductors. Transmitting the power is one thing. Transmitting it with a small enough outlay to make it a commercial success is another. Mr. Boynton's statements imply that he has discovered some new methods of electric power transmission, as we all know that 113 mile transmissions in New England at the present day would be far from being successful. That Mr. Boynton has some new system that will do this, looks about as

probable to observing electricians as did the statement of Dr. Wellington Adams' several years ago, in connection with the Chicago-St. Louis electric railway fake, that he had in hand a multiphase alternating system operating with two wires.

ECHOES OF MILWAUKEE STRIKE.

The strike on the Milwaukee Electric Railway's lines, which was mentioned as practically over, in our last issue, is still heard in echoes of the most remarkable boycott on record. The whole trouble, as previously stated, arose from agitators who created unrest among the men, and by a persistent urging to strike finally brought it on. The demands were for an increase in wages of from 19 to 20 cents an hour, and a recognition of the union. The first was absolutely impossible for the company to grant, owing to the financial condition of the road, and after its experience with the unreasonable and faith-breaking methods of the union, there is little wonder the management does not care to bind itself to union restrictions and measures.

After giving the men ample notice that unless they returned to the places they had voluntarily left, the company would seek employes elsewhere; and the men spurning the offer, the management set to work enlisting other men. Within four days it had imported from other cities nearly 1,000 men. These men were all experienced; some had been in service several years; and nearly all were in uniform. Some of them had already learned the lesson of "going out on strike" elsewhere, and were mighty glad to have another chance of permanent work at the 19-cent rate. The company housed and fed its new men several weeks, and so far as the operation of the road is concerned, the only change noticed is for the better, if anything.

But a condition was presented which could not be duplicated in any other city of any considerable size in the country. Milwaukee is well known as one of the strongest labor union centers in the country, and failing to force the company to their own terms, the men, fairly beaten in the strike by the natural law of labor demand and supply, resorted to other means to force a victory. The now celebrated boycott was announced, and was taken up to an astonishing, and but for the seriousness of the situation, a ridiculous extent. The strikers secured a lot of busses of all kinds and condition of servitude, announced a transportation line and solicited the patronage of the public. The labor element, already in sympathy, readily responded. But this did not satisfy the union leaders, and they proceeded to force a general patronage. Some violence was resorted to, such as throwing stones, bricks and eggs at the passing cars, though on the whole it can be said there was less violence than usually marks extensive strikes. To force the public to patronize the strikers' buss lines, or at least to prevent it riding on the cars, the boycott was instituted. Merchants who were seen riding in a car were spotted, and all friends of labor notified not to trade with such an one. It would not be supposed possible to work out all the ramifications of this boycott system, which was actually accomplished. As an illustration the following, a few cases out of hundreds, will serve to illustrate:

Retail grocers were boycotted who purchased from wholesale houses which sold supplies to the street railway for its men who were being boarded at the company's expense. The wholesale men lost their nerve, and the result was the company has been spending about $1,000 a day with Chicago provision concerns—just that much money taken out of Milwaukee. A retail grocer was warned because he purchased goods of a traveling salesman from another city, who rode on the cars. A butcher, who by some irony of fate was in full sympathy with the strikers, was boycotted because his wife's brother took a position on the special police force for the city. A saloon keeper lost fully half his trade because his wife's sister was seen on a car. Barbers refused to shave the imported men; dealers to sell them tobacco; tailors to make their uniforms. The result was all these were provided by the company from out of town. Politicians and city officials were told their political name was Dennis if they used the cars; and so on everywhere.

REMARKABLE ADVERTISEMENT.

One of the curiosities of the boycott is the following, which is but one of several similar advertisements which have appeared in the daily papers:

"WILL PAY $100 REWARD."

"There is a rumor afloat that I, Jacob Katz, of the Katz Dry Goods Company, has been seen riding on the cars of the Milwaukee Street Railway Company. Now, I will give $100 reward to any person or persons who will prove that I have been seen riding on the cars of the Milwaukee Street Railway Company since the strike was declared."

AWOKE THE WRONG PASSENGER.

A crowd of strike sympathizers stood opposite the Farwell avenue car house when a colored man—a cook—came out of the house to sun himself. Some one yelled "coon scab." Another dared the black man to come across the street; remarking something about breaking his "black head." The colored man, to the surprise of every one, came quietly across to the crowd, never saying a word until he reached the sidewalk. Then he said: "Gents, I've only got to die once; here I am." No one offered to strike a blow, neither did any one call him "coon scab." So he went into a saloon, bought a drink, looked the crowd over contemptuously, and strolled back into the car house. A bystander remarked that although this particular colored man was not a barber he had something in his sleeve that barbers use.

WANT FRANCHISES ANNULLED.

Not satisfied with starting an opposition service, an attempt was made to have the city council in special session declare the company's franchises annulled on such lines as by reason of special violence, wire cutting,

blockades, etc., the company was unable to run cars for some days. Of course the city could not do this, even if its officials wanted to. Another scheme was to petition for a special session of the legislature to grant authority for the city to purchase the lines under a sort of confiscation arrangement. This was after the State Board of Arbitration had spent several days in Milwaukee studying the situation and had gone back home, having found nothing to arbitrate. Even the state board could not discover any way to arbitrate more than 19 cents an hour out of the present and past earnings of the road.

The union men did not reflect any credit on themselves or their organization by

HANGING IN EFFIGY

the officials of the road, who had always treated them kindly and considerately. The postal laws were also violated by sending the officials threats of violence, and one letter contained a "sentence of death." In a front yard where the police could not interfere, was a coffin set up on end with the name of one of the company's officers placarded on the front.

SHOOTING FROM AMBUSH.

The most serious offenses of the strikers and their sympathizers have been in the way of shooting at cars after night from ambush. On the evening of June 4, a conductor and motorman were both seriously wounded. The same night a passenger on one of the cars was shot in the leg. A volley of shots was fired in both cases. Several arrests of suspects have been made.

FOUR CENT ORDINANCE.

The city council, at a meeting held June 8, passed a 4-cent fair ordinance, giving the company one month in which to put it in effect. The company will fight the ordinance in the courts.

The fight has, however, settled into one between different factions of the public, and time will put an entirely different hue upon the at present intensified sympathy. When that time comes, 1,500 men will find themselves out of a job, with nothing gained, and will begin to realize what consummate fools they have been.

A NERVY MOTORMAN.

A lively picture of what the new men had to stand up against who went to take the places abandoned by the Milwaukee strikers is given in the following, extracted from a letter from one of them, during the early part of the strike, to a friend at home. His name is Davy Jones, and he says:

"Fred Phillips came with me, and I got him as my conductor. We have been through the fire now for two days. I got all my windows broken both days. Bricks and stones rained like hailstones about our heads. Their cries are deafening. We are called all the names, curses and swears you ever heard in your life, but we care not. I am here and shall hold my motor or die. They cannot scare me. Two big brewery fellows, at 12 to-day, as I was turning up Walnut street, there were hundreds there throwing stones, but these two jumped on my car to pull me off. One the policeman cracked on the head with his club, the other I kicked in the head. Both went rolling in the street. At the same time I gave my car the loop and she went flying through them twenty miles an hour. The air was blue with their shouts.

"We are operating the roads in spite of them. I made eight round trips to-day, but yesterday I lost my way, as neither I nor Fred Phillips, my conductor, knew one street from another, but we got back after traveling all over the town. We got on lines where there has not been a car run since the strike started, and you can guess what a job we had to get through. There was everything imaginable thrown on the tracks to block us, but we fought our way foot by foot, and got back without a scratch. Fred stuck to me like glue, and when any of them goes for me he goes for them, and when they go for him I go for them with my controller handle. They have fought us, they have coaxed us to desert our cars, but all in vain. We came there to work, and we are stayers or die. Well, we are in the war; I expect you will laugh when you read this; two Welsh boys together on the one car. Fred is a six-footer and an ex-sergeant of the British army. We have both seen service for the queen, fighting savages. Now we are fighting white savages in Milwaukee."

SPECIAL CONVENTION TICKET FROM TERRE HAUTE.

The first week in June the traveling men of the United States met in convention at Terre Haute. It

was a large and brilliant affair. For the use of the traveling men President Russell B. Harrison had a special ticket prepared. Our engravings show front and back. Our Terre Haute friends always keep to the front as this ticket indicates.

President Harrison says regarding the design on the back which is supposed to represent the officers of the road welcoming the traveling man: "The position of the bald-headed president of this road, and the other officers, will amuse you, and if our attitudes on our knees are not graceful, you will understand it is because we have not had much experience in that position."

The new Fort Pitt traction line at Pittsburg, Pa., was opened on May 9 in the presence of a large body of representative citizens. Fifteen cars were run over the line. Excellent service is promised.

THE POWER HOUSE

This department is devoted to the construction and operation of electric railway power houses. Correspondence from practical men is specially invited. Both the users and makers of power house appliances, are expected to give their views and experiences on subjects within the range of the department.

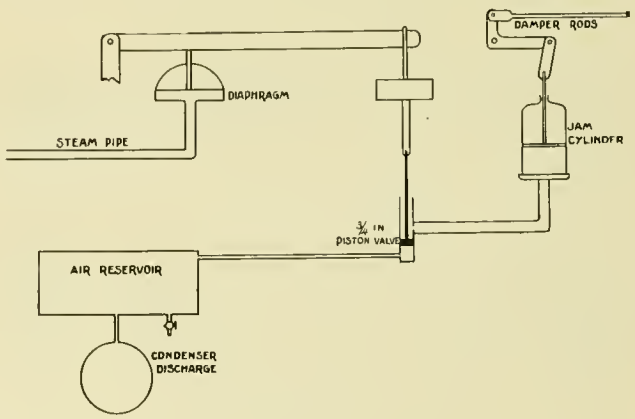
"We go about the building of power houses different from most people," remarked the manager of the electrical department for a syndicate which has electrically equipped many systems. "We contract for all the machinery first and plan the power house afterward." His remarks call attention to a mistake that is often made in designing power plants. Where land and buildings are cheap, it may be satisfactory to plan a building that will "surely be big enough to hold anything we will want to put in it," but such a method is almost sure to be wasteful of room, and if an attempt is made to design the building and its arrangements on a close margin before the exact form of machinery is known, the completed plant will be like a piece of cut-and-try patchwork. The proper order of things in building a power house is to first select the types of machinery, then buy it, then arrange it, and finally plan the house to cover it.

* * *

The various companies under control of the Yerkes' interests in Chicago have a very convenient arrangement for supplying current for owl car load and lighting the barns after midnight. The various Yerkes companies own in all five large power houses. Each one of these supplies a territory of several miles radius during the day. It would be a very uneconomical proceeding to run every station to take care of its own owl car load, not only because of the labor, but because these stations are composed of very large units, and it would be a case of running a 600-horse-power engine or larger to pull a few cars. The method adopted is to connect all these stations together and run the entire five districts from one. The total load of the five districts is enough to load one generator. The connection is made by running a feeder direct from one station to another and connecting it through feeder panels at each end to the bus bars. The plan is not a new one, but nowhere is such an immense territory fed from one station as in this case. It also suggests the fact that it would be a good thing if various companies operating in the same city would make some kind of an agreement for taking care of owl car load in this way. Even where companies are not on very friendly terms they can generally agree on something that will be to their mutual profit as this would.

* * *

In the power house of the Atlanta Consolidated is a damper regulator that is decidedly out of the common run and also derives its power from an unusual source. The condenser elevates its discharge water about 10 feet to a cooler, and of course has about four pounds pressure at the pump. As is well known there is always a small amount of air going out with the water. This air is taken off by a small pipe to a reservoir, from there to the regulating valve and then to an ordinary jam air cylinder. This regulating valve is a simple disk sliding in a brass pipe, and is worked by a diaphragm

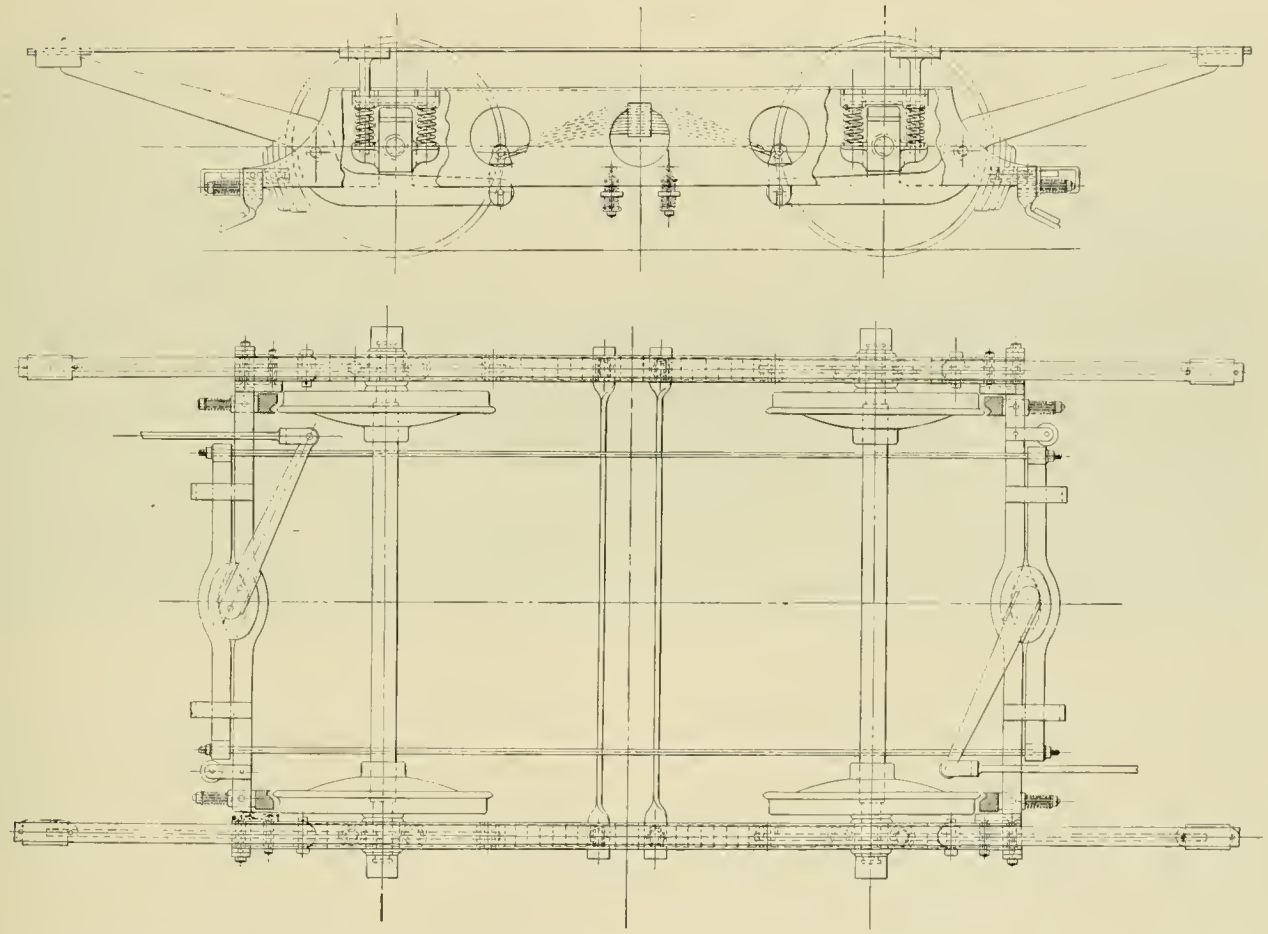


ELLIOTT'S DAMPER REGULATOR.

from an old regulator as shown by the sketch. Of course there are plenty of regulators on the market that are satisfactory, but this has no packing and no water to leak, and Thomas Elliott, chief engineer, who put in the arrangement, says that it will open and close with a variation of one-half pound in pressure, which it easily does because there is so little friction. When the pressure raises the diaphragm it raises the valve above the small holes and admits air to the cylinder, thereby closing the dampers. When the pressure drops the valve goes down and lets the air out over the top of the valve. As long as Mr. Elliott stays at Atlanta there seems to be some good feature added to the power house every few weeks.

EXTENSION LEVER TRUCK.

A new form of truck designed to combine maximum spring base and body support, with minimum wheel base, has recently been brought out by Bell & Co., 512 Betz Building, Philadelphia. The truck is made up of solid plate steel frames, ⅜ inch thick, without bolts or rivets, and it is claimed that it will carry a longer car than any other single truck. The design of the truck is such as to prevent sagging, though no longitudinal braces are used, and there is a peculiar combination of steel levers and springs for the purpose of securing easy riding and freedom from lateral and longitudinal oscillation. The levers which support the car body have a sliding connection with the top frames upon their longer arms, and their shorter arms are connected with steel springs. On a truck for a 32-foot car these springs are 44½ inches in length, made up of 9 steel plates ½ inch thick and 3¼ inches wide. The length of the side frame is 10 feet, 6¾ inches, and the height 16 inches. One of the noticeable characteristics of the truck is the comparative length of spring base and wheel base—17 feet and 6 feet 6 inches respectively. The boxes are provided with patent dust collars, and the frames are so constructed that the wheels can be removed by taking out two bolts at each end, and raising the car from the truck.



THE HARDIE & LEARY TRUCK.

SUSPENDED CABLE-WAY FOR ROCHESTER, N. Y., PARKS.

The park system of Rochester, N. Y., is peculiarly situated, being in two parts, one on each side of the Genesee river, one beginning just opposite the point where the other terminates. The nearest bridge across the river is at the far end of one of the parks. It is proposed, and the plans are under way, to construct a suspended cable-way about one mile from the present bridge and more convenient to both parks. The river banks are about 170 feet, above the water and the distance across 800 feet. The cable-way will have two 1¾-inch cables suspended about 3½ feet apart, side by side. The car will be about 7 by 7 feet, of steel, and is expected to carry 18 or 20 people. Two or three ⅝-inch cables will be used to haul the car back and forwards. Under the car will be a rack for the carriage of bicycles. The work is in the hands of Brayer & Albaugh, general contractors, Rochester.

Madison, Wis., has discovered that it has made a mistake in the way it has collected taxes from the Madison City Railway, having levied according to the old Wisconsin law, which taxed the assessed property of the company instead of according to the new law which taxes the gross receipts.

WRECK CLEARED AWAY.

JUST AFTER THE BREAK.

SCENE OF VICTORIA, B. C., BRIDGE DISASTER JUST AFTER THE WRECK.

THE VICTORIA BRIDGE DISASTER.

Worst Accident in the History of Street Railroading—Over Sixty Drowned.

At 2 p. m., May 29, a heavily loaded car of the Victoria Railway & Lighting Company, Victoria, B. C., broke through the Point Ellice bridge and carried with it sixty-three people to death at the river bottom. This is, without doubt, the most terrible accident in the history of street railroads. The span which broke was about 150 feet in length Another heavily loaded car had gone over the same bridge but a few minutes before. A sham fight and review at Macauley Point were attracting great crowds, which were taxing the railway facilities. The car was completely submerged, and but few of those on board were saved. Several carriages were on the bridge at the same time and went down also. The bridge was originally built for wagon traffic, and evidently was not strong enough for an electric car load. Press reports say the bridge had been pronounced unsafe three times before. Our views show the appearance of the bridge immediately after the wreck, and also several days after, when the car body had been hauled upon the shore. It evidently turned clear over in its fall.

Among those on the bridge in carriages was Superintendent Wilson, of the railway company, who had with him his five children. He succeeded in saving four. The bridge is across a branch of Puget Sound, and is 100 feet above the water, which is 20 feet deep at that place.

CAR DRAWN UP AFTER ACCIDENT.

INTER-STATE ELECTRIC OPENED.

Important Tri-City Line Links Hammond, Whiting and East Chicago.

Friday, May 15, was anything but an unlucky day for the people of the three cities of Hammond, Whiting and East Chicago, for it marked the completion of the electric lines which not only bind the three young giant cities in bonds of steel, but by agreement with the South Chicago road, passengers can make the journey all the way to the center of Chicago a distance of 30 miles on electric cars. No one unfamiliar with the great Calumet district, with Lake Michigan on the north and Calumet lake on the south, can form any adequate conception of its rapid evolution. Where only a few years ago were marshes and swamps, utterly impassable during wet seasons, now are finely paved streets, water and sewerage systems, countless manufacturing industries, elevators, acres upon acres of railroad terminals, three and four story business blocks, ship building and iron works, and a vast population. Close observers predict an additional population of 200,000 within ten years, and that the Calumet district is destined to become the great maritime center of Chicago.

A. M. TURNER.

The plan for this electric interurban is one which has been worked out by A. Murray Turner, president of the Hammond, Whiting & East Chicago Electric Railway, and in the face of great obstacles both of an engineering character, and the still more difficult local jealousies growing out of the most intense rivalry between the three towns named.

It was, therefore, a fitting and happy thing to celebrate the opening of the through line by a special train and dinner. The program was carried out to the minute. Guests assembled at Hammond, Ind., and made a flying trip over the lines and also to Sixty-fourth street, Chicago, over the South Chicago tracks. Returning the party left the cars at the historic Forsyth house, where an orchestra of 25 pieces entertained the guests during a most elaborate dinner lasting three hours, and at which one hundred dined.

The gathering was a somewhat remarkable one. There were present the mayors, city officials and aldermen of the three cities, judges, local newspaper men, representatives of many of the big industries of the Calumet, President Cameron and Superintendent Jones, of the South Chicago road, while the Review editor struggled to maintain the honors of the street railway press. The intense rivalry of the three cities has been mentioned, and it was the first time all these conflicting interests had ever been assembled except for belligerent purposes. But President Turner proved himself a most graceful entertainer and Geo. A. Royce, of the Hammond Tribune, a toastmaster of rare tact and ability. The speeches lasted over three hours, and the occasion did more to unite the interests of the three towns than could have been attained in any other way.

The track and overhead construction is first-class, the power supply ample, and the car service good. Already the new line is doing a big business and with its 15 cent fare from Hammond to the heart of Chicago—as against a 40 cent rate on the steam roads—the road gives every promise of present success, while its future can hardly be conceived.

REMARKABLE ACROBATIC PERFORMANCE OF A CAR.

A Review editor dropped into the luxurious office of Robert Andrews, vice-president of the Pintsch system of gas lighting in New York, as that gentleman was reading a letter from his St. Louis agent, in which was related the details of the great storm. One incident was especially remarkable and particularly interested Mr. Andrews, who was general superintendent of the Wabash railroad in 1872, when a big tornado swept East St. Louis. The railroad lost its round house and other buildings and hundreds of cars, and one 32-ton locomotive was hurled 20 feet from its tracks and thrown into a ditch. But this was not a circumstance to what happened in the recent storm as related in the letter. It seems the Brownell Car Company had just completed 10 very handsome cars for Columbus, O., in which among other good things were the Pintsch lights. These cars were loaded on flat cars and would have left East St. Louis at 6.30 p. m. At 5.30 the storm broke in all its fury and six of the 10 were badly wrecked. Three escaped unscratched, and one was lifted bodily into the air, trucks and all, turned completely over and landed on the same flat car within a foot of the space it had been resting on a moment before. This car suffered comparatively little damage although the globes of the gas lamps were shattered. As Mr. Andrews remarked, it was one of those cyclone phenomena which could only happen once in a thousand times.

The engineer at the power house of the Columbia Electric Railway Company, Lancaster, Pa., in attempting to close a window during a violent storm, was thrown against and caught in the belting and instantly killed.

The Central Railway & Electric Company, of New Britain, Conn., and the Newington Tramway Company were served with an injunction against some construction work. As the road through the town passed through the private property of John S. Kirkham, Mr. Kirkham held that the courts had no right to say whether a man should build a road through his private property and the work went on.

STREET RAILWAYS IN THE ST. LOUIS CYCLONE.

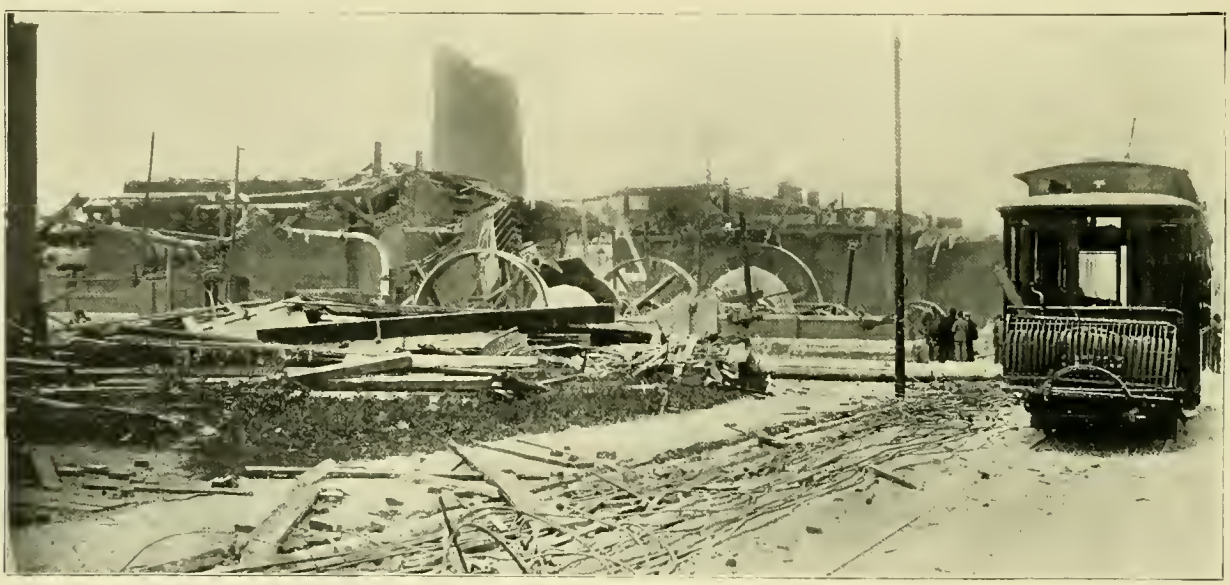
The cyclone which passed over St. Louis May 27, played havoc with street railway service for several days, besides doing considerable damage to buildings and rolling stock. By far the greatest sufferer was the Union Depot Railroad, which had its largest power house at Missouri and Geyer avenues, badly wrecked. One of our engravings shows this plant shortly after the storm. The greatest havoc was caused by the falling of the brick chimney which stood near the middle and fell into the engine room. The chimney was 162 feet high and 38 feet in diameter at the base. Ernest Zimmerman, chief engineer, was buried in the ruins. Harry Scullin, general manager, estimates the loss at $50,000. In addition to the power house, the car sheds and machine shop adjoining were destroyed and two men killed. Twenty cars were in the house, but were not seriously damaged. The accident tied up part of the Union Depot lines for some time. Fortunately the falling chimney did not affect the two big direct connected generators in the west end of the engine room, and in about a week after the storm nearly the whole system was operating. The escape of the men in the car sheds and machine shops was wonderful, as they had but a few seconds warning. The loss of power house machinery was largely in small 62 kilowatt generators, of which there was a large number in the station, and which the company could more easily afford to spare than the more modern machines. Power was borrowed from the Cass Avenue & Fair Grounds plant.

SOME OF THE STREET OBSTRUCTIONS—ST. LOUIS CYCLONE.

MOTOR AND TRAILER UPSET—ST. LOUIS CYCLONE.

The power house of the People's Railway, operating the Fourth street cable line, had the roof taken off and walls somewhat wrecked, but the ruin was cleared away, fires started and the machinery set in motion with the sky for a roof.

The Choteau avenue car house and repair shops of



WRECK OF UNION DEPOT RAILROAD POWER HOUSE—ST. LOUIS CYCLONE.

the Lindell Railway were entirely demolished and some damage done at the two power houses of this company.

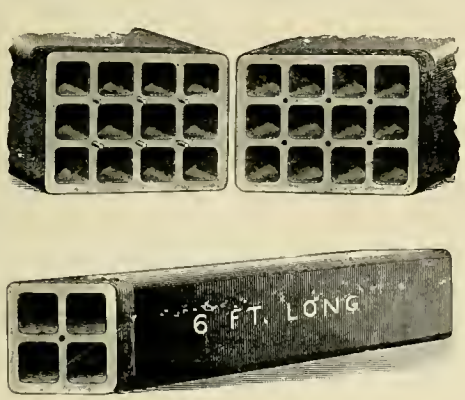
Of course all companies had trouble from the falling of tons of telephone poles, wires and other wreck, on overhead work and track, and the scarcity of linemen made the work of repair and clearing up slow. Some cars were blown over and smashed in the street. One of our illustrations shows a train consisting of motor and trailer upset and lying several feet from the track. It was nearly a week before regular service was restored on the majority of lines, and considering the amount of overhead work to be repaired it shows some pretty hard work on the part of our St. Louis friends that it was not a longer time.

WILL TRY THIRD RAIL.

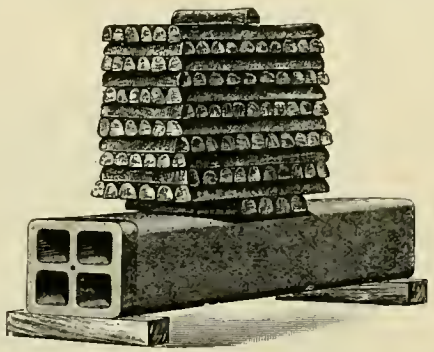
The electrically equipped portion of the New York, New Haven & Hartford Railroad, which now consists of the Nantasket Beach branch, is to be extended at once by putting in a third rail on the company's double track main line from Nantasket Junction (where the Nantasket electric line now joins the main line) to East Weymouth, a distance of about four miles. During the latter part of May an experiment was tried with a third rail on about a mile of the Nantasket Beach trolley line and the results were satisfactory. The third rail will be laid midway between the tracks and at the same time the track will be relaid with 100-pound rail, the intention being to operate it in connection with the trolley system the coming summer. This will be the first application of the third rail to a surface road and is of considerable importance in view of the developments that may come from it. J. C. Sanborn is superintendent of the division on which this work will be done. Col. N. H. Heft has charge of electrical construction for the road. Charles R. Clark, president, is a man of advanced ideas on electric traction for steam roads.

TERRA COTTA CONDUIT IN 6-FOOT LENGTHS.

A form of terra cotta conduit of which over 20,000 feet have recently been laid by Clift Wise, the electric railway contractor of Chicago, is shown in the illustrations herewith. The peculiarity of this conduit



for the laying of underground cables and its great superiority lie in the fact that it is made in six-foot lengths of great strength. The strength is obtained by vitrifying it after the manner of paving brick. The material from which these ducts are burned is fine ground shale and the entire surface both interior and exterior is glazed. The interior of the ducts being very



smooth and with rounded edges there is nothing to catch cables when drawing in or out. But the strongest point about this conduit is the long lengths in which it is furnished, obviating the necessity of frequent and troublesome joints. The joints are held in line by iron dowel pins and are wrapped in 15 feet of burlap and surrounded by cement laid on a concrete bed. One of the engravings shows a six-foot length of four-chamber 8 by 8 inch conduit, supporting seven tons of pig iron.

BROOKLYN HEIGHTS PRIZES.

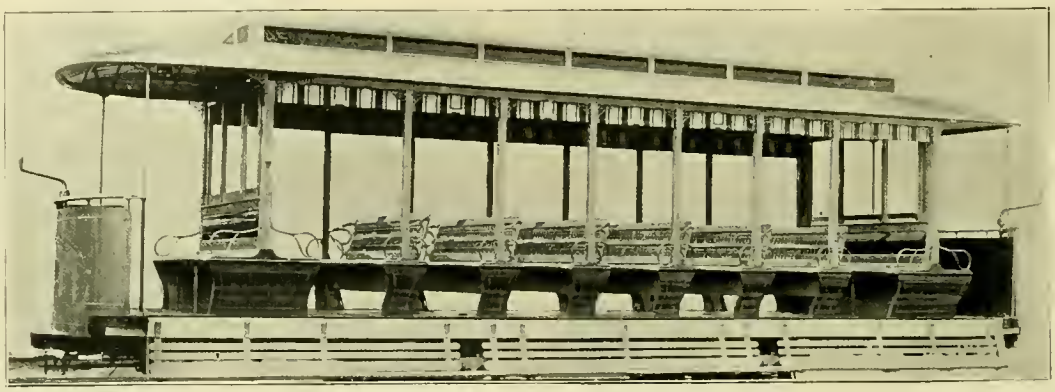
The Brooklyn Heights Railroad during the last month distributed $10,000 among the conductors and motormen of the company who had not violated any of the company's rules and had no accident. There were 1,304 names on the list, making the award average $7.67 apiece. President Rossiter feels very well satisfied with the experiment and thinks that the added interest taken by the men makes it worth while.

A GOOD BUSINESS.

The Peckham Motor Truck and Wheel Company, Kingston, N. Y., reports that its business for the month of April beat all previous records—290 trucks having been sold. The best previous month's record was 222. The sales for May were still greater, and over 1,400 have been sold for the year up to May 15. The shipments for April went to fifteen states, in many cases to several cities in the same state, and also to five foreign countries. The general manager, W. E. Cooke, has of late been giving his entire time to increasing the factory facilities, so as to enable it to keep up with orders, and believes that he will be able to increase the volume of business turned out from month to month. The orders for foreign countries went to England, Australia and Japan. The company is still far behind in its orders, having on its books for immediate delivery over 400 trucks.

HANDSOME OPEN CARS.

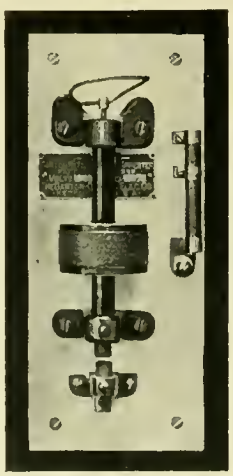
The Wells & French Company has recently turned out a lot of handsome open cars for the Chicago City Railway Company, the appearance of which is well shown in the accompanying engraving from photograph. The cars are 30 feet in length over all, and have 10 seats, the seating capacity being 50. The sills are plated with a ½-inch by 7-inch steel plate. The brake handles are of the ratchet pattern. The cars have the appearance of great strength, and the finish is more than ordinarily fine. The platforms are so deep as to give the motorman and conductor plenty of room, even when the platform seats are fully occupied.



NEW OPEN CARS—CHICAGO CITY RAILWAY.

THE GARTON LIGHTNING ARRESTERS FOR 1896.

The Garton-Daniels lightning arrester has been improved for 1896, and the way it has been sweeping the field this season is a surprise even to its makers. The new arrester has an air gap and circuit breaking plunger and magnet somewhat similar to the old arrester, but has a high non-inductive resistance in shunt with the magnet and a low non-inductive resistance in series with the magnet which breaks the circuit. The resistance used is a graphite rod. The action of the arrester is truly remarkable and it has been put through some tests by companies adopting it that would be judged impossible were it not for the hard facts. Upon sticking a piece of metal between the discharge points the effect on the arrester is the same as if it was discharging many hundred times a minute, for the plunger operated by the magnet will make and open the short circuit as fast as it is possible for magnetism to act. Yet this tremendous rate of discharge caused by sticking metal between the discharge points has been maintained for many minutes at a stretch without injuring the arrester, and what is still more wonderful, an ammeter in circuit shows that when the arrester is discharging at this rate less than one ampere of effective current flows. The Garton-Daniels people naturally feel somewhat pleased at the fact that the Walker Company has adopted the arrester for its use in equipping cars after the most severe competitive tests and various attempts to burn up the device. Orders are coming in fast from some large roads where equally severe tests were made, and also from many smaller roads where the merits of the old style arresters have assured the future use of the Garton type.



GARTON ARRESTER.

TWO NEW YORK STATE WRECKS.

Two bad wrecks are reported from western New York. The first was a collision between a train on the Western New York & Pennsylvania Railroad and a car of the Buffalo, Gardenville & Ebenezer Electric Railroad just outside of Buffalo, on the morning of May 28. The car was run down at a crossing. One man was killed, a woman seriously injured and two men more or less cut and bruised. It is said that the motorman disobeyed the conductor's signals.

The second accident was upon the Rochester, Charlotte & Manitou Beach Railroad and resulted in the death of Motorman James C. Cook and injury to several passengers. This was a collision between two electric cars. The road is a single track and the accident was occasioned by Cook trying to make a siding in advance of the train in the opposite direction which had the right of way.

NEW WALKER CONTROLLER.

The Walker Company has brought out a new controller which has one cylinder for making the various connections and another auxiliary cylinder which breaks contact in sixteen places at once for the express purpose of breaking the circuit without a destructive arc. Another new feature is that this auxiliary drum shuts off current whenever the handle is moved one point toward off position, and current can not thereafter be turned on until the handle has been brought back to off.

FENDERS, ARE THEY PRACTICABLE?

A Paper Read Before the California Street Railway Association, April 21, 1896.

BY M. D. STEIN, DIVISION SUPERINTENDENT MARKET STREET RAILWAY COMPANY, SAN FRANCISCO.

When all the ingenuity and intelligence of the whole street railroad fraternity of the United States, reinforced by the great army of inventors and cranks, have been unable to solve the fender question, it is at once evident how ungrateful is the subject allotted to me.

In the last few years thousands of fenders have been designed, and hundreds tested, but few have been chosen, and those few were adopted simply for the mere sake of having a fender and not because they were by any means considered as answering the purpose of a life saving device. The governing bodies of most of our large cities and some of the smaller ones have taken up the question of fenders, determined to compel the street car companies to adopt one which they as the representatives of the public could approve, but in most cases when the trials were made and the generally unsatisfactory results observed, the cars were still left fenderless, or, as I have said before, some fender was adopted officially in order to satisfy the public, but with very little confidence in its ability to fulfill its mission.

The condition of my subject being thus in a chaotic state, I can not attempt to give an elaborate history of the fender question, but simply and briefly enumerate a few results of the tests which our company has made at the instance of the board of supervisors of this city.

I presume there is no one here who is not familiar with the various newly patented fenders, described and pictured from time to time in the street railway publications. I think I may say that we have tried most of these and also quite a number that were designed by the mushroom growth of local inventors that so suddenly sprang up here. It was our aim throughout all the trials to obtain the very best life saving device and in each case ample opportunity was given the inventor or promoter to demonstrate the particular merits of his appliance. But no fender experimented with received the approving sanction of the supervisors; no one among the number tested was found of sufficient merit to be called practicable, and it might be well to observe here, that no criticism can be made as to the non-scientific personnel of the tribunal passing judgment militating against the force of their decision, for the question of the practicability or non-practicability of fenders addresses itself, so far as its primary efficiency as a life saving device is concerned, to the mind of every observing common-sense individual. From the foregoing the only reply that can be made to the question, the title of this paper, so far as all past experiments warrants, can be readily deduced.

If double truck cars with trucks near the ends of the cars, substantially like cable cars, were in vogue, the fender question could be readily solved, inasmuch as any guard attached to the truck could be carried very close to the ground and would also reach to the end of the car and provide protection both as a wheel and a car fender. But in this era of single truck electric cars we have a problem which seems especially designed to baffle all attempts at solution. We are confronted with cars on a 6 to 7-foot wheel base, having an overhang of from 8 to 10 feet, and mounting grades as steep as 14 per cent; (one of our lines in fact climbing a 25 per cent hill with the aid of a cable and balance car, an exceptional case, however, which need not be considered) this overhang when approaching the vertical curve at the foot of a grade of from 10 to 14 per cent causes it to approach 6 to 8 inches nearer to the ground than it does on a level. This fact of course makes it evident to any one familiar with cars that any fender carried on the front of the car body or projecting beyond it must be attached high enough to clear such vertical curves, say 12 inches, as it would not be practicable to raise and lower the fender every few blocks to suit the conformation of the ground.

In one or two cases we tried hinged fenders, which we calculated would ride over such places but we found that it required only a few trips to hammer them into an unrecognizable mass. Furthermore, when so arranged as to ride over high places, they would with equal ease ride over the objects they were intended to catch, thus looking like a hugh jaw swallowing the dummy used in making the test.

The next proposition was to provide a guard that would carry high enough to clear all places but which could be lowered by the motorman in case of need. The Baltimore fender was tried with this idea, and worked fairly well when operated by the motorman.

The universal desire, however, seems to be for an automatic device, simple in construction and positive in action, and in following this line of thought we tried one or two fenders which projected in front of the car, well elevated and provided with triggers on their extreme ends, calculated to drop the whole device immediately on contact with a solid obstruction, and as may have been expected we found that with a car running at about eight miles per hour, the interval between the blow on the triggers and the dropping of the fender could not be made short enough, and the object would disappear under the car before the reflex action of the machine manifested itself.

I think it must be admitted that whatever apparatus be attached to the front of the car, a simple strong scoop or pilot should always be attached to the truck immediately in front of the wheels to catch or shove along an object that has escaped the more pretentious front guard. A guard so placed can be carried in places where the street paving is fair at about three and one-half inches from the rail in order to allow for the crown and irregularities of the roadway.

Only passing mention need be given to the suspended spring mattress carried ahead of the car on a set of

wheels which the inventor proudly claimed could be used as a baggage car for bicycles when the car is traveling in the other direction; or of the independent snow plow fender shoved along by the car. Then there is the revolving brush, calculated to brush the victim out of the path of the car, but in reality raising so much dust that passengers would almost prefer to be run over than to ride behind it.

An amusing incident was the case of a small boy who came into my office on his way to school, to show me a childish sketch, and ask my opinion as to the advisability of his taking out a patent on his fender; it consisted of a wooden roller covered with sharp hooked spikes. This roller was to be kept revolving in front of the car, and to catch the victim by the clothes and land him high and dry on a platform. When I called his attention to the fact that some of the hooks might tear out a man's eyes and lacerate him generally in such a manner that he would look as if he had come out of sausage mill, he seemed for the first time to realize that when a person fell in front of a car he did not first bundle himself up in a blanket or two, so as to be conveniently hooked up by the fender.

One of the requirements for a practical fender, that is not usually considered by inventors, but which will at once appeal to a practical street railroad man, is that it should not occupy too much space, or if it does, it should be so arranged as to be folded up when the car is stored away for the night. Most car houses have been built to accommodate the cars of certain lines, and are so located that they can not conveniently be enlarged. As a rule, they are too much crowded by the natural increase of cars on these lines to allow for an addition of 6 to 8 feet to each car.

It seems strange to me that some of the statistical writers who have presented data on so many subjects during the last few years in the street railway journals have not taken up the statistics of accidents in relation to the question of fenders. This is a subject that I should have liked to have taken up for presentation to this association, but as any one who has ever undertaken such work knows it requires at least ten or twelve months to gather material and condense it into suitable form. This subject would be an especially difficult one to handle statistically, as but few roads have their records of accidents in such shape that reliable data could be gleaned from them. The impossibility of thus preparing in the short time at my disposal a comprehensive resume of accidents, especially collisions with human beings, is therefore my excuse for inflicting on you this informal description of my own experience in fender tests and the deductions I have made from them. The statistics I have mentioned and which I should like to gather if possible from a large number of street railroads comprise the following, and to my mind the most important points bearing on the fender question:

What proportion of persons struck by cars are struck by the center of the car, and what proportion by the corners?

What is the relative number of adults and children injured in collision?

How many persons are struck standing up and how many in a reclining or recumbent position?

How many fall down in front of cars?

Again, what are the results of the blows struck by the front dash-boards, when the persons are thrown clear of the track; and lastly and most important of all, what is the proportion of persons struck down by cars having projecting fenders compared with the number struck by cars having no front fenders and making approximately the same number of car miles under similar conditions?

Is it not possible that the municipal authorities in most of our cities are making a grave mistake in deciding upon these projecting scoops and nets? Is it not possible that they are bringing about the very thing they are trying to avoid, namely, danger of life and limb to the public they are anxious to protect?

This question can be answered satisfactorily only by having sufficient data from actual experience. But not having this information to aid me, I must draw upon the resources at hand for my conclusions, and I must say that I think that the figures when obtained will bear me out in stating that a great many people are knocked down and hurt by a fender projecting in front of the car who would otherwise have escaped contact with the car entirely.

We all know that it is a natural impulse to rush in front of a car which is almost upon one with the entire attention concentrated upon the body of the car and the man in charge. Whereas, ninety-nine per cent of these people probably now escape altogether, how many years must elapse before they would take the projecting fender into consideration, especially as it is below the natural line of vision, and what a series of accidents would occur in this interval.

Such being the case would it not be better to provide a scoop fender under the front end of the car which would drop to the ground when released by a suitable trigger placed slightly ahead of the car, in such a position that the trigger would come in contact with the object in time to give the mechanism a chance to act.

Such a device has been placed on one of the cars of the Market Street Railway Company, and when perfected in some minor mechanical details, I think will approach more nearly to what is needed than anything I have yet seen. In this fender the trigger, which is made of light iron lattice work, acts also as a buffer to soften the blow of the car, and yet does not project far enough ahead to become dangerous in the way I have before alluded to.

In conclusion, I would say, that I trust the near future will see the practicable life saving fender an existing actuality, no longer a mere phantom of some inventor's brain. No railroad man is blind to its necessity, no railroad but would welcome its coming with open arms. No wanton niggardliness accounts for the present absence of fenders. The fault lies in the fenders them-

selves thus far proposed. The expense incurred by railroads in fitting their cars with the practicable fender, when it is a reality and at hand, will be the greatest economy the roads have ever practiced.

In these days of constantly increasing population and advancing civilization, rapid transit has become more and more an established need in the daily transportation of a city's population, the people have become, as it were, wedded to it; but with more rapid transit, comes greater danger, and the presence of greater danger demands the exercise of greater precaution. Rapidity and safety are therefore the summa bona to be attained. This joint realization is made possible by the practicable life saving fender. May we soon hail its advent.

DISCUSSION.

Mr. Vining: The subject of fenders is of such general interest that perhaps it would be interesting to hear something of the experiences of the members. Some little time ago I received from the board of Supervisors, a pamphlet advertising a fender made by a company in Providence, R. I., which published the pamphlet to show the workings and advantages of their fender. It had been used on a line running from Newark to Jersey City. It ran for fifteen months, and they published this pamphlet to show the wonderful results claimed to have been obtained. We all know that the most dangerous period in operating an electric railroad is the first year or so, when the people are not familiar with its power, rapidity, etc. They seem to think that the speed is the same as that of the old-fashioned horse car. It takes people some little time to get used to an electric car, and they seem to forget that such a car is almost as dangerous as a locomotive, and it takes time for them to learn that fact. Now, in Newark and Jersey City, this record was not of a fender used during the first year of the introduction of the electric cars. It was after the electric cars were well known, and after the people had learned to look out for electric cars, that these fenders were first used; therefore, the result ought to have been comparatively good. Furthermore, the road ran through cities not nearly as large as San Francisco. During the fifteen months in which that company used this wonderful and extraordinary fender the result was as follows: One hundred and twenty-six people were knocked down by the fenders, four of these people were killed and nine were seriously injured. According to their own statement, ten or twelve more were more or less seriously injured, and still more were somewhat injured. So you see that even according to their own statement, there were about twenty killed or seriously injured, while there were one hundred more who were knocked down and more or less injured.

Now, during the same time, in San Francisco, with roads running through more crowded streets, during the first fifteen months of the operating of our electric system only one-sixth of that number of accidents occurred; of that number four were killed. We had altogether sixteen accidents, where they had 126. I think the comparison of these statistics shows very much in our favor. We know that it is the practice of all men when they see a car coming, to calculate whether they can cross ahead of the car or not. Almost every one rushes across ahead of the car, just barely in time to escape, and the adoption of a fender projecting beyond the front of the car is liable to cause six times the number of accidents that would otherwise occur. The accidents that we have had, have all been either with small children who were too young to have been permitted to cross the street alone, or else with people who were not in the full possession of their faculties, owing sometimes to old age, infirmity or disease, but owing more frequenly to intoxication.

Mr. McLenegan: I would like to ask if there is any other fender that you would prefer?

Mr. Stein: There is no one of the fenders that we have tried, which in my opinion equals the simple, common pilot board attached to the truck.

Mr. McLenegan: I believe that more accidents occur if there are fenders on the cars, for then motormen think that their cars are equipped with a device which will prevent accidents; in that way they grow careless, and more accidents are likely to occur.

WESTINGHOUSE ELECTRIC STREET CAR EQUIPMENTS.

The above is the title of a book written by F. L. Hutchinson and L. A. Phillips, two engineers of the Westinghouse Electric & Manufacturing Company. It is as its title implies a treatise on the construction, care and repair of Westinghouse electric railway motors and car apparatus, and is intended for the use of the men who have the actual care of these equipments. It contains an introductory chapter on electrical units and terms, a description of all the Westinghouse railway motors and controllers, directions for motormen and inspectors, methods of locating and remedying faults, and complete directions for winding armatures. It is a book that it is very desirable to have in the hands of employes on every road operating Westinghouse motors.

A COMMERCIAL TOUR TO SOUTH AMERICA.

Under the above heading Theodore C. Search, president of the National Association of Manufacturers, has issued a pamphlet outlining the objects and the itinerary of a proposed tour by representative business men of the United States to Brazil, Argentine and Uruguay, to cover the months of July, August and September. The governments of the countries named have expressed such interest in the matter as to insure the most complete opportunities for observing prevailing commercial conditions. Each member of the party will represent and devote himself to some particular interest and report upon the same upon his return.

NEW INCLINE UP LOOKOUT MOUNTAIN AT CHATTANOOGA.

The third railway to ascend Lookout Mountain, at Chattanooga, was placed in operation last November by the Lookout Incline & Lula Lake Railway Company. It is of unusual interest, not only as a factor in local transportation at Chattanooga, but because it is also in places the steepest incline road in the world.

The building of this incline has very greatly facilitated travel to the mountain, the time occupied in a trip from the center of the city to the top of the mountain being from twenty-two to twenty-five minutes. By either of the old routes it takes from fifty to sixty minutes.

There is a large travel to Lookout Mountain during certain seasons of the year, many tourists being attracted to the vicinity by the natural beauty of the scenery, and there are numerous hotels and residences on the plateau of the mountain top.

The grading, track laying and trestle building was done under the immediate supervision of the president and chief promotor of the company, J. T. Cross, who is a railroad contractor of experience. The engineering, both civil and mechanical, was done by the firm of Guild & White, of Chattanooga. The preparation of the plans and construction were under the immediate supervision of Linn White, of the above firm, with Ransom Rogers as assistant. Many of the special features introduced in this work are original with the engineer in charge, and are used for the first time on this road.

In its length of 4,972 feet the new incline attains an elevation of 1,450 feet. It is a double cable road, with alignment of track perfectly straight.

The lower end of the incline is on the minimum grade, gradually increasing to 33.27 per cent at the passing switch, half way up; then again decreasing from a point a short distance above the switch, to 23.17 per cent; then again increasing to 38 per cent, and from this by a vertical curve to the maximum of 68 per cent, which is kept for a distance of 450 feet, to within 75 feet of the upper terminus. The last 75 feet is on a grade of 60 per cent, and is the grade on which the car stops.

The lower half of the incline is laid with two rails, and the upper half with three. At the center four rails are laid, providing a passing switch with a clearance length of 200 feet. There are no movable switch points, but car No. 1 is made always to take the south track at the switch, and car No. 2 the north track, by a special arrangement of fixed points and guards, and by turning the flanges of the wheels of one car outside, and the flanges of the other inside. This arrangement works perfectly, as there are no curves on the line except the long radius curves at the passing switch. The rails are standard 56-pound, laid to standard gage, on oak ties 5 by 7 inches by 8 and 12 feet, spaced 2 feet centers, except on trestles, where they are 16-inch centers. There are three wagon and two railroad crossings, at all of which the incline is carried overhead on trestles. The total length of the line on trestles is 715 feet. The longest trestle is 378 feet, and the highest bent 30 feet.

The trestles are built without the use of drift bolts, with the especial object in view of making repairs easy and convenient. The bents, spaced 12½ feet horizontally between centers, are framed with one plumb post and two batter posts. Stringers bolt to corbels framed on caps to suit the grade, held in line by 3 by 6 inch

100-FOOT CUT AND 67 PER CENT GRADE. GRADE OF INCLINE AT THE CUT. VIEW OF ENTIRE INCLINE.

spacing blocks spiked on top of caps, and by 3 by 6 inch keys through from stringer to stringer.

Neither corbels nor stringers are bolted to caps. Ties are held in place by ¾ by 5 inch dowel pins. For about 900 feet of the upper end of the track, (the steeper portion,) the ties are laid on stringers which in turn are supported on cross sills bedded in rock.

The stringers are double, breaking joints on alternate sills, and are spliced and keyed as on trestles. In fact the track construction on the heavier grade is an extension of the deck system of the trestles, with sills bedded in broken stone taking the place of framed bents. This gives a very stiff and substantial track construction, effectually keeping the alignment and surface, and reducing the tendency to creep down grade to a minimum. At numerous points the stringers are anchored by rods to eye bolts drilled into the solid rock.

Throughout the length of the road are laid two 5 by 6 inch wooden guard rails, supported on 5 by 6 inch bolsters, bolted through the ties, forming a guard 10 inches high. They are laid on the inside of the rails on the two rail track, and in a corresponding position on the three and four rail track, that is, just inside the outer rails. They serve the double purpose of the usual guard rail, to prevent derailment, and as a safety rail in conjunction with the safety brake described later.

There was no very heavy grading on the line except near the summit where the sandstone bluff forming the escarpment or brow of the mountain had to be cut through. Here the cut in the solid rock is nearly 100 feet deep. The difficulty and danger of this portion of the work was increased by the close proximity of the hotel and numerous cottages on the top of the mountain, and by the fact that 900 feet below was the crossing of the Lookout Mountain standard guage railway, operating regular passenger trains. But in spite of these obstacles the blasting was done and the whole line of road completed without a single accident, barring a few hours delay of trains and perhaps a few mashed fingers and toes among the workmen.

The rock excavated was a conglomerate sandstone full of seams and hard pebbles. An attempt was made to use steam drills, but it was not a success, owing to the seamy nature of the rock. The drilling was all done by hand, work being carried on day and night.

The machinery consists of two 75-horse-power balanced slide valve engines connected to one 8-inch shaft, carrying a steel pinion which engages with two steel gear wheels on the shafts of the winding drums. The pinion is made in halves bolted together, shrouded, and has a pitch diameter of 25 inches.

The gear wheels are each 9-feet pitch diameter, all 10-inch face. There are two six grooved winding drums 6 feet 6 inches diameter, keyed on 10-inch shafts. On each drum are strap brakes controlled by a foot lever in the engineer's room, and on the engine shaft two strap brakes worked by a hand lever. The engineer's position is overhead in front of the engines where he has a clear view of the whole line. He has convenient to hand the hand throttle wheel, reversing lever, foot and hand brake levers, and a foot lever controlling a second quick cut-off steam valve; for, in addition to the throttle valve of the regular globe type, there is a lever gate valve to cut off quickly in an emergency. This valve also will be cut off automatically, by the car striking a lever, if it runs beyond the point at which it is intended to stop. Thus if anything is the matter with the throttle valve, and, if upon attempting to slow up just before the car reaches the upper terminus, the engineer finds he can not control the steam, he can shut it off instantly with the foot lever.

And if he is negligent, or for any reason fails to close either valve, the car itself will cut off the steam before it overruns its position far enough to do any damage.

The winding drums are cast solid, and the grooves turned 1½-inch between centers. As mentioned above, there are two 1¼-inch steel cables, of Roebling make, an end of each being attached to each car, and the descending car is moved by its own weight.

The winding drums are set in line with track number 1, and the two cables come in overhead to the center grooves on the rear drum, passing underneath to the center grooves of the forward drum, (which are separated three inches between centers,) thence over to the rear drums, and so on, making three complete circuits around both drums, and coming off underneath the forward drum from the outer grooves—the cables then being separated 9 inches. They then pass to a set of inclined sheaves which bring them back together in line with track number 2. Each cable is 5.175 feet long, and of course, the stretching and expansion and contraction is considerable, but no device for taking up expansion is needed, as the car at the lower terminus may stop anywhere within fifty feet while the car at the upper terminus is always brought to approximately the same point. The cables are laid together in the center of the track on double grooved track sheaves placed an average distance of 30 feet apart.

At the turnout spools with flanges at one end are used instead of the double grooved sheaves. The cables are attached underneath each car by a clamp. It consists of two steel plates, the upper ⅝ inch and the lower ⅜ inch. The clamp proper consists of two halves of brass 11 inches long, with the groove lengthwise for the cable. The two halves are put together, enclosing the cable, and through small holes is poured molten lead, completely filling the recess around cable and running well in between strands of cable.

The whole clamp may revolve around the 2½-inch steel king pin in either direction according to which cable is the shorter. Thus, if one cable should stretch more than the other, the clamp will revolve a certain distance until the difference in length is adjusted and the tension kept equal in each.

The ends of the cables passing through the clamp are carried through the main end sills (which are there reinforced by an iron plate) and fastened together by Crosby clips. The fastenings of the cables in the clamp being

entirely independent of each other one of them might slip without damaging the fastening of the other. In case the clamps of both cables should slip the fastening through the end sill is amply safe.

Again, in case either cable should break, slip in its fastening or unduly stretch causing the clamp to revolve to the limit, a trigger will be struck throwing into operation the safety brake. The safety brake (one on each car) engages with the 5 by 6-inch guard rail elsewhere spoken of. There are two 3 by 10-inch channel beams 16 feet long, fastened to rigid frames underneath the car running one on each side of the guard rail. At the rear or upper end they are hinged so the front or lower ends may be pressed a certain distance apart, opening as the blades of scissors. Between the beams and guard rail are two cast iron slides with toothed faces to press against the guard rail, free to slide to the hinged ends of beams. The down grade ends of the beams are pressed together by coiled springs but are kept normally apart by hinged toggle arms.

The cars are of substantial construction, 8 feet wide by 30 feet long. The floor is built in steps to be level on the average grade.

The seats are arranged as in ordinary passenger coaches, but suspended to allow for the changing grade. On the upper end of the car is a platform and at each end of the car is a vestibule, one of which is specially arranged for baggage.

The carrying capacity of each car is fifty passengers, but the vestibule compartments not being provided with seats, the regular seating capacity is only twenty-four.

The windows are large and arranged to let down into pockets, or to be removed altogether, making them practically open cars for summer use.

The weight of each car with cable fastenings and all attachments is about 12,500 pounds. The maximum load of fifty people at 150 pounds each is 7,500 pounds. To this add 1,500 pounds for baggage and 12,500 pounds weight of car, and we have a total of 21,500. The weight of each cable is 2.5 pounds per foot. With this data the strain on the cables and work of engines can be calculated for any position of the cars and any varying conditions of load. It will be found that under the most adverse conditions there is a factor of safety of at least 12, taking the guaranteed breaking strain of each cable at 104,000 pounds.

CARS ENTERING SWITCH HALF WAY—VIEW FROM MOUNTAIN.

The grade is such that equal loads approximately balance each other at all points on the line. The car at the lower end being on the minimum grade has the whole length of cable attached to it, but, to counterbalance this combined weight, the car at the upper end stands on the maximum grade.

To each car is attached a light overhead trolley running on a galvanized iron trolley wire, each car having its separate wire and gong in the engineer's room, which are distinguished from each other by difference in tone. In each end of the cars are push buttons, and by a code of signals to the engineer the movements of the cars are regulated. There is also a signal wire from the power house to the lower depot, and telephonic communication between the two stations. The road operates the entire year.

DUTIES OF PASSENGERS TO OBEY COMPANY'S RULES.

In the Case of McMillan vs. Federal Street and Pleasant Valley Passenger Railway Company, Appellant, Some Points of Interest Were Brought Out.

Trespass in Ejecting Passenger from Car—Reasonableness of Rule—Rights and Duties of Passengers—Unnecessary Force.

The rule of a street railway company forbidding passengers to stand on the platform when there is room inside, is a reasonable one, and is intended to secure the safety and comfort of passengers. It is the duty of the duty of the passenger to obey it, and the right of the company to enforce it. The passenger has no right to make himself the judge of the necessity for the enforcement of the rule.

When passenger resists conductor in the proper performance of his duty, he makes the use of force necessary, and if in the struggle which follows, there is not an exact and delicate adjustment of it to the end in view, he has no ground of complaint. A rule that might be suspended at the will of the passenger, would cease to be a rule.

(Appeal, No. 139, October term 1895, by defendant from judgment of the Court of Common Pleas No. 2, of Alleghany County, Pennsylvania at No. 725 April term 1894.)

Trespass for ejectment from street car. The facts appear in the opinion of the Supreme Court. Verdict and judgment for plaintiff for $375; Hudson and McCue, for appellee. Messrs. Stone and Potter for appellant. Fell, J:—The reasonableness of the rule of the defendant company, forbidding passengers to stand on the platform when there was room inside the car seems to have been conceded at the trial. The questions submitted to the jury were whether under the circumstances the plaintiff was excused from complying with the rule, and whether unnecessary force was used in putting him off the car. While the testimony as to a part of the occurence was conflicting, the main facts are clear of doubt. The plaintiff was asked by the conductor to go from the platform to the inside of the car where there were vacant seats which were pointed out to him. He refused to do so. He knew of the rule of the company which forbade passengers to stand upon the platform when there was room inside of the car, and if his attention was not called to it at that time he understood fully that the conductor's request had reference to the rule and that it was his duty to enforce it. After some discussion and the plaintiff's final refusal to comply with the request made, the car was stopped and he was told that he must either go inside or get off. He persisted in his refusal to do either and was put off. When the car was started he attempted to get on and was resisted by the conductor, who pushed him away from the platform. He was not injured. The force used was to loosen his hold from the railing to remove him from the platform and to prevent him from boarding the car again while it was in motion. These facts were either admitted or so clearly established by the testimony as to be beyond dispute. It remains to consider whether under the circumstances it was unreasonable to enforce this rule and whether unnecessary force was used in ejecting the plaintiff from the car. The rule however, was a reasonable one, intended to secure the safety and comfort of the passengers. It was the duty of the plaintiff to obey it and the right of the company to enforce it. Cases might arise in which it would seem that the rule should not be rigidly enforced or an immediate compliance with it required, as where the passenger was at the point of alighting and his presence for a few moments on the platform would not endanger or inconvenience anyone; but the necessity for the enforcement of the rule is not to be determined by the passenger. A rule that might be suspended at his will would cease to be a rule. The management of the car in all matters which relate to the conduct of the passengers is with the conductor, and ordinarily the enforcement or suspension of a rule rests with him. A passenger in any event would have no right to complain of the enforcement of a reasonable rule unless he had stated to the conductor an adequate reason for its suspension in his case. This the plaintiff did not do. He testified that he told the conductor that he was not going far enough to "justify" him in going inside the car because if he went in and sat down he would have to come right out again. That he would be at his stopping place and there was no use in going inside for he was not going far enough to go and it was not worth while to go in; but when asked by the conductor how far he was going, his only reply was "not far." This was coupled with the assertion that he would not go in. His statement that he was not going far, with his refusal to say how far, gave the conductor no information. He might have meant a square or a mile. That he rode some distance during the controversy before the car was stopped and afterwards attempted to get on and finish his journey casts serious doubt upon his good faith and confirms the suspicion of want of candor which his previous conduct had indicated. He undertook to make himself the judge of the necessity for the enforcement of the rule. In this he was wrong.

The learned judge was incorrect in stating in part of his charge, which is the subject of the first specification or error, that the plaintiff had testified that he had been kicked. No such statement appears in the testimony. There was testimony given by others that he had been kicked, due no doubt to the fact that the conductor held his foot in a position to push the plaintiff away from the platform when he attempted to get on the car while in motion. The plaintiff testified that the conductor alone put him off the car; that it was done by pushing him; that he did not know that the motorman touched him. He testified repeatedly and distinctly that he was not aware of being struck or kicked, and that as far as he knew he was not. There is no evidence to justify the conclusion that there was any wanton or reckless

conduct on the part of the conductor, and the plaintiff complained of none. The whole burden of his complaint was that he had been put off, not in the manner in which it was done. The case should not have been left to the jury to find punitive damages. When the plaintiff resisted the conductor in the proper performance of his duty, he made the use of force necessary, and if in the struggle there was not an exact and delicate adjustment of it to the end in view, he had no ground of complaint.

The assignments of error are sustained and the judgment reversed.

A SUCCESSFUL MAXIMUM TRACTION TRUCK.

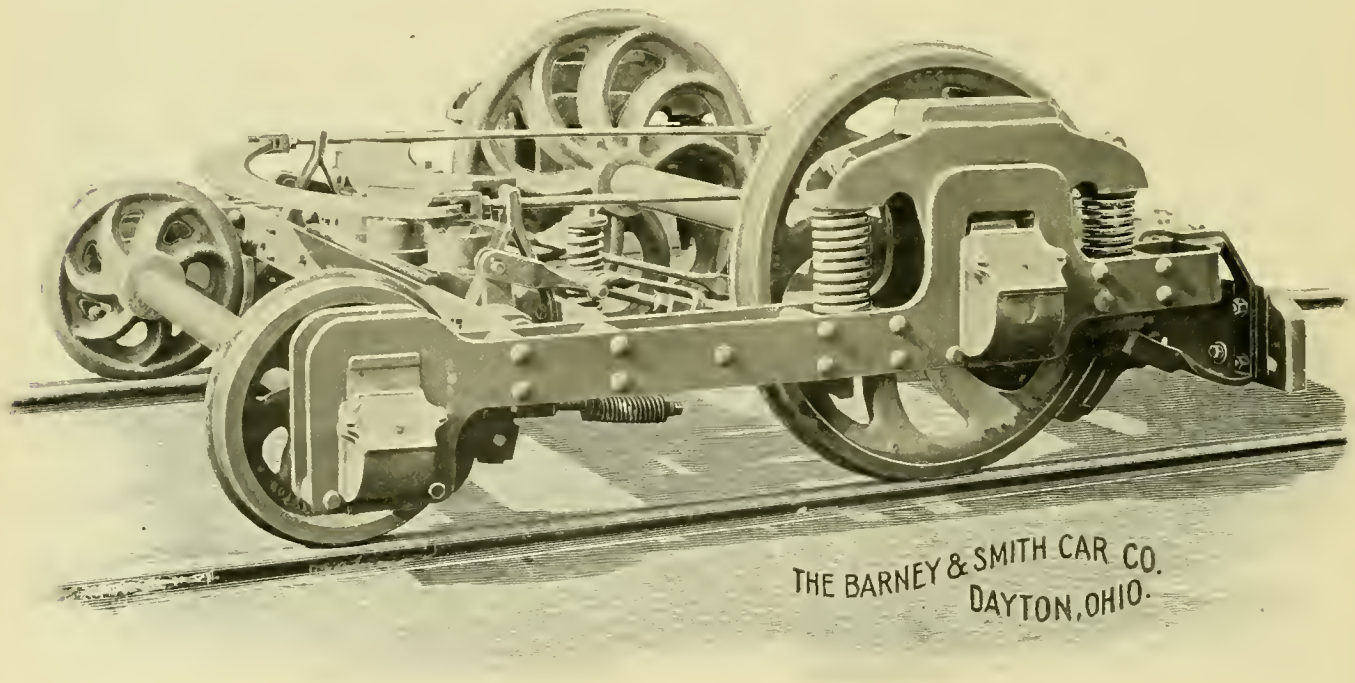
Maximum traction trucks are undoubtedly more suitable for long cars than any other class used for this purpose, principally for the reason that both height of steps and width over side frame remain the same as those on the ordinary four wheeled car. But, in order to be successful, these trucks must be designed and constructed to at least meet the requirements as to noiselessness, riding qualities and, beyond all, must be proof against derailment.

The Barney & Smith Car Company, of Dayton, Ohio, has produced such a truck. When making the design they had in mind the weak and faulty points of the trucks of this class then on the market and set out to overcome them. After making a number of tests and experiments the design illustrated on this page was evolved, and trucks built in accordance with it are now in daily use on a large number of cars.

The side frames are of the best quality of wrought iron forged to shape shown. Experiments showed that a malleable or steel casting was not sufficiently reliable and as the object was to produce an absolutely safe truck the more expensive forged frame was adopted.

The back or central bearing springs are contained in a casting provided with the proper number of cylindrical chambers for this purpose. The casting itself is held in position by two heavy wrought iron transoms, which are secured to the side frames by means of hot rivets. In fact, all joints where possible are made in this way.

The carrying springs are arranged in such a manner that the truck frame is supported by spiral springs and the car body, in addition to this, by half elliptics. This was adopted after a number of trials had demonstrated it, to produce less noise and better riding than any other. The back springs can be adjusted by means of screws, thus making it possible to adjust the pressure on trail wheels conveniently and promptly.



THE BARNEY & SMITH MAXIMUM TRACTION TRUCK.

The driving wheels are 33 inches diameter and the trail wheels 18 inches diameter, the latter size being adopted to swing readily under the side steps on an open car. Axles are of the best forged iron, the trail axle 3 inches in diameter and driving axle to meet the requirements of any motor.

The truck is equipped with adjustable brakes applied to all wheels, the pressure being proportioned to the weight carried on each. There is also a "V" shaped pilot plank, and proper arrangement for all styles of motor supports.

The Atlantic Avenue Railroad of Brooklyn has unearthed a case where a washerwoman got a verdict of $5,000 for the death of her husband, said husband having not been killed.

TESTING DROP AROUND RAIL JOINTS.

BY FRANKLIN SHEBLE.

One of the most important questions in electric railway construction is the proper bonding of the rails. The joints are usually bonded according to the railway manager's best judgment; the different bonds are shown in section, but their mechanical appearance as presented by the salesmen, their low cost and the ease of installing are the only features considered. The carrying capacity of the different bonds, or which is the same thing, the actual drop in the voltage around the joints, is seldom tested.

The ideal construction would be to make the bond equal the rail in carrying capacity. It is well known that a 90-pound rail has a cross section of 9 square inches; 70-pound rail, 7 square inches, etc. Since steel has about one-seventh the carrying capacity of an equal section of copper, the conductivity of a 90-pound rail is equal to a copper rod about 1¼ inches in diameter. If we used a perfect bond we would have for the purpose of returning current to the power house the equivalent of two 1¼ inch copper rods, represented by the two rails. If one or more number 0000 copper bonds were used, the carrying capacity of the return rail circuit would be reduced much more than is generally supposed. An immense advantage would be gained if the total rail section could be utilized for a return circuit. This condition can never be reached in practice by using copper bonds, or any bond depending on mere surface contact.

It may not be amiss to state here that it is a mistaken idea to suppose the fish plates carry much current around the joints. After the track has been laid a short time the plates and rail are rusted to a degree which offers very high resistance to the passage of current, since oxide of iron is almost an insulator.

As stated, a railway manager will bond according to his best judgment, and then crawl into his shell, coming out only when his cars are badly when passing over a joint, or when the snow melts around a heated joint. While the evil forces of corrosion, electrolysis, mechanical hammering and loosening of the bonds are always at work, the junk shops in the vicinity should also be watched for short lengths of copper wire, since exposed copper bonds are easily stolen.

It is acknowledged that a proper return circuit is as important as the feeder circuit, and since it has received so little consideration, it is the desire of the writer to propose simple methods of testing the drop around rail joints for the purpose of finding poor connections and for determining the necessity of efficient bonding.

Some portable high-reading voltmeters have a third binding post attached to a test coil for use in calibrating. If one is not on an instrument it can be placed there by the makers for a few dollars. This arrangement will measure very low voltage, the total scale of 600 volts equalling probably not over 2 or 3 volts. The proper constant for each deflection can be obtained from the makers and the true drop determined by multiplying the reading by the constant. If the reading around a joint is 150 and the constant for each deflection is .0024, the drop in voltage will be .36 or about ⅓ of a volt.

This method has been used by the writer and is diagramatically explained in a recent article in the "Electrical World" by Geo. T. Hanchett, on "How to use a Voltmeter as an Ammeter." A low reading voltmeter is direct reading and, of course, preferable, but it costs more. Or for a small sum the makers will apply both a low-reading coil and a new scale with two sets of figures from which direct readings can be made.

The current flowing through the joint can be approximated by knowing the number of cars beyond the joints, if there is no other means of return than through the track. A section of exposed track is preferable. A car can be braked beyond the joint and the current measured more accurately. Power house tests can, of course, be made still more accurately, using the station ammeter for this purpose.

The total return drop was measured by the writer some years ago by using a telephone circuit as a potential wire, from the power house to a distant point on the line, a straight connection being made late one night through the telephone exchange from the negative bus bar at the power house to the distant track where a voltmeter was inserted. One car was taken out to the point where measurements were taken; it was braked and current and voltage readings taken around the motors, and at the same instant the drop in the return circuit was measured. The sum of the drop around motors and the drop in the return circuit, subtracted from the voltage at the power house, which was kept constant, gave the drop in the line circuit.

W. E. Harrington, engineer of the Camden Horse Railway, has prepared the attached table. He took a

TABLE SHOWING CURRENT FLOWING THROUGH 29 FEET OF THE FOLLOWING SIZES GIRDER RAIL FOR A GIVEN DROP IN POTENTIAL. BASED ON 100 AMPERES FLOWING THROUGH 29 FEET OF 60 POUND GIRDER RAIL CAUSING A DROP OF .0531 VOLTS

DROP IN VOLTAGE		CURRENT IN AMPERES												
V.M READING	ACTUAL DROP IN VOLTS	40 LB RAIL	45 LB RAIL	50 LB RAIL	55 LB RAIL	60 LB RAIL	65 LB RAIL	70 LB RAIL	75 LB RAIL	80 LB RAIL	85 LB RAIL	90 LB RAIL	95 LB RAIL	100 LB RAIL
5	.0110	148.0	167.0	185.0	203.0	222.0	240.0	259.0	278.0	296.0	315.0	334.0	352.0	370.0
25	.059	740.0	835.0	925.0	1015.0	1110.0	1200.0	1295.0	1390.0	1480.0	1575.0	1670.0	1760.0	1850.0
50	.118	1480.0	1670.0	1850.0	2030.0	2220.0	2400.0	2590.0	2780.0	2960.0	3150.0	3340.0	3520.0	3700.0
75	.177	2220.0	2506.0	2775.0	3046.0	3330.0	3600.0	3885.0	4170.0	4440.0	4725.0	5010.0	5280.0	5550.0
100	.236	2960.0	3340.0	3700.0	4060.0	4440.0	4800.0	5180.0	5560.0	5920.0	6300.0	6680.0	7040.0	7400.0
125	.295	3700.0	4175.0	4625.0	5075.0	5550.0	6000.0	6475.0	6950.0	7400.0	7875.0	8350.0	8800.0	9250.0
150	.354	4440.0	5010.0	5550.0	6090.0	6660.0	7200.0	7770.0	8340.0	8880.0	9450.0	10020.0	10560.0	11100.0
175	.413	5180.0	5845.0	6475.0	7105.0	7770.0	8400.0	9065.0	9730.0	10360.0	11025.0	11690.0	12320.0	12950.0
200	.472	5920.0	6680.0	7400.0	8120.0	8880.0	9600.0	10360.0	11120.0	11840.0	12600.0	13360.0	14080.0	14800.0
225	.531	6660.0	7515.0	8325.0	9135.0	9990.0	10800.0	11655.0	12510.0	13320.0	14175.0	15030.0	15840.0	16650.0
250	.590	7400.0	8350.0	9250.0	10150.0	11100.0	12000.0	12950.0	13900.0	14800.0	15750.0	16700.0	17600.0	18500.0
275	.649	8140.0	9185.0	10175.0	11165.0	12210.0	13200.0	14245.0	15290.0	16280.0	17325.0	18370.0	19360.0	20350.0
300	.708	8880.0	10020.0	11100.0	12180.0	13320.0	14400.0	15540.0	16680.0	17760.0	18900.0	20040.0	21120.0	22200.0
325	.767	9620.0	10855.0	12025.0	13195.0	14420.0	15600.0	16835.0	18070.0	19240.0	20475.0	21710.0	22880.0	24050.0
350	.826	10360.0	11690.0	12950.0	14210.0	15540.0	16800.0	18130.0	19460.0	20720.0	22050.0	23380.0	24640.0	25900.0
375	.885	11100.0	12525.0	13875.0	15225.0	16650.0	18000.0	19425.0	20850.0	22200.0	23625.0	25050.0	26400.0	27750.0
400	.944	11840.0	13360.0	14800.0	16240.0	17760.0	19200.0	20720.0	22240.0	23680.0	25200.0	26720.0	28160.0	29600.0
425	1.003	12580.0	14195.0	15725.0	17255.0	18870.0	20400.0	22015.0	23630.0	25160.0	26775.0	28390.0	29920.0	31450.0
450	1.062	13320.0	15030.0	16650.0	18270.0	19980.0	21600.0	23310.0	25020.0	26640.0	28350.0	30060.0	31680.0	33300.0
475	1.121	14060.0	15865.0	17575.0	19285.0	21090.0	22800.0	24605.0	26410.0	28120.0	29925.0	31730.0	33440.0	35200.0
500	1.180	14800.0	16700.0	18500.0	20300.0	22200.0	24000.0	25900.0	27800.0	29600.0	31500.0	33400.0	35200.0	37000.0
525	1.239	15540.0	17535.0	19425.0	21315.0	23310.0	25200.0	27195.0	29190.0	31080.0	33075.0	35070.0	36960.0	38850.0
550	1.298	16280.0	18370.0	20350.0	22330.0	24420.0	26400.0	28490.0	30580.0	32560.0	34650.0	36740.0	38720.0	40700.0
575	1.357	17020.0	19205.0	21275.0	23345.0	25520.0	27600.0	29785.0	31970.0	34040.0	36225.0	38410.0	40480.0	42550.0
600	1.416	17760.0	20040.0	22200.0	24360.0	26640.0	28800.0	31080.0	33360.0	35520.0	37800.0	40080.0	42240.0	44400.0

60-pound girder rail, drilled holes in it 6 inches from each end and filled the holes with mercury. Connecting

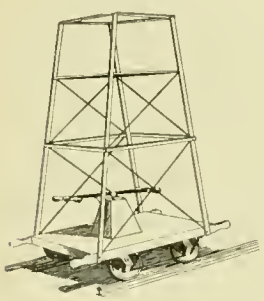
wires were inserted in these mercury cups, varying currents passed through the rail and readings taken on the calibrating coil of his portable voltmeter. These readings are given in the first column. The second column gives the actual drop found by multiplying each unit division by the constant, which in this case was .00236.

This table gives valuable figures and also shows how thoroughly Mr. Harrington has gone into the subject. If more engineers would only take the same trouble to investigate for themselves the condition of their rail returns and take steps towards improvement, great economy would be effected both in running expenses and in reducing the amount of electrolytic trouble.

The main object of this article is to endeavor to get street railway managers to look more closely into their return circuits and by simple means to see what they have got; then to take steps to better it, making the same crucial test on the methods proposed for betterment. It is the low resistance return which is desired, and a permanent bond which should equal the rail in carrying capacity.

TROLLEY REPAIR HANDCAR.

The Cleveland & Elyria Interurban, with its twenty-one-mile long line has devised a simple repair outfit which the linemen can use without need of a car and motors. It is a light tower structure capable of sustaining the weight of two men and mounted on an ordinary hand car. A box under the car contains the few necessary tools, and two men on the handles can develop quite a satisfactory speed, especially as the road is free from grades. The two men with the assistance of conductor and motorman can always remove it from the track upon meeting a car in service.



MUST GO INSIDE OR GET OFF.

An interesting case has recently been decided in the city court of Albany, N. Y., involving the right of a passenger to stand upon the platform of a street car when there is standing room inside. The action was brought by Edmund C. Knickerbocker against the Albany Railway, for breach of contract in forcibly ejecting plaintiff from a car. The facts in the case were agreed upon by both parties, the ejectment being forcible in a legal sense only, and the only point involved was the passenger's right to stand on the platform after being requested by the conductor to enter the car. The law in the case is clearly stated by the court, as follows:

"As it has been well settled in this and other states that passengers must comply with reasonable directions of employes of railway companies, and that it is the duty of passengers to go inside when requested so to do. I think the conductor of defendant had a right, after the refusal of the plaintiff to obey his request, to do either of two things, viz.: to use reasonable and necessary force to put the plaintiff inside the car or to use the degree of force necessary to put him off the car. It seems to me that the conductor being in charge of the car had a right to and it was his duty to use his discretion, having in mind the proper running of the cars and the comfort and safety of the other passengers as to whether he should force plaintiff inside the car or force him off the car. Judgment is therefore rendered for the defendant."

A THIRTY-FIVE THOUSAND DOLLAR LEG.

A Boston jury has awarded a verdict for $35,000 against the Lynn & Boston Street Railway Company in favor of Francis A. Daly for the loss of a leg. Daly was pushed off a crowded car while standing on the running board and he was run over by the trailer. He lost one leg and sustained such injuries to his spine that he is now a wreck and has been subjected to four distinct operations. It was claimed that the car ran faster than the law allows and that the attaching of a trailer was illegal. The case will probably be appealed.

DENVER NOTES.

The Tramway Company has been putting its rheostats on the right side of the motorman's platform bringing them under the left side of the rear platform. This is to keep the moisture away from them in bad weather, as they are not now in the line of travel of the passengers. The step has been removed from the side where the rheostat is.

The Tramway intends to extend its new Arapahoe street and Gallup avenue line to Arago in the near future.

The Tramway has put lights at all switches on single track, one at each end of switch. On the southern end of the switch, for example, the light turned on means the car is south of that point. If it is off the car is to run to the next switch. On the northern end the light turned on means the car is north of that point, and if off the car is coming, wait at switch.

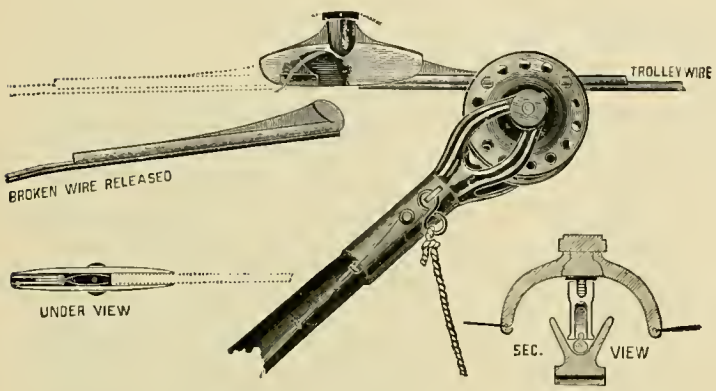
GEN JACKSON, OF NASHVILLE, RETIRES.

Gen. W. H. Jackson, the whole-souled Kentuckian, who has been president of the Nashville Street Railway for several years, retires as chief executive in favor of T. M. Steger. The general will still serve as director and retains his interest. He is second vice-president of the American Association. Other officers elected were: A. M. Shook, vice-president; N. P. Yeatman, secretary and treasurer; E. G. Connette, general manager.

The proposition made by the elevated roads of Brooklyn to lease the Brooklyn bridge and operate trains over it has been side tracked in the New York legislature.

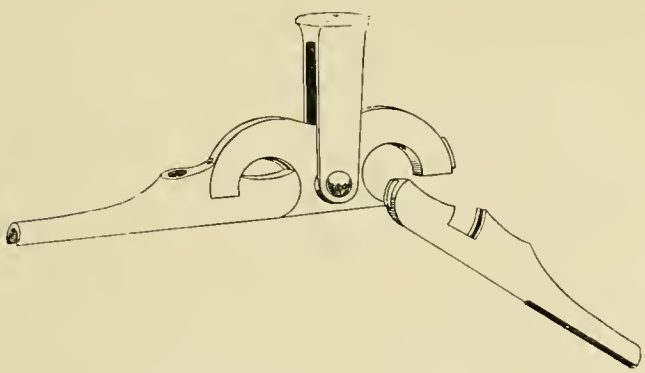
SAFETY TROLLEY WIRE HANGERS.

Numerous hangers have been designed which drop the wire entirely when it breaks, but have so far found little favor among electric railway men. Two of these hangers are illustrated herewith. The first is the design



THE HUTCHINS SAFETY HANGER.

of A. E. Hutchins, of Detroit, Mich. The second is the design of Theodore Fletcher, of San Antonio, Tex., and differs from the Hutchins hanger mainly in the manner of attaching the wires to the clip. The principle, of course, is plain. Whenever a trolley wire breaks, the sag in the wire between the two spans where the break



THE FLETCHER SAFETY HANGER.

occurs, automatically releases it from the hangers so that it falls to ground its whole length, leaving no live ends dangling in the street. While the end is a desirable one to be attained the difficulty of good or economical construction when the trolley wire is cut every 125 feet for each hanger is such that it is not favorably looked upon

TROLLEYS AS FARE REDUCERS.

Its the deadly trolley sure enough this time, for the Pennsylvania road has been obliged to greatly reduce its suburban fares out of Pittsburgh, in order to maintain its business against the electric lines. The same is true of the Missouri Pacific out of St. Louis, and the Chicago & Northern Pacific in Chicago. Similar reductions are reported elsewhere. All this is good for the riding public which is beginning to see the error of its ways.

ANTI-EXPECTORATION ORDER.

The effort to abate a most disgusting, and universal, nuisance is becoming quite general; the latest being an order by the New York city board of health, which amends the sanitary code as follows:

"Spitting upon the floors of public buildings and of railroad cars and of ferry-boats is hereby forbidden, and officers in charge or control of all such buildings, cars and boats shall keep posted permanently in each railroad car and in each ferry-boat, a sufficient number of such notices forbidding spitting upon the floor, and janitors of buildings, conductors of cars and employes of ferry-boats shall call attention of all violators to such notices."

Unfortunately there seems to be no penalty attached to the violation of the order, or any provision for police enforcement of the same. It is difficult to discern just how the "reform" is to be enforced.

THE DURR LIGHT.

A new light for the use of contractors has just been put upon the market by Richard J. Leupold, Baltimore, Md. The principal improvements claimed for it are that it requires no air pump for its operation, and that it will burn ordinary coal oil of 150 test.

The oil in its liquid state is admitted drop by drop into the interior drum of the cylinder through pinholes in the conducting tube, where it is converted into gas, and comes out at the burner. No liquid oil reaches the burner, and the use of the lamp is thus rendered safe under any ordinary conditions.

The lamp is said to burn about seven hours at one filling, and can be refilled while burning. It is simple in construction, and there are no delicate parts liable to wear out. It is in use in both the English and German armies.

HURT REMAINS AT THE HEAD.

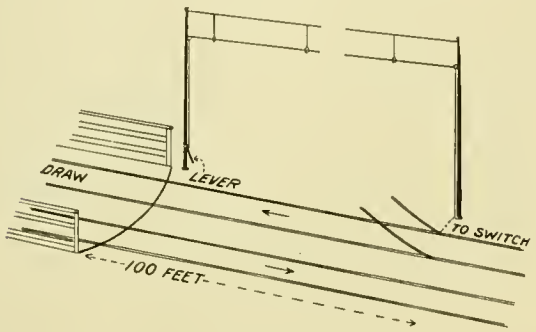
At the stockholders' meeting of the Atlanta Consolidated Street Railway last month, Joel Hurt announced that he would reconsider the resignation from the presidency, made last fall, and remain at the head. This is by a very urgent request of the board of directors and some of the largest bondholders.

The report for the year shows that the expenditures exceeded the receipts by $24,412. The expenditures consists of the operating expenses, fixed charges, and $143,283 spent for additions to take care of exposition traffic, and paving. The receipts were $497,289; operating expenses, $257,157; fixed charges, $121,467. The operating expense per car mile was $.114.

White caps are worn in summer by conductors of the Baltimore Traction Company.

DERAILING SWITCHES ON CLEVELAND DRAW BRIDGES.

The Cleveland Electric Railway has changed the location of the lever which conductors must pull in order to throw the derailing switch into straight track, on the draw bridges. Heretofore the lever was placed at the switch; now a wire has been run from the switch, which is 100 feet from the draw, to the edge of the



DERAILING SWITCH AT CLEVELAND.

draw, so conductors absolutely can make no mistake as to the position of the draw. The city has also strengthened the bridge gates by the addition of a rolled steel angle iron which extends the full length of the gate, about the middle. Cars must come to a full stop at derailing switch, while conductor runs the 100 feet, and while a little time is lost, the safe passage of the car is very greatly enhanced.

CABLE CUTS MANHATTAN'S EARNINGS.

The effect of the extension of cable roads in New York upon the elevated roads is reduced to dollars and cents in the last quarterly statement of the Manhattan Railway. The report covers up to March 31, and shows a deficit of $65,239, after paying the quarterly dividend of 1½ per cent. This is one of the worst showings ever made. The total income for the period was $995,179, against $1,108,873 last year and $1,199,682 in 1894. More than one and a quarter million less passengers were carried than last year during the same time, and nearly four million less than in 1894.

THE IOWA ASSOCIATION.

The Iowa Street Railroad Association is making good progress toward permanent organization. Mr. Hall, president of the lines at Cedar Rapids, is temporary president and George B. Hippe, general manager of the Des Moines City Railway is secretary. Every road in the state should join and take an active interest in its work, for it is high time there was a better and closer acquaintance among the Iowa managers, and the same advantages which have followed state organizations elewhere can be secured. The meeting for final organization will occur in November.

SWALLOWED HER TRANSFER.

It was on a summit street trailer, says the Kansas City World, and the young mother was absent-mindedly gazing on a-far-off blue-capped height and carelessly toying with a pink-tinted transfer check in her right hand. The baby had asked for the pretty ticket, but the mother's thoughts were busy elsewhere. She kept on looking out over the landscape, evidently in a brown study.

"Fares, please!" It was the conductor. The mother came back to the present tense with a jump.

"I paid my fare once."

"No mam, you didn't, beggin your pardin'."

"Yes I did. I had a trans——"

Just then the baby began to gag and grow black in the face. And not only black, but all about her little mouth were remarkable variegations in shades of pink. The transfer ticket had returned to the pulp from which it was made. The mother scooped out what was left of it from baby's mouth, thumped the little one's back to aid it in recovering its breath and then turned a very red face toward the conductor in mute inquiry as to what was to be done.

The conductor said never a word. He merely held out his hand.

"Well, I won't pay again. I—I—I'll walk first."

The conductor gave the gripman one bell. All the passengers looked their sympathy as the mother and the variegated little one left the car.

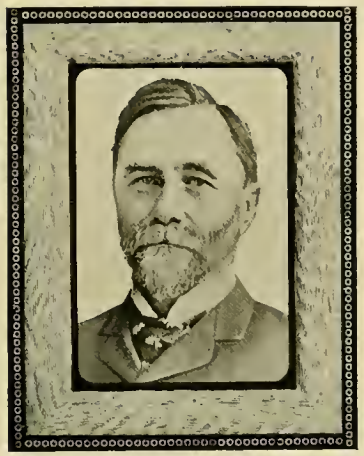
PAYS TRAINMEN DAILY.

The somewhat novel plan of paying employes daily, which has been inaugurated by the Pittsburgh, Allegheny & Manchester Traction Company is apparently giving satisfaction to the management if not to all parties concerned. We are informed, however, by G. D. Williams, paymaster and cashier, that the plan is not a new one, but was in force with the company about 1859 or 1860 to 1890, when a change was made to semi-monthly payments, with more or less dissatisfaction all around. The advantages claimed for the system are that it prevents mistakes, lessens labor and saves the expense of a time-keeper. It is also said that there is no chance for errors, since the receiver can see at a glance how much time has been made on a day card handed him at the end of a day's work, and on paying the amount called for and taking a receipt on the back of the card the account is fully closed. Mr. Williams writes: "From twenty years experience in street railway work, I claim this as the only successful plan by which motormen and conductors can be paid." It is said that there is some objection on the part of the men on the ground that those who have not inherited or acquired a habit of saving money find themselves "broke" when weekly bills come due.

All the street railway lines of Dayton, O., are operating without conductors.

COLONEL F. K. HAIN, KILLED.

Franklin Kintzle Hain, vice-president and general manager of the Manhattan Elevated Railway, who was killed by a freight train at Clifton Springs, N. Y., on May 9, has been for years the most widely known figure in connection with elevated railway transportation. He was born at Stouchsburg, Berks County, Pa., July 22, 1836, and at the age of 16 entered the shops of the Philadelphia & Reading Road. From that time on he served in various capacities on different railroads and for a time as engineer in the United States Navy. He was successively superintendent of motive power of the Pennsylvania, and the New York, Lake Erie & Western roads, in charge of the designing department of the Baldwin Locomotive Works, and general superintendent of the Keokuk & Des Moines road. He entered the service of the Manhattan Elevated as master mechanic, became general manager in March, 1880, and later was elected vice-president. Col. Hain was a man of extraordinary executive ability, and to his indefatigable labor and skillful management is due the greater share of credit for the record of the road in having carried a larger number of passengers than any line in the world without a fatal accident to one of them.



COL. F. K. HAIN.

ONE ON THE STEAM ROADS.

The commercial travelers have developed a scheme for getting ahead of the Pennsylvania road and incidentally assisting the street car line. Travelers would check baggage at Greensburg for Jeannette and then at their leisure board a street car for the same place and save the difference in fare. Orders have been issued not to check baggage without ample evidence of the traveler's intention to go with it, and now the street car men are wondering how they can assist the restoration of the former practice.

HE KNEW THE BUSINESS.

"You just leave that to me and I'll cover the tracks."

It was a new employe, strange to San Francisco's streets and the fact that they are covered with a network of abandoned tracks, the result of the consolidations, interlacing and twisting like telegraph wires after a storm. The car is the one that makes one daily trip over one line to save the franchise.

The superintendent told him the names of the streets over which he should drive and let him go, having refrained from adding further instructions after receiving the above reply. But a crush on Market street drove the line of march out of the driver's head. He felt that he couldn't go wrong, however, if he followed the rails. He drove all day, crossing and recrossing principal streets, getting tangled up with cable cars and astonishing residents of streets where for years a car had not been seen. A happy accident led him at night to a switch which put him on the homeward journey, "otherwise," as a railroad man remarked, "he would be going yet." He did not know his business but what he did not know about the streets of 'Frisco was hardly worth telling.

CONSOLIDATED GETS NO INJUNCTION.

In the action brought at Bridgeport, Conn., by the Consolidated Railway Company against the Shelton Street Railway Company to enjoin the street railroad from crossing the viaduct between Shelton and Birmingham, a decision adverse to the plaintiff was handed down May 5. It was held that as the street railroad had legislative authority and the approval of the public, and as such use did not endanger public travel, it was not desirable to grant the injunction. The railroad company claimed that the bridge was built by a road now leased by it.

LOOK OUT FOR AUCTIONEERS.

The Milwaukee Street Railway Company has been asked through the courts to pay $7,500 to Frank M. Hoyt for acting as auctioneer, when the road was about to pass out of the receiver's hands. A young attorney, to whom the company had agreed to pay $300 for a similar service was objected to by the court on the ground that he was not a master in chancery. The New York stockholders insisted that the auctioneer should go to New York and personally cancel the old bonds, and it is for this that the bill is presented.

HOUSTON STREET RAILWAY SOLD.

The Houston, Tex., City Street Railway Company's property was sold May 5, under an order of the United States circuit court as the result of an action brought by Alfred N. Parlin. The property was bought for $100,000 by A. H. Hayward, representing a syndicate of bondholders who are residents of the New England states. The interest of the bondholders amounted to a million and a quarter, but there was no competition and the price paid was the minimum fixed by the court. The company will probably be reorganized and an attempt made to put it on a paying basis.

A broken axle on a car of the Cincinnati Inclined Plane Railway caused the car to turn completely over on its side. Must have stumbled.

Cost of Motor Maintenance

PART II.

The following is a continuation of the series of reports received from various roads on the maintenance of motors and trucks. At the conclusion of the series the results will be tabulated, as stated in the previous article.

(11) THE EVERETT (WASH.,) RAILWAY & ELECTRIC COMPANY

keeps two cars in daily operation. They have double Westinghouse single reduction motor equipments. All the ordinary repairs are done by two men, whose combined pay is $110 per month. Once a day commutators and brushes are inspected and other parts are inspected during the week in turn. Cars are only overhauled as they require it. Motors average 153 miles a day, making the cost of labor for maintenance $.0118 per car mile and $55 per car per month. Axle bearings are brass, with an average life of ten to twelve months. The average life of armatures is not known. Some have run for over three years and are apparently as good as new; have had no broken wires for over two years. Gears and pinions last two years and over.

(12) DENVER CONSOLIDATED TRAMWAY.

This road has 80 motor cars in daily operation. The total equipment numbers 119 motor cars as follows: 23 W. P. 50 double equipments, with rheostat control; 15 W. P. 50 single equipments with rheostat control; 20 W. P. 30 double equipments with rheostat control; 20 G. E. 800 double equipments with series-parallel control; 16 Westinghouse number 3 double equipments; 1 Westinghouse number 3 single equipment; 1 Westinghouse number 12 double equipment; 17 F.20 double equipments; 5 Sprague number 6. These are housed in 4 barns. The total force of men engaged in inspection and repair of motors and car electrical equipment is 38, divided as follows: Armature winders, 6; blacksmiths, 2; machinists, 9; brass foundry, 2; motor and truck repairers (day force) 6; night men at car houses, 13.

The pay roll is about $1,700 per month making $21.25 per car in service per month. Motor cars average 4,300 miles per month so that the pay roll is $.0049 per car mile. The work of night inspectors is divided by having one man at each barn to look after brush holders and oiling, and putting the rest on general work. In addition to the night work it is the practice to give each motor car a general inspection and overhauling each month. They find this inspection especially necessary with the old style motors. The new General Electric and Westinghouse motors run well for several months at a time. When a car is overhauled the trucks are taken out from under it and new bearings, brush holders and wheels put in when necessary, so that when the car goes out it is in very good shape for a long steady run. Axle bearings last about eight months, brass being used on the old style motors and babbitt on the new. Armature bearings last about three months and are of babbitt on the modern equipments. The average life of armatures is about two years and they generally run about one year before trouble from breaking of wires begins. Cast iron gears without a gear case last about eight months; steel gears in oil about fifteen months. Pinions last four months,—rawhide longer. Maintenance of motors costs $.0085 per car mile; of car bodies and trucks $.0043.

(13) MACON CONSOLIDATED STREET RAILROAD.

The daily schedule calls for 16 cars. They are all singly equipped with W. P. 50 motors and rheostats. A machinist and two helpers do all the repair work of any consequence on trucks and electrical equipment. Two night men are employed who do car cleaning and make slight repairs. Armature winding is done by the assistant engineer who is allowed extra time. The labor bill for maintenance of motors and trucks is $120 a month or $7.50 a car. Motors run about 4,000 miles a month, making the cost of repair labor per car mile, $.0018. Motors are cleaned and brush holders examined every night. Cars sometimes run two and three months without any other attention. Steel gears last from 1 to 1½ years, and steel pinions about 1 year.

(14) AN INDIANA ROAD

operating daily 12 cars, (of which two-thirds are W. P. 50 and one-third G. E. 800, two-thirds E, and one-third K controllers, 10 single and 6 double equipments), employs 5 men on repairs, consisting of 1 armature winder, 1 helper, 1 on repair of trucks, 1 general mechanic and 1 night inspector. The monthly pay roll of these men is $235, making about $19 per car per month. Cars make 4,200 miles a month, so that maintenance labor is $.0046 per car mile. An inspection is made every night, and motors overhauled every month, at that time being given a general cleaning, and having worn parts replaced. The W. P. 50 armatures have an average life of about two years. The G. E. 800 armatures have not been in use long enough to determine their life.

(15) THE LAKE CITIES ELECTRIC RAILWAY,

of Michigan City, Ind., operates 2 cars, with single number 3 Westinghouse equipments. They are taken care of by one man. A detailed inspection is made every other night.

(16) CITY ELECTRIC RAILWAY, PORT HURON, MICH.

This road operates 8 motor cars, of which 6 are W. P. 30, with Thomson-Houston E controllers and 2 Westinghouse 12 A, with 28 D controllers. They are

taken care of by 4 men, of which 2 are winders, 1 a blacksmith and one a machinist. The pay roll is $188 a month, $23 per car, and $.0066 per car mile. Every night motors are wiped, brushes inspected, and any light repairs reported by the motorman are made. Once a month is a complete overhauling and cleaning. Brass axle bearings last 2 years.

(17) NIAGARA FALLS PARK AND RIVER RAILWAY.

This road operates twenty-five motor cars and sixteen trailers during six months of the year. The motors are W. P. 50 built by the Canadian General Electric Company with controllers of types E and K. Fifteen are single and ten double equipments, and they are kept in two barns. In all seven men are employed on the care of these, five working in the daytime. Of the day men two are road inspectors and three shop men, consisting of one machinist, one blacksmith and one shop inspector. These men also do armature winding and all electrical repairs. The pay roll is $310 per month or $12 per motor car per month or $.0048 per motor car mile, as cars average 2,500 miles. All cars are inspected as they go from the barn in the morning, and the inspectors on the road look after them once every trip. All cars are thoroughly overhauled once every six months. The motors are taken apart and looked over for weak places, commutators are turned down and all parts cleaned. The brass axle bearings have been in use two years (actual running time), ever since the road started, and are not worn out yet. Armature bearings of brass have also run two years without being worn out.

(18) THE BLOOMINGTON (ILL.) CITY RAILWAY

operates from nine to fourteen motor cars, according to the season. All are double equipments of modern design and are housed at one barn. Three men working daytime do practically all the inspection and repair work. There are enough cars in reserve so that little night work is necessary. Once a week all parts of a car are thoroughly inspected. A general overhauling occurs every six months, when all worn bearings, etc., are replaced. The average motor car mileage is 3,500 per month. Axle bearings which are of babbitt last six months. Armature bearings of the same material last one year. The road has been running three and one-half years without losing an armature, so no estimate can be made of their average life, and no armature wires have been broken. Gears last one year and pinions one and a half to two years.

(19) MARQUETTE CITY & PRESQUE ISLE RAILWAY.

C. Retallic, superintendent, reports his road as operating 3 Thomson-Houston S. R. G. 30 motors, with rheostatic control; all double equipments. The repair work is done by 1 man working during the day. The night watchman does some inspecting when he cleans the cars. The pay of this labor is $75 per month, making $25 per car per month. Overhauling takes place once a year, when all worn parts are replaced. Bell metal axle bearings last two years. Average life of armatures is four years. Gears and pinions last two years. No trouble from breaking of armature wires has been experienced in the six years the road has been in operation.

(20) THE GALESBURG (ILL.) ELECTRIC MOTOR & POWER COMPANY

operates 6 cars, 4 of which have double equipments of Westinghouse number 3 and two single equipments of the same, all with type D Westinghouse controllers. Three men take care of the car electrical equipment, of which 1 is an armature winder and repair man, 1 a blacksmith and 1 a night inspector and repair man. The pay roll of these men being $180 per month; the cost per car is $30. As motor cars average 4,300 miles per month, the cost per car mile is $.0069. Motors are inspected every night. They are also overhauled and thoroughly repaired every four to six months, when the armatures are taken out, boxes rebabbitted, and fields cleaned and varnished if necessary. Axle bearings which are magnolia metal usually last a year. The same material in the armature boxes lasts four to six months. Malleable iron gears last about two years. Steel pinions last two to two and one-half years, and rawhide one and one-half years.

(21) ITHACA (N. Y.) STREET RAILWAY.

In winter this road operates 8 motor cars and in summer 10 motor cars and 6 trailers. The total equipment is 10 cars of which 6 have W. P. 50 motors, 3 G. E. 800 and 1 Wightman. Two day men and two night men take care of these. Of the night men one does the car cleaning and general inspection and the other pays more attention to trucks, motors, brakes, etc. The pay of motor maintenance force is $175 per month, making $17.50 per motor car in summer and $22 in winter, which with the monthly mileage of 1,600 is $.0010 in summer and $.0013 in winter. Motors are inspected thoroughly every night and overhauled every 6 to 8 weeks.

(22) THE DELAWARE (O.) ELECTRIC STREET RAILWAY

operates 6 cars in summer and 5 in winter. The equipment consists of 4 double and 3 single Westinghouse Number 3 motors with type D controllers. The maintenance force consists of a blacksmith and helper and a night man, together with another who puts in part of his time doing electrical work, such as armature winding car wiring and commutator repairs. The blacksmith with a helper one half day attends to other repairs. The cost of labor for maintenance of trucks and electrical equipment is $82 per month, making $16 per car per month in winter and $13 in summer. Every morning the barn man leaves the barn with the cars and cleans the commutator and examines the bushes of each motor while running. Having seven cars, each car is left in the barn every third day and given a thorough inspection and repair as to adjustment of brakes, clearance of armature, gears and pinions, trucks and brush holders. A careful record is kept of the overhauling of each car and the weak points that were noted and remedied. In addition to the

repairs every third day a still more thorough overhauling is given every 4 months. At these times armatures are taken out, commutators turned down and armature and axle bearings renewed. The motor is cleaned inside and out with gasolene and painted inside with P. & B. varnish. The outside is painted with asphaltum varnish. Armature and axle bearings are renewed every 4 months during the overhauling. Gibson & Price motor metal is employed and after being used in armature bearings is put in axle bearings. Out of 13 armatures 4 were burned out the first year and one since, in the 3½ years of electrical operation. Gears and pinions both average 14 months.

(*To be Continued.*)

RESIDENTS WANT FARES RAISED.

The people of Bensonhurst, a suburb of Brooklyn, have occasioned some astonishment by petitioning the management of the Nassau Electric Railroad Company to raise the fare from five to ten cents. The reason assigned for this remarkable course is that the suburbanites desire to be less crowded and drive away the noisy Coney Island contingent. Secretary James C. Church, of the Nassau line, is quoted as saying:

"It is surprising what the five cent car fare has done. Last Sunday this company was paid for carrying 160,000 people and I believe that we did not get the fares for 15 per cent of those that used our cars. So great were the crowds that it was absolutely impossible to collect all the fares. One conductor collected 146 on one trip and he holds the record. Another with a load about equally as large rang up 42. He holds nothing, not even his position. We are buying cars just as fast as the makers can turn them out, but the more cars we have the more passengers there are to use them. I really believe that if on last Sunday the Coney Island cars had been running on ten seconds headway they would all have been filled."

LENGTHENED ITS OPEN CARS.

The Cleveland Electric Railway has just finished rebuilding at its own shops 50 old open cars, increasing them from seven to ten bench, and affording seats for 50 passengers or with standing load 110. The cars are all mounted on new Dupont trucks, which are very popular on this road and giving most excellent satisfaction. Double running boards have been put on, making entrance and exit much easier. The cars are attractive and shapely and not only present a fine appearance, but are much liked by the riding public.

The General Electric Company has removed the electric railway from Ottawa, Ill. The road was a losing venture and as none of the citizens of Ottawa wanted to pay more for the property than it is worth torn up and scrapped, it is being taken out.

HALF FARES

Interesting Bits of Information from all Parts of the Country, Boiled Down for Busy Readers.

The Rockford (Ill.) Traction Company has made the Union Aid Society a present of $150 in cash.

The Calumet Electric Railway of this city is putting up 10 miles of figure 8 trolley wire this season.

A mile in one minute and thirty-five seconds is the record made by the Lorain-Elyria, O., electric road.

The Cleveland Electric Railway will not lay its new track with hot riveted rail joints this year as reported.

John Peterson, an electrician on the Stillwater (Minn.) Electric Railway was killed by a shock when changing the brushes on a car.

A fire in the boiler room of the Metropolitan Traction Company's building at No. 9, Baxter street, New York, caused $4,000 damages.

The City & Suburban Railway of Baltimore will install more boosters for feeding long lines in its power house the coming season.

An alcoholic blow-lamp exploded May 11, at Hartford, Conn., badly burning two employes of the Hartford Street Railway Company.

One line of the Rochester, N. Y., Street Railway Company is reported to have carried 7,000 passengers to the base ball park on one day.

The Hardie compressed air motor will be tested on the One Hundred and Tenth street line of the Third Avenue Railroad Company, of New York.

The Buffalo & Niagara Falls Electric Railway Company has voluntarily increased the wages of conductors and motormen from 13 to 18 cents an hour.

Francis Lafferty, for some years general manager of the Hestonville, Mantua and Fairmount Street Railway, Philadelphia, died May 13, at his home in that city.

The Camden Horse Railroad distributed $500 in prizes to employes having no accidents during three months previous. Ninety-six received prizes averaging $5 each.

At a special meeting of stockholders held at Camden, N. J., May 2, the West Jersey, Camden & Atlantic, West Jersey & Atlantic, Philadelphia, Marlton & Medford, Alloway & Quinton and the Chelsea Branch railroad companies were merged into a single corporation, to be known as the West Jersey & Seashore Railroad

Company. The present directors are the former directors of the West Jersey. The capital of the new company is $8,000,000. The rolling stock will be renewed.

The car now being built by the Barney & Smith Car Company for the Wayne avenue line, Dayton, O., for gasoline motor power, is nearly completed, and will soon be tested.

The breaking of the crank pin bolts and blowing out of the engine cylinder head caused a lively time, but no injuries at the power house, of the Aurora, Ill., Street Railway, May 8.

The Claremont, Ferries & University Street Railway Company, of Berkeley, Cal., is preparing to substitute gasoline motors for the horses now used between East and West Berkeley.

The Ringing Rocks Electric Railway Company, Pottstown, Pa., has on its line a park noted for a deposit of large stones which, when struck by a hammer, produce a ringing musical tone.

The party car, belonging to the Consolidated Street Railway Company, Atlanta, Ga., is proving so popular as to be engaged for nearly every evening. It is decorated with 130 electric lights and with flowers and flags.

The first trolley party of the season in Kansas City was given by the Warwick Club on May 19, in the new cars of the Independence and Washington Park line. The cars have tables and a buffet which the company will stock.

Detectives riding free on the Atlanta street cars are required to fill out a slip bearing date and time of entering and leaving, the number of the car and the conductor, and the reading of the fare register at the time of leaving the car.

Governor Morton has signed the bill compelling elevated railroad companies in cities over 1,200,000 inhabitants to equip two-fifths of their cars with modern methods of lighting within two years and the remainder within three years.

The first trolley party of the season over the lines of the Baltimore Traction Company was given by ex-Governor Frank Brown, May 11. The party consisted of the pupils of the young ladies' school, at which his daughter is in attendance.

Patrick Flynn, a conductor on one of the New Orleans electric lines, was shot and almost instantly killed May 16, by Joseph Hasemann, a motorman on another car. Bad blood existed between the parties on account of an alleged insult offered to Flynn's wife by Hasemann.

F. H. Josslyn was, on May 7, appointed receiver for the Central Wisconsin Electric Railway of Oshkosh. The appointment grew out of an action brought by A. E. Thompson, H. B. Harshaw and J. C. Thompson, to recover a judgment of $148. Other creditors are C. E. Loss and F. A. Wachter.

The Buffalo, Tonawanda & Niagara Falls Electric Railway recently had its barn burned by an incendiary who proved to be a former employe of the company. The act was done while he was drunk and he afterwards confessed of his own accord. The company is inclined to deal leniently with him.

A well filled electric car in St. Louis took fire the other day and in their haste to escape several pretty young ladies created great enthusiasm among spectators by the graceful manner in which they jumped through the open windows, incidentally involving a rare exhibition of the celebrated St. Louis foot.

Hugh Smith, of Chicago, May 11 secured judgment against the Cicero & Proviso Street Railway Company for $100, as damages for killing a thoroughbred English pointer. The motorman did not ring the bell, and the difference between a live and dead dog of high degree was considered equal to the amount stated.

The end of the action brought by the District of Columbia against the Metropolitan Railroad Company, for reimbursement of amounts expended in repairing the tracks of that road with cobble stones, in accordance with the company's charter, has been reached in the payment by the company of $34,136.12 into the District treasury. The amount claimed was $315,000.00, and the total amount paid by the company is $65,740.47.

St. Louis conductors are noted for their urbanity, and one of the outward evidences of it is noticeable in their readiness to answer questions. One evening the cable on the Olive street line stopped for about half an hour, with the usual results of bunched cars, interested crowd and inquisitive old lady. She began her questions as usual.

"What made you so late getting here?"

"Well, you see," replied the gentlemanly conductor, as he rang up her fare, "I stopped to answer all the questions asked me."

A simple-minded Celestial, desiring to ride from Berkeley, Cal., into San Francisco, made a mistake and took a loop electric car instead of the steam railroad train. Making one circuit of the loop he made no effort to get off, and the conductor, supposing him charmed with the scenery, calmly collected another fare. This he did eight times, or until the conductor called a policeman and had him run in for the purpose of inquiring into his sanity. An interpreter soon straightened matters out, and Ah Chow went on his way. He apparently got his money's worth, and was better satisfied than was the tramp who once rode around the kite-shaped track at San Bernadino on the truck of a fast passenger train.

VITRIFIED CLAY RAIL INSULATORS.

Realizing that the wood blocks used for insulating its third rail must in course of time give way to the ravages of the weather, the Metropolitan Elevated Railroad, of this city, is experimenting with various forms of insulators to displace the wooden blocks when the time comes

VITRIFIED CLAY THIRD RAIL SUPPORT.

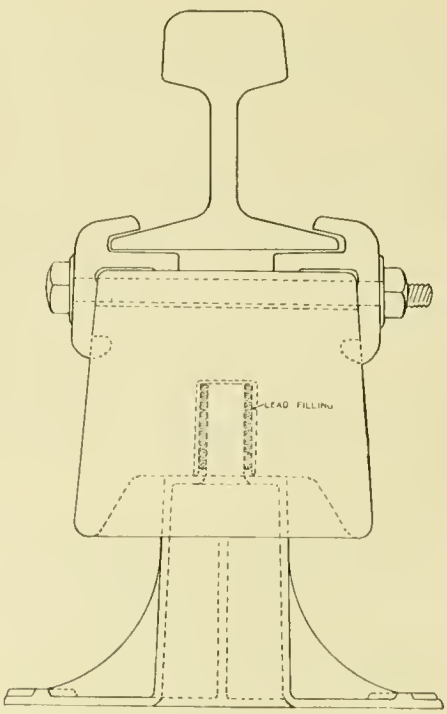
that the latter are no longer serviceable. The accompanying engraving shows one of the most promising forms. It is the design of P. Haley, a contractor who has done some work for the road. The insulating material is a large block of vitrified clay of the form indicated by the engravings and coated with a very hard smooth glaze, which is good to resist moisture. The material seems to be immensely strong and insulation tests of it show it to have as high an insulation resistance as porcelain. To make the iron supporting pin fit the insulator tightly, melted lead is poured around it. There seems to be no good reason why—if vitrified brick will serve as a paving block—this insulator should not have ample mechanical strength and the fact that it has a high insulation resistance makes the outlook for its success very promising.

PUBLISHER SUED FOR FIFTY THOUSAND DOLLARS.

The editor of the Electric Railway Gazette made a bad break when he editoralized at top of column, next reading matter, on the transmission of electric power from Niagara Falls to the Electrical Exposition in New York. Not satisfied with branding the most interesting performance as a "fake" he goes on to demonstrate mathematically to his own satisfaction why it is so. As the Gazette is published by the publishers of the Electrical World, the charge was a most surprising one, reflecting as it did upon the honor of gentlemen well known in electrical circles and at the head of the exposition. The Gazette not only has to now defend a libel suit for $50,000, but is placed in the humiliating position of having gone on record, in detail, as showing why and how an electrical problem was impossible, which has actually and with surprising ease and success been accomplished. The Gazette will have to send its editorial force to a night school and study "Johnston's First Rudiments in Publishing an Electrical Journal."

ANOTHER CASE OF "LEFT THE HANDLE ON."

A locomotive engineer who would attempt to start his train forward with the reverse lever back, would be considered a fit subject for an insane asylum, but if all the motormen who ever did that or who have left the front platform without taking the controller levers with them were to be collected together it would take a big asylum to hold them. A car of the Pennsylvania Traction Company run on the line between Lancaster and Lititz was partly wrecked the past month by carelessness in the two respects mentioned. The car was standing at the end of the line with the reverse handle on the



VITRIFIED CLAY THIRD RAIL SUPPORT—SECTION.

controller. A "jay" from the rural districts came along and boarded the car as a passenger, but as he passed the controller, stopped to play with the reverse lever. Mr. Motorman came along to start the car, failed to notice that the reverse lever (which he should have had with him) had been turned and crash went the car back into an old trailer used as a waiting room.

The returns are not all in yet by any means. Reports from every direction show the intense interest being taken by street railways in the matter of parks and pleasure resorts, and managers are using every effort to devise and study out new and popular attractions to offer their patrons. This feature of created travel is sweeping the country, and there can be no question it has come to stay. We have not begun to realize or appreciate its possibilities as yet, and we predict the improvements to be carried out, and the money to be invested in this branch of street railway work in the next two or three years will be astonishing. Already we know of not a few railway resorts where upwards of $100,000 has been spent in providing suitable amusements for the public. In some cases a separate organization, or stock company is formed to own and conduct the resort, but under the control and owned by the stockholders of the railway. In most cases the railway owns and operates the resort in its own name. The pleasure resort is widening the needs of the manager. He now has to post himself on a great variety of amusement matters, and know how to select such attractions and entertainments as will please his patrons. Our reports this month from many cities will be found full of suggestion, and aid the manager in planning and selecting what he will do. One thing is certain, every street railway should have something of the kind, and if worked out on practical, business, common sense principles cannot fail to be a big money earner. Trolley party and special car service will also be better than ever, this year, and much created travel be made in this way. There is no reason why most street railways cannot do all the Sunday-school picnic business in their cities, if they go at it early and right. Many secret societies and other organizations could also be induced to take an afternoon or evening out, if only the manager makes up a nice plan of arrangements, and possibly assists by furnishing the music, and presents the scheme properly. The progressive and successful manager is he who secures all the business possible, and it is business which uses the cars usually at an hour when they can best be spared, and business in which the expense is comparatively small. Again we say work it for every dollar there is in it.

REPORTS FROM RESORTS.

FT. WORTH, TEX.

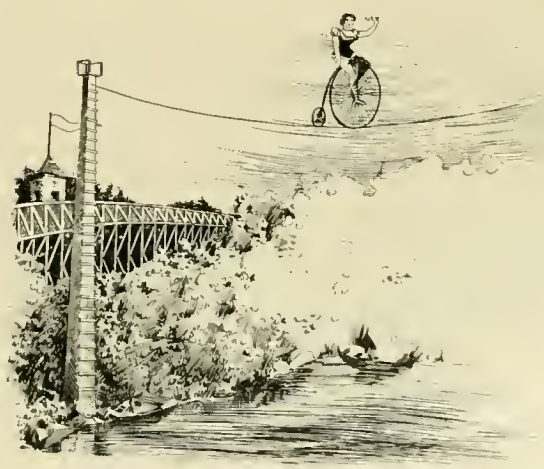
The Glenwood & Polytechnic College Street Railway Company is developing and improving the amusement resorts at Tyler's Lake and Arlington Heights Lake, near which its lines run. The grounds have been thoroughly equipped with electric lights, a large number of boats provided and the band stand rebuilt. A unique feature will be a floating pavilion for dancing. This is 40 by 65 feet and will be moored so as to float in the middle of the lake. Trolley parties will be made a specialty.

ST. LOUIS.

The street car lines of St. Louis have made preparations to go into the show business to a large extent. The city is well provided with resorts reached by the various lines, including Sportsmen's Park, Fair Grounds and Jockey Club, Forest Park, containing about 1,400 acres, Tower Grove Park, Shaw's Garden, and a number of picnic resorts, summer theatres and gardens. The plan of the companies is to each select a place which cannot be reached by other lines and devote special attention to the attractions there. The list of features includes concerts, minstrel shows, chutes, sham battles, etc., etc. The Southern Electric Railroad Company will advertise the attractions of the government reservation at the end of its line. This is an extensive tract, partially wooded, located high upon the banks of the Mississippi and is an ideal spot for church and school picnics.

CINCINNATI, O.

"The Lagoon," the popular summer outing place of Cincinnati, will be more attractive than ever this season, if earnest work and the expenditure of large sums of money by Manager Noonan carry any weight. One of



the principal attractions arranged for is suggested in the accompanying illustration. Two famous high wire artists have been engaged to perform their feats of

waltzing and bicycle riding on a wire stretched across the lake at a height of 90 feet. Spectacular performances will be given at the amphitheater, and vaudeville performances, a dog and monkey circus, chutes, electric launches, carousals, a band of Arabs and a cyclorama of the Monitor and Merrimac are some of the other features scheduled. A beautiful club house is in process of erection at the lake and its cuisine will be presided over by an experienced steward. The street railway service is in excellent condition for handling unlimited pleasure seekers.

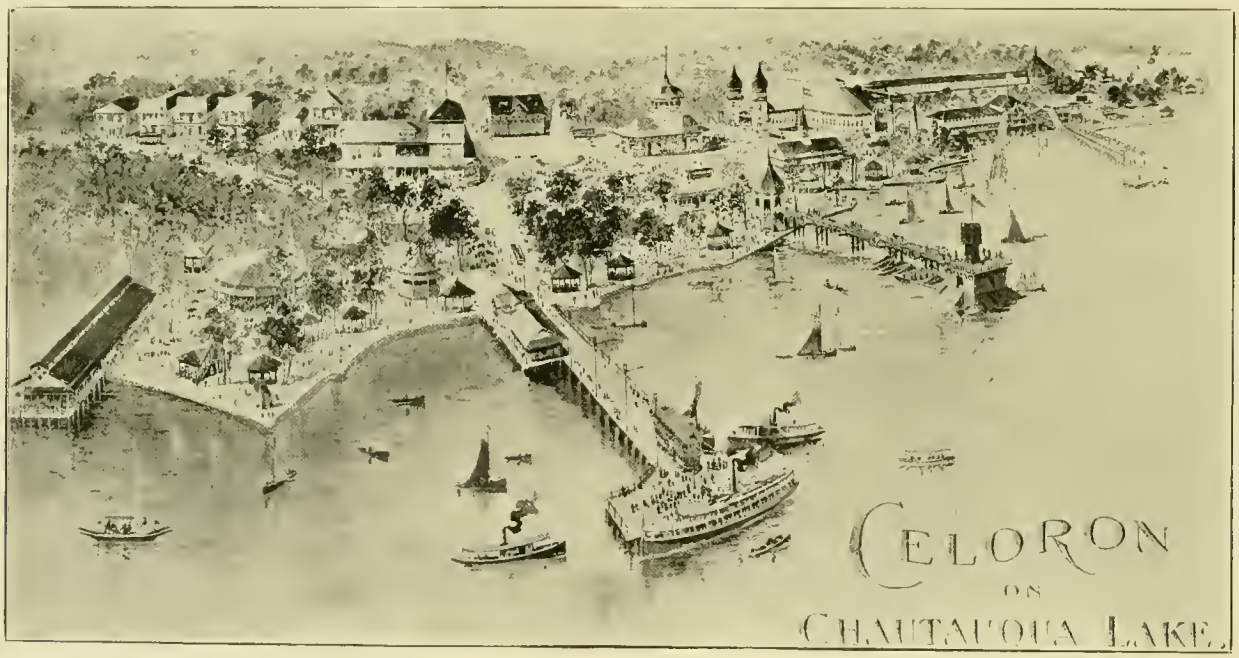
JAMESTOWN, N. Y.

Celeron Park, at Lake Chautauqua, is one of the most completely equipped resorts in the country. It is run in connection with the Jamestown Street Railway Company, through the courtesy of whose superintendent, Geo. E. Maltby, who is also general manager of the amusement company, we have received copies of the very attractive program provided for Memorial Day, May 30, as well as many particulars concerning the permanent amusement facilities.

In the first place, the situation is one of the most beautiful that can be imagined. Lake Chautauqua itself is almost universally known as having been by nature one of the most charming of the many beautiful lakes of western New York, and the hand of man, while in the act of improving, has done little to mar and much to enhance the attractions bestowed by nature. The sheet of water, clear as crystal, surrounded by hills whose deep green foliage, broken only by the lighter shaded green of grassy fields sloping to the water's edge, is thus furnished with a setting as fair as the gem itself. A delightful spot, if man had done nothing.

But, fortunately for street railways, every one is not fond of solitude and meditation, and amusements must be provided for those who wish to enjoy the beauties of nature jointly with the comforts and amusements to which they are accustomed under other conditions, and for those who could not, without such provision, enjoy either. There has therefore been established at Celeron an aggregation of amusement facilities which it would be difficult to surpass, and to these the enterprise of the management is constantly adding special attractions.

The pavilions and buildings for various purposes are very numerous. The dancing pavilion, spacious and well-lighted, overhangs the lake, whose cool breezes remove the one objection to summer dancing. The auditorium, especially arranged as a convention hall, with a seating capacity of 8,500, and the great serpentine rink, 850 feet in length, well arranged and equipped for roller skating, and the bathing pavilion, are among the larger buildings. The latter has 150 rooms, with male and female attendants, and has three toboggan slides leading into the lake. A mammoth electric fountain, similar to those seen at the World's Fair, affords amusement for those who enjoy dazzling effects and studies in color. There is a large merry-go-round, a tower over the lake, from which search-light exhibitions are given, bicycle course and ball grounds, bowling alley and shooting gallery, billiard and pool tables, ponies, row and sail boats, and a variety of other facilities for the amusement of young or old. Bear pits, monkey cages, a maze, phonographs, etc., are some of the minor features. The Fenton Guards band of twenty pieces gives concerts each afternoon and evening.



The Phoenix wheel, recently purchased from the management of the Atlanta Exposition, has been erected at the park, and was dedicated May 30, by the performance of a marriage ceremony at a height of 200 feet from the ground. The wheel is so located as to furnish an excellent bird's-eye view of Lake Chautauqua, and

will doubtless prove one of the greatest attractions of the resort.

Other special features provided for Decoration Day were the three Lorettas, who have an original combination flying trapeze act, which is performed at a height of sixty feet from the ground; a game of lacrosse between two clubs of Indians; and a concert by the Celeron Gold band of twenty-five pieces.

The accompanying illustrations present a fair idea of the general appearance of the grounds and surroundings, the Phoenix wheel and other features of general interest.

PITTSBURG.

The Second Avenue Traction Company has at Calhoun park an unusually attractive resort. A great variety of amusements have been provided, including swings, roller coasters, merry-go-rounds, dancing pavilions, and facilities for all kinds of recreations and sports. There is no limit to the capacity of the park.

BROOKLYN, N. Y.

The Brooklyn Heights Railroad Company has decided to build a large loop and a station at Bowery Bay for the accommodation of patrons of the amusement resort, which is being laid out there. A considerable water frontage in the form of a tract with lawn and groves will be provided with amusement facilities, a large amount of money being expended by the owner.

MERIDEN, CONN.

The Meriden Electric Railroad Company is now preparing to build a comfortable waiting room at Hanover park, for the exclusive use of women and children. It will be fitted up with toilet rooms and other conveniences. The season has already been opened and concerts are given by an orchestra in the casino at the park. The boats and carousel are well patronized.

TRUMBULL, O.

The Trumbull Electric Railroad Company has entered into a contract with R. H. Umbenhaur & Co., of Cleveland, to establish an amusement resort at Midway Place. The attractions will include a theater, balloon and parachute, ball games and fancy bicycle riding. No intoxicants will be sold.

THE PHOENIX WHEEL—CELERON PARK.

CHUTE AT ROCHESTER.

President John N. Beckley, of the Rochester Railway Company, and of the Irondequoit Railway Company, has recently contracted for the erection of a "chute" at Summerville, which is expected not only to prove a source of profit in itself but add materially to the earnings of the railway companies. The chute will be 250 feet long and 60 feet in height, built of steel. A company with a capital of $75,000 has been organized for its operation.

BAND STAND AND ELECTRIC FOUNTAIN—CELERON PARK.

PROMENADE AND GROVE—CELERON PARK.

BANGOR, ME.

The Bangor, Oldtown & Orono Electric Railroad Company is arranging for a park on Indian Island, Oldtown, of which the principal attraction will be a zoological garden. Contracts have been made for buffalo, moose, elk, deer and several specimens of bear. There will also be a pavilion for music and dancing and electric launches for river service.

NEW HAVEN, CONN.

The New Haven Street Railway has improved its resort at Lighthouse Point by the erection of several new pavilions and other extensive improvements are under consideration.

CLARKSVILLE, TENN.

The Clarksville Street Railway Company, Clarksville, Tenn., has improved its Porter's Bluff property with a great variety of shrubs and flowers and has made the place a beautiful resort during the heated season.

INDIANAPOLIS.

The Broad Ripple Electric Line, Indianapolis, opened its park May 3, with a grand military concert. The amusement and refreshment privileges are in competent hands and the desires of the public will be properly cared for.

A STARTLING FEAT.

The popularity of pleasure resorts easily reached by street railway lines has made the business of supplying attractions of as much importance as the work of a regular theatrical agency, and has produced a great number

BICYCLING ON A LIVE WIRE.

of specialists who have little difficulty in making a series of lucrative engagements for the summer months. One of the most unique performances arranged for this particular purpose is shown in the accompanying engraving. The artist is known to the amusement loving public as "Arion," and his most novel as well as attractive performance is riding a bicycle over a live wire ninety feet from the ground, and taking from it a sufficient amount of current to feed a large number of incandescent lamps which are arranged upon his person and upon the wheels and handle bar of his bicycle. As an evening performance this has proven one of the most attractive, especially for the reason that a beautiful electrical display is added to the feat, with all the elements of danger, which are always sure of a good crowd of onlookers. The repertoire also includes an act for advertising purposes, which consists in riding through the streets on the car tracks, taking for his illuminating power the current by which the cars are propelled. Some of the other feats which this daring performer has given in various cities are walking forward and backward over a live wire with the same electric light effects; carrying a man on his back across the wire; making up a bed with a mattress and pillows and apparently going to sleep; walking the wire in street costume with ordinary boots, and going through a variety of acrobatic performances. The bicycle feat, however, is by far the most novel and attractive.

The New Orleans Traction Company has extended its lines to the head of Canal street and will run its cars to the West End Park. A famous tight rope walker, a band, and numerous other attractions have been secured for the season.

The Atchison, Kans., Street Railway Company has two parks on its line, at each of which it will provide free amusements of the usual variety during the summer.

The Geneva, Waterloo, Seneca Falls & Cayuga Lake, N. Y., Traction Company, has had Cayuga Lake Park put in order for the summer season. Water has been introduced and the grounds thoroughly cleared up.

The Wilmington, Del., Street Railway Company has improved Shellpot Park, and contemplates the introduction of several cages of wild animals.

The Enterprise Railway Company, Charleston, S. C., is making Tuxedo Park popular as a Sunday resort, by carrying all persons free who wish to go to the park between the hours of three and four on Sunday afternoon. An excellent band of music has been secured and sacred concerts are given each Sunday. The park has been greatly improved recently.

The Duluth Street Railway Company will not run its pavilion this summer, but has made an arrangement with the city band, by which concerts will be given each evening during the summer and occasional attractions secured.

The Altoona & Logan Valley, Pa., Electric Railway, has erected at its Lake Mont park a summer theatre to seat 600 people.

The Jasper County, Mo., Electric Railway will furnish a good list of amusements at its Lake Side park during the summer.

The Schenectady, N. Y., Railway Company has recently bought the pleasure grounds known as Brandywine Park, situated at one end of its line, and is erecting a casino, pavilions, swings, etc. Boats will be provided and arrangements are being made to secure a good line of miscellaneous attractions.

General Manager Douglass, of the Schuylkill Valley Traction Company, has negotiated for the purchase of fifteen acres of meadow and wood land bordering on the Skippack, near Norristown, Pa. This will be fitted up with a pavilion, etc., and arrangements will be made to accommodate boating, dancing and fishing parties. The scenery along the river is very attractive, and the resort will undoubtedly be well patronized.

The city authorities of Kansas City having ordered the improvement of Budd Park, the Northeast Electric Railway Company has decided to furnish a band to play three times a week, including Sundays.

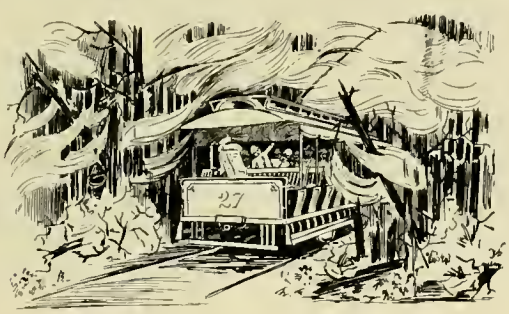
Herman Bergholtz and Deforest Van Vleet of Utica, N. Y., who are interested in the Cortland & Homer Traction Company are making arrangements for the erection of a dance hall and restaurant in the East Hill park at Cortland. The plans call for a building 70 by 100 feet and two stories in height,

The Jasper County, Mo., Electric Railway Company has opened the season at Midway Park, Webb City, with Sunday concerts by an Italian band. Fred Hinckley, of Joplin, is in charge of the park, and J. A. Wagner, of Coffeyville, Kans., has secured the refreshment privilege.

The Shamokin, Pa., Street Railway Company, is to have several fine attractions at Indian Park this summer, including trained pigs, contortionists, base ball games, etc., all of which President Marshall has already arranged for. Men are now engaged in fitting up the ball ground. The railway track has been extended nearly to the enclosure and a station will be built at the lake for the convenience of boating and fishing parties.

CAR RUNS THROUGH FIRE.

Employes and passengers on the electric line between North Billerica and Chelmsford, Mass., had an exciting experience a short time since in passing through a fire which was raging in the woods close by the line. The fire was upon both sides when a car from Reading for



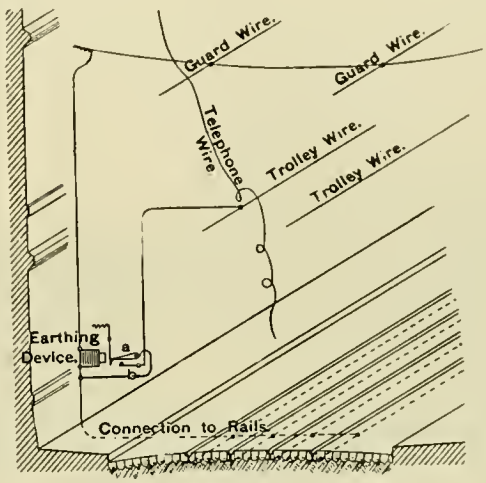
ELECTRIC CAR IN THE FIRE.

Lowell reached the place, and it was feared that it might cross the line in the rear and surround the car. After waiting an hour with no signs of relief the conductor got on his knees, the passengers crawled upon the floor and the car was put through. Burned faces and blistered paint were the only casualties.

ANOTHER GERMAN SAFETY DEVICE.

Much more attention is paid in Germany to safety devices in connection with the overhead work of electric railways than in this country. This, as we have explained before, is partly because the government has control of telephone and telegraph and is very rigid in its requirements. A substitute for guard wires employed to some extent in that country was shown in our April issue.

The device herewith illustrated has for its object the



AUTOMATIC GROUNDING DEVICE.

prevention of a live wire dangling in the street when it has fallen across both trolley and guard wire. The guard wire is grounded through the magnet of a grounding device which is arranged to permanently ground the trolley wire in case connection is made between guard and trolley wire, by the falling of a telephone wire. It will then be impossible to keep the circuit breaker in at the power house until the employes of the company go and remove the telephone wire and reset the earthing device.

STEAM ROAD BUYS TROLLEY LINE.

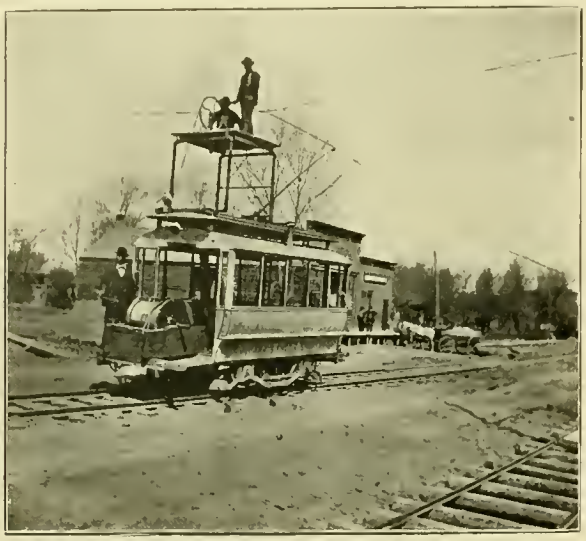
The Meriden, Waterbury & Connecticut River Railroad was sold May 18 to A. Heaton Robertson, of New Haven, for $180,000. It is said that the purchase was made on behalf of the "Consolidated." The property includes thirty miles of road and all the appurtenances for its operation. The sale was made pursuant to an order of the Superior Court in a foreclosure suit under a mortgage to secure the bondholders. The road runs from Cromwell through Middletown, Meriden, Cheshire and Prospect, to Waterbury. It is supposed that the line will be equipped to run by electricity.

A NEW MEANNESS.

A new method of getting back at a street railway company by discharged employes has developed at Clifton, N. J., on the lines of the New Jersey Electric Railway Company. On the morning of May 1, three trolley poles were found sawed off and lying across the track. It is supposed the work was done by men recently discharged for "knocking down" fares.

STRINGING LIVE TROLLEY WIRE.

Furnishing the power to string a trolley wire, through the trolley wire itself, is something of a novelty, but that is what was done by the Sioux City Traction Company under the direction of Superintendent I. B. Walker, when building its new line from Covington to South Sioux City. How this was done is best explained by the picture. An



STRINGING LIVE TROLLEY WIRE—SIOUX CITY.

old construction car had a reel of wire put on the front platform and a sheave over which it could run placed on the roof. The controller stand is just behind the end of the spool at the left hand of the man on the front platform. With this outfit 1½ miles of wire was strung in half a day with the crew shown. It is surely a rapid and labor saving method. In building this extension, all the rails and ties were hauled as far as possible on the company's electric construction car and in future all new work will be done in this way.

A POWERFUL PLANT.

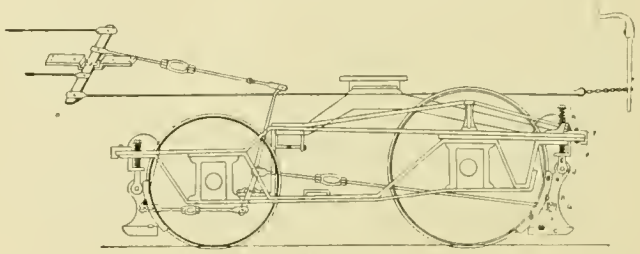
Developments are being made at Pittsford, Vt., which promise the most powerful electric plant in the state. The water is brought from Chittenden through a 40-inch steel penstock, and will run two wheels which are expected to furnish 2,000-horse-power to run the electric roads of Rutland and from Rutland to Pittsford and possibly to Brandon. The head of water at the power house is about 800 feet.

GETTING RID OF CURVES.

The electric lines in and around Pittsburg are preparing plans for the elimination of curves. The Pleasant Valley and the Carnegie companies will, during the present summer, change the position of their tracks so as to do away with their worst curves, which not only compel slow running but cause severe wear on the rolling stock. It would, perhaps, be well if companies would learn the economy of building right in the first place.

THE DEVLIN POWER BRAKE.

The accompanying illustration represents a new form of brake for street car use which is designed to combine the functions of a wheel and track brake. The device is owned and operated by the Devlin Power Brake Company, of Memphis, Tenn. To the brake-head casting A, is attached a wheel shoe B, with a



DEVLIN BRAKE.

groove into which the casting fits, and to the lower edge of the casting is keyed the rail shoe C. The casting A is carried in a clevis, E, which is supported from a bracket secured to the truck frame by a rod having a surrounding spiral spring resting upon the bracket. In operation, when the shoe is drawn against the wheel, the friction causes the spring to yield and, if the pressure is sufficient, brings the track shoe into contact with the rail. The length of this shoe being eight or ten inches the combined friction of the two shoes furnishes a very great retarding force. It is claimed that with this device a car running at full speed can be stopped without reversing in twenty feet, and that the brake shoe

TRACK CONSTRUCTION AT SIOUX CITY.

operates as a wheel fender. It is also stated as a remarkable fact that the brake in use upon a car of the Lindell Railway whose wheels were previously flattened, in thirty-five days restored the wheels to their original circular form.

It is to be understood that the rail shoe is depressed to the rail only in case of emergency.

ACETYLENE GAS FOR STREET CARS.

The Street Railway Company of Paris and the department of the Seine, France, upon the initiative of its general manager, Mr. Broca, has experimented with acetylene gas as a means of lighting the cars. The experiments were made upon one of the cars running between the Madeleine and Gennevilliers.

The installation, invented by Messrs Letang & Serpollet, consisted of a generator for the acetylene gas, the pipes for carrying the gas and the burners placed in the original lamps, in the interior of the car and on the platform.

The details of the arrangement, for which we are indebted to "La Nature" are as follows: The generator is placed on the rear platform, under the staircase by which passengers get to the roof; notwithstanding its small size it can produce more than a cubic meter of acetylene without being recharged. As the co-efficient of luminosity of acetylene, according to the most recent photometric tests, is about fifteen times greater than that of ordinary gas, it may be seen that the generator, which when ready to work weighs only 26½ pounds, can nevertheless furnish a considerable quantity of light. The gas is produced by the reaction, originally discovered by Verneuil and now so well known, of water and calcium carbide. By a special arrangement of the parts of the apparatus the gas is produced in exact proportion to the consumption. This is done under a pressure of not more than 13 centimeters (5.1 inches of water.) An arrangement of baffles neutralises the effects of shaking and jarring to which the apparatus is subject.

The gas pipes are connected to the generator by a hydraulic joint and the whole is sufficiently enclosed, so as not to allow the least odor to escape. The burner is a common fish-tail gas burner of small size, fixed on a porcelain candle, but as the burner of the rear lamp only needs to give a very small light, there is a contrivance for admitting air, so that only 4 liters (244 cubic inches) of gas are consumed per hour.

The car is so well lighted that a newspaper may be read with ease in any of the seats. For this it is necessary that the candle-power of the central burner should be at least equal to six carcels. It can, if required, be doubled at any moment.

It is not possible to determine, upon an experiment of such short duration, what the exact daily consumption of calcium carbide would be for lighting cars during the whole of their night service, but we have enough data to know that the expense will be less than when lighting with kerosene and a great economy will result from the substitution of the new acetylene system for electric lighting.

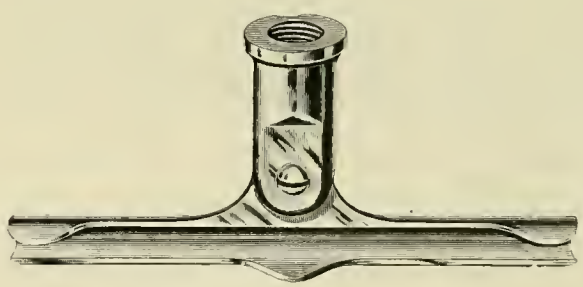
The lighting of the trial car has been done in this way, regularly every night since the 27th of February, without any interruption or the slightest accident happening. This regularity of working and the excellence of the light should be attributed to the steadiness of the production and the pressure. The absence of a reserve of gas and the extremely small pressure, only 5 inches of water, which it has to sustain, eliminate all danger of explosion or of fire.

The recharging of the generator is very simple and as the lime water resulting from the decomposition of the calcium carbide is not caustic there is absolutely no danger.

The storage batteries, which, up to the present, have supplied the light and which are certainly of the most improved kind, do not possess these advantages, for their total weight is 275 pounds and the sulphuric acid contained in the cells is often spilled during the troublesome operation of taking them out or replacing them.

CENTRAL ELECTRIC MECHANICAL CLIP.

A railway man said recently that there were more mechanical clips on the market than you could "shake a stick at." We guess that this is so, but it does not seem an undesirable condition, as one is able to choose from the many patterns something that will suit his particular fancy or needs. The aim, of course, in all of these various designs has been to improve upon the previous patterns. One of the latest efforts in this direction is made by the railway department of the Central Electric Company, and is shown in the accompanying illustration of the "Central" flexible mechanical clip. They are made in 7-inch and 15-inch lengths, either flexible or rigid, to fit ⅝-inch or 7-16-inch studs. They



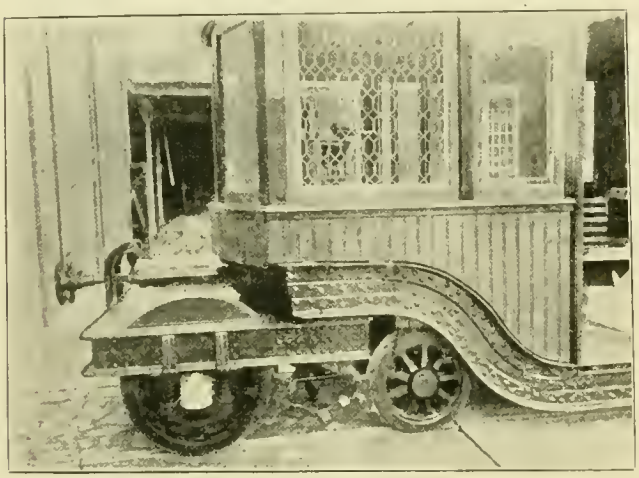
CENTRAL ELECTRIC MECHANICAL CLIP.

are very quickly placed in position. The intention is to overcome the objectionable features of rigid construction and permit expansion and contraction of the trolley wire without drawing the clip out of line so that it would offer an obstruction to the trolley wheel which would cause pounding. The "Central" clip is nearly straight underrunning. The groove for this clip has a small incline from the end toward the center, not sufficient to kink the wire, but just enough to prevent the hanger from crawling. It can be placed in position without the removal of screws or the use of special tools. The rigid clip is intended for curve work. New designs of trolley wire known as figure 8 and triple section are receiving considerable attention from railway builders. The Central Electric Company is preparing a special line of overhead material designed to be used in connection with this new wire.

UNDERGROUND RAILWAY AT BUDAPEST.

The London Electrical Review has the following account of this interesting road:

This line has been constructed under the residential streets of Budapest. The whole track had to be done on the cut and cover system. The line is double track throughout, and will be opened for traffic, it is believed, next month. The stations are only 1,300 feet apart, and it is intended to run the cars at a maximum speed of 24 miles an hour. A novel system of speed regulation has been adopted, the object of which is to do away with the necessity for any intelligence on the part of the motorman. The motorman can only cut the motors in and out, but cannot regulate their speed, this being done automatically. A solenoid is connected to the brush terminals of the motor on the car, and as the counter electro-motive force increases, so does the magnetism of the solenoid. The device is extremely ingenious, and



END OF MOTOR CAR, BUDAPEST UNDERGROUND ROAD.

it can be regulated in such a way as to practically fix the distance in which the car will attain its maximum speed. Electric brakes are also used, similar to the Sperry brake now adopted by the General Electric, of America. There are two motors on each car, they also being used for braking by short-circuiting them, and making them work as generators The height of the tunnel from the top of the rail is 9.3 feet; the tunnel could not be made any higher, as otherwise it would have been lower than the level of the Danube, and that would have increased the expense of construction enormously. The cars have been specially built; each car is mounted on two bogies, and inside they are exceedingly handsome, and look more like the saloon of a yacht than a tram car. There are twenty-nine seats, and there is room for fifteen to stand up. The total weight of a car when empty is twelve tons. One 50-horse-power motor is mounted on each truck. The line was built and equipped by Messrs. Siemens & Halske, of Berlin. The current is taken from an overhead conductor, which is fixed to the roof of the tunnel by means of cast-iron shoes. The tunnels and the stations are all lined with glazed tiles. The line was constructed with the object of connecting the system of tramways which encircles Budapest with the center of the city. Tramways were not possible, as the town authorities would not allow any rails to be laid down along the streets of the residential quarters through which this line would have had to pass.

THE OPERATION OF A SMALL ROAD.

G. T. Kearsley, superintendent of the Radford (Va.) Street Railway, writes us something on the operation of a small road "what's really small," and very interesting reading it is, too.

"We have but one car, with two number 12 Westinghouse motors. One man repairs track during the day, but cleans, inspects and oils car before 8 a. m., makes any ordinary repairs and reports. This labor on car amounts to $11.66 per month, of which $6.66 is for experienced help. The car makes 5,000 miles each month, and repairs over pit are done at night; cost per car mile, $.002. As to life of armatures, they have operated two years without trouble except by accident. Repairs are made only when necessary. I might add, we operate every day on a monthly pay roll of $51.66 for all labor, operating and attention to car, and give half hour service on a three-mile road."

HARTSHORN ROLLERS.

The Stewart-Hartshorn Company, manufacturer of the well-known Hartshorn shade rollers, has just issued a little pamphlet containing cuts and descriptions of a variety of rollers and fixtures, and a brief statement of the sizes which should be used for different purposes. The proper manner of mounting them so as to secure the best results is explained. The fixtures cover a great variety of patterns for special conditions, so as to insure the perfect running of the roller. The Hartshorn roller is so well known as the standard for railway car use that it is unnecessary to enter into any description.

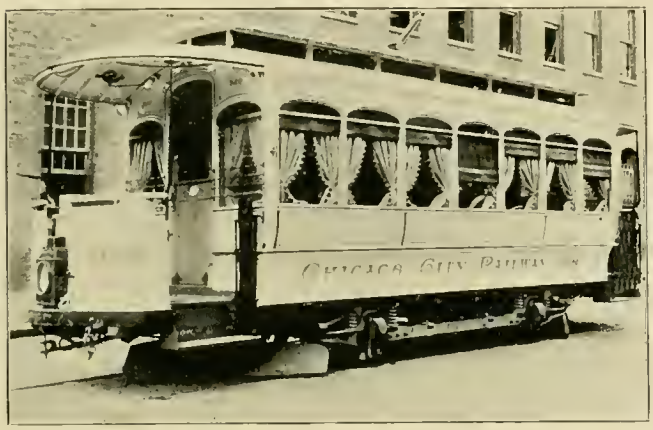
STORAGE BATTERIES FOR PRESSURE EQUALIZERS.

The Union Traction Company, of Philadelphia, is about to try an experiment with storage batteries for maintaining pressure on its Chestnut Hill line.

There is a long hill near the terminus of this line; it is far from the power station and the maximum demand is far above the average. This combination of circumstances led the Traction Company to believe that perhaps a storage battery near the hill taking current from the line when the load is light and discharging when it is heavy would be the best thing for keeping up the potential on the hill. Accordingly a small building is being erected and a set of batteries will be put therein. Both the Union Traction Company and the Electric Storage Battery Company which furnishes the batteries, evidently consider the installation as somewhat of an experiment as the plans are being kept quiet.

NICE TROLLEY CAR.

The trolley car for parties which the Chicago City Railway Company dedicated May 19, is one of the finest cars which has ever been put upon the road for the benefit of pleasure seeking companies. The car was designed and built by the company and is a model of its kind. It is finished in costly woods, and the windows and doors are covered with heavy portieres of exquisite workmanship. The ceiling is decorated in relief and lighted up with numerous incandescent lights. The seats are simply easy chairs, movable at will, and creature



CHICAGO CITY RAILWAY'S PARTY CAR.

comforts are cared for and kept fresh by an ice-water tank and refrigerator on the rear platform. The initial trip, in charge of Superintendent Bowen, was an enjoyable affair in every way and was participated in by a number of Chicago street railroad men.

The company has issued a circular containing a fine

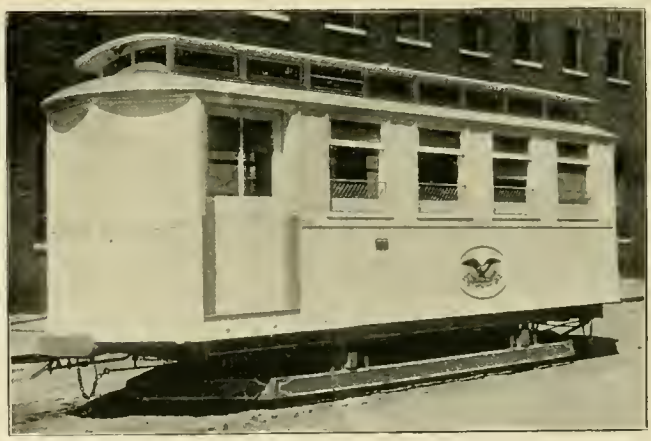
INTERIOR OF TROLLEY PARTY CAR.

engraving of the interior of the car and giving a schedule of prices for parties. As these are a matter of general interest, they are reproduced as follows: Electric cars for picnic parties, each car, one way, $3.50; round trip, $6.50. For trolley and theatre parties, round trip not exceeding thirty miles, palace motor car, $18.00; with trailer, $25.00; common motor car, $10.00; with trailer, $15.00. Cable cars are furnished for picnic parties at a charge of $2.00 for grip car for special train one way, and $3.50 for round trip. For each coach attached to regular or special train there is a charge of $3.50 one way and $6.50 for round trip. Horse cars may be chartered to run between points not exceeding five miles at $4.00 for one way and $7.00 for round trip, with an additional charge of seventy-five cents for each mile or fraction thereof. In the case of electric cars for parties, stopovers may be made at convenient points not to exceed a total of three hours.

The same company has just constructed a convenient and fine appearing mail car, as shown in the accompanying illustration from photograph.

ELECTRIC LIGHT FOR CONSTRUCTION.

The City & Suburban Railway, of Baltimore, uses for night construction a portable cluster of incandescent lamps. This is hung on the trolley wire wherever it is wanted, and of course it is an easy matter to get a ground with a rod anywhere along the track. Where



CHICAGO CITY RAILWAY MAIL CAR.

much work is done a number can be used. They are much more convenient than oil lamps. It need hardly be said that whoever has the placing and changing of these clusters should be warned never to make or break a ground connection when the cluster is hanging on the wire. Failure to do this is almost sure to result in a heavy shock.

The Northwestern Elevated Railroad Company, of Chicago, is buying its pine ties in the south and having them shipped to New York for treatment.

The quarterly report of the Brooklyn Elevated Railroad Company, covering the year up to March 31, shows a falling off in net income of $97,000 as compared with the corresponding period a year ago. The trolley lines are apparently responsible.

McLEAN GOES TO MEXICO.

By the time this magazine reaches its readers our good friend Thomas H. McLean will have become a Mexican in good and regular standing, and will have adorned himself with a sombrero and, we fear, a cigarette. Mr. McLean left on May 28 to become chairman of the board of directors—which is equivalent to the presidency—and general manager of the District Railway Company of the City of Mexico. The company is the newly completed consolidation of the lines in the City of Mexico purchased by a syndicate of of English capitalists. When the buyers had contracted for the various roads they at once set about securing the right man to conduct the property and called Mr. McLean to England, where he was given full charge.

THOMAS H. MCLEAN.

The Mexico system includes some 150 miles of track; 4,000 mules; 300 cars, first, second and third class, with a corresponding difference in fares. The three cars, one of each class are usually run close together, though each carries its own crew and team As previously illustrated in these columns the funeral car service constitutes a big business in itself, there being twenty-one such cars. Chartered cars are also largely used for social purposes. The new syndicate takes possession July 1, and what will be of great interest is the announcement that the conversion of the road to a first-class trolley system will be effected as soon as possible. This will involve an entire relaying of tracks and the purchase of trucks and bodies for all motor cars. Much of the present rolling stock will be suitable for trailers.

Mr. McLean's very numerous friends will learn with pleasure of his election, and that the position is a highly remunerative one, and will join the REVIEW in wishing him every possible success in the land of the Montezumas.

Mr. McLean is a native of Albany, N. Y., at which place he gained his first experience in street railroading between 1875 and 1877, between the ages of 20 and 23. He then went to the Twenty-third Street Railway Company of New York as receiver, being subsequently book keeper and acting secretary. In 1882 he was elected secretary and general manager. In 1892 he was promoted to the place of general manager of all the lines under the control of the Houston, West Street & Pavonia Ferry Railroad. In 1894 he took charge of the Citizens' Railroad of Indianapolis. He has always been noted as a successful manager of men, and we trust that the reputation will be kept up now that his employes are Mexican instead of American citizens, and that serious labor troubles will be as infrequent as formerly.

THE WHEREFORE OF THE WHY.

Because the conductor of the rear trailer rang the bell before two of the young women had climbed into the open car, says the Chicago Record, the man on the smokers' seat felt called upon to say a few sharp words about undue haste and criminal carelessness.

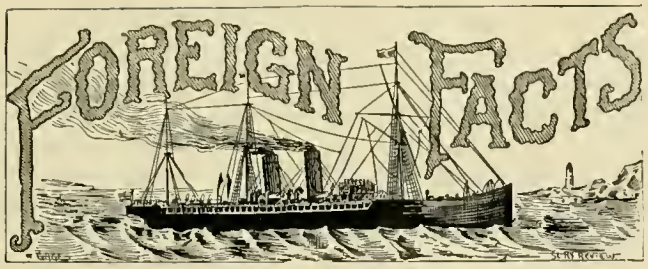
The nickel collector listened with patience, and then said:

"Why, bless you, I only rang the bell to make them girls make up their minds. I kept my hand on the bell-cord, and if I had seen that they were likely to get hurt I would have rung to stop. You see, a woman does not seem to know when her mind's made up. Now, those three girls started to get aboard. The first one climbed on all right, and the second one started to follow her. The third one took the next space. But the second girl changed her mind while her foot was on the running board, and she stepped back to try another opening. That rattled the third girl and she followed suit. Then they both got mixed on their dates and concluded to try a new deal, and one started one way and one another. Then I rang the bell and they both jumped aboard as quick as a flash. If I had let them alone they would have been dodging around yet. I've seen a woman try five seats in an open car before she settled down, and if we were to let every woman who wants a ride loaf around while she made up her mind which end of the car to take, we would not make three trips a day."

WORKING UP EXCURSIONS.

We are in receipt of a publication entitled "Picturesque Binghamton," which reflects great credit and shows great enterprise on the part of the Binghamton Railroad, which is its publisher. It was printed with the object of attracting excursion business from the surrounding towns, and it contains a very attractive account of the things of interest and beauty in and around the city, not omitting the magnificent parks or the street railway facilities. The paper consists of twenty pages about the size of the STREET RAILWAY REVIEW, and the engravings are all half tones from excellent photographs printed on good paper for the purpose, a fact that is of no little importance in attracting excursion business and picnic parties from other towns. Binghampton is well located, both as to railroad facilities and natural beauties, to get much of this business. The publication costs the street railway but little if anything, because of the income which is derived from the advertisements of local merchants, and General Manager J. P. E. Clark is to be commended for his enterprise.

The reports of the New Haven street railway companies for the month of April make a very satisfactory showing of gross earnings as compared with the same month last year and March of this year. The increase in the case of each line is from $2,000 to $4,500.



The city of Bolton, Eng., will expend $50,000 on the equipment of the Doubhill lines with the overhead system.

Generators, engines, boilers, etc., are being advertised for by the Leeds, Eng., municipality, to be used in the electric railway experiment.

Rouen, France, will soon have a second electric railway. A. M. Requier, representing the company, is now in New York, purchasing the equipment.

Hamburg, Germany, with 360 motor cars, has the largest electric railway system in Europe. The capital stock is $3,700,000, and indebtedness $2,400,000.

An overhead trolley railway at Hartlepool, Eng., has been completed by the Wolverhampton Electric Construction Company. The delighted public is giving the company a large patronage. The distance between the two Hartlepools, 2 miles, is covered in less than fifteen minutes.

Douglas, Isle of Man, has completed the Southern Electric Tramway, 2½ miles in length, making a system 14 miles long, on the Manx coast. No tour of Great Britain is complete without a visit to these wild and picturesque shores. The new road's revenue will be derived chiefly from pleasure seekers.

Birmingham, Eng., will have but one street railway company if the proposed consolidation is effected. The plan is to abandon horses and steam engines for electricity, at a cost of $5,000,000. The Central Tramway Company favors the project, but the Aston Tramway Company, the Midland Tramway Company and the South Staffordshire Company, have held aloof.

GLASGOW, SCOTLAND, FAVORS THE TROLLEY.

The report of the special street railway committee of the Glasgow, Scotland, municipality, is a strong indorsement of the electric railway and especially the overhead trolley. Councilman Crawford and General Manager John Young, of the street railway, traveled over all Europe to gain information. Among the towns visited were Brussels, Hanover, Hamburg, Berlin, Dresden, Budapest, Vienna, Milan, Genoa, Paris and Rouen.

Gas traction is declared to be unsatisfactory, by the committee, which says, "The Luhrig gas motor cars seem to be quite successful as regards cost of working, but the smoke and smell and generally unsatisfactory appearance of the whole turnout, not to speak of the vibration, would in our opinion render them unacceptable to the Glasgow citizens."

Compressed air fares no better at the hands of the committee: "With regard to the compressed air motor cars, (Paris) it is evident they are not a success. Apart from their being very expensive to work, their appearance is against them; and the fact that the motor car alone, when empty, weighs 22 tons, is enough of itself to put the system out of consideration. Nor do we consider the steam cars on the Serpollet system, which run from the Madeleine out to distant suburbs, or any of the other steam cars we saw, are at all suitable for our streets."

Storage batteries are rejected as being costly and cumbersome. Underground electric conduit systems are objected to on the score of great first cost, probable stoppage by water and dirt and the width of the slot. Respecting the overhead trolley system as employed in eighty towns in Europe and in all American cities the committee says:

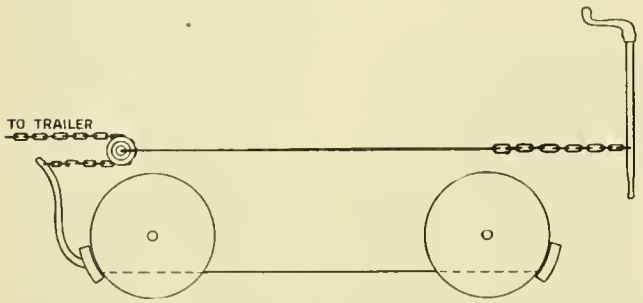
"Our observation leads us unhesitatingly to say that the overhead system can be extended over all existing tramway routes in Glasgow without any disadvantage. The one great and practically the only serious objection urged against the overhead wires is the objection to their appearance. This is the only reason why the system has not been adopted throughout in such cities as Budapest, the objection being to make a change in the general aspect of their much loved city. We started our investigations more or less in sympathy with this objection; but we are bound to say that what we have now seen has quite removed from our minds any objection to the overhead wires. Where the system is carried out in the most approved manner, we found that the wires give only the very slightest offence to the eye, and that a few hours' familiarity removed the objection entirely."

WATERLOO AND CITY RAILWAY, LONDON.

The necessity for some better means of communication between the "city" and Waterloo station, London, has been so long apparent that residents of that city are greatly interested in the progress of the new underground road now in process of construction between those points. The distance is but a mile and a half, but the time now required is almost equal to that necessary for a trip to Brighton on the south coast. The line crosses under the river in an oblique direction near Blackfriars bridge. Construction was begun from two caissons sunk in the river to the depth of 76 feet, the tunnels running in each direction therefrom, the reason for selecting this point being the greater ease of bringing and removing material in barges. The road will be operated electrically. It is expected that the work will be completed in about two years.

TRAILER CONNECTIONS FOR COMMON HAND BRAKES.

The Chicago City Railway has adopted the rather novel practice of connecting its trailer brakes to the motor car brakes so that both motor and trailer brakes are operated by the motorman's hand brake. It is very common to connect trailer brakes to be operated from the forward car when friction brakes are used, as on cable, and recently on a few electric cars, but this plan has never been tried to any extent with the plain hand



TRAILER BRAKE CONNECTIONS CHICAGO CITY RAILWAY.

brake. A diagram of the Chicago City Railway's arrangement is shown herewith, the trucks being McGuire. On the rear end of the rod to which the brake staff chain is attached is a pulley. Around this pulley runs a chain, one end of which is attached to the trailer brake connection and the other to the lever of the motor car brake. This of course equalizes the pull between motor and trailer. When the trailer is not in use it is of course necessary to hook the trailer connecnection to a ring under the motor car platform, otherwise the brake would be inoperative.

A PROSPEROUS BENEFICIARY ORGANIZATION.

It should be gratifying to those who are interested in the inauguration of beneficiary organizations among railway employes, to note the success that has attended those which have been in operation long enough to have passed the experimental stage. A particularly satisfactory showing is that made by the Pleasant Valley Beneficial Society, of Allegheny, Pa., which has been in existence since May, 1893. Another feature in which the officers feel especial pride is the fact that the society is absolutely self-supporting, the initiation fees and dues being the only source of revenue, since no assessments have ever been levied.

The society is composed entirely of employes and ex-employes of the Federal Street and Pleasant Valley Passenger Railway Company, and the scheme of the organization contemplates the payment of both a stated sum per week to members in case of sickness or injury, and a stated sum to beneficiaries in case of death.

Notwithstanding the fact that the organization has been supported entirely upon admission fees and regular dues, both these taxes are exceedingly light, the initiation fee being fifty cents, and the dues ten cents per week. Upon admission to the society the member signs an order upon the treasurer of the street railway company by which he is employed, requesting the payment to the treasurer of the society of the amount of his admission fee, and of the sum of ten cents weekly until notified in writing to discontinue the payment. There is, however, a provision in the by-laws for the levying of assessments for funeral expenses or death benefits, if the condition of the treasury is such that it cannot otherwise be paid. In this case the amount required is not deducted from the wages of the member, but collected from him directly. As before stated, this contingency has never arisen. A relief committee of one member under pay is appointed to visit, and report upon the condition of any disabled member as often as his condition may require. The weekly benefits are $5, and the death benefit $100, no sick benefit being paid during the first week's sickness, or for a longer period than twelve weeks. Nor is any member entitled to benefits until three months after his admission

The statement of the treasurer, covering up to December 31, 1895, shows that there has been received the sum of $3,904, of which $3,304 was obtained from dues and initiation fees, the balance being the receipts from entertainments, trolley parties, etc. The total amount paid in sick and death benefits was $2,975, of which $599 was paid in death claims. The expenses, aside from these beneficiary expenses, were very small —the total amount from organization to date of report, being only $227, or less than $100 per year. The society now finds itself in a flattering condition, with all claims paid and $701 balance in the treasury. Of this amount $500 has been deposited at interest at 4 per cent.

Organizations of this nature are of so much value to those upon whom the railway companies must rely to keep the wheels moving, and the trolley on the wire, that both the companies and the employes are subject to congratulation upon this unmistakable evidence that they can be conducted on a business basis with financially satisfactory results. One important point which is well illustrated in the present instance is the very small expense at which the work can be carried on aside from the sums which are in the nature of direct benefit. For this credit should be given to the officers, who are as follows: Theo. Stripeke, president; Geo. E. Fry, secretary; Wm. Hageman, treasurer, and James A. Connell, relief committee. As an indication that the record already given is not necessarily an exceptional one, it may be stated that at the present time the treasurer reports a balance in cash in hand of a little over $1,000.

The Staten Island Electric Railroad Company, after much delay, has at last begun to run its cars across the tracks of the Staten Island Rapid Transit Company at Clifton, making its road continuous from Port Richmond nearly to South Beach.

LIFE OF RAILS UNDER ELECTRIC SERVICE.

II.

Continuing our reports from page 253 of our April issue we learn from W. A. Smith, general manager of the Omaha Street Railway, that some 45 and 58½-pound girder rail has been worn out on that road after seven years of electric service. The number of cars over the track daily was 175, the weight of motor cars being from 11,000 to 13,000 pounds and that of trailers 4,000 pounds.

The track was laid on oak ties with crushed stone ballast, suspended joints. Ties were 2½ feet between centers. The streets were both business and residence and were paved, but teaming on the tracks was not heavy.

NASHVILLE STREET RAILWAY.

E. G. Connette, general manager, says: "The question of depreciation of track depends upon the tonnage which passes over it, provided the joints are properly and amply bonded to prevent electrolysis. We have found in places where the bonds were broken or weak that the base and web of rails had suffered from the arcing. Outside of this I do not believe that electric service is any more severe than any other service, tonnage only causing wear and tear."

Mr. Connette's road has not worn out any rail as yet in electric service.

CHICAGO.

None of the electric lines in Chicago have been in operation long enough yet to really wear out any rails. The experience of the cable lines may be of some value however.

The last cable rail taken up by the Chicago City Railway was the 63-pound girder which had been down from eight to nine years. This rail was literally worn out so that the flanges rode on the tram of the rail in many places. In the new section, however, the tram was only one inch below the head of the rail. The service over this track consisted of cable trains of from two to four cars running on about one minute headway. During the World's Fair this headway was at times forty-five seconds, while at other times and during the evening it would be more than one minute. This rail would have lasted longer were it not that the chairs were of a form which allowed the rails to spread.

The North Chicago Street Railroad laid its cable lines in 1886, and the greater portion of this track was relaid in 1893. This rail was 68-pound girder. The main trouble was with the joints, although it was fairly well worn out otherwise. The traffic consisted of cable trains of two to four cars on forty-five seconds to two minutes headway.

CONCLUSION.

We do not claim that our inquiries were drawn up in a very scientific manner, or that any general conclusion can be arrived at from the reports received. With the information that managers are able to furnish us it is impossible to tell anywhere near the exact tonnage that has passed over a rail, and without such information the matter cannot be handled in a scientific manner. The way for a manager to get any profit out of these reports is for him to take those corresponding most nearly to the conditions on his own road and from them make an intelligent guess as to how long his rails will last. No general rules can be laid down. But by picking individual cases we believe managers can get much good of these experiences.

AT THE J. M. JONES' WORKS.

A REVIEW representative dropped into the extensive works of the J. M. Jones' Sons Company, West Troy, and although the floor space already covers acres, the company is planning still further enlargements and new buildings. The shops are running all day and until 9 o'clock at night, and if orders continue pouring in as they have the past few months the night force will have to work much later, although much of the work Mr. Jones steadily refuses to allow being done at night, and insists on the same careful, painstaking and severe inspection which has made the name of the Jones company synonymous for workmanship of the highest character and lasting qualities. It has been this persevering adherence to a high ideal in car building which keeps the company busy without a single man traveling on the road.

During May there were sent out sixty cars, mostly opens, and the June record promises even better. Orders for winter cars are already coming in.

A strong feature of the works is the brass foundry and finishing shop, where all the brass trimmings used on the Jones cars are made. The company prides itself on its brass work, which is cast much heavier and stronger than is used by many builders, and on the pains taken in finishing and polishing. An interesting machine which bores square holes has just been installed in the wood working shop.

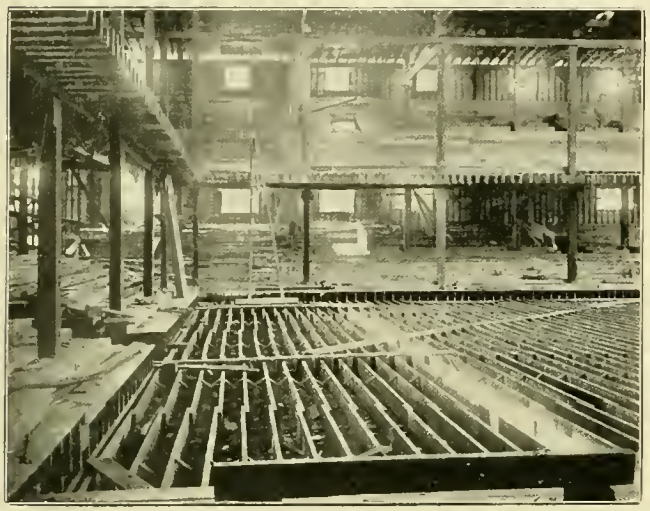
Shipments during the past few weeks include the following: 58 for the Union Railroad of Providence, R. I.; 25, Troy City Railway; 25, Fort Wayne Consolidated, and to each of the following 10 to 15 each: Portland, Me.; Quincy & Boston; Albany Railway; Interstate Consolidated, Attleboro, Mass.; New Haven Street Railway; Globe Street Railway, Fall River, Mass.; Somerset & Swansea Railway, Taunton, Mass.; Stillwater, N. Y.; Cohoes, N. Y.; Burlington, Vt.; Cochituate & Natick Street Railway and others.

Some noticeably large cars are building for the interstate, connecting Lowell, Mass., and Nashua, N. H. They are 13-bench opens and seat 65 persons, and are carried on double trucks. Some of the same type are also making for the Dartmouth & New Bedford.

Mr. Jones considers the outlook as good, and his reports from street railway managers indicate a gratifying increase in passenger earnings throughout the country.

CONVENTION HALL ST. LOUIS.

Our artist was in St. Louis a short time before the completion of the great convention hall and took two views of the structure which will give some idea of how



CONVENTION HALL AT ST. LOUIS—INTERIOR.

it will look in October when the street railway convention will be held there. It is unnecessary to say that there will be ample space for all the exhibits the supply men can bring on, and that is saying much, for the exhibit will be the largest and best in the association's history.

The city of Lincoln, Neb., has begun suit against the Lincoln Street Railway to recover $35,000 in taxes and paving assessments. The road is in the hands of a receiver. The city asks for a sale of the road to satisfy the claim.

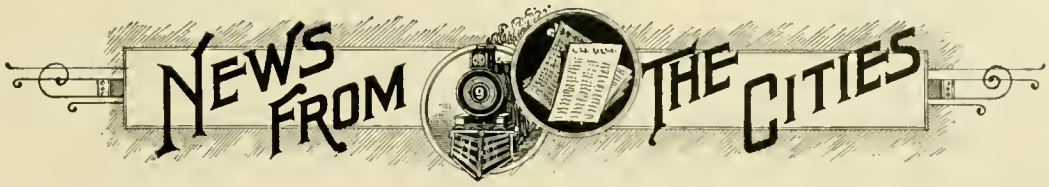
CAST WELDED JOINT BUSINESS BOOMING.

The cast welded joint process is in strong demand as the season opens. Contracts have been made to weld every joint on the system of the Twin City Rapid Transit Company, of Minneapolis and St. Paul, where two Falk machines have been at work since May 1. A similar contract has been entered into by the Chicago City Railway, where one cupola has been at work since April 1. There is also one cupola working on the lines of the Brooklyn City & Newtown Railway, and another on the Brooklyn Heights Railroad. In St. Louis work is progressing on the Missouri Railroad, the Lindell Railway and the Citizens' Railway. The latter road will keep a cupola busy all summer. The Capital Traction Company, of Washington, D. C., is having some joints cast this month. At last some work is being done at Milwaukee, the home of the process, both on old and new rail, where the Falk Company now has one machine busily at work.

FAIRMOUNT PARK ROAD.

Every effort is being made in the plans and construction of the new trolley road which is being built through world renowned Fairmount Park, Philadelphia, to make it as inoffensive to the æsthetic tastes of the park visitors as possible. The power station and car barn will be put in a gully and nearly hidden from view. The feed cables will be put in underground conduits. The road will be depressed where it crosses drives and walks. It is also designed to put sod up to and between the rails. The people of Philadelphia will certainly have no cause to regret the building of a road that furnishes them facilities for transportation around their great pleasure ground without interfering with its beauty.

CONVENTION HALL AT ST. LOUIS—EXTERIOR.



Alabama.

BIRMINGHAM, ALA.—H. L. Underwood has been appointed receiver of the Highland Avenue & Belt Railroad, on application of the Columbian Equipment Company, New York. The latter company, eighteen months ago, contracted to buy the Highland for $350,000, and after paying $35,000, expended $27,000 in improvements. Now it is claimed the Highland Company has not carried out the contract.

California.

SANTA MONICA, CAL.—Construction of the Santa Monica & Soldiers' Home Railway has begun.

LOS ANGELES, CAL.—The Main Street & Agricultural Park Railroad has issued $350,000 bonds to improve and electrify its lines.

SAN JOSE, CAL.—Jacob Rich, proprietor of the First Street Railroad, has failed. Assets, $700,000; liabilities, $600,000. The company is hopelessly involved.

SANTA BARBARA, CAL.—H. S. Luster, secretary and treasurer, writes that the Santa Barbara Consolidated Electric Company is in the market for two 100-kilowatt generators, two 150-horse-power engines, three 150-horse-power boilers, and stacks, five double car equipments: motors and trucks.

Chicago.

CHICAGO.—The Chicago Electric Transit Company, a Yerkes corporation, has applied for a franchise.

Connecticut.

NEW HAVEN, CONN.—Grading of the Manufacturers' Street Railway has begun.

ENFIELD, CONN.—The Enfield & Longmeadow Electric Railway has been granted the right to extend across the state line to Springfield, Mass.

SOUTH NORWALK, CONN.—The Norwalk & South Norwalk Electric Railway will be sold at auction June 16, on petition of dissatisfied stockholders.

MERIDEN, CONN.—Judge A. H. Robertson, of New Haven, is said to have purchased the Meriden, Waterbury & Connecticut River Railroad, thirty miles in length, with a view to equipping for electricity.

HARTFORD, CONN.—The New York, New Haven & Hartford Railroad contemplates electrifying its recent purchase, the New England Railroad, between Hartford and New Britain, to shut out the Hartford Street Railway, the Newington Tramway Company and the Central Railway & Electric Company, of New Britain, which have been trying for some time to make connection.

Delaware.

MILFORD, DEL.—The Sussex Electric Railroad, recently chartered and now constructing, has elected William B. Tomlison president, William T. Parker, vice-president; Dr. James A. Hopkins, secretary; John C. Hazzard, treasurer; directors, the foregoing and John M. Robbins, Charles A. Atkins and William H. Magee.

District of Columbia.

WASHINGTON, D. C.—A repair shop and car house, 60 by 150 feet, is being built by the Washington & Great Falls Electric Railway.

WASHINGTON, D. C.—O. T. Crosby and C. A. Lieb have purchased for $36,000, at auction, the Tenallytown & Rockville Electric Railway.

Florida.

PENSACOLA, FLA.—The Pensacola Terminal Railway has been granted a franchise for electric lines throughout. Work is to begin soon and be finished by September.

ORLANDO, FLA.—Samuel F. Wilkies, of Boston, Mass., has purchased for $150, at master's sale, the track, five cars, and right of way belonging to the defunct Orlando Electric Street Railway.

BRADFORD, PA.—The Bradford Electric Street Railway has purchased the property and rights of the Bradford & Kendall Street Car Company. General Manager Pierce will begin work on the electric road as soon as the mayor signs the ordinance.

Georgia.

AUGUSTA, GA.—The Augusta Street Railway will be sold by order of court, at the instance of the Metropolitan Trust Company, of New York.

AUGUSTA, GA.—Jarvis & Conklin have bought in for $100,000 the Augusta Railway. The bondholders will reorganize the company and improve the lines.

BOSTWICK, GA.—John Bostwick has engaged the Athens University corps to survey the route of and design the power plant for an electric railway six miles in length, between Bostwick and Florence.

Illinois.

OTTAWA, ILL.—J. McMillan Smith will rehabilitate the electric railway.

WAUKEGAN, ILL.—Power for the new electric road will be furnished by the Thomas Brass & Iron Works.

PEORIA, ILL.—Stevens, Seiberling and Avery, promoters of the Independent Electric Railway, are organizing a company with $100,000 capital to be known as the Peoria & Glen Oak Railway Company.

BELVIDERE, ILL.—The Belvidere Electric Railway has been incorporated by D. A. Henderson, $20,000; J. B. Canterbury, $13,500; John M. Roach, $500; C. E. Fuller, $500, and W. C. De Wolf, Jr., $100. Arrangements are being made with the local electric company for power.

EAST ST. LOUIS, ILL.—The St. Louis & O'Fallon Railway Company has been incorporated to build between East St. Louis and O'Fallon, Ill. Capital stock, $100,000; incorporators, Edward L. Thomas, John T. Taylor, William A. Reiss, John Vogt and Ellis Taylor, of Belleville.

Indiana.

FT. WAYNE, IND.—Alexander B. White asks a franchise for an electric road to New Haven.

INDIANAPOLIS, IND.—The Citizens' Street Railroad will soon begin work on the Garfield Park line.

WASHINGTON, IND.—The working of changing the horse car line to electricity is now in progress.

MONTPELIER, IND.—The Montpelier Street & Suburban Railway Company has been incorporated with $10,000 capital stock.

PLYMOUTH, IND.—William Sear, of Plymouth, plans a standard-gage passenger and freight electric railway to operate between Plymouth, Goshen, Winamac and Bremen.

Kansas.

ATCHISON, KAN.—Two open cars will be purchased by the Atchison Railway, Electric Light & Power Company.

Kentucky.

HOPKINSVILLE, KY.—Col. W. R. Vaughan, of Bowling Green, has applied for right to build an electric railway in Hopkinsville. Col. Vaughan has his Clarksville road well under way.

COVINGTON, KY.—The South Covington & Cincinnati Street Railway stockholders will meet June 16, to increase the stock from $3,000,000 to $4,000,000, and the bonds from $3,000,000 to $4,000,000, to take up the floating debt and provide for contemplated extensions and improvements.

Louisiana.

NEW ORLEANS, LA.—A. G. Tebo, A. A. Castanado, L. Soards, Toby Hart and others, have petitioned the city council for a franchise to construct an electric railway to run out Napoleon avenue to Lake Pontchartram.

Maine.

LEWISTON, ME.—A. F. Gerald, of Fairfield, I. C. Libbey, of Waterville, and Galen C. Moses and Fritz H. Twitchell, of Bath, contemplate consolidating the electric railways of Bath, New Lewiston, Auburn and other towns in the Androscoggin Valley.

Maryland.

BALTIMORE, MD.—Franchises are asked by the Metropolitan Railway Company.

BALTIMORE, MD.—Favorable report has been made by the council committee on the Central Railway Company's application for franchises over many streets.

HAGERSTOWN, MD.—Plans for the Hagerstown Railway power house have been drawn by Foose & Lloyd, of Harrisburg, Pa. D. K. Cushwa, of Williamsport, has the contract to erect the building.

BALTIMORE, MD.—The Gwynn's Falls Railway has purchased right of way of the Traction Company. Cars will be running by July. President, Joseph B. Seth; secretary, Henry A. Clark, and treasurer. Charles W. Dorsey.

FREDERICK, MD.—The directors of the Frederick & Middletown Electric Railway have now decided not to build a power house, but to buy current of A. L. Bosley, owner of the Frederick lighting plant, in which railway generators will be installed.

BALTIMORE, MD.—Instead of building a power plant for the South Shore and Druid Hill lines the Baltimore Traction Company will lease electric energy of the Baltimore & Ohio Railroad. The latter has a surplus of power at its Belt line plant, used for operating the famous electric tunnel line.

BALTIMORE, MD.—Favorable action is expected on the application of the Falls Road Electric Railway for right to lay two miles of double track. The company has not organized nor elected officers. The provisional directors are: Wallace King, George R. Webb, Henry W. Rogers, J. Reese Pitcher and John Cowan.

BALTIMORE, MD.—The Metropolitan Railroad Company has been incorporated to build an extensive system of crosstown conduit electric railways connecting Patterson, Clifton and Druid Hill Parks. The capital stock is $2,000,000, and the incorporators are E. Southard Parker, of Washington, D. C., president of the Columbia National Bank; A. C. Stevens and J. S. Lawrence, both of Washington; Charles P. Janney, of Leesburg, Va.; A. S. Bigelow, of Rochester, N. Y.; John T. Collins, of New York City; J. Kemp Bartlett, Jr., of Shriver, Bartlett & Company; Henry B. Wilcox, cashier of the Equitable National Bank; James B. Chastain, dealer in real estate, and Albert W. Reed, grain dealer, of Baltimore.

Massachusetts.

SALEM, MASS.—The Salem, Lynnfield & Wakefield Street Railway expects soon to begin construction.

NORTH ADAMS, MASS.—The Hoosac Valley Street Railway contemplates a 2-mile extension to Beaver.

TAUNTON, MASS.—The Taunton & Brockton Street Railway has been incorporated with $100,000 capital.

BROCKTON, MASS.—Taunton has granted a franchise to the Brockton, Bridgewater & Taunton Street Railway.

GREENFIELD, MASS.—The Greenfield & Turners Falls Street Railway has absorbed the Montague Street Railway.

WOBURN, MASS.—The North Woburn Street Railway contemplates electrical equipment. A. F. Breed, of Lynn, president.

HANOVER, MASS.—The Hanover street Railway, under construction, has been authorized to increase its capital stock $30,000.

HANOVER, MASS.—Norwell wants the Hanover Street Railway to extend from West Norwell through Norwell to Scituate Harbor.

MIDDLEBORO, MASS.—The Middleboro & Lakeville Street Railway has purchased the waterfall at Muttock for its power plant.

BRIDGEWATER, MASS. The Brocton, Bridgewater & Taunton Street Railway has been granted a franchise through Bridgewater.

BROCKTON, MASS.—S. M. Thomas and others have incorporated the Brockton & Taunton Street Railway with $100,000 capital stock.

LEOMINSTER, MASS.—The Clinton Street Railway Company has changed its name to Leominster & Clinton Street Railway Company.

BOSTON, MASS.—The West Roxbury & Roslindale Street Railway has contracted for the erection of a house 46 by 200 feet, to hold twenty-five cars.

RANDOLPH, MASS.—The Randolph Street Railway has been incorporated. Capital stock, $35,000; directors, John R. Graham, J. F. Merrill, of Quincy, and others.

MIDDLEBORO, MASS.—George E. Wood has been elected president, John N. Main secretary and Harry P. Sparrow treasurer of the Middleboro & Lakeville Street Railway, which is about to construct.

WORCESTER, MASS.—William H. Tyler, real estate dealer, 4 Walnut street, and Theodore C. Bates, are among those who have subscribed $83,500 out of the $150,000 capital for an electric road from Worcester to Clinton.

SALEM, MASS.—Peabody has granted right of way to the Salem, Lynnfield & Wakefield Street Railway, requiring T rail, square painted poles and $5,000 bonds. Col. Woodard, of Wakefield, who represents the company, says the road will be finished before August.

ROCKPORT, MASS.—The Rockport Street Railway has been incorporated. Capital stock, $125,000; directors, W. B. Ferguson, of Malden; L. M. Haskins, A. Goodwin, C. H. Cleaves, and H. N. Woods, of Rockport; A. D. Bosson, of Chelsea, and A. R. Hallowell, of Gloucester.

WORCESTER, MASS.—The Blackstone Valley Street Railway contemplates canceling its power lease with the Millbury Water Company to make a more favorable arrangement with the Worcester & Suburban Street railway. The latter would then install additional generators.

NEEDHAM, MASS.—The death of A. C. Pond, of Newton, chief promoter and financial backer, of the Needham & Newton Street Railway, has given the project a decided setback. The $1,000 bond has been forfeited for non-construction, and on July 1 the Needham franchise will become void.

SPRINGFIELD, MASS. The Suffield, Agawam & West Springfield Railway has been organized with I. L. Currier, of Worcester, president and treasurer; Elmer D. Powers, of Springfield, clerk; and L. L. Whitman, H. S. Kelsey, Samuel Pyne, M. L. Ahl, all of Agawam, and I. R. Fairbanks, of West Springfield, directors. Of the 11 miles of road, 7 will be in Massachusetts and 4 in Connecticut.

WORCESTER, MASS.—The Blackstone Valley Electric Railway, now under construction, has recently elected the following officers: President, James H. Ferguson; treasurer, Herbert A. Ryan; clerk, Lewis H. Clark, of Worcester; directors, James H. Ferguson, E. E. Howe, of Fisherville; L. E. Chase, of Wilkinsonville; Charles Buck, G. F. Mellen, of New York; W. S. Green, of Fall River; W. P. Reid, of New York; P. W. Sprague and Abraham Manchester, of Boston.

WORCESTER, MASS.—Among those interested in the Worcester and Clinton railway project are Charles E. Dresser, William S. Reed, Charles E. Hudson, Alexander S. Paton and Edward F. Blodgett, of Leominster, joint owners of the Clinton Street Railway and the new electric railway being constructed between Clinton and Leominster; Frank E. Lowe, president of the Greenfield & Turner's Falls Street Railway, Hon. T. C. Bates, William H. Tylee, Col. T. S. Johnson, O. A. Kelley and others of Worcester.

SHELBURNE FALLS, MASS. H. Newell, treasurer, writes: "The Shelburne Falls & Colrain Street Railway Company are ready to receive bids for construction of their roadbed and bridges. About 6½ miles will be built this season. The company will furnish poles, ties, rails, etc., and will place orders for same very soon. The electrical equipment will be contracted for within the next few weeks. Application for specifications or bids for material should be addressed to D. W. Temple, president, or H. Newell, treasurer, Shelburne Falls, Mass."

Michigan.

DETROIT, MICH.—Having obtained a franchise through St. Clair Heights, E. H. Sloman has begun work on his double-track electric road.

BENTON HARBOR, MICH.—The Benton Harbor & Eastern Transit Company will construct 30 miles of electric railway, including a tunnel, for which the franchise has just been granted. Fruit and other freight will be carried.

DETROIT, MICH.—W. M. Dolfrey and J. H. Clark, stock breeders, near Birmingham, are the principal promoters of an electric railway to operate between Royal Oak and Farmington, a distance of twenty miles, for which they have the right of way.

Minnesota.

DULUTH, MINN.—A controlling interest in the Minnesota Point Street Railway has been sold by H. O. Underwood, Boston, and Dunn Bros., Philadelphia.

MINNEAPOLIS, MINN.—Right of way for an electric road to Wayzata, Minnetonka and Mound City is petitioned for by S. C. Bailey, D. A. Lydiard, A. J. Rosander, R. L. Penney, P. P. Swensen, F. D. Normberg, John Dahlquist and E. S. Barnes.

Missouri.

ST. LOUIS, MO. M. E. Lennon and Ernest P. Bell are the principal promoters of the Belt Line Electric Railway.

ST. LOUIS, MO—The St. Louis & Meramec River Railroad has increased its capital stock from $750,000 to $1,000,000.

SPRINGFIELD, MO.—At the Springfield Traction Company's annual meeting it was decided to equip cars with new and powerful motors.

ST. LOUIS, MO.—Adolphus Busch, the wealthy brewer, is said to be backing Eugene Sweeney, promoter of the City Central Electric Railway.

ST. LOUIS, MO.—President Eugene Benoist, of the Midland Street Railway, has asked that the franchise be revived, agreeing to file $10,000 bonds to guarantee immediate construction.

KANSAS CITY, MO.—M. M. Broadwell, of New York, is trying to straighten out the affairs of the Union Cable Company, that it may be operated. An electric equipment will first be installed.

KANSAS CITY, MO.—The People's Cable Railway, or Tenth Street Line, which was sold March 14 under foreclosure, was sold a second time, June 6, under a judgment for $20,100 in favor of James Lillis, contractor.

ST. LOUIS, MO.—The St. Louis Cross-County Railroad Company has been incorporated to build the belt electric railway. Capital stock, $100,000; directors, Ernest P. Bell, Mark E. Lennon, Charles Frederick, Julius Erickson, J. L. McDowell, Louis Bierman, Charles Robyn and Philip Dauser.

ST. LOUIS, MO.—The Highland Scenic Railway has been incorporated to build 10 miles of electric road from the terminus of the St. Louis & Kirkwood Railroad to Meramec Highlands. Capital stock, $150,000; incorporators, James D. Houseman, Jr., Earnest Marshall, J. J. Broderick, L. B. Jones and W. F. Richards.

OREGON, MO.—The Oregon & Forest City Electric Railway has been surveyed and mapped. Heavy freight, as well as passengers, will be carried. The road will be three miles long, with the power house at Forest City. Judge S. C. Douglass, Kansas City, president; F. C. Oakley, vice president; Ex-Mayor James E. Cummins, Oregon, secretary, and J. B. Harden, treasurer.

ST. LOUIS, MO. The Wellston, Creve Cœur Lake & St. Charles Railway Company, of St. Louis, has been incorporated to build and operate an electric road from Wellston to St. Charles, with a branch to Creve Cœur Lake. Capital stock, $2,000; incorporators, J. B. C. Lucas, F. A. Thompson, T. T. Lucas, Charles P. Damon, G. R. Wise, J. H. Chambers, John H. Bobb and E. T. Thomas.

New Jersey.

ELIZABETH, N. J. Riker & Riker, of Newark, want right of way to Plainfield for an electric road.

ELIZABETH, N. J.—The change from horse to electricity, on the Elizabeth Street Railway, is about to be made.

PATERSON, N. J.—Bird W. Spencer, president of the Passaic & Newark Electric Railway, has applied to Franklin for a franchise to Bloomfield.

MONTCLAIR, N. J.—Ira C. Chase proposes to construct a conduit electric road in Montclair, which is obstinately opposed to the overhead trolley.

OCEAN CITY, N. J.—The Steel Pier & Railway Company has been incorporated to build a pier and beach electric railway at Ocean City. Capital stock, $50,000; incorporators, William J. Warrington, William T. Lalden, Thomas W. Jenkins and Edward Stabler, Jr., of Baltimore, and Albert P. Warrington, of Norfolk, Va., and Elmer L. Corthell and Joseph A. Oaks.

New Hampshire.

CONCORD, N. H.—The Concord Street Railway is installing telephones between turnouts.

LACONIA, N. H.—The proposition to electrify the horse line has been dropped by the directors owing to the opposition of a large stockholder.

New York.

LOCKPORT, N. Y.—The Lock City Electric Railway is building a short extension.

UTICA, N. Y.—The Utica Suburban Railway has been granted a franchise between Oriskany and Whitestown.

WATERTOWN, N. Y.—B. W. Folger thinks of buying the street railway when sold in July by Receiver J. A. Lawyer.

NEW YORK, N. Y.—The Metropolitan Traction Company has leased the Fourth avenue horse line for ninety-nine years.

AUBURN, N. Y.—Permission to increase its capital stock from $250,000 to $350,000 has been granted the Auburn City Railway.

PLATTSBURG, N. Y. The Plattsburg Traction Company has been incorporated. Contracts have been let for the 8 miles of road.

ELMIRA, N. Y.—Construction of the Elmira & Watkins Electric Railway will soon begin, the right of way having been obtained.

ROCHESTER, N. Y.—The Rochester Railway directors have decided to relay the West avenue tracks with heavier rail, at a cost of $40,000.

SARATOGA, N. Y.—Superintendent A. J. Voyer, of Albany, is overhauling the Union Electric Railway for operation during the summer season.

BUFFALO, N. Y. The Lewiston & Youngstown Frontier Railway has been authorized to increase its capital stock from $60,000 to $150,000.

PATCHOGUE, N. Y.—The Patchogue & Port Jefferson Traction Company was granted permission to build June 2, by the state railroad commission.

PALMYRA, N. Y.—Le Grand Brown, city engineer of Rochester, denies the report that the Palmyra & Marion Electric Railway project has fallen through.

ALBANY, N. Y.—The survey of the Albany, Helderberg & Schoharie Electric Railway has been completed. Contractors are on the ground making estimates.

BROOKLYN, N. Y.—Justice Osborne has peremptorily directed that a permit be issued the Nassau Electric Railroad for the construction of a double track on Buffalo avenue.

DUNKIRK, N. Y.—D. S. Campbell, R. L. Chadwick and F. B. Marville, of New York, contemplate constructing an electric railway between Dunkirk and Van Buren.

SODUS, N. Y.—I. N. Luddington and others, of Rochester, are getting consents for an electric line from Rochester to Sodus Point via. Webster, Ontario, Williamson and Sodus.

NEWBURGH, N. Y.—Major W. H. Weston, of Newburgh, claims that an electric road to New Paltz would be a paying investment. H. C. Norton and J. M. Dickey also are interested.

BROOKLYN, N. Y. The Brooklyn Heights Railroad is negotiating for the lease of the Brooklyn & Rockaway Beach steam road which runs to Canarsie. If the deal is closed electricity will be installed.

NIAGARA FALLS, N. Y.—Franchises on Prospect street and on Niagara street respectively, are asked for by the Niagara Falls & Suspension Bridge Street Railway and the Niagara Street Railway.

KINGSTON, N. Y.—The Ulster & Delaware Railroad contemplate building a power house and putting up overhead work to convey passengers from Kingston Point to Rondout by electricity instead of steam.

BROOKLYN, N. Y.—The Long Island City & Newtown Railroad, formerly owned by Mayor Gleason, was sold by auction May 9, for $700,000 to the Steinway Electric Railway Company, which has been operating the road since January.

PORT JERVIS, N. Y.—The Stroudsburg & Port Jervis Electric Railway has purchased the rights of the Delaware Valley Railway for $1,025. Chief Engineer E. P. Breese and assistants are routing the road. As soon as their plans are completed bids will be received for construction.

BUFFALO, N. Y.—The Buffalo Traction Company's special bill has been signed by the Governor. The following officers were recently elected: President, Edwin G. S. Miller; secretary, Herbert P. Bissell; treasurer, Joseph B. Mayer; directors, Wilson S. Bissell, Herbert P. Bissell, Edwin G. S. Miller, Joseph B. Mayer, Frank J. Illig, Tom L. Johnson and Jacob Lang.

BUFFALO, N. Y.—A consolidation of the Tonawanda Street Railroad and the Tonawanda Electric Railroad has been effected, thus forming a continuous line of road, under the name of the Buffalo, Tonawanda & Niagara Falls Electric Railroad. Capital stock, $300,000; officers, George H. Smith, president; James H. Rand, vice president; John A. Read, treasurer, and Henry M. Fales, secretary.

PATCHOGUE, N. Y.—The promoters of the Patchogue & Port Jefferson Traction Company, Edwin Bailey, of Patchogue; O. F. Fanning, Charles E. Tooker and Thomas O'Donnelly, of Port Jefferson, met recently at the office of the treasurer, Frank Miller, Bridgeport, Conn., and selected Joseph McElroy, of New York, as electrical engineer, and Mr. Baily to present the application for a franchise to the railroad commission.

SYRACUSE, N. Y.—The Syracuse Rapid Transit Railway Company has been incorporated to legalize the consolidation practically effected two months ago. Capital, $1,250,000 preferred and $2,750,000 common stock; directors, John Alvin Young, of Jersey City, N. J.; Ansel L. White, George F. Brown, David H. Darling, John B. Summerfield, Edward T. Perine, William H. Chesebrough, Jr., and S. B. Lawrence, of New York, and Edward H. Tobey, of Brooklyn.

CHAUTAUQUA, N. Y.—The Westfield, Mayville & Chautauqua Electric Railway Company is being organized by W. L. Minton, Hon. S. F. Nixon, F. W. Crandall, cashier of the bank, and Herman L. Kent, all of Westfield. W. L. Minton has the right of way parallel the Lake Shore and Nickel Plate roads, from Fredonia to the Pennsylvania state line, but the route favored is from Westfield through Mayville to Chautauqua. This is estimated to cost $140,000, equipped with 6 motors and 6 trail cars. The power house is to be at Button's Inn.

North Carolina.

SALISBURY, N. C.—Dr. F. J. Murdock has bought the interests of his associates in the electric railway project.

Ohio.

YOUNGSTOWN, O. The Youngstown Street Railway will double-track the Brier Hill line.

CLEVELAND, O.—A franchise through Dover has been granted the Lorain & Cleveland Electric Railway.

TOLEDO, O.—Bowling Green has granted a franchise to the Toledo, Bowling Green & Fremont Electric Railway.

PAINESVILLE, O.—The Painesville, Fairport & Richmond Street Railway, a horse line, is for sale by the sheriff.

CINCINNATI, O.—A car house 215 by 120 feet, of brick and stone, will be erected by the Cincinnati Street Railway.

ALLIANCE, O.—The Alliance Street Railway has settled the judgments against it, and resumed work on the new track.

CINCINNATI, O.—The Cincinnati Street Railway is arranging to consolidate with the Mt. Adams & Eden Park Incline Railway.

LORAIN, O.—Rumor has it that F. M. Lewis, of Cleveland, is investigating the feasibility of an electric road between Lorain and Wellington for Boston capitalists.

COLUMBUS, O.—The Columbus & Buckeye Park Street Railway, which was incorporated by T. J. Keating and others, is getting ready to build. The Hoskins gasoline motor is to be used.

TOLEDO, O.—Parks Foster has resigned the presidency of the Toledo, Bowling Green & Fremont Electric Railway. His successor has not been named, but it is said construction will be pushed just the same.

CHAGRIN FALLS, O.—C. E. Loss & Co., Chicago, have been given the contract to build and equip 14 miles of road for the Cleveland and Chagrin Falls Electric Railway, including rolling stock and power house.

BUCYRUS, O. C. A. Lynn is getting consents for the Toledo men who expect to take up the construction of the road to Galion, the franchise of the Bucyrus & Galion Suburban Electric Railway having expired by limitation.

LANCASTER, O.—William Duffey has brought suit against the Lancaster Street Railway to enforce stockholders liability. Duffey alleges the company owes him $5,000 on a note.

XENIA, O.—Charles E. Smith & Co., of New York, have brought suit against the Rapid Transit Company, which was to build the Springfield-Xenia Electric Railway, to recover $4,512.50, alleged to be due for obtaining contractors to build the road.

PAINESVILLE, O.—Henry A. Everett has purchased the Painesville, Fairport & Richmond Street Railroad of the Cleveland bondholders, who recently took it under sheriff's sale for $3,160. It will become a part of the Cleveland, Painesville & Eastern Electric Railway.

NEW PHILADELPHIA, O.—The Tuscarawas Railroad Company has been incorporated to build an electric railway to Uhrichsville. Capital stock, $150,000. Incorporators. Maj. Charles Mitchener, of this place; William Christy and James Christy, of Akron, and C. H. Howland, of Cuyahoga Falls.

Pennsylvania.

READING, PA.—The Neversink Mountain Railway will build one mile of electric road.

PHILADELPHIA, PA.—The Central Electric Elevated Street Railway project has been abandoned.

UNIONTOWN, PA.—Surveys are being made for a 3-mile extension of the Uniontown Electric Railway.

PHILADELPHIA, PA.—The Holmesburg, Tacony & Frankford Railway will double-track its whole line.

PITTSBURG, PA.—Braddock has granted right of way to the Pittsburg, Braddock & McKeesport Traction Company.

TAMAQUA, PA.—The Tamaqua & Lansford Electric Street Railway, has been granted right of way through Lansford. The line must be completed within six months.

PITTSBURG, PA.—The Allegheny Traction Company will build a freight and passenger railway to Butler. The cost of the thirty-one miles of road is estimated at $500,000.

PECKVILLE, PA.—Daniel Davis is president of the Blakely Rapid Transit Company, which was recently incorporated with $24,000 capital, to build four miles of electric road.

NORRISTOWN, PA.—The Schuylkill Valley Traction Company has contracted with W. A. Cullen, of Paterson, N. Y., for the grading, tracklaying and ballasting of five miles of road between Trooper and Collegeville.

CHESTER, PA.—S. M. Patterson says the resurvey of the Pennsylvania Traction Company's lines from Parkesburg to Coatesville will be made by the Chester & Delaware Railway Company, which is soon to resume construction.

STROUDSBURG, PA.—The East Stroudsburg & Matamoras Railroad, of which Simon Friedberger is president, is in financial difficulties. The company has no connection with the new Stroudsburg & Port Jervis Electric Railway projected by Philadelphians.

NEW CASTLE, PA.—Hon. Richard Quay, of Beaver, and Messrs. Hostetter, Stewart, Kennedy and Dilworth, of Pittsburg, have bought the New Castle Electric Street Railway. After obtaining additional lines and franchises, they will inaugurate extensive improvements.

PHILADELPHIA, PA.—Spontaneous combustion caused a fire May 11, in a two-story brick addition to the Union Traction's Company's Second and Third streets barn. Some old cars were damaged, and a lot of baled hay was ruined. Loss on building and contents, $5,000.

SCRANTON, PA.—The Citizens' Street Railway Company has been incorporated to build and operate thirty miles of electric road in competition with the Scranton Traction Company. Capital stock, $200,000; incorporators, ex-Mayor W. L. Connell, P. S. Page, Charles H. Schadt, H. H. Archer and P. J. Horan, all of Scranton.

PEN ARGYL, PA.—The proposed Pen Argyl, Bangor & Water Gap Electric Railroad is reviving. At a meeting of stockholders in the office of J. C. Merrill, at Easton, the following directors were chosen: John C. Merrill, president; E. V. N. Heermance, New York, vice president; C. Albert Sandt, Easton, secretary and treasurer; John Bitters, Easton; Edwin Merrill, New York; and C. C. Wise and W. F. Jordan, of Bangor.

Rhode Island.

PROVIDENCE, R. I.—Four companies have been incorporated to build electric railways from Providence to Bristol county. The Bristol County Railroad Company, capital stock, $200,000; incorporators, Orrin L. Bosworth, O. L. Anthony, Lewis B. Smith and Alexander G. Sandford; the Bristol, Warren & Barrington Street Railway Company, capital stock, $100,000; incorporators, Hugh K. Norman, G. Norman Weaver and Samuel P. Colt; the Warren & Barrington Street Railway Company, capital stock, $200,000; incorporators, Edward Hayes, Almon K. Goodwin and Charles C. Gray, and the Bristol Land & Investment Company, incorporators, William B. DeWolf, William T. C. Wardwell and Charles F. Chace.

South Carolina.

COLUMBIA, S. C.—The Columbia & Eau Claire Electric Railway has been incorporated to build to Marstellar Springs to develop real estate which it controls. Capital stock, $50,000; incorporators, F. H. Hyatt, Chas. W. McCreery, W. A. Clark and J. S. Muller.

COLUMBIA, S. C.—F. H. Hyatt has been elected president and treasurer; C. W. McCreery, vice-president, and J. S. Muller, secretary, of the new Columbia & Eau Claire Electric Railway. The road is half finished. Its pleasure park is being beautified.

Tennessee.

KNOXVILLE, TENN.—The Citizens' Street Railway has contracted for the immediate erection of a power house.

CHATTANOOGA, TENN.—The Chattanooga Rapid Transit Company has been incorporated by S. W. Divine, C. T. Divine, G. N. Henson, David Bakofger and J. B. Stizer.

CHATTANOOGA, TENN.—The reorganized Chattanooga Electric Street Railway has elected Charles A. Lyerly, president; P. K. Root, vice-president; E. D. Lilly, secretary and treasurer, and W. S. McCall, superintendent. Directors, W. T. Adams, Charles A. Lyerly, George W. Mead, P. K. Root, Frank Spurlock, J. H. Warner and T. D. Young.

NASHVILLE, TENN.—The Nashville & Suburban Railway Company has been incorporated by William Checkley Shaw, of Baltimore, president; Col. Baxter Smith, vice president; T. H. Bennett, secretary and treasurer; P. D. Maddin, D. R. Johnson, and J. R. Buist, of Nashville, J. C. Middleton and R. D Forbes, of Baltimore. The company succeeds the Nashville Traction Company, and will put the Glendale electric road in good condition.

Texas.

HOUSTON, TEX.—A. H. Hayward, representing bondholders, on May 5 purchased the Houston City Street Railway at receiver's sale. The improvements, which have been under way, will be pushed to completion.

Utah.

OGDEN, UTAH.—W. H. Rowe has been appointed receiver of the Ogden City Street Railway Company on petition of the Jarvis-Conklin Mortgage Trust Company, of New York. The $105,000 interest on the $350,000 mortgage has not been paid.

SALT LAKE CITY, UTAH.—The New East Tintic Railway Company has been incorporated to build five miles of horse, electric or steam railway from Mammoth station to the Mammoth mine. Capital stock, $50,000; incorporators, J. A. Cunningham, H. S. Young Frank B. Cook, J. A. Cunningham, Jr., William M. Bradley, W. C. Shoup and William Pischel, all of Salt Lake.

Vermont.

MONTPELIER, VT.—The Consolidated Lighting Company, C. P. Pitkin, president, has applied for a franchise to build an electric railway. J. S. Pierson, F. C. Kennedy, O. A. Humphrey and J. J. Flynn, of Burlington, are backing the light company in the railway enterprise.

Virginia.

RICHMOND, VA.—The Richmond Railway & Electric Company contemplates extending to Lakeside Park.

Washington.

TACOMA, WASH.—Franchises are asked for by the Puget Sound, Mount Tacoma & Eastern Railway.

TACOMA, WASH.—Robert Wingate has purchased the American Lake Railway and will equip with electricity.

West Virginia.

PARKERSBURG, W. VA.—Eastern capitalists will electrify the street railway.

PARKERSBURG, W. VA.—The American Construction Company of Boston, Mass., has purchased the Park City Street Railway and will make the change from horse to electricity.

WHEELING, W. VA.—The Suburban Railway contemplates extending its new electric road from Tridelphia to West Alexander, a distance of nine miles. A franchise is asked and will probably be granted.

Wisconsin.

KENOSHA, WIS.—The Milwaukee, Racine & Kenosha Street Railway has accepted its franchise.

GREEN BAY, WIS.—W. B. Anderson has the contract to grade three miles for the De Pere extension of the Fox River Electric Railway.

MENASHA, WIS.—Ordinances have been introduced in Appleton and Kaukauna to grant franchises to F. C. Rutan's Wisconsin Interurban Railroad Company.

RACINE, WIS.—The Belle City Street Railway has been granted the right by the city council to run the cars of the Milwaukee, Racine & Kenosha Electric Railway over certain lines.

MILWAUKEE, WIS.—Rumor has it that Tom L. Johnson, of Cleveland, and Senator Calvin S. Brice, of Ohio, are the financial backers of the Milwaukee & Waukesha Electric Railway.

MILWAUKEE, WIS.—Greenfield has granted a franchise to the Milwaukee Electric Railway & Light Company, for the Layton Park extension. Work is to begin at once, and be completed by July.

MILWAUKEE, WIS.—The newspaper reports that Milwaukee & Waukesha Electric Railway had let contracts for the extension and the electric equipment of the motor line are false. The Waukesha line has not even been located. Some difficulty is experienced in getting right of way to the center of the city, but the local promoters, James Petley, A. B. Meyers and J. W. Wegner, expect to win.

Canada

HALIFAX, N. S.—The electric street railway will be extended to Richmond by June.

SARNIA, ONT.—A bonus of $15,000 has been given for the electric road to Point Edward and Wees Beach.

ST. ALPHONSE, QUE.—The Chicoutimi Electric Company will construct a railway from St. Alphonse to Chicoutimi.

HAMILTON, ONT.—Burlington has granted right of way to the Hamilton Radial Railway. Construction is soon to begin.

A. M. Requier, electrical engineer of the Westinghouse Electric & Manufacturing Company, will be at the Fifth Avenue Hotel, New York, after June 8, to contract for all the equipment and material, except rails and wire, for 14 miles of electric railway in Rouen, France, to be built by a company of which his father is president.

Fliegender Blaetter thinks we are coming to this.

A FAKE INTERVIEW.

The daily and one or two technical papers have been taken in again by an alleged interview with Rufus Hill, master mechanic of the Pennsylvania Railroad at the Camden, N. J., shops, stating that inside of five years the entire Pennsylvania system will be operated by electricity in place of steam, and other slightly more plausible assertions. Mr. Hill states that he does not believe the statements said to emanate from himself, which fact is not to be wondered at considering the nature of the predictions.

MORE CONDUCTORLESS ROADS.

To the list of roads running without conductors published in April may be added the following:

Astoria Street Railway, Astoria, Ore.
Salem Consolidated Street Railway, Salem, Ore.
Albany Street Railway, Albany, Ore.
Eugene Street Railway, Eugene, Ore.
Walla Walla Street Railway, Walla Walla, Wash.
Olympia Street Railway, Olympia, Wash.
Dayton, O., all the street railways.

John W. Lippitt, a director of the Utica, Clinton & Binghamton Railroad Company since 1881, died recently.

THE McGUIRE MANUFACTURING COMPANY'S PLANT AND PRODUCTS.

The McGuire Manufacturing Company furnishes a notable instance of a plant which, being established for the manufacture of a single article, has so far outgrown its original limits that the first purpose of its organization is often lost sight of. The company was organized for the manufacture of the "Star" grain door for freight cars. Though the success of the door was something phenomenal, the increasing use of electricity for street railway purposes seemed to open an enlarged field in the manufacture of car trucks for this purpose. This has since become the most important branch of the business.

WORKS OF THE M'GUIRE MANUFACTURING COMPANY.

The founders were W. A. McGuire and W. J. Cooke, respectively president and vice-president, and sole members of the present company. These two gentlemen have always been virtually the company, though for a short time three other parties were interested. They began business in a small old building on the present site of their works, and there is, perhaps, no better indication of the success which has attended them than the appearance of the two large and substantial buildings in which the work is now carried on. The character of these is well shown in the accompanying engravings. The space occupied is about half a block. The offices of the company are in the building fronting on North Sangamon street, numbers 122 to 132 inclusive. This building, having been erected during the past year in place of the old two-story building in which the company first began business. This is a well-built three-story brick building, having its second floor level with the sidewalk. The second floor of the south end (in the foreground of the picture) contains large, well-lighted and nicely finished offices, which are also shown in the illustrations. Directly to the north of the offices on the same floor is the storeroom for the small parts necessary to be kept in stock on account of the great variety of work done in the line of street railway trucks. These are all arranged in numbered bins, so that any desired part can be found without delay. Over this room is storage space for parts of sweepers and stoves, which lines form an important part of the company's business. The manufacture of these goods begins in July in season for September shipment. The closeness with which the business is looked after is indicated by the small number of stoves to be carried over to next season—perhaps fifty at a rough estimate. In one corner of this room is the brass foundry, where bearings and small brass parts are made, the material in the form of copper and tin ingots being kept in the room below, under lock and key, and delivered in stated quantities each morning. In another corner a space is partitioned off for a pattern shop, which is an unusually important part of the business, owing to the great variety of styles of goods made.

The lower floor of the same building is used for the storage of heavy parts and for raw material which is delivered directly from the street and passes to the blacksmith shop in the rear without unnecessary re-handling.

The blacksmith shop is large and well lighted and fully equipped with forges, hammers and bull-dozers

PRESIDENT M'GUIRE IN HIS OFFICE.

adapted to the special work done. There are two of the last-named machines, one of them double, both being of the company's own make. These are used for forging, bending, punching and shearing on the various parts going to the make-up or a truck.

On the lower floor of the large building in the rear, the older shop, is the machine shop. This is well-equipped with the usual lathes, boring machines, presses and planers for car truck work, as well as many machines designed and built by the company to meet the requirements of special cases. One of the most interesting of these is a key-seat cutter, which automatically forms key-seats in axles with an absolute certainty of uniformity in dimensions and finish. The work in this department requires a great degree of accuracy, many specifications on axle work limiting dimensions to one-thousandths of an inch. The two floors above the machine shop are devoted to erecting purposes with a capacity of 25 trucks per day. The several tracks are so arranged that the parts of a truck can be brought together with the least expenditure of time and labor. In one corner of the lower erecting shop is a well lighted drafting room, fitted with the usual appliances.

All of the parts which go to make up street railway trucks, except the wheels, are made at this plant. The diversity of opinion as to standards in the matter of wheels is so great that the company finds it better to purchase wheels of the kind specified than to deal with such a variety of patterns. Even without the wheels the variety of patterns and the stock of parts that it is necessary to keep on hand is something startling. It is well indicated, however, by the fact that the latest truck is number 26 in order, and that seven varieties of double trucks for electric work and two for trailers are now made. This company was the first to begin the manufacture of double trucks for street railway service and there are but few others engaged in that branch of the

VICE-PRESIDENT COOKE IN HIS OFFICE.

work. The recent large orders for the Lake street elevated road in Chicago and for the Brooklyn bridge cars are notable examples of these trucks

There are over 250 men at present employed, and the works are running at night to fill large orders. Among those upon which they are now engaged may be mentioned 256 trucks for the Cincinnati Street Railway Company, 300 for the Pittsburg Traction Company, 100

M'GUIRE MANUFACTURING COMPANY—BLACKSMITH SHOP.

of which have been delivered, 100 for the Pasadena & Los Angeles Railway Company, 90 for the Calumet Electric Railway Company, of Chicago, 75 for the Chicago City Railway Company, and a variety of orders ranging from 50 down.

A specialty with which the company is having a great success is a new form of motorman's brake handle, though as indicated, the principal business in the street railway line is the manufacture of trucks. Its trucks are in use on nearly one-half the roads in the United States.

The shops are under the direct supervision of the president, Mr. McGuire, while Mr. Cooke looks after the interests of the sales department.

TIE PLATES IN STREET RAILWAY SERVICE.

The value of tie plates, as a means for preserving even joints, keeping up the gage of track and as a preservative of cross ties has been for some time pretty generally recognized in steam railway service. It is, however, within a comparatively recent period that any consideration has been given to the subject in connection with street railway construction. In the case of lines laid on stringers through paved streets, a practice now almost obsolete, the tie plate has no function to perform, but on the long lines through country districts, which have become so numerous within the last few years and where the rails are laid upon cross ties as they now usually are, the conditions of the steam road are very nearly simulated. It would, therefore, seem reasonable that street railway companies should borrow from the experience of their predecessors, and that in so doing they might find a way out of some difficulties much shorter and less expensive than that by which the original experience was gained.

The chief function of ties plates is undoubtedly the restriction of rail movements. Naturally this is greatest at the joints and its results are more immediately manifest in rough riding and hammered rail ends. It has, therefore, become customary to speak of the tie plate as a part of the joint though its use is by no means confined to joint ties. The same difficulties are met with to a less degree on other parts of the rail. The effect of the constant vibration of the rail, which is greater proportionately upon street than upon steam car tracks, on account of the rocking motion of the car and the greater frequency of stops, causes the rail to gradually become loosened from the tie. The hammering effect produced by constant rising and falling has a tendency to destroy the surface fibers and with the assistance of sand rapidly cuts a cross groove in the tie and increases the possible play of the rail. In this respect, also, the street railway is on a worse basis than the steam line, great quantities of dirt being deposited along the rails by the wheels of highway traffic. The tie plate acts to prevent the initial vibration by securing better union between rail and tie, since most tie plates have one or more flanges which take hold upon the wood, and because of the spike holes punched in the plate the spiking is necessarily more nearly uniform and perfect.

The gage of the track is also kept more nearly in its normal condition, both because of the better spiking in the first place, and because the rails are prevented from canting on curves or elsewhere by the cutting of the rail flange into the tie.

The ideal track is of course that approaching most nearly an integral structure, and thus communicating shocks and stresses over as great a surface as possible. This is the basis upon which the advocates of continuous rails found their convictions, and the end for which the introducers of new forms of rail joints have long been seeking. There should, however, be no ground of contention between these devices and the tie plate. The latter has its independent field and is useful, though perhaps less essential, with most of the approved forms of joints or continuous rails. It finds its greatest usefulness as suggested at the outset, in those places where the natural character of the roadbed is such as to increase the vibrations due to service.

One of the desirable features of the tie plate is such a construction that some portion of it will enter the wood of the tie and become a fixture. Various forms have been devised, but it seems natural to suppose that a plate with wedged-shaped ribs upon the under side which enter between the longitudinal fibers of the wood will injure the latter less and secure a firmer hold. The fibers thus become compressed under the plate and assist in preventing the accumulation of moisture at that point. The well known Servis plate, manufactured by the Q. & C. Company, Chicago, is an example of this class. This plate has been in service for many years upon the best steam roads of the country, and has latterly been introduced with excellent results upon several street car lines. Among these may be mentioned the Citizens' line at Detroit, a road at Los Angeles, Cal., and the Calumet line at Chicago, which has 60,000 in use. Upon elevated roads their use is extensive. The Manhattan Railway, New York, and the Kings County Elevated Railway, of Brooklyn, have used them by the hundreds of thousands, and the Northwestern Elevated, of Chicago has ordered 200,000 for the equipment of its line. The tie plate is evidently entering the field of street railway work with considerable vigor, and it should be a matter of consideration at the outset what form of plate is best adapted to the requirements.

DEATH OF ANDREW J. BOWNE.

Andrew J. Bowne, president of the Grand Rapids' Consolidated Street Railroad and the Lowell & Hastings' Railroad, dropped dead of heart disease at his home in Grand Rapids, June 7. In addition to his railroad connections he was prominent in banking circles, being president of the Fourth National Bank. He was one of the pioneer wool and grain buyers in the state.

PERSONAL

G. H. Binkley, of the Calumet Electric Railway, this city, entertained a number of friends on a trolley party recently.

James Butler, hitherto foreman for the Bridgeport, Conn., Traction Company, has been made superintendent of the entire line.

Charles Fleck, formerly foreman on the Jamestown, N. Y., Electric Railway, has been appointed superintendent of the line at Warren, O.

Alex. Flatland, general electrician of the Alameda, Oakland & Piedmont Electric Railway, has resigned and his place has been filled by H. Wolff.

Taro Adache, S. Mimura and T. Hiraoca, officials of the Japan railways, have been in Boston and other cities studying modern methods of rapid transit.

Marshall P. Campbell, of Williamsville, N. Y., has been appointed superintendent of the Buffalo, North Main Street & Tonawanda Electric Railway Company.

J. A. Hanna, New York, eastern representative of the McGuire Manufacturing Company, called on the REVIEW and other friends during his recent trip west.

E. J. Evans, the recently elected manager of the Waukesha Beach Electric Railway, has taken up his duties, and has a force engaged in putting the road in shape.

Frank X. Cicott, manager of the railway department of Pettingill-Andrews Company, Boston and New York, has sailed for Europe, to be absent about two months.

A. D. Titsworth has resigned as manager of the Richmond, Ind., City Railway Company, and E. Kessler, formerly superintendent, has been appointed to the position.

William Grauten, the electrician of the Hartford, Conn., Street Railway Company, has left the service of the company to engage in electric railroad construction at Cape Town, South Africa.

John C. Hamlin, a Syracuse electrician formerly in the employ of the Cortland & Homer Traction Company, has accepted the position of superintendent of trolley lines and electric lights at Syracuse.

W. Clyde Jones, electrical patent attorney, of this city, and president of the Chicago Electrical Association, and Miss Emma Boyd, were married at the home of the bride's parents, Paullina, Iowa, June 3.

President Frank Brown, of the Baltimore Traction Company, on June 6 sailed for Europe with his children. General Manager William A. House, Jr., will perform the duties of the position during his absence.

C. L. West, who has been superintendent of construction for the Irondequoit Park Railroad Company, of Rochester, N. Y., having finished the work has resigned. In accepting the resignation the company presented Mr. West with $100 in recognition of the good construction and prompt completion of the road.

Frederick H. Tidman has resigned the position of superintendent and engineer of the Orange, N. J., Crosstown Railroad to become superintendent of the Lake Ontario & Riverside Street Railway, Oswego, N. Y.

Charles Howell, claim agent of the Baltimore & Ohio Railroad at Pittsburg, Pa., has tendered his resignation to accept a similar position with the Pittsburg Traction Company. The position is a newly created one.

William H. Lucas, claim agent of the Metropolitan Street Railway Company, of Kansas City, has resigned, his resignation having taken effect June 1. On his return from a European trip he will take up general practice.

L. Wheeler, superintendent of the Alameda, Oakland & Piedmont Electric Railway, Cal., has left the employ of the company. The employes of the company gave him several handsome presents, in evidence of the esteem in which he is held. He is succeeded by a Mr. Fisher.

Parks Foster has resigned the presidency of the Toledo, Bowling Green & Fremont Electric Railroad Company, in order to give more attention to another road. He still retains a position on the directorate. S. C. Schenck, vice-president, will fill the vacancy temporarily.

William J. Fransioli, formerly chief clerk and private secretary to the late Colonel F. K. Hain, was on May 15, appointed temporary manager of the Manhattan Elevated Railway Company. He has been sixteen years in the employ of the company and it is expected that the appointment may be made permanent.

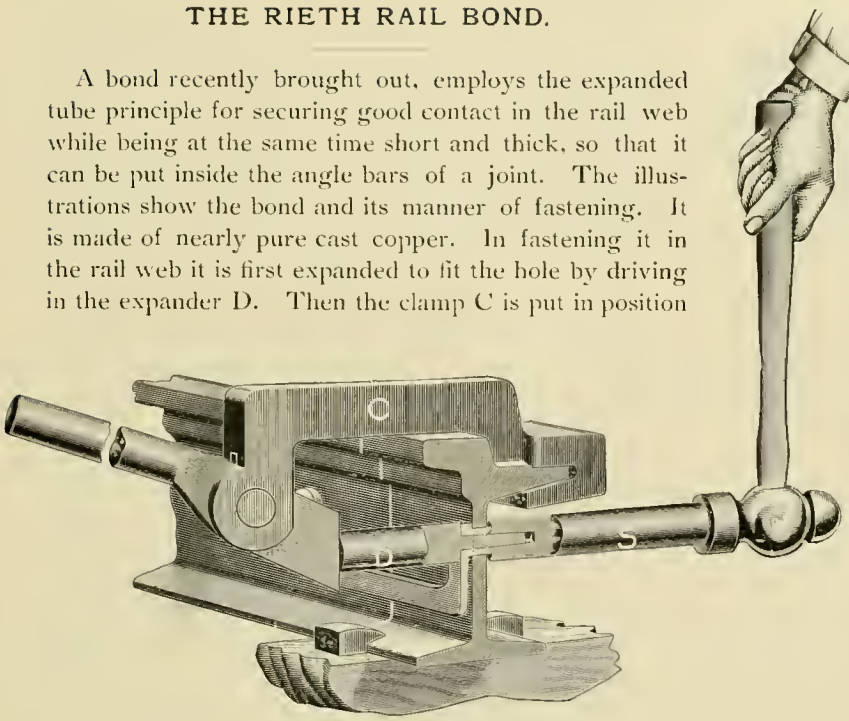
T. Commerford Martin has been appointed to represent the American Institute of Electrical Engineers, at the celebration of the jubilee of the professorship of Lord Kelvin, which is to take place in Glasgow June 16. During the trip he will lecture before the Royal Institute upon the power plant at Niagara Falls. Mr. Martin sailed June 6.

Henry G. Issertel, E. E., formerly with the H. W. Johns Manufacturing Company, of New York, has been appointed to the chair of Practical Dynamic Electricity in the National College of Electro Therapeutics, at Indianapolis, Ind. As the professional duties constitute an annual series of lectures Prof. Issertel will still continue his connection with the New York office of the Walker Company.

Armistead K. Baylor, of the General Electric Company, sailed for England May 23, to assume the position of European representative of the company. Though but twenty-eight years of age, Mr. Baylor has made a reputation in the electrical field. He has been for several years connected with the General Electric Company, both in the engineering department and as assistant to the manager of the railway department. The British Thomson-Houston Company, limited, is the licensee of the General Electric Company for Great Britain, and the connection of Mr. Baylor will be directly with that company.

THE RIETH RAIL BOND.

A bond recently brought out, employs the expanded tube principle for securing good contact in the rail web while being at the same time short and thick, so that it can be put inside the angle bars of a joint. The illustrations show the bond and its manner of fastening. It is made of nearly pure cast copper. In fastening it in the rail web it is first expanded to fit the hole by driving in the expander D. Then the clamp C is put in position

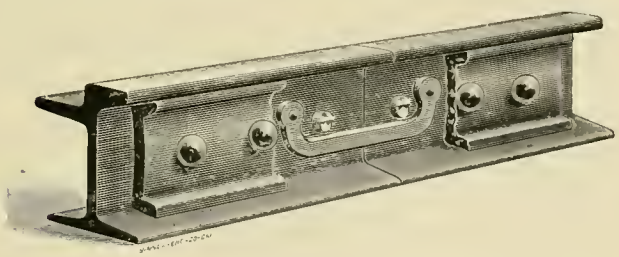


METHOD OF FASTENING RIETH BOND.

as shown and by driving the tool S the bond is both upset and expanded to a perfect electrical and mechanical fit.

A RAPIDLY GROWING CONCERN.

One of the most striking illustrations of the growth and development of street railway interests is found in a visit to the very extensive plant of the Sterling Supply & Manufacturing Company, which has increased its facilities each year since the start, and is still expanding, this month occupying another entire floor in the immense

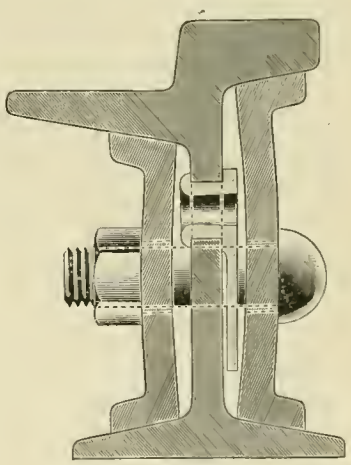


RIETH BOND.

building on Bank street, N. Y. The success which has attended the Sterling specialties is due first, to the excellence of the company's product and second to the fine executive ability of President Carson, who has maintained a high standard in the company's work, improved wherever improvement was possible, sparing neither money or effort to put out goods which would give entire satisfaction. Notwithstanding the fact that Mr. Carson is an intensely busy man, he has that happy faculty of doing several things at once and always finds time to entertain his friends most charmingly. As an evidence of the rapidly expanding nature of the Sterling Company's business, it need only be said that the record for 1895 showed double the business of '94, and that the present year will more than double last year.

In the register department all hands are being worked to the utmost capacity of the shops, but are now 300 registers behind orders. The additions now being made in shop room will facilitate future orders and insure prompt delivery. Among large users of Sterling registers is the Nassau system, Brooklyn; the Bergen County Traction; the Newburgh road; the entire Broadway system, New York City; Portland, Me., Providence, R. I., Richmond, Va., Traction Company, and many others. The Steinway, L. I., lines, use 100 Sterling registers. Mr. Benton, whose name is linked with the earliest efforts in fare registration and who has followed the business all these years, has charge of the mechanical department, and brings to his work an experience the fruit of many years.

The Sterling brake has proved a phenomenal success. One has only to watch the Broadway cable cars, or ride a few blocks on the line, to witness a constant demonstration of the good work of a most excellent and reliable brake. On no other line in the world is there greater need and necessity for a quick and easy acting brake, and the fact that after trying a few brakes for a few weeks, the management adopted the Sterling, is evidence that it fills the bill completely. Stops are made surprisingly quick, with a gliding, retarding motion, free from jar and jerk, and without locking the wheels. For the severe requirements of cable and electric cars the Sterling brake especially commends itself. The demand has already been large, is constantly increasing and the shops devoted to the brake department are filled with machinery and busy men. The visitor cannot fail to be impressed with the high class of the workmen employed, and the more than usually intelligent class of employes.



RIETH BOND.

President Carson has just reason to feel proud of the business he has built up; of the fine plant he has installed for manufacturing, and by no means least, of the satisfaction the Sterling supplies give to the many street railway managers who do not care to consider any other.

The Cleveland City Railway is equipping with Dederick fenders.

The Pierce Construction Company has begun work on the new Bradford, Pa., Electric Railway.

Geo. H. Knebel & Co., have sublet to W. H. Schott, of Chicago, the contract for building a street railroad at Madison, Ind.

Ludwig Batt has the contract to build the Maplewood extension of the Newark & South Orange Street Railway, Newark, N. J.

W. H. Basley, of Baltimore, has been awarded the contract to electrify the horse lines of the Pensacola, Fla., Terminal Company.

McCarthy & Woodward, 1332 Monadnock block, have taken the western agency for the Wheeler Rail Joint Company, of New York.

William D. Smith, of Bangor, Me., will grade and lay track for the Great Works extension of the Bangor, Orono & Oldtown Railway.

G. S. W. Brubaker, of Lancaster, Pa., is building the extension of the Reading & Southwestern Street Railway to Mineral Spring Park.

J. H. McLean & Son, of Coldwater, Mich., have been awarded the contract to build the Milwaukee & Waukesha Electric Railway, Milwaukee, Wis.

Pepper & Register, of Philadelphia, have been given the contract for the overhead construction of the Fairmount Park Electric Railway, Philadelphia.

The McGuire Manufacturing Company announces that J. A. Hanna is no longer in its employ, and its New York office will hereafter be in charge of P. E. Hirsch.

Charles A. Porter has been awarded the contract for the grading, masonry and track laying for the electric railway of the Fairmount Park Transportation Company, Philadelphia.

The Southern Construction Company, of Philadelphia, has contracted to build that section of the Stroudsburg & Port Jervis Electric Railroad lying between Matamoras and Milford, Pa.

The Elliott Frog & Switch Company, of East St. Louis, is subject to congratulations in having suffered so little damage from the tornado of May 27, as to be able to resume work June 1.

The Fairmount Park, Philadelphia, Transportation Company has let to Charles Porter the contracts for grading and brick and masonry work on the new trolley line through Fairmount Park.

The Laconia Car Company, Laconia, N. H., is doing a rushing business in building electric cars. There are at present employed 375 men, and the prospects are good for increased business.

According to a Providence paper, "six new bloomer cars and a trolley party car for the Woonsocket street railway have been received from the builders, the Laconia Car Company, of Laconia, N. H."

The St. Louis Car Company is building twenty-five summer cars, motors and trailers, for the Norfolk, Va., Street Railroad Company. They will be double seated and accommodate fifty or sixty passengers.

The John Stephenson Company has delivered to the Irondequoit Park Railway Company, six motor cars and four trailers. They are painted white with orange trimmings and a dark blue streak above the windows.

George Cradock & Co., wire rope makers, of Wakefield, England, desire us to inform the trade that T. A. Wigham is no longer in their employ as American representative. They are desirous of appointing agents in different parts of the United States.

H. W. Wright & Co., of Springfield, Mass., have been given the contract for excavating, grading and track laying on the Shelburne Falls & Colrain Electric Railway, Shelburne Falls, Mass. Fred T. Ley & Co. have the contract for bridge and stone work.

The Cleveland Engineering & Electric Company has been incorporated at Cleveland, O., to construct electric railways and lighting plants. The capital stock is $10,000, and the incorporators are H. F. Fishback, M. J. Cormack, A. J. Hale, T. J. Cannock and J. S. Matson.

The Shickle, Harrison & Howard Iron Company, of St. Louis, has made arrangements with Long & Cramer, formerly the General Railway Equipment Company, 643 Rookery, to handle its specialties for street railway service, including its well-known cast steel motor gears.

The Chicago Truck Company is filling an order for fourteen Curtis trucks, to be placed under open cars which the Wells & French Company is building for the Akron & Cuyahoga Falls Rapid Transit Company, and two trucks which will be placed under cars now in service.

The Watertown Engine Company, Watertown, N. Y., has established an office in New York City, at 39 Cortlandt street, in charge of L. Copleston, formerly with E. P. Hampson & Co. Mr. Copleston is familiar with the work and the requirements of the trade in that vicinity.

The Metropolitan Electric Company, of Chicago, is much elated over the success of its immense new catalog mentioned before in our columns. Orders for it have been received from all over the world, and it is highly praised for its comprehensive character and attention to details.

The Consolidated Car Fender Company, of Providence, R. I., has received an order from the Fall River Street Rail-

way Company for the equipment of all its cars with the "Providence" fender. The entire equipment includes fender, cushion and wheel guard for each end of the car.

The Corliss Engine Company, of Providence, R. I., has received from the Union Loop Elevated Railway Company, of Chicago, an order for three cross-compound engines having cylinders 30 and 60 inches, with 60-inch stroke and adapted to run at a speed of 75 revolutions per minute.

The Joseph Dixon Crucible Company is supplying the electrical industries with large quantities of flake graphite for lubricating cylinders of engines and the bearings of all classes of machinery, especially dynamos and engines. The demand for graphite resistance rods has greatly increased in the past few years.

Arthur S. Partridge, the well known street railway supply man of St. Louis, handles a full line of supplies for all needs in this direction, and has made it a point of having nothing on his list the merits of which he has not fully investigated. He has succeeded in building up an extensive business upon this basis.

The National Air Brake Company, 15 Cortland street, New York, is making rapid and satisfactory progress. Two mail cars in Brooklyn with the National equipment have developed surprising results on Fulton street, where the grade is very severe, and have proved absolutely reliable, where other brakes have failed.

J. G. Brill & Co., Philadelphia, have been given the order for 60 cars for the new Fairmount Park line of the Fairmount Park Transportation Company. The cars will have double trucks, and will seat from 60 to 75 persons. One-half of the order is for motor cars having four 30-horse-power motors, and the remainder are trailers.

A recent visit to the shops of A. G. Hathaway, Cleveland, presented a busy scene. The demand for turn-tables, wheel presses, Murray brakes, and other Hathaway specialties has necessitated running the shops both day and night. An interesting order is being filled, calling for twelve mail machines for Japan, with more to follow.

The Fairmount Park Transportation Company, Philadelphia, has awarded contracts for track construction, for generators and electrical equipment and for engines, boilers, etc., required by its park electric railway, to William Wharton, Jr. & Co., the General Electric Company and the Wetherell Engine Company, respectively.

The Brill Company has delivered a 2,500-gallon sprinkling car, mounted on a Brill No. 7 truck, and equipped with two 50-horse power Westinghouse motors, to the Chester, Pa., Traction Company. The car, with load, weighs 15 tons. The sprinkler is a rotary, and Superintendent Mac Fayden is greatly pleased with the car and its performance.

As we are going to press we are advised that the McGuire Manufacturing Company has been awarded the contract for fifty of its No. 26 double trucks for the Suburban Electric Railway Company, Chicago. The McGuire Company also secured a large order for the same style of truck from the Cleveland & Cuyahoga Falls Railroad, Cleveland, O.

The Electric Railway Equipment Company, of Cincinnati, has issued a handsome book of over one hundred pages, profusely illustrated with cuts of a full line of electric railway supplies. The company is an extensive manufacturer of wrought iron and steel poles for trolley or lighting purposes and of the various articles which go to make up an electric railway plant.

The Steel Motor Company has doubled its capacity since its removal to Johnstown, is now working night and day to the full extent of its capacity, and has orders for about four months ahead. The new type of motor recently brought out is giving excellent satisfaction. The new catalog is in the hands of the printer, and is nearly ready for distribution.

The Michigan Electric Company, of Detroit, has just moved into new quarters at 101 Woodward avenue. A four-story and basement building has been fitted up with everything electrical, and an unusual convenience has been added in the shape of a room on the second floor where customers may make themselves at home and read the papers pertaining to the trade.

The Phœnix Carbon Manufacturing Company, of St. Louis, claims to be turning out the best motor brushes for electric railways and substantiates the claim by a reference to the constant increase of its business. The general manager of the company, Colonel S. G. Booker, is thoroughly posted in the carbon business and endeavors to turn out the best goods in every particular.

J. Holt Gates has opened a store on the main floor of the Manhattan building, Chicago, and will carry a stock of C. & C. and other stationary motors, for 500 volt circuits and also some electric specialties. Mr. Gates has had a long experience in the sale of electrical machinery, as we presume all our readers know and will, no doubt, be quite a factor in this branch of the business.

The Brooklyn Bridge Trustees have awarded the following contracts for the bridge electric road: Babcock & Wilcox Company, Chicago and New York, 2 boilers of 400-horse-power; Southwark Foundry & Machine Company, Philadelphia, 2 engines of 600-horse-power; Walker Company, Cleveland, 2 generators, and Pullman Company, 20 cars, with electric equipment.

The Creaghead Engineering Company, of Cincinnati, has issued a very unique catalog of its electric railway overhead line material. This company was among the first to put out a line of flexible suspension material for bracket and center-pole construction while improvements have been made over the original patterns and many designs added as the catalog shows. The line of material this company now carries is very complete.

A rope manufactured by George Cradock & Co., of Wakefield, England, was recently removed for replacement with one of different size from the plant of the London Tramway Company which had made a record of 853 days. It had run 1,791,293 car miles without being the cause of a stoppage. The management believes that the rope would still be running had not causes other than its being worn out necessitated its removal.

The Lombard oil brake was recently tested on the Richmond Hill division of the Brooklyn Heights Railroad Company. Some improvements have recently been made to better suit the requirements of street railway service. The car used in the test was a long car with Brill maximum trucks and weighed about 16,000 pounds. Some very good stops were made in the course of the test. The oil used is under an air pressure of 220 pounds.

The La Rose Car Brake Company, of New Bedford, Mass., has recently been organized, and will take up the manufacture of brakes for street railway cars. Its brakes are in use on the Dartmouth & Westport Street Railway, of that place. Two forms of brake are made. The one for heavy cars derives its power from a friction disk on the axle. The brake for light cars consists of a system of compound gears operated by power from the ordinary brake staff.

The Taylor Electric Truck Company, of Troy, N. Y., reports an excellent business and the receipt of many unsolicited orders. Among the orders recently booked for double trucks are from Oakland, Cal., Portland, Ore., Lowell, Mass.; San Francisco, Cal., Omaha, Neb., and Camden, N. J. Single trucks are ordered from Albany, N. Y., North Adams, Mass., Grand Rapids, Mich., Fishkill, Plattsburgh and Cohoes, N. Y., and various other points scattered over the country.

The Burt Manufacturing Company, Akron, Ohio, is meeting with excellent success in the introduction of the Cross oil filter and purifier, and the testimony of a large number of users indicates that it is deserved by the merits of the device. The waste of oil in any large establishment amounts to a considerable percentage of the total quantity used, and as the lubricating qualities are not impaired except by the presence of impurities, the cost of a filter is saved in a very short time. The filter is sent on approval.

The Jackson & Sharp Company, Wilmington, Del., has recently taken orders for six double truck cars for the Saginaw & Bay City Interurban Railroad Company, to be equipped with vestibules and deck roof. Four are passenger cars and the others combination with baggage and express compartments. Of the standard open ten-bench type the company has arranged to keep on hand a large stock for rush orders. Recent orders for cars cover roads in many different states and a great variety of equipment.

H. E. Collins & Co., Pittsburg, Pa., are justly elated over the success of the Cahall vertical water tube boilers in use at the works of the Carnegie Steel Company. Two years ago a trial plant of 2,000-horse-power boilers was put in at the gas pumping works at Bagdad, and about a year later four more were put in at the Edgar-Thomson Steel Works and thoroughly tested. The work done was so satisfactory that arrangements have been made to tear out all the old boilers at three of the furnaces of the latter works and install enough of the Cahall boilers to furnish 5,250 horse-power.

J. G. Brill & Co., Philadelphia, are building twenty-eight large and handsome cars for the Akron, Bedford & Cleveland Electric Railway. They will seat forty-eight passengers, having double seats with an aisle through the middle. The interior finish is mahogany, the front end is vestibuled, and each car has a toilet room. The trucks are Brill's and each car has four 50-horse-power Westinghouse motors. The same company is also engaged upon an order for the People's Street Railway of St. Louis and for the Broadway and Lexington avenue line in New York, and upon large orders for a Buffalo road.

The Standard Paint Company finds that in spite of the many new insulating compounds on the market, for which great claims are made, that its business in P. & B. compounds is by no means being spoiled, and P. & B. is used more largely than ever before. Manufacturers do not care to take the risk of spoiling thousands of dollars worth of machinery by using some new and untried article. P. & B. armature and field coil varnish is used extensively by the Westinghouse Company, as well as many other large manufacturers and street railways. The company especially invites correspondence from those interested in roofing.

On a recent visit to the office of the McGuire Manufacturing Company we noticed that it had recently added to its elegantly finished office two handsomely framed diplomas, just received from the jury of awards of the World's Columbian Exposition, one for its well known and extensively used Star grain door for freight cars, and the other for its celebrated electric trucks, both single and double. The truck diploma has been on exhibition at Hyman, Berg & Co.'s, Washington and State streets, the last two weeks, and, being among the first received in Chicago, it has received a great deal of attention, the police being required to clear the sidewalk several times.

The Standard Underground Cable Company, Pittsburg, Pa., announces that it has completed arrangements whereby it is enabled to undertake the installation of underground systems of all descriptions, complete in every detail. It is ready to furnish quotations for the equipment of underground systems with cement lined pipe, vitrified clay, or wooden pump-log conduit, as may seem best under the circumstances, as well as for systems complete in every detail, conduits, manholes, handholes, cables, junction boxes, terminals, etc. The company has established a conduit department with F. S. Viele at its head as manager. Mr. Viele is an experienced practical engineer in conduit and cable construction, and the conduit department is sure to prove an important and successful branch of this company's business.

The Graphite Lubricating Company is receiving reports of excellent results with the use of graphite and bronze trolley bushings, a recent order given by A. & J. M. Anderson being for 5,000, after a careful comparison and test of various makes. The bushings have given good service—they are durable and require no oil and it is said that the graphite improves the electrical conductivity of the bearing. The Graphite Company was the original introducer of this system of lubrication and among the users of its material are now included the Ball Engine Company, Ames Iron Works, Shaw Electric Crane Company, Ball & Wood Company, American Engine Company, Jeffrey Manufacturing Company and many other important manufacturing concerns. The graphite is especially valuable in the case of light and fast running journals.

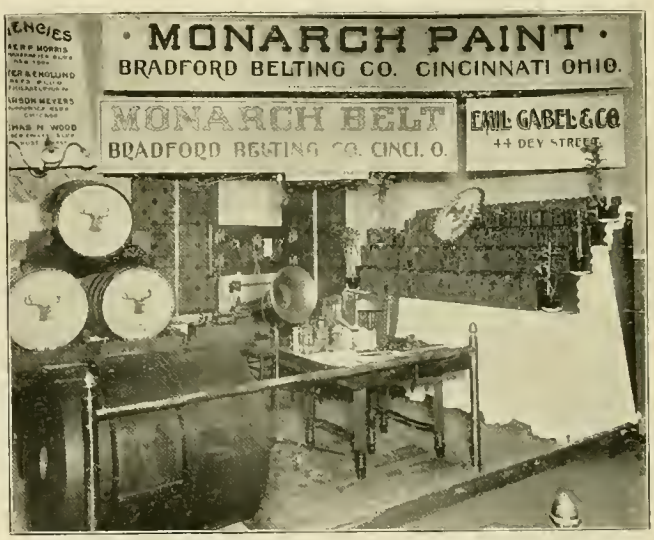
Warren Webster & Co., Camden, N. J., have issued a neat pamphlet devoted to a very complete description of their well-known vacuum system of steam heating. A considerable part of the book is devoted to a statement of the objections found in various systems, and of the manner in which the Webster system obviates them. The advantages in the regulation of temperature, in the expense and labor of operation and maintenance, and in preventing the waste of steam, water and fuel, are set forth as points which are fully guaranteed. The illustrations give interior and exterior views of their feed water heater, detail views showing the arrangement of combinations of steam and feed water heating apparatus, and of the exterior and interior of their commodious building and offices. The little book is creditable to the firm and interesting to the reader.

Edward Beadle, the veteran register man and manager of the Railway Register Company, New York, reports business in his line as showing a nice increase, and particularly in the demand for bell punches. Mr. Beadle is satisfied that for the deferential fares on interurban roads, where several rates are used on a single trip, that there is nothing like the bell punch for securing an accurate accounting with conductors. As our readers are probably aware, the method is to have as many colored slips of cardboard as there are rates of fare, and the conductor on collecting a 5, 10 or 15 cent fare, etc., punches out of the colored strip indicating the amount collected. The cuttings, which are securely held in the punch and can only be opened at the office, must tally with the total of the punched slips. The system, while less desirable than the fare register for one or two rates of fare, becomes very simple and serviceable on such a line as the the Cleveland & Elyria, or the A. B. C. road, where as high as eight different fare rates are in use.

The operative exhibit of the J. H. McEwen Manufacturing Company, installed at the Electrical Exposition held at Grand Central Palace, New York, during the month of May, and consisting of a 40 K. W. Thompson-Ryan multipolar generator direct connected to a 10 by 10 McEwen engine, received its due share of attention from the engineering profession and others who visited the show. Its compactness, pleasing outline and smooth running drew many highly complimentary remarks from the thousands of visitors, and in order to satisfy those who were interested from a practical standpoint, a water rheostat was provided, so that any desired load up to 50 per cent beyond the rated capacity of the dynamo could be thrown on and off at will. The normal capacity of the dynamo was 320 amperes at 125 volts and the test of throwing on and off 450 to 475 amperes instantly, with absolutely no sparking and without racing of the engine, was a suprise to all who witnessed the tests. Naturally enough the machines earned for themselves the verdict, "They can't be beat." Catalogs describing the above machines may be obtained free by addressing the company at 27 Cortlandt street, New York.

The Pintsch system is steadily growing in favor with street railway managers, and no better testimonial could be given than the statement that where it is once introduced both the company and the public are so well pleased with its work, that additions are soon made. The company's systems on Broadway line in New York, and on lines in Denver, Chicago, Kansas City, Washington and elsewhere, are giving perfect satisfaction. Producing plants are being established in all the large cities, among the most recent being Washington and Baltimore. The new interurban line between these two cities, and which will probably be the finest type of such lines ever built, will light all its cars with Pintsch gas. An interesting feature of the company's business is its rapidly growing use by the government for marine signal lighting. Floating buoys are now built which burn continuously night and day for 140 days and thus in most cases on the lakes have to be recharged but once in the entire season. The company has even built a few which burn 370 days continuously and which will not extinguish even when submerged for several minutes. As these buoys require no attention the saving to the government already runs into thousands of dollars over the old oil burning lamps which require constant attendance, and cost four times as much as the gas for operation.

The Bradford Belting Company, of Cincinnati, had one of the most attractive displays at the recent electrical exposition. The most interesting feature was probably the demonstration that was carried on at various times showing the



fire-proof qualities of Monarch insulating paint, of which this company has recently taken the exclusive control. Iron painted with this material was heated very hot with a torch, with no signs of blistering or burning the paint. Of course, there was an exhibit of Bradford belting also. Elmer P. Morris and O. M. Hubbard were in charge.

The Bradford, Pa., Electric Street Railway Company has elected officers as follows: President, Lewis Emery, Jr.; vice-president and general manager, H. L. Pierce; secretary and treasurer, Charles E. Hudson. It is expected that several lines will be completed prior to September 1.

It is stated that the deal by which the Second Avenue Traction Company of Pittsburg was to acquire the franchise and properties of the Homestead & Highland Company has fallen through, owing to the opposition of the owner of the Homestead bridge over which the line passes, who feared that the new owners might fail to operate the line.

NEW PUBLICATIONS.

Professor George D. Shepardson, of the University of Minnesota, sends us an announcement of the engineering departments of the university, which shows that institution to be keeping well to the front in these lines.

In spite of the fact that Duncan is dead, Duncan's Tram-Manual of Great Britain and the colonies is published as formerly, with its usual care and completeness. This is the nineteenth edition. It contains abstracts of accounts, directory of offices and firms and extract of tramways act—board of trade and metropolitan.

The C. W. Hunt Company, 45 Broadway, New York, has recently published a handsome work on the subject of "Manilla Rope." The work is copiously illustrated and contains a very complete history of the manufacture of rope with incidental illusions to the merits of "Stevedore" rope for transmission purposes. There is also added a large amount of technical information, with diagrams and tables for rope users.

Electrical Engineering in Modern Central Stations, by Lewis A. Ferguson, electrical engineer of the Chicago Edison Company, a lecture delivered before the students in the College of Mechanics and Engineering, University of Wisconsin, Dec. 7, 1894, has been published as one of the bulletins of the University of Wisconsin, and can be obtained for 35 cents. Mr. Ferguson takes up the electrical equipment of direct current lighting stations very completely.

The American Electrician is the name of a new paper published by gentlemen interested in the Street Railway Journal of New York. With it is incorporated Electrical Industries, the successful monthly formerly published in Chicago. It will be a monthly, and it is announced that its attention will be given to the industrial rather than the scientific phases of electrical work. Its contributors will be leading men in the electrical field. With its present backing this journal cannot fail to prove itself a strong and valuable acquisition to the trade.

"Press Working of Metals," by Oberlin Smith, is one of the most interesting works in the line of industrial literature which has recently appeared. There is no work in existence covering the subject fully, and of the author's ability to handle it adequately there is no necessity to speak. The book is to some extent a reprint of articles which have appeared in various technical papers, but the value is greatly enhanced by their collation in a single volume, and material additions have been made by way of illustration. The entire subject suggested by the title is thoroughly handled in the author's graphic style. No little value is added to the work as an authoritative book of reference by the knowledge that its contents are almost entirely the information derived from the writer's personal experience. The work contains 275 pages and descriptive matter, is assisted by 433 illustrations. John Wiley & Sons, New York, are the publishers.

WOODWARD-NORTON.

A. H. Woodward, secretary and manager of the International Register Company, was married at Jefferson, O., May 20. The bride was Miss Edith M. Norton, daughter of Mr. and Mrs. R. M. Norton, of Jefferson.

COMPRESSED AIR PROGRESS.

The Metropolitan Traction Company of New York is to do some experimenting with compressed air. The American Wheelock Engine Company is building a compressing plant for the trial under the patents of J. H. Hoadley. The daily press is greatly worked up over the trial and expects a great revolution in rapid transit.

The compressing machinery is being put in at the power plant of the Chicago General Railway at Thirtieth street and Kedzie avenue for a trial of the system of the Compressed Air Motor Company of this city. This is the system devised by Robert Hardie, of the Rome, N. Y., locomotive works.

THE Street Railway Review

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THE legal battle at Trenton, N. J., in which Mrs. Roebling endeavored to secure the removal of two trolley poles from in front of her residence, has been in litigation some time, and has attracted widespread attention. The company won in both the supreme and court of appeals, and the decision, which we print in full in this issue, is a valuable document for every manager.

THERE seems to be an impression in the minds of some that the efficiency of modern single reduction motors is higher than for some of the older types. As a fact, some of the first motors designed for street railway service can not be beat today for simple ecomomy of power in moving a car over the road in service. The trouble is they more than make up for this efficiency by the repairs they require.

A MOST interesting decision has been made in this city as to the validity of consents to build railway, where a consideration has been paid for such signatures. The judge rules, "It is unlawful because it is against the public policy of the state." At the same time he declares a city council to be a legislative, not a judicial body, and has no power or authority to summon witnesses and pass on the question of whether the consents are purchased or otherwise; and that after passing such an ordinance if it can be shown in court that less than a majority of the frontage was signed without compensation, then the ordinance is void. Some of the points raised are brought up for the first time, and the decision, which we print in full, should be read by every manager and street railway attorney.

TO AN outsider the reports on motor maintenance, which began in our May issue and will probably be concluded and tabulated in August, appear to be very dry reading, but to the man actually in charge of rolling stock they are full of interest, because they give him a chance to compare the efficiency of his methods with those used on other roads. One cannot help being impressed with the great diversity in every item in the reports. It is surely sound reasoning that what one road can do, another can do under similar conditions, and the best record is the one toward which to strive. Each manager, in plowing along in his own rut, imagines that he is taking care of his motors with the least possible cost, until he finds out what others are doing. Then there is likely to be a waking up.

THE Electrical Engineer, in editorially discussing the revival of the third rail, seizes the opportunity to make a thrust at the overhead trolley system, and comes out with this declaration:

"The more one contemplates the situation the stronger grows the conviction that the time will be very short, indeed, when the overhead trolley will disappear in all of our large cities, and with it will begin a new era in the prosperity and stability of the electric railway, both as a system of transportation and as an investment."

The statement gives evidence of two things: First, that for some time past in treating of conduit and underrunning trolley systems, the paper seems to be edited in the interest of the promoters of those systems, and hostile to the overhead. Second, that like other electrical journals, when they attempt to discuss practical street railway matters, they often fall into grievous error. We look upon the underground trolley system for surface roads with hope and favor, under certain conditions and for certain places. But "the more we contemplate the situation the stronger grows the conviction" that it will be a long time before the "overhead trolley will disappear in all of our large cities." No conduit system of electric railway has ever yet brought to its owners a "new era of prosperity and stability" which the overhead trolley would not have done in a still greater degree. The conduit system promoters claim their method of operation is, not cheaper than the overhead, but no more expensive! While in every case the interest account for the first construction cost has been several times larger than would have been incurred by the use of the overhead wires and trolley. It is sheer idiocy to claim that "as an investment" a system which costs $20,000 to $30,000 per single mile of track, exclusive of rails, to earn the same money which an overhead line would do for $5,000 a mile, with service every whit as good, will ever begin any "new era" of prosperity to

the railways. Conduit systems are expensive, necessarily so; and while there will come a time when it may be policy—we greatly question the economy—of installing such construction in the down-town business streets of the largest cities, there will always be 10 miles of feeder lines to one mile of the great arteries, in which the more expensive system is not warranted. Cities grow with sparsely settled districts all around the edges, and if the new territory is to be early served with transportation, the construction account must be as low as possible, consistent with good cars and good speed. The Electrical Engineer, by its thoughtless statement, or efforts to please the conduit people, has not rendered a service which will be specially enjoyed by managers of those many roads where the city government seizes every opportunity to oppress and hold them up.

While managers are very properly straining every nerve to increase the summer riding, and correspondingly the revenue, by pleasure resort attractions, trolley parties and similar inducements, they should not forget that there are other ways equally as commendable for the winter months. One of the best is the utilization of the exhaust steam for heating offices, stores, residences and public buildings. There are few cities where this system cannot be undertaken to advantage, and the installation once made, an additional source of revenue is secured, and during months when travel is smallest. Not even the occasional severe demands on boiler service during heavy snow storms, are sufficient to deter a trial of the plan; for wherever it has been commenced the results have been satisfactory, and followed by extensions of the mains One street railway of which we know, cleared last winter not less than $15,000 over and above all extra expense of producing the steam furnished. This, too, is all the more surprising, when we state the initial cost of the installation of mains and other necessary construction features was only $30,000. Occasionally a power house is so far remote from the district where supply could find many consumers as to make the project less attractive; but in nearly all cases there is a good business available if only the plan be understood, and the service furnished. That a reliable service can be furnished interests the consumer no less than the fact that the service can be had at an economy over present methods which strongly appeals to his bank account. While managers are striving to reduce expenses, and save in the various items of power-house expense, they are absolutely throwing away an immense amount of good heating steam which has a commercial value quite as determinable as the coal which produces it.

There is the widest difference of opinion among superintendents as to what should be the proper training for a motorman, and what duties should be expected of him. On one extreme is the man who teaches his men as much as possible about the theory of electricity and the working of the electric motor, gives his motormen each a kit of tools, and expects them to make small repairs and be familiar with the entire electrical apparatus of a car. On the other extreme is the superintendent that forbids his motormen to open a motor, and expects them simply to obey faithfully the instructions given them regarding the handling of the controller and brake. The former class of superintendents is by far the most numerous. True, many of them do not make any very vigorous efforts to teach their men, but they believe in teaching them as much as possible. The man who declares himself as against the education of motormen as to electrical matters, has been vigorously "sat down on" in the past, both by his brother superintendents and by editors and contributors in technical papers. This is but natural, as the man in this day who sets himself in opposition to education of any kind does not usually receive any applause from intelligent people. Nevertheless, we think the superintendent who professes to believe in the limited education of motormen is often misunderstood. The writer discussed the matter at length recently, in conversation with one of this class of superintendents, who has charge of several hundred motormen, and was forced to admit the soundness of some of the arguments in favor of confining a motorman's duties strictly to the brake and controller handles. This superintendent has had extensive experience with the plan of giving each motorman a set of tools, and trying to teach him to make repairs on the road. He maintained that in actual practice more trouble than good resulted from motormen tinkering with apparatus, and that with several hundred men it is out of the question to teach them enough so that they can be relied on to do the machinery any good when making repairs. He considers that motormen are hired for the purpose of running cars—not for the purpose of repairing them, and that the mixing of the functions of motorman and repair shop man is bad when it comes to actual practice, however nice it may be in theory. We do not wish to be understood as endorsing this view, but simply explain it to show that there is more than one side to the question, and that there are good arguments both ways. We think that neither extreme is entirely right, and that in time the best practice will simmer down to teaching a motorman the essential things that it is necessary for him to know in running his car. The superintendent should ask himself first, what are a motorman's duties, and second, how can those duties be best taught and enforced. To the first question the answer that naturally comes, is that a motorman is hired for the purpose of operating cars over the road on schedule time, with safety to the passengers and public, and minimum wear and tear on car and motors. What are the things that it is necessary for him to know in order to do these things best? First and most important, he must be taught to handle the brake with skill and judgment, for, as a manager once remarked, "we want to be able to stop whether we are ever able to start or not." This includes instruction on the flattening of wheels. Next after skill in the stopping of a car should come a knowledge of

how to start properly, and get a car over the road with the least possible consumption of power consistent with the time table. To do this it is not necessary that he should know even the first principles of electricity. It is simply essential that he should be thoroughly instructed in the handling of the controller. In teaching a man this, an ammeter on the dash is a very great aid, but no knowledge of electricity is required to note its variations. Now comes the question as to what emergencies should be prepared for in the education of a man. In the operation of a car there are a few minor accidents which are very liable to happen, and which will cause an annoying delay to traffic if the motorman is not prepared to remedy the trouble. With modern equipments and car-house inspectors doing their duty, almost the only troubles that will come up for the motorman to meet are the blowing of fuses and the breaking of the ground circuit by the car running onto dirty track. Possibly, also, loose brushes should be included in the list. Will any one deny that when a man has been really taught the things enumerated, and follows his instructions, that he will make a good motorman and valuable employe? True, it will do him no harm, and may do him good, to be an expert electrician in addition, but it by no means follows that he will make any better motorman than if he was not. After a motorman has been fully instructed in that which it is essential for him to know in operating his car, the kind of a servant he will make depends not on the amount of knowledge he has over and above that which is essential, but on his honesty in obeying the orders that have been given him, and his temperament. Some men are careless about obeying that which has been told them, others are physically awkward, and still others are naturally so reckless as to be unfitted. Any amount of education can not change these qualities in men, and they are the greatest evils the manager has to contend with in his motormen. Education is a good thing. There can't be too much of it in this world, but what the superintendent needs more than anything else just at present is something that will make the education he gives his motormen take root. A certain amount of education and practice are necessary in the evolution of an efficient motorman, but that there are these other things just as essential and important, is too often lost sight of in the general cry for education. The conductor that "knocks down" the company's fares, and the motorman that "knocks down" the company's rolling stock and power, are both dishonest, because they are disobeying orders which they are paid to execute. Methods of securing honest conductors, and seeing that they remain honest, have been in use long enough so that they have reached a fair degree of perfection. Hasten the day when satisfactory methods are available in keeping tab on motormen. We hope and believe that such methods are coming, and when they do come they will mark a great advance in the art. It is only within the past four years that steam road managers have realized the importance of keeping comparative records of the efficiency of their locomotive engineers. Records are not so easily kept in the case of electric roads, but surely the problem can be solved.

THE FIRST STREET RAILWAY GENERAL PASSENGER AGENT.

J. B. McClary, superintendent of the Birmingham (Ala.) Railway & Electric Company, writes us as follows: "In your April issue you state that the Brooklyn Heights Railroad was the first street railway to inaugurate a general passenger agent's department. I beg to correct this. We appointed a general passenger agent in June, 1892, and have had one ever since that time, except during the winter months, greatly to our advantage. I enclose a letter head used by our agent in 1892, and also a photograph of H. W. English, 'the first street railway passenger agent.' Next!"

H. W. ENGLISH.

LOADS OF LUNATICS.

Passengers whose actions on street cars give every evidence of being lunatics are by no means uncommon, but it is not often a road has to haul a whole train load of them. This sight was recently witnessed at Middletown, N. Y., when 300 female inmates of the asylum for the insane were taken out for an eight-mile trolley ride. They were in charge of twenty attendants and all appeared to enjoy the outing immensely. The 500 inmates of the male wards were taken out at another time.

NEW MEN ALL RIGHT.

There was big riding on the lines of the Milwaukee Street Railway July 4 and 5, and so successfully and safely were the large crowds handled Manager Wyman posted a letter of commendation at all barns the next day.

The letter closes with: "Such work speaks most highly for your general intelligence, enthusiasm and skill as street railway men, and we thank you for the earnestness you exhibited in the performance of your duties, and we wish to assure of our appreciation of your work.

A police lieutenant of Rochester, N. Y., has been called up before the police commission for violation of one of their regulations to the effect that no officer shall ride upon the street cars when on duty. It was explained that he had a long distance to cover and could not otherwise reach some of his men. The rule is not looked upon with favor by the day officers who have to cover more ground than night men.

THREE PHASE ELECTRIC RAILWAY AT LUGANO, SWITZERLAND.

(TRANSLATED FROM THE ELECTROTECHNISCHEN ZEITSCHRIFT.)

The multiphase system as applied to street railways has certain advantages and also certain disadvantages when compared to the direct current system. The principal objection made to it is, that on selecting either the two or the three phase current we must have two conductors above ground. If this question is carefully studied we find that the objection is not so weighty as at first sight it appears.

That which may be said to make the most unpleasant impression in general in connection with overhead conductors is the collection of poles, brackets, span wires, brace wires and guy ropes. It is not necessary to use an appreciably greater weight of copper for the two overhead wires than with the continuous current, so that the same supporting wires can be selected. The crossings and switches will, as a matter of course, be more complicated, but these can be simplified by taking the current at these places from one wire only, the other wire at the cross point not being in circuit. It is known that multiphase motors, when they are once in motion, can continue to run as single phase motors, and this property can be made use of at the crossings. But the double trolley here possesses an important advantage, which is, that two trolleys can take the current, and when these are properly arranged it is almost impossible for an interruption of the current to take place in both trolleys at the same time when passing points of suspension or curves. It follows from this that sparking is almost entirely avoided and, as besides this, alternating currents, when interrupted, produce much less sparking, the overhead conductors do not deteriorate to the same extent as with continuous currents.

Nevertheless, the principal advantages of alternating currents for street railways are the following: It is possible to serve an extensive network of track at a low cost for conductors and with an insignificant loss of power. As alternating currents can be transformed with very little loss and the transformers require no looking after, a current of high tension can be produced

LUGANO -THREE PHASE ELECTRIC ROAD.

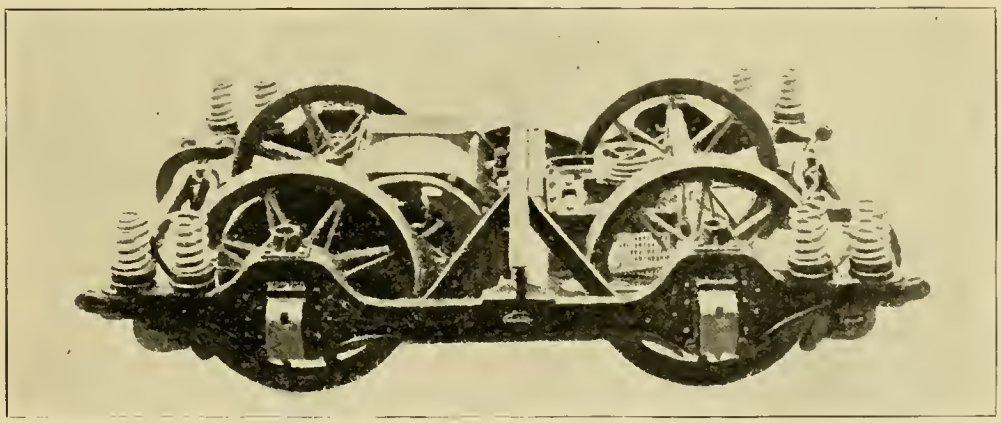
CARS ON THREE PHASE ELECTRIC ROAD—LUGANO, SWITZERLAND.

at the power station and conducted to the different points of the system where it will be most suitable to transform it down. In this way not only are heavy feeders unnecessary but the overhead work can be lighter.

It follows from what we have said that it is possible to employ a water power (which may be at a considerable distance) to run a street railway. It is true that this can also be done with continuous currents, if, for instance, we take a high tension continuous current or alternating current to the central point of the railway system, and there set up a converter station. This has though the disadvantage that the resultant working current is less and the cost of the installation is greater, inasmuch as at the converting station we have to have machines in motion and these necessitate constant attendance.

As to the motors, experience teaches us that multiphase motors, in consequence of their simpler construction, offer a greater guarantee for safe running. As one of the most important advantages, prominence

ture of such resistances is made easier and they are subject to much less trouble than in apparatus working with high tension continuous currents. With alternating currents there is in addition to this the advantage that there are no dangerous arcs at the switches. By means of the switch resistance in the armature circuit the rotations of such a motor can be varied at pleasure from zero up to that which gives a synchronous movement. Usually the resistance is altogether shunted out and the motor then has, as has been proved in practice, the great advantage that it continues to run at almost a constant speed, no matter what the variation in the load may be. When climbing a hill, as also when running down, the car keeps its normal speed without any regulation being needed, so that driving such a car is very much simplified. Further, a very important point should here be noted, which is, that the car, on running down hill, without any alteration in the circuits, feeds back current into the line and in consequence of this is automatically



TRUCK, MOTOR AND CONTROLLER ON THREE PHASE ROAD AT LUGANO, SWITZERLAND.

should be given to the fact that rotary current motors have no commutators, but at most possess collecting rings. Although it has been possible to so arrange continuous current railway motors that the commutators have not caused too much trouble, yet every one will freely admit that a motor which has no commutator is much to be preferred, particularly for street railway work, where extraordinary variations in the load are continually taking place and a supervision of the motor, in consequence of its position, is not possible. The common opinion that a multiphase motor cannot develop the same tractive force at starting that a continuous current motor can, is no longer correct. On the contrary, with an equal weight, the alternating current motor can produce a considerably greater starting power, as in such motors the induction in the iron, in the normal working condition, is considerably less than in continuous current motors and in consequence the sudden starting power can be very greatly increased. To control the speed the resistances in multiphase currents are switched into an armature circuit, the tension of which can be selected as low as may be wished. By this means the manufac-

braked to the extent that the speed cannot increase beyond a certain maximum.

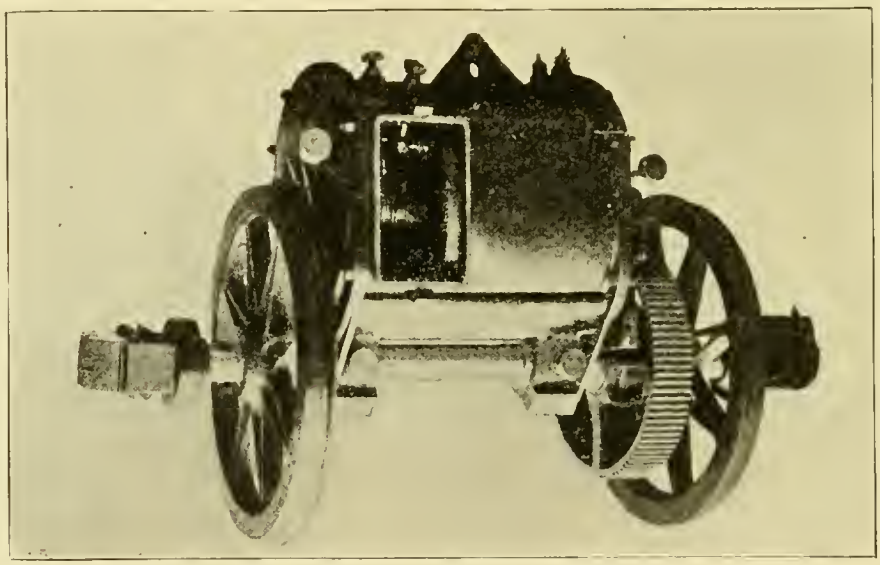
Respecting the first street railway built for the rotary current system it should be observed that about the middle of the year 1894 the firm of Brown, Boveri & Co., of Baden, Switzerland, was requested by the well-known firm of Bucher-Durrer, of Kerns, to prepare a plan for the railway at Lugano, and the definite order for carrying this out was given in February, 1895. The conditions of the undertaking are as follows: At a disance of about 7½ miles from Lugano, in the village of Maroggia, Bucher-Durrer possess water power, by means of which the city of Lugano has, for several years past, been supplied with electric light, by ordinary alternating current. It was required that this water-power should be used for running a street railway in Lugano and in addition to this supply power for the San Salvatore Mountain Railway, and for a few factories. The street railway makes a very convenient connection between the suburbs, in which there are numerous hotels and villas, and the city. From these data it can be seen that it is out of the question to bring from Maroggia a

continuous current of 500 to 600 volts. The erection of a conversion station was also too costly and associated with too much loss. The conditions, too, showed problems which could be solved by driving direct with rotary currents. Bucher & Durrer, therefore accepted from Brown, Boveri & Co., the solution they offered. The line would have been working by the middle of last year if difficulties regarding the concession had not hindered it. As to the final carrying out of the project the following may be said:

At Maroggia there is a 300-horse power, high pressure turbine supplied by Bell & Co., of Kriens. This has a horizonal shaft and is connected by means of a flexible coupling with a 150-horse power three phase generator. Its revolutions are 600 per minute, its tension 5,000 volts and its periodicity 40.

The arrangement of the generators is such that the transformers will be put in at other points. The transformers reduce the tension to 400 volts. The total length of track is about three miles and throughout the distance there are long stretches of grades up to 3 per cent. In three places there are quite short stretches of 6 per cent grades. The two overhead wires are about Number 4 and are put up at a distance of nearly 10 inches apart. The rail bonding is provided by means of a well rivetted copper strip. There is no separate earth return wire.

For the present there are four cars. Each car seats 24 passengers. A car has only one motor, which, by means of a simple spur gearing drives the axle with a ratio of 1 to 4. The car travels at a speed of about 9 miles an hour. On the car are two separate trolley poles, the one set about three feet behind the other. The motor is in a completely enclosed cast iron casing



THREE PHASE MOTOR AT LUGANO, SWITZERLAND.

armature is stationary and only the iron parts of the magnetic field rotate. Differing from the construction which is everywhere customary in these machines are the rotating pole pieces which are so disposed that they are not opposite to each other, but are put in so that the poles on one side always correspond to pole openings on the other. The advantages of this arrangement consist principally in this, that the armature coils are common to both cores. That is, armature winding goes directly through the two halves of armature and each half does not have a separate winding. The armature wires are placed in holes and are separated from the core by strong insulation tubes.

The exciting machine is on the same shaft with the generator and so arranged that its commutator is next to the bearing.

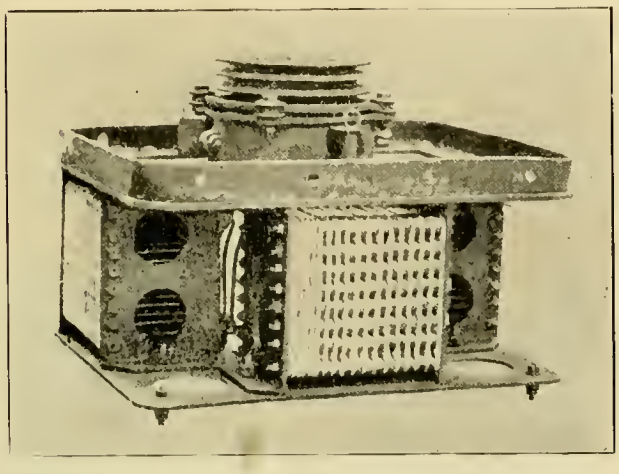
The conductors to Lugano consist of three wires of about Number 4 size, and for the present there is only one transformer station, which is at about the middle point of the system. Later on, when more cars are running, so that it is protected from dust and damp. By means of three contact rings the induced current is taken from the rotating portions of the motor and conducted to the regulating apparatus and regulating resistance. To permit access to the motor there is an opening at the top, which is hermetically sealed by means of a cover.

The car can be run from either platform. On the right of the driver is a grip for the hand brake. On the left is the regulator handle by means of which the car is set in motion and run at any desired speed, from standing, to 9 miles per hour. Besides this there is also a switch at the lower left-hand side, which alters the direction and at the same time serves for completely interrupting the current. As was before stated, the labor of regulating the speed which is imposed upon the driver is a remarkably easy one. In most cases he has only to set the lever for the full speed and the car runs up hill or down at a constant speed.

Out in the country, where a much higher speed is permitted and desired, the number of magnetic poles

can be reduced by a switch, by which the speed is correspondingly increased. A similar result can also be attained on such lines by working with a higher number periods. Where there are quite extraordinary grades to overcome the duty of the motor can be considerably increased by changing the connections of the winding (increasing the field density.) An increase of power of the motor can naturally be also accomplished in giving to those lines with steep grades a current of higher tension. This is quite easily done in consequence of the simplicity of the transformers.

If afterwards it is desired to work line with a smaller consumption of power, then the speed can be reduced



CONTROLLER FOR THREE-PHASE RAILWAY MOTORS—LUGANO, SWITZERLAND.

by feeding with a current of lower period number or, as already shown, by changing the pole number, so changing the speed.

The first trial runs of the Lugano Street Railway took place in December, 1895, and were in every respect satisfactory. As the road in whole length ran closely along side a telephone line it was to be expected it would influence the latter. In respect to this, trial showed that by means of insulated metallic return for the telephone this influence could be entirely removed. In consequence, an arrangement was made with the telephone company to carry out their work in this manner. Finally it may, perhaps, be of interest to state that these trials showed that on the steepest grades, which were about 6 per cent, the overloaded cars ran easily without there being any need to increase the intensity of field of the motor.

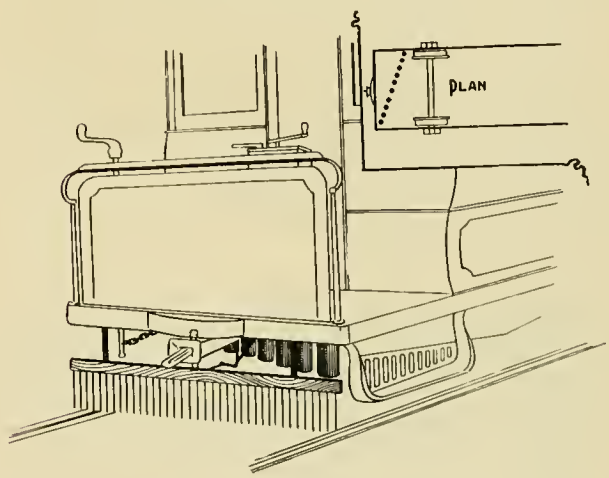
The Warren, Brookfield & Spencer, Mass., Street Railway Company opened June 1, and seemed to have struck the nail on the head at once as far as business is concerned. Though there are only three cars running the first day's business amounted to 2,800 passengers, while the records of the second and third days showed up 3,500 and 5,000 respectively. The line runs from Spencer to the town line of Warren, and the business has exceeded the most sanguine expectations.

THE GLASGOW SUBWAY.

The Glasgow subway, of which some description was given by the Review a little more than a year ago, is now approaching completion. We are informed by the contractors, Simpson & Wilson, that it is expected to open the line early in August with a five-minute service on each circle. There will be two 40-foot cars to each train, each car capable of holding 42 passengers seated and as many more standing. The service will begin with seven trains on each circle and the number will afterward be increased to fourteen It will be remembered that the line consists of two tracks covering a line which, generally speaking, is circular in form and six and a half miles in length. The difficulties in the way of the undertaking were prodigious, on account of the softness of the material through which the tunnel was bored, but the completion of the work gives such facilities for rapid transit to the citizens of Glasgow as they have never before known and such as few cities enjoy.

ROLLS 'EM OFF.

The editor of the Review recently came across a fender in his travels that was really new. The fender proper consisted of a row of rollers arranged shear plow fashion across the track in front of the truck. These are held up away from the track normally, but when an



NEW IDEA IN FENDERS.

object strikes the rake in front they are dropped to the ground and the victim is rolled to one side by the rollers. Whatever remains of the victim—that is what the pavement does not scrape off during the brushing aside operation—can then be taken charge of by the company's surgeon.

Members of the Street Railway Employes Association, Detroit, are endeavoring to bring about some arrangement for the punishment of children who jump on and off moving cars or who run across in front of the cars. The motormen are becoming gray with constant fears of fatal accidents for which they are liable to be blamed.

LAYING McROY CONDUIT.

In our issue of June we described a new vitrified terra cotta conduit in six-foot lengths that has been laid extensively by the Chicago City Railway Company this year.

This conduit, which is made by processes and machinery invented by J. T. McRoy, 915 Chamber of Commerce, Chicago, and who has it on sale, is much superior to short lengths on account of the less number of joints. The accompanying engravings show the process of laying this conduit and winding asphalted burlap around the joints. After these joints have been wrapped or wiped with burlap and the asphalt has hardened, they are almost as rigid as iron, and two six-foot lengths of conduit can be lifted about as if one piece. Street railways are more and more coming to the adoption of permanent construction with feeders, which means putting under ground, and while somewhat more expensive than

pole lines, has the very great advantage of absolute protection from damage to the wires by storm.

The telephone and lighting companies which have laid many miles of the McRoy conduit and the street railways which have used it, speak in warmest terms of the work.

ONE MORE CONDUCTORLESS ROAD.

"Burning Money to Use Conductors."

J. B. McClary, who as superintendent of the Birmingham (Ala.,) Railway & Electric Co., has made it one of the regular dividend paying roads of the south, writes us regarding the article in the Review on "Conductorless Roads," and says:

"Referring to the list of conductorless roads published in your April and June issues, I write to ask you to add this road to the list. We have one division, known as the City Lines, operating seventeen motor cars with fare boxes. We could not be induced to use conductors, believing it would be a dead loss to do so. We find we have fewer accidents than when we used conductors. One man on a car charged with full responsibility is more careful than two. We have one line seven miles long running to a park and lake resort, using six motor cars with trailers, where conductors are used. When trailers are not used, we think it burning money to use conductors."

S. C. PECK DIES IN MEXICO.

The electrical fraternity learned with general sorrow of the death of Samuel C. Peck, which occurred on board train while en route to Boston, where he was hastening to undergo an operation for appendicitis. He was the Mexican agent for the General Electric Company, and had been in the City of Mexico since 1890. Within twenty minutes after the receipt of the news of his death the two clubs, the American and the Jockey, were heavily draped in mourning, and the daily papers, both American and Spanish, gave long notices of his life and death. He was one of the most popular Americans in the City of Mexico.

A new electric line from Columbia, S. C., to the highlands north of the city was opened June 15. The line is known as the Suburban and Eau Claire Electric Railroad, and is operated by the Columbia Electric Light & Power Company.

TESTS OF HEAVY MOTOR CARS ON THE BUFFALO & NIAGARA FALLS ELECTRIC RAILWAY.

The past spring, H. P. Curtiss and H. O. Pond, seniors in Cornell University, have been carrying on a series of tests on the Buffalo & Niagara Falls Electric Railway, the results of which were presented to the university authorities in a thesis. Some of the tests are of unusual interest because they are on motor cars of a type and weight very little used at present, but which will probably be employed extensively in the near future. It is of importance, therefore, to electric railway engineers to know what they will do in service, and this is what the tests tell us. We have selected from the thesis such tests relating to the rolling stock as would specially interest our readers.

In making these tests the car and motorman were the same in all cases and the error of wind resistance was eliminated by selecting times when there was practically no wind.

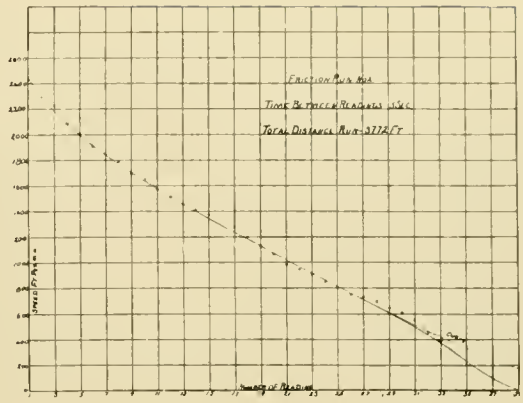
The rail is 78-pound girder laid on ties 2 feet between centers and rock ballasted. The track is for the most

part clean. Thus it will be seen conditions were favorable for good records.

The type of car, on which the tests of special interest were made has a 28-foot body mounted on double trucks. It is 36 feet over all and 8 feet wide. The seating capacity is 44. The greatest peculiarity of these cars is that they have a motor on each of the four axles. The motors are G. E. 800, but during the past winter these were found to be too light and are being changed for G. E. 1,000. The weight of car is 30,515 pounds. When out on the open country as during the tests the controllers of these cars (known as type K. 4 B.) are connected to start the cars with motors two in series and two in parallel, changing before full speed is reached to all four in parallel.

The tests of which we give results are: (1) Friction test of car. (2) Traction test of car (determined from friction test.) (3) Acceleration test of car. (4) Electrical test of car, determining the performance of the car and individual motors.

The friction test is something we believe has never



been made on electric cars before. Its main practical usefulness lies in the fact that it is one way of determining the horizontal effort in pounds per ton required to keep a car moving. If a car of a known weight moving at a known speed over a level track be allowed to come to rest by its own friction alone the friction can be determined by the formula.

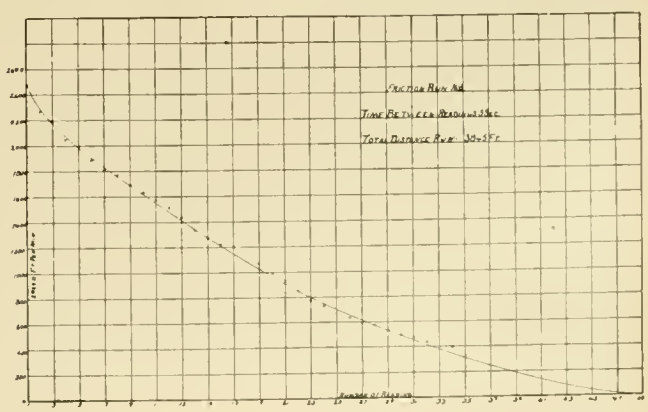
$$F = \frac{1}{2D} \cdot \frac{W}{32.2} V^2$$

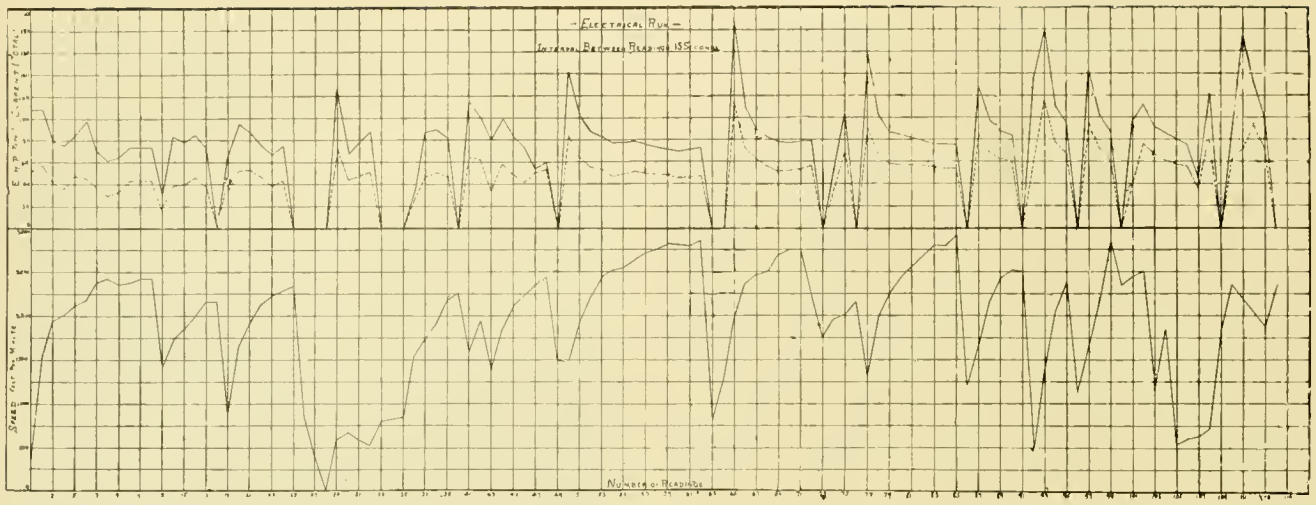
when

F = friction in pounds,
D = total distance run in feet,
V = maximum speed in feet per second,
W = weight of car.

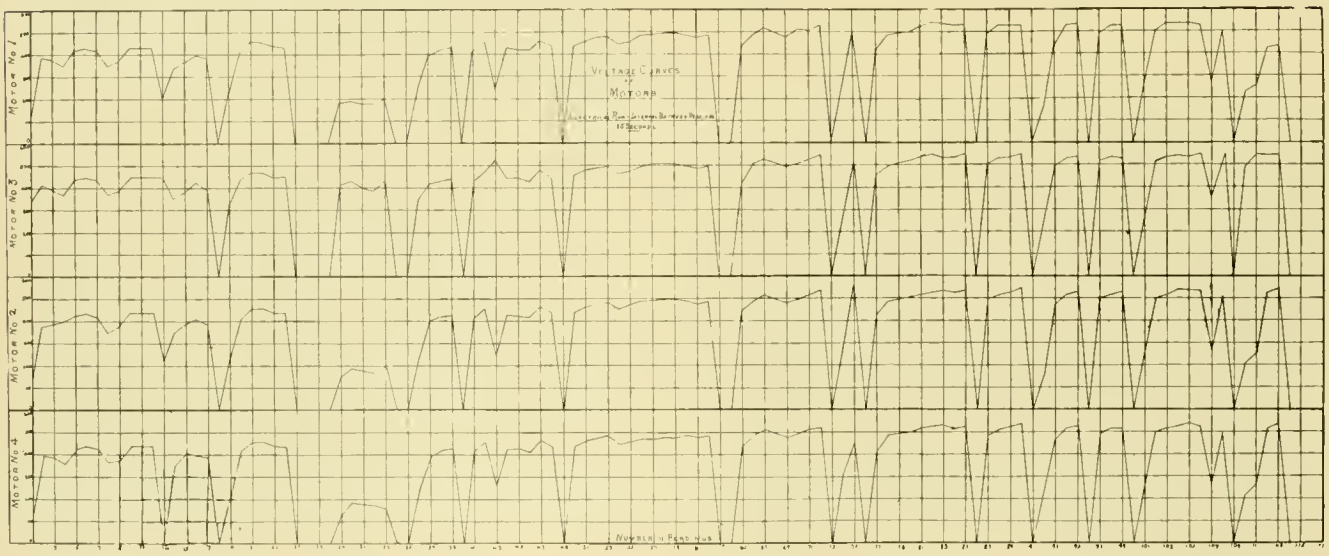
This formula gives the total friction of the car in pounds and is, of course, equal to the traction force or horizontal effort required to overcome the friction and keep the car in motion. To determine the coefficient of traction it is only necessary to divide the friction as determined in the test by the weight of the car. We show herewith the curves taken from the readings on three friction runs. Run Number 1 gives the friction of the car, (weighing 30,515 pounds) as 203.3 pounds, from which is derived a coefficient of traction of 6.66 pounds per 1,000 pounds weight. From run Number 2 the friction figures out 207.7 pounds or 6.86 pounds per 1,000 while Number 3 gives friction as 210.5 with a coefficient of 6.88 pounds per 1,000.

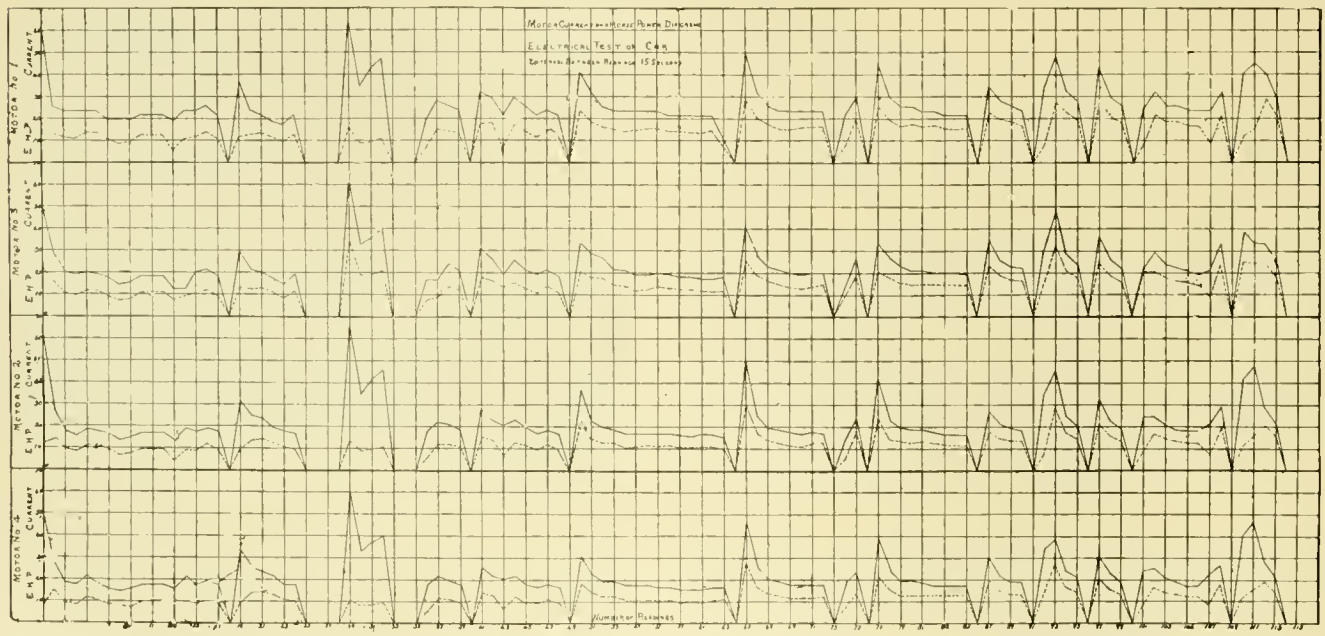
The starting or acceleration curves of three tests are shown here as they represent fairly the various condi-



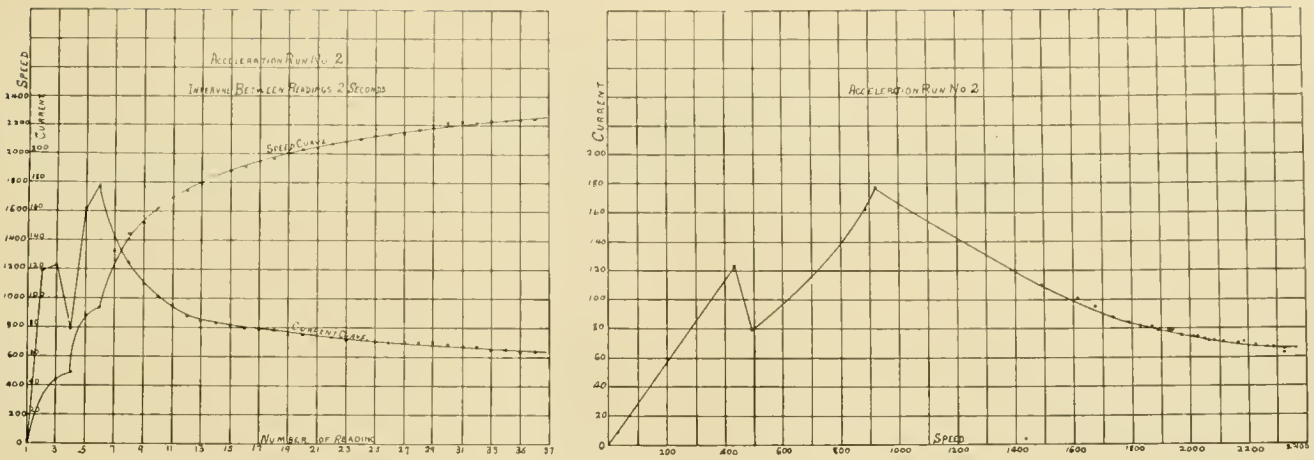


SPEED VOLTAGE AND HORSE-POWER OF 15-TON ELECTRIC CAR WITH FOUR G. E. 800 MOTORS—SPECIAL RUN.





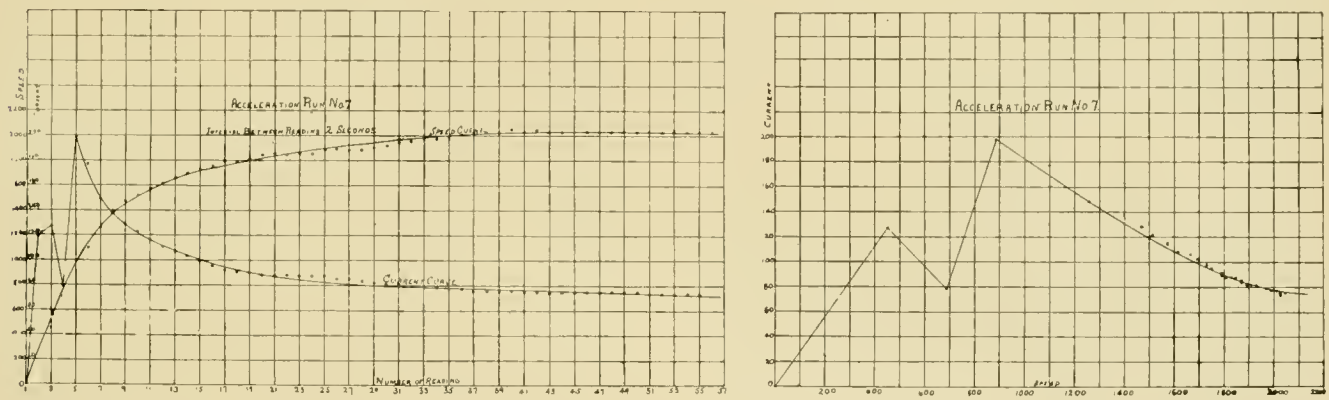
THE TWO ABOVE CURVES ARE FROM THE SAME RUN—MADE TO DETERMINE THE VOLTAGE AND CURRENT DISTRIBUTION BETWEEN THE FOUR MOTORS OF AN EQUIPMENT.



STARTING CURVES FOR 15-TON ELECTRIC CAR—FOUR G. E. 800 MOTORS. MAXIMUM SPEED ATTAINED 26 MILES AN HOUR.

tions. As stated before, the motors are started two in series and two in parallel and subsequently put four in parallel. They give a good idea of the performance of this class of rolling stock.

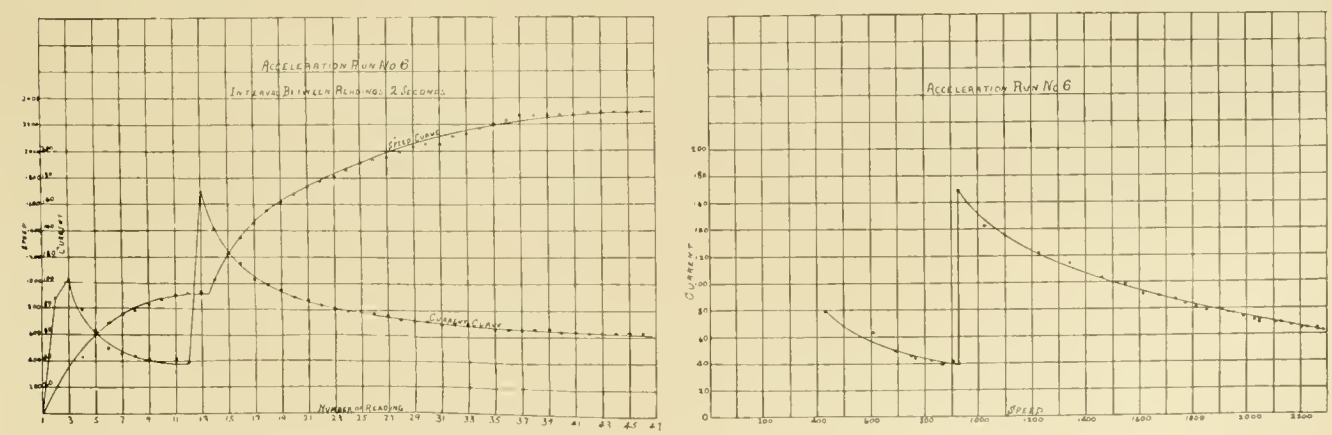
meter was connected across the brushes of each motor, one being also connected across the main circuit so as to give the potential of the line. A tachometer belted to the axle gave the speed of the car at any instant. The



STARTING CURVES FOR 15-TON ELECTRIC CAR—FOUR G. E. 800 MOTORS. MAXIMUM SPEED ATTAINED 25 MILES AN HOUR.

One of the most interesting tests was that to determine the current distribution among the individual motors of a car. During this test the car was equipped with instruments as follows: A Weston ammeter was placed in the armature circuit of each motor and a Weston volt-

time was measured with a stop watch and readings of all the instruments taken every fifteen seconds. The car was run as a special, making no unavoidable stops. It will be noticed by reference to the curves and data that when running with all four motors in parallel the



STARTING CURVES FOR 15-TON ELECTRIC CAR—FOUR G. E. 800 MOTORS, MAXIMUM SPEED ATTAINED 26 MILES AN HOUR.

current was distributed as follows: No. 1 motor took most, No. 3 next, then No. 4, No. 2 taking the least. With the other combination, that is, No. 1 and No. 3 in parallel and No. 2 and No. 4 in parallel and the two pairs in series, No. 2 always took more current than any of the others, and No. 1 took more than No. 3.

Another curve is given, showing the speed, line voltage, total current and total electrical horse power of the car during similar runs to the one just described.

AVERAGES.

The results of the complete series of tests are summed up in the following averages, which furnish useful information to electric railway engineers contemplating similar interurban service:

Average friction of car, equivalent draw bar pull	208.5 lbs
Average traction coefficient, pounds per 1,000	6.86 lbs.
Average acceleration horse power (this is not the actual electric horse power expended)	16.02
Average mechanical efficiency of car on straight level track at constant speed	63.37 per cent
Average voltage on line from several runs	513.10
Average current taken on trip over entire line	63.4 amperes
Average electrical horse power of car over entire line	40.44
Average speed in miles per hour	23
Maximum current taken by car during tests	188 amperes
Maximum pressure at car during tests	583 volts
Maximum electrical horse power of car during tests	143
Maximum speed in miles per hour on regular run	36
Maximum speed attained in miles per hour	42

NEW KIND OF JOKE.

The hero of the story, which comes from New York, is an actor who never loses his sense of humor even when his other faculties are "drowned out." He was riding up town one night with a load which would entitle the conductor to charge double fare and pompously asked the latter to "shop at Shurshevans Housh, main entransh." The conductor compromised on the north side of 29th street, where the passenger dismounted and disappeared in the bar of the Sturtevant House, cursing the company. While there he evolved from his fuddled brain a scheme of revenge. The convulsions of inward laughter aroused by the thought of his brilliant plan added so much to his top-heaviness that it was with no conscious effort that he lurched out across the sidewalk and fell prostrate upon the tracks in front of a rapidly approaching cable train. The crowd yelled and the gripman tugged at his brake, finally coming to a stop just clear of the prostrate form. Picked up and resting easily in the arms of the terrified conductor, he looked around with a smile of satisfaction until at last the sight of the conductor's uniform seemed to remind him of something.

"Shay,' ductor, thought y' said y' didn't shop ash Shurshevans Housh."

A company called the Metropolitan Railroad is seeking cross town franchises in Baltimore, and proposing to put in a conduit system similar to that of the Metropolitan Railroad at Washington.

UNPROFITABLE BUSINESS.

The London Electrical Engineer tells a good story about the opening of the new road at Dublin. "The Dublin and Dalkey Tramway Company, while waiting for the permission of the Board of Trade to open the line, have taken advantage of the interval to train their motormen and conductors, and for this purpose the cars have been running daily, no passengers, of course, being taken. An outside car man, who naturally thought there was nothing like horse-flesh, having observed the empty cars, remarked to his fare, "These new trams 'll never do." "Why?" was the inevitable question. "Sure, Sir, they've been running them for the past month, and the divil a passenger they had at all; the public won't thrust 'em. And how are they goin' to pay their way at that rate. There's nothin' like an outsider, Sir." But perhaps he only wanted to delude an ignorant "Saxon" after all. To make anyone prefer an outside car because it was a "safe" conveyance would rank high in the scale of blarney even among such accomplished practitioners as the Dublin car men."

METROPOLITAN GETS MORE.

The Metropolitan Street Railway Company, New York, has leased the Fourth avenue horse-car line, for a period of 999 years, at an annual rental of $350,000, exclusive of taxes, for the first five years, and $400,000 thereafter. These amounts are equivalent to 3½ and 4 per cent, respectively, on the capital stock of the company. The lease also includes for three years the use of the real estate now used for depot purposes with the option of purchase at the end of that period. It is supposed, however, that before that time the use of horses will be done away with and this property will not be required. The company will establish a liberal system of transfers to other parts of the system.

A KEEN EYED MOTORMAN.

A motorman was getting his sight tested by a doctor who lived in a house facing a large park. The doctor used to say to his patients, "Look over there and tell me what you can see." When the knight of the controller handle learned that his sight was to be tested, he arranged with his son to take his bicycle half a mile into the park and be oiling it. In due time our friend was led to the window, the doctor saying, as usual:

"What do you see?"

Peering out, he answered," I see a young man stooping beside his bicycle."

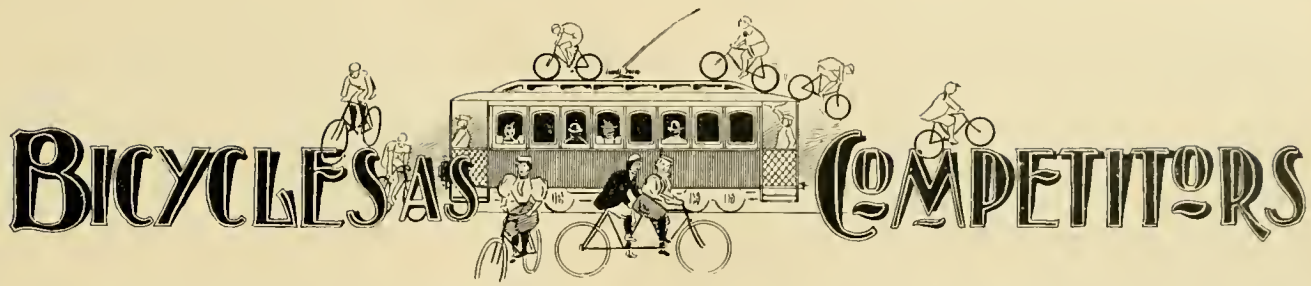
"Do you?" said the doctor. "I don't see anything at all."

"Nonsense," said the veracious brake-twister, "Why he is oiling it."

The doctor took up a pair of field glasses and plainly saw the same.

"Magnificent sight!" he said.

The motorman is still drawing his wages.



The remarkable popularity of the bicycle during the last few years, not only as a means of recreation and amusement, but also among business and professional men for utilitarian purposes, has caused considerable speculation—not to say anxiety—among street railway officials as to the extent to which the craze is cutting into their earnings, and as to the probable ultimate outcome. That some effect must be felt is apparent. It is only necessary to stand for a few minutes upon the street corners of any good-sized city to become impressed with the fact that as a means of locomotion the bicycle has become, within certain limitations, no mean rival to other longer known means of locomotion. Its use is not confined to any one class or condition of men. Business men and women are as frequently seen as the pleasure rider, and wearers of gray hairs come in a good second to the boys and girls.

The question that is of immediate interest, however, is not what proportion of the people ride at some time, but how many of them ride a wheel when they would otherwise patronize a street car. In some instances the apparent adverse influence upon the street car service is wholly or partially counterbalanced by the necessity of patronizing a car in order to get to or from a suitable spot for wheeling. This would probably only occur in cities whose surface is "on edge," like San Francisco or Kansas City, and where there is good wheeling ground outside the city limits. In other cases it is possible that the created habit of being in the open air increases street car receipts when conditions or personal inclinations are unfavorable to wheeling.

There is considerable difficulty in estimating with any degree of exactness the effects of bicycling, for the reason that the season for wheeling is coincident with the season when all roads expect and provide for a large increase of traffic. There is, therefore, no perceptible falling off in the number of passengers carried, and in most instances the number increases at the time when the wheels come most into use. The effect upon possible receipts can only approximately be arrived at by a calculation of the degree of natural increase as estimated, in comparison with the business actually done. Believing that an interchange of facts and opinions upon the whole question would be of interest and possible advantage, the STREET RAILWAY REVIEW has addressed letters to the management of a number of roads in widely separated localities, inquiring into the past and probable future effects of the rise of this formidable competitor in the public favor. The letter embraced the following series of questions:—

1. Have you noticed any perceptible falling off in receipts which may reasonably be charged to the use of bicycles? If so, to what extent?

2. Have you noticed any change in the number of passengers carried before and after the opening of the bicycle season?

3. Do you know approximately the number of bicycles in use in your city? What proportion of the riders would probably patronize your lines?

4. If any effect is noticeable is it increasing or decreasing?

The substance of the answers received will be given in condensed form, the name of the road replying being in some cases omitted at the request of the writer.

ATLANTA, GA.

Joel Hurt, president of the Atlanta Consolidated Street Railway Company, reports that no falling off in receipts on account of bicycles has been noticed. This, however, is attributed to the growth of the city and it is thought that business would be considerably greater but for the use of bicycles. No estimate is given of the probable increase or decrease or of the number of wheels in the city.

SAN FRANCISCO, CAL.

E. P. Vining, general manager, Market Street Railway Company, notices no change in receipts or in the number of passengers carried, but explains as follows:—"San Francisco is very hilly and the business streets are crowded and rather rough; hence it results that most of the bicycle riding for pleasure is done in and about Golden Gate park, and the number of men who use bicycles between their homes and their places of business is not large. Many who use bicycles for pleasure keep them in repositories near the park and take the street cars in going to and from the park. So far as can be judged this increase of business is nearly or quite sufficient to offset the decrease occasioned by those who use bicycles between their homes and their places of business."

PORTLAND, ME.

The Portland & Cape Elizabeth Railway Company, through H. R. McLeod, reports no perceptible falling off in traffic. This road is largely devoted to summer traffic and as the receipts constantly increase as the season advances the opening of the bicycle season is not

noticeable. There are from 2,500 to 3,000 bicycles in the city and the receipts would probably be a little greater if there were none.

PROVIDENCE, R. I.

There are 25,000 to 30,000 bicycles in the territory covered by the lines of the Union Railroad Company, but A. T. Potter, general manager, reports no perceptible effect, as receipts increased last year, although there would, without doubt, be a greater increase if bicycles were not in use. The number of passengers increases as soon as summer cars are put on.

A TEXAS ROAD.

The general manager of a road in Texas, in a town in which there are several hundred bicycles, reports that during the months of January, February and March of the present year, there was an increase of 10 per cent in receipts as compared with the same months of last year, but in the month of April the receipts were very much less than last year. This is attributed to the use of bicycles. The receipts for May were slightly in excess of those of May, 1895. He also states that among those riding bicycles are seen many former regular patrons who were in the habit of spending from 15 to 30 cents a day on the cars. About 30 per cent of the riders is the estimate of the number who were former patrons of the road. There is, however, one great advantage in favor of the railway company. When it rains the streets are in such a condition as to bar bicycles and if thoroughly sprinkled the result is the same. There are also a number of grades. The writer states that he has paid very close attention to the matter and believes that the number of wheels will soon decrease to some extent with a corresponding good effect upon street railway business.

BROOKLYN, N. Y.

C. L. Rossiter, president of the Brooklyn Heights Railroad Company, states that he is unable to answer the questions for the reason that summer travel is heavier than that at any other season and begins at the same time as the opening of the bicycle season.

DAYTON, O.

L. A. Scovil, superintendent City Railroad Company, thinks the use of bicycles makes quite a difference in receipts, but questions the opinion of the officers of another road in the city who think the falling off is 15 to 20 per cent. A change is noticed in the number of passengers carried during the bicycle season and he thinks daily receipts are cut quite seriously.

SALT LAKE CITY, UTAH.

The Salt Lake City Railroad Company writes us: "We have noticed a falling off in our revenue of $50 per day, about the time bicycles begin to be used in the summer season. On a clear, nice day more bicycles are to be seen in the street and our revenue falls off some. When it rains our receipts increase. If the day is hot our patronage increases as bicyclers don't like the heat. We have noticed a great many of our former patrons who now use bicycles. It is said there are 2,000 bicyclers in the city and we think we can safely say 50 per cent of them would patronize us. The effect is decreasing. We do not think bicycles are used as much this season as last, but the wet weather may be partly the cause."

CHICAGO, ILL.

M. K. Bowen, superintendent Chicago City Railway, believes his road loses 12,000 fares per day which may reasonably be charged to the use of bicycles, and states that the opening of the season is perceptible. There are, according to the estimates of dealers, 180,000 wheels in Chicago. The effect is at a stand-still or increasing slightly. The road is entitled to a natural increase each year, but how much that is reduced by the use of bicycles is a matter of conjecture.

ANOTHER ROAD

which has about 100 miles of electrically operated line estimates the loss occasioned by the 5,000 to 10,000 wheels in the city at $100 per day. From this standpoint it is peculiarly unfortunate since the bicycle season lasts practically the entire year. The only consolation offered is a belief that the effect of the craze is decreasing.

MEMPHIS, TENN.

The Citizens' Street Railroad Company has noticed no falling off in receipts and no change in the number of passengers carried except the usual increase for warm weather. The bicycles are numbered by thousands and riding is increasing, though without perceptible effect upon railway business.

MINNEAPOLIS AND ST. PAUL, MINN.

It is estimated that there are 20,000 wheels in the two cities and the loss in business is believed to reach $300 per day. Many riders, however, might be in carriages if not on wheels, and the sport has partaken so much of the nature of a fad as to suffer the fate of fads and begin to wane.

ANOTHER CITY

having 65 miles of road and 5,173 licensed bicycles furnishes the basis for a report to the effect that the increase from early spring to summer travel is not believed to be as marked as in years past, when bicycle riding was less common, but the receipts of the road reporting have so greatly increased owing to natural growth that it is impossible for it to state whether or not the proportionate increase would have been greater had there been no bicycles. It is thought that a difference in receipts is noticeable between good and bad bicycle weather, and as an offset that the use of bicycles during the fine summer weather very materially augments travel in bad weather and during the winter season, for the reason that people who once get into the habit of making quick time between their homes and places of employment soon become regular street car patrons. In this city it is estimated that 50 per cent of the riders would otherwise patronize the car lines.

WORCESTER, MASS.,

has 15,000 wheels, but the Worcester Consolidated Street Railway Company, through Superintendent J. N. Akarman, reports that there is not only no falling off in receipts at the opening of the season, but that there is on the contrary a large increase in the number of passengers carried.

CLEVELAND, O.

J. B. Hanna, secretary and treasurer Cleveland City Railway Company, figures that bicycles take approximately $350 per day away from his company. On account of the simultaneous opening of the best seasons for wheeling and for street car business, the change in number of passengers is difficult to determine, but of the riders of the 20,000 wheels in the city it is believed that at least three-fourths would patronize this line. The effects are increasing this year.

NEWARK, N. J.

The Consolidated Traction Company has noticed no falling off, but its receipts have constantly increased. The business is much greater in the summer. It is thought that of the thousands of bicycle riders none would patronize the lines for the trips taken on the wheel.

ALLEGHENY, PA.

The Federal Street & Pleasant Valley road is one of those fortunate roads which have received no detriment from the inroads of the bicycle. "No effect whatever," as D. F. Henry, president, says, but adds that this is possibly owing to heavy grades.

A WESTERN ROAD

in a city where there are about 18,000 bicycles, which number is increasing at the rate of about 1,000 per month, reports a falling off of about 5 to 10 per cent, according to the condition of the weather. The effects of the bicycle influence are increasing at a rate proportionate to the additions to the number of wheels.

A WISCONSIN ROAD

having as rivals in the business of transportation about 1,000 to 1,200 wheels has experienced no falling off in receipts, but a good healthy increase of 20 per cent for the month of May, 1896, over the business of the corresponding month of last year. The wheels in this city are used almost exclusively by young people for pleasure purposes, so few being used by business men that the superintendent of the street railways estimates that at a liberal estimate not 5 per cent of the bicyclers would use the cars.

MONTGOMERY, ALA.

The Montgomery Street Railway, by R. F. Scott, general manager, reports that there is no perceptible falling off in receipts that can be charged to the use of bicycles. Receipts increase in the summer season. Wheels are carried on the cars at a charge of five cents. Mr. Scott states that there are about 1,500 bicycles in the city, but that only a few of the riders would patronize the cars since they belong mostly to the wealthier class who would otherwise use their own carriages or patronize livery stables, or to laborers who would walk if they did not have wheels. The popularity of the wheel is thought to be on the wane.

PATERSON, N. J.

M. R. McAdoo, general manager of the Paterson Railway Company, informs us that every day traffic is affected to some extent, but it is impossible to determine how much. He considers that the effect is greater on Sundays than on other days for the reason that many people take an outing on the bicycle who would ordinarily patronize the street cars. The earnings of the road begin to increase in April and continue to be much greater during the summer than in the winter months. The number of wheels in the city is estimated at from 8,000 to 10,000.

BOSTON, MASS.

C. S. Sergeant, general manager West End Street Railway Company, writes us that a great many former patrons of the road use the bicycle between their homes and places of business and for pleasure riding, but is unable to say to what extent the earnings of the company are affected.

PHILADELPHIA, PA.

From information gathered by a representative of the REVIEW, during a recent visit to Philadelphia, it seems probable that the great amount of asphalt paving has proved to be such an attraction to bicycle riders as to affect the earnings of the street railway company to a considerable extent, though its earnings are increasing. The recent consolidation of the lines there makes the presentation of figures or definite conclusions impossible, but it seems probable that the use of wheels must cut into the street railway earnings to the extent of $2,000 per day or more.

M. J. SULLIVAN, DEAD.

It is with deep regret we chronicle the death of Michael J. Sullivan, which occurred at Washington, D. C., on June 12, of appendicitis. For several years past Mr. Sullivan has been active in electrical and street railway journalism, and was at one time editor of the Street Railway Gazette. He made his home in Chicago for several years, and it was here in 1894 he was married.

Mr. Sullivan possessed an unusually bright and sunny disposition, and his many friends will learn with sadness of the sudden ending of a life's work, full of promise, when it was only just begun.

A controlling interest in the Minnesota Point Street Railway Company of Duluth, has been purchased by Eastern parties, and necessary improvements will at once be made. It is supposed that electric power will be put in as soon as the investment seems to warrant it. G. A. Leland will act as president and superintendent in the place of Captain J. J. Hibbard who retires.

THE OUT-OF-DATE HORSE CAR.

The old order passeth, with horse cars as with all other things, and in St. Louis, Mo., the storm city, this passing away is complete. On the car barns at Jefferson avenue may be read the notice, "Horse cars for sale

OUT OF DATE.

cheap," and out at King's Highway, just before the recent blow, could be seen one of the disused cars, a good, sound, well built car, for which the owner informed us he had paid the street railroad company the sum of $10.

EXHAUSTED WIND SYSTEM.

Our readers can interpret the above title in any way they wish, provided they do not take it to mean that the wind of the inventor is exhausted. The Atmospheric Railway and Power Company has been organized at Baltimore to revive a traction system which died and was buried fifty years ago. The name of the company suggests a flying machine. It is not a flying machine, but it would be a good deal more likely to succeed as a means of transportation if it was a flying machine. Between the tracks, as in a cable railway, is laid a conduit. This conduit consists of a continuous tube with an endless slot at the top. In this tube fits a cylinder with a double headed piston. This is connected directly with the mechanism of the car. By the exhaustion of the air in the tube the cylinder is moved forward, propelling the car. A block system is used in the tubes, and the car is propelled from one block to the other by the exhaustion of the air between each block. Comment is unnecessary.

"L" CAR JUMPS THE STRUCTURE.

A motor car on the Lake Street Elevated, this city, in taking a switch on the afternoon of June 20, jumped the guard rails and plunged to the ground. In its fall the car turned completely over, landing on the roof. The fall was about thirty feet, and while the car was a total wreck, the motorman and three other occupants of the car who went down with it will all recover. The trail cars carried good loads, but did not go down, and none of the passengers therein were injured.

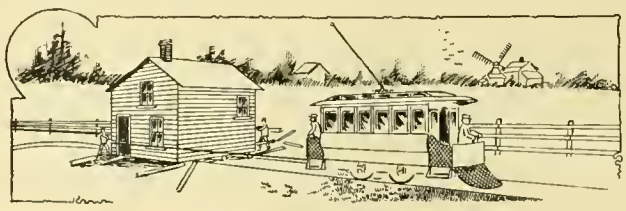
NEW ORLEANS BENEFIT ASSOCIATION.

The employes of the New Orleans street railway companies have taken so great an interest in their aid association, organized March 26, that of the 1,100 men over 700 already belong. The objects of the association are the ordinary ones—providing for members when sick or disabled and for their families at death. The association has branches at each of the six barns of the companies, and the business organization is composed of one member from each branch and four appointed by the companies. The benefits are fixed at $1 per day for total disability for six months, and 50 cents a day for the next six months, when benefits cease. In case of death the benefit to the family is the equivalent of 50 cents from each member in good standing at the time.

The association also binds itself to pay small sums in case of death of one of the member's family. Fifty dollars is the amount payable on the death of a member's wife or the mother of an unmarried member. It also pays $25 on the death of a child under 14 years and provides medicine and minor medical attendance. Each branch elects its own physician and selects its own drug store with the result of securing low rates. The dues are $1 initiation and 50 cents a month, aside from the assessments above referred to, but no assessments are levied so long as there is sufficient over $1,000 in the treasury to pay death benefits. The Traction Company has agreed to contribute to the association to the extent of $1,000 per year with a condition that it shall confine its discussions purely to relevant subjects. The officers are as follows: President, J. W. Kelly; vice-president, H. J. Dressel; secretary, P. Rudelhuber, and assistant secretary and treasurer, A. H. Ford. The originator of the association is President J. H. Maury.

HAULED A HOUSE.

A house which was being moved from Webb City, Mo., to a farm near by, became stranded on the tracks of the Jasper County Electric Railroad. Traffic was delayed for about three hours. Superintendent Fitch, having been summoned, had a cable attached to the



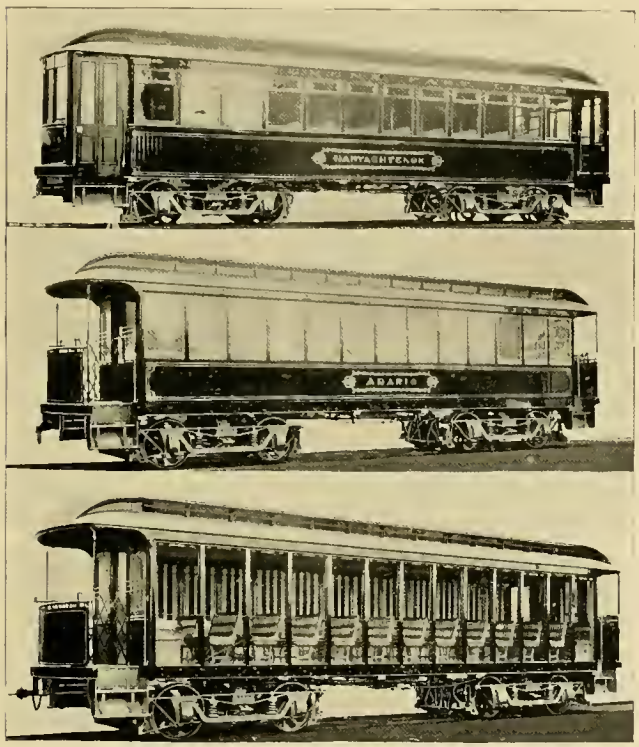
REMOVING OBSTRUCTIONS.

house and to an electric car. When the car moved, the house moved also—into the ditch, where it tumbled to pieces, a total wreck. The owner received no sympathy for his loss, as it was being moved for the purpose of shutting off condemnation proceedings which had been instituted against him to have the district school house placed on his land.

SOME CHOICE CARS.

The Barney & Smith Car Company, Dayton, O., has just completed an order for a large number of passenger cars for the Rapid Railway Company to run between Detroit and Mt. Clemens, Mich. The appearance is well shown in the accompanying engravings. As shown, the cars are of an unusual size and bear a close resemblance to such as usually run on steam-operated roads. They are all handsomely finished on both exterior and interior and the manufacturing company and the owners are justly proud of their appearance.

The first illustration shows the vestibuled closed motor car. These cars are 31 feet 5½ inches in length of



CARS FOR DETROIT & MT. CLEMENS.

body, 41 feet over all, and 8 feet 8 inches in width. The roof and hood are of regular steam car pattern and the vestibules have doors on each side. The sides are sheathed with narrow sheathing running up and down. The interior has rattan-covered reversible seats of the Wheeler "Walkover" pattern, tapestry curtains, basket racks, four tables and Baker heating system. The finish is bird's-eye maple. Trap doors let down over the steps making the platform the whole width of the car.

The second engraving shows a convertible car in winter rig. In converting to summer use the sash and the wood panels below are removed, and in place is attached a wire screen as shown in the third engraving. The convertible feature is thoroughly worked out in all its details and it would be impossible for one not knowing to detect its character. The wood panels are made water and storm proof. The appearance of the open trail car is also shown in the third engraving, being the same as described without the convertible feature.

The cars are all mounted on the standard Class F interurban motor trucks, are equipped with the Hunt air brake, and the body sills are heavily plated with steel. The exterior is painted a bright vermillion with letters and ornamentation in gold. The cars, as a whole, are as handsome and substantial looking as can be seen on any line in the country.

TRAMWAY TRACTION IN ENGLAND.

The Mechanical World, London, says: It is impossible to turn in any direction throughout the country without noticing the extraordinary interest which is being manifested in tramway matters in the large towns. Whether it be the question of municipalization of the tramways, or the substitution of improved methods of traction for those now existing, or a combination of the two, the remarkable fact is that the tramway question now towers above all others in importance and in engaging the public mind. On the one hand, the expiration of existing leases of tramway companies, or the expiry of the powers granted to them under the Tramways Act, 1870, has drawn the attention of local authorities to the question of municipalizing those lines now owned by others, and of working all the tramways for the common good. On the other hand, existing companies are impressed with the necessity for employing better methods of traction with a view to improving the financial position of their undertakings. It would, perhaps, be difficult to decide which party claims the most attention at the moment. As a municipal undertaking, the Leeds tramways may be said to come first by reason of the electric trolley system being adopted at the present moment. At Birmingham proposals are under consideration for the conversion of the principal tramways to electric traction, and at Manchester a committee of the Corporation report in favor of the tramway question being postponed until the expiration of the first lease in 1898, and that in the meantime powers to work the lines should be obtained. Various other towns are somewhat similarly placed. It is, of course, highly desirable that street locomotion on tramways should be effected by modern methods, but we doubt very much whether it be to the general interest of the public that tramways should be worked by local authorities. Certainly the framers of the Act of 1870 had no intention that such powers should ultimately be given to these authorities; but it appears, from the suspension of the standing orders of the House of Commons, that private enterprise must bow to municipal work and to—red tape.

The LaCrosse-Onalaska, Wis., Street Railway Company June 1 declared a dividend of six per cent, and the following named officers were elected: Frank Pooler, president; S. Y. Hyde, vice-president; J. E. North, secretary-treasurer, and Frank Pooler, J. E. North, F. E. Nichols, S. Y. Hyde and W. W. Cargill, directors.

STREET RAILWAY LAW.

EDITED BY FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Purchasing Consent of Property Owner to Use of Street for Railroad.

A common council of a city is a legislative and not a judicial body, and has power to grant the use of streets for railroad purposes, only when more than a majority of frontage petitions are presented. Property owners who sign a petition have no right to sell their signatures thereto, and an agreement to sign such a petition when made for a consideration moving to the property owner, is unlawful, and such purchased consents being unlawful, cannot form the basis of a valid ordinance.

An abutting property owner is entitled to an injunction restraining the construction of a street railway under an ordinance based upon an invalid petition; but one who owns land fronting on a street is not such a trustee for other abutting land owners on the same street as to entitle him to an injunction restraining the presentation of purchased petitions of other frontage owners to the common council.

Payne J., giving the opinion of the Court, said:

These are bills for injunctions filed by Levi Z. Leiter, John McMahon and some forty other property owners on Van Buren street against the Union Consolidated Elevated Railway Company of the City of Chicago, and a number of property owners on said street who have signed the consent or frontage petitions authorizing the passage of an ordinance for the Union Loop on Van Buren street.

No good purpose can be served by making a full statement of the bills, they are alike in all important particulars except as to the Clinton Lithographing Company, which will be discussed later, and raise the question:

Whether abutting property owners on a street can enjoin other abutting property owners on the same street from presenting to the city council purchased frontage consents for the passage of an ordinance for an elevated railway.

In the Leiter bill an injunction was issued without notice, and this is a motion to dissolve on the face of the bill. In the McMahon bill the motion is for an injunction on the face of the bill.

The facts are, that the defendant Elevated Railway Company called the Union Loop, desires an ordinance for a double track elevated road from Wabash avenue to the river, and a single track from the river west to a point near Halsted street, and has by purchase from the defendant property owners at the price of from fifty to one hundred dollars per front foot (and the consent of a railroad company, which it is claimed does not own the fee and cannot give consent) obtained a majority of the frontage between the points named.

It is contended that the frontage so purchased is fraudulent, and the purchase and sale of the same unlawful, but that the city council and mayor have no power or machinery to summon witnesses and ascertain the facts, and that the consents have been purchased is not disclosed to the council, and if the property owners are allowed to use or permit the use of such fraudulent consents the council will pass and the mayor will approve the ordinance, and the complainants will be without remedy.

The questions thus raised are raised for the first time. The doctrine invoked is, that land owners on a street in a city owe such a duty to other abutting land owners that they become trustees for them, and if they sell the frontage consents, or, more accurately, if they are paid a consideration to induce them to petition the council for the passage of an ordinance, the petition is not only fraudulent, but its use may, because of the trust relation, be injoined by a court of equity.

Under the city charter the city council has power to regulate the use of the streets. If no restriction upon this power had been imposed the whole subject would be under the control of the council. By paragraph 90, Sec. 1 of Art. 5, Ch. 24, as well as by the statute governing the construction of elevated roads, it is provided: that the city council shall have no power to grant the use of, or the right to lay any railroad tracks in any street in any city to any railroad company, except upon the petition of the owners of the land representing more than one-half of the frontage of the street in each mile proposed to be taken, and no petition shall be valid unless more than one-half in each mile sign the same.

This statute is a plain and manifest limitation upon the power of the council. Loose expressions may be found in some opinions to the effect that the action of the council in determining the amount of frontage represented is a judicial or a quasi-judicial act; such a position cannot be sustained by reason or authority. The common council is a legislative, not a judicial body. It has power to grant the use of the streets for railroad purposes, when, and *only* when, more than a majority of the frontage petitions are presented. The statute not only says it shall not have power to act until such petitions are presented, but in the same paragraph adds this significant language.

"No petition of land owners shall be valid unless the same shall be signed by the owners of the land representing more than one-half the frontage of each mile and the fraction of a mile of such street proposed to be taken."

If the council acts upon a petition representing less than a majority, such a petition by express legislative act is invalid, and an ordinance based upon it is not simply voidable but void. The frontage petitions are as necessary to give power to the council as the service of process is to give jurisdiction to a court.

If the council should assume to determine the amount and validity of frontage represented, and should in the most solemn manner declare that more than a majority was represented, and it should turn out that such was not the fact, the situation would not be changed. The question is, was there in fact more than a majority represented, not what the council may have supposed to have been the fact.

The manifest purpose of the legislature was to place the control of the streets so far as the right of a railway to lay tracks in, or use the same, in the control of the owners of a majority of the frontage.

These cases involve the relations sustained by these frontage owners to abutting owners, and to the public.

The supreme court of this state has recently made a most wholesome decision touching this question. In Doane v. City Railway Company, 160 Ill., 22, Mr. Justice Magruder, speaking for the court, said:

"The abutting property owners, who sign the petition, and thus put in motion the legislative action of the common council are to a certain extent charged with a duty to the public. As the rights of third persons, and of the general public, are thus affected by the action of the property owners who sign the petition, they have no right to sell their signatures thereto. Public policy requires the unbiased and uninfluenced judgment of such signers." Again, "An agreement to sign such a petition is an agreement to influence the common council, and when made for a consideration moving to the property owner is unlawful."

And in another connection he said: "It is certainly true, that the owner of property abutting upon a street, the fee of which is in the city, has the right of ingress and egress to and from his premises by means of the street. This right is an interest in the street appurtenant to his property which is distinct from the interests of the general public in the street."

This case leaves no question as to the validity of purchased consents, they are unlawful, and being unlawful can not form the basis of a valid ordinance.

Nor should there be longer room for doubt as to the right of an abutting property owner to maintain a bill to enjoin the construction of a railway under an ordinance based upon an invalid petition; his interest in the street is manifestly different from that of the general public, and, besides the right of ingress and egress, the value and use of his property is affected. It is no answer to say he can sue at law and recover damages. The rail road company must comply with the law before it can say to a property owner, you must accept damages.

If courts adhere to the position that a railroad may be built under a void ordinance, and the land owners can not enjoin, but must sue for damages, the statute which I have discussed is thereby repealed, and the Bill of Rights which declares that no person shall be deprived of life, liberty or property, without due process of law, is plainly violated.

To say the Attorney-General must take action affords no adequate remedy, for the individual cannot compel him to act.

An adequate remedy means a complete remedy to which a person may resort at will and which he can control; 54 Conn. 244. What has been said leads up to the new question involved in the cases at bar, that is:

Are the owners of land fronting on a street, under the act in question, trustees for other abutting land owners on the same street, and can such owners who may be injuriously affected by purchased petitions enjoin the presentation of such petitions to the common council? It is too much to say that the case of Griswold v. Brega, 160 Ill., 490, recently decided by the supreme court, is chiefly relied on as authority to sustain this position. A careful discussion of that case is therefore necessary.

* * *

In the arguments for complainants it was rather assumed than proven by authority, that the relation of trustee existed. I am of opinion that such a relation does not exist. That abutting property owners owe a duty to other abutting land owners, to act in good faith is clear, but they owe the same duty to the public, different in no respect, except in degree.

Good faith is always due from man to man, but this duty, or a violation of good faith does not create the relation of trustee or enable one suffering to go into court and compel the observance of good faith.

The duty here involved, touches the question of public policy. If it was lawful to sell frontage consents, no one would contend that an abutting property owner could treat his neighbor as a trustee. It is not unlawful because of any rule of property which would create the relation of trustee. It is unlawful because it is against the public policy of the state. This does not create a relation between property owners, but renders the petition unlawfully purchased, invalid, and prevents them from conferring power upon the council to pass the ordinance.

I am also of opinion that these bills are premature.

A court can never act upon the assumption that a co-ordinate department of the government will fail to do its duty. If the council refuses to pass the ordinance, or if passed, and the mayor vetoes it, then the action of the court, should the bills be sustained, would be useless. A court of equity will never do a useless thing, the remedy must be exercised to enjoin action under the ordinance if it is passed. In reaching this conclusion I am not unmindful of the fact that these bills are brought because it has been held that a bill cannot be maintained by a property owner, to enjoin the enforcement of an ordinance claimed to be invalid. Notwithstanding such decisions, I am of opinion that such a remedy exists and will ultimately be found adequate.

The injunction in the Leiter bill must be dissolved, and in the McMahon bill denied, except as to the Clinton Lithographing Company, as to that, the owner of the fee, in the absence of authority to the tenant has the right to enjoin the tenant from signing a frontage petition.

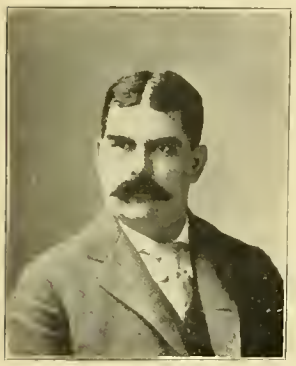
(Superior court of Cook County, Illinois, May 1896. Leiter vs. Union Consolidated Elevated Railway Company, 1 Chicago Law Journal weekly 262).

The Metropolitan Street Railway, Kansas City, has adopted the Minneapolis plan of gates, which prevent passengers from getting on or off a car, except when the car is at a standstill, and the motorman opens them.

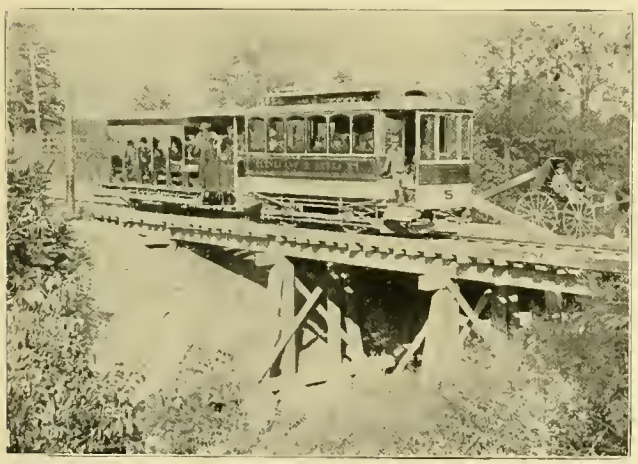
A SUCCESSFUL INTERURBAN.

One of the prettiest summer rides in the whole country is that afforded by the Cleveland & Elyria Electric Railway, whose lines connect Berea and the two cities named. The distance from Elyria to Cleveland is twenty-one miles, and the branch to Berea, which diverges from the main line about six miles out of Cleveland, is four miles, making a total of twenty-five miles. The Berea branch has been in operation two years and still retains its old corporate name—the Cleveland & Berea Street Railway. Except where a short cut is made across private right of way the track is laid at one side of the old government road all the way from Cleveland to Elyria, and is shaded by gigantic elms and maples. The settlement all the way is dense for a rural district, and the visitor is at a loss to tell where Elyria ceases and Cleveland begins. Many roads in cities have outside lines which show less settlement. Naturally this provides a large amount of revenue in addition to the through travel, which is heavy. The run of twenty-one miles is made in an hour, and even this time may soon be reduced. In addition to passengers the American Express have a good service with collecting and distributing depots and teams at each terminus. The cars are commodious, cross seats with center aisle, and were built by the Jackson & Sharpe Company, Wilmington, Del., on Dorner & Dutton trucks. The motor equipment is two 50-horse-power Westinghouse. Air brakes are used. At the power house, which is one of the best arranged we have seen, are 700-horse-power of E. P. Allis engines and 1,000 of Sterling boilers. The rail is a 56-pound shanghai T and the overhead work Ohio Brass Company's with 00 trolley and 0000 Roebling feeder wires.

A very interesting feature is the long transmission. It was fully intended to erect two power houses, but experience has shown that no difficulty is found in transmitting the thirteen miles from power house to Elyria terminus. The generators are two 250-Westinghouse.



F. T. POMEROY,
General Manager.



CLEVELAND & BEREA TRAIN.

CLEVELAND & ELYRIA TRAIN.

CLEVELAND & ELYRIA ELECTRIC RAILWAY—BRIDGE OVER ROCKY RIVER.

CLEVELAND & ELYRIA ELECTRIC R. R. CO.

DAILY TRIP REPORT

DATE _____ 1896

Trip No.	Car No.	Time	Number of Passengers at 5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	Tickets Collected	Fare	No. of Passengers	Express	Total Amount Collected
1		E																				
		W																				
2		E																				
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4		E																				
		W																				
5		E																				
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6		E																				
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7		E																				
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TOTALS.																						

CONDUCTOR

TRIP REPORT FOR OFFICE USE.

A few miles out of Cleveland the line crosses South Rocky river bridge 100 feet above the water. The structure is 1,219 feet long, with a 32-foot roadway paved with brick. The bridge was built by the King Bridge Company, of Cleveland, and is one of the notable bridges of the state.

There are nine points between which 5-cent fares are collected, the through rate being 40 cents, the round trip 75 cents. The regulation of collecting differential fares has always been one of the knotty problems for interurban lines, but Secretary Akins has invented and applied for a patent on a cash fare receipt which works nicely. Our cut shows the form of slip which is put up in books of 100 each with a serial and book number. When fare is collected conductor doubles the slip and with one cancellation punches through both parts, cutting the points between which fare is paid. One part is then torn off and given the passenger as a receipt and the other is turned in to the office.

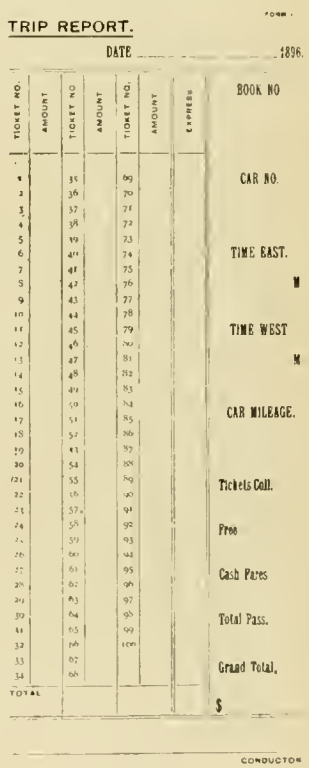
Two forms of trip reports are used, one for conductors and the other for office. An inspection of these will explain them.

WEST.	EAST.	BOOK NO.	SERIES	No.
Lorain St. Dep't	Elyria	740	AA	74000
Rockp't Station	Town Line	CLEVELAND & ELYRIA ELECTRIC R. R. CO.		
Kamms or Rocky R. Bridge	Ridge-ville	CASH FARE RECEIPT for Single Trip, Round Trip and Express. Passengers should retain RECEIPT until destination is reached. See that amount paid is punched in margin. Good for RETURN TRIP between places punched until canceled.		
South Dover	County Line			
North Olmsted	North Olmsted			
County Line	South Dover			
Ridge-ville	Rocky R. Bridge			
Town Line	Kamms or			
Elyria	Rockp't Station			
	Lorain St. Dep't	35 30 25 20 15 10 5		Express Half
CANCEL O		40 45 50 55 60 65 70 75		

Patent Applied For.

INTERURBAN FARE RECEIPT—CLEVELAND & ELYRIA.

CLEVELAND & ELYRIA TRAIN IN SNOW.



CONDUCTOR'S TRIP REPORT—CLEVELAND & ELYRIA.

A HANDSOME CATALOG.

The catalog just issued by the American Car Company, St. Louis, is one of the most attractive and complete we have ever seen. In addition to about 250 excellent illustrations of car interiors and exteriors, trucks, etc., there is included a feature as novel as it is useful and attractive, in the form of ten lithographed plates showing the development of various color schemes by which one may gain an accurate idea how any combination of colors will appear. The company's cars and trucks are in use upon ninety-nine roads in various states.

COST OF MOTOR MAINTENANCE

PART III.

The following reports are a continuation of the work taken up in two previous articles, the object of which was fully explained in our May issue.

(23) THE BUFFALO, BELLVUE & LANCASTER (N. Y.,) RAILWAY

operates 6 motor cars, each equipped with two W. P. 50 motors and K controllers, and 1 electric locomotive with two W. P. 50 motors and K controllers. This locomotive is wound for slow speed and handles from 5 to 25 steam road freight cars a day. The equivalent of 3½ men is employed on the inspection and maintenance of trucks and electrical car equipment. Two men, half time, repair electrical equipment and test it. Two and one-half men inspect and repair trucks and motors. Part of the time of some of these men is put on other than motor and truck work, hence the fraction. The monthly pay roll is $185 for truck and motor maintenance, or $26 per car per month, including the locomotive. The passenger cars average 5,000 miles per month. Commutators, brush-holders and connections and bolts are inspected daily. Tests for grounds are made weekly. Overhauling takes place monthly. At this time armatures and fields are tested, armatures removed and thoroughly cleaned, commutators turned down if necessary and "entire equipment from trolley to truck cleaned and put in perfect order." Motor axle bearings are of brass and last 20 months and over. Brass armature bearings last 12 to 14 months. It is found that commutators need turning down about every 60 days. Steel gears last 18 months and steel pinions 12 months. Motor maintenance costs $.0041 per mile and truck maintenance $.0023, making a total of $.0064. Materials for motor and truck repairs cost $.0026 per car mile, leaving the labor $.0038.

(24) H. L. C.,

the superintendent of a road in the north central states reports the operation in winter of 16 Westinghouse number 3 motor equipments with Westinghouse series-parallel and rheostat controllers. During the summer this is increased to 20 or 30 motor cars and 5 trailers. He says: "Our labor force consists of 1 blacksmith, 1 truck man, 1 winder, 1 carpenter and painter combined (this man does not count on motor and truck maintenance.—EDITORS), 1 car inspector on duty from noon till midnight, and 2 night men that grease and look over cars. The cost of these men is $413 per month. We do our own armature and field winding, build our own commutators, do all car wiring and changing from winter to summer bodies, all lathe work, and all repairs on motors and trucks. We give motors and trucks an all around overhauling twice a year, and never allow the slightest defect to run any longer than the time it takes to get the car in for repairs. Being a practical electrician and mechanic of eight years experience in the street railway business, I find that good inspection and careful attention to small things avoids many a large expense. I would be pleased at any time to compare expense of operating with street railway men, condition of trucks and equipment considered.

(25) THE NEGAUNEE & ISHPEMING STREET RAILWAY & ELECTRIC COMPANY

operates 3 cars equipped with two Thomson-Houston S. R. G. 30 motors. Two men are employed to take care of them, but all of their time is not put on trucks and motors. The labor for truck and motor maintenance amounts to $100 per month, or $33 per car. Motors are inspected every day and overhauled every night. Motor cars average 1,800 per month, making the cost of labor for maintenance $.0185 per car mile. Axle bearings of posts 0 metal last 4 months. Brass armature bearings last 1 year.

(26) THE KINGSTON, ONT., PLYMOUTH & CATARAQUI ELECTRIC RAILWAY

has 12 double and 1 single equipment of G. E. 800 and W. P. 50 motors with K and K_2 controllers. The maintenance force consists of 4 men, 3 of whom work in the daytime, and consist of 2 blacksmiths and 1 winder. Cars average 3,600 miles a month. Motors are inspected and commutators cleaned every night. Every month they are opened and thoroughly cleaned and overhauled. Some bell metal axle bearings have lasted 2½ years, and are still running. On the commutator end of armatures bell metal, and on the pinion end babbitt, last about 9 months.

(27). THE ELMIRA & HORSEHEADS RAILWAY,

of which J. B. Cahoon is general manager, operates regularly 12 motor cars of various makes. The force consists of 2 machinists and 2 inspectors, or 4 men, not including 1 painter and 1 carpenter. The machinists work daytime, the inspector at night. Armatures and fields are sent away for repairs. The daily inspection consists in cleaning all running parts, wiping dirt off motors, filling grease cups, seeing that brushes are in good condition, brakes properly adjusted, trolley all right, and all repairs made as called for in the daily reports of motormen and conductors as to condition of cars. Once a month motors are removed from cars and put in perfect condition. The average monthly mileage of motor cars is 4,710. On the G. E. 800 equipments brass axle bearings last 9 months. On Edison and Westinghouse equipments babbitt is employed, and lasts 12 months. The average life of armature bearings is 7 months for both brass and babbitt. The average life of

armatures is given as 2½ years for Westinghouse number 12, 3 years for Westinghouse number 3, and for the G. E. 800, unknown.

(28) THE BIRMINGHAM RAILWAY & ELECTRIC COMPANY

through J. B. McClary, superintendent, reports that his company regularly operates 23 double equipments, of which 17 are G. E. 800 motors with rheostat control and 6 G. E. 1,000 motors with K_2 controllers. Besides this the road has 14 G. E. 800 single equipments and 2 G. E. 1,000 double equipments for special occasions. They are housed at two barns. The total force of men employed to keep up this rolling stock is 11, of which one is an armature winder and the balance common labor. The day force is 8 and the night force 3. Monthly pay roll is $450 making $20 a month per car in regular service. The total average mileage of motor cars is 87,000, making the cost of labor for maintenance $.0051 per car mile. Inspection is made nightly for small defects and monthly the trucks are taken out from under a car and motors taken apart. Axle bearings of brass and babbit last a year and armature bearings of brass 4 months.

(29) THE PLAINFIELD (N. J.) STREET RAILWAY

has 6 cars in steady service, of which 4 are S. R. G. 30 single equipments, 1 a W. P. 30 double equipment and 1 a G. E. 800 double equipment. They are taken care of by 1 man working days (who sometimes has a helper, and 1 night watchman who also cleans cars. Armatures and fields are sent away for repairs. Inspection is made every night and motors are taken apart and overhauled once a month. The average monthly mileage of motor cars is 4,000. Brass axle bearings run 50,000 miles, and brass armature bearings about 40,000 miles. The average lives of armatures are 1 year for the S. R. G. 30 and W. P. 30 and 1½ years for the G. E. 800. Steel pinions last 6 months, rawhide pinions 4½ months. New armatures usually run a year before trouble from breaking of wires begins.

(30) THE MARINETTE (WIS.) STREET RAILWAY

operates 5 motors cars the year round, which number is sometimes increased to 10. They are cared for by 1 day man and 1 night man. An inspection is made nightly.

(31) THE WHEELING (W. VA.) RAILWAY

has 5 double equipments of W. P. 30 and 20 of G. E. 800 motors with K_2 controllers. Sixteen are operated daily. The force employed on these is 6 day men and 4 night men. There is 1 armature winder, 1 machinist and 1 blacksmith. The balance are common repair men.

(32) THE ASHLAND & CATLETTSBURG (KY.) STREET RAILWAY

owns 4 Westinghouse number 3 single motor equipments and 1 Walker number 5 single motor equipment. Four and 5 cars are in regular service. Two repair men are employed, 1 for day and 1 for night,—the pay roll being $60 per month or about $15 per car. The total monthly mileage is 19,095 so that repair labor costs $.0031 per car mile. Armature winding, babbiting of bearings and trolley repairs are done at the car house. Other work is done at railroad shops near by. The superintendent inspects cars every morning. Motors are thoroughly cleaned once a month and every three months bearings are rebabbitted whether they need it or not. Axle bearings last 18 months,—composition bronze being employed in them. Armature bearings of babbitt last three months. The average life of armatures on this road is 22 to 26 months. New armatures run 8 to 12 months before trouble from breaking of wires begins. The method of testing adopted by Mr. Niles at Indianapolis is to be used.

(33) THE ANDERSON (IND.) ELECTRIC STREET RAILWAY

has in regular operation 8 cars, of which 3 are Thomson-Houston S. R. G. 30, and 5 Westinghouse number 3, all with double equipments. There are two extras besides these. The maintenance occupies almost the entire time of 2 men, both doing general work. Motors are inspected about once a week, at which time brushes are taken out and placed in oil over night, loose joints are looked for and bearings and controllers are oiled and inspected. Overhauling takes place every six months, when winter equipments are changed to summer, and vice versa, at which time bearings and gears are renewed. Motor cars average 3,000 miles a month each. Babbitt axle bearings last from 1 to 1½ years, and brass 3 years. Babbitt armature bearings last 1 year. Some brass armature bearings have been running 3½ years.

(34) THE KINGSTON CITY RAILROAD, RONDOUT, N. Y.,

has 10 double equipments of W. P. 50 and G. E. 800 motors, with type K controllers, of which 4 are in regular operation. To keep the electrical and mechanical parts in running order requires the equivalent of the time of 2 men, but as an extra motorman and an extra conductor put in part time on repairs, the pay roll can not be divided. Commutators are turned down and wheels bored and pressed on at an outside shop. Motors are looked over every night, and only overhauled when necessary. The motor cars average 2,000 miles per month.

(35) THE OAKLAND, SAN LEANDRO & HAYWARDS (CAL.) ELECTRIC RAILWAY

operates regularly 16 cars, but owns 31, as follows: Nine W. P. 50 double equipments, 1 G. E. 800 double equipment, 1 double 25-horse-power Westinghouse equipment, 20 W. P. 50 single equipments. Motor and truck maintenance requires the services of 9 men and 1 boy. The day force consists of 1 foreman, 1 machinist, 1 armature winder, 2 men on trucks, 1 blacksmith, and 1 boy helper in the shop. The 3 men on night inspection divide the work by 1 man looking after and oiling bearings, 1 man looking after trolleys, and 1 on controllers. The pay roll is $540 per month; monthly mileage per car, 6,300; cost per car in service per month for maintenance labor, $33; cost per car mile for repair labor, $.0052. Inspection is made every night,

and every month motors are taken apart, armatures are blown out with compressed air and repainted, new brasses are put in if necessary, and commutator turned down. Phosphor bronze axle bearings last from 24 to 26 months. Armature bearings of phosphor bronze last from 50 to 60 days. The average life of armatures is 4 to 5 years. Gears of best steel last 18 to 20 months, and pinions from 6 to 7 months. New armatures usually run from 12 to 18 months before wires begin to break. Motor and truck maintenance costs $.0139 per car mile, of which material costs $.006.

(36) THE CARBON COUNTY ELECTRIC RAILWAY, MAUCH CHUNK, PA.,

operates 4 Westinghouse number 3 double equipments, with D controllers, and has for summer use another car with 2 Westinghouse number 12. A night man and a day man do all repair work. The pay roll amounts to $99, or $25 per car per month. A thorough looking over is given each car every two weeks. Axle bearings of the best Magnolia babbit last 12 months, and armature bearings of the same material last 6 months. The armatures the company has, have been running 3 years without a burnout or the breaking of a wire. Malleable gears last 18 months. Steel pinions last 2 years.

(37) A SOUTH EASTERN ROAD

operates 15 cars, of which 6 are G. E. 800 double equipments, 3 Edison number 10 double equipments with G. E. type E. controllers, 6 Edison number 6 single equipments. Electrical and mechanical repairs are taken care of by 7 men and 2 boys, all working during the day. The pay roll is about $335 per month. This is $22 per car per month. The cost per car mile for repair and inspection labor is $.006, and for repair materials the same. Every 30 days motors are given a slight overhauling, and every 90 days are taken apart and thoroughly cleaned and worn parts renewed. Axle bearings of babbit run 40,000 miles. Armature bearings are made of scrap brass and phosphor tin and run 16,000 miles. The average life of Edison armatures is 25,000 miles. Edison steel gears last 1 year or 40,000 miles. Rawhide pinions last 70,000 miles, steel 150,000.

(38) THE STOCKTON, CAL., ELECTRIC RAILROAD

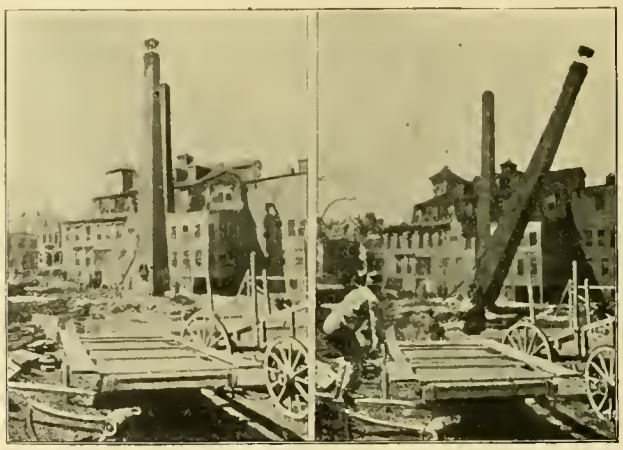
operates 10 cars, of which 8 are W. P. 30 single equipments, 2 number 3 Westinghouse single equipments. The Westinghouse have D controllers and the W. P.'s rheostats. One day man and 1 night man maintain these. Blacksmith work is sent to outside shops. The pay roll is $140 per month, making $14 per car run and $.0038 per car mile, as motor cars average 3,650 miles per month. Twice each month motors are opened up, dusted with heavy bellows, cleaned, lead wires examined, and grease cups cleaned. The average life of brass axle bearings is 8 to 12 months. Brass in W. P. 50 armature bearings lasts 6 to 8 months, and babbit in the Westinghouse armature bearings lasts 2 months. No armatures have been entirely lost in the 3½ years the road has operated, but occasionally a coil goes.

NEW LINE FOR THOMASTON, MAINE.

The citizens of Thomaston, Me., are rejoicing over the fact that all opposition has been removed, and the line of the Rockland, Thomaston & Camden Street Railway has been extended so as to accommodate them. The first car, highly decorated with bunting and with music on board, ran into the town June 16. This piece of work is considered one of the best in the state, and was pushed to completion in a very short time, through the energetic efforts of Superintendent Hawken. The road is ballasted with lime rock chips and gravel. The same company has also completed a line from Main street, Rockland, to the wharves, to connect with boats, and has established a 10-minute service which will prove a great accommodation to summer tourists.

THROWING DOWN A CHIMNEY.

In reconstructing a mill recently, at Lawrence, Mass., it was necessary to remove a brick chimney 110 feet high. One side of the base was cut away, and a jack screw



applied to the other side. The chimney fell within a few inches of the place aimed at, and was completely broken in its fall. Our illustration is from Engineering News.

INTERNATIONAL ELECTRICAL CONGRESS AT GENEVA.

The Swiss Society of Electrical Engineers is taking advantage of the opportunity presented by the holding of the National Swiss Exhibition at Geneva to organize an International electrical congress to be held from August 4 to 9. The electrical institutes and societies of America, England, Germany and France have extended it their patronage as well as several local organizations. A very interesting program is mapped out, which is to be followed by an excursion to all the principal electrical installations in Switzerland. Inquiries should be sent to the Bureau of the International Congress of Electricians, Universite, Geneva, Switzerland.

SAVED BY LIGHTNING.

A flash of lightning, June 9, saved a car load of passengers on the line of the Consolidated Traction Company, Newark, N. J. The car was about to cross the Hackensack river when the flash came and by its light the motorman saw that the draw was open just in time to bring the car to a stop as the front platform was hanging over the place where the bridge should have been. Either the bridge tender neglected to display the danger signal or the lights went out.

BROOKLYN TROLLEY EXPRESS.

Express service has been started by the National Express Company on the line of the Brooklyn Heights Railroad Company, which furnishes six cars for the service. One hundred branch call offices are established at convenient points where patrons may leave packages or orders for the company's wagon. A specialty is made of store packages and the transfer of trunks to and from railroad stations. The service was opened June 15.

STEPHENSON CAR FOR BROOKLYN EXPRESS SERVICE.

The cars for this work are from the time tested shops of the John Stephenson Company, which fact is a sufficient guarantee of their lightness, strength and suitability for this purpose.

A CLOSE CALL.

A car with about fifty passengers while crossing the tracks of the New York Central Railroad at 138th street and Railroad avenue, New York, June 10, had a narrow escape from being struck by the Boston Express. The car had crossed one track when the trolley slipped and the conductor fumbled in replacing it. He finally succeeded and got the car started with a jump when the train was within about ten feet.

INTERNATIONAL UNION OF STREET RAILWAYS.

Under the caption, Permanent International Union of Tramways, we have received official notice from Brussels, Belgium, of the general meeting of the association at Stockholm, the 25th to the 30th of August next. An extensive program has been arranged, for discussion on subjects of interest. Such questions as motors, the advantages of a turntable over a curve of short radius; the advantages or disadvantages of a line being upon the street, or on an elevated structure; rules that should determine the length of trains, methods of removing snow, changes necessary on substituting mechanical for animal traction, power consumed by electric motors, difficulties and legal contests resulting from disturbance of the telegraphic and telephonic services and damage done by electrolysis, car barns for electric traction, stopping at fixed points, or at call of passengers; speed of cars, car fenders, etc.

The above is a precis of a provisional and not a complete list of subjects which will be discussed by representatives of street railway companies from many parts of the world. This ninth general meeting of the association commences at 7:30 p. m., Tuesday, August 25, at the Grand Hotel, Stockholm, Sweden, with an informal reception. The actual work of the convention commences at 8:30 the following morning. Excursions to various points of interest and a "picnic dinner" are arranged for.

CARS ON THIRTY DAY HEADWAY.

In Warrensburg, Mo., there is a street railway system of three miles in length over which a car is run only once a month. The road was built five years ago during a boom, but the boom collapsed and with it the car system, but the franchise was thought to be worth saving. Hence the occasional trips. The car is a bobtail and is getting ricketty, the mules, which furnish the motive power are getting gray, not by hard service, and the tracks are so warped and twisted by suns and frosts that the car usually jumps the rails once in a few rods, and it sometimes takes two days to make the round trip. The day of the trip is a partial holiday for the natives, and if a passing drummer can be enticed to take passage upon the line the whole town turns out to enjoy the rich savor of the joke, and it is said that even the mule has sometimes been known to smile.

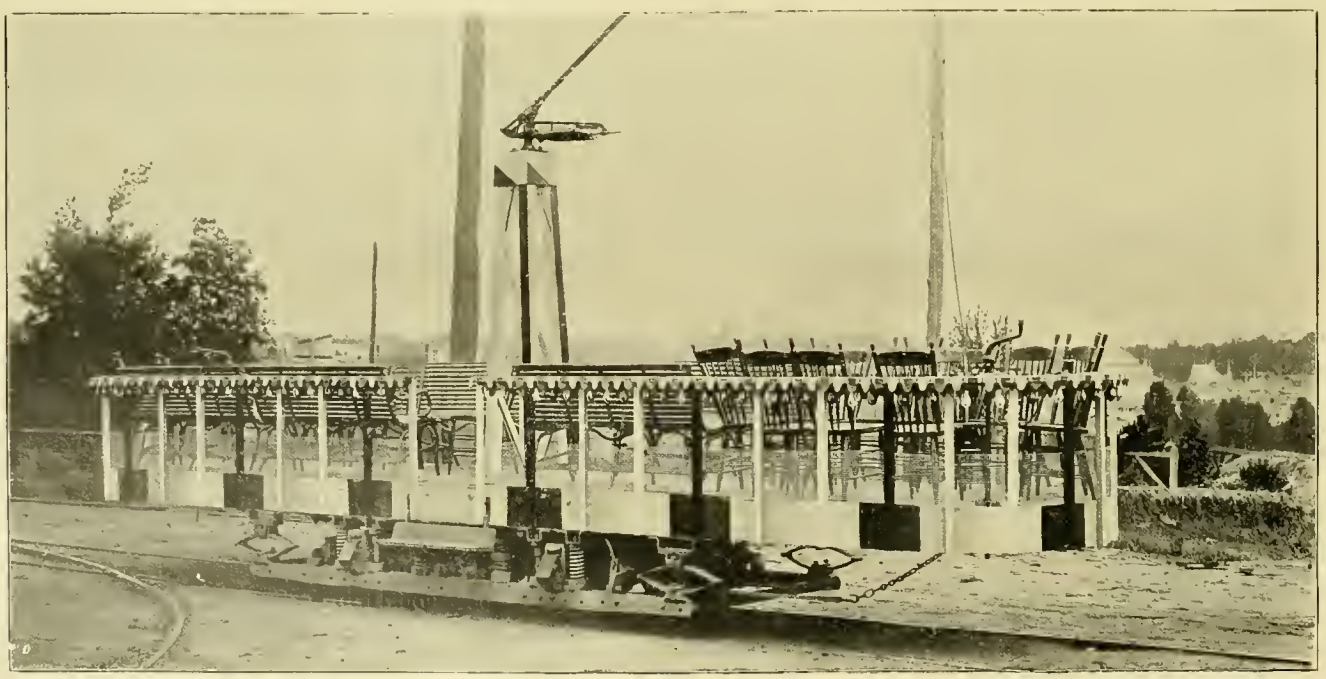
STREET RAILWAY PRESIDENTS AS POLITICIANS.

We have always maintained that the qualities and abilities necessary to make the successful street railway operator are those which are found in both the general, the statesman and the successful business man. And at this time the fact is prominently in the minds of the people, who have witnessed a most remarkable conduct of a political campaign in which not a trained politician and lobbyist, with years of experience in the pulling of wires, but a high-minded business man, has conducted affairs in a strictly business way. The fraternity may well be proud of the fact that Mark A. Hanna is one of their number, being president of the Cleveland City Railway. We also find another street railway man a prominent political figure, for is not G. A. Hobart, republican candidate for vice-president, already a street railway president, and at the head of the Paterson Railway Company, of Paterson, N. J.?

If there were fewer politicians and more solid business men in command of the legislative halls and executive offices of our government, what—but there are some things beyond the grasp of human intellect.

A CHEAP TROLLEY PARTY CAR.

Thomas Elliott, chief engineer of the Atlanta Consolidated sends us a photograph, which is reproduced herewith, of a cheap and popular trolley party car built in the company's shops, two being built in one week. The novelty of the car is, of course, quite an attraction. Rheostat control is used for various reasons, among which are the necessity of having a very smooth start on account of the chairs and the desirability of having no controller stand on the car. The body is 30 feet long over all.



NOVEL TROLLEY PARTY CAR—ATLANTA.

ELECTRIC TRACTION AT KIOTA, JAPAN.

The electric street railway at Kiota, Japan, has proved an irresistible competitor to the man hauled jinricksha, hitherto the principal passenger vehicle of that quaint city. Today the Japanese man or woman gets aboard the trolley car with as much unconcern as can be expected in a country which not thirty years ago was a feudal state under the peculiar rule of a shogun, hands over the nimble nickel or its equivalent and takes his ride by current.

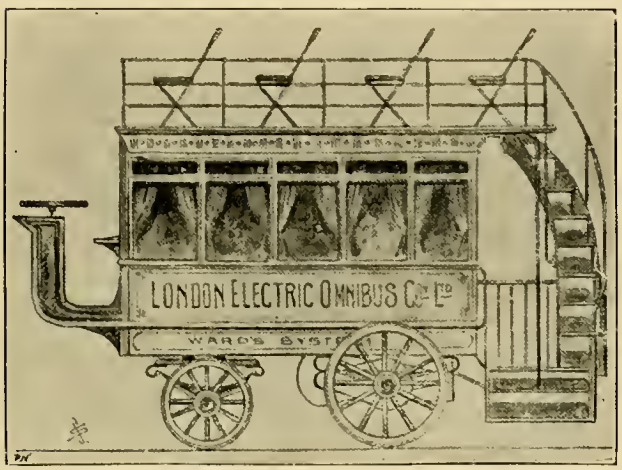
No tribute to Japanese intelligence could well be found more striking than this adoption of the trolley car and the adaptation of American electrical machinery to transportation purposes

The great canal which joins Lake Biwa and the Ujigawa and the inclined plane for the canal boat and river has been already described in our pages. At the foot of the incline plane a station has been built to take advantage of the water power developed by the difference of level between the canal and river. The hydraulic plant consists of twenty Pelton wheels each of 120-horse-power belted to General Electric generators furnishing 435 kilowatts of continuous current at 500 volts, 250 kilowatts in alternating current single phase at 1,000 and 2,000 volts. Another 2,000 volt three-phase generator has just been erected. The power is distributed to cotton and other factories, for lighting the streets and for driving the Kiota Street Railway. The rolling stock of the Kiota Railway consists of twenty-six cars, all of American manufacture. Each car is equipped with two G. E. 800 motors and two K2 series parallel controllers.

The Atlantic Coast Electric Railroad Company will hereafter follow the ticket system of collecting fares between Asbury Park and Long Branch.

ELECTRIC OMNIBUSES FOR LONDON.

A serious attempt is now being made to introduce self contained electric omnibuses into London, says Lightning, our English contemporary, from which the accompanying engraving is reproduced. The plans of Radcliffe Ward for storage battery omnibuses have met with much hostile criticism, and the above paper pub-



lishes a long interview in which that gentleman defends himself. He says: "Two horses of course, draw more passengers on a tramrail or tramcar than they do on the street or in an omnibus. So also will an accumulator of given power. But the ratio of economy between horses and electric power is the same." Yes, the ratio is the same, perhaps, but unfortunately so far it has seemed to be in favor of the horses rather than the batteries.

NOVELTIES ON THE HARTLEPOOL, ENG., TRAMWAY.

The electric road recently completed at Hartlepool, Eng., is the smallest electric tramway in England and has a number of features out of the ordinary run of standard American practice which are related in the London Electrical Review. The overhead construction is of the style first used on the South Staffordshire tramways, having the trolley wire at one side of the road and a swivel trolley pole with swiveling wheel. The road is almost entirely the work of English manufacturers and engineers, unlike several of the most recent roads installed in England. Electric feed pumps are used as in all the most modern English electric railway plants. There are two 100-horse-power generators direct connected to Willan's engines running at 450 revolutions per minute. An economical and steady load is kept on the engines by having a storage battery as an auxiliary to take up the variations. The battery has only 53 cells and on account of its low voltage a motor-dynamo has to be used for charging. One end of this machine is wound for 500 volts and 30 amperes and the other end for 135 volts and 85 amperes. With light load the generators work through this motor-generator to charge the batteries, and with heavy load the batteries work through the motor-generator to help the generators. One feature of the switchboard that should be of special interest is the placing of a resistance in shunt with the circuit breakers. When the circuit breakers open some current still flows into the line through the resistance. This saves some of the strain on the machinery and tends to diminish the arc at the circuit breaker. It also enables the attendant to know whether there is a dead short circuit or simply a temporary overload. This is a plan that has been talked of many times, but seldom put in actual operation. The cars are equipped with one motor each, built by the Electric Construction Corporation. They are similar in design to modern American motors, the chief peculiarities being the use of double tooth helical gear and four carbon brushes. The resistance consists of 40 platinoid spirals sheathed with abestos and contained in vertical brass tubes, a construction which allows the dissipation of a large amount of heat. When the trolley current is shut off the motor is short circuited so that when the controller is off it is only necessary to throw the reverse lever to make a generator of the motor and have a powerful emergency electric brake.

PRESIDENT HARRISON'S STRIKE REMEDY.

The doctors say they can furnish a remedy and effect a cure for almost any disease if they can only take the case in its first stages. When a few uneasy agitators tried to work up trouble on the Terre Haute lines Russel B. Harrison at once began the preparation of a sort of anti-toxin, as it were. In a day or two the leaders announced the boys would strike unless wages were raised from 14 to 17 cents. The president informed the men 14 cents was all the company could afford to pay, and the leaders set Wednesday morning, the day of the Buffalo Bill show as the strike day.

Tuesday evening every car carried on its front platform a nicely uniformed, experienced motorman, who had just arrived from Chicago, St. Louis and one or two other places. The new men simply rode there as passengers, but one or two trips was sufficient to learn the routes, and when Wednesday morning dawned the old men passed the word along the line that the rumored strike was a mistake, and no one could be found who even thought of striking. The new men were kept several days, had their fares paid both ways and time, not a very big bill all counted, and that's the way Dr. Harrison cures strikes.

Frank S. Buck, a conductor in the employ of the Buffalo Railway Company, was arrested June 13 on a charge of forgery in the third degree. He was discovered to be working the old transfer game. His plan was to punch transfers and then turn them over to a confederate who turned them in to the company and divided profits with the principal.

THE PASSING OF THE GAZETTE.

The Street Railway Gazette is dead.

That is, official announcement is now made of its death; its demise actually occurred many, many moons agone.

It died hard: very, very hard. The more surprising too, from the fact that it never was very much alive. Its birth occurred at a most opportune time, just as street railways were entering the great field of reconstruction; when managers had to learn their business all over anew, and when the demand for sound opinions on the new ideas was widespread. Until the Review was started in 1891, the Gazette was all alone in this great western field. Had it risen to its possibilities at that time there would have been no "long felt want" which the Review has filled for six years.

It started as a monthly, and the December 1st issue was wont to appear the latter part of the January following, and so on through the year. In 1891 it passed into the hands of M. J. Sullivan, who ran it as a weekly for a few months, during which time it was the best it has ever been. But then as now, there was no field for a weekly; for with the Review on the 15th and the Journal on the 1st of each month, the field is fully covered. There are no news or market conditions, which make a weekly publication essential to street railway men, as exist in most commercial lines where prices of raw and manufactured products are constantly changing. What street railway men want is not so much the news, as ideas, methods, practice, policy. As a weekly it was neither a news nor a technical journal. In 1893 it passed into the hands of the Street Railway Journal management, the plan being to run it as a daily during the World's Fair and incidentally with the Journal in the east and the Gazette in the west, to so "concentrate" the advertising as to salivate the Review. But even with the utmost economy, and using the same engravings, first in the Journal and afterward in the Gazette, somehow the only hit it made was to hit the pocketbook of its owners. This it did, as indeed it always has from its first issue, for it has in turn been backed by street railway men, supplymen, and newspaper men, who in turn put in money and drew out copious draughts of experience. In 1894, after moving to New York, the Journal unloaded its interest onto C. E. Stump, who made a desperate and heroic effort in the face of the most discouraging difficulties to get it on its feet. After many months, it was only on one leg, and that a short one; it went to W. J. Johnston, of the Electrical World, who promised to show the boys how to run a paper. But somehow the expected boom got side tracked up a salt creek marsh. Even under the Johnston administration it lacked sufficient wind to fill the sails, and its gasps became more feeble and less frequent,—only two gasps a month. And now "the only publication of its kind issued oftener than once a month" has, technically speaking, gone up the flume. Somehow we can't help thinking how like it is to the 13th man in the new Chinese puzzle; the one that gets off the world,—we mean the earth, and no one knows where he has disappeared.

Far be it from us to glory in the misfortunes of another; but the lesson is plain, and cannot be ignored. There never has been, is not now, and will not be for some years to come at least; a demand for a weekly paper, even a strong one (which the Gazette never was) in the street railway field. Time and again we have sounded the opinions of the best managers in all parts of the country and always with the same result, "We do not want a weekly."

When the time comes through new conditions which have never yet, and may never arise, that make a weekly necessary, the Review will be found up and coming.

The thousands of dollars which have been sunk by publishers of the Gazette and its advertising friends would be surprising in the aggregate, were the amount known.

So here's our sprig of evergreen to the memory of the "Gazoot," and as its owners, the mourners, lay it tenderly to rest, here's "How" and better luck next time.

AND NOW FIREMEN WALK.

During the Milwaukee strike the fire department men refused to ride on the cars, which had always carried them free, declaring they liked walking better. The management has taken them at their word, and a local daily quotes an official as saying: "It seems that some of the firemen didn't want to ride. We don't want to cast pearls before swine, so we have decided to furnish those with tickets that we care to accommodate. Our relations with the fire department are just as amicable as they ever were, and we have no trouble with the firemen."

POLE LINE WRECKED BY WIND.

A high wind at St. Paul, played a curious freak on the University avenue line of the Twin City Rapid Transit Company, June 7. Some thirty poles carrying the trolley wires were removed bodily or broken off at the joints. Wires were temporarily suspended from telegraph and telephone poles, but several persons were forced to pass an uncomfortable night. The storm did little damage aside from that inflicted upon the street car company.

THIS ROAD RAN NOWHERE.

Lunatics often assume a superiority of intellect which is amusing. A gentleman, walking in the vicinity of an asylum for the insane, encountered a number of the inmates out for exercise. With a nod toward the street car line he said to one of them:

"Where does this railway go to?"

The lunatic glanced at him scornfully, and then replied:

"It doesn't go anywhere. We keep it here to run cars on."

AN IMPORTANT POLE DECISION.

Considerable interest has attended the suit brought by Mrs. Emily W. Roebling, of Trenton, N. J., against the Trenton Passenger Railway and Board of Public Works of that city, in an action to have the ordinance under which two poles were placed in front of her residential property declared irregular, and the poles removed. The company won in the State Supreme Court, and the case was taken on appeal to the Court of Errors and Appeals, where the ruling of the lower court was affirmed. We give the opinion in full, as follows:

Depue, J.: This writ brings up a judgment of the Supreme Court sustaining an ordinance entitled, "An ordinance to authorize the Trenton Passenger Railway Company, Consolidated, to use electric motors as the propelling power of its cars through certain streets and avenues in the city of Trenton, and to provide for the erection of poles and stringing of wires thereon to supply electricity to the motors," passed by the Board of Public Works of the city of Trenton, February 8th, 1894, and approved by the mayor February 12, 1894.

The ordinance was passed in virtue of the act of 1893 (P. L. 1893, p. 241).

The first section of that act authorizes street or horse railroad companies to use electric motors as the propelling power of their cars instead of horses, provided consent of the municipal authorities be first obtained.

This section empowers the municipal authorities to authorize the use of poles to be located in the public streets, with wires, etc., for the purpose of supplying the motors with electricity and to prescribe the manner in which and the places where such poles should be located.

The ordinance is in all respects in compliance with this statute so far as is material to this case, and is in conformity with the powers of the city government to regulate the use of public streets.

The prosecutrix is the owner of a lot on the southerly side of West State street, between Warren and Calhoun streets. Her title extends to the middle line of the street, subject to an easement in the public for the purpose of a public highway.

The reason filed for setting aside this ordinance are: First, because the erection of poles and the stringing of wires thereon upon the lands of the prosecutrix, in West State street, in the city of Trenton, for the purpose of supplying electricity to the motors to be used by the Trenton Passenger Railway Company Consolidated, in propelling their cars over and along their railroad in said city ,without the consent of said prosecutrix, and without payment to her therefore, is in violation of the constitution of the State of New Jersey, in that it is a taking of private property for public use by a private corporation without compensation first made to said prosecutrix, and, therefore, an ordinance authorizing the erection of such poles and the stringing of wires thereon for such purpose, without providing for compensation for land taken, is illegal and void. Second, because the construction and operation of an electric railroad in the public streets of Trenton on the lands of the prosecutrix therein, without her consent and without payment to her therefor, is in violation of the constitution of the State of New Jersey, in that it is a taking of private property for public use by a private corporation without compensation first made to the said prosecutrix, and, therefore, an ordinance authorizing the construction and operation of such a railroad without providing for land taken, is illegal and void.

Third, because the said ordinance is unreasonable as far as it authorizes and permits the construction and operation of a double track electric railway to be operated by what is known as the trolley system upon West State street, between Warren and Calhoun streets, in the city of Trenton.

The ordinance in prescribing the places in which the company's poles should be located fixed the location of two of its poles on the sidewalk in front of the property of the prosecutrix, just inside of the curb line, and the company has erected these two poles at the places indicated. The evidence shows that the cars used by the company weigh seven and one-half tons, and are thirty feet in length; and that ordinary horse cars weigh one and a half tons and are fourteen feet in length; and that the speed with which the company runs its cars in the section of the street on which the property of the prosecutrix is located, is from seven and one-half to seventeen miles per hour, with a mean average speed on the forty-six trips observed, of twelve miles per hour. There is also evidence in the depositions that by reason of the weight of the cars and the speed at which they are run, they occasion at times vibrations to the extent of rattling the windows in the dwellings fronting on the street.

The prosecutrix's standing in this proceeding is that of the owner of the property complaining of an invasion of her property rights. The ordinance being in compliance with the statute, the question is whether the act of 1893 is within the power of the legisture.

In considering this question it must be admitted at the outset that the transmission of passengers with increased speed and greater comfort is a great public benefit.

It is also conceded that the erection of poles with wires strung thereon in the present state of the science is necessary to accomplish the purposes contemplated by this legislative provision. This is equally true of the lines of railroad that traverse our state and penetrate into every section, of the diversion of waters to create water ways for carrying freight, or to supply water for use in the large cities and towns.

But no consideration of public advantage should be permitted to predominate over the rights of private property, which by a constitutional inhibition cannot be taken for public use without compensation. As was said by Chancellor Green in Hinchman v. Pat. H. R. R. Co., 2 C. E. Green, 75-80: "Nothing can be claimed on the ground that city railroads are a great public convenience and benefit; if they are so the public can afford to pay for it; that is certainly no reason why individual property should be taken for public use."

This constitutional provision has uniformly been liberally construed for the protection of private property, not only in actual taking, but also the destruction of private property, either total or partial, or the diminution of its value by the act of the government, directly and not merely incidentally affecting it, which deprives the owner of the ordinary use of it, is a taking within the constitutional provision which can only be exercised under the right of eminent domain, on just compensation made. Trenton Water Power v. Raff, 7 Vroom 335; P. K. R. Co. v. Angel 14 Stew. 316 to 329.

The title to the soil over which the highways and streets are laid remains in the owner of the fee, subject only to the public easement.

"The rights of the public in a highway," said Chief Justice Beasley in State v. Laverack, 5 Vroom 206, "consists in the privilege of passage, and such privileges as are annexed as incidents by usage or custom, as the right to make sewers and drains and lay gas and water pipes; these subordinate privileges are entirely consistent with the primary use of the highway and are no detriment to the land owner."

This principle has been extended to the use of streets in populous districts, to appliances for distributing water, light, heat, power and matters of general necessity or convenience. Leins on Eminent Domain, Sec. 126. In Stoudinger v. Newark, 1 Stew. 187, S. C. id., 446, it was held against the land owner's objection that the use of the street for sewers was a legitimate use, consistent with the purpose for which the land was appropriated.

The uses of the streets for such and similar local and public benefits, have from an early period in municipal government been so usual and customary, as that they may be regarded as having been in contemplation when the streets were laid out or dedicated as servitudes upon land within and abutting upon streets, to be put in force as occasions arise for their use, which confer a benefit immediately upon the adjacent lands. But it is not every use of a public street that is lawful as against the rights of the owner of the fee, though such use may promote public benefit.

Thus it was held in State v. Laverack that the legislature has not the power under the constitution of this state to authorize a market to be held in a public street of a city without providing compensation to the proprietors of the contiguous lands who owned to the center of such street, notwithstanding that such market was designed for public use and inured to a public benefit. In Starr v. C. & A. R. R. Co., 4 Zal. 592, the subject was discussed by Mr. Justice Haines, who explicitly held that the constitution of this state prevented the legislature from granting to a railroad the right to use a public highway as the bed of its railroad, without compensation to the owner of the soil, and his opinion on that head has uniformly and frequently been adopted as a correct exposition of the constitutional right of the owner of the soil within public highways. In both the cases cited the prosecution was at the instance of the owner of abutting lands, whose title extended to the center line of the highway.

In Hinchman v. Paterson H. R. R. Co., 2 C. E. Green 75, the power of the legislature to authorize the use of a public street for street railways was directly under consideration.

The bill was filed by owners of lots abutting upon the street, having title to the middle of the street, to enjoin a horse railroad company from the construction of its railroad through the street under the authority of its act of incorporation.

Chancellor Green, in his opinion, quoted with approbation the opinion of Mr. Justice Haines in Starr v. C. & A. R. R. Co., and affirmed the incapacity of the legislature under our Constitution to appropriate lands within public highways to any other than their legitimate use as highways, without compensation to the owners of the soil. The learned Chancellor distinguished the use of a street for a horse railroad from its use by an ordinary railroad and justified the use of part of the highway for street railroads in this language. "They are ordinarily, as in this case, required to be laid level with the surface of the street, in conformity with existing grades. No excavations or embankments to affect the land are authorized or permitted. The use of the road is nearly identical with that of the ordinary highway. The motive power is the same.

The noise and jarring of the street by the cars is not greater, and ordinarily less than that produced by omnibuses and other vehicles in ordinary use. Admit that the nature of the use, as respects the traveling public is somewhat variant, how does it prejudice the landholder? Is his property taken? Are his rights as a land holder affected? Does it interfere with the use of his property any more than an ordinary highway?" It will also be observed that the Chancellor in his subsequent language expressly repudiates the idea that the rights of land owners in the premises could be affected by the fact that the city railroads were a great public convenience.

The extract made from the opinion of the learned Chancellor has frequently been referred to with approval by the courts of this State. The ground of the Chancellor's decisions denying the injunction was, that the complainants' rights as owners of lands were not in fact prejudiced or interfered with by the use of the streets by a street railroad operated in the manner in which the railroad in question was authorized to be operated, to a greater degree than they would be affected by their use as any ordinary highway; in other words, that the mode in which the company was authorized by its charter to use the streets of the city in fact created no additional servitude upon the lands.

The defendant was incorporated as a "horse railroad company," with power to lay rails and operate a railroad through Clinton and State streets in the city of Trenton. (P. L. 1859 p. 266.)

The act of 1893 and the consent of the city authorities by the ordinance, authorized the company to substitute electric motors in the places of horses as the propelling power of its cars.

Neither the statute of 1893 nor the ordinance conferred upon the company any rights beyond those vested in it by its charter, except in allowing a change in the motive power to be applied to its cars. The change in the motive power of the cars did not necessarily occasion any injurious effects upon the prosecutrix's property. Cars of the same pattern and size of the cars used by the company as a horse railroad and driven with no greater speed, might have been adapted to the new motive power. I agree with those cases in our courts which hold that the substitution of electric motors with the trolley system for horses on street railways does not *per se* create an additional easement. The injury to property which would give the prosecutrix a legal ground to complaint does not spring from the kind of motors used. The statute also empowers the municipal authorities to authorize the use of poles in the streets with wires thereon to supply the motors with electricity, and to prescribe the places in which such poles should be located. Two of these poles were located by the ordinance on the complainant's lands on the sidewalk inside of the curb. Holes were dug and poles were set in the ground by the company at the places indicated by the ordinance.

The contention of the prosecutrix is that the setting of these poles on her lands constituted a permanent, exclusive and continuous use of the lands, not within the customary and legitimate use of the lands of abutting owners on a public way, and was to that extent a taking of private property such as is interdicted by the Constitution except upon just compensation made; and that an ordinance authorizing the erection of poles and the stringing of wires thereon for the purpose of supplying the company's motors with electricity, without providing for land taken, is illegal and void. The statute which underlies this ordinance does not confer upon these companies the right to acquire private property by the exercise of the right of eminent domain. By the act, the legislative purpose was to confer upon these companies the right to erect poles and use the trolley system, so far as the public easement was concerned, and made it the duty of the municipal government to fix and designate the location of the poles with a view to the public convenience in the use of the streets, leaving the several companies, if their necessity or convenience require, the appropriation of private property, to obtain the consent of land-owners by agreement. In withholding the power of eminent domain, the legislature intended that if private property was necessary or desirable, these companies should acquire rights in private property by the consent of the owners and not take it *in invite*.

The act in withholding the power of condemnation may not effectuate all that these companies in particular instances desire for the scheme of improvement they have embarked upon, but the act by its imperfection in this respect, is not rendered wholly void.

Injuries by vibration caused by the weight of the cars of the company, combined with the speed at which they were run, belong to the same class of injuries as that which may arise from the setting of the poles.

The owner of lands abutting upon a street holds his title subject to the inconvenience and injurious consequences, including those occasioned by noise and vibration, resulting from a user which is consistent with the legitimate and proper use to which these public thoroughfares are devoted. But such injuries as are caused by a manner or mode of user which is not justifiable on the grounds that the *locus in quo* is a public street, will lay the foundation for and are redressible by action.

In Beseman v. P. R. R. Co., 21 Vroom 235, S. C. 23 id 221, the immunity of a corporation exercising public franchises from liability for incidental damages occasioned to abutting lands was limited to such damages as were occasioned by the exercise of its franchises with care and skill in all respects. Neither the act of 1893 of the ordinance under review, purported to legalize the size or weight of cars to be provided by the company, nor the speed at which they should be run. The privileges granted were capable of being enjoyed without any excessive or unusual injury to lands abutting upon the streets. If the privileges granted by this statute are made the occasion for unlawfully injuring the owners of abutting property, such acts of the company are *ultra vires* and redressible by action of the suit of the injured party.

The act of the legislature is a general law for the equipment of street railways throughout the state, and the ordinance under review, is in those respects which are material to this controversy, similar to the ordinances under which many street railways have been equipped and are operated.

A decision that such ordinances and the statute under which they were made were invalid, for the reason that in a particular case before the court it should appear that these privileges have been made the occasion for unlawfully injuring private property when such injury was not the direct product of the ordinance, would be disastrous to public interests and not warranted in law.

For such injuries the remedy of the party injured is by action. If the acts done under color of the ordinance or the statute be found to be an unlawful invasion of the right of private property an action will lie in which neither the ordinance nor the statute would be a justification. Costigan v. Penn R. R. Co., 25 Vroom, 234, 239, 240.

The remaining reason assigned for setting aside this ordinance is that it is unreasonable so far as it it authorizes and permits the construction and operation of a double track railway to be operated by the trolley system upon West State street, between Warren and Calhoun streets. The title of the ordinance relates solely to the use of electric motors and the erection of poles with wires thereon to supply electricity to the motors. The permission granted to the company is to use their motors and appliances "on its tracks, which are hereby authorized to be laid," enumerating certain streets, among which is State street, from the easterly limits to the westerly limits of the city.

The ordinance recognizes double and single tracks, which were probably laid under the authority of the company's original charter. Be that as it may, nothing appears in the case to show that there is anything in the situation of West State street, either in its width or surroundings, that makes a double track in the street with cars operated by the trolley system in itself injurious or unreasonable, either with respect to the public convenience or to private property. Nor

does it appear that the track of the company's railroad next to the property of the prosecutrix has been placed so near the curb line as unreasonably to interfere with access to her property or the enjoyment of those privileges which owners of abutting lands are entitled to enjoy in a public highway in front of their premises.

The ordinance in its second section reserves to the Board of Public Works the right to make reasonable regulations, governing among other things the number of cars in a train; and in the sixth subdivision of the nineteenth section trail cars are mentioned.

Under these sections the company appears to claim a right to run trains made up of a motor car and one or more connected passenger cars called trailers. Trains so made up were running during the State Fair as through trains to the fair grounds, with instructions to the company's employes not to carry local passengers.

It may be difficult to justify such a use of the streets upon the theory upon which the use of streets for street railways has been justified as a legitimate use. But there is no reason assigned which brings this part of the ordinance under review.

Finding no infirmity in the ordinance or in the statute in virtue of which it was passed, within the reasons assigned for setting aside the ordinance, I think the judgment of the Supreme Court sustaining it should be affirmed.

CAN'T TAX POLES AND CARS.

The city council of Bloomington, Ill., two months ago passed a resolution favoring a levy on the railway of $2 per month per car and ten cents per pole per month and reducing fares. The matter was before the judiciary committee of the council for about six weeks. The committee had the opinion of the city attorney and another attorney who is an ex-judge of the circuit court, and reported that the city had not the power to levy such taxes or reduce fares. The report of the committee was accepted by the council and the matter of cheap fares was settled for Bloomington, and in a measure for all Illinois cities. Congratulations.

Spikes placed in the cable slot on the Cottage Grove avenue line, Chicago, derailed a train and bruised and otherwise injured several persons. Two boys arraigned June 12, were discharged, the only evidence against them being that they were with others in the vicinity just before the accident occurred.

PARIS STREET RAILWAY NOTES.

BY CHARLES R. KING.

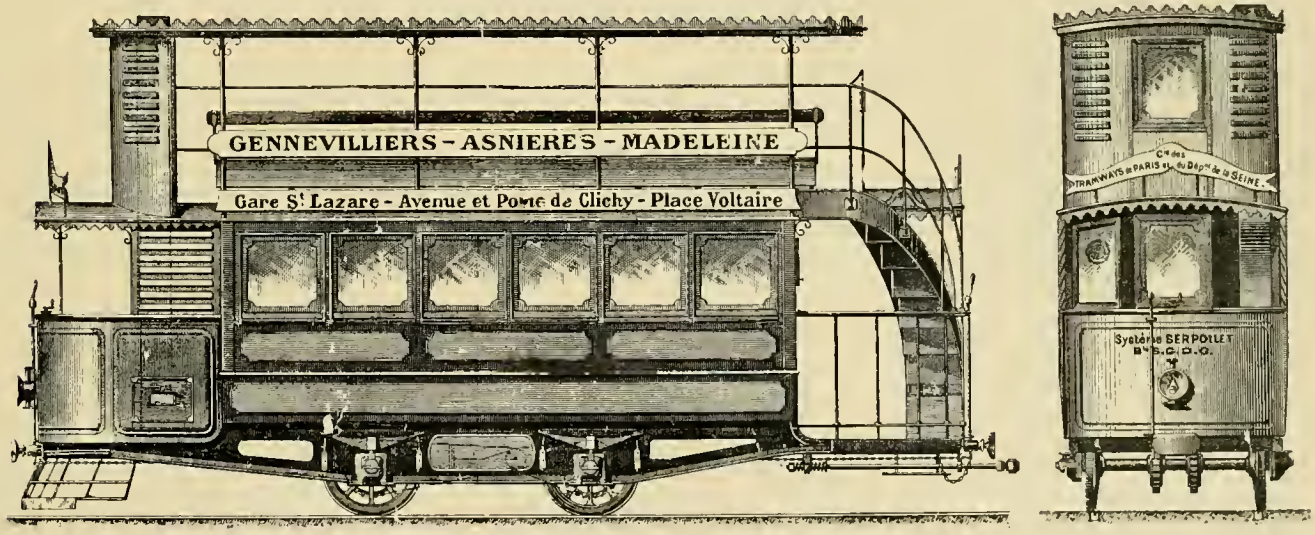
Mechanical traction is now occupying the lively attention of all users of horses in Paris. Private and delivery omnibuses, automotive, are numerous enough already;

TYPICAL FRENCH CAR.

automotor hacks, cabs and public omnibuses are also proposed.

The General Omnibus Company, of Paris, is negotiating with the city of Paris for the transformation of animal into mechanical traction upon the whole of its lines, and is pursuing these arrangements with the endeavor to keep up with the ever increasing demands made upon the traffic, but also with some preoccupation in regard to the short term of years to elapse before the whole organization will have to be handed over to the city of Paris, in 1910.

The form of power to be used promises to decide in favor of steam. The city of Paris will not tolerate overhead wires. The Mekarski compressed air locomotives

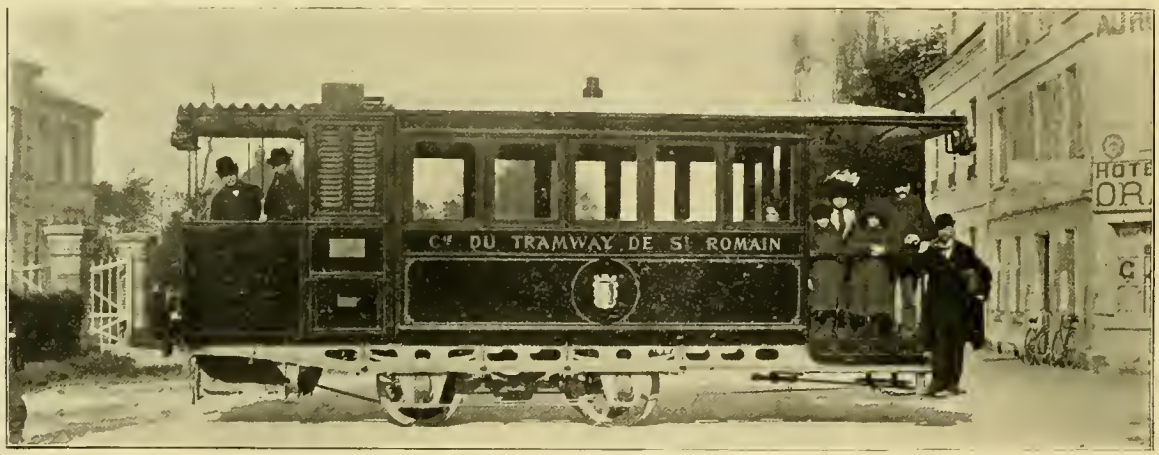


CAR OF NORTHERN STREET CAR COMPANY OF PARIS.

and auto-cars are used on the St. Augustine & Vincennes line—5.7 miles—passing through the most crowded parts of the city. Upon the Louvre-Versailles line—12 miles—the air-locomotives haul two and three cars, according to the need and are able to develop up to 40-horse-power. The trail cars for the Mekarski motors have roof seats completely roofed in. The working of these cars seems satisfactory.

The Omnibus Company considers them to work now to give satisfaction, with a working cost of 12.8 cents per mile made up as follows, for ten miles:

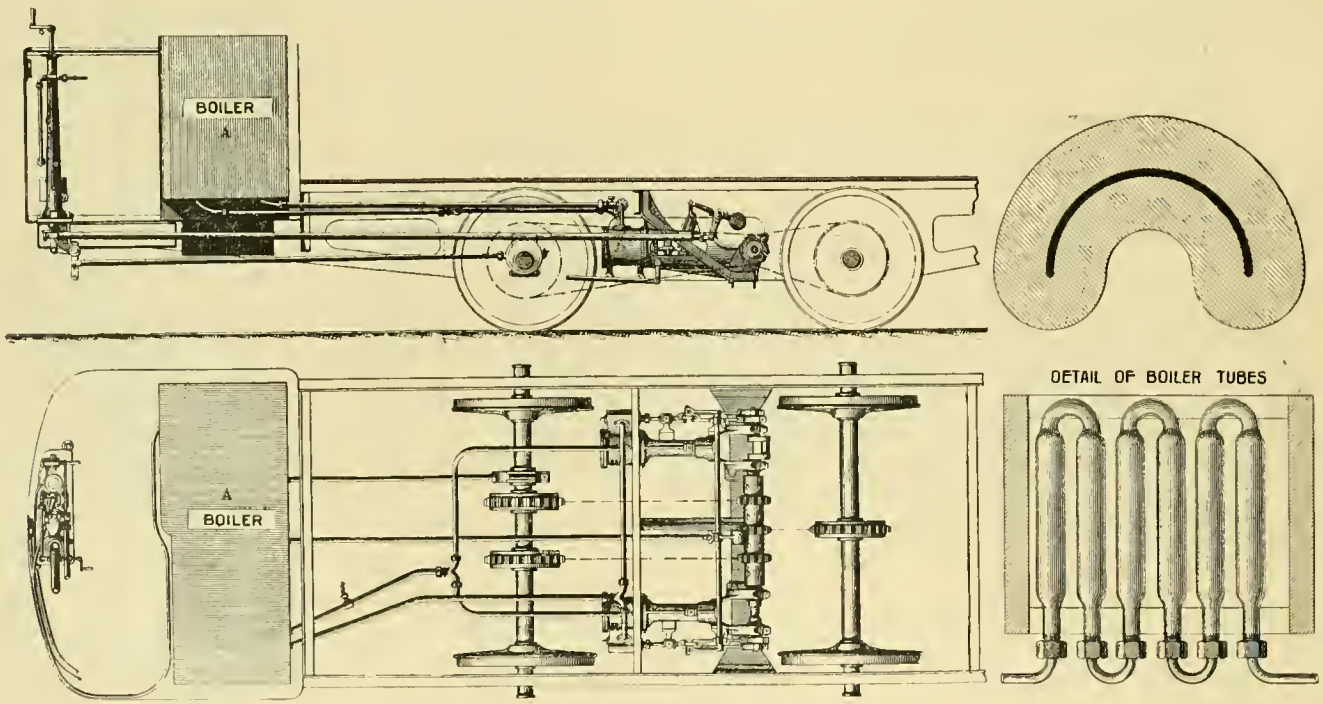
Oil and waste	$.096
Coke (lighting up and working)	.48
Driver	.288
Maintenance of engine boiler and brakes	.322
Water	.064
Coking	.032
	$1.282



ST. ROMAIN CAR WITH SERPOLLET MOTOR.

better than before and quite normally. The same company also employs, over part of the same line—Louvre to Boulogne—two very handsome condensing steam

The General Omnibus Company has given an order for sixty similar cars. The Northern Street Car Company or *Compagnie de Tramways de Paris et du departement de la Seine*, has already twenty-three of these cars at work or ordered from the makers, on the lines Madeline-Asnieres and Asnieres-Bourguignon. Besides steam-power, the same company employs electric accumulator-driven cars.



DETAILS OF SERPOLLET MOTOR.

cars by Rowan, apparently doing excellent work and very manageable, but with which the fumes given off by the coke are perceptible to passers-by,

For some months past a Serpollet car has been upon trial on one of the company's eastern lines and appeared

For the *Compagnie Francaise de Tramways*, six of these auto-cars are on order for its Tours lines and ten for its lines in the city of Orleans. For the Lille to Ronbaix line in North France, four Serpollet boilers are being made and will take the place of the Lanim & Francq fireless engines. For one of the Cherbourg lines five cars are under way. For Haiti a commencement is to be made there with five Serpollet cars, and others to follow. At Marseilles arrangements are being made for a number of these cars to complete the services of its lines, and two cars worked by air have had their air reservoirs replaced by Serpollet generators. At Havre the line to St. Romain is worked by a special type of car with Serpollet motor, and gives satisfaction.

The objections, powerful in theory, against the Serpollett system of boilers have been proved in practice to be invalid. The tubes do not choke when certain practicable precautions are taken, as for instance purification of water which is highly charged with salts or otherwise impure, and the periodic washing of the tubes with water containing 10 per cent of hydrochloric acid—a ten-minute operation. In practice the continuously changing movement of the water and steam forward, while the locomotive is working and the backward rush of the steam when the regulator is closed, greatly assist to prevent the deposit of calcareous matter.

The oiling is done by an automatic variable lubricator, which, once regulated, needs no further attention; the oil is injected into the steam before its arrival at the valve chest. For a motor of 5-horse-power (French) less than ¼ litre of valvoline suffices for a day of 10 hours work, or about ⅓ litre for the two cylinders of a 50-seat car in a day of 12 hours work. The high temperature of the steam never produces any deterioration of the valve faces or valve slides. The danger of burning of the tubes during stoppages of the engines is avoided by several means. A chimney damper; special doors allowing a current of air to rush on to the battery of tubes and, at the same time, the usual ash-pan damper. At no time do the tubes become red—not even a dull red—from the heat.

The dismounting of the batteries of tubes is easily accomplished, and any tube can be readily removed by unscrewing the nuts at its two extremities. Each tube is connected to its neighbor by a short bend (see detail.) The tubes of steel are taken in lengths of round section, drawn out at mid-length and at each end. The intermediate parts are stamped out in C section, and finally bent at the middle until each half is parallel to the other. As arranged in the firebox, the embossed parts of the tubes alone are submitted to the direct action of the fire, the elbows being protected and reached by a far lower temperature, while the threaded ends come to the outside of the firebox, and are easily reached therefrom. In practice these tubes are tested to 100 atmospheres, and stamped for a pressure of 94 atmospheres. At present the generators are made for nominal powers of 25 horses. The cars and engines are made by numerous firms throughout France, under special arrangement with the Serpollet Company.

Steam enters the cylinders at about 320 degrees centigrade, and leaves the blast pipe so dry as to be invisible. The generator is encased in a double sheathing of thin iron, lined with asbestos, besides which the air circulates freely between the outer walls of the generator and this sheathing, as well as between the latter and the panels of the car, so that inside passengers do not feel the heat. The bad smell usually caused by coke is diminished by means of the generator chimney emptying itself into a continuation of the double sheathing just mentioned, and in which a strong draft is produced, and wherein the products of combustion are diluted in a large volume of ascending air.

In starting, the driver works the hand pump for a few seconds until sufficient pressure for starting is obtained; at this moment the variation of speed is regulated by the cock placed between the generator and the pumps, and which directs the water either into (1) the generator, (2) the water reservoir or (3) partially into both.

Stoppages are made by a very powerful wire-rope brake acting on the axles and wheel-rims, and by the usual reverse lever. On arriving at a steep gradient, a few strokes can be made on the hand pump to rapidly augment the pressure, but this is only done in exceptional cases. When stopping with the brake alone, the driver puts his reverse lever over to the dead center, and the escape ports of the cylinders being thus closed, the generator remains under a pressure which, by reason of the high temperature of the steam, can be maintained for 10 or 15 minutes. By removing the foot from the brake pedal, and pushing the reverse lever forward, the car is once more started. This lever need not always be used, the foot-brake being sufficient at times to stop the car, even with the pressure remaining on the pistons. There is no danger in working, for the pressure in the tubes depends upon their heat and the density of the steam, which latter depends in turn upon the quantity of water in the generator, which is always relatively very little; the machine starting the flow of cold water at once brings the pressure down to normal level.

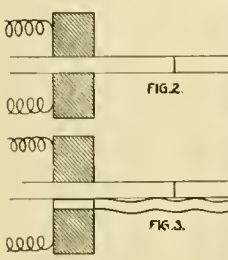
Besides the foot brake, an emergency brake, with screw adjustment, is also provided. Under the hand of the driver are four pieces of apparatus: the hand-pump, the regulator, the reversing lever and the brake.

The cars are made for 15 to 50 seats, and the power of the motor is so arranged that each autocar shall be capable of hauling a load equal to its own weight up grades of 5 and 6 in 100. The 50-seat cars weigh about 8 tons; the 40-seat 6 tons, and the 20-seat 3½ tons.

Placed inside the frame horizontally, the cylinders drive an intermediary crank-shaft, which is connected by two chains to the front axle, and by one chain to the rear axle; the cylinders make three revolutions to one of the wheels. Though the chain is considered best for such moderate speed as 16 miles per hour, above that rate it is considered better to couple up by cog gearing, or direct to the axle.

ELECTRICALLY BRAZING RAIL BONDS.

An interesting method of attaching rail bonds is being perfected by D. W. Payne. of Elmira, N. Y. It consists in short of brazing the copper bond directly to the rail—the electric current being used for heating the rail and bond. The bond used is simply a strip of flat copper six inches long and of the desired cross section. The strip is corrugated so as to permit of vertical and horizontal movement. The area of contact between the bond and rail may be as large as desired. The bonds already experimented with by Mr. Payne have a cross section equal to that of a 0000 wire and a contact at each end equal to one square inch. The bond requires a clearance of five-sixteenths inch between rail and fish plate. Figure 1 shows the cross and longitudinal sections and side view of the bond. The method of application is as follows: A current of low voltage and high amperage is brought to four carbons which are in contact with the rails on opposite sides as shown in Figure 2. In the experimental apparatus used so far, 150 amperes at a pressure of ten volts is required to make a joint. As soon as the temperature of the rail is brought



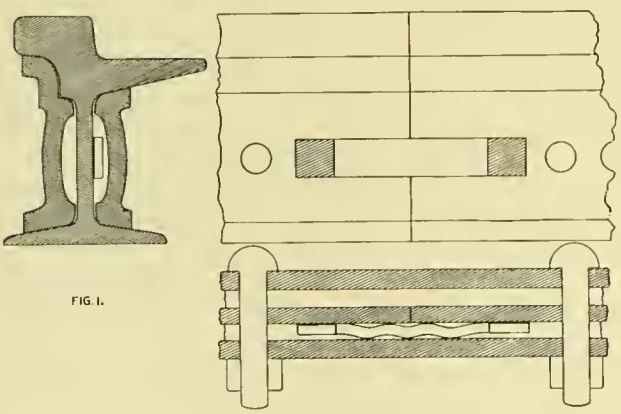


FIG. 1.

high enough the bond is slipped between the rail and carbons as in Figure 3. The brazing or welding takes place instantaneously. The greatest expenditure of time is in bringing the rails to proper temperature—the time required being three to four minutes with the 150 amperes mentioned before. In practice it is contemplated to arrange the apparatus to make four joints at one operation. Of course the rails at the points of contact must be brightened with an emery wheel. For rebonding roads already laid an apparatus has been designed to be carried on an ordinary car—the current to be taken from the trolley wire to a motor transformer. For new roads the apparatus would be carried on a platform car and operated by a steam engine. The weight of copper in a bond equivalent to a 0000 wire is two and one-half ounces. The total time required to set the apparatus and braze four joints is six minutes or a rate of forty joints per hour.

LIGHTS, OR JUST OIL LAMPS?

The following lines. picked up by a representative of the Review, were evidently intended to apply, not only to the cars of the road named. but to all lines which, having convenient means for lighting, prefer to hide the semblance of it under a bushel of smoky chimneys. The ditty is apparently intended to be sung to the tune "It was my last cigar."

'Twas on a South side trailer car,
One pleasant summer's eve,
I sat upon the smoker's seat,
And had no cares to grieve;
I pulled from out my pocket's depths
The paper of the day,
But could not read at all, by gum!
(Lights were not built that way.)

For though the cars were trolley cars—
At least, the motor was,—
The trailer was an ancient barn
That once behind a "hoss"—
Had run around Chicago's streets
For many years. Alas!
It's lamps were all old coal-oil glims
Instead of "juice" or gas!

POINTERS FROM FT. WORTH.

The Ft. Worth Street Railway, of which George B. Hendricks is superintendent, has a boarding house for its employes. The power house and car shed are located north of the city and not as convenient to boarding places for the men as should be. The company was consequently obliged to build a boarding house convenient to the car house, where all the employes who saw fit could board. One of the employes rents this house of the company and boards the men. It is entirely optional with the men where they board. as matters of this kind are left to the individual convenience. The management does not believe it is good policy to force them to do anything to interfere with their legitimate private rights, although there are very stringent rules as to the conduct of the men, even while off duty. They are not allowed to enter saloons at any time, on or off duty.

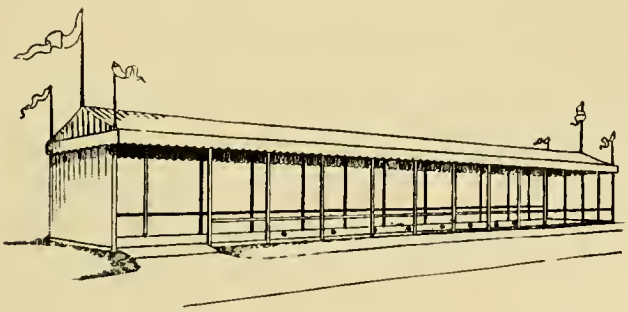
A very complete system of fire protection is in use around the buildings. Pipes are laid in and outside of car sheds with hydrants 60 feet apart. Each hydrant has 50 feet of 2-inch fire hose with fire nozzle attached to each plug. The main pipe is connected to two large pumps, which give a pressure of 125 pounds per square inch.

The car shed is made large enough to accommodate 21 cars, and tracks are laid on an incline so that in case of fire the brakes are all released, and with one man to manipulate the switch, the cars can soon be run out of the shed.

It is some months since we commenced to publish reports from resorts which were run for the pleasure of the people either by street railway companies or by concerns in which the companies have an interest. The list is by no means exhausted, as is shown by the reports which are presented this month. There are more to follow. For this month we content ourselves with the presentation of the following:

FOR WOBBLY BICYCLERS.

A new device for the benefit of bicycle riders at pleasure resorts is shown in the accompanying engraving. It consists simply of a covered platform or pavilion 100 feet long by 10 feet wide with a row of push-buttons along the floor and flush with it, the buttons being connected



through a battery with an electric bell and an annunciator. The fun comes in when the rider attempts to guide his wheel so as to press each button, thereby ringing the bell and operating the annunciator. Scores can be kept from the records made by the annunciator and the game becomes a fascinating one in proportion to the number of "wobbly" riders in the game. One of the platforms has recently been erected at Coney Island.

"ZOO" AT PITTSBURG.

The plans for the new zoological building at Highland Park, Pittsburg, Pa., have recently been turned over to the city by the architect, J. L. Silsbee, 1532 Marquette building, Chicago, through whose courtesy we are enabled to reproduce the perspective view and first floor plan herewith. Though the establishment will be directly under the control of the city, the expense of the building is actually defrayed by the Fort Pitt Traction Company, who offered $100,000 for the purpose, and the plans have been made upon that basis of cost.

As shown by our illustrations, the structure consists of a main building with narrow wings running in each direction. Each wing terminates in an octagonal house, one of the houses being devoted to marsupials and the other containing the monkey cages. Six of the sides of each house have deep curved bays extending outwardly, and these are occupied by a series of summer cages, the other two sides being taken up by the entrances through the wings from the main building and from the outside. In general design the plan bears a resemblance to the much-admired Fisheries building at the World's Fair, and is equally adapted to its purposes.

The wings are laid out upon a regular curve extending through ninety degrees, and are divided in the middle by a longitudinal partition, one side forming a passageway and the other half being devoted to bird cages, etc. The main building, 264 feet in length, is variously subdivided. A large swell upon the rear is to be the aquarium, with grottoes in front, and is flanked upon either side with toilet rooms, directors' room and feed room for the larger animals. The latter will include elephants, camels, giraffes, cape buffalo and llamas and will be located to the right as one approaches the front of the building. The corresponding space at the left will be devoted to reptiles, and has three large tanks for the use of alligators and other amphibia. At each end of the main building are entrances with commodious porches and vestibules leading to the wings. The immediate front of the main building, covering a space of 175 feet in length, is the summer and winter quarters of the carnivora.

PERSPECTIVE OF THE ZOOLOGICAL BUILDING AT PITTSBURG.

The entire structure will be of red pressed brick with stone trimmings and tile roof. The total length, including wings, is 600 feet, and when completed promises to be a structure reflecting credit alike upon the architect, the city and the company whose enterprising spirit inaugurated the scheme and made possible its carrying out.

RICHMOND, IND.

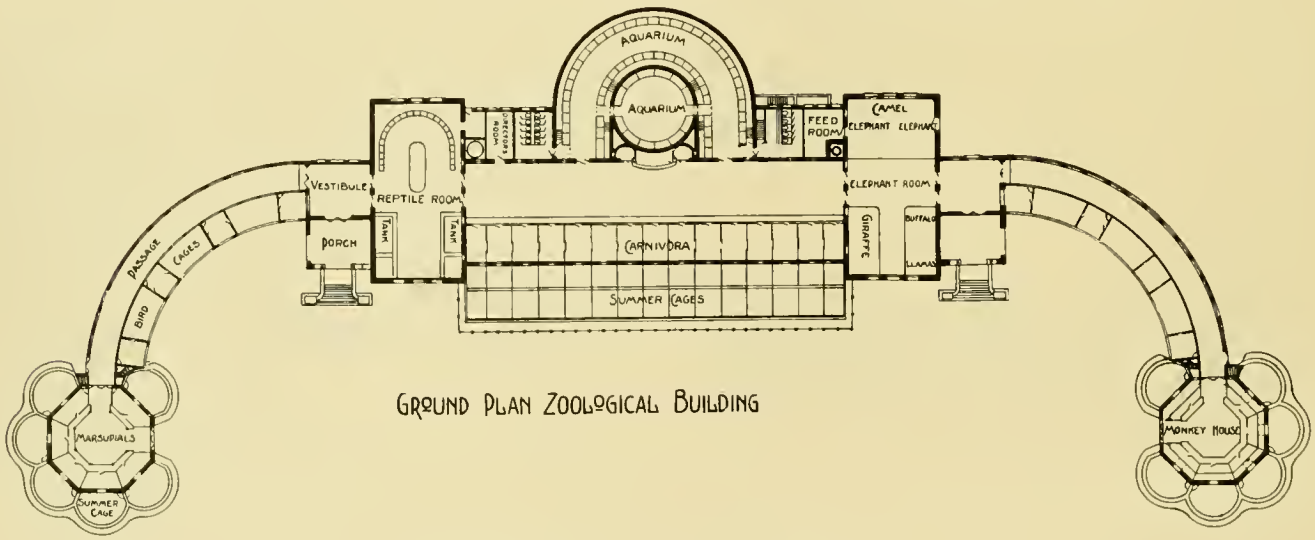
Richmond has a park of 200 acres two miles east of the city, controlled by the city. It is on the line of the Richmond City Railway Company, and E. Kessler, superintendent, writes us that the company under a concession from the city has erected a theatre capable of seating 2,500 people for opera and all kinds of suitable stage performances. The theater was opened June 2, by a comedy company, which gave performances three evenings in the week and a Saturday matinee. Band concerts are given Sunday afternoons. Bird and animal cages are located in various parts of the park and the natural beauties of the grounds are assisted by frequent flower beds. The site is partially covered with a natural growth of beech and sugar maple timber. A lake of five acres in extent is well equipped with boats. There is also a pavilion which will afford protection to 1,500 people in case of storm. All kinds of light refreshments are served. On the opening day the company received 900 admissions to the theatre at 20 cents each.

MINNEAPOLIS, MINN.

An attraction as unique as beautiful has been provided for the entertainment of patrons of the Twin City Rapid Transit Company at Minnehaha Falls. The glen in which the falls are situated is a beautiful spot in the daytime, but its attractiveness in the evening is greatly enhanced by illuminating with powerful calcium lights and fireworks and colored fires set off under the apron of the falls. The initial presentation drew a large crowd and it has since been repeated.

CHAMPAIGN, ILL.

B. F. Harris, Jr., general manager, with his usual enterprise, still keeps pushing West End Park, which his company started several years ago in the face of much ridicule on the part of those people who "know it all." He advertises it liberally not only in Champaign but in surrounding towns. This park was built out of a piece of ground having no natural attractions whatever and has been a great success. Admission to the park and to the entertainments provided there, is free. A switchback railroad has proved a great dividend earner. Among the other attractions are free base ball games, theatrical entertainments, band concerts, refreshments, bowling alleys, electric stereopticon, and dancing pavilion. With the aid of a landscape gardener and the planting of plenty of trees the park (which was originally a cornfield) has been made very attractive, and Mr. Harris takes advantage of every opportunity to get crowds, in which efforts he has been well rewarded.



GROUND PLAN ZOOLOGICAL BUILDING

THE ZOOLOGICAL BUILDING AT PITTSBURG.

"Arion," who has invented the most novel and exciting feat for pleasure resorts, viz: riding a bicycle on a live wire, carrying 500 volts, 90 feet from the ground, has engaged for a month with the Calumet electric, this city. His wheel and body are covered with incandescent lights, taking current from the wire he rides. He made a big hit at Winnipeg, where he performed for the electric road there. Arion is a young Chicagoan, and gave his first public performance three years ago, at Niagara, where he crossed the river several times. The feat was all the more remarkable, from the fact that it was made after only six weeks' practice, except a few attempts several years before when a boy. Arion is a big drawing card; and, we must not forget to say, very much of a gentleman.

The Leominster & Clinton, Mass., Street Railway Company has contracted for the erection of a building

40 by 100 feet for a bowling alley at its new park near Leominster.

The Fort Madison, Ia., Street Railway Company has re-opened Ivanhoe Park with a good stock of vaudeville talent. Admission is free.

The promoters of the Lewiston & Youngstown road have purchased a grove at the mouth of Niagara river for the site of a hotel and picnic grounds.

The Bridgeport, Conn., Traction Company is fitting up a large tract of land near Avon park, and will have a variety of attractions for the entertainment of picnic parties and others.

The management of the Tri-city Railway Company is arranging for a season of summer opera at the Watch Tower, Moline, Ill. Negotiations are pending with several leading artists in that line.

The Marinette, Wis., Street Railway Company has leased the amusement privileges at Lakeside Park to Charles P. Salisbury, of Milwaukee, a well-known theatrical manager who will furnish an excellent list of attractions.

The Fitchburg & Leominster Street Railway Company has had as one of its attractions at its resort at Whalom, the Kilpatricks, the well-known bicycle riders, who have appeared at similar resorts in various parts of the country.

The Marinette, Wis., Street Railway Company is favorably considering the proposition to provide a base ball park at Lakeside. Over $3,000 was spent upon these grounds last year in the erection of pavilions, docks, etc., and in supplying boats.

The Ft. Wayne, Ind., Consolidated Railway Company, is fortunate in having upon its line so pleasant a spot as Swift's park, and the management is to be commended for its enterprise in fitting it up. Several buildings have been planned and some are near completion. Steam and electric launches have opportunities for a sail of twelve or fifteen miles, and various other attractions are provided.

General Spencer, president of the Paterson, Passaic & Newark Railway says that a company will be incorporated with a capital stock of $50,000 for the purpose of laying out a park at Yanticaw Pond, a few miles from the Passaic river, where a full line of summer attractions will be provided. Another company is being organized with a capital of $100,000, to locate and run a similar park between Passaic and Paterson.

The management of the street railway at Concord, N. H., has arranged for a series of entertainments for the summer at Contoocook River park, the season being opened by Gorman's Royal Japanese troupe. The company has appeared at leading vaudeville houses in New York and is said to be one of the best attractions of the kind in the country. Afternoon and evening performances are given. An orchestra has also been engaged.

The Suburban & Eau Claire Electric Railroad Company, a new road opened June 15, at Columbia, S. C., is putting in a large amount of work at Hyatt park, the terminus of its line. Work is progressing rapidly on a $6,000 casino and the 15 acres of the park are being put in shape for summer use. The park contains two mineral springs, the water of which will be pumped to the casino. The grounds are well shaded and the resort promises to be a most delightful one.

The electric roads in and about Niagara are experiencing an increase of business through band concerts, which are given in Prospect Park of the State Reservation on Monday, Wednesday and Friday evenings of each week. The Niagara Falls and Suspension Bridge Railway was a liberal subscriber to these concerts, as was also the Buffalo-Niagara Falls road. The cars on this last named road all carry bulletins of the concerts. This year Prospect Park is lighted by electricity and hundreds of people spend the evenings within its beautiful borders.

Contoocook River Park, at the northern terminus of the Concord, N. H., Street Railway, has been formally opened. A band concert, an orchestra to furnish music for dancing and excellent vocal music were some of the attractions. The bowling alleys and pool and billiard rooms were well patronized. A bowling match was arranged between teams from two local bicycle clubs. Everything at the park is in good order, but improvements in the shape of an auditorium with a seating capacity of 2,000, and a bicycle track are in prospect in the near future. Work on the auditorium has begun and a line of attractions is being booked.

VOLTS FOR VERSAILLES.

Versailles is to have an electric street railway and within two months the old horse cars will give way to the new system. The street railway will be run from the light and power station.

The steam generating plant will consist of four semi-tubular boilers supplying steam to four horizontal single cylinder engines aggregating 350-horse-power for the light and power service in the city and two steam engines aggregating 240-horse-power for the street railway. The electric generating plant will consist of two general electric monocyclic machines aggregating 250 kilowatts and two direct coupled railway generators of same make, aggregating 200 kilowatts. The rolling stock will be 15 cars, each equipped with G. E. 800 motors and controllers.

The ladies of Dubuque, Ia., collected the fares on the street car lines June 20, for the benefit of Finley hospital.

HALF FARES

Interesting Bits of Information from all Parts of the Country, Boiled Down for Busy Readers.

San Francisco is to have street railway mail cars.

The Metropolitan Street Railway Company of Kansas City has recently made a successful test of an electric brake which is handled by the General Electric Company.

Augustus S. Chase, president of the Benedict & Burnham Manufacturing Company, died from paralysis, in Paris, June 7.

The Canadian General Electric Company is building a 30-ton electric locomotive for the Hull & Aylmer Electric Railway.

The women of Clinton, Ia., took charge of the street car lines June 17, and turned in the fares to the benefit of Agatha hospital.

At a meeting held May 25 all the salaried officers of the New York Rapid Transit Commission presented their resignations.

The New Haven Street Railway Company opened, May 21, its extension from Whitneyville to Hamden. Everybody rode free.

Squeezed wind is the irreverent expression a Worcester, Mass., newspaper applies to compressed air as a street railway motive power.

The Lockport, N. Y., Street Railway Company, June 20, reduced the wages of conductors and motormen to 12½ cents per hour.

The Buffalo & Niagara Falls Electric Railway has begun the running of cars with smoking compartments, which are said to be quite popular.

Boys at Yonkers, N. Y., daubed with blue paint and objectionable names a lot of newly painted reserve cars of the Yonkers Railroad Company.

A Russian railway engineer, V. Herzenstein, estimates the life of creosoted pine ties at fifteen years, oak eighteen years, and beech twenty years.

Collecting street car tickets is becoming quite a fad The collection which adorns the wall of the Review office is probably the largest in the country.

The Victoria (B. C.) Electric Railway & Lighting Company's property was sold at auction to F. S. Barnard, who represents an English syndicate. The price was $340,000.

A crowded car in Milwaukee escaped by six inches a plunge into the river at an open draw June 25. The motorman reversed his lever and put on the brake, but the car slid along the rails. The bridge is operated by electricity and was opened very suddenly.

The Denver Tramway has purchased 250 tons of 72-pound 6-inch T rail for proposed improvements. This order was rolled by the Colorado Fuel and Iron Company, of Pueblo.

The Metropolitan Street Railway Company, of Kansas City, meets the requirements of trolley parties by stocking the buffets of party cars according to the tastes of the company using them.

The attempt to use a storage battery car in the owl car service on one of the Cleveland roads was a dismal failure. It gave out early in the game and had to be pushed home by a grip car.

The Chicago & St. Louis electric air line, which was 99 per cent wind, has been heard from again, and the stockholders are asked to increase the stock $6,500,000 and issue $11,500,000 new bonds.

The Alton Railway & Illuminating Company finished and dedicated, June 1, the electric system connecting Upper and North Alton with the city. The line represents an investment of $260,000.

The Manhattan Elevated Road, New York, will run bicycle trains every half hour, from 5 p. m. to midnight. This action was taken by the directorate upon the petition of the local branch of the L. A. W.

The directors of the Delaware, O., Street Railway Company recently elected the following named officers: J. D. VanDeman, president; J. K. Newcomer, vice-president; V. T. Hills, treasurer, and L. L. Hudson, secretary.

The Pasadena & Mt. Wilson, commonly known as the Mt. Lowe road has practically been taken charge of by its creditors, although no legal action has been brought. The creditors are to be allowed the management, and hope to be able to pull the road out of its trouble.

A mail service in effect July 1, has been instituted between the post office and Station A, Niagara Falls, N. Y., over the Niagara Falls & Suspension Bridge Railway, and in the near future a similar service will be put in operation to Buffalo, over the Buffalo & Niagara Falls line.

John J. Swenie has filed a creditor's bill in the circuit court asking for the appointment of a receiver for the National School of Electricity. Mr. Swenie holds judgment against the school for $3,626. This is the enterprise promoted by J. P. Barrett, Chicago city electrician and J. Allan Hornsby.

A new road known as the Biloxi City Railway Company has been opened at Biloxi, Miss. The capital is $25,000, and the road has five and a quarter miles of line operated by horses. The officers of the company are: James J. Lemon, president; E. W. Morrill, secretary and treasurer. The secretary also acts as purchasing agent.

Things seem to be coming our way now. At a recent election at New Canaan, Conn., there were two tickets in the field designated as "trolley" and "anti-trolley." The issue was upon the removal of certain restrictions upon the work of the Norwalk Electric Railroad Company whose lines are being extended to New Canaan, and the "trolleys" won.

Highwaymen held up a trolley car of the Brooklyn Heights Railroad in the Bergen woods, Brooklyn, June 21, and robbed the conductor. In an interview with a "prominent highwayman," published by the New York Press, the blame is placed upon the company, because they carry so many passengers and allow the conductors to become loaded down with nickels.

Rumors to the effect that the Columbus Central and the Columbus, O., Street Railway Companies were to be consolidated, are denied by General manager Barry, who states that the recent conference which gave rise to the rumor, was only for the purpose of settling the amount of rental to be paid by the Central company for the use of tracks upon one street.

"The Trolley," is the name of a neat little publication issued by the Brooklyn Heights Railroad Company, calling attention to points of interest accessible over the lines of that system. It is well illustrated and carefully printed, and aside from the matter for the promulgation of which the work is especially gotten up, contains considerable interesting reading matter.

In the action brought by the Yale & Towne Manufacturing Company, of Stamford, Conn., against the Cleveland City Railway Company for infringement of patent on a friction clutch used in the cable power house, a decision in favor of complainant has been rendered by Judge Ricks, of the United States Circuit Court. The device is made by the Walker Company, of Cleveland.

The Danville, Ill., Gas, Electric Light and Street Railway Company May 14, placed on record a first mortgage to the American Loan & Trust Company, of Boston, to secure an issue of twenty year bonds to the amount of $300,000. The plant and equipment are in excellent shape, particularly in the matter of steam heating, which was remarkably satisfactory during the past winter.

At Syracuse, N. Y., a new company, which will probably be known as the Syracuse Rapid Transit Company, will take over all the property of the Consolidated Street Railroad Company and the Syracuse Street Railroad Company and overhaul the lines now existing in the eastern section of the city. It is stated that the new work will be of the latest improved kind, a new and solid roadbed laid and a new lot of cars purchased.

President Frank Brown, of the Baltimore Traction Company, in the course of a communication to the stockholders, is quoted as speaking upon the subject of consolidation as follows: "My experience has made me an earnest advocate of a consolidation of the street railway lines of Baltimore city, believing that the interests of the companies and the people and the development of the city can be better subserved by one joint property than by the individual companies, competing, as they do, for the different thoroughfares frequently against the wishes of the property owners bordering on the same."

By way of quiet endeavor to restrain disorderly and noisy spirits who sometimes make a part of trolley parties, the Union Traction Company, of Philadelphia, and the Hestonville, Mantua & Fairmount Passenger Railway Company have agreed to insert the following clause as a part of the contract made with trolley parties: "Be it understood, and it is a part of this contract, that liquor shall not be taken, fireworks shall not be used, horns blown nor yelling or other disorderly conduct indulged in on the car. There shall be no vocal or instrumental music while passing hospitals, and all such music shall cease at 11 p. m.

THE PROFITS (?) OF CONVENTIONS.

The money made out of conventions and special occasions drawing great crowds to a city is liable to be overestimated by those who do not figure all the items there are to offset the profits made from carrying the crowds. The St. Louis Globe Democrat quotes a street railway president of that city as saying after the republican convention:

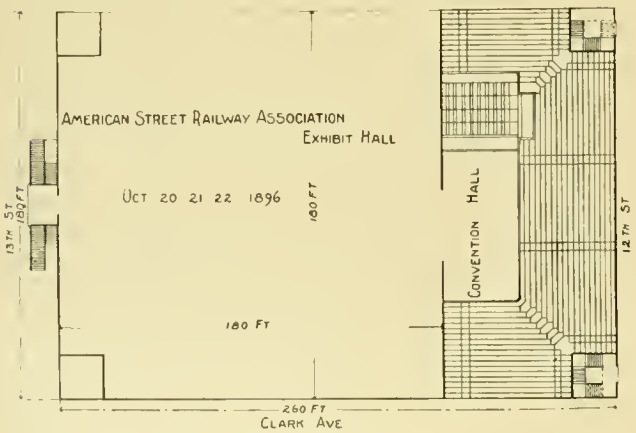
"The people of this city no doubt have formed an opinion that we have coined money, so to speak, since last Monday. They imagine that we reaped a harvest, and wanted the convention continued indefinitely. I know that this is the impression entertained by over one-half of the inhabitants of this city. Well, it is just the other way. We do not hanker much after a convention. The expense we incur in giving the accommodations is considerable. In the first place we are expected to subscribe quite a liberal sum to help meet the expenses of the committee who have charge of the convention. Then we must turn out extra cars, which requires extra crews; then we must print streamers, placards, advertise in the daily papers and issue circulars. When all of these expenses are added up it will be found that a great many thousands of additional fares must be collected to come out even. We also run greater risks of accidents, and a serious one will take all of our profits and leave us in the hole besides. This is applicable to every line in the city."

ASSIGNING EXHIBIT SPACE FOR ST. LOUIS CONVENTION.

Intending exhibitors at the Street Railway Convention in St. Louis, next October, are advised that distribution and assignment of space will not be made until August 16. On that date the committee will meet and take up all the applications, of which there are already a large number. While there will undoubtedly be enough for all, it is already discerned that the exhibits in number and size will far exceed any previous display. It is the intention of the committee, of which Geo. W. Baumhoff, general manager of the Lindell road, is chairman, to this year classify the exhibits; and in order to assist the committee in carrying out this plan, and that exhibitors may be located with others of their own class of supplies, it is requested that applications so far as possible, reach the chairman at once.

The space rate is lower than usual this year being but 10 cents per square foot, with a minimum allotment of 100 square feet; and there is no reason why exhibitors should not only apply early, but commence work on their intended exhibits so all may be in place when the convention opens. Two days early is much better than 24 hours late, for there are always quite a large number of delegates who go early on purpose to more carefully inspect the show.

We show herewith the ground plan of the building constructed for the national republican convention, as it will be specially remodeled for the use of the American Street Railway Association convention, October 20, 21,



22, 1896. As has been said before, and as can be seen by the plan, the only entrance to the convention hall is through the exhibit hall. Delegates are obliged to pass the whole length of exhibit hall to get to and from the convention. The arrangement is apparently an eminently satisfactory one.

A bright man in Hudson County, N. J., has an idea in the matter of track laying for trolley roads, which, if put into effect—as it probably will be universally—would effectually prevent the possibility of accidents. He wants tracks elevated one foot above the street level so that wagons can't cross them.

OPPOSITION TO THE LONG ISLAND.

The recently incorporated New York & Queens County Railroad Company is liable to prove a formidable competitor to the Long Island Railroad Company, if present plans are carried out. The company has virtual control of all electric surface roads running out of Long Island City and of all but one in Queens County. The company is capitalized at $2,000,000; backed by wealthy men of New York and Philadelphia. It is proposed to erect new general offices and car barns opposite the 34th street ferry and to begin the extension of the lines at once. The officers are, R. T. McCabe, president; Walter A. Pease, secretary, and George Chambers, general manager.

FIRE AT MERRILL, WIS.

One of the most disastrous fires which the city ever had was the burning of the plant of the Merrill Electric Railway and Lighting Company on the morning of June 27. Three cars stored in the barn, the track sprinkler, two armatures and a lot of tools and material, were wholly destroyed, as it was impossible for the firemen to gain access to the iron-sheathed building. The fire will deprive the city of its street car service for six or eight weeks as it will be necessary to get an entire new equipment. The loss is about $7,000. The cause is unknown, but supposed to be spontaneous combustion in a pile of waste.

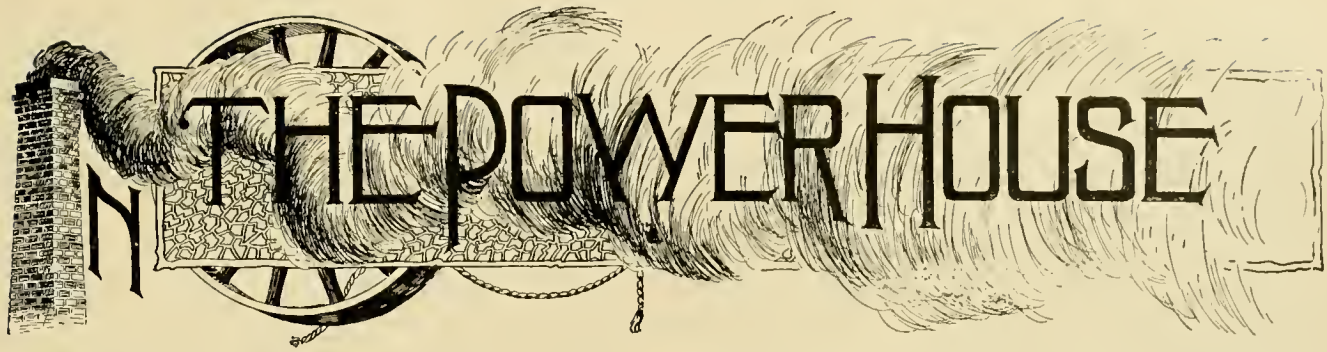
HYPNOTIZED THE STREET CAR.

Paul Alexander Johnstone, the mind reader, is credited with the performance of a remarkable feat at Muncie, Ind., the other day. He took an electric car, and blindfolded, ran it from the city to Westside park, a distance of two miles, where he found a needle which had been hidden in a stump. In the course of the trip he rang the bell for street crossings and vehicles and made all necessary stops.

PAINTING BY ELECTRICITY.

The Liverpool Elevated road is using some of its electric power for driving a paint spraying plant for painting its structure. The electric motor which drives the paint pump is carried in a box on wheels and is run underneath the structure. A similar method of spraying paint was used in going over some of the World's Fair buildings, and has proved a very rapid method of getting over large surfaces.

The employes of the Quincy & Boston Street Railway celebrated by a banquet at midnight, May 25, the issuance by the state of the charter for their benefit association. Superintendent B. J. Weeks, who was to have presided, was unable to be present on account of sickness, and his place was filled by Assistant Superintendent Waterhouse.



This department is devoted to the construction and operation of electric railway power houses Correspondence from practical men is specially invited. Both the users and makers of power house appliances, are expected to give their views and experiences on subjects within the range of the department.

"Put not thy trust in a single fan," is a good motto for power plants depending on artificial draft. We would not for a minute wish to be understood as saying anything against artificial draft furnished by a fan in the stack, but there should be more than one fan and more than one engine or motor to drive it. The entire station of a large eastern road was shut down last month by the breaking of a small engine driving a draft fan.

* * *

Interest in the matter of providing condensing water where there is not a large natural supply at hand to draw from is undoubtedly on the increase and this department of the REVIEW thinks that it can justly claim some of the credit for this awakening. The great saving in fuel certainly makes it worth looking into, and we feel justified in devoting considerable space to the subject. The Calumet road, of this city, is arranging to cool water for condensing purposes. A large reservoir is being excavated on the company's property near the power house, and some form of cooling apparatus is to be provided, so that the water in the reservoir can be used continuously for condensing without getting too hot. When arrangements are completed we will take pleasure in giving our readers full information as to the devices used and the results attained. The Calumet power house is favorably situated for doing this, as land is plenty for the reservoir. Condensing is also specially desirable in this case, because the station is fitted with compound engines, and as is well known, these run better on a variable load when condensing, than when exhausting into the air.

* * *

A fire in the electric power house of the Chicago City Railway the past month emphasizes the fact that even buildings which are considered fireproof can give rise under certain conditions to a serious blaze. The only things about the City Railway power house that can burn are the floor of the engine room and window casings. In one corner of the engine room basement was a locker room where employes keep their clothes and a room for oil and waste. It was these two weak links in an otherwise strong chain that made the trouble. The fire probably started from spontaneous combustion in the oil room or from a pipe in the clothes in the lockers. At any rate a good sized blaze resulted. Some difficulty was experienced in keeping the firemen from throwing cold water on cast iron pipe fittings under high steam pressure and the generators were shut down a few minutes to prevent danger from live wires. The damage done amounted to only a few hundred dollars, but the circumstance should serve as a reminder to all that there are practically no power houses where it is impossible for a fire to do damage.

* * *

A Self-Cooling Condenser.

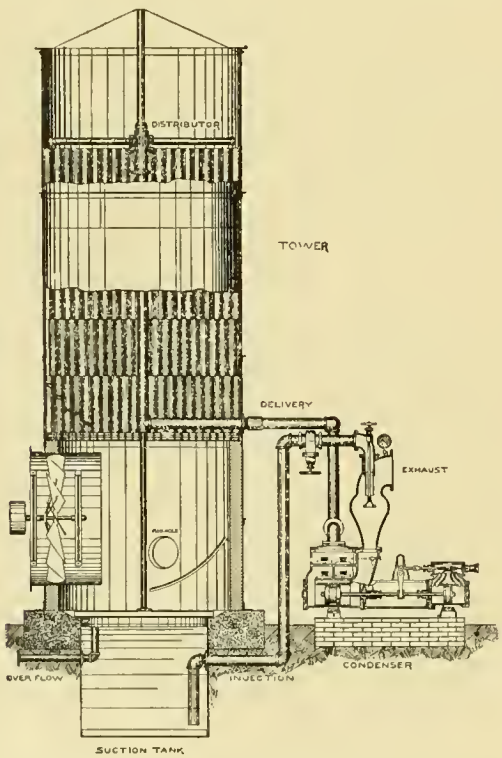
At the May, 1896, meeting of the American Society of Mechanical Engineers, held at St. Louis, a paper was presented by Louis R. Alberger upon the subject of self-cooling condensers, in which the author gave a description of what would seem to be a simple and effective form of apparatus of especial interest to those interested in the management of electric railway power houses.

The stated object of the paper was to present a form of apparatus which operating without a natural water supply should yet produce results which might compare favorably with those obtained in the ordinary manner, and in which, broadly speaking, the air becomes the condensing medium. The end attained by the use of the system is the possibility of using the most modern types of compound and triple expansion condensing engines, in places where only sufficient water for boiler-feeding purposes is available.

The paper discusses the practices sometimes employed in other countries of exposing the heated water to a large area of evaporating surface, as, for instance, pumping it over a pile of brush, a series of suspended gunnysacks, or in evaporating pans, as in sugar manufacture in Cuba, etc. Such methods, while operative in a limited way, are obviously impracticable in the case of plants necessitated by modern conditions. As embodying the same principle, however, a system suited to prevailing conditions is described as follows:

"An apparatus for this purpose, and one that can be safely employed as a reliable portion of a steam power plant must be simple and compact in construction, thor-

oughly durable, and so completely under control as to be practically independent of changes of wind and weather. These features are to be found in the self-cooling condenser, as illustrated in section in the accompanying engraving. It consists of two parts—the condenser, in which the exhaust steam of the main engine or engines is condensed, and the tower, in which the heated discharge from the condenser is cooled to a proper temperature to be used again for the further condensation of exhaust steam. The tower consists of a cylindrical steel shell open at the top, supported upon a suitable foundation, and having fitted at one side a fan, the function of which is to circulate a current of air through the tower and its filling. This filling consists of layers of cylindrical tubular tiling, which rests upon a grating supported by a brick wall extending around the circumference of the tower. The heated discharge water



A SELF-COOLING JET CONDENSER.

from the condenser enters the tower at the side, passes up the central pipe, is delivered on the upper layer of tiling and over the whole cross section of the tower by a distributing device consisting of four pipes, which are caused to rotate about the central water pipe by the simple reaction of the jets of heated water issuing from one side of each pipe after the manner of a Barker's mill. The water thus delivered spreads over the outside and inside surfaces of the walls of the tiling, and forms a continuous sheet, which is presented to the action of the air. The tiling, which is preferably six inches in diameter and twenty-four inches long, is placed on end in horizontal layers, one upon the other, and packed as closely as possible, the walls of each individual tile of each successive layer being disposed so as to come opposite to the air spaces of the next lower layer, breaking joints.

"Assuming that each tile rests on only two others, a given quantity of water, placed on any one tile in the top layer, will be divided over at least two tile in the second layer, three in the third, four in the fourth, and so on, until it becomes spread over fifty-four in the lower layer on the grating. The practical importance of this extremely effective distribution of the water, due to the mere arrangement of the filling, has been demonstrated in a tower where the distributor was purposely stopped, when the efficiency of the apparatus was found to be so slightly impaired that the difference was not noticeable in the engine room. The air is distributed in an equally good manner, and there is a large free area with equal facility for its passage upward over the entire cross section of the tower. The heated water falling through the tower is cooled by three processes; first, radiation from the sides of the tower; second, the contact of cool air, and third, evaporation. This latter is by far the most important, as the evaporation of a pound of water in this way carries off about 1,000 units of heat, and enables a pound of steam to be condensed in the condenser. As quite a proportion of the cooling is done by the first two processes, the evaporation of water in the tower must be less than the water formed by steam condensed in the condenser. Consequently the supply of circulating water is constantly augumented and requires no replenishing. The cooled water falls from the grating to the subsiding tank at the bottom, and is from there drawn by the condenser to again perform condensation.

"There is constantly coming into the system water from the city mains or other source to feed the boilers. There is constantly going out of the system the water evaporated in the tower, an amount that is less than that which comes from the steam condensed, and the slight overflow from the suction tank that will carry off the oil and grease that come from the engine with the exhaust steam, and which would tend to accumulate in the suction tank.

"In situations where the water to be had for boiler feeding is so impure as to form objectionable scale in the boilers, a modification of the apparatus may be used to great advantage. This modification consists in the substitution of a surface condenser with air and circulating pumps for the jet condenser and pump.

"The circulating pump draws the cool water from the suction tank, passes it through the tubes of the surface condenser and the tower and back again in a continuous circuit to the suction tank. The exhaust steam from the main engine brought in contact with the outside of the tubes is condensed. The pure water thus formed, together with the air and uncondensable vapor, is removed by the air pump and delivered to the hot well, from whence the water is fed to the boilers. The loss to the circulating water by evaporation in the tower must needs be made up from the source of water supply."

It is stated that the dimensions occupied by the cooling tower need not exceed seventeen feet in diameter

and thirty feet in height for 1,000-horse-power. The suction tank may be located within the foundation of the tower, and should contain about 2,000 gallons of circulating water. The location is immaterial, distance being limited only by the pipe friction of the water. The operation of the fan is estimated to require an average not exceeding 1¼ per cent of the power of the main engine.

The author also mentions an advantage of a self-cooling condenser over a condenser dependent upon a natural water supply, especially with engines subject to considerable variations of load. He says:

"It is substantially correct to say that not less than half the condensing apparatus in use in connection with stationary engines are located so as to be compelled to lift the injection water at least 16 feet, and a number as high as 20 to 22 feet. This is caused by the fact that the stations or mills, if they are alongside of a river, are usually placed upon moderately high and firm ground. The result of this arrangement is that, in case of a sudden overload of the engine by which steam may be carried three-fourths of the stroke, instead of one-fourth of the stroke, as normally, the condenser is not capable of maintaining the full degree of vacuum, and when the vacuum falls, as it must necessarily, unless a very large and extravagant amount of water is being passed through the condenser, to a point below that due to the suction lift, plus the friction in the pipe, say to twenty inches, then the water is lost entirely, and the engine must either be run non-condensing or the condenser cooled off and started by means of a forced injection from some outside source. This is very undesirable occurrence in an electric railway station, as can readily be understood.

With the self-cooling condenser, however, having the suction lift reduced to a few feet, and a supply of water on hand entirely free from debris or foreign material such as would cause the stoppage of the injection supply, an overload may come to the condenser and the vacuum temporarily fall to a point as low as ten inches without becoming entirely lost. Just as soon as the cut-off again takes place at an earlier point, the vacuum will return to the normal degree without the extreme annoyance of shutting down or of cooling and priming the condenser."

Another Big Power House for Chicago.

The Chicago City Railway, after due deliberation, has purchased ground for a mammoth new power house at Forty-ninth street and Oakley avenue. It is to be designed for a capacity of 15,000 horse-power—the largest yet planned, even in this city of big power houses—but the full capacity of machinery will not be put in at present. The station will be in the western edge of the company's present territory, but it is expected the growth of the next few years will bring it into the center of distribution. It is located on steam railroad tracks, so that coal will come cheaper than at any of the company's other stations. The general arrangement will be similar to that of the present station at Fifty-second street and Wabash avenue. At present six 800-kilowatt Walker generators will be put in. The station will be built to hold twelve of these machines. Rope drive will be employed, and two engines coupled to one fly-wheel will drive two generators through one set of transmission rope. The engines are to be simple high pressure. The maximum output over the main bus bars when the station is filled will be 21,000 amperes. The plans call for two brick stacks each 200 feet high with 14-foot flue. The structure will be steel frame similar to that of modern office buildings.

Fly Wheel Requirements.

W. H. Wakeman, in the Engineering Magazine, writing on "Points in the Selection of Steam Engines," says:

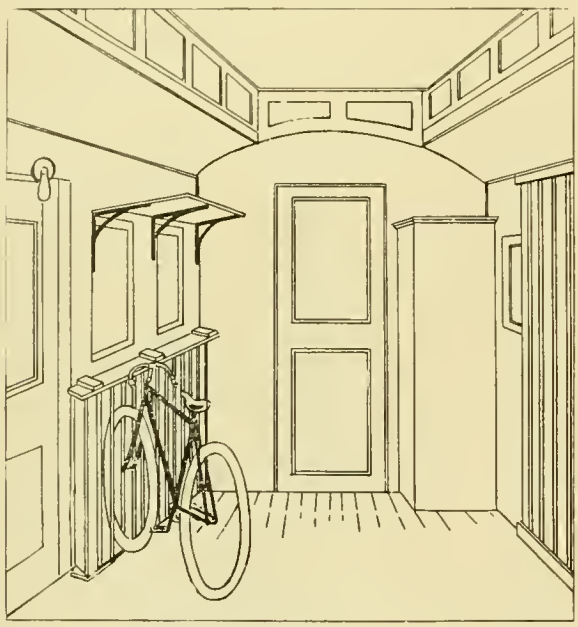
"Every engine should have a properly-designed and well built fly-wheel. When fly-wheels burst, they are capable of doing great damage to life, limb and property. A fly-wheel should have metal enough in the rim not only to make it stiff enough for every day use, but also to prevent it from springing outward between the arms, for it has been demonstrated that this action does take place at high velocities. The distance between the arms at the rim should not be excessive. No inflexible rules covering every set of conditions can be given, but one point must not be overlooked, namely, the speed of the rim; this should never exceed 4,800 feet per minute, or 80 feet per second, for any form of cast iron. Although some wheels exceed this safe limit, it is better to be on the safe side. If the governor fails to work properly for a few seconds only, the safe limit of speed is soon passed. Every engine should have a stop motion of some kind on it, so that, if the governor belt breaks or runs off from its pulleys, the engine cannot run away. The too-frequent fly-wheel failures have also demonstrated that provision for automatically shutting off steam when regular speed is exceeded and the governor belt is in place, should be supplied.

The Chicago General Railway Company has purchased a tract of six acres lying south of Thirty-fifth street and west of Lawndale avenue, adjacent to the drainage canal, for the use of patrons of the road visiting the canal.

George J. Gould, as representative of the Manhattan Railroad Company, recently presented to the Rapid Transit Commission a statement of what the company is willing to do in the matter of increasing rapid transit facilities. The company is willing to pay for the right to build extensions and does not ask to be relieved from further taxation or guaranteed against the payment of damages to property owners. New lines are proposed on West street to Twenty-third street connecting with the ferries and the Ninth and Sixth avenue roads, and from Brooklyn bridge connecting with West side lines as far as Kingsbridge and with East side lines to Fordham.

BROOKLYN HEIGHTS CHECKS BIKES.

The Brooklyn Heights Railroad Company has made arrangements to accommodate bicycling patrons by putting on eight express cars between the ferry and Jamaica, in which bicycles will be checked for a fee of fifteen cents. The cars will be run at half-hour intervals on Sunday mornings and evenings, and will take up and deliver wheels at any point on the line. They are devoted exclusively to this service. The interior is

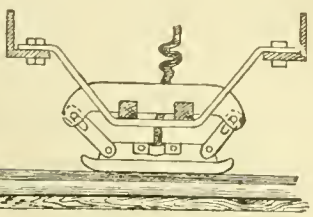


NATIONAL EXPRESS COMPANY'S BICYCLE CAR—BROOKLYN HEIGHTS RAILROAD.

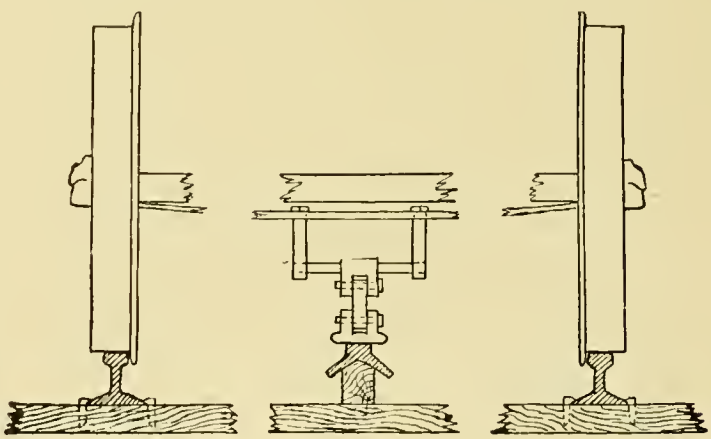
shown in the accompanying illustration. The sides are provided with a series of racks for holding the wheels. The roads from Brooklyn to Jamaica are paved with granite blocks or cobble stones and the ride over them was sufficient to spoil much of the pleasure in riding upon the smooth macadam beyond.

THIRD RAIL AT NANTASKET.

Although the track near Nantasket Junction on the New York, New Haven & Hartford Railroad, which has recently been equipped with the third rail electric system, is not as has often been said of late, the first surface road to be equipped with a third rail, it is nevertheless of a good deal of interest at the present time when steam roads are looking into electric methods for suburban service. One of the earliest commercial electric railways ever built—that at Portrush, Ireland.—has a third rail, supplied at a pressure of 500 volts, and has worked successfully for many years. In the hope of getting something better than the trolley for heavy high speed work the management of the New York, New Haven & Hartford Railroad, which already owns the famous Nantasket Beach electric trolley line, has been experimenting recently with a third rail laid midway between the track rails. A double track 3½ miles long from East Weymouth to Nantasket Junction has been equipped with the third rail and extensively tested during the past month. Of course it is not proper to pronounce it a success electrically until it has seen a service of a year and all kinds of weather, but mechanically it has been found to be all right. The shape of the rail is an inverted V as shown in the accompaning sketches. It is supported every 10 feet by ash blocks on ties which have been boiled in vacuum pans with a far compound which fills the pores of the wood. The shoe used is like that used on the Metropolitan Elevated. One shoe is hung from each truck of the car so that interruptions in the third rail less than the distance between truck centers do not interfere with the current supply. Where as at some highway crossings the length of the break is greater than this the cars must run by momentum from one section to the next. This is the



CONTACT SHOE AND THIRD RAIL.



SECTION THROUGH TRACK WITH THIRD RAIL.

first steam surface road to be equipped with a third rail for electric traction and consequently much interest attended the formal trial of this section on June 26. A large party of railroad officers, electrical engineers and newspaper men was present. The trial was successful in every way and a speed of 70 miles an hour is said to have been reached. Col. N. H. Heft has charge of the electrical work on the road and President C. P. Clark is taking much interest in these trials.

The capital stock of the consolidation of the Toledo Traction Company and the Toledo Electric Street Railway Company is fixed at $6,000,000, with 40,000 shares common and 20,000 preferred stock. The Toledo Electric will receive $150,000 preferred and $1,200,000 in common stock, and the Traction Company $1,850,000 preferred and $2,800,000 common. Mortgage bonds to the amount of $6,000,000 are to be floated, secured by first mortgage to a New York trust company.

Are Personal Injury Cases Assignable?

A decision of the utmost importance to street railway companies and many others was recently handed down by the supreme court of the state of Illinois. The case was that of the appeal of the North Chicago Street Railway Company against Ackley, and grew out of a previous action for damages for personal injuries sustained by a woman who employed Ackley as attorney and to whom she assigned one-half her claim. The company settled and paid the complainant directly $3,750. Ackley brought an action against the company to recover one-half the amount of settlement and the case has gone through various stages of appeal, until it now stands as at first stated, pending action upon a motion for rehearing. The grounds upon which the decision was based, are stated to be, that "leaving out of view questions of public policy, all causes of action which under the law survive are assignable," and the contention of the appellant now is that the court erred in "leaving out of view questions of public policy" in a case of this nature. The effect of the decision if finally allowed to stand would be to put at the mercy of shysters every corporation and every employer of labor in the state, and it is earnestly to be hoped that this last contention of the appellants will be sufficiently vigorous to secure a modification of the honorable court's position.

Expert Witness Comes to Grief.

The West Chicago Street Railroad attorneys are to be congratulated on bringing to earth a pretended expert witness brought to testify in a personal injury suit recently brought against the company. Charles Schuf was called in as an ex-gripman to testify concerning the time in which a cable car could be brought to a standstill. He claimed the distance was about seven feet. He went to pieces on the cross-examination, however, when closely questioned as to his former employment. He said he had been in the employ of the Broadway cable road, New York, but gave dates much out of place, as the road was not in operation until several years later. He also got mixed up on Philadelphia streets, where he claimed to have operated cars. Judge Gibbons sent him to jail on a charge of perjury in default of $1,000 bail.

A Convenient Joint.

A man by the name of Frank Flannery, who pretends to be a post office inspector, has a unique way of "doing up" street railway companies, and recently got in his work at Wichita, Kans., to the extent of $1,000. It seems he has a loose hip joint that he can dislocate at will, and when he finds himself in want of funds he has only to pick out a loose board in a sidewalk, or fall from a street car to furnish grounds for a good action against the city or company. In Wichita he succeeded in compromising a case against the city for $500, and the next day he was found on a sidewalk with a similar dislocation which was paid for at the same rates. He has also operated at Guthrie, Oklahoma.

A Strange Suit.

Two women have brought actions against the Atlanta Consolidated Street Railway Company for $5,000 each on peculiar grounds. They were visitors to the Exposition and wholly unacquainted with the city. On the night of November 5 they visited the opera house in company with an acquaintance, who at the close of the performance escorted them to a car which she said went near to the house at which they were stopping. The conductor also is said to have given the same information. After riding some time the car stopped and they were told that was the place where they were to get off. They did so, but failed to find the house they were looking for, and wandered around until after 1 o'clock when upon inquiry they were informed that their house was next door. They want the amount stated by way of damages for the sufferings during the search, which they attribute to the negligence of the conductor.

It Depends.

"That man wouldn't take a thousand dollars for those scars," remarked the president of a street railway company, pointing to a man whose face looked as if some one had been drawing a map of Europe on it with a razor.

"He got them fighting duels at Heidelberg University, and he's prouder of them than of anything he owns; and yet if he got scarred up half as badly in an accident on our road he would think $25,000 was small pay for them."

Scientific or Legal Insanity?

A notable case has just been decided by the Appellate Court in favor of the Calumet Electric Street Railway Company. The action was brought by Nicholas J. Wheeler for $30,000 damages for injuries sustained while in the employ of the road, which injuries were claimed to have resulted in insanity. The counsel for the defense claimed that there was a difference between scientific and legal insanity, and sustained his point with such force that the Appellate Court reversed the previ-

ous decision against the company without remanding the case. It is said that this is the second instance in which such action has been taken. In an interview with John Farson, president of the company, he informed a REVIEW representative that though Wheeler had sustained some injury to the head while in the employ of the company he, nevertheless, continued to work in the same capacity, as engineer, for nine months afterward, and delayed bringing suit against the company until two years had elapsed.

* * *

The Metropolitan Street Railway Company of Kansas City is having a lot of trouble with counterfeit quarterly passes. Six of them were reported within a few days and one has been taken up and turned in at headquarters. The trouble began in January. Pass number 702 was reported lost and conductors were instructed to watch for it with the result that it was soon reported that two passes numbered 70 were out. They were taken up when it was discovered that the missing figure had been carefully removed with acid. Soon complaints came in that many holders of passes refused to show them and would even leave the car in preference to doing so. The company's only alternative has been to call in all passes above a certain number. It is said that there are clues by which it is hoped to locate the guilty parties.

* * *

The action of the Bell Telephone Company against the Montreal Street Railway Company for $30,000 damages on account of the derangement of its service by the introduction of the trolley system was dismissed June 30.

* * *

An action for $5,000 damages in behalf of a seven-year-old boy has been commenced against the Brooklyn Heights Railroad Company. A fuse burned out and scared the boy so that he jumped from the car, receiving a severe cut on his head and bruises on his body. The claim is that the motorman was responsible for the burning out of the fuse.

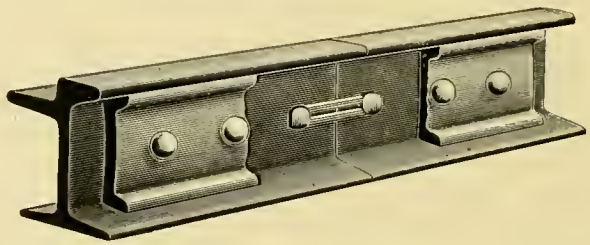
* * *

The supreme court of Minnesota, June 29, handed down a decision in the case of Agnes M. Defoe against the St. Paul City Railway Company, to the effect that in an action to recover damages alleged to have been sustained in alighting from a car, the lower court erred in refusing to charge the jury that plaintiff could not recover if it was shown that she alighted while the car was slowing down preparatory to stopping.

A five-year old daughter of William Beckett, Sacramento, Cal., was run over and killed by a street car, June 6. She had crossed the track safely but returned in answer to a scream from her mother who was behind.

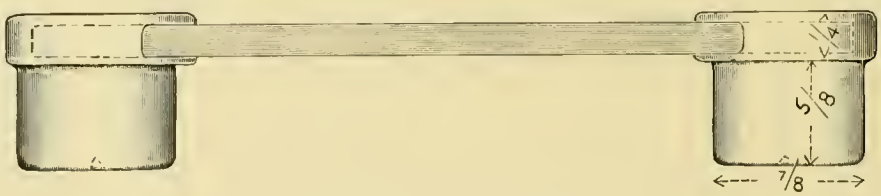
FOREST CITY ELECTRIC COMPANY'S BOND.

The Forest City Electric Company, of Cleveland, is manufacturing a bond which is termed the "protected," as it is intended to go inside the fish plates. It is constructed of flattened copper wires with their ends cast-welded into copper terminals. The terminals are then



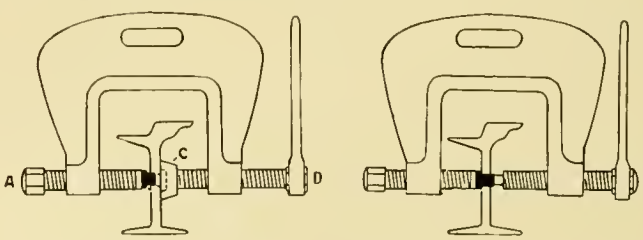
FOREST CITY RAIL BOND.

drop forged to size and finish. This makes a flexible but practically one piece bond. The great flexibility relieves the rail contacts from torsional strain. These bonds are best inserted with the aid of a machine which is shown herewith. The bond is started into the hole with a hand hammer. Then the machine is put on with



FOREST CITY RAIL BOND.

the screw A on the head of the bond and the cap C on the end of the screw D. Then A is turned up with a wrench until the bond is in place. Then the cap C is



DEVICE FOR FASTENING FOREST CITY BOND.

taken out and D is tightened so that the point on D is forced into the bond terminal so as to rivet and expand it. The time required is two minutes per bond. Bonds are made in 3 and 4 inch lengths, but can be furnished any desired length.

Belvidere, Ill., started its street railway July 1 with free rides for everybody and a special car for the city council and ladies. The promoter is James M. Canterbury, of the La Crosse & Onalaska, Wis., Street Railway. With him are interested D. A. Henderson, Charles E. Fuller, W. C. DeWolf, Jr. and John M. Roach, superintendent of the North Chicago Street Railroad.

THE WASHINGTON, ALEXANDRIA & MT. VERNON ELECTRIC RAILWAY.

Novel Devices for Automatic Changing from Underground to Overhead Trolley—A High Speed Road.

This road comprises about two miles of underground electric construction in the city of Washington and about twenty-five miles of overhead trolley between Washington and Mt. Vernon and Washington and Arlington, Virginia, crossing the Potomac River on the

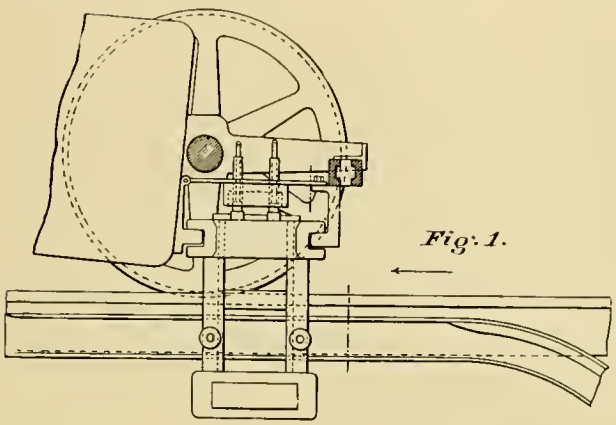


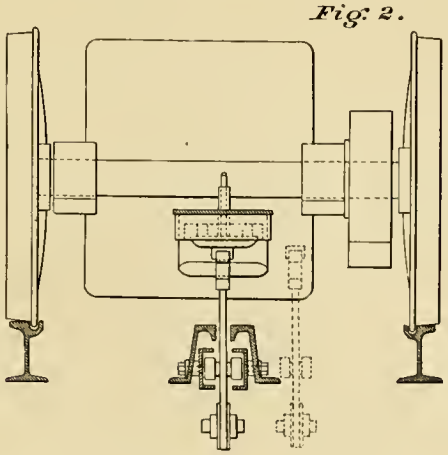
Fig. 1.

Pennsylvania Railroad Company's bridge. The speed maintained on the overhead system is forty miles per hour with 550 volts, and the underground system ten miles per hour with 220 volts.

The cars are run in trains consisting of a motor car and from two to three trailers, the former complete, unloaded, weighing about twenty and the trailers twelve tons each; double truck. These cars are 40 feet long, are equipped with air brakes and the motors are mounted on maximum traction trucks.

The current for the overhead trolley lines is furnished by two power houses on the Virginia side of the river,

Fig. 2.



while the underground conduit in Washington is fed by the electric light company.

The underground system is very substantially constructed, having a concrete conduit 25 inches in depth, heavy girder rails and cast iron yokes, with positive and negative conductor rails suspended by porcelain insulators, the electric plow having sliding contact with the conductor rails.

One of the most novel and interesting features of this company's system is the automatic change from the underground to the overhead trolley, detaching the electric plow while running at full speed, the general plan and details of which are shown in the accompanying cuts. This is the joint invention of W. B. Upton, consulting engineer, S. G. Brosius, chief engineer and Joseph Colvin, electrical engineer of the road.

The plow (when the car is on the conduit portion of the route) is in position on its supporting hangers, attached to the car truck, and is supplying current to the motors through automatic contact boxes. When the car approaches the vault where its plow is to be removed, it is guided sideways by the curved slot rails till disengaged from the hangers, the rollers on the sides of the

Fig. 3.

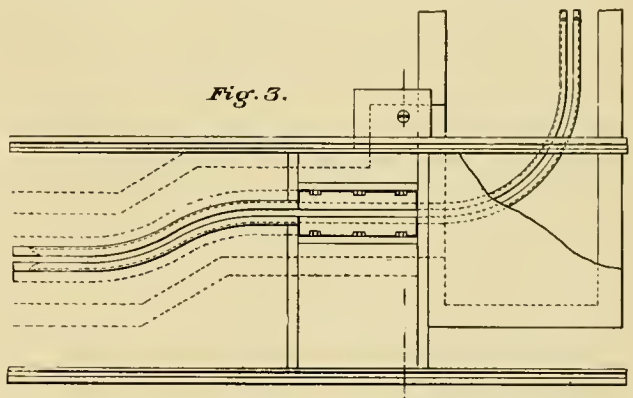
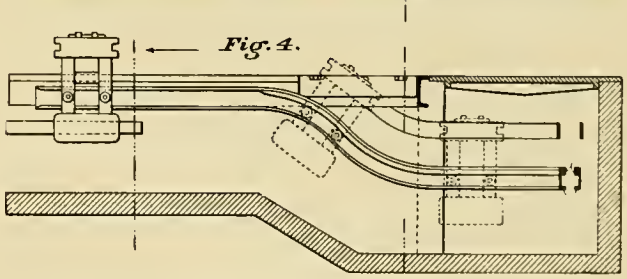


Fig. 4.



plow having previously entered in the two channel rails below the surface, which carry it and guide it down through the traps into the vault, the car passing on without stop, and taking the overhead current. The plow then travels around to position, to be attached to the car on the return trip. The trap is opened and closed by the vault tender. Figures 1 and 2 show the plow and contact boxes in position on the truck, the guide rollers in the channel rails. Figures 3 and 4 show the plow and side view of the plow vault. Figures 5 and 6 show the end and side view of the plow, contact box and supporting carriers. Figure 7 is the general working drawing showing the plow pit as constructed.

Another good feature of supporting the plow on the open hangers with the automatic contact boxes is the prevention of accidents to the plow or electrical apparatus at misplaced track switches, or by derailment of the

car; allowing the plow to drop automatically from the car; this has been demonstrated by practical operation.

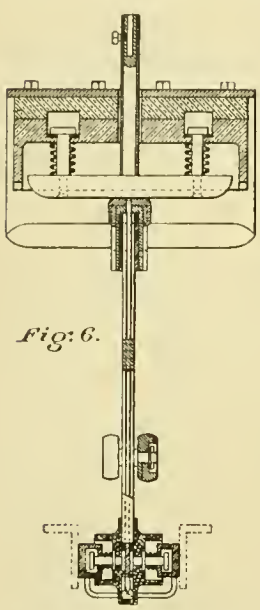


Fig. 6.

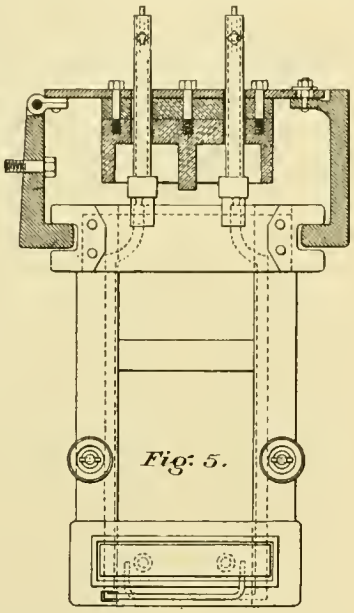


Fig. 5.

The entire road was constructed under the direction Dr G. E. Abbot, president and general manager of the company; Wm. B. Upton, consulting engineer; S G. Brosius, chief engineer, and Joseph Colvin, electrical engineer. The cost of the road and equipment complete was about $700,000.

The road is practically a "steam road operated by electricity," being operated under steam road rules exclusively, and using electricity as motive power. Part of the way an absolute block system is used, and the balance is operated under an order system from telegraph stations, precisely as on steam roads.

The road is already doing a splendid business, and is destined to be one of the best interurban properties in the country. Its trains of three 40-foot cars, as they loop around the cable building, present a most pleasing sight, especially at night, with their brilliant illumination.

Laborers in the employ of a contractor engaged in the work for the Newark & South Orange, N. J., Street Railway Company came into collision with the trustees of the village of South Orange, June 28. They were laying a double switch and the trustees tried to stop the work on the ground that the franchise allowed only a single switch. Failing in their endeavors the fire department came to the rescue with their hose. The Italians responded to the stream of water with stones, and for an hour the fight was kept up, or until the contractor appeared on the scene. There were several injuries on each side. The place was put under the control of the police and work stopped for the time being.

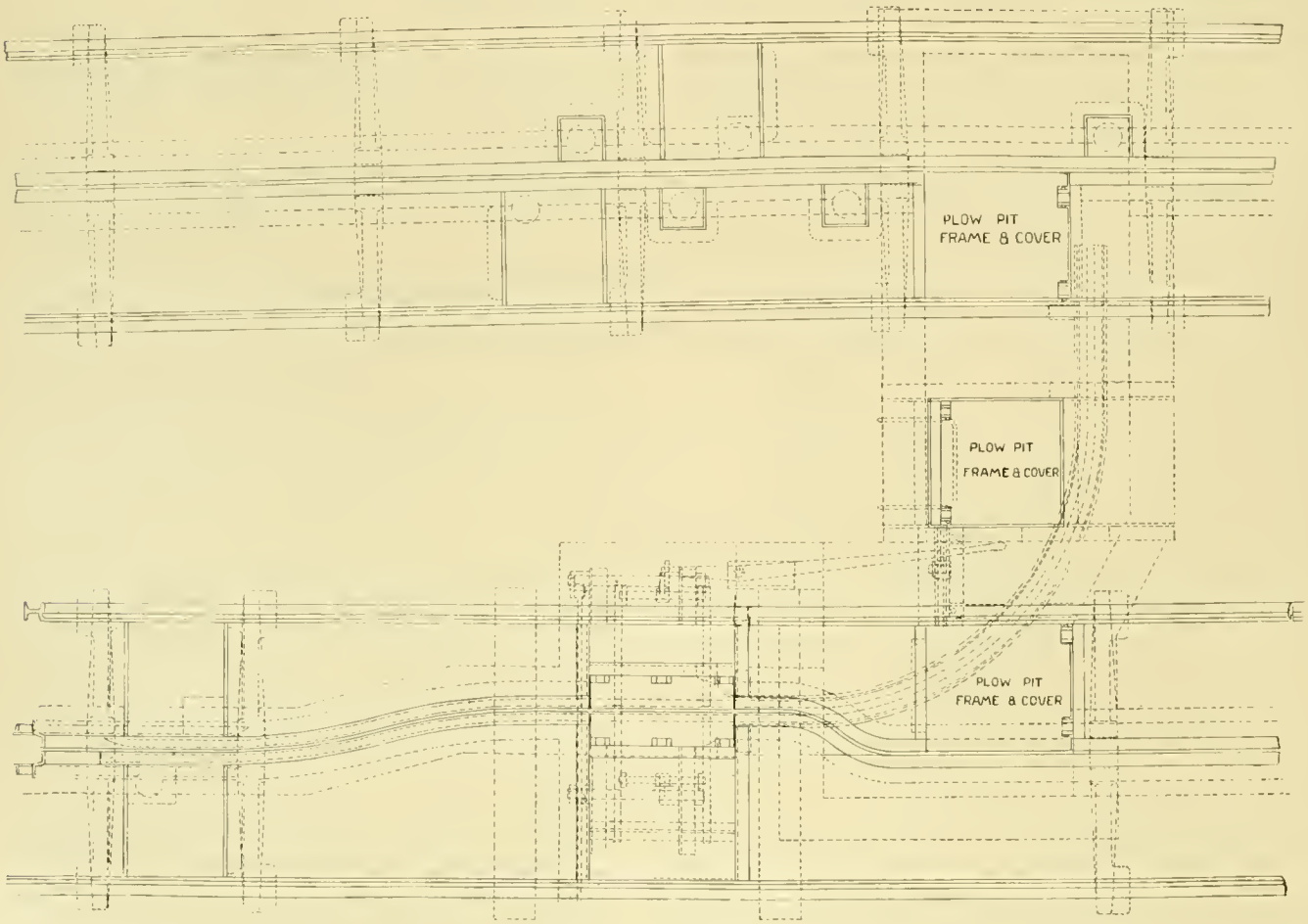


FIGURE 7.

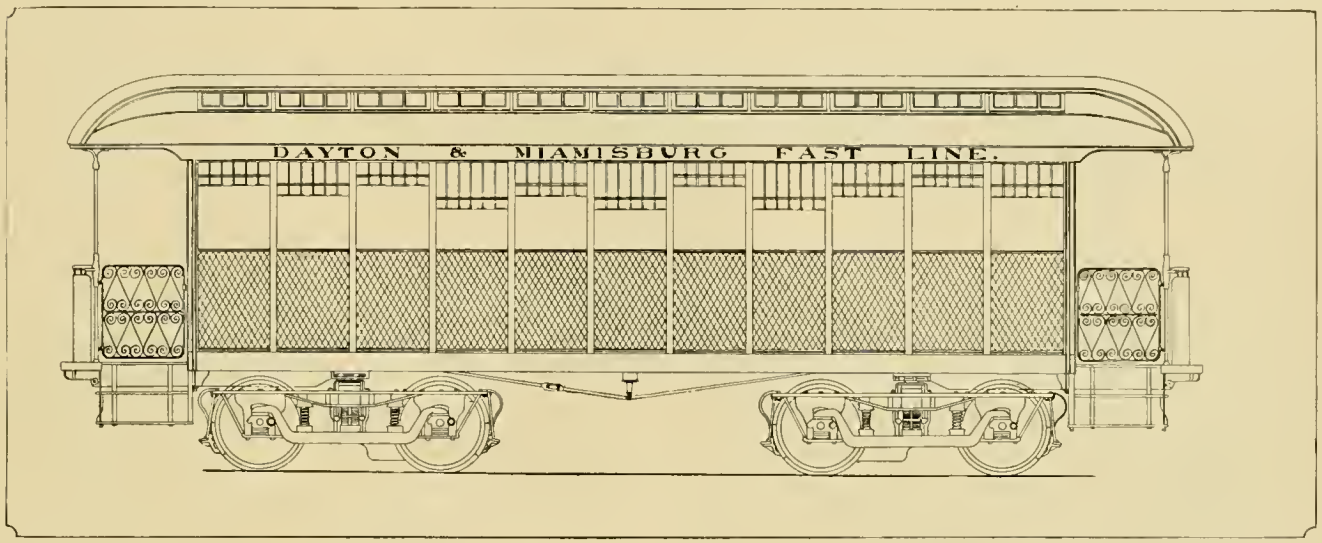
THE DAYTON-MIAMISBURG (O.) ROAD.

The Dayton Traction Company in connecting Dayton and Miamisburg with an electric road followed steam railroad practice closely. The line is nearly direct and the few curves there are have such large radius that they are not objectionable. The roadbed is graded to a proper elevation above the surrounding country and furnished with a complete system of stone, brick and pipe culverts. A 68-foot steel single span bridge has been built over the Miami Canal at Carrolton. The rails are 60-pound T, with six bolt angle bars at the joints, rolled by the Carnegie Company, laid on ties 2,500 to the mile. The road is ballasted with rock and gravel. In the cities iron side pole overhead construction is used. Outside of the towns wrought iron brackets on wooden poles support the wire.

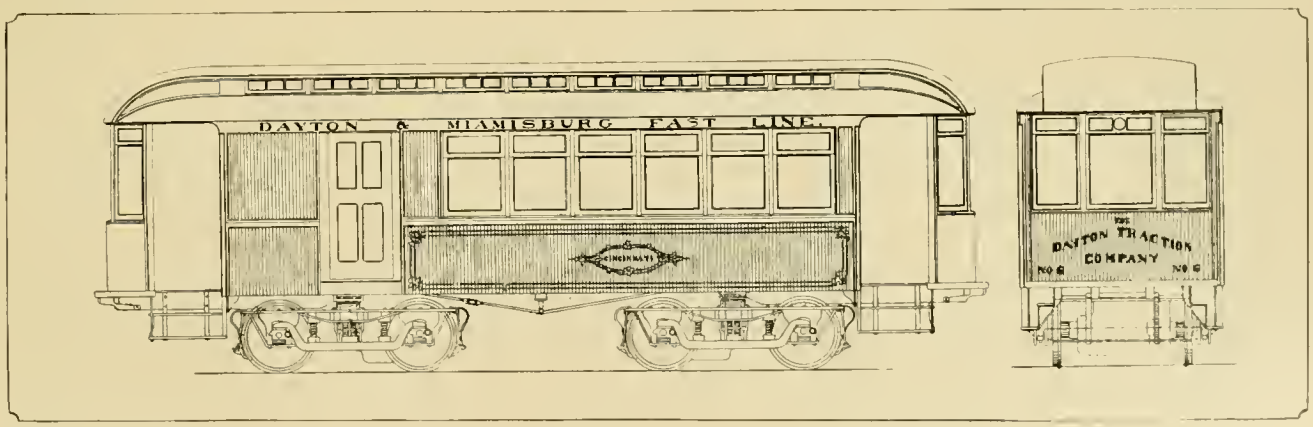
The car barn and power station have been erected at a point midway between the termini, and so situated as to enable the bringing in of coal at one side, and are in close proximity to water of good quality for steam making and condensing. These buildings are constructed entirely of brick and steel and are practically fireproof.

The power station is 80 by 50 feet, divided by a firewall. There are two 200-kilowatt multipolar generators belt driven by two 18 by 42 Hamilton corliss condensing engines. The engine foundations are seven feet deep. Either one of these units is sufficient at present to operate the road. The boilers are horizontal return flue, 18 feet long, 72 inches in diameter and containing 72 four-inch tubes. They are made of the best quality of flange steel, triple riveted and designed to carry a working pressure of 125 pounds per square inch. The stack is of steel, 5 feet in diameter and 102 feet high.

The motor cars are of modern design and similar in appearance to standard steam railroad cars. They are 35 feet long, vestibuled at both ends, 8 feet wide and mounted upon double trucks, having all wheels 33 inches in diameter. They are straight sided with steam car roofs. The interior finish is of extra quality and of hard wood. The windows are large and double and special wide arm rests have been provided for.



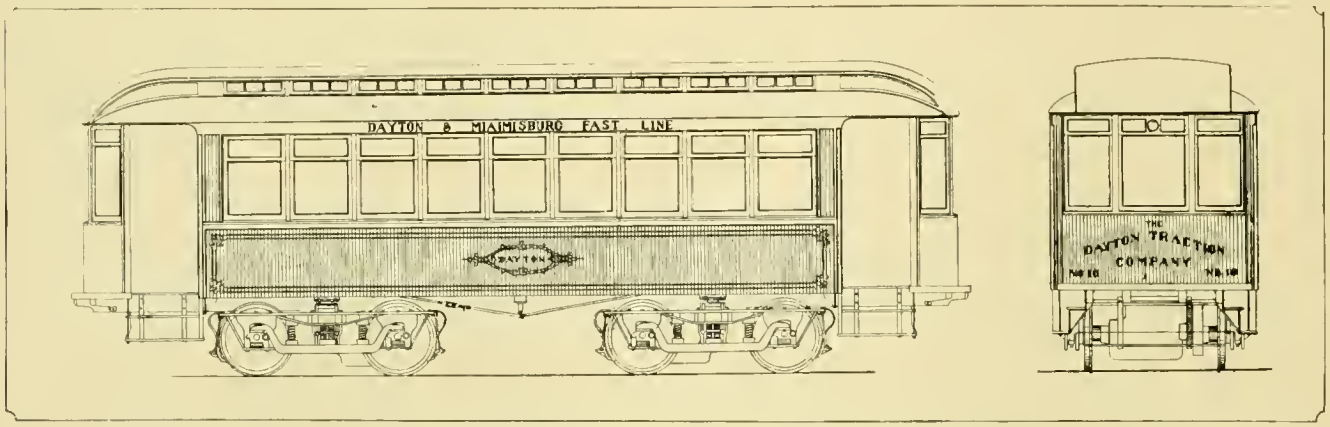
The seats are arranged at right angles with the length of the cars, having a center aisle between them. They are fitted with springs and upholstered in cane. There are two rows of double seats, seating in all 36 passengers. The center aisle is 18 inches wide. Each car is lighted with ten 16-candle-power lamps.



The combination baggage and express car is similar in appearance to the above described, but consists of two compartments, one for passengers and the other for the carrying of baggage and express matter.

The trail cars are 34 feet in length having seats

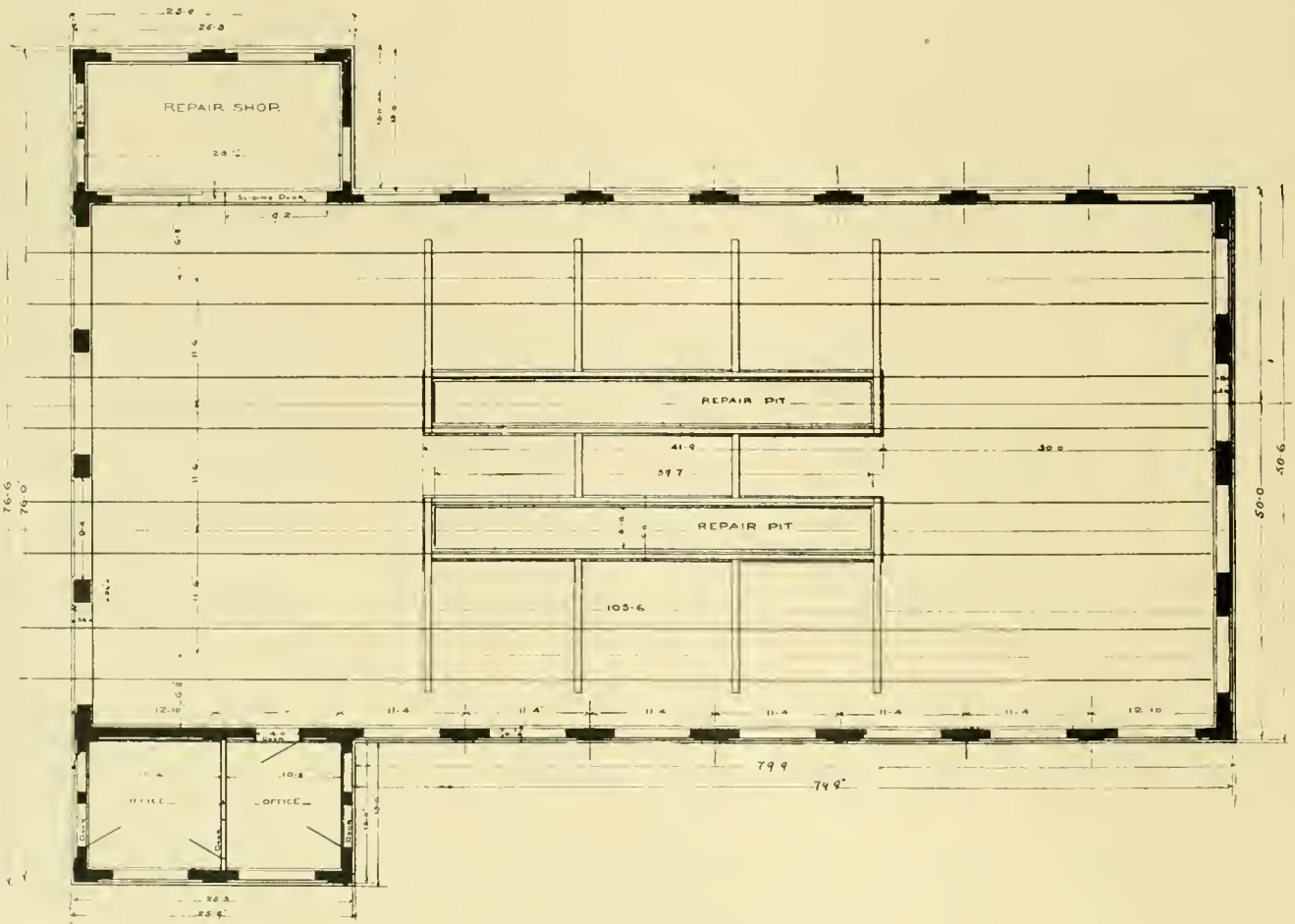
arranged at right angles with the length of car and a center aisle between them. There are two rows of double seats, eleven on each side, each car seating 44 passengers. Trailers are lighted by means of coupler with ten 16 candle-power lamps and in the same manner as the motor cars. Sides of trailers are provided with wire guards to prevent accidents.



The motor cars are equipped with two General Electric motors each (100-horse-power per car) with controllers at both ends of platforms. All the cars and trucks were made by the Barney & Smith Car Company of Dayton, from the plans of Stern & Silverman.

The road was opened the latter part of June and has already demonstrated not only its excellent mechanical qualities, but its earning capabilities as well. The entire work of design and construction, including the track, overhead work and power station was placed in the hands of Stern & Silverman, street railway engineers and contractors, of Philadelphia, and has been carried out to prompt completion in a most satisfactory and creditable manner. They also undertook the financing, and in a no less successful way negotiated the company's bonds at favorable figures.

The officers of the road are Judge Dennis Dwyer, president; O. B. Brown, treasurer, and O. M. Gotshall, secretary, all of Dayton.



CAR HOUSE AND SHOPS OF DAYTON-MIAMISBURG LINE.

TOUGH ROADS.

The following extract from a letter written by an engineer resident in Cairo, Egypt, is published by "Lightning," London, as descriptive of the new electric road under construction. The letter states:

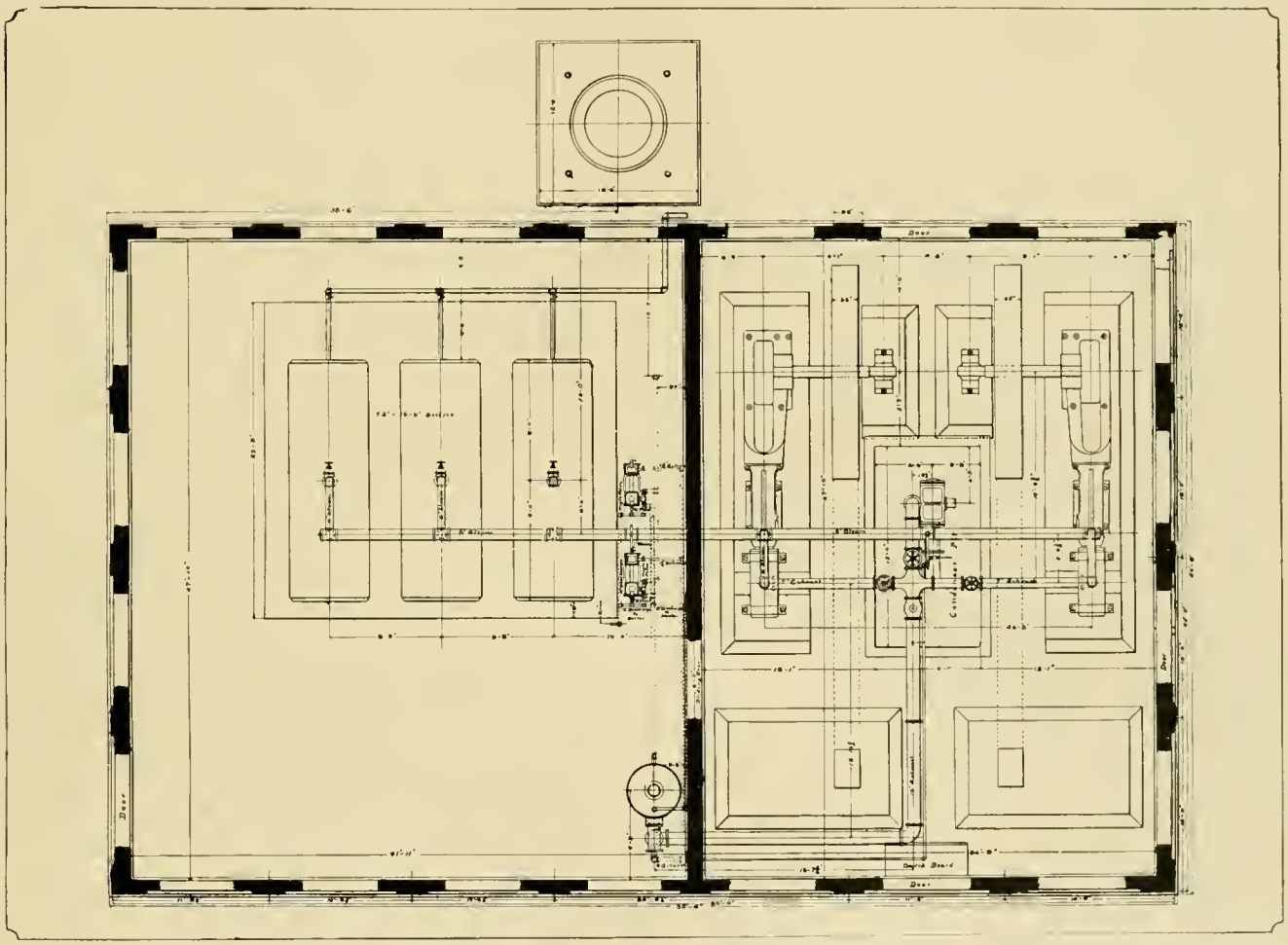
"A Belgian firm has secured a concession for establishing the tramways, and is now hard at work spoiling all the roads, though they never were very good. I never saw rails put down without some kind of foundation before, but these in Cairo are rolled with bottom flanges about six inches wide, and are simply laid in holes cut in the roadway. Distance pieces are fixed between the webs of the rails, with nuts on each side of the web. When the rails are in place they are covered with road-making material and the whole is rolled down. Can you imagine what the roads are like?

The trams are to be driven by electric motors, and the supply is by overhead wires. The generating works are built on the Nile, and the chimney shaft is looked upon at present only as an eye sore."

Women in bloomers chaperoned the cars of the Indiana Electric Railway, Elkhart, Ind., June 20, and collected fares for the benefit of the building fund of St John's Episcopal church.

A ROAD FOR HINGHAM, MASS.

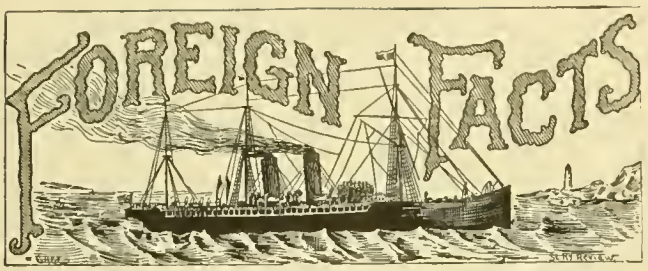
The Hingham, Mass., Street Railway was formally opened June 22, with appropriate ceremonies. The total length of line when completed will be about 16 miles, being composed of a main line, and four branches reaching to connect with lines already in operation. The present equipment consists of 20 cars mostly open. The power plant consists of a power house 30 by 72 feet equipped with two compound engines of 250-horse-power each and two Thompson-Paine dynamos of 300 amperes and 500 volts capacity each. The car house is 150 by 60 feet with a capacity of 50 cars. The officers of the company are S. Reed Anthony, president; W. A. Tucker, treasurer; Walter Foster, secretary; H. W. Brooks, superintendent.



POWER HOUSE OF DAYTON TRACTION COMPANY.

PROGRESS AT ST. JOSEPH, MICH.

W. Worth Bean, president and general manager of the St. Joseph & Benton Harbor Electric Railway & Light Company, has just scored another victory. He has secured a five-year contract to furnish the city of St. Joseph forty lights at the rate of $96 per annum. At the same time Mr. Bean took care of the railway by getting a franchise through the city and two miles south.



Genoa and Rivarolo, Italy, are to be connected by electric railway.

Prague, Austria, is to have another electric railway. It will run to Kuchelbad.

The Florence, Italy, Street Railway has applied for permission to change from horse to electricity.

San Sebastian, Spain, proposes to adopt electricity in place of horses as motive power for its street cars.

Water power will generate electricity for the 6 miles of proposed railway from Zermatt up the Gornergrat, Switzerland.

Blackpool, Eng., has voted to operate the electric cars on Sundays, the strenuous opposition of Sabbatarians notwithstanding.

Brown, Boveri & Company will put in a three phase electric railway system at Zermatt, Switzerland, similar to that at Lugano.

Marseilles, France, it is said, will have in operation by August 1 two or three miles of electric railway on the Simplex magnetic contact system.

The Bristol & Kingswood, Eng., Electric Railway, during Whitsuntide holiday week, carried over its 4 miles of line fully 122,000 passengers.

European financial papers and capitalists are becoming interested in the bonds of American electric roads and beginning to recognize their value as securities.

Cardiff, Wales, has decided upon a plan to acquire the Cardiff Street Railway. The cars will be operated by electricity from the municipality's present lighting plant.

The Swansea & Mumbles Railway, of Swansea, Wales, has applied to the municipality for electric power to operate its cars. Steam is to be displaced by electricity.

Paris, France, has received the report of its commission on the proposed electric railways. There is to be a belt line 14½ miles long and 2 cross lines intersecting one another at right angles.

Buenos Ayres street railway companies contemplate displacing horses by electricity with a view to reducing operating expense. It is estimated that the proposed change would reduce the expenses of the Anglo-Argentine Company from 70 to 50 per cent of the receipts, thus effecting a saving of $150,000, or 2 per cent on the capital stock.

The Simplex Electric Tramway Conduit Company offers to construct a line on its system without cost to the Glasgow, Scotland, municipality, if it should not prove satisfactory. The cost is estimated at $20,000 for single and $40,000 for double track per mile.

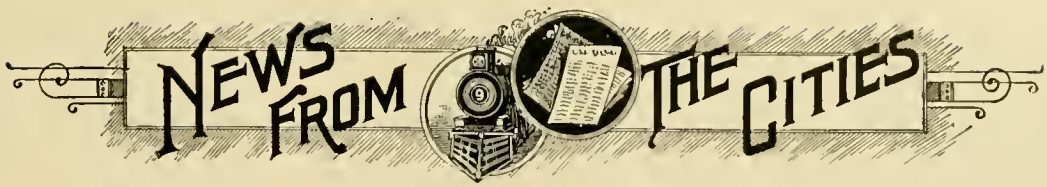
Electric railways will be built in the boroughs of Ashton-under-Lyne and Hyde, the urban districts of Denton and Audenshaw, the rural district of Limehurst and the districts of the parish councils of Waterloo and Bardsley, by the British Electric Traction Company, which has a bill before Parliament conferring these powers.

A STORAGE BATTERY-TROLLEY COMBINATION.

For some time various tales have been going around regarding the use of storage batteries on the Hanover, Germany lines, and some would even have us believe that the company there has abandoned the trolley in favor of the storage battery. This seemed like a mysterious proceeding to street railway men conversant with the usual performances of storage batteries on cars. At last, however, the whole truth has come out. In the center of town the Hanover authorities have not yet sanctioned the overhead wire. Consequently the trolley cars entering the center of the city carry each a battery of 200 Tudor accumulators, which are charged from the trolley when the cars are on the part of the road so equipped and furnish motive power when the car is in the heart of the city. These batteries weigh 2½ tons per car and their maintenance is guaranteed at a certain figure by the manufacturers. A similar plan is in use on one or two short lines at Dresden.

MOTORS UNDER WATER.

The amount of water that modern electric railway apparatus will stand is remarkable. Early last spring the streets of Danbury, Conn., were flooded by a freshet. In order to bring the employes living on the east side to the barns so that cars could be started on schedule time in the morning it was necessary to run a motor car across the causeway. This car, which was equipped with two G. E. 800 motors, ran through water twenty-two inches deep, and the wave motion caused by the rapid motion of the car made the water come up under the bumper and wash across the front platform, so that during half of each trip the resistance was practically submerged. After getting the employes over the car continued in regular operation for two hours, until an old summer car, drawn by horses, could be substituted. After each trip the water was drained out of the motors at the bottom plugs, but there was very little.



Alabama.

MOBILE, ALA.—J. H. Wilson, manager, writes that the Mobile Light & Railway Company wants a railway generator, either multipolar 100 or Westinghouse 150-horse-power, with instruments. Must be guaranteed to be in A1 condition. State length of service and lowest cash price.

California.

LOS ANGELES, CAL.—H. G. Wilshire has received the right to build an electric railway.

SAN FRANCISCO CAL.—The Market Street Railway Company will extend its Mission street line two miles to San Mateo.

SAN MATEO, CAL.—J. D. Byrnes, F. T. Newberry, J. Debenedetti and R. Hatch have applied for an electric railway franchise.

NEVADA CITY, CAL.—A new company has purchased the franchise of John F. Kidder for an electric railway connecting Nevada City and Grass Valley.

REDLANDS, CAL.—Rumor has it that A. K. Smiley, of Redlands, will build an electric railway up the mountain to his proposed summer resort, Fradelba Park.

RIVERSIDE, CAL.—The Riverside & Arlington Street Railway, which contemplates changing to electricity, has contracted with the city for the necessary electric power.

SANTA ANA, CAL.—The Santa Ana Chamber of Commerce is organizing a company to purchase the Santa Ana, Orange & Tustin Street Railway, and lease the road to responsible parties for operation.

SANTA BARBARA, CAL.—The Citizens Railroad and the Santa Barbara Street Railroad have received permission to change from mules to electric power. The roads are owned by G. H. Bonebrake, of Los Angeles.

Chicago.

CHICAGO.—The Lake Street Elevated Railroad will build an extension from its present western terminus one mile in length. At midnight, June 13, the operation of the road by electricity begins.

Colorado.

VICTOR, COLO.—Ross & Mackay are surveying the electric road for which they have a franchise.

Connecticut.

HARTFORD, CONN.—Right to extend is asked by the Hartford Street Railway.

WATERBURY, CONN.—The Waterbury Traction Company will begin work at once on the extensions.

MANCHESTER, CONN.—Surveys for its line to Vernon Center are being made by the Hartford, Manchester & Rockville Tramway Company.

TORRINGTON, CONN.—Captain J. M. Murphy is interesting citizens in a plan to build an electric railway from Torrington to Litchfield. No overhead work is used in the Murphy-Pierce system. The car wheel depresses a protruding pin, thus energizing the rail length upon which the car stands. Captain Murphy's new company will place a road in operation at Middleboro, Mass., and a second one is to be built between Bennington and Rutland, Vt.

District of Columbia.

WASHINGTON, D. C.—The bill incorporating the East Washington Heights Traction Company has passed the senate.

WASHINGTON, D. C.—The House and Senate have passed the Eckington & Belt Railway bill. The lines of the company lying within the city limits must be equipped with compressed air motors within three months. Authority is given to install the conduit electric system if compressed air proves unsuitable after eighteen months trial. The Eckington Company is granted new routes and extensions of old lines and right to issue additional stock and bonds.

Florida.

JACKSONVILLE, FLA.—The Panama Park Company has applied for an electric railway franchise. A. W. Cockrell, Jr., is secretary of the company.

Georgia.

AUGUSTA, GA.—The Augusta Street Railway & Electric Company has been incorporated with $500,000 capital stock, to operate the street railway which recently changed hands.

Illinois.

OTTAWA, ILL.—J. McMillan Smith has incorporated a company to operate the street railway.

WAUKEGAN, ILL.—The Bluff City Electric Railway Company is about to erect its car barn at North Chicago.

EVANSTON, ILL.—The Evanston Electric Railway Company has increased its capital stock from $200,000 to $1,000,000.

HARVEY, ILL.—The Englewood & Chicago Street Railway (storage battery) has been granted a franchise through Harvey.

JOLIET, ILL.—William McKinley, of Champaign, and State Senator Macomber, of Augusta, are negotiating for the purchase of the Joliet Electric Street Railway, now owned by J. A. Henry. Improvements costing $50,000 are contemplated.

OTTAWA, ILL.—J. McMillan Smith will install a 250-horse-power engine for the Ottawa car line, which he has acquired. Mr. Smith is president of the General Power & Quick Transit Company which operates the electric road at South Bend, Ind.

AURORA, ILL.—The Aurora & Geneva Railway Company has been incorporated to build an electric line to Batavia, and later to Geneva to connect with the new Elgin interurban. Capital stock, $10,000; incorporators, D. A. Belden, F. H. Thatcher and E. B. Mix.

BELLEVILLE, ILL.—The St. Louis & Belleville Rapid Transit Company has been incorporated to build an electric railway between East St. Louis and Belleville. Capital stock, $300,000; incorporators, George Silsby, Saginaw, Mich., president; George H. Welton, Chicago, vice-president; W. F. Stevens, Saginaw, Mich., treasurer; John H. McDonald, Bay City, Mich., secretary; Daniel P. Alexander, East St. Louis, auditor.

JOLIET, ILL.—The formal transfer of the Joliet Street Railway to the syndicate operating lines in Springfield, O., Defiance, O., and Bay City, Mich., has taken place. J. A. Henry, of the old company, will continue as president of the new one. William B. McKinley will be manager. With ample capital the contemplated improvements will be carried out at an expense of $50,000. The power house will be enlarged, new cars purchased and extensions built north to Lemont and 7 miles east to New Lenox. In the near future the company will take steps to obtain right of way for a line to Chicago.

Indiana.

ELWOOD, IND.—The generator of the Elwood Electric Street Railway burned out recently, stopping the service several days.

ANDERSON, IND.—The Anderson Electric Street Railway Company has revived the project to build to Alexandria, in order to head off Noah Clodfelter's Company.

MONTPELIER, IND.—F. C. Brownwell, Charles Pape, G. E. Evans, J. H. Shoemaker and E. C. Palmer are the incorporators of the Montpelier Street & Suburban Railway.

Iowa.

OSKALOOSA, A.—An electric railway franchise is asked for by the Oskaloosa Street Railway & Land Company.

Kansas.

LEAVENWORTH, KAN.—The Leavenworth Electric Railway has been granted a franchise to extend a line.

Maine.

LEWISTON, ME.—Henry W. True, of the Lewiston & Auburn Horse Railway Company (electric) has purchased the stock held by N. Q. Pope and Col. F. W. Dana.

Maryland.

BALTIMORE, MD.—The East Baltimore & Clifton Park Railroad Company has been incorporated by Nelson Perin, George C. Jenkins and William P. Harvey.

BALTIMORE, MD.—The Central Railway has been granted the franchises asked in east and northeast Baltimore. This grant will hinder the new Metropolitan Railway.

CATONSVILLE, MD.—A majority of stock in the Catonsville Short Line has been transferred to the Baltimore & Catonsville Construction Company, which latter is practically the Columbia & Maryland Electric Railway Company. As soon as the new owners can purchase a lease of the line held by the Pennsylvania Company, they will proceed to install electricity.

Massachusetts.

MILLBURY, MASS.—The Blackstone Valley Electric Railroad has nearly been completed and will soon be in operation.

BOSTON, MASS.—Everett town has granted the West End Street Railway Company the right to lay double track to Malden.

ROCKPORT, MASS.—The new Rockport Street Railway has elected James H. Cunningham, president; A. D. Bossom, treasurer, and David S. Presson, clerk.

SPRINGFIELD, MASS.—The Springfield Street Railway has been granted a franchise to the state line. This leaves the Enfield & Longmeadow project out in the cold.

BROCKTON, MASS.—The franchise just granted by the town of Raynham completes the right of way of the proposed Brockton, Bridgewater & Taunton Street Railway.

WORCESTER, MASS.—Shrewsbury has granted a franchise to the Worcester & Marlboro Street Railway Company, requiring construction to begin before November. The company expects to lay 60-pound T rail.

NORWELL, MASS.—Jonathan Hatch, Horace T. Fogg and William D. Turner, of Norwell, and Henry Webb, of Scituate, have formed the Norwell & Scituate Street Railway Company with $25,000 capital stock to build 9 miles of electric road.

WORCESTER, MASS.—Instead of granting the franchise asked by the new Worcester & Marlboro Electric Railway the selectmen of Shrewsbury are making overtures to the Consolidated Street Railway, of Worcester, to extend its line into their town.

BOSTON, MASS.—The Martha's Vineyard Street Railway Company has been incorporated to build. Capital stock, $150,000; incorporators John R. Graham, John A. Duggan, Frederick H. Smith, Josiah Quincy, William H. Callison, John F. Merrill, Boston, Mass., and Frederick Nichols.

WORCESTER, MASS.—Construction of the Blackstone Valley Electric Railway has stopped. Supply men and sub-contractors are suing to recover for material furnished and work done. The contract is held by the Worcester Engineering Company, composed of Edward W. Shedd, Waldo H. Sawin and George C. Hunt. The road is not involved, the trouble being between Contractors E. W. Shedd and G. H. Mellen.

Michigan.

FLINT, MICH.—The proposed electric railway from Flint to Fenton, which has been on the tapis for two years past, appears to be reviving. John E. Nolan, of Saginaw, is the promoter.

SAULT STE. MARIE, MICH.—The franchise of the old Sault Ste. Marie Street Railway has been revoked.

BATTLE CREEK, MICH.—Major Downs is getting right of way for the electric road to Kalamazoo. The twenty-four miles of road will pass through Augusta, Galesburg and Comstock. General Manager E. E. Downs, of the Citizens' Street Railway, says: "I am in hopes if everything moves smoothly that we shall see the cars running by next July. The value of this line to Kalamazoo, Battle Creek and intervening country cannot be over estimated, and we are hard at work hoping to succeed in the enterprise sooner or later."

Minnesota.

DULUTH, MINN.—The Minnesota Point Street Railway plans an extension from Duluth to Itasca.

Missouri.

CARTERSVILLE, MO.—The Southwestern Missouri Electric Railway Company has certified the secretary of state of an increase of its capital stock from $500,000 to $650,000.

WEBB CITY, MO.—The Joplin & Galena Electric Railway has been consolidated with the Southwest Missouri Electric Railway. The result is that the Joplin & Galena, the Carterville, Webb City & Joplin Interurban and the Joplin Main Street will be operated as one system by the Southwest Missouri, with A. H. Rogers, of Joplin, as president and general manager, and E. Z. Wallower, of Harrisburg, Pa., as secretary.

Nebraska.

OMAHA, NEB.—A permit to extend its Thirteenth street line has been taken out by the Omaha Street Railway Company.

New Hampshire.

DOVER, N. H.—The Union Street Railway will be sold by auction for not less than $100,000, on suit of the International Trust Company.

New Jersey.

PASSAIC, N. J.—Belleville has granted a franchise to the Paterson Passaic & Newark Railway.

CAMDEN, N. J.—The Camden Horse Railroad has applied for an electric franchise in Stockton.

ELIZABETH, N. J.—The Elizabeth Street Railway has been granted a franchise to change its gage and adopt electricity.

ASBURY PARK, N. J.—Hon. William L. Dayton has been reappointed receiver of the Asbury Park & Belmar Street Railway, in the suit of Aaron Vanderveer against the company.

RAHWAY, N. J.—An electric railway is being constructed between Rahway and Boynton Beach. Current for the five miles will be taken from the Rahway power house. C. W. Boynton, Henry Maurer and two others are bearing the expenses.

New Mexico.

ALBUQUERQUE, N. M.—The Albuquerque Street Railway Company has been incorporated. Capital stock, $50,000; incorporators, Oliver E. Cromwell, of New York, and A. A. Trimble, E. S. Stover, H. E. Ferguson and B. A. Sleystock, of New Mexico.

New York.

HUDSON, N. Y.—Alfred G. Bowles has been appointed receiver of the Hudson Street Railway Company.

NEW YORK, N. Y.—The Twenty-eighth and Twenty-ninth Streets Railway was sold June 25 by auction.

BROOKLYN, N. Y.—Estimates on 100 closed double-truck cars are asked by the Brooklyn Heights Railroad.

STATEN ISLAND, N. Y.—New Brighton has granted the Midland Railroad franchises for four lines which must be completed within a year.

ALBANY, N. Y.—The Albany Railway, as lessee of the Watervliet Turnpike & Railway Company, has applied for right of way in Watervliet.

ELMIRA, N. Y.—The franchise to build the Elmira & Seneca Lake Railroad has been extended ninety days on a promise of the company to have it in operation within six months.

BUFFALO, N. Y.—The Buffalo Railway Company has been granted additional franchises in 6 streets. The lines on Jefferson and Clinton streets are to be in operation within 90 days.

KINGSTON, N. Y.—The railroad commissioners have granted the application of the Kingston & Lake Katrine Railroad Company for permission to build four miles of electric road.

GLENS FALLS, N. Y.—J. A. Powers, secretary and treasurer, is buying equipment for the Glens Falls, Sandy Hill & Ft. Edward Street Railway. The road will be built between Glens Falls and South Glens Falls.

ROCHESTER, N. Y.—The Penfield Land Company is getting right of way for an electric railway from the city to Penfield. The right will be presented to the Rochester Railway Company, which will begin construction very soon.

NEW YORK, N. Y.—The New York & Brooklyn Railroad Company has been incorporated to build 2 miles of road and a tunnel between the cities. Capital stock, $20,000; incorporators, Benjamin S. Stenning, Alonzo B. Cornell and others.

BROOKLYN, N. Y.—The Long Island Electric Railroad Company has been granted two franchises; one between Jamaica and Hempstead, and another from Jamaica to Far Rockaway. President A. R. Hart says the company is prepared to begin work.

SYRACUSE, N. Y.—Two 1,000-horse-power generators and four boilers will be added to the Tracy street power plant of the Syracuse Street Railway, so as to operate the entire system from one station. A two story brick barn will be erected in South Salina, all others except the Wolf street barn being abandoned.

NEW YORK, N. Y.—Gillespie Bros. & Co., 4 Stone street, New York, have plans of the Kingston Street Car Company's lines, the franchise for which is soon to be sold on expiration of the original grant. Horses are the present motive power for the 12 miles of track. Applications for the franchise may be made before July 31 to the clerk of the Privy Council, Kingston, Jamaica, West India.

GREENBUSH, N. Y.—The Greenbush Heights Electric Railway Company will be incorporated to build 4 miles of road. Of the capital stock $41,000 has been subscribed by William H. Slingerland, Jr., of Slingerlands; John C. Unger, East Albany; George H. Welsh, Albany; G. W. Slingerland, Hackensack, N. J.; Archibald Vineburg, Greenbush Heights; Henry J. Boyle, Albany; John C. Cole, Greenbush.

SYRACUSE, N. Y.—The Syracuse & Suburban Railroad Company held a meeting recently to confer on plans for construction. It was decided to lay 9-inch grooved girder rail, weighing 90 pounds to the yard. The following officers were elected: A. Cady Palmer, of Manlius, president; Arthur Jenkins, vice-president, and Giles H. Stilwell, secretary and treasurer. These officers, with John L. King and Charles E. Hubbell, will constitute the executive committee.

ALBANY, N. Y.—The Cohoes City Railway has been consolidated with the Albany Railway, President Urban Weldon having sold a controlling interest to Robert C. Pruyn, a director of the Albany Railway. The Cohoes City Railway has elected new officers, as follows: President, John W. McNamara, of Albany; vice-president, John Garside of Cohoes; treasurer, Edgar S. Fassett; secretary, Thomas I. Van Antwerp; directors, Albert Hessberg, George R. Turner, H. J. P. Green, Urban Weldon and John Clute.

BROOKLYN, N. Y.—The New York & Queen's County Railway Company has been incorporated with $2,500,000 capital stock, to consolidate the Steinway Railway Company of Long Island City, the Newtown Railway Company, the Riker Avenue & Sanford's Point Railroad Company, and the Flushing & College Point Electric Railway Company. The directors are Rudolph T. McCabe, Benjamin Orme, Walter Pease, of New York City, and Edward J. Matthews, Edward T. Stotesbury, Caleb F. Fox, William Shelmerdine, and R. E. Gowen of Philadelphia.

North Carolina.

WINSTON, N. C.—George W. Hinshaw and others contemplate constructing an electric railway from Yadkin Shoals to East Bend.

Ohio.

CLEVELAND, O.—The Cleveland City Railway Company has received permission to extend.

COLUMBUS, O.—Right to lay double track in Oak street has been granted the Columbus Street Railway.

DENNISON, O.—The United Electric company, of Dennison, offers to extend its railway five miles, to Gnadenhutten or Tuscarawas.

TOLEDO, O.—By order of court Receiver L. S. Baumgardner has resold the Put-in-Bay Railway, Light & Power Company to Arbuckle, Ryan & Co.

CINCINNATI, O.—The Madisonville & Cincinnati Street Railway Company has been granted a franchise. It is expected the Cincinnati Street Railway will build the road.

WAPAKONETA, O.—The Wapakoneta & Kenton Railway Company has been incorporated to build and operate an electric road between the two towns. Capital stock, $100,000; incorporators, L. N. Blume, Jacob Hauss, M. D. Shaw and C. T. Kelter.

ASHLAND, O.—The Ashland & Wooster Railway Company has been incorporated to build an electric road from Sandusky to Cadiz. Capital stock, $100,000; incorporators, Horace B. Camp, Charles Baird, Aaron Wagoner, William Buchtel and Thomas Walsh.

MARIETTA, O.—The Marietta Electric Company has been incorporated under the laws of West Virginia to immediately construct an electric railway. Capital stock, $30,000; incorporators, Nelson Moore, A. L. Gracey, John Kaiser, J. S. H. Torner, W. H. H. Jett, John S. Simpson, E. Coste and D. T. McEvoy, all of Marietta, and James Tate, of Pittsburg.

Oregon.

SALEM, ORE.—The Salem Light & Traction Company has been incorporated with $100,000 capital stock, by E. P. McCormack, F. R. Anson, F. H. Page and D. S. Tuthill.

PORTLAND, ORE.—The Crouch Motor & Traction Company has been incorporated. Capital stock, $100,000; incorporators, C. E. Leyner, M. S. Hait and Charles R. Church.

Pennsylvania.

MEADVILLE, PA.—Kennedy & Quay have surveyors on the route of the proposed Croton street car line.

PHILADELPHIA, PA.—Charles McCaul will erect the power house and car barn of the Fairmount Park Transportation Company.

PITTSBURG, PA.—The Second Avenue Traction Company has purchased the Pittsburg, Allegheny & Manchester Traction Company's 19 miles of road.

PITTSBURG, PA.—The sale of the Pleasant Valley Traction Company to Brown Bros., of Baltimore, Md., has been effected. On July 1 new officers were elected.

NEW WILMINGTON, PA.—Gen. W. A. Clark, who operates the electric light and power plant at this place, is said to be contemplating the construction of three miles of car line to Wilmington Junction.

PITTSBURG, PA.—The North Side Traction Company has been incorporated. Capital stock, $15,000. Incorporators, G. T. Hamilton, Edgewood; T. W. Dierker, W. W. Parker, Pittsburgh; H. W. Stern, Avalon; W. T. Ford, Allegheny City.

WILKINSBURG, PA.—The Wilkinsburg & East Pittsburg Electric Railway is asking right of way. Capital stock, $150,000; incorporators, William M. Brinker, president; George W. Black, vice-president; A. W. Duff, solicitor; W. O. McNary and J. J. Jennings.

BRISTOL, PA.—The Bristol & Philadelphia Electric Railway Company will soon have its 9 miles of road finished. It is a single track. The power plant at Croydon will have 2 generators furnished by the General Electric Company and 2 Hamilton corliss engines of 400 horse power furnished by Hooven, Owens & Rentschler.

South Dakota.

SIOUX FALLS, S. D.—The Sioux Falls Transportation Company has been incorporated to build 5 miles of electric railway if a franchise can be obtained.

SIOUX FALLS, S. D.—The incorporators of the Sioux Falls Transportation Company are Charles F. Smith, cashier of the Continental National Bank, of Boston; John H. Voorhees, Dr. F. H Files, Charles O. Baily and Harold E. Judge, all of Sioux Falls.

Tennessee.

JACKSON, TENN.—Work on the proposed electric street railway is soon to begin.

CHATTANOOGA, TENN.—Signal Mountain is the objective point of thirteen miles of proposed electric railway in which T. J. Nichol is interested.

CHATTANOOGA, TENN.—The Chattanooga Electric Street Railway has been granted a 9-month's extension of time in which to build on Fourth and other streets.

MEMPHIS, TENN.—At the June 5 meeting of the Citizens'Street Railway, action on the proposed consolidation with the East End, the Suburban and the Raleigh lines was postponed until September 8, when the next meeting will be held.

CHATTANOOGA, TENN.—John Orr bid in for $8,100, at auction, June 15, the Chattanooga & North Side Street Railway, known as the Vallambrosa line. Other members of the purchasing syndicate are H. C. Beck, S. R. Read, H. A. Nicholl and W. A. Sadd. They will reorganize the company in an endeavor to place it on a paying basis.

Texas.

SAN ANTONIO, TEX.—President W. H. Weiss, of the San Antonio Street Railway Company, writes that he wants a quantity of new armatures for Thomson-Houston F 30 motors. Would buy second-hand if in first-class condition. Name price, with particulars.

Vermont.

SPRINGFIELD, VT.—The Springfield Electric Railway Company has been formed to construct 6 miles of road to Charlestown, N. H. Capital stock, $50,000; Adna Brown, president; C. E. Richardson, treasurer, and Fred C. Davis, secretary. The town has voted $30,000 to aid construction.

Virginia.

STAUNTON, VA. The City Street Car Company has completed the change to electricity and is running cars.

West Virginia.

WHEELING, W. VA.—The Suburban Railway has opened its new line between Elm Grove and Tridelphia. It will be extended.

BRAMWELL, W. VA.—The Flat Top Central Electric Power Supply & Traction Company has been incorporated to build a railroad from Kimball to Roseville, W. Va. Capital stock, $500,000; incorporators, L. E. Tierney, Powhatan; H. Bert Wright, Kyle, and Isaac T. Mann, Bramwell.

Wisconsin.

MILWAUKEE, WIS.—The Milwaukee Electric Railway & Lighting Company has purchased the Pabst street railway, running to Wauwantosa, and on July 1 took possession.

MERRILL, WIS.—The car barn of the Merrill Railway & Lighting Company was burned on the morning of June 27. Every car was destroyed. Loss, $7,000; insurance, $4,000.

EAU CLAIRE, WIS.—Receiver Wheeler has been authorized to sell for the benefit of bondholders, the Eau Claire Street Railway, Light & Power Company's property. The sale will take place in September.

MENASHA, WIS.—Right to build extensions has been granted the Menasha & Neenah Street Railway, now operating a horse line. The extensions will be electric and form part of the interurban road to Kaukauna.

MADISON, WIS.—W. T. Fish and H. C. Adams, who own a franchise, propose to build a mile of electric railway and make a gift of it to the Madison Street Railway Company on condition that the latter operate cars on it.

MILWAUKEE, WIS.—George W. Hommell, general manager of the Milwaukee & Waukesha Electric Railway, office Pabst building, writes: "We are contemplating building a new line and will be in the market for new cars, etc."

MILWAUKEE, WIS.—The Milwaukee Municipal & Suburban Railroad Company has been incorporated with the visionary object of accomplishing municipal ownership of the street railway of Milwaukee. Capital, $1,000,000; incorporators, Gotthilf Reuther, Jacob Kehrein, Anton Palm, Frank O. Immler and John Ulrich.

MILWAUKEE, WIS.—James T. Lentzy, 80 Broadway, N. Y., is the promoter of the Milwaukee & Waukesha Electric Railway. He has induced six eastern men to take $500,000 of the bonds. Senator Calvin S. Brice denies he is interested. McLean Bros., of Coldwater, Mich., who have contracted to build the line, will take the remaining $500,000 of bonds in compensation.

Canada

PERTH, ONT.—A bonus of $5,000 has been voted for an electric railway to Lanark;

HAMILTON, ONT.—A bonus of $15,000 on reaching Ancaster and an equal amount on completion is asked for the proposed Hamilton, Chedoke & Ancaster Railway which is to operate in connection with the electric road between Hamilton and Alberton.

Mexico.

MEXICO CITY, MEX.—The proposed contract of Francisco Espinosa to furnish power for the new car lines has fallen through.

GEORGE LAW DEAD.

George Law, the well-known president of the Eighth and Ninth avenue railroad companies, New York, died at his home in that city, July 7. He had been ill with erysipelas since early in June, but the immediate cause of his death was spinal meningitis. His age was 53 years. He had been connected with street railway service since he was a young man, beginning as a driver upon the lines of which he afterward became superintendent and president, though at the time heir to about $8,000,000. His father was a well known engineer and contractor, the builder of the High Bridge and the organizer of most of the East river ferries. Mr. Law was married two years ago.

GEORGE LAW.

SMITH'S ELECTRIC HEADLIGHT.

A new dash headlight has just been placed on the market by Smith, of New York. Charles Smith, the manager of the business that was established by his father fifty-six years ago, deserves a great deal of credit for the large and varied line of headlights and street railway lamps that he is now placing upon the market. There is nothing in the way of a light that street railway companies demand that Smith of New York has not immediately placed on the market, and the reputation of the goods still continues as it has since 1840. In addition to the dash light mentioned he has just got out a very handsome eight-inch semaphore headlight, and also a large variety of car lamps. The Smith lamps can be found on a majority of the largest roads in the United States.

PECKHAM WORKS MAY MOVE.

E. Peckham, president of the Peckham Motor Truck and Wheel Company has purchased the Superior Stove Works on Van Rensselaer's Island, at Albany, with a view of moving his plant there from Kingston this summer or the coming fall, although the matter has not been fully decided. The business of the company has made necessary larger quarters, and the newly purchased property has excellent facilities not only for turning out much work but for shipment of goods after they are manufactured. The plant has over five acres of ground and the various buildings are heated with steam and lighted by electricity. The main building is 71 by 203 feet and the foundry 129 by 281 feet. There are also three large store houses, a fine residence and numerous stables. The daily output of the Kingston works now averages eleven trucks, and orders are coming in so rapidly as to make necessary an increased plant.

THE PATTON ELECTRIC SYSTEM.

A trial run of the Patton motor was made at Racine, Wis., July 8, in the presence of a number of leading business men of Racine and a representative of the Review. The run was over the line of the Chicago, Milwaukee & St. Paul road, from the works af the J. I. Case Machine Company to Western Union Junction and return, a total distance of 14 miles. Frank Bull, manager of the Case works, officiated as motorman. The trial, as a whole, was successful, the motor at times attaining a speed of 25 miles per hour, and surmounting grades without difficulty beyond a perceptible slowing up. The heaviest grades are 55 feet to the mile. The total time consumed in making the trip was one hour, including a stop of ten minutes at the terminus.

The principle of the motor is fairly well known, though some changes have recently been made in details. A gasoline engine is used to drive a dynamo,

THE PATTON ELECTRIC MOTOR.

which in turn operates the motor in the usual manner. The principal claim of the inventor is on the use of a storage battery which accumulates the power of the dynamo when on a down grade, or at rest, and which is automatically connected in to assist when the work is heavy. The gasoline is stored in a tank in the roof of the car, and it is said that the 23 gallons carried is a sufficient quantity to run 150 miles. The motor is especially adapted to places where a power-house and line wire would be unprofitable.

ROYALTIES ON UNDER RUNNING TROLLEY.

The Thomson-Houston Electric Company's suit against the Nassau Electric Railroad Company, of Brooklyn, for infringement of trolley patents, came up before Judge Lacombe in the United States circuit court, June 26, and was stricken from the calendar at the request of the counsel for plaintiff, who stated that an agreement had been entered into whereby the Nassau company agreed to pay past and present royalties on apparatus now in use. A similar suit against the Union Railway of New York, was temporarily withdrawn.

PERSONAL

C. T. Yerkes and wife are spending two months in Europe.

E. B. Gunn, of the Lafayette Street Railway, made us a pleasant call last week.

Oscar Throop has been appointed superintendent of the street railway line at Owosso, Mich.

C. E. Runey has been appointed assistant superintendent of the street railway line at Waukegan, Ill.

Elias F. Ward, of Newark, N. J., becomes electrical engineer of the Bridgeport, Conn., Traction Company.

F. M. Todd, formerly of Elgin, Ill., has taken charge as superintendent of the electric street railway at Waukegan.

Percy Domville has been appointed Electrical Engineer of the Hamilton, Ont., Radial Electric Railway Company.

W. E. Baker, general manager of the Metropolitan West Side Elevated Railroad, Chicago, took a short vacation the first part of this month.

F. E. Huntress, president of the Neal Headlight Company, of Boston, is spending a few weeks in Europe on a combined business and pleasure trip.

Warren S. Skinner, electrician of the Elgin, Ill., City Railway Company, and Mary Lawson, were married June 17, and have left for a short trip.

Superintendent Frank Peck, of the Metropolitan Street Railway Company, Kansas City, has resigned for the purpose of engaging in the sand business.

W. A. Larabee, formerly a conductor on the Lynn & Boston Street Railway has been appointed superintendent of the Ipswich & Essex Electric Railway.

President E. Peckham, of the Peckham Motor Truck & Wheel Company, spent several days in Chicago on his way home from a long sojourn in California.

Edward E. Higgins, editor of the Street Railway Journal, was married June 10, to Miss Mary Austin White, at West Roxbury, Mass. Our heartiest congratulations.

F. Wayland Brown, well known among Ohio managers, and recently of Youngstown, has taken charge of the street railway department of the Moorland & Borland detective agency.

Assistant Superintendent Jones, of the Hammond, Whiting & East Chicago Electric Railway, had his arm fractured, July 1, by a man jumping from a burning building at East Chicago.

George H. R. Preble, formerly acting superintendent of the Fitchburg & Leominster Street Railway, has left for New York to superintend the construction of a new road near that city.

William D. Ray, general manager of the Everett Railway & Electric Company, Everett, Wash., made a pleasant call upon the Review during his recent visit to Chicago.

Thomas M. Linn, formerly superintendent of the Geneva, Waterloo, Seneca Falls & Cayuga Lake Traction Company, is now in charge of the Irondequoit Park Railroad, of Rochester, N. Y.

Frank S. Stevens has resigned as president of the Globe Street Railway, Fall River, Mass., and Robert S. Goff has been elected in his place. Herbert S. Read will act as treasurer in place of Mr. Goff.

P. B. Flint, superintendent of the Mount Vernon Electric Railway, from Washington to Mount Vernon, Va., has tendered his resignation, to take effect as soon as his successor shall have been elected.

George H. Scranton, superintendent of transportation, Columbus, O., Street Railway Company, has recovered from a severe sickness brought about by overwork. He will take a rest for a time at Mackinac Island.

On his recent return to Fitchburg, W. W. Sargent, superintendent of the Fitchburg & Leominster Street Railway, was given a royal banquet by the employes, which was also attended by the directors of the road, as guests.

C. Metterhausen, assistant to the president of the Jackson & Sharp Company Car Works, Wilmington, Del., is making an extensive western trip in the interests of that company. Mr. Metterhausen spent several days in Chicago and called on the Review.

Edgar A. B. Haynes has been elected president of the St. Louis & Kirkwood Electric Railway Company, to succeed Dr. John Pitman, resigned. Other officers are:—Edgar S. Rannalls, vice-president; George L. Edwards, treasurer, and George W. Taussig, secretary.

H. P. Myton, superintendent of the Elkhart, Ind., Street Railway, has had his legislative ambitions checked by a clause in the state constitution, which necessitates a two years' residence in the state prior to election. He was at one time a member of the Kansas legislature.

C. L. West, who recently completed the construction of a line for the Irondequoit Park Railway Company at Rochester, N. Y., has taken the contract to construct twenty-five miles of electric road at Hamilton, Ont. He has also the contract for building eleven miles of road at Syracuse.

Charles Fleck has assumed his duties as manager of the Trumbull, O., Street Railway Company. He has previously been engaged in a similar capacity with the Jamestown, N. Y., Street Railway Company, and it is believed that under his management the service at Trumbull will witness great improvements.

James Ross, vice-president of the Montreal Street Railway Company, and William Mackenzie, president of the Toronto Street Railway Company, are in England negotiating for the purchase of the Central Tramway of Birmingham. If negotiations are successful it is said they will convert it into an electric system.

C. R. Fredericks, who for several years has been superintendent of the Cicero & Proviso lines, this city, resigned July 1, and for the first time in 17 years will treat himself to a vacation and a deserved rest. The Cicero road has been leased by the West Chicago, and it is intended to abolish the position and handle the lines from the main office.

Frank A. Thayer, for some years general manager of the Goubert Manufacturing Company, of New York, has severed his connection with that company and associated himself with the Aultman & Taylor Machinery Company, of Mansfield, Ohio, in the selling department, for the Cahall vertical and Babcock & Wilcox horizontal water tube boilers.

H. B. Niles has returned from a trip to Mexico City greatly impressed with the possibilities of the system there when converted to electric and operated in accordance with American ideas of management. He reports that Mr. McLean has already put under way many improvements in the service, and has been most warmly welcomed by the leading citizens of the Mexican capital.

W. A. McGuire, president of the McGuire Manufacturing Company, Chicago, finds time from the duties of his office to enjoy many of the pleasures of travel, and not satisfied with spending his winters in California, has started on an extended European trip. While abroad he will inspect the McGuire trucks running on German and other roads, and while the trip is a pleasure one will combine some business at the same time.

Rodney Thayer, late manager of the Atlantic district for the Babcock & Wilcox Company, of New York, has severed his connection with the Babcock & Wilcox Company, and associated himself with the Aultman & Taylor Machinery Company, in its sales department of the water tube boiler business. The Aultman & Taylor Machinery Company, is manufacturer of the Cahall vertical and Babcock & Wilcox horizontal water tube boilers.

R. J. McCarty, the well known street railway engineer of Kansas City, has written a little story, "The Silvular Hypothesis; A Legend of Free Silver," which is one of the brightest, most pointed reviews of the vexed question we have seen. It traces the rise and progress of the "Orinetians," and in quaint but forceful language relates the struggles, failures and results of this ancient people to force the use of silver as money on the basis of a fixed ratio to gold. It should be widely read.

Francis W. Lane, assistant editor of the STREET RAILWAY REVIEW, was elected associate member of the Master Car Builders' Association at the convention held at Saratoga, N. Y., beginning June 17. There are five other associate members: David L. Barnes, chief consulting engineer of the Baldwin-Westinghouse combination; M. N. Forney, editor of the American Engineer; H. G. Prout, editor of the Railroad Gazette; Angus Sinclair, editor of Locomotive Engineering, and J. H. Setchell, of the Pittsburg Locomotive Works.

Benjamin F. Sherburn, who was recently elected to the superintendency of the Plymouth & Kingston, Mass., Street Railway Company to fill the vacancy caused by the resignation of C. E. Barnes, has had a long experience in street railway business, having commenced as driver on the old Metropolitan line of Boston in 1871, and has been in the service continuously since, in Manchester and Concord, N. H., and Haverhill, Mass. At Concord he had charge of the reconstruction in changing from horses to electricity, and at Haverhill he served as assistant superintendent of the Haverhill division of the Lowell, Lawrence & Haverhill road.

At the commencement exercises of the graduating class of '96 from the Stevens Institute of Technology, Hoboken, N. J., held June 18th, 1896, the degree of Doctor of Engineering was conferred by the faculty and trustees of Stevens Institute upon Commodore George W. Melville, engineer-in-chief of the United States navy, in appreciation of the excellent engineering work performed by Commodore Melville for his country and the advancement of the science of steam engineering well illustrated in the world-wide famed "White Squadron." Only once before in the twenty-five years' history of the Stevens Institute has the degree of Doctor of Engineering been conferred, and then upon Professor R. H. Thurston, of Rhode Island, who formerly occupied the chair of Mechanical Engineering in Stevens Institute and is now director of Sibley College, Cornell University.

JAMES A. HANNA GOES WITH PECKHAM.

James A. Hanna, one of the most popular and best known supply men in the fraternity, has accepted the general western agency for the Peckham Motor Truck & Wheel Company, with headquarters at Chicago. During the past two years Mr. Hanna has been eastern representative of the McGuire Manufacturing Company, with offices in New York. His western friends, who are legion, will be delighted at his return to the west, and glad to learn that his new position has been accepted under very advantageous arrangements.

A NINE-HOUR DAY AT TOLEDO.

The street car employes at Toledo, O., have won their contention for shorter hours and more pay. The substance of the agreement entered into between them and the company is as follows: First—Nine hours shall constitute a day's work. Second—Each car shall have two crews of two men each. Third—There shall be two grades of wages. Men in the employ of the company three months or less shall receive 16 cents an hour. Men over three months shall receive 18 cents an hour.

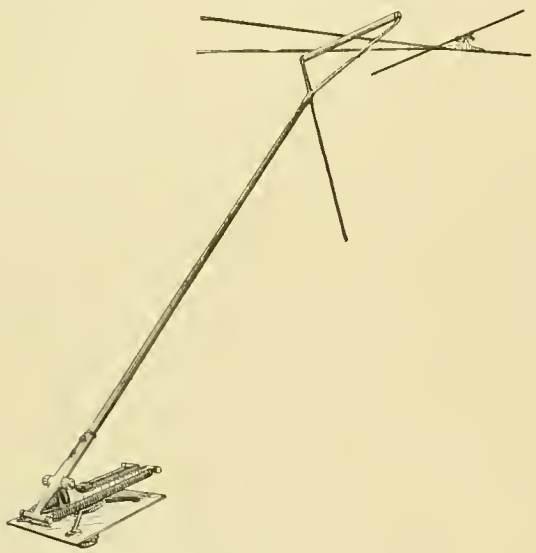
SUNDAY IN THE COUNTRY.

Cheap excursion tickets to Wisconsin resorts are sold every Friday and Saturday by the Chicago, Milwaukee & St. Paul Railway. Burlington, Delavan, Waukesha, Milwaukee, Elkhart, Oconomowoc, Madison, and many other attractive places, are within easy reach of Chicago. For rates and other information apply at ticket office, 95 Adams street, or at Union Passenger Station, Canal, Adams and Madison Streets.

THE WALKER TROLLEY.

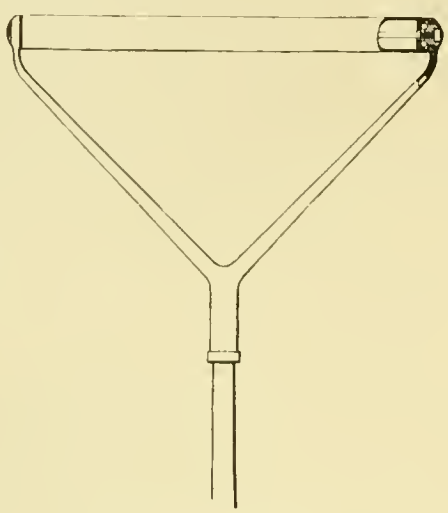
The Walker Company is now offering a trolley which differs radically from those now in use in this country, and which it is claimed does not infringe the Van Depoele patents owned by the General Electric Company. It does not swivel and does not employ a grooved wheel.

As shown by the illustrations, contact is made with a long roller mounted on ball bearings. The roller is of



THE WALKER TROLLEY.

hard steel sheathed with a soft metal. The base, as said, does not swivel, but when the pole is pulled down to the roof it unlatches so that it can be turned to run the other way. The roller is wide enough so that the lateral motion of the car and variations in the trolley wire cannot make it jump the wire. The use of this kind of trolley will greatly simplify the design and construction of switches and curves, because no grooved wheel must be provided for. Some German roads use



THÆ WALKER TROLLEY.

a trolley somewhat similar to this, except that it has a sliding contact, and it has demonstrated its ability to keep the wire at all times. It appears like a very practical device and will no doubt receive a warm welcome. It is said the ball bearing requires no oil, so making electrical contact easier.

THE SADDLER SWITCHES AND SIGNALS.

One of the newest inventions in electrical signaling is the recently invented Saddler system of block signaling, the invention of I. N. Saddler, of Toledo, O., and put upon the market by the Saddler Electric Switch and Signal Company, having its offices at 809 Monroe street, Toledo, Ohio.

In this system there are no semaphores, no lamps on poles, no grounded boxes—those easy marks for lightning—and positively no waste of current and but little expense for repairs. Small boxes, called by the inventor "Photophones," are placed in each car, and are so connected that should a car leave a switch after the approaching car ahead had left the next switch, the light in the photophone will be lighted and the bell will ring. The system is automatic and requires no attention from any one, nor can it be tampered with by meddlers.

It is so arranged that the backing in of cars will not in any manner disturb the mechanism of the apparatus, which is simple and thoroughly effective. It is believed that no other method of signaling presents equal advantages with this new photophone system.

This company also handles the Saddler automatic street car switch, a simple arrangement for throwing a switch without a switch hook. The switches in practical use are said to work perfectly under all conditions, and to be inexpensive.

GREASED THE WRONG END.

"I wish you would make sure of catching the 10:45 at the depot," said the fat man to the conductor, tipping him a half dollar at the same time. Going forward to his motorman the conductor said:

"Here, Billy, this gentleman wants to catch the 10:45 at the station."

The motorman, who had seen the coin change hands, only answered with a grunt.

They arrived just in time to see the 10:45 leaving the platform.

In a towering passion the fat man went to the motorman and shouted:

"Weren't you told to catch the 10:45 train?"

Leisurely removing the controller handle for the return trip, the motorman, with a solemn wink, replied:

"Yes, sir, but you greased the wrong end of the car."

"There are microbes on the car seats,
There are germs upon the straps;
I can't stand upon the platform,
Nor sit on young men's laps;
Can't afford to buy a carriage,
Nor to ride a bike in bloo-
Mers. But if I was wealthy,—
What can a poor girl do?"

W. H. Sills & Co., dealers in insulating mica at Chicago, have failed.

M. A. Cooledge, of Fitchburg, Mass., has received the contract to build the Amherst & Sunderland Electric Railway.

The Taunton Locomotive Works has recently delivered a big sprinkler to the Athol & Orange, Mass., Street Railway Company.

The Steel Motor Company is daily adding to its list of employes at Johnstown, and now has over 400 with all the work they can do.

The C. & G. Cooper Company, Mt. Vernon, O., is installing a fine 400-horse-power Corliss for the Southwest Missouri Electric, at Webb City, Mo.

Macartney, McElroy & Co., of New York, have been awarded the contract to construct the first 12-mile section of the Hamilton, Ont., Radial Electric Railway.

J. N. Alsup, of Owensboro, Ky., has been awarded the contract to construct and equip the Clarksville, Tenn., Electric Street Railway. Rails and cars have been purchased.

The Clonbrock Steam Boiler Works, Brooklyn, are very busy at present, being crowded with orders upon which they are now engaged, and with a large number of orders ahead.

The Metropolitan Electric Company, Chicago, has taken the northwestern agency of the Missouri Telephone Manufacturing Company, and is carrying a full line of its telephones.

The Q & C Company, Chicago, has received its medal and diploma from the Atlanta Exposition, for its metal sawing machines, on the grounds of effective service and economical action.

The Shickle, Harrison & Howard Iron Company, St. Louis, has just opened an office in the Drexel building, Philadelphia, for the sale of its cast steel motor gears, with Janney & Steinmetz as agents.

The Cleveland Construction Company, of Akron, O., has been awarded the contract to build the 10 miles of electric railway between Uhrichsville and New Philadelphia for the Tuscarawas Railroad Company.

Rogers, Baldwin & Vickers, of New York, have been awarded the contract to construct the Darien & Westport extensions and the Roton point double-track of the Norwalk Tramway Company, Norwalk, Conn.

The Westinghouse Electric & Manufacturing Company has received the contract to furnish thirty-two motors of 100-horse power and twenty of 30-horse-power for the Baltimore, Cantonsville & Ellicott City Railway.

E. W. Cooke, formerly director of the School of Mechanical Engineering, Armour Institute, Chicago, has opened an office at 10 Wall street, N. Y., and will inspect and render expert reports on steam, electric, mining, etc., properties.

J. A. Long has been appointed receiver of the Falls Rivet & Machine Company, of Cuyahoga Falls, O., on application of Erskine L. Babcock and the Akron Belting Company. The liabilities are $375,000 and the assets $615,000.

Harold P. Brown, owner of the plastic rail bond, has received a letter from Robert Dunning, master mechanic of the Buffalo Railway, telling of taking up a plastic bond, down for some time, which showed both rail and angle bars to be bright as a new dollar.

The Neal Electric Headlight Company has been incorporated at Boston, Mass., to make and sell headlights and street railway supplies. The capital stock is $10,000, and the incorporators are Franklin E. Huntress, F. A. Huntress, George C. Ewing and George N. Towle.

The Indianapolis, Anderson & Marion Electric Railway Company has begun work. Promoter Noah Clodfelter has let the contract for grading to Hayworth & Sons, of Jonesboro, and the contract for the two power houses at Fairmont and Alexandria to Wooten & Baker, of Fairmont.

The Charles Scott Spring Company, Philadelphia, has gotten out a very neat and desirable vest-pocket memorandum book containing calendar and bound in Russia leather. There are compartments for cards, stamps, etc., and it makes one of the handiest souvenirs we have seen in a long time.

W. C. Turner, for several years connected with the sales department of the Babcock & Wilcox Company, in New York, has resigned his position with that company, to associate himself with the Aultman & Taylor Machinery Company, of Mansfield, Ohio, in its Cahall sales department.

The Universal Construction Company, Rookery, Chicago, of which W. R. Stirling is president, has issued a pamphlet calling attention to the merits of the Harvey and the Pennock steel cars, which they are placing on the market. The facts stated furnish a strong argument in favor of steel in car construction.

The Mica Insulator Company, of New York and Chicago, is sending out a little folder containing a sample of its flexible micanite, style B. This is the latest production in extra flexible micanite. Its extreme flexibility allows it to be bent into any shape desired, for armature slots, armature coils and field magnet coils.

The Canal & Claiborne Railroad Company, New Orleans, La., has awarded the contracts for the equipment of its power house. The General Electric Company will furnish the generators, etc., the Edw. P. Allis Company, of Milwaukee, Wis., the engines, and the Edgemoor Iron Company, of Wilmington, Del., the boilers.

L. W. Kingsley, secretary of the Mica Insulator Company, 218 State street, N. Y., sailed June 3, on the steamship St. Louis, for a trip abroad, where he will spend considerable

time sight seeing, and looking after the affairs of the company in Europe. The company's business is largely increasing in foreign countries. At its newly-equipped factory, which is located at Stoke Newington, London, upwards of 100 hands are given employment. The company's London office is at 12 Camomile street.

Clift Wise, street railway engineer and contractor, has in hand one of the largest contracts for foundations ever given by a street railway. It covers all the foundations for walls, stack, generators, engines and boilers for the new mammoth 15,000-horse-power station for the Chicago City Railway. Fifteen car loads of material are consumed daily in the work.

The American Electric Heating Corporation, Sears building, Boston, is now sending out one of the finest and best illustrated catalogs on car heating ever issued. It is full of interesting matter for managers. The company has branch offices in the Havemeyer building, New York, and in the Monadnock, Chicago, the latter in charge of Carter H. Ftzhugh.

M. G. Hogan, of Altafont, Ill., is one of the largest shippers of railroad ties in the west and has done a very large business among steam roads and is now also taking up that of street railways. Mr. Hogan is not only a contractor of large experience but is president of a bank in his city and has facilities for prompt shipment and handles the very best quality of material.

Isaac A. Hopper, of 219 West 125th street, New York, has been awarded the general contract to construct the roadway, power house and car barn for the Third Avenue Railroad, of that city. The contract is a large one. The engine plant will occupy 100 by 100 feet, the boiler plant a like space, and the car barn 200 by 300 feet. Work on the car barn will begin very soon.

The Garton-Daniels Electric Company, Keokuk, Iowa, has many inquiries regarding its improved arrester, thereby proving the company's assumption that there was a demand for something better than there was previously on the market. It is now enjoying a larger trade than it anticipated, which is saying a great deal, and is working day and night to keep abreast of its orders.

Albert Anderson, of A. & J. M. Anderson, Boston, spent several days in this city the early part of the month looking after their interests here, and incidentally closing large orders for the Anderson materials for the Lake Street Elevated and the West and North Chicago Street Railroads. The railway department of the Anderson works is very busy with a business increasing each month.

The West End Street Railway, Boston, is still adding to its already large equipment, and has ordered 150 new 25-foot handsome box cars for early fall delivery. The Laconia Car Company, Laconia, N. H., has been awarded the contract for 75 of these cars. As we go to press the trucks had not yet been selected. This order makes 125 Laconia cars purchased by the West End road this year.

Winthrop Thayer, for fourteen years connected with the sales department of the Babcock & Wilcox Company, of New York, and for the last eight years manager of its New England district, has resigned his position taking effect July 1st, and is now associated with the Aultman & Taylor Machinery Company, at Mansfield, Ohio, manufacturer of the Caball vertical and Babcock & Wilcox horizontal water tube boilers.

Stern & Silverman, Philadelphia, have received a resolution of thanks and congratulations from the Dayton Traction Company, and the originators of the scheme of building an electric line from Dayton to Miamisburg, O., for the promptness and thoroughness with which the plant has been constructed. The entire plant, including roadbed, track, power plant and equipment were furnished by this firm under a general contract.

The Western Gear Company, Milwaukee, has purchased the business and plant of the Kunz & Rau Gear Company, that city, and will continue the manufacture of street railway motor gears with considerably increased capital and plant. Mr. Rau, of the former company, has sold his entire interest in the business. The company has been a successful and growing one, and the business will now be pushed harder than ever, with good prospects.

The White-Crosby Company has completed work upon the Gwynn's Falls, Md., Electric Railway to such an extent that a trial trip was made over the line June 29. The present extent of the line is about 3,500 feet, the work upon which was done in two weeks, but it is intended ultimately to carry the line about two and a half miles beyond the present terminus. The line is built of 58-pound steel T rails laid on oak ties with stone ballast.

The Watertown Steam Engine Company, Watertown, N. Y., has issued a handsome catalog, descriptive of the various styles of steam engines manufactured by it. The work is especially devoted to engines for direct connection with electric generators of each of the best known classes, and the variety of prices and styles is such as to meet the wants of everybody. The handsome appearance of the catalog is a good indication of the character of their work.

Be certain that you get the best of everything in this life, and in carrying out this principle with reference to traveling, see that when you go from Chicago to St. Paul, Minneapolis, Duluth, the Superiors, Ashland, Iron Towns, Fox River points, or any of the principal towns in Central Wisconsin, your tickets read via the Wisconsin Central. Berth reservations and full information at City Ticket Office, 204 Clark Street, or Grand Central Passenger Station, Fifth Avenue and Harrison Street.

The Elliot Frog & Switch Company, East St. Louis, Ill., has just issued a handsome little book descriptive and illustrative of its manufactures. The list includes almost everything in the way of track material and appliances, and the book also gives a lot of valuable information relative to the best methods of laying out switches, turnouts, crossovers, etc., quantities of material required for various classes of work, and other useful tables. The book is neatly bound in flexible covers and is in itself an indication of the careful manner in which the company looks after the details of its business.

A. G. Hathaway, of Cleveland, whose transfer tables are scattered all over this country, recently sent a nine-foot table to Cairo, Egypt, for the new electric railway there, and also another large table to the Honolulu Street Railway in the Sandwich Islands. He has likewise just filled an order for a 26-foot transfer table of 30-ton capacity, which has gone to the street railway at Cape Town, Africa. Mr. Hathaway is also shipping a full equipment of the Murrey brakes for the Englewood & Chicago Street Railway, and his shops are extremely busy with other orders now in hand.

The Kinzer & Jones Manufacturing Company, Pittsburg, is putting on the market a variety of brake shoes and brake shoe connections for which the claim is made that they excel in efficiency, durability, simplicity and consequently economy. In addition to its standard and composition filled shoes the company manufactures special forms for the Brill, McGuire, Bemis, Du Pont, Three River, Henry, Barney & Smith and Peckham trucks. With the Kinzer patented connections these shoes have made some remarkable records and are receiving the warmest praise from companies which have them in use.

The Edison-Brown Plastic Rail Bond has been used this season by the Fairmount Park Traction Company, of Philadelphia; the Hamilton Radial Electric Railway between Hamilton and Burlington, Ont.; the 20-mile road built at Hingham, Mass., by Pepper & Register; on extensions of the Louisville Railway; Richmond, Va., Railway; Staunton, Va., Railway; Denver Consolidated Tramway, Staten Island, N. Y., Railway, and others. The success of the plastic bond has been remarkable, but considering its merit and the studious and scientific work Mr. Brown exerts in its promotion it is not strange.

The Bergen County Traction Company, of Edgewater, N. J., has awarded the following contracts for its extension: Generators and electric equipment, the General Electric Company, New York; car bodies, the Jackson & Sharp Company, Wilmington, Del., and the St. Louis Car Company, St. Louis, Mo.; trucks, the Peckham Motor Truck & Wheel Company, Kingston, N. Y.; overhead construction, the White-Crosby Company, Baltimore, Md.; rails, Pennsylvania Steel Company; engines, the Edw. P. Allis Company, Milwaukee, Wis., and boilers, the Heine Safety Boiler Company, St. Louis, Mo.

Mayer & Englund, Betz building, Philadelphia, eastern representatives of the International Register Company, Chicago, have closed a contract with the Fairmount Park Transportation Company, Philadelphia, for an equipment of sixty International "Iron Clad" fare registers, to be installed in thirty-six open cars now being built. They have also secured the contract for furnishing all the overhead line material for the Fairmount Park Transportation Company, Philadelphia. All of this material will be of special designs and extra large and heavy, as 0000 round trolley wire and one-half inch span wires will be used.

The Forest City Electric Company, of Cleveland, has been adding to its facilities of late to keep pace with increasing orders and among improvements is a 750-ton hydraulic press for pressing commutator bars; also a 1,000 pound drop hammer which will largely increase the output of drop-forged bars. In this and other ways and by the use of new and improved machinery it has decreased the cost of manufacturing its product so that the selling prices still remain the same, although the price of the copper has largely advanced. The company is doing a splendid business and not only keeping its old customers, but rapidly securing additional new ones.

"The wise man placeth the butt of the gun against his shoulder before he fireth, but the fool looketh down the barrel to see the ball start." The truth of this adage is unquestionable, and just in the midst of the fire-cracker and gun shooting season it shows great thoughtfulness on the part of the American Electrical Works, Providence, R. I., to call the attention of their friends to it. They also advise Johnny to get his gun, and for fear he may have some difficulty in getting it they send him one. We have been unable as yet to practice much with the one sent to us, but as it seems to be one of the kind with which the company makes so many bull's eyes in the way of securing business, we have no doubt it can easily be made to create a record, even in inexperienced hands.

The Automatic Circuit Breaker Company, of Newago, Mich., is sending out some very fine testimonial letters received from users of its circuit breaker. Among them is one from Astoria, Ore., in which the writer states that the breaker is doing more than was claimed for it. Another from the Armour Company, Chicago, which writes to order seven additional breakers to complete its equipment; the Electric Transit Company, of Hamilton, O., which has equipped its power-house with it and regarding which Electrician Bowman writes: "It has given perfect satisfaction and is perfectly reliable. We have nothing to fear either from short circuits or lightning, in fact, we never had a shut down or a burn out last spring in those severe lightning storms. It works like a charm and speaks for itself."

The R. Bliss Manufacturing Company, Pawtucket, R. I., is doing an excellent business with Wood's car gate, and it is becoming popular with railway managers, many of whom have adopted it as standard. Orders for the Wood's patent car gate have been recently received from Laclede Car Company, St. Louis, Mo.; St. Louis Car Company, St. Louis, Mo.; Laconia Car Company, Laconia, N. H.; Barney & Smith Car Company, Dayton, O.; Albany Street Railroad Company; Chicago & Alton Railroad; New York, New Haven & Hartford Railroad, and Boston & Maine Railroad. Nearly all the large steam railroads of the west are taking the matter up with the makers of this gate, which is good evidence of its being universally adopted as the standard car gate. The makers have prospects of some very large orders during the coming months, among which are several hundred new street cars with the gate specified.

The New Haven Register Company, New Haven, is very busy, and the shops are being crowded to fill orders. Several very large orders have been closed within the past month, and the additions on roads already using this excellent machine, for extra summer cars, aggregate a fine total. The double and triple register for fares and transfers is finding great favor, especially on interurbans. When the REVIEW representative called, Mr. Bradley had just received his

medal and diploma from the World's Columbian Exposition; not "after many days," but after many years. He was also advised a few days since that the silver medal, the only one awarded a fare register at the Atlanta Exposition, was ready, and would be sent at once. The company has just received three foreign orders, which while not large, will undoubtedly result in good sales when the buyers have had time to use the machine and demonstrate its working.

The Q & C Company, Chicago, has published three pamphlets, which taken together contain a vast amount of information upon the subject of the proper construction and maintenance of railway track. The most comprehensive is a pamphlet of 64 pages on "The Value of Tie Plates in Track Repairs" by Benj. Reece, well known as a thoroughly posted track engineer, which fully covers the subject suggested by the title. "Economies in Maintenance of Way," is by the same author, being a paper read by him before the New York Railroad Club, March 17, 1892. The third, entitled, "Use and Economy of Tie Plates," is designed more especially to call attention to the merits of the Servis tie plate, manufactured by the company. The three will be sent free to any street railway official on application to the Q & C Company, 703 Phoenix Building, Chicago. The economical results of using the tie plate are extensively recognized by steam railroad men, who use them by the thousands, but until recently street railway men do not seem to have realized their value. The booklets above mentioned contain information on track work which should be read by every manager.

The Peckham Motor Truck & Wheel Company, New York, is having a demand which is really remarkable, and for some time past the works have been running night and day. How extensive its business is, the following list of orders taken during the month of June will illustrate. It will be noted the orders reach from Maine to Montana and California, and take in nearly all the states between. The ordering roads are:

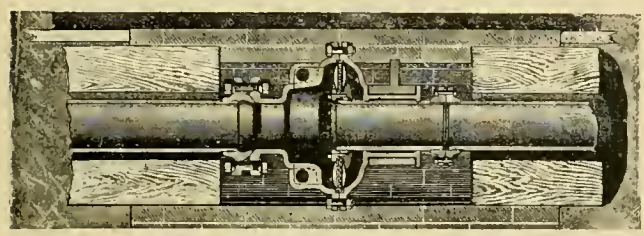
Union Traction Co., Philadelphia, Pa.
Metropolitan Street Railway Co., New York City.
Lynn & Boston Railroad Co., Lynn, Mass.
Worcester Construction Co., Brookfield, Mass.
Bristol Belt Line Railroad Co., Bristol, Tenn.
Hagerstown Traction Co., Hagerstown, Md.
Metropolitan Railroad Co., Washington, D. C.
Butte Consolidated Railway Co., Butte, Mont.
Steinway Railway Co., Long Island City, N. Y.
Oswego Street Railway Co., Oswego, N. Y.
Brooklyn Heights Railroad Co., Brooklyn, N. Y.
Bradford Electric Street Railway Co., Bradford, Pa.
American Wheelock Engine Co., Worcester, Mass.
Plattsburgh Traction Co., Plattsburgh, N. Y.
Baltimore City Passenger Railway Co., Baltimore, Md.
Kingston City Railroad Co., Kingston, N. Y.
Bergen County Traction Co., Fort Lee, N. J.
Georgetown & Tennallytown Railway Co., Georgetown, D. C.
Ryder Compressed Air Motor Co., San Francisco, Cal.
Clinton & Leominster Railway Co., Leominster, Mass.
Calumet Electric Railway Co., Chicago, Ill.
Coney & Brooklyn Railroad Co., Brooklyn, N. Y.
Mobile & Spring Hill Railway Co., Mobile, Ala.
Hingham Street Railway Co., Hingham, Mass.
Worcester Suburban Street Railway Co., Worcester, Mass.
Wakefield & Stonebam Street Railway Co., Wakefield, Mass.
North Woburn Street Railway Co., Wakefield, Mass.
Woburn & Reading Street Railway Co., Woburn, Mass.
Somerset Traction Co., Skowhegan, Me.
General Construction Co., Derry, N. H.
Bangor, Orono & Oldtown Railway Co., Bangor, Me.
Braintree & Weymouth Street Railway Co., Braintree, Mass.
Woonsocket Street Railway Co., Woonsocket, R. I.
Passaic & Newark Electric Traction Co., Passaic, N. J.
Dublin Tramway Co., Dublin, Ireland.
Consolidated Traction Co. Jersey City, N. J.

The new line between Pittsfield and Dalton, Mass., was opened June 30, with great enthusiasm on the part of the citizens of the two towns. The company is highly pleased with the successful working of the line.

HEATING BY EXHAUST STEAM.

An important source of revenue in connection with plants for the production of electric light and power has in many instances been lost sight of. The percentage of steam generated in the best boilers is very much greater than that utilized in doing useful work. There are no economical considerations which should seriously interfere with the utilization of this commonly wasted energy in any way which may be suggested.

The most easily available plan for using this over-production of steam seems naturally to lie in the direction of

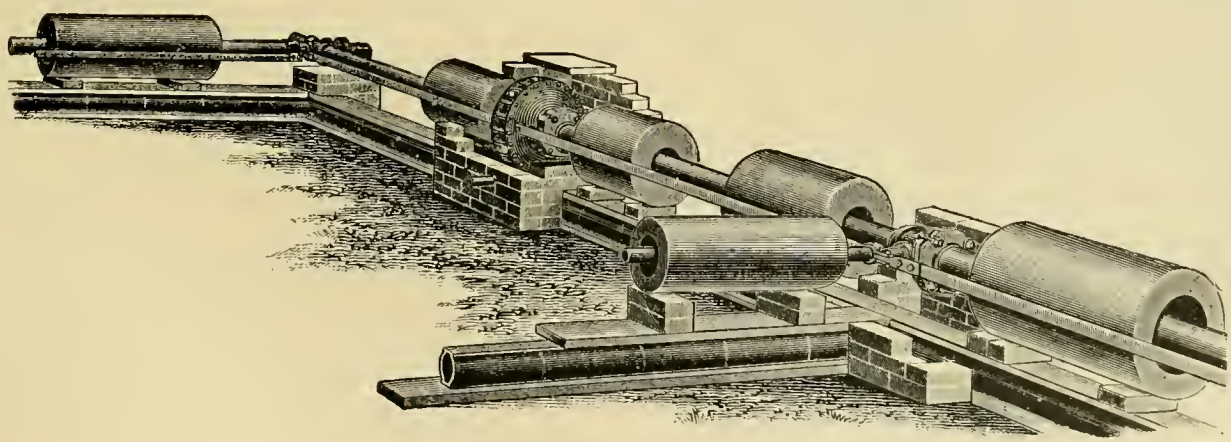


SECTIONAL VIEW OF SERVICE VARIATOR.

heating, and though several systems have been devised, that known as the Holly system seems to cover all desirable features. It is controlled by the American District Steam Company, of Lockport, N. Y., and is in use in connection with a number of electric light and power stations in various parts of the country. A small amount of back pressure upon the engines, say four or five pounds, will enable the exhaust steam to be utilized in the heating of buildings, and so far as we are able to learn from the users of this system the amount of back pressure is not sufficient to occasion any embarassment in the operation of the engines. It is stated that when engines carry a day and night load of fair proportions—the day load being the operation of street car lines and the night load that necessary for lighting purposes—the sales of exhaust steam will pay station expenses in the shape of fuel charges, water rents, expenses of boiler room, etc. The exhaust from a battery of boilers producing 100-horse-power will heat about one million cubic feet of space, and the actual cost of this amount of heating will amount to from $3,000 to $5,000 at ordinary rates per year.

In the case of the smaller lighting companies, who have but little or no day load, the work of the exhaust can easily be supplemented with live steam and the volume of business be correspondingly increased.

The accompanying illustrations present a fair idea of two of the important features of the system above named. One is a sectional view showing the method in which the steam heating mains are constructed and the second a sectional view of what is known as the service variator. The first consists of pine logs bored so as to leave a four-inch shell which is thickly coated with asphaltum which forms a covering for the iron pipe through which the steam is carried. The sections are tenoned together and supported upon a line of tile which also serves to carry away any surplus moisture. The wooden jacket serves as a protection and a non-conductor. The construction of the joint between the sections of pipe is shown in the sectional view of the surface variator. This contains a corrugated copper diaphragm supported by cast-iron backing plates to give the necessary strength. The yielding of the diaphragm provides for the varying lengths of the pipe under changes of temperature. Stuffing boxes are not required. This system of heating is in extensive use by the Springfield, Ill., Electric Light & Power Company, the Terre Haute, Ind., Electric Railway Company, the Danville, Ill., Electric Light & Power Company, the St. Joseph, Mo., Light, Heat & Power Company, and many others. The Danville Electric Light & Power Company informs us that it now has 2,000 feet of street mains from 6 to 12 inches diameter, covering the principal business street and serving 15 business blocks including the government building, court house and a hotel. The system was in use last winter for the first time and gave good satisfaction. There are in use during the day two 125-horse-power high-speed Ideal engines. At night there is more steam produced than can be used because of the engines which run the lighting plant. The engines running during the day furnish power for the street railway and for private consumers. The space heated by the steam which would



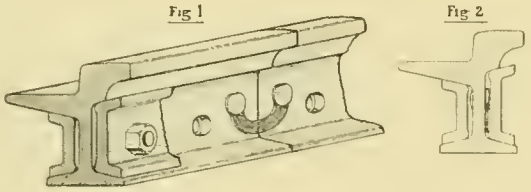
SECTIONAL VIEW OF STEAM HEATING MAINS.

otherwise go to waste amounts to about a million and a half or two million feet. This company, as well as others who have used the system, is so well satisfied that the plant investment is a profitable one that it is in readiness to increase its plant, whenever occasion shall warrant it.

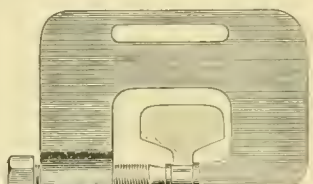
The New York Steam Company is laying 4,000 feet of 20-inch mains for its uptown plant and is putting in a 60-ton 1,000 horse-power boiler at its Greenwich street station. The company is at present using direct steam. This indicates confidence in the business and the opportunities are more promising where the exhaust steam can be used.

HORSESHOE RAIL BOND.

This bond which is the invention of B. J. Jones, superintendent of the South Chicago City Railway, has been extensively used on that system for some time and is now being put on the open market by J. M. Atkinson



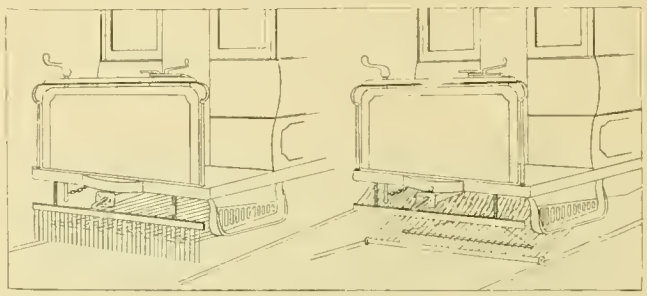
& Co., 1439 Monadnock building, Chicago, the latter company being the sole owner. The bond is made of copper wires with drop forged terminals, placed under the fish plate and given a horseshoe or loop form to provide for contraction and expansion. The patent is claimed to cover broadly the use of a flexible body of loop form with lateral rivet lugs, and users are cautioned against using infringing articles as the company intends to hold them strictly to account. The tool with which the rivets are expanded into the holes in the rail web is shown in the accompanying illustration, and it is certainly a great advance over the old method of riveting. The importance of having bonds protected under the fish plates is coming to be more recognized every day, and this bond was among the first to fill the want.



A conductor on the Lenox avenue line, New York, had an experience the other day in which he served not only as conductor of the trailer, but was "the whole thing" himself. He slipped just as the motorman turned on the current and the pocket of his coat was caught upon the coupling pin. The motorman was not in the habit of paying attention to anything but bells, and his partner's yells were unheeded. The conductor was dragged along until his coat finally gave way. His only injury was the loss of his nickel pocket.

A FENDER FROM TROY.

Two Troy, N. Y., inventors have been at work on a fender for some years, and recently six of their design have been ordered by the Troy City Railway. It is of the automatic trigger type and consists of a wheel fender, normally held up away from the track. It is touched off or let down by an object striking the rake



NEW TROY FENDER.

which hangs under the front dash. The fender has small wheels which, when it is let down, run on the track. The difficulty with this fender appears to us (as with all fenders on a similar principle) to be that unless the car is going very slow the fender will not drop quick enough after being touched off to prevent it riding over the victim.

NEW PUBLICATIONS.

The verbatim report of the fourth annual meeting of the Pennsylvania Street Railway Association, held at Wilkes-Barre, September 4 and 5, 1895, has been issued.

The Technic for 1896—the publication of the engineering society of the University of Michigan—has been issued and has a number of articles by alumni of interest to street railway men. Price 50 cents.

"The Problem of Economical Heat, Light and Power Supply for Building Blocks, Etc.," is taken up very thoroughly in a bulletin of the University of Wisconsin by G. Adolph Gerdtzen. Its price is 45 cents.

Since the organization of the Electric Mutual Casualty Association of Scranton, Pa., by street railway managers to care for the accident losses of their respective roads, their efforts in the interest of the Association have met with pronounced success. Over forty-five roads have joined and as many more are applicants or have signified their willingness to join as soon as their present insurance expires. The Association's corps of adjusters and detectives has been organized, and immediately upon report of a serious accident upon any of their roads, prompt measures are taken to ascertain the liability of the assured, and when such is evident immediate steps are taken to prevent litigation. By these means a better feeling among the public is maintained toward the assured in their respective localities. All statements of accidents are reported to a skilled legal board, which includes some of the best talent among railway lawyers. The association promises to be a successful adjunct to thorough street railway management.

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THE little road being built down in New Haven by certain manufacturers is the first electric street railway to be built for the purpose of transferring freight exclusively. While the peculiar conditions of New Haven are not found in many places, yet the fact that permission was given to build such a road shows that there is a commendable tendency to recognize the value of the electric street railway for other purposes than the carrying of passengers.

WHILE the street car controller has reached a form which is satisfactory to both motormen and operating companies, there seems to be—from the motorman's standpoint at least—some room for improvement in the large controllers for elevated and heavy work. When a large controller is worked with a crank handle, the circle that a man's arm must describe at the end of the long crank is a large one and there is much complaint among the motormen that the left arm gets exceedingly tired in a day's run. This, of course, is bad from the company's standpoint, as it invites accidents.

THE first application of the power to be transmitted from Niagara Falls to Buffalo is for the Buffalo Railway. There has been considerable controversy as to whether this power transmitted from Niagara would be able to compete with steam power at Buffalo, but the fact that the Buffalo Railway, which has a large and economical plant, has thought best to accept an offer from the Niagara Falls Power Company certainly ought to settle all controversy on that point. It will not be strange if within a few years all the electric railway within fifty miles of Niagara is driven by its power. There is already a considerable mileage so driven.

BY no means an insignificant use of the cast welding process is in making joints where switches, curves, crossings and other special work join to the standard rail sections. This has always been an exceedingly weak place on all special work. It comes near to being one of the impossibilities to make an angle bar joint that will stay tight any length of time between rails of different section. Consequently there is almost as much wear on special work due to loose joints where it connects with the regular track as there is legitimate wear. There are two ways of geting around this. One is to have the special work of the same rail section as the balance of the track, and the other is to cast weld the connection. There is very little jar in going over good special work if the joints are tight.

THE convertible car is no doubt finding increased favor. We do not mean the patent kind with a lot of complicated devices that rattle like a hardware store rolling down hill, but the plain common sense kind with removable windows that is even stronger, simpler, and as noiseless as the standard box car. The convertible car has been made possible by the use of cars with center aisle and cross seats. Although this arrangement of seats came into use primarily because of its popularity with the public and because of the possibility with it of confining entrance and exit to the right hand rear step, it has proved an even greater blessing in the way of making practicable the long desired convertible car. In fact even a cross seat center aisle car, which is not intended as a convertible, can be made into a very fair open car by simply letting down the windows. Open cars the public must be given if a road expects to get much of an increase of revenue in the summer; but the investment needed for a double equipment, the room required for storage, the increased fire risk and the expense of changing trucks twice a year, have always been thorns in the flesh. In some of the very largest cities, where cars are much crowded at certain times, roads may not find it an advantage to use an open car which can be entered only at the platforms, but on the vast majority of less crowded systems the convertible car will at least bear consideration when buying equipment.

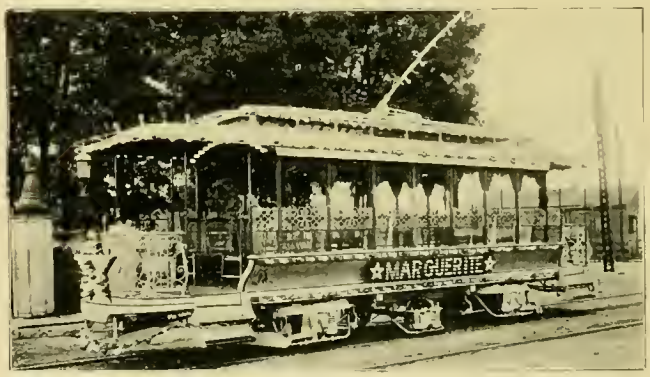
THE advocates of municipal ownership of street railways would do well to thoroughly look over the results of municipal ownership in the case of the allied industry of electric lighting. At a convention of street lighting officials held recently at New Haven, it was conclusively

shown what a delusion municipal ownership of electric lighting is. Most of the reports showing remarkably low cost for street lighting which have been heralded over the country have taken no proper account of depreciation, a large item in electric lighting and a still larger one in street railway operation. It was shown that Wabash, Ind., gave $18,000 for its plant and sold it for $30. Xenia, O., paid $35,000 for a plant and after eight years sold it for $10,000. Moline, Ill., paid $15,000 and after four years sold it for $8,000. Michigan City, Ind., paid $10,000 for a plant it sold for $2,500. And yet depreciation is an item that is usually not included when the price of the light is given, or if it is included it is put down as a paltry 5 per cent. Then too there is the question of risk. M. J. Francisco stated that at the time of the tornado in St. Lous half a million dollars worth of the property of electric companies was destroyed in half an hour, and asks, "Should a municipality whose province it is to govern and regulate, assume such risks and enter into a business subject to such losses? The private companies must meet such things, but have you ever heard of a case where such losses have been charged in the accounts of the electrical department of a city producing its own light?" In the case of municipal ownership of street railways the conditions would be even vastly worse.

Three cent fare, of which the dailies say so much, is one thing on paper and quite another on the tracks. The newspaper assertion has always been that the increased riding by reason of the decreased fare rate, would not only even up the difference between the five cent and the lower fare, but would even leave a larger balance to the good than before. In common decency and honor, these papers should now give equal prominence to the two instances where the 3-cent fare has actually been tried in this country. The Citizens' road, in Detroit, which has had 3-cent fares since the first of the year, shows a decrease in earnings over the same period a year ago (under the 5-cent fare) of nearly $80,000. This too, notwithstanding the fact that this year all the lines have been electrically operated, while a year ago the service was mostly by horses. At Grand Rapids, Mich., a lively, enterprising city of 65,000, and a good street railway town, the experiment of selling 24 tickets for one dollar, was tried 90 days ago. The result was a falling off in earnings of $3,000 in May, and $3,900 in June. In July the company was forced to restore the rate to 5 cents. In Savannah, Ga., the two competitive lines entered into a senseless rate war, and finally put fares down to 2 cents. The low rate charged was heralded throughout the coountry, but the explanation that it was the result of two roads each trying to exterminate the other, was carefully withheld, nor was publicity given to the result when both roads went into the hands of receivers as the outcome of 2-cent fares. It may be the above facts have never been brought to the attention of the editors of the daily press, but they should be; and we believe street railway managers, everywhere, should request publication in their local papers of these statements. The public, from the Atlantic to the Pacific, have been surfeited with the 3-cent fare heresy, and it is time they were given a crumb of truth, now that the cold facts and figures are before us. Theoretically, a 3-cent fare is a thing of beauty and joy; practically and commercially, it means disaster and bankruptcy. The boasted economy of mechanical power did not save any of the lines mentioned, for each is electric, and well equipped.

MILWAUKEE'S ELABORATE CAR.

No sooner does one company get up a very elaborate special party car than another in some other city tries to outdo it. Why there should be such competition between companies that are in no way business competitors must be explained on sentimental rather than commercial grounds, but it certainly produces magnificent results. The management of the Milwaukee Street Railway rejoices in a car recently turned out of its own shops which it has no reason to be ashamed of. It is an open car about 32 feet over all. The platforms are 5-foot. The floor of the body proper is carpeted and



twenty-four chairs and a few tables for refreshments are part of the outfit. Provisions for light refreshments for twenty-four people can be carried easily. The draperies at the top of the side posts are ornamental, but at the same time durable and waterproof.

There are just a few lights on the car. Yes, just a few. There are over 700 of them, and it would swamp the electric light plant of many a small town to furnish power enough to run them. The elaborate design of the gates and railing work on the platforms adds not a little to the appearance of the car. The design of the car shows much originality and the people of Milwaukee certainly ought to appreciate it.

DOROTHY WINDSOR.

Dorothy, the infant daughter and only child of the editor of the Review, died suddenly, while at Marengo, Ills., July 17, aged three months and fifteen days.

COMPRESSED AIR FOR STREET CARS.

Early in May last, the Metropolitan dailies became highly excited over the announcement that the Metropolitan Traction Company, of New York, had discovered a radically new and inexpensive method of operating street cars. So valuable and awe-inspiring was this newly discovered force, the company officials dare not even breathe its name to the anxious reporters, and by properly feeding the flame, newspaper and public curiosity was excited to a high pitch of expectancy. It was cheap; it was simple, so simple the marvel was no one had discovered the secret long ago; and the inference drawn was that the trolley and the cable would now be obliged to get off the earth, just as the faithful horse has had to go back to the farm from whence he came. Of one thing, however, no doubt was entertained. That was the big Philadelphia syndicate had the rights in a bag, and was holding the string with both hands.

A month later the secret began to ooze out, and was judiciously fed to the daily press, which, in turn, devoted columns to appeasing the appetite of the starving public.

The great power was compressed air. Mr. Yerkes was quoted as having given up an even million dollars for the Chicago rights alone. The whole thing was going on the same scale. The Associated Press covered the country from the east to the far west with the wonder of it. Incidentally we may mention that Mr. Yerkes denies having any financial interest in the scheme; and as for Chicago—well, his cables and trolleys are giving a good enough service at present. The entire conduct of the enterprise, from start to present time, has all the indications of a stock jobbing scheme.

It was finally announced that the compressed air cars were building, and would be ready for operation in New York July 1, but the usual unforseen delays in all such matters have delayed delivery somewhat, and the cars will not be running until about the time this paper reaches its readers.

There are two companies building the air motors. One type is that of Robert Hardie, who is doing his work at the locomotive works, Rome, N. Y.; the other of Hoadly Bros., building at the American Engine Works, Worcester, Mass.

Robert Hardie is known as one of the most competent authorities on compressed air in this country. It has been the study of a lifetime with him. In 1881 he built a compressed air motor which was tried on the Manhattan Elevated Road in New York. The motor carried 18,400 feet of free air, stored under a pressure of 600 pounds. In drawing the regulation elevated train at that time 1,470 cubic feet of air was used per train mile. The engine was built by the Baldwin Locomotive Works.

Although there appears undisputed evidence from well-known engineers who witnessed the experiment, that mechanically the motor appeared to be a success, the management of the road for some reason did not endorse it, and has continued to use steam dummies ever since. At present electricity is being earnestly considered.

Other attempts have been made at various times and in divers places in this country with compressed air. The Mekarski system was given a thorough trial at Toledo, Ohio, in 1891 and 92. Engines, compressors and storage tanks were substantially installed at no small expense, in the electric plant of the Toledo Electric Railway, and every opportunity given to make the experiment a successful one. The editor of the Review studied the system carefully at that time, his observations appearing in the December, 1891, issue. The Toledo road, however, abandoned the air. The trouble was the constant, even daily, repairs upon the driving machinery, necessary to keep it in working order. The car was in charge of a French expert thoroughly conversant with the system. Another recent test covering about one year, was made on the street railway tracks at Westfield, Mass., by J. F. Lewis, of the Rand Drill Company, well known builders of successful compressed air machinery for mining, caisson and other purposes. Although the car was in service several months no street railway cared to adopt the air.

Great stress has always been laid on the far away operation of compressed air cars in France, where two or three roads have been so operated for several years. It is a noticeable fact, however, that on the largest roads on the continent and in England, where a change has been made from animal power, it has been to either electricity or cable and not to air. This, too, in view of the fact that European tramways employ engineers of high standing and ability and on account of the high charges there for fodder, have long been anxious to break away from animal power. The changes now going on are all to electric. The new underground road in Glasgow seven miles long is operated by cable.

The advocates of the air system have laid considerable stress on the improvements and inventions of the the past two years, in Germany, whereby the construction of storage tanks for containing the supply carried on the car has been greatly improved. Reservoirs are now made seamless, and with only the one opening for charging and discharge, and can safely carry a pressure of 2,000 pounds per square inch. The appliances for compressing are simple and entirely adequate.

The question then naturally arises, if the compression and storage is sufficient to provide air for say 10 or 12 miles, where is the weak point?—for admittedly compressed air is in very many respects a most ideal method. It is clean, safe, and each car is self-contained. The trouble all along is in the driving apparatus. To secure the desired results the engines, which are after the type of a steam engine, must work under 100 or 125 pounds pressure. The location of the engine cylinders is under the car body. This means they are very close to the pavement, which also means that they are where it is impossible to protect them from the dust and grit of the street. This dirt quickly cuts the packing and leakage and consequent loss of power result. Trouble is also

experienced from the valves. The comparison made to dust and locomotive cylinders is not a parallel case, for the latter are placed much higher and being at the extreme front are ahead of the dust raised by the passage of the train. It is true our street railway tracks are now better sprinkled than a few years ago, but there is plenty of dust, and dust will penetrate and do its mischief where even water cannot enter. The entire driving mechanism of compressed air motors has always been of too delicate and intricate a nature to commend itself to the stern and severe demands of street car service. The few roads across the water run by air are each small roads, with long headway and comparatively light loads and, what would be considered by electric street railway men, slow speed.

In these days when almost any scientific and mechanical problem seems possible, it is no evidence of wisdom to shut one's eyes and assert that any particular thing is absolutely impossible. But when we consider the fact that the use of compressed air as power is contemporaneous with that of gunpowder, and review the numerous attempts to utilize it as a traction motive power in which large sums of money have been fruitlessly expended, the outlook is less promising. Air for moving street cars must not be confused with the use of the same air in stationary work in factories and buildings, as in Paris for example. The two are entirely different problems. As stated, compressed air is, theoretically, just the thing desired; and the tables prepared of the cost of installation and operation are very attractive. But the operating expenses have always been figured on the most successful work of one or two single cars, operating under the most favorable conditions; what might be termed a sort of laboratory test, and we all know how disappointing the expectations built on such a basis turn out in actual practice.

We insist there has never been a demonstration in this country of air for street cars which was a genuine demonstration. One or two cars run for a short time is no test in this field. And yet so far it has been impossible to demonstrate, with even one or two cars under most favorable and watchful conditions, a service which would warrant even a progressive manager to adopt it for his entire system. Nothing short of 10 or 20 cars running 100 miles or more per day, in regular schedule, for at least one year, will furnish the convincing proof which street railway men will demand before considering seriously the claims of the air system promoters. One swallow does not make a summer, and what may even be true of the working of one favored car, with a small army of hopeful friends to foster it, may fall a long ways short of 99 more cars of the same kind when the 100 are turned over to the operation of the average motorman.

We also continue to hold to our belief, repeatedly announced, that the most economical system and that which meets the most requirements, is that in which the power is generated at a central station where various economies can be practiced, and every car on the line is in constant touch with that power supply, from which it may draw as much or little as needed at every moment of the day. At the present time the only systems which meet these requirements are the electric trolley—overhead or otherwise—and the cable.

The Review is for progress and advance. If it can be shown that compressed air is worthy of adoption we shall be glad to welcome it. We hope no money or effort will be spared to bring out all its possible good qualities; as the weak points are developed we trust mechanical ingenuity will be equal to correcting them. But there should be no half-hearted business; the trial should be as fair and complete as possible, and let the results tell the story. But while we are wide open to conviction, we cannot yet attach any very strong expectations to the ability of compressed air to commercially compete with the overhead trolley.

RELIGIOUS SERVICES AND BASEBALL.

There was once a story told of the late Wendell Phillips, of which an application appears to have been made at Birmingham, Ala. The clerical appearance of Mr. Phillips invited the acquaintance of a white-chokered individual travelling by the same train, who accosted him with the question, "What is your mission in life?"

"To rescue the negro from slavery," promptly replied Phillips.

"Why, then, do you stay in the North? Why don't you go to the South where the negro lives?" asked his acquaintance, with some show of scorn. Phillips gave an off-hand answer and shortly asked a similar question.

"My object in life is to save souls from hell," was the self-satisfied answer.

"Very well," continued the great abolitionist, "may I inquire if you propose to go down there to do it?"

The Birmingham form of applying the point of the story is that, instead of trying to close places of Sunday resort and prevent the running of street cars on Sunday, as is the case in several cities, the religious people of that city unite in holding religious services every Sunday at the baseball park. There is a seating capacity of 1,000 and the choir is composed of 100 of the best singers in Birmingham.

A PITTSBURG ROAD LEASED.

At a meeting of the stockholders of the Federal Street & Pleasant Valley Passenger Railway Company, July 20, the line was virtually sold to the Northside Traction Company, by the confirmation of a lease for 960 years at an annual rental of $70,000, representing 5 per cent interest on a valuation of $1,400,000. It is expected that considerable improvements will be made upon the line under the new management. The officers elected are: W. H. Keech, president; R. F. Ramsey, secretary and treasurer, and S. J. Bowdoin, Patrick Calhoun, W. V. Callery, W. A. Stone, James C. Reilly, M. K. McMullin, and W. H. Graham, directors.

SICK OF 3-CENT FARES.

DETROIT RECEIPTS DOWN:—
NO DIVIDENDS IN SIGHT:—
3-CENT FARES RESPONSIBLE.

NEW EQUIPMENT WEARING OUT AND
REPAIR BILLS LOOMING UP.

RECEIPTS OF SUMMER MONTHS LITTLE
BETTER THAN WINTER EARNINGS.

"Time will tell," is a true old saw, and it is proving itself now in the case of the famous 3-cent fares in Detroit.

Street railway men all predicted just what is now coming to pass, and if the daily papers all over this country have any decency they will make what poor amends they now can to undo a little of the mischief they created by heralding the 3-cent fare in Detroit as what other roads could do if they only wanted to. The street railway fraternity everywhere in the United States feels justly agrieved at the policy followed, and so freely advertised by the Detroit Railway Company. Many of the most prominent managers have said to us the action of the Detroit Railway management has done more to work harm to street railway interests, than anything which has ever arisen since the industry began. And they concluded with "But time will tell."

It has not been so very long either, but the inexorable hand of fate is now revealed. Men who violate physical laws sooner or later pay the penalty; and no business enterprise can long maintain itself successfully when it sells its product for less than the cost of production. This is precisely what the Detroit Railway started out to do.

President Albert Pack makes the following statement in the Detroit Free Press, on his return from New York, where some kind of a joint deal was made with the owners of the Detroit Citizens', with a view to preventing further competition and reducing expenses in every possible item.

MR. PACK'S STATEMENT.

"Mr. Everett and myself met the Messrs. Wilson and Johnson in New York, and have practically come to an agreement on many points of difference between us, and I think, hereafter, we will work in harmony and to the better advantage of the stockholders of both companies, and at the same time give the public good service.

"The managements of both roads are very much disappointed in the receipts for the three months ending July 1, which were only a little better than they were in the three winter months, ending April 1. We had expected that the low rate of fare would have stimulated riding on the cars to a much greater extent than has been the case. I think without doubt that the vast number of bicycles in use has a great deal to do with the poor earnings.

"Whatever the cause is, the fact stares us in the face that we are fast wearing out our fine new equipment, and not earning money enough to pay even a low rate of interest on our investment, and we see the necessity of saving at every possible point.

"All of our litigation will be settled out of court, except the main case now pending decision in the Supreme Court. We will do away with the sharp competition on some of our routes where there are too many empty cars running now. We will also use some of the down-town terminals of the Citizens' road if it will be more advantageous. We will also exchange power in case of a mishap in either power house, and in a general way will work for the best interests of both companies consistent with good service to the public."

While the attempt is made to lay the blame on the bicycles, it is a very small hole to crawl out of, as shown by our article last month on "Bicycles as Competitors," for while some roads figured quite a loss in revenue from this source, they nearly all show increased earnings over a year ago, due to natural increase in population and the street car riding habit.

Vice-president Hutchins, of the Citizens' Company, allows something for the bicycle competition, but looks the trouble squarely in the face and says:

"In spite of the bicycle craze, which is prevalent throughout the country, the receipts of street railway companies in Brooklyn, Cleveland and many other cities from which we have obtained data, have largely increased over last year. Though the topography of Detroit may be more favorable for bicycling and therefore may have diverted a little more from street car traffic in Detroit than in the other cities, it would not be sufficient to account for the vast difference in our receipts. For instance, since last Saturday, when the blue ribbon meeting opened here, receipts have been considerably behind those on corresponding days of last year, when no races were held here. Besides that, quite a few of our lines were still operated by horse power then, and it is a fact that electric propulsion has increased street car traffic. There is no doubt in my mind that it is the three-cent fare above all that has so largely reduced our receipts.

"There has been no consolidation, but simply an agreement to drop all hostilities which have existed between the two companies, excepting our suit to determine our claim to priority rights in any street of the city, which Mr. Pack refers to as the main case. Both concerns have realized that companies working under such heavy expense as they do, cannot keep up hostilities without great loss to each other, and decided to work in harmony hereafter. At present each company is wasting a great deal of power every night to run a few cars, when all the necessary power might be furnished by one plant, and likewise during the day time a great deal of power might be saved."

Every manager knows what is the ratio between the earnings in winter months and summer months, for it is in the latter that the dividends must be found. The

natural increase of summer riding over winter ought to be a good many times that represented by the bicyclers, and yet the Detroit railways are unable to show any but a small difference between three best summer and the same number of winter months.

We have shown conclusively in these columns, and printed the figures to prove our assertion beyond any question; that passengers cannot be carried in our large cities, in the manner and at the speed and frequency absolutely demanded in these days, for 3 cents per head. There is not one street railway in the whole state of Massachusetts that is doing it—we specially mention Massachusetts because we printed the figures in full in that instance.

The Detroit road is beginning already to wear out—a road cannot be used without wear—and from this time on the charges for renewals will rapidly increase, precisely as they do on every other road.

Pingree, the great apostle of 3-cent fares, would now do well to turn his eyes from raising potatoes (which cost the city a great deal more than the potatoes could have been bought for on the street) and give a little timely and prayerful consideration to raising the price of car fares.

PENNSYLVANIA STREET RAILWAY ASSOCIATION.

The fifth annual convention of the Pennsylvania Street Railway association will be held in Altoona, September 2 and 3. The members of the association will convene Wednesday, at 11 o'clock a. m., at the Casino of Lakemont park. Scientific papers on different subjects of general interest to the members of the association will be read and discussed, and methods for the promotion of the general welfare of street railways considered. The second day will be devoted to a series of entertainments provided for the members and visitors of the association, including an excursion over the lines of the City Passenger and Altoona and Logan Valley railways, a trip to Wopsononock, and closing the day with a banquet at the Mountain House, Cresson. An interesting programme has been arranged and will in due time be published and mailed to members and street railway people throughout the state.

All street railway companies in the state of Pennsylvania are eligible to active membership and all manufacturers or dealers in street railway supplies, by recent amendment to the by-laws of the association, are eligible to associate membership in the association, the membership fee in each case being $25. Those desiring membership in the association can acqurre the same at once, by sending membership fee of $25 and one year's annual dues, $10, to the secretary, S. P. Light, Lebanon, Pennsylvania.

Members of the association are urged to send as many representatives as possible to the convention, and others who have not yet joined the association are not only invited, but earnestly requested to be present.

WHAT FREE COINAGE OF SILVER MEANS TO STREET RAILWAYS AND STREET RAILWAY EMPLOYES.

It has always been one of the professional ethics of technical journalism that politics should not be editorially considered.

The political issue this year, however, has ceased to be one purely of politics, or even party, as ordinarily understood, but has become one of sound finances and national honor. Hence, all old party lines should be forgotten. Every man is for good money, or he is against it. However good silver money may be at home, in Mexico or Japan, it is not good, it is not available as a medium of exchange in the great international clearing house of nations. American independence, as expressed in the Declaration of Independence, is one thing; American independence in setting up a money standard at variance with the rest of the civilized world, especially when we are now, and want to be still more, the debtors of these other nations, is quite another matter. Millions of European capital are invested in street railway bonds in this country. This money came to us in gold. Interest and principal must be paid back in the same coin. But for this foreign money to buy materials and pay laborers to construct, our industrial advance would be twenty-five years behind what it is to-day. Men who have money to lend, both abroad and at home, insist that their loans shall be repaid in a money which will pass the same anywhere in the world. Silver will not do this; gold alone will. Hence, interest and principal on most street railway securities are made payable in the universal medium of exchange—that is gold.

At present our silver dollar, while containing much less silver than can be purchased in bullion form for a gold dollar, and our paper dollar, worth *per se* only a few cents per pound as old paper, both pass current in our own country for the purchasing power of the gold dollar. That is because our government has promised to redeem each with a gold dollar on demand. With the unlimited coinage of silver this ability to redeem in gold at its face value, soon becomes impossible. This means that gold goes to a premium. A very conservative expectation would be that of two silver dollars to one gold dollar.

Now, what does this mean to street railways? Unlike the maker of boots and cloth and nails, the street railway cannot raise the price of its product. A street railway has rides to sell—this is all it has as a means of earning money. The price of that ride is fixed by the franchise, and as the courts have ruled that cities cannot reduce the rate agreed upon until the expiration of that franchise, by the same token the company cannot raise that fixed amount. In almost every case the price of the ride is limited to five cents. This fare money is paid in the baser coins, copper and nickel and silver; never in gold. The entire earnings, then, of the street railways are limited in amount, and received in other coins than gold; in coins that would be worth about one-half as

much as gold. But the interest charges in nearly every case are payable in gold. This means that it will take twice as much as it does now, of the kind of money a street railway earns, to pay its interest.

How many roads could stand a doubling of their interest account? Even though the stockholders received no return at all, in few, very few cases, would there be sufficient left to pay the interest. But stockholders would insist on some return. Where would it come from? Fuel, oil, rails—everything the company has to buy in the way of supplies would be higher. The pay roll would be the only place where a reduction could be made, and the pay roll is the big expense in operating a street railway. The pay roll is about equal all the other operating expenses combined.

It is very plain that even if a company was willing to get along without any dividends for its stockholders, and if the same wages were still paid, these wages would be in the same kind of money as that earned, which would be silver money. With the price of all commodities advanced to meet the gold standard, the conductor and the motorman, who now earns $60 a month, would still receive his $60, but it would buy only as much as $30 does now. It is not the number of dollars a day's labor will earn which counts so much, as the purchasing power of those dollars. We have already shown how impossible it would be for a street railroad to increase its wages, because it cannot increase its earnings.

The friends of "free silver"—which means any man can take his silver to the mint and have it minted free,—insist that the troubles above mentioned will not result. But why should this one nation be an exception to all the rest of the world? Is there a car builder in the United States who will build a street car worth here $1,000 and ship it to Mexico and accept 1,000 Mexican silver dollars in payment? Is there a painter, or carpenter, or blacksmith in these car works who wants to have his $3 or $4 a day earned in building that car, paid him in these same Mexican dollars? Why is it these Mexican silver dollars are not as good as our own silver dollars? As a matter of fact when the two dollars are melted down it will be found there is more silver in the Mexican than in our own silver dollar. It is simply because the U. S. silver dollar is redeemable in gold; the other is not. But with the ability of any and every man to take 50 or 60 cents worth of silver to the mint and have it coined free of cost into a silver dollar, how long will that coin be worth what it passes for now, and how long can this government, or any other, redeem such unlimited coinage in gold at face value of each?

Mexican silver dollars are selling on the streets of Chicago to-day at 50 cents each.

Even the bi-metallists of Europe (who want an international agreement to use the two metals) stand aghast at the proposed free coinage by this country alone, and declare it has retarded international bi-metallism many years.

Here are the views of some of the best known and most successful street railway presidents in the United States, on what free coinage of silver means to them and their employes.

CHARLES T. YERKES.

President North and West Chicago Street Railroads.

Dear Sir:—Yours of the 28th is received asking me to send you my opinion in regard to the probable effect of free coinage of silver on street railway interests. This question as regards our business needs but few words. If the silver standard should be adopted there will certainly be a depreciation in the value of the present legal tender silver coin, and as we would receive less, it would be necessary for us to cut down our expenses; consequently our employes would be obliged to accept a reduction in wages.

The question, however, that arises in my mind is, why are people so foolish as to agitate a change in standard values at all. I can comprehend why the owner of silver mines wishes to force his product on the market, but why a laboring man or a farmer, or any one outside of the class mentioned, should wish to change our standard of money, is more than I can comprehend.

The only way for us to get back to good times is to produce the condition which we had a few years ago when we had good times, and that is, a fair protective tariff, which would encourage the manufacturer and make the working people prosperous and produce a good home market for our farm products. The currency was all right then, why not leave it as it was instead of trying experiments? In one case we have a condition that was perfectly satisfactory, in the other, we at best would be obliged to try an experiment.

ROBERT E. JENKINS.

President Metropolitan West Side Elevated Railroad Company, Chicago.

The adoption of free and unlimited coinage of silver would be most disastrous to street railway interests, and street railway employes, for many reasons.

1. Most street railways have a mortgage indebtedness, principal and interest payable in gold. Free coinage would send gold at once to a high premium and drive it out of circulation in this country. All income of the street railways would be silver. Out of this silver they must buy gold with which to meet interest charges. The loss must fall on the stockholders, many of whom are persons of limited means. Their dividends would decrease and the value of their investments greatly depreciate.

2. The funds to pay interest and dividends would be lessened, because the expense of operation, except wages, would be increased. The purchase price of all supplies and equipments would be advanced to the silver standard. Value would not change, but a new standard would be applied. The result would be a large increase in cost of operation. In some lines of business a corresponding advance in selling price of their product might be possible. But in the case of street railways.

3. Their rate of fare could not be raised, because they are limited by their charter. Hence they would be ground between the upper and the nether millstone. The hardship and ruin which would result can hardly be estimated.

4. But street railway employes must suffer more than stockholders. Taking the country over, it is probable that fully half the earnings of all street railways is paid out in wages. As the income of the railroads must be lessened under free coinage of silver, there could be no increase of wages, while employes must pay the increased fictitious silver prices to purchase necessaries for support of themselves and their families. The wages they now receive under the gold standard would only purchase half so much under the silver standard. This would be largely the case also with all railroad employes.

5. The inevitable result must be labor troubles and strikes. The readjustment necessary in shifting to the silver basis would mean at once antagonisms between labor and capital in all departments of business. The employes of street railways especially would be unable to understand that their company's income was lessened. It would take years to reach an adjustment of conflicting interests. Meantime, numbers of street and other railroad companies would have gone into bankruptcy.

B. F. HARRIS, JR.,

President Urbana & Champaign Electric Street Railway, Champaign, Ill.

My Dear Sir:—Your favor of the 25th inst.. asking my opinion as to the probable effect of free coinage on street railway interests, is received. In the first place, I might say that without any reference to possible or probable charges of unprofessional journalism, unorthodox religious ministration, or unwarranted interference, I think it is the duty of all honorable and honest men and interests to speak out clearly for what concerns the integrity and good name of our country. The question of politics is entirely eliminated; it is one of financial life or death for most of us.

Free coinage would work an especial hardship on street railway interests.

There is scarcely a question but that a good street railway system is the most potent industrial factor in extending the growth of a city and increasing real estate values beyond the heart of a city. Under free coinage—the rate of fare being fixed by ordinance at, say five cents—that five cents may be gold or 16 to 1. The depreciated value of the five cent fare would probably reduce the actual or intrinsic value of railway receipts 50 per cent. The railway's gold bond and mortgage would have to be redeemed at $2 for $1, likewise interest account would be 100 per cent heavier for the railway company.

Supply companies furnishing all the hundred and one items required in the operation of a road, would have to ask from 25 per cent to 100 per cent advance in price. In a word, all receipts would be greatly reduced and every item of expense would be increased.

The only thing left to the railway company, looking toward even partial self-preservation, would be to stop all extensions, take off cars, making service less frequent, abolish all transfers and commutation rates, cheapen the service and expense in every particular, and cut the wages of every employe right in two in the middle, or, what is about the same thing, pay them in Bryan's 16 to 1, 50 cent dollars.

The fools aren't all dead yet, but I can't believe that the people—or the working men above all others—can be so blind as to vote 16 to 1 against their own pocket books.

S. W. FORDYCE,

President Hot Springs Railroad Company.

Dear Sir:—Replying to your letter of the 25th instant, my opinion is that the free and unlimited coinage of silver, at the ratio of 16 to 1, by this government, independent of other nations, will put this country on an absolutely free silver basis, which will diminish the purchasing power of money taken in by street railways at least 50 per cent. It will also affect the street railway employes just as injuriously as it will affect the owners of these properties. The employes will be paid in the same kind of money received for fares, which money will purchase only about one-half the quantity of supplies needed for the support of themselves and families.

All this means partial starvation for the employes, and complete bankruptcy for the owners of the properties. Mexico is on a silver basis and the railway employes in that country who are receiving practically the same amount of pay in numbers of dollars, are compelled to pay more than double for necessary supplies. The American laborer will never submit peaceably to being put upon a parity with the laborers of Mexico and other free silver countries.

CLIFFORD C. BAKER,

President Topeka, Kans., Railway Company.

Dear Sir:—Answering your favor of the 25th, free coinage of silver would have a more disastrous effect on street railway employes than on almost any other class of laborers. Wages could not be advanced, because there are not enough earnings to justify it, and earnings could not be increased by an increased rate of fare, because the maximum rate of fare is fixed by the franchise.

The grocer and butcher can charge more, if the commodities they handle advance, and they will, of course, do so. Railroad men would receive the same wages as now, but the purchasing power of the money they received would be decreased about one-half. For a street railway employe to vote for the free coinage of silver is to vote for a voluntary reduction of the value of his wages.

(To be continued.)

Cast-welded rails are being tried on the Seventh street cable line, Washington, D. C.

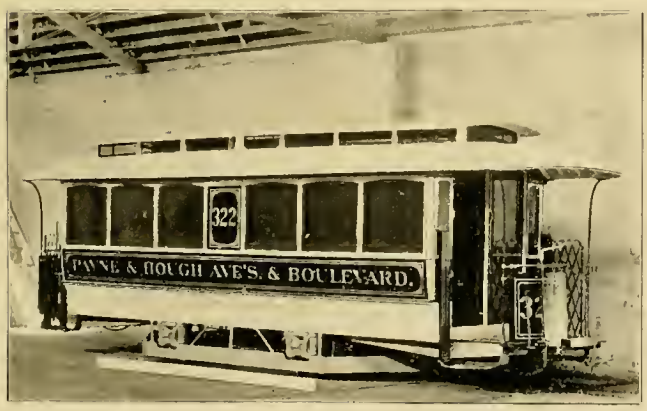
HANDSOME CARS FOR KANSAS CITY.

A shipment of very large and attractive cars has reached the Metropolitan of Kansas City from the works of the Brownell Car Company, St. Louis.

Our illustration gives a very fair conception of these cars, which are of 34-foot body, 8 feet wide and 43 feet 10 inches over all. There are 13 cross seats on each side of a center aisle, affording a seating capacity of

BROWNELL CARS FOR KANSAS CITY.

52 passengers. The cars are built with rear entrance only, and this is guarded by gates operated by the motorman, as on the Minneapolis system. By reason of the low windows, which are removed in summer, the car is equally serviceable at all seasons of the year. In case of storm in summer an exterior curtain rolls down for protection, while to shut out the sun the sash curtains are at instant command. The cars have been so favorably received that, while the intention was to put



BROWNELL CARS FOR CLEVELAND.

them all in regular service, so many demands have been made for their use as specials, that several are being kept out to run for trolley parties.

Our second illustration shows a very neat 25-foot car very popular in Cleveland. The center panel, which takes the place of a window, has a bevelled plate glass mirror on the inside, and in the winter the stove is placed at this point, taking up one seat which is available in summer. The interior finish and workmanship throughout on all the cars of both these patterns shows the same thorough, painstaking care which has made the Brownell cars justly famous.

THE HEILMANN AGGREGATION AGAIN.

To the vast majority of both steam and electric railroad men it is a mystery why the Northern Railroad of France sees fit to spend money on trials of the Heilmann electric locomotive—the machine that carries its own power plant. It seems that the one tried in 1893 is now being reconstructed on a larger scale. The Electrical Review of London hits the nail on the head when it says:

It carries an immense boiler and a six-crank steam engine, and its one advantage is that in going uphill the steam engine can be run at speed, and will not therefore lose power, as is now the case with a locomotive, which, as it travels slower, also revolves slower, and loses power thereby. But this is to some extent a fable. When a locomotive mounts a hill it revolves more slowly and, therefore, gets more pressure, and for an occasional hill it is not usually necessary to take along the whole roundhouse. * * * It is expected that these new moving stations will be ready for trial about the end of August. We do not doubt that the locomotive will run: that it will do so at a high speed; that it will haul good loads; that it will be a hill climber. We may admit all this, and more, and we think we shall still be free to paraphrase a famous French saying and repeat, "It is magnificent, but it is not engineering."

SOME WILD ESTIMATES.

The manufacture of electric railway material and estimates of cost of construction do not seem to have arrived at a hard pan basis as yet in England. The Railway World, of London, publishes an account of several remarkable developments in connection with the bids for the electric road to be built by the city of Leeds. Between the highest and lowest bids for the complete construction of the road there was only the difference between $190,000 and $310,000. On the various separate items the difference was even greater between the lowest and the highest bids. On poles and brackets the lowest was $18,000 and the highest $78,400. On trolley wires and attachments the lowest was $16,850 and the highest $48,800, while on the electric motor cars the lowest was $64,000 and highest $125,000, all of which goes to show that electric railway work in England is decidedly in its infancy and that the cost of manufacture of electric railway apparatus is quite an uncertainty in the minds of the makers themselves.

UNITES GREEN BAY AND DEPERE.

The extension of the Fox River Electric Railway Company's line between Green Bay and Depere, Wis., has been completed and was formally opened June 30. The line is excellently built with steel rails sixty feet in length. The property is at present leased by the company from David McCartney, with an option of purchase after one year. The lessor also agrees to furnish funds for connections across the river. These will give the company over fifteen miles of road.

Cost of Motor Maintenance

PART IV.

The present article completes the series of reports which we have been publishing for the last three months, and with the table which sums up all the reports given, is, we believe, the most complete compilation of information ever published on this subject. The conditions under which motors operate on various roads are somewhat different, and some allowance must be made for this as well as for the fact that large roads do much repairing, which is sent away by small roads, and consequently does not appear in the labor accounts of the smaller lines.

(39) THE JASPER COUNTY ELECTRIC RAILROAD,

of Carthage, Mo., through F. H. Fitch, superintendent, reports 4 cars in daily use, with Walker 30-horse-power double equipments, and type B_2 controllers. One man does all the inspection and repair work except on the overhauling of motors, which takes place every 60 days, when the regular motorman of the car being overhauled comes in and assists. This one man also wipes the engines and acts as watchman for car and power houses. The average pay roll for the six months previous to making the report was $89 per month. Cars average 5,205 miles per month, so that the cost of labor is $22 per month per car, or $.0042 per car mile. Motormen inspect their motors for heating, sparking, brushes, etc., empty oil cups and clean commutators twice during each 10-hour shift. In this way a motor is casually inspected and commutator cleaned three times per day. The night man oils and inspects each night. A car is not allowed to remain in service more than 60 days without having a thorough overhauling of the motors. Bearings are removed and examined, copper dust removed and commutators turned down if necessary.

(40) THE NEWTON STREET RAILWAY,

of West Newton, Mass., operates in winter 11 motor cars, of which 4 are double W. P. 30, 2 double G. E. 800, 4 single W. P. 50 and 1 single F 30. The care of these takes the time of 2½ men. Blacksmithing is done outside. The pay roll is about $175 per month, or $15 per car per month. The average monthly mileage of motor cars is 2,500, making cost of labor $.0063 per car mile. Inspection and cleaning takes place daily and overhauling monthly. Axle bearings, which are of brass, last two years on the W. P. 50 motors. Armature bearings of brass on the commutator end last 3 to 5 months, and on the gear end 6 to 9 months. The first year one W. P. 50 armature was lost. Since then the average has been one coil burned out in each armature every 6 months. Cast iron gears last 8 to 10 months, steel pinions 6 months.

(41)

This road operates 5 cars equipped with G. E. 800 motors and K_2 controllers. One day man and 1 night man with an occasional helper take care of these. The day man is also watchman and starter and the night man is watchman and cleaner. The maintenance of electrical car equipment and trucks cost $45 a month, which with the average mileage of 3,500 per car, is $.0025 per car mile. The total cost of truck and motor maintenance is $.0037 per car mile. Motors are inspected before they go out every morning by a capable machinist and electrician, looking over nuts, bolts and connections. The night man cleans motors and armatures every night. Once a week controllers are looked over, cleaned and greased with vaseline. Axle bearings of babbitt last 28,000 miles. Armature bearings of the same material last 14,000 miles.

(42) THE CITY AND SUBURBAN, PORTLAND, ORE.,

operates 35 double equipments of W. P. 30 motors. They are kept at four houses. The force consists of 12 men and 3 boys, but as a great deal of outside work is taken in comparison cannot be made with other roads as to number of men. The monthly pay roll is $702, or $20 per car per month. This is the average amount per month charged to motor and truck repairs during the last six months. All work done in the shops is charged by the hour just as if they were run by an outside party, and this is the amount of time put on the electric railway motors and trucks. The 4 night men (one at each car house), clean and inspect every night but do no repairs. Overhauling takes place once a month.

(43) THE SHEBOYGAN LIGHT, POWER & RAILWAY COMPANY

operates 6 double motor cars with Walker 30 horse-power motors. One man takes care of the motors and trucks on these. Armature winding and machine work is sent to outside shops. The electrician oversees the daily inspection and such repairs as are beyond the regular repair man. There is no periodical overhauling as it is intended to make the daily inspection thorough enough so that any defects can be discovered and completely repaired immediately. Cars average 3,000 miles per month. Maintenance labor costs $.0033 per car mile and $10 per car per month.

(44) THE SCRANTON (PA.) TRACTION COMPANY

operates 50 double motor cars with Number 3 Westinghouse motors and G controllers. They are kept at two barns. In all, 27 men are employed on motors and trucks. Of these, 4 are armature winders, 1 a blacksmith, 1 a machinist and 21 helpers. Five men are

COST OF MOTOR MAINTENANCE.

Number of Report.	Number Cars Operated Daily.	Men Employed on Motors, Trucks and Electric Equipment.	Day Men.	Night Men.	Monthly Pay-Roll—Inspection and Repairs of Trucks and Motors.	Cost per Car Mile, (approximate), Repair and Inspection Labor.	Average Monthly Mileage—Motor Cars.	Cost Repair Labor per Car per month.	Cars Inspected.	Cars Overhauled.
1	6	5	3	2	$ 300.	$.0083	6,000	$50.00	Daily	
2	71	22	4	7	1,200.	.0056	3,000	16.00	Daily	Yearly.
3	49	12	8	4	.....	.....	3,000	.....	Daily	
4	8	6	5	1	325.	.0105	3,843	40.00	Daily	When Necessary.
5	11	3	..	..	127.50	.0023	4,900	11.00	Daily	Monthly.
6	9	3	2	1	114.75	.0048	3,300	12.00	Daily	
7	27	13	10	3	1000.	.0100	3,700	37.00	Every other Day	When Necessary.
8	13	6	4	2	325.	.0067	3,692	25.00	Daily	Four Months.
9	7	3	2	1	300.	.0130	3,180	43.00	Daily	
10	3	1	..	..	60.	.0083	2,400	20.00	Daily	Two Months.
11	2	2	..	..	110.	.0118	4,590	55.00	Daily	When Necessary.
12	80	38	25	13	1700.	.0049	4,300	21.00	Daily	Monthly.
13	16	3	..	..	120.	.0018	4,000	7.50	Daily	
14	12	5	4	1	235.	.0046	4,200	19.00	Daily	Monthly.
15	2	1	..	..	.....	.....	.....	.....	Every other Night	
16	8	4	..	..	188.	.0066	.....	23.00	Daily	Monthly.
17	25	7	5	2	310.	.0048	2,500	12.00	Daily	Six Months.
18	9-14	3	3	..	.....	.....	3,500	.....	Weekly	Six Months.
19	3	1	1	..	75.	.....	.....	25.00		Annually.
20	6	3	2	1	180.	.0069	4,300	30.00	Daily	Four to Six Months.
21	10	4	2	2	175.	.0013	1,600	17.00	Daily	Two Months.
22	6	3	2	1	82.	.....	.....	16.00	Daily	Four Months.
23	6	3½	..	..	185.	.0038	5,000	26.00	Daily	Monthly.
24	16-30	4	2	2	360.	.....	.....	12 to 23	Daily	Six Months.
25	3	2	..	..	100.	.0185	1,800	33.00	Daily	Daily.
26	13	4	3	1	.....	.....	3,600	.....	Daily	Monthly.
27	12	4	2	2	.....	.....	4,710	.....	Daily	Monthly.
28	23	11	8	3	450.	.0051	3,782	20.00	Daily	Monthly.
29	6	1½	1	½	.....	.....	4,000	.....	Daily	Monthly.
30	5-10	2	1	1	.....	.....	.....	.....	Daily	
31	16	10	6	4	.....	.....	.....	.....		
32	5	2	1	1	60.	.0031	3,819	15.00	Daily	Monthly.
33	8	2	..	..	.....	.....	3,000	.....	Weekly	Six Months.
34	4	2	..	..	.....	.....	2,000	.....	Daily	When Necessary.
35	16	9½	6½	3	540.	.0052	6,300	33.00	Daily	Monthly.
36	4	2	1	1	90.	.....	.....	25.00	Daily	Two Weeks.
37	15	8	8	0	335.	.0060	.....	22.00	Monthly	Three Months.
38	10	2	1	1	140.	.0038	3,650	14.00		Two Weeks.
39	4	1	..	..	80.	.0042	5,205	22.00	Three times Daily	Two Months.
40	11	2½	..	..	175.	.0063	2,500	15.00	Daily	Monthly.
41	5	2	1	1	45.	.0025	3,500	9.00	Twice Daily	
42	35	13	9	4	702.	.....	.....	20.00	Daily	Monthly.
43	6	1	..	..	.....	.0033	3,000	10.00	Daily	When Needed.
44	50	27	22	5	1,030.	.0047	4,182	20.00	Daily	Monthly.
45	8	2	..	..	140.	.0045	3,900	17.00	Daily & every six weeks.	Six Months.
46	36	13	8	5	1,212.	.....	.....	33.00	Several times Daily	Variable according to Service.
47	13	8	5	3	410.	.0105	.....	31.00	Daily	Six Months.
48	341	105	85	20	.....	.....	3,900	.....	Daily	Monthly.
49	97	17	15	2	.....	.....	4,100	.....	Daily	Monthly.
50	25	5	3	2	.....	.....	4,800	.....	Daily	Yearly.
51	115	17	..	..	815.	.0022	2,800	7.00	Every Two Trips	Six Months.
52	5	3	..	..	135.	.0070	3,840	27.00	Daily	Four Months.

NOTE:—Reports from 1 to 10 appeared in May, 1896; reports 11 to 22 appeared in June, 1896; reports 23 to 38 appeared in July, and 39 to 52 appear this month.

employed in night inspection and repairs at the barns, and 10 at the barns in the day time. The pay roll is $1,030 a month, making $20 per car per month, and with the mileage of each car, averaging 4,182, amounts to $.0047 per car mile. An inspection of brushes, brush holders and grease cups, is made every night, and any defects noted on motorman's daily report card, are fixed. A very thorough overhauling of the electrical equipment, from trolley to trucks, takes place once a month.

(45) THE NORTH EAST STREET RAILWAY,

Kansas City, Mo., operates 8 Westinghouse Number 12 double equipments, and has 2 extras with same motors. One man and two boys do all the repair work on cars and line during the day, and one night man does all the inspection of motors and car cleaning at night, so that the time spent on motors and trucks cannot be accurately determined. The pay roll of motor and truck maintenance men is $140 a month, or $17 per car per month. With the monthly mileage of 3,900 miles, this is $.0045 per car mile. Armature winding is done outoutside. Motors are inspected twice a day as to commutators and bolts. Once in six weeks cars are run in repair shop and carefully inspected. It is not thought that the plan of taking motors all apart every month is a good one. Once in six months new bearings are put in and armatures and fields are repainted. Axle bearings and armature bearings of babbitt are used 6 months and then renewed whether they need it or not. Gears last 112,000 miles and pinions 70,000 miles.

(46) THE SAN FRANCISCO & SAN MATEO RAILWAY

operates 36 double motor cars, divided as follows: 15 single trucks equipped with S. R. G. motors with rheostat control; 15 double trucks with W. P. 50 motors and rheostat control; 6 single trucks with G. E. 800 motors and type K controllers. They are kept at two barns. The care of these gives employment to 13 men, consisting of 1 armature winder, 1 machinist, 1 machinist's helper, 1 blacksmith and helper, 4 day men in car shop, and 5 night men. The pay roll is $1.212, at the outside, per month. This amounts to $33 per car per month. Cars are inspected nightly and also by car inspectors at terminal points. The work is divided among the night men by parts of equipment. Two men work on brakes, 1 on brushes and trolley wheels, 1 on oil and grease cups, 1 on sand boxes and general work. The inspection during the day is confined chiefly to brakes and brushes, both of which have hard service owing to San Francisco hills. The frequency of overhauling depends on the motor and the service. S. R. G. equipments are overhauled once in 2 months. W. P. 50 equipments on certain hard runs have a general overhauling every month. G. E. 800 motors require little attention, but are opened up and cleaned once a month.

(47) THE CEDAR RAPIDS & MARION CITY RAILWAY

operates 13 cars as follows:—8 cars with single S. R. G. 15-horse-power equipments; 2 double truck cars with W. P. 50 motors; 2 with W. P. 25 motors and 1 with W. P. 30. There are 8 men on car maintenance of which 2 are foremen, 1 a blacksmith, 1 an armature winder, 1 helper and 3 general men. Five work in the day time and 3 at night. The pay roll is $410 per month or $31 per car per month. The cost per car mile is $.0105. Motors are inspected daily and overhauled ever six months. Brass axle bearings are run 6 months and armature bearings 9 months. Armatures run 2½ to 3 years before they give any trouble.

(48 THE TWIN CITY RAPID TRANSIT COMPANY

reports for its Minneapolis system 341 double motor cars in regular operation of which 189 are Sprague equipments; 70 S. R. G.; 22 double reduction Thomson-Houston (rebuilt,) and 60 W. P. All have series-parallel controllers. They are housed at 8 stations. In all 105 men are employed on inspection and repair of trucks, motors and car electrical equipment. Their work is divided as follows:—motor repair shop 30, machine shop 23, brass foundry 5, armature room 14, blacksmith shop 8, in night inspection and repair at barns 20, in day inspection and repair at barns 5. The night men have their work divided by cars. Cars are looked over every night and overhauled once a month. Cars average 130 miles per day.

(49) THE ALBANY RAILWAY,

of Albany, N. Y., operates 97 cars, of which 15 are G. E. 800 with K controllers, 15 W. P. 50 with rheostat control, 32 No. 3 Westinghouse with 28a controllers and 35 No. 12a Westinghouse with 28a controllers. All are double equipments. The total repair and inspection force is 17, of which 2 are winders, 2 winders' helpers, 2 blacksmiths' helpers, 2 machinists, 1 boy, 2 men on night inspection and repair at the barns, and 4 on day inspection and repair. Cars average 4,100 miles per month. Motors are inspected as to brushes, bolts and connections every night and taken apart and overhauled once a month. Axle bearings last 10 months and are of first-class babbitt. In armature bearings the same metal lasts 2 months on General Electric motors and 6 months on Westinghouse. Armatures all average about 2 years' life. Gears meshing into rawhide pinions last 4 years and rawhide pinions 4 to 9 months.

(50) THE FORT WAYNE CONSOLIDATED RAILWAY

operates 25 cars with double Short equipments. They are kept in two houses. There are 5 men in all taking care of these—two on day work in the car houses, 2 on night work and 1 in the repair shop. Motors are looked over every night and overhauled once a year. Cars average 4,800 miles a month.

(51) THE CINCINNATI, COVINGTON & NEWPORT RAILWAY

operates 115 cars, all with double equipments of Number 3 Westinghouse motors. They are kept at four houses. The repair and maintenance force consists of 15 men and 4 boys, comprising 2 blacksmiths, 1 helper, 1 armature winder, 1 helper, 2 machinists, 8 men on truck repairs and 4 men repairing and inspecting at the

car houses. The pay roll is $815 per month, making $7.09 per car. Cars average about 2,800 miles per month. Maintenance labor costs $.0022 per car mile. The average life of armatures is not yet known. There are 18 or 20 that have been running over 4 years. Axle bearings last 9 months and armature bearings 12 months. Malleable gears last 16 to 18 months and pinions 1 year. At the time the report was made it was intended to introduce a more perfect system of testing resistance and insulation. Cars are inspected every other trip and overhauled every 6 months.

(52) THE EAU CLAIRE (WIS.) STREET RAILWAY has 5 Edison Number 6 equipments. Three men work on motors and trucks during the day and there are 2 men at the barns at night on general cleaning and inspection. The monthly pay roll is $135 for motor and truck maintenance, or $27 per car. The mileage is 3,840 per car so that the cost per car mile is $.007. Brass axle bearings last about 2 years, and armature bearings 4 months. Inspection is daily and overhauling every 4 months.

BUSINESS VERSUS FAMILY RELATIONS.

There is said to be a conductor in Detroit who is involved in divorce litigation, and by order of court is compelled to pay his wife $3 per week alimony pending a decision of the case. A few days ago the complainant entered the car upon which her husband was collecting nickels. When he reached her in turn he extended his hand with his customary businesslike "Fare, please." She referred the conductor to her husband. He refused to recognize the dual relation with the remark, "Our relation here, madam, is simply business. You are a passenger and I represent the company. Pay up or get off."

"I'll neither pay nor get off," was her reply.

Stopping the car the conductor lifted his refractory passenger from the seat and deposited her on the pavement to the accompaniment of rapid blows from her umbrella and a flow of words not found in school editions of Webster.

And the car moved on.

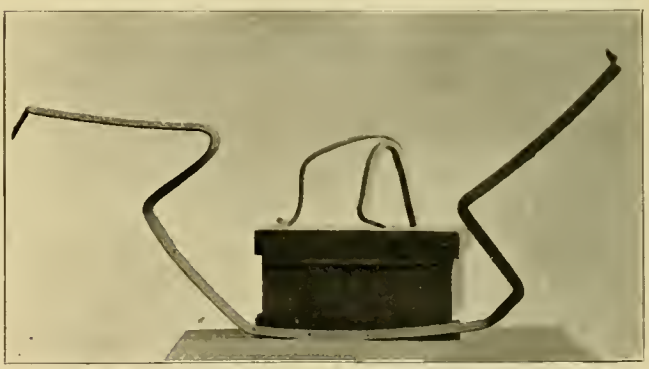
JOLIET ROAD CHANGES HANDS.

The papers were signed and part of the money paid July 6, by which deal the Joliet Street Railway passed into the hands of a new organization of which William B. McKinley, of Champaign, Ill., is the leading spirit. Mr. McKinley is a thoroughly experienced street car man, being president of the Springfield, O., Railway Company, and of the Consolidated Street Railway Company, of Bay City, Mich. The new company is capitalized for $300,000, and will furnish heat, light and power. Improvements will be made in track and equipment and the lines extended. J. A. Henry has been largely instrumental in putting the road on its feet, but will now retire from active participation in its affairs.

ST. LOUIS CYCLONE RELICS.

As described in the June REVIEW the cyclone destroyed seven Brownell cars which were on the flat cars in East St Louis and which, thirty minutes later, would have been several miles away. In clearing up the wreck, which was complete, some interesting relics were preserved, and we illustrate three herewith, which give a striking example of the terrible force of the storm. The first cut shows a wrought iron dash rail, or what is left of one after its acrobatic contortions in the wind. In the second, the center piece was a step iron bent almost double. Not the least interesting and a strong testimonial to the quality of the metal used, is the steel rafter which, though bent at more than right angles, shows no breaks or cracks.

DASH RAIL BENT BY CYCLONE.



STEP IRON AND RAFTER BENT BY CYCLONE.

BIG TROLLEY PARTY.

The largest trolley party yet heard from was given July 15, by the Knights of Pythias, over the lines of the Calumet Electric Street Railway, Chicago. There were about 2,500 persons in the party and 54 cars were necessary for their accommodation, making a procession a mile long. The ride was over a considerable part of the line with a stop at Gardiner's park, where a few speeches were made.

THE AMERICAN ENGINE COMPANY.

The recent announcement in the trade papers that Frank H. Ball has become associated with the American Engine Company, of Bound Brook, N. J., and has assumed the management of its affairs, has attracted some attention to that company, and the REVIEW is glad to be able to give its readers a brief sketch of Mr. Ball's business career, and something of a description of the plant of the American Engine Company.

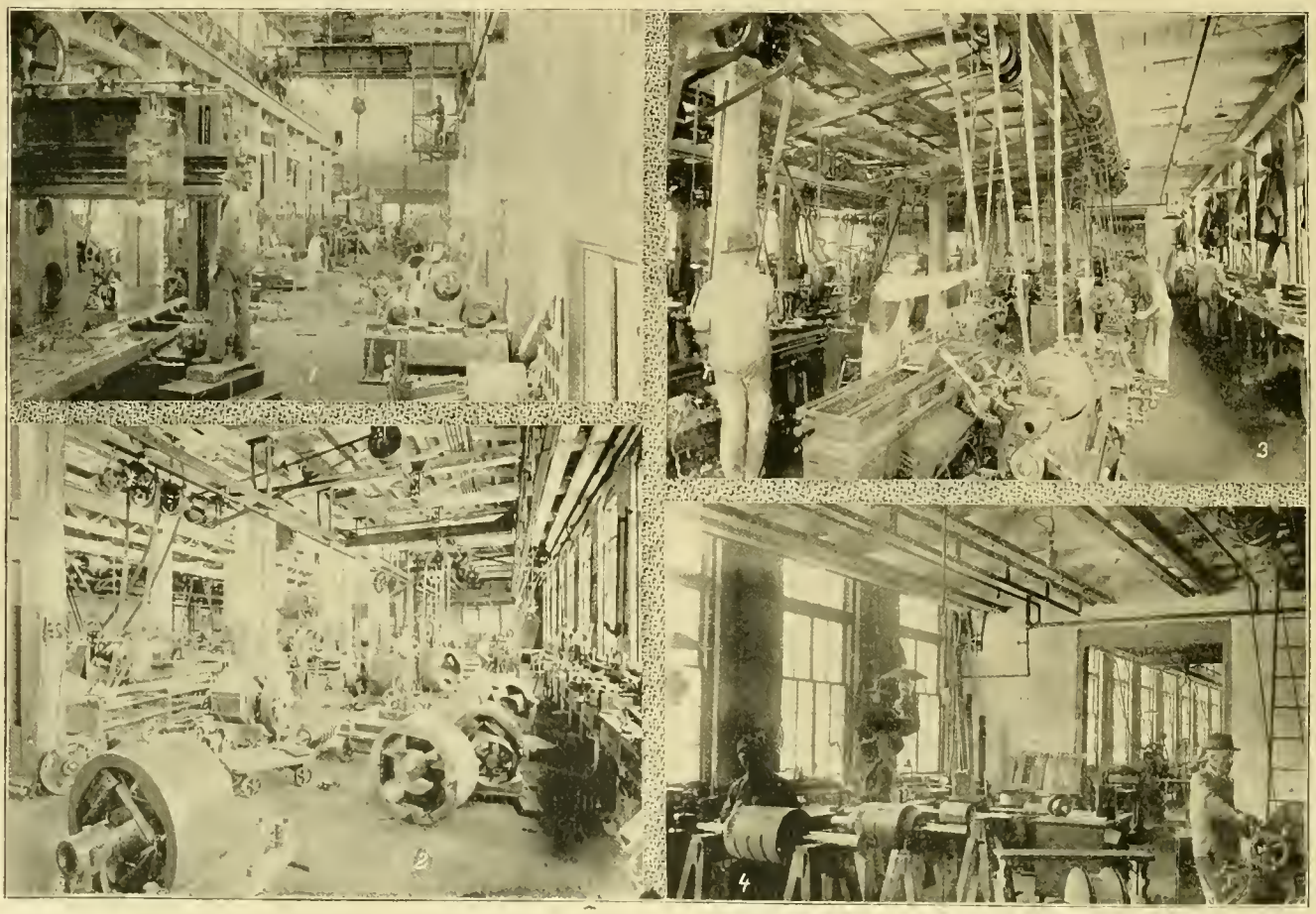
FRANK H. BALL.

The business community knows Mr. Ball, chiefly in connection with the steam engine business, which has been his specialty for nearly twenty-five years. His work in this field began in 1872, when he designed an engine for use in drilling and pumping oil wells. These engines were built first at Buffalo, N. Y., and afterward at Erie, Pa., and became very popular in the oil country, where about 2,000 were sold.

In 1881 the Ball Engine Company was organized in Erie, Pa., to continue the manufacture of the Ball Engine; but about this time the commercial development of electricity began, and Mr. Ball turned his attention to the building of engines for this service, which work soon superseded the other class of engines, and since 1883, when the first Ball engine of the high speed type was exhibited at the fair of the Mechanics' Institute at Boston, his work has been altogether in the field of engines for electric service.

The Ball engine of 1883 attracted special attention, because of its novel governor, which utilized the pull of the belt as a governing force, and thus effected a constant "weighing of the load." Simpler forms of governors have since been produced that meet very exacting requirements, but the engineering world recognizes Mr. Ball as a pioneer in introducing the refinements of governing that are essential to successful driving of dynamos.

In 1891 Mr. Ball sold his entire interest in the Ball Engine Company, of Erie, and with T. C. Wood, of New York, and others, organized the Ball & Wood Company, of Elizabeth, N. J. This company has established an enviable reputation for the excellence of its engines, which rank among the best engines of their class. Mr. Ball's connection with the Ball & Wood Company as general manager, continued until January, 1896, when he sold his interest in the business and retired from its management, expecting to devote his time to professional work, chiefly as mechanical expert in patent cases; but his plans were changed by a busi-



WORKS OF THE AMERICAN ENGINE COMPANY.

ness proposition from the American Engine Company, which resulted in his taking charge of its affairs as already mentioned, where he is bringing out a new line of engines in which the public will, no doubt, get the benefit of his extended experience.

As a professional engineer Mr. Ball is prominently identified with the American Society of Mechanical Engineers, having served on its board of managers, and is at this time one of its vice-presidents.

The American Engine Company is a comparatively new corporation and has heretofore not become widely known. Its works are situated at Bound Brook, N. J., a thriving town thirty miles distant from New York, and sixty miles from Philadelphia, and with unsurpassed transportation facilities both by rail and water. The plant of the American Engine Company is situated near the Central Railroad of New Jersey, and also adjacent to the tracks of the Lehigh Valley Railroad, from which a side track enters the premises, which cover a plot of ground 250 by 500. The main building containing the machine shop, the electrical department and the testing room, is a brick structure 80 feet wide and 325 feet long, provided with automatic sprinklers for fire protection.

Fig. 1 is an interior view of machine shop looking west, and shows the 10-ton electric traveling crane which serves the central section of floor. Fig. 2 is a view of a side floor of machine shop and is served by hand traveling crane. Fig. 3 is a view of another side floor of machine shop. Fig. 4 is a view in armature winding department. Fig. 5 shows the assembling and testing room, which is served with a 20-ton electric traveling crane as shown.

The business of the American Engine Company is the manufacture of steam engines and electric generators and motors. Prior to Mr. Ball's advent in the business, the engines built by this establishment were designed by E. F. Spaulding, and consisted of a line of horizontal side crank engines, and also several sizes of the vertical type; all of which embody a very novel valve gear, the invention of Mr. Spaulding.

The electrical work has heretofore consisted of Multipolar dynamos and motors, chiefly of the belted type; but the extension of the business now in progress in the direction of a new line of Mr. Ball's well-known engines, is also accompanied by a new line of 6-pole electric generators; all designed as a symmetrical whole, and making complete generating units. This extension of the business opens a broader field of operation, and with the experience and ability which Mr. Ball brings into the concern it is safe to predict that a prosperous and successful future is before the American Engine Company.

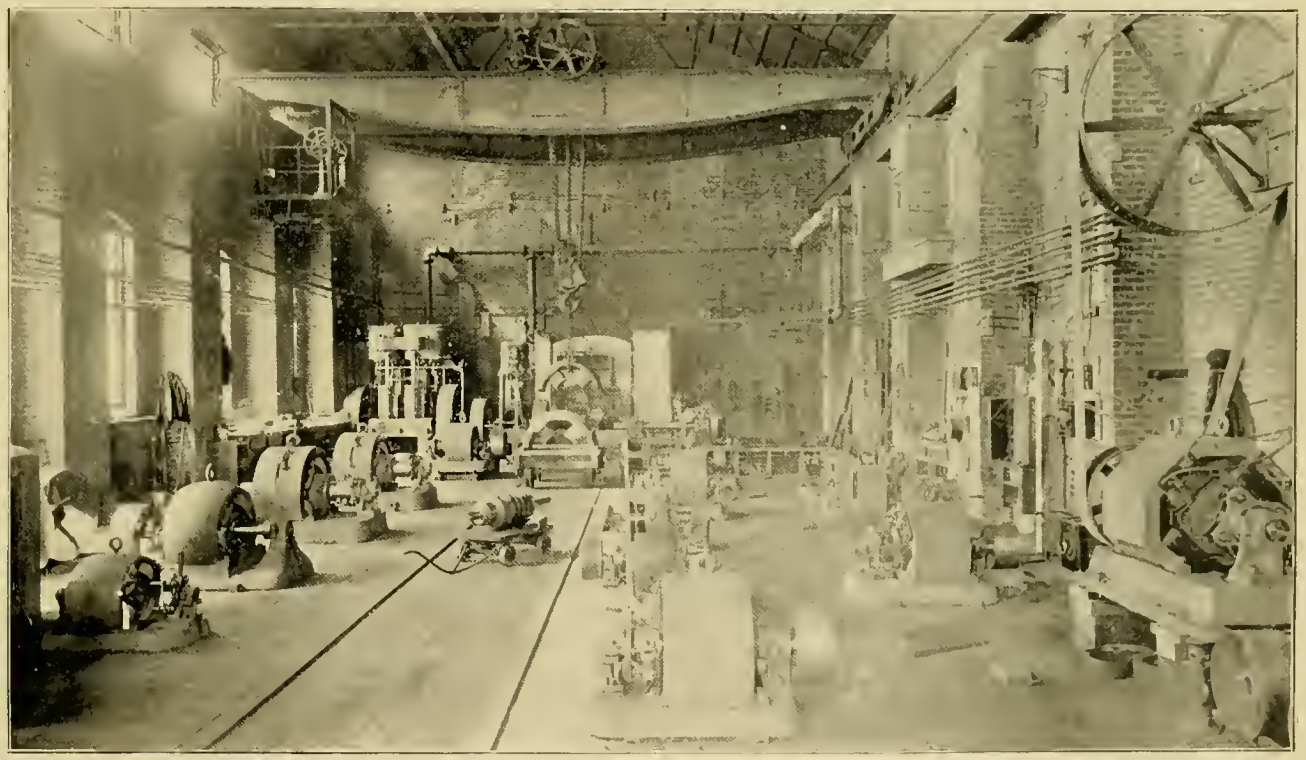


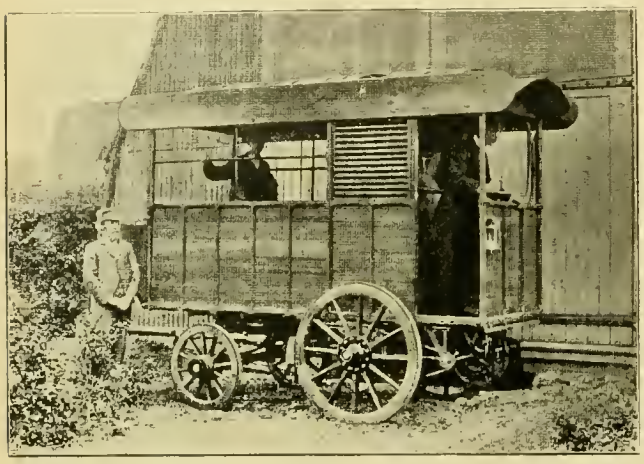
FIG. 5.—ASSEMBLING AND TESTING ROOM.

CHANGED OFFICERS.

At the annual meeting of the Lewiston & Auburn, Me., Horse Railroad Company, held July 7, the following named officers were elected: John M. Robbins, president; Cyrus Greeley, treasurer; Cheney C. Brown, Clerk, and Henry W. True, general superintendent. N. Q. Pope, who is entitled to a large part of the credit for changing the road to an electric system, has disposed of his interest on account of the necessity of giving more attention to other enterprises with which he is connected.

THORNYCROFT STEAM ROAD CARRIAGE.

The well known English engineer, J. I. Thornycroft, has again taken up the matter of mechanically propelled vehicles, and has brought out the machine illustrated herewith, for which illustration, as well as the facts, we are indebted to London Engineering. It is intended to carry a load of one ton. There are two small compound engines supplied by a Thornycroft water tube boiler and the safety valves are arranged to discharge into an air



THORNYCROFT STEAM CARRIAGE.

condenser on the roof, making blowing off practically noiseless. The wheels are loose on the axles, the connections being made by chain and sprocket wheels, the rear wheels serving for steering purposes. Several trial trips have been made successfully with the new carriage, and it is said that a fair degree of speed was attained, and no difficulty was experienced in surmounting grades up to 1 in 13. The boiler pressure carried is about 150 pounds and coke is used as fuel.

LOW FARES DIDN'T PAY.

After a trial extending over a period of three months, the Consolidated Street Railway Company, of Grand Rapids, Mich., on July 15 returned to the straight five-cent rate of fares. The plan of selling 24 tickets for $1, was tried in the hope of increasing the volume of traffic, but so far as the officials can determine the number of passengers carried was not increased and there was a constant decrease of business as compared with the corresponding months last year. At no time during the three months was there any special demand for the tickets, though ample facilities were provided by large stocks of tickets in the hands of druggists and large dealers in other lines. Those previously purchased will of course, be honored, but there will probably be no return to the reduced rates.

In explanation of the change General Manager Johnson is quoted as saying: "In a nut-shell, we can state that we cannot, under existing circumstances, afford to carry passengers for one iota less than five cents. The business does not warrant it. We cannot afford to go below the mark any more than a merchant can afford to sell goods at a loss, for that is what it means to us."

The falling off during May amounted to $3,000, and in June to $3,900 as compared with the same months of 1895.

LOW RATES FOR WORKMEN AND SCHOOL CHILDREN.

The Sheboygan, Wis., Light, Power & Railway Company has inaugurated a departure which the topography and local conditions of the place seem to the management to warrant. It is not, however, a method which could be attempted in but very few cities, and probably not in Sheboygan, but for the reasons stated below. It will also be noted that the entire amount of this special rate business is very small. The scheme is the selling to laborers and school children 50-coupon tickets for $1. The full scope and workings of the plan are described in a letter to the REVIEW by E. L. Debell, secretary:

"We sell a coupon book containing 50 tickets for $1, good for factory laborers, between 6 and 7 a. m., and 6 and 7 p. m., also for school children 10 years of age and under, going to and from school. They can be used on Sundays by workmen who work on that day, watchmen, engineers, firemen, etc.

"Our policy in issuing such fares is as follows: Nearly all the laborers employed here are unskilled and obtain small wages. At the regular rates of fare we think few if any of them could afford to ride, and as our cars pass nearly all the factories and are lightly loaded during the hours in which these fares are available, we can handle the trade without extra expense or inconvenience. We believe we would get very little of this traffic at a higher rate of fare.

"In the case of school children, we believe that few of the parents could afford $2 to $3 per month, but quite a number will allow $1 for scholar's car fare.

"We do not know from actual experience if a higher rate would result in an increased income, as we have not tried it, but from our knowledge of the financial condition of the laboring class in this city we believe it would not.

"By far the largest number of laborers walk to and from their work, even with the 2-cent fare, the average number of tickets used per month being about 3,000.

"The plan has been in use since the opening of our electric line in December, 1895."

TO CONTROL THIRD RAIL SYSTEM.

A company is reported to be in process of formation at Springfield, Mass., for the purpose of controlling the third rail system of operating electric railways and manufacturing the appliances connected with the system for Springfield roads. The matter is in charge of L. Dumas, and the company hopes to be able to sustain the claims of an application for patent allowed August 6, 1890, covering a form of under running trolley.

STREET RAILWAY LAW.

EDITED BY FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Effect of the Statute of Limitations, where injured person becomes insane.

In order to be effectual to suspend the operation of the Statute of Limitations, the insanity must have existed at the time when the right of action first accrued, and if the statute has once commenced to run, no subsequent disability will interrupt it.

In cases of personal injuries resulting from the negligence or unskillfulness of another, the Statute of Limitations begins to run at the date of the infliction of the injury, and not when the full extent of the damages sustained has been ascertained.

The suit was begun on September 29, 1893. The original declaration was filed on November 9, 1893, and alleged a colliding of the car in which Wheeler was riding as a passenger, with another of Appellant's cars, on March 4, 1891, whereby Wheeler was hurt, etc., and by reason of said hurts became on November 11, 1891, paralyzed, etc. To that declaration a plea of the Statute of Limitations was interposed.

Wheeler was on March 20, 1895, found by a jury of the Probate Court of Cook County, to be a distracted person, and incapable of managing and controlling his estate, and that he had been so "for a period of about three and one-half years prior to" that date, and letters of conservatorship were issued to the Appellee. And on October 10, 1895, the Appellee filed an amended declaration, in his name, as conservator of Wheeler's estate, alleging, in addition to the allegation of the original declaration, that on account of the injuries received by Wheeler he had become distracted and insane. A plea of the Statute of Limitations was filed to the amended declaration, and to such plea Appellee replied that Wheeler was "at the time of the injuries hereinbefore complained of rendered insane, and so remained from that time hitherto."

Shepard, J. With the view we entertain of the case, we will not particularly discuss the question of the extent of the injury received by the Appellee. It is enough to say, that upon a careful examination of the entire record, we do not discover such error as would justify a reversal of the judgment for any reason other than that presented by the plea of the Statute of Limitations. That statute (Sec. 14, Chap. 83, entitled, Limitations), provides that actions of this character "shall be commenced within two years after the cause of action accrued," except (Sec. 21, same Chap.), if the person entitled to bring such action "is, at the time the cause of action accrued, * * * insane," the action may be brought within two years after the disability is removed.

Assuming that the replication was sufficient, if proved, to avoid the bar of the statute, the evidence failed to sustain it. Wheeler was chief engineer of the dynamo and engine at the power house of the appellant, and the evidence is undisputed, that after an absence of three days from his duties, because of the injury, he resumed his work and performed his duties as usual, until he was stricken with paralysis, on November 11, 1891, more than six months after the accident, and nobody who testified, except members of his own family, observed anything unusual in his manner or conversation before that time. Such evidences of impairment to his mind prior to that date, as were testified to by members of his family, can in no sense be held to establish his insanity before then. Being cross, cranky, freakish, and peculiar, on occasions, either in private or public, is not being insane within the meaning of the statute. The circumstance that the jury who in the proceedings had in the Probate Court, dated his period of distraction back no further than to the time when he became paralyzed, and that in the original declaration filed in the suit begun by himself, no claim for damages because of resulting insanity, was alleged, coupled with the fact that he performed his customary duties, which were necessarily of a kind that required a substantially sound intellect, for over half a year after the accident, and that those with whom he came in contact during that period, failed to observe anything unusual in what he said or did, abundantly rebuts all inferences to be drawn from all the other evidence in the case that even tends to show his insanity prior to the commencement of the suit. The insanity contemplated by the statute, is that which exists when the injured person becomes entitled to bring his action, and if the statute has once commenced to run, no subsequent disability will interrupt it. 2 Wood on Limitations, (2nd Ed.), Sec. 239; McDonald v. Hovey, 110 U. S. 619.

In actions for injuries resulting from negligence or unskillfulness of another, the statute attaches and begins to run from the time when the injury was first inflicted, and not from the time when the full extent of the damages sustained has been ascertained. 1 Wood on Limitations, (2nd Ed.) Sec. 179, Pa. Co. v. C. M. & St. P. R. R. Co., 44 Ill. App. 132. We do not decide that the insanity must have existed prior to the injury, so as to give literal effect to the present tense of the words of the statute: "is, at the time the cause of action accrued, * * * insane," nor that the insanity must have resulted instantly from the injury. A reasonable construction should be given to every like statute, and we will not here say, because it is not necessary to decide that question, just how long a time may elapse between the accruing of the right of action and the disability, before the statute will begin to run, so as not to be interrupted by a subsequent disability. It is enough to here hold, as was done in McDonald v. Hovey, *supra*, wherein Mr. Justice Bradley said: "As the appellant was free from any disability for several months after the entry of the decree appealed from, the statute commenced to run at that time." So here, as Wheeler was free from legal disability for six months after the injury occurred, the statute must be held to have commenced to run at that time. "If a man dies, even a day after his cause of

action accrues, and leaves infant heirs, their disability does not avail them, though it continue until the bar of the statute falls." 13 Am. & Eng. Ency. of Law, 734.

(Appellate Court of Illinois, Calumet Electric Street Railway Co., vs. A. E. Mabie, conservator, 1 Chicago Law Journal Weekly 387.)

Inquiry to Passenger—Latent Defects—Presumption of Negligence.

Where a train of cable cars, on which the plaintiff was a passenger standing in the alley behind the gripman, near the dashboard of a combination grip and passenger car, is suddenly stopped by running against an iron manhole cover which protruded above and between the tracks, and plaintiff was thrown over the dashboard and thereby received a personal injury, *held* that the manhole and cover thereto being a part of the defendant's track, it was presumptive negligence to maintain a covering to it which should occasion injury to its passengers.

As affecting the liability of carriers for injury to a servant through latent defects in appliances or machinery belonging to the carrier, the question is not whether the carrier had actual notice of such latent defects sufficiently long before the accident to have repaired it, but whether by the exercise of that high degree of care required of passenger carriers, it might have been discovered and remedied.

(Appellate Court of Illinois. West Chicago Street Railroad Co. vs. Stephens, 1 Chicago Law Journal Weekly 389.)

Steps of Street Car—Accumulation of Mud—When Duty to Passenger Ends.

In action to recover for injuries alleged to have been sustained by reason of an accumulation of mud upon the steps of a street car, an instruction that the railway was only bound to use such diligence in keeping its steps clear of mud as ordinarily prudent persons use, is properly refused, because lowering the standard of diligence required of railway companies.

If the step of a street car was in a reasonably safe condition, and mud thereon was only such as would gather there, the weather considered, while the car was in transit from its starting place, to a point where plaintiff slipped from the step, there is no negligence on the part of the company.

The duty of a street railway company to a passenger on one of its cars is not ended until the passenger is safely off and clear of the car. The same liability of carriers applies to transportation by city railways as by ordinary steam travel.

(Supreme court of Kentucky, Louisville Railway Co., vs. Park, 29 South Western Reporter 455.)

Changing Method of Transfer Without Notice—Wrongful Ejection.

If a street railway company has established by its practice a right in its passengers to change without a transfer ticket from one car to another in the completion of their journey, it cannot change such practice without due notice.

If a passenger having a right to remain in a car, is ordered by the conductor to leave it, and, the car being stopped, obeys such order, such conduct of the conductor is tortious for which an action will lie.

(Supreme court of New Jersey, Consolidated Traction Co., vs. Taborn, 2 Am. & Eng. R. Cas. (N. S.) 124.)

Alighting at Unsafe Place in Street—Liability of Company.

A street railroad company, having no control over the street, is not an insurer of the safety of any place at which it stops a car for passengers to alight. If the company exercises proper care in its selection of a place, it is not in legal fault, if the place proves to be in fact unsafe.

(Supreme court of Maine. Conway vs. Lewiston & Auburn Horse R. Co., 2 Am. & Eng. R. Cas. (M. S.) 339).

THE TROLLEY DID IT.

The delivery wagon of Mr. Smith took fright at a passing street car while standing in front of the east end meat market yesterday afternoon and ran away. The only damage done was the breaking of several pop bottles.—Marion, O., Mirror.

We rise to inquire what the horse was doing while the wagon was running away. Did he unresistingly allow himself to be pushed along by the frightened wagon? As delivery wagons are usually not high spirited we surmise the unwonted activity in this case must have been due to a fit of indigestion from a diet of pop bottles. The owner is advised to feed the wagon on bran and water with a little linseed meal to lubricate the insides.

ANOTHER ELECTRIC LOCOMOTIVE SOLD.

All of the electric locomotives that the General Electric Company has built will soon be in service, and it is a rather curious circumstance that the first one to be completed was the last one to be sold. The one to which we refer is the 30-ton locomotive exhibited at the World's Fair. It has been purchased by the Manufacturers Street Railroad Company, of New Haven, Conn. This street railway is in itself something of a novelty, being constructed entirely for the purpose of transferring freight from various factories to the New York, New Haven & Hartford Railroad. It runs from a point about one mile from the passenger depot to the Bigelow Boiler Works, the National Pipe Bending Works, the Quinnipiac Brewery, the New Haven Rolling Mills and other factories along the water front at some distance from the freight yards of the consolidated road.

There are four other electric locomotives built by the General Electric company, in service. Three of 96-tons are in the B. & O. tunnel at Baltimore, as is well-known, and one of 40-tons is used as a switch engine at the Taftville, (Conn.) cotton mills.

"SHRIVELLED UP" MOTORS.

EDITOR STREET RAILWAY REVIEW:

I enclose a clipping from the "The Car." This must be a dump car, judging from its contents.

A storm, when there is plenty of lightning, is an expensive matter for the street railway systems. The wires have a strong attraction for the electrical fluid which is carried along, conveyed by the trolley pole to the car directly into the motor and then the car stops, completely disabled and with the motor burned out.

There isn't any motor made which will stand a shock from nature's power-house, but she insists perversely in occasionally trying to help the cars along by tendering a little of this free electricity. It is trite to say that electrical men have a great deal to learn, but they have yet to solve the problem of saying to the lightnings: "No, thanks, we don't want you," and turning them immediately from the wires to the ground. Until they solve this question the mighty power-house of the heavens will occasionally contribute a few unexpected volts, which, not turned to account because of the incapacity of human contrivance to utilize this tremendous energy, will continue to shrivel up the motors, or in other words, to "burn them out." The theorist may look forward some day to harnessing the lightnings, but that time has not yet come.

The explanation of the manner in which lightning burns out car motors is especially lucid, and worthy a more technical writer. It could be recommended that the writer of this effusion look up the matter of car motor protection. He would find that with the most approved lightning arresters, and kicking-or choke-coils, car motors are provided with a most reliable protection, and that every electric car in the United States employing overhead construction, is equipped in a similar manner. If the lightning arrester is reliable, as are a few, no trouble is experienced from the "shrivelling up" of the motors.

We hope that you will mention this matter in your next issue of the REVIEW. MANAGER.

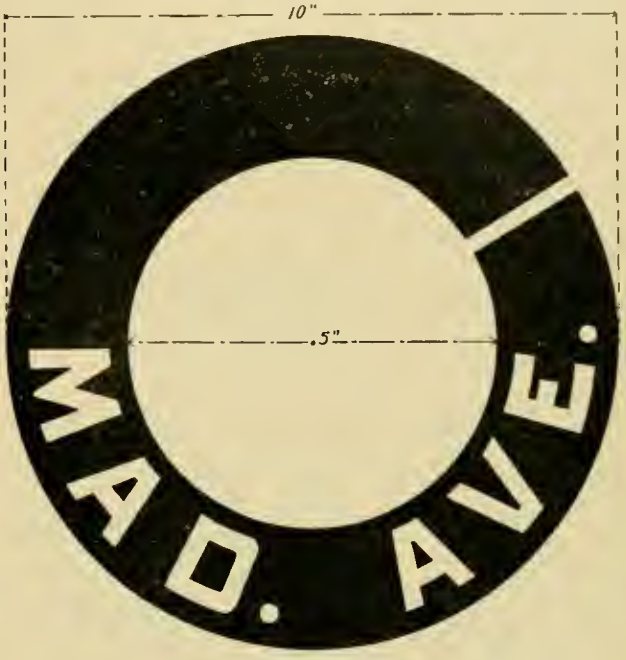
ANOTHER BRIDGE GOES DOWN.

The falling of the new iron bridge on the suburban line running out of Dayton was, in some respects a fortunate one, inasmuch as no lives were lost. Had it gone down under the excursion trains which would have been run a few hours later the loss of life would probably have been terrible. The bridge gave way when a trial trip was being made by a few officials of the road. The bridge was built by the King Bridge Company, of Cleveland, O., and the accident was due to using bolts instead of rivets. The bolts were so much smaller than the holes that the result was a shearing of all the bolts when the car entered the structure, and a consequent gradual sinking of the bridge under the load. As it was the occupants of the car escaped with bruises and a great scare.

The necessity for better work and closer inspection, as pointed out in an article elsewhere in this issue, is thus again brought forcibly to mind. Intentional poor material or poor work in bridges is nothing less than criminal, and even where unintentional the results to the unfortunate victims are quite as disastrous, even though more excusable.

ILLUMINATED SIGNS FOR CINCINNATI.

The city council of Cincinnati has passed an ordinance requiring the use of illuminated destination signs on all cars at night. This ordinance is being complied with both by the Cincinnati Street Railway and the Cincinnati, Newport & Covington, by the use of lettered electric headlight, placed on top of the cars. The sign is lettered in white on a black background, in a circle around the edge of the headlights glass. The diameter of the glass is 10 inches and the thickness of the black ring 2½ inches. It shows very well both day and night.



COMBINED HEADLIGHT AND SIGN CINCINNATI.

BEMIS CAR BOX COMPANY WINS SUIT.

The suit entered in July, 1890, by the Bemis Car Box Company, of Springfield, Mass., against the Boston & Revere Street Railway, the real defendant being the J. G. Brill Company, for infringement of the Bemis car axle box, was decided in the United States circuit court in favor of Mr. Bemis. The case has been in the courts five years and is noted with interest as involving the same infringment on the part of other car builders who will now be asked to pay royalties past due.

The Bemis car axle box, the invention of S. A. Bemis, is well known and in use all over the country. The invention is for the purpose of keeping dust and dirt from getting into the axle boxes and injuring the bearings.

Manager Erb, of the Leavenworth, Kas., electric line, discharged four conductors, July 6, for dishonesty. A system of fraud had been carried on probably for some time in collusion with the transfer boy, who sold them sixteen transfers for a quarter. They then turned in the transfers and pocketed the nickels.

A JOINT TRAFFIC TICKET.

The Hestonville, Mantua & Fairmount Passenger Railway, of Philadelphia, has recently made a joint traffic agreement with certain steamboats on the Delaware river, whereby tickets are sold by the street railway which cover both the steamboat ride and transportation on the Hestonville lines. We show herewith one used in connection with the steamer Republic which runs to Cape May. Tickets are also sold in connection with a line of steamers running to Washington Park. The regular fare on the steamers to Cape May and return is $1. The new tickets, which include car fare to and from the docks, are soldfor $1. The regular fare to Washington Park and return is 20 cents. The new tickets are sold for 25 cents. W. R. Benson, secretary and treasurer, reports that the road has, since this plan was started, carried a large number of passengers that would ordinarily use other lines were it not for the saving in fare. The tickets are numbered consecutively so that they can be kept track of. The number issued is charged to the dispatcher who, in turn, charges the number given to each conductor, keeping each day a statement of commencing and closing numbers, which is turned into the treasurer's office next morning and audited. The dispatcher also sees that the number of tickets returned each night corresponds with the number as reported by the conductor. Settlement is made with the steamboat company every week. Mr. Benson says the plan has proved quite a success.

The house of Albert White, secretary and treasurer of the Calumet Electric Railway Company, was broken into on the afternoon of June 29 and about $800 in silverware and jewelry taken.

Work upon the Marion, Anderson & Indianapolis Electric Railroad has been suspended. The company was unable to honor the vouchers of the contractors and the workmen refused to be satisfied with promises and quit work.

BRIDGES FOR ELECTRIC RAILROADS.

Under the above title Chas. F. Stowell contributes an article to the Railroad Gazette, called out by the several bridge accidents on trolley lines during the past few months. He says:

"In the old day of horse cars, almost any bridge that would carry ordinary wagon loads would answer for the street railroad. The advent of electric cars with their greatly increased loads and higher speed rendered a general overhauling of bridges obviously necessary, but this work does not seem always to have received the attention which its importance demanded. Bridge accidents on trolley roads are beginning to be reported, and it is to be feared that the owners of such roads will have to be taught in the hard school of experience before they become convinced that the cheapest is not always in the long run the most economical construction.

It took steam railroads many years to realize that it did not pay to try to skimp on their bridges, but with unimportant exceptions they have all learned it, and now the rule is, at least on roads of any size, to have the bridge periodically examined by trained men; to have their own designs for new structures made by their own experts, either permanently employed or temporarily retained, and to have their work executed under rigid specifications and with close inspection over every portion, from the manufacture of the material to the finished structure. Railroad companies have found that this method of procedure pays not only in the matter of better and safer bridges, to say nothing of getting the full worth of the money they lay out, but, in the event of any possible accident on a bridge, it is found to be a very comfortable thing to be able to demonstrate its exact condition by sources and from testimony entirely independent both of the company itself and of the contractor.

How many trolley companies have done or are doing this? The usual method of obtaining a bridge on a trolley line is either to place the whole thing in the hands of some favored contractor, trusting to his skill and sense of honor to do what is right, or, worse, to get up a general battue of bridge agents, each one making his own plans and specifications, and letting the contract to the one who offers to cover the opening for the least money, after the fashion of ordinary highway bridge lettings and subject to the accompanying evils of pools, poor designs, bad work and rotten steel. The man who would advertise for a horse 5 feet high and 8 feet long, letting the seller fill in the rest of the requirements would be looked upon as crazy. But this is precisely in line with what highway commissioners and trolley roads are doing every day, only in their case the result is liable to be more disastrous and costly.

The consequences of this state of affairs are beginning to show themselves in the trolley accidents which happen. Every one of these accidents might have been prevented by the exercise of as much prudence as a man would naturally use in buying a horse if he knew nothing

about horses. We shall see how many more cases will be recorded within the next six months.

In ordering a bridge for trolley use the officials of the road are quite likely to underestimate the loads which it will have to carry. I have known them repeatedly to give as the weight of cars the lightest, or at most the average weight, not thinking apparently that it is the heaviest car in use, or the heaviest that may be used at some future time, that is likely to do the mischief. For the load on a car it is common to estimate the seating capacity of a car, though it is notorious that cars with a seating capacity of 25 to 50 are frequently packed with 100 to 150 passengers. In steam railroad work it is common practice to make certain allowances for impact, but in the case of trolley roads this is not generally done, though the necessity for it is the greater. Such bridges are often located in a "hole" between two grades where fast running is natural and where speeds of 25 or 30 miles per hour are not unusual. Moreover the pitching or "teetering" so often noticeable on trolley cars is something unknown on steam cars, and is especially severe on the floor system, throwing, as it does, excessive loads alternately on each axle in rapid succession. But very often it is not the regular or even occasional heavy trolley loads which cause trouble, but the adventitious loads to which almost any road is liable, but which are rarely allowed for. Some roads carry freight, the weight of which should be the governing factor in determining the capacity of the bridges, while a great many run an occasional carload of coal, either for their own or other's use. It was such a load that wrecked the Tinker's Creek bridge, and the Clinton River bridge broke down under three carloads of ballast pushed by a motor. A loaded coal car frequently weighs 88,000 lbs., or 11 tons on each axle, and this is the kind of load which is likely to wreck a good many more trolley bridges before the record is closed.

The quality of the material of which a bridge is built is usually one of the least of the considerations, because it is the one that the purchaser knows least about. It is generally left entirely to the builder, whose object is to make all he can out of the contract and who naturally uses whatever material can be obtained cheapest. Many people delude themseves with the idea that the quality of their steel is of little importance, provided they only get in enough of it. A large amount of poor steel may delay a catastrophe, but will not prevent it. We hear some engineers asserting that as long as steel pulls, bends, elongates and reduces well, that is everything necessary, and all the rest may be safely left to the manufacturer. It would be equally consistent to say to a contractor, "I want a bridge which will carry 50 tons. Build it any way you please and out of anything that comes handy, only load it once with 100 tons, and if it does not break down I will take it." They do not realize that out of a lot of 15,000 to 20,000 lbs., one sample weighing two or three pounds, selected, prepared and tested by the manufacturer himself, whose every interest is to have the test come out exactly as he wishes, may possibly not be a fair examplar of the whole lot; or even if it is, that steel of which a small piece has done certain things once in a laboratory test, may not in large quantities and under the actual conditions of use continue to do the same thing indefinitely.

To get good and safe bridges for trolley use requires only that one obtain good designs, good material and good workmanship. And the difference in cost between this and poor designs, scant sections, bad work and rotten material is very slight.

ROUND TRIP AND ADMISSION TICKET.

A simple, convenient and inexpensive combination ticket, good for round trip ride and admission to resort theater, as sold by the Urbana & Champaign Electric Railway, of Champaign, Ill., is shown herewith. It is printed

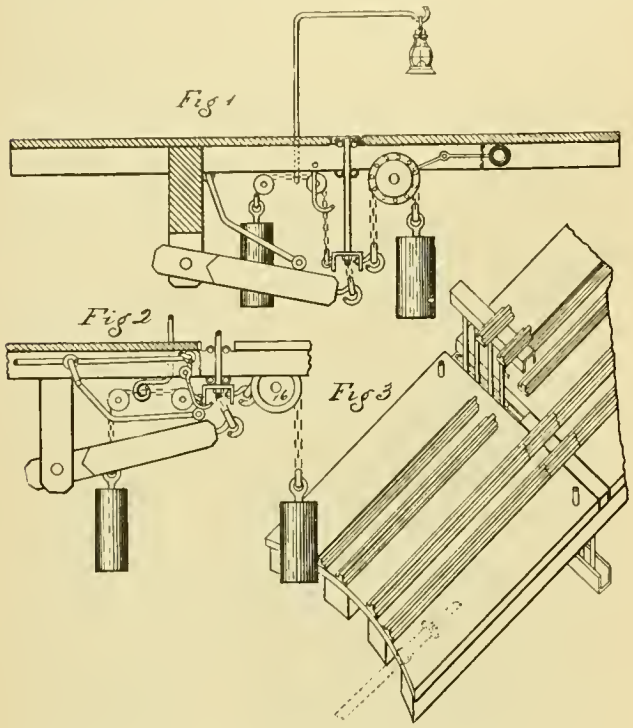
on tough manilla, perforated between coupons, and local ads on the reverse side cover the expense of printing. Visitors to the resort who come other than in the prescribed street car method have to pay an admission fee of 10 cents, which is the price of the ticket illustrated.

HOME FOR STREET CAR MEN.

A plan is on foot in New York to provide a home for disabled or worn out street railway employes. The organization will be in the nature of a protective association, and funds will be raised by selling bonds to conductors and gripmen at $1 each, each man being asked to take three bonds, with a period of three months in which to pay for them. The capital proposed is $10,000. The scheme is being promoted by John Rogers, 414 West Fifty-Third street. The finances are to be managed by a board of trustees consisting of a a Protestant minister, a Catholic priest and a Jewish rabbi.

CONDON SAFETY GATE FOR DRAWS.

William F. Condon, of Saginaw, Mich., has recently patented a safety gate for drawbridges which appears to be practicable and safe. Figures 1, 2 and 3 are from the patent specifications and show the principle. It is intended to be operated by the bridge tender, and the bridge cannot be opened until the gates have been raised.



CONDON'S SAFETY GATE FOR DRAWBRIDGES.

The gate proper consists of a channel iron frame supported on iron rods which can be made strong enough to stop a street car if desired. Counterbalance weights are shown which make the lifting of the gate easy. This apparatus has the essentials of a good draw safety appliance.

METROPOLITAN ASSIGNS DUTIES.

The Metropolitan Street Railway Company, New York, having acquired control of the city line of the New York & Harlem Railroad and branches, will hereafter operate the same as its Fourth Avenue Division, and has assigned the work of heads of departments and officers as follows:

J. W. Ritchie, assistant general manager, in charge of general operation; John H. Oakley, assistant superintendent, in charge of transportation; Henry A. Robinson, attorney, damages and claims; H. S. Beattie, treasurer, receipts and disbursements; Charles E. Warren, secretary, office and organization; W. C. Kimball, auditor, accounts; A. C. Tully, purchasing agent and storekeeper, supplies; Thomas Millen, general master mechanic, rolling stock and building; W. B Reed, engineer maintenance of way, track; Dr. H. Neher, veterinary.

DEAD WEIGHT — IS IT PROFITABLE OR PRACTICABLE TO REDUCE IT?

We hear much these days of the wonderful load a bicycle carries in proportion to its weight, and it is hinted often that cars weigh much more than they should in proportion to the loads they are expected to carry. Indeed, Locomotive Engineering, one of our most level headed steam road contemporaries, remarks that "a study of the bicycle might prove a profitable pastime for the designers of railroad rolling stock," and says, "the trend of car designers is to increase the proportion of dead weight to paying load." This is more noticeable in steam road practice than in street railway work, for although the weight of street cars has increased, it has been due more to the addition of electric motors and greater seating capacity than to any great increase of weight of car body per passenger. However, the weight of cars and motors is very great in proportion to the load they are ordinarily expected to carry, and it certainly is not out of place to investigate the subject a little.

In considering a matter of this kind, there are two questions that immediately come up. First, is it mechanically possible to reduce the weight? Second, if it is possible, will it pay? As to whether it is mechanically possible there is not much doubt but that there might be some reduction in weight if roads were willing to pay for it. How much, no one seems inclined at the present day to state. That is something which could only be decided by long trial and experiment. Before spending money in trying to answer the first question, the second question as to whether it might pay must be at least partially answered. That it is going to cost more to build rolling stock lighter than it is now for the same weight of load, is evident. How much can a road afford to pay for making its rolling stock lighter?

For a concrete example let us take the case of a motor car of a very common type, viz: a closed motor car with 16-foot body and double motor equipment, weighing complete, 11,100 pounds. Its seating capacity is 22 and the weight of car per passenger, seated, is 504 pounds. This seems like an enormous dead weight, but it must be remembered that the car must be prepared to carry at times as many people as can crowd on; and in some cities it will be called on to carry 60 or more people several times a day. This would bring the dead weight down to 185 pounds per passenger. On open cars with seats running clear across, the dead weight per passenger, seated, is considerably less than with closed cars.

Suppose now that it were possible by more expensive construction, and in some places the use of different materials, to cut the weight of our 16-foot closed motor car one-half without weakening it. How much is the reduction in weight worth to the operating company? The first and most important saving will, of course, be in power, although a reduction in car weight would be far reaching in its effects, having an influence on the cost

of construction and maintenance of the track, overhead feeders and power station—three of the most expensive parts of a street railway equipment. If the weight of a car and equipment is reduced 50 per cent it will theoretically reduce the power required to run it 50 per cent. However, as the various losses, both electrical and mechanical, will be proportionately larger for the light car, we will assume that reducing the car's weight 50 per cent will reduce the power needed 40 per cent, which is probably a conservative estimate. The average cost per car mile for power taken from the tabulated reports on power plant performance, published in our April, 1896, issue, was $.015, and the yearly cost of running a 16-foot car will be figured on that basis. If the car runs 3,000 miles per month its yearly mileage will be 36,000, and the cost of power taken to run it that distance at $.015 per car mile will be $540. Forty per cent saving of $540 would be $216 a year, or enough to pay interest at 6 per cent on an investment of $3,600. According to this the average road could afford to pay $3,600 more apiece for its motor cars than it is paying now if they could be reduced 50 per cent in weight without sacrificing any strength. There are some roads where power costs twice the average amount assumed, and they could consequently afford to pay twice the amount estimated for the sake of lighter cars. On the other hand there are some that get power for half the assumed figure and they consequently could afford to pay only $1,800 more per car. This takes account only of power saving. There would be other economies as before mentioned. If car, truck and motor builders see anything in these figures that make it any inducement to attempt any great reduction in weight, there will, of course, be a move in that direction. Cutting down weight without losing strength is, however, an expensive process, and it is useless to try to predict what can or what cannot be done along this line. One thing should not be forgotten, which is, that the parts of a car are dependent on each other, and the lightening of one part allows the lightening of others. The lightening of a car body permits the lightening of the truck that carries it and the motors that propel it. The lightening of the motors in turn allows the trucks to be lightened, and so on.

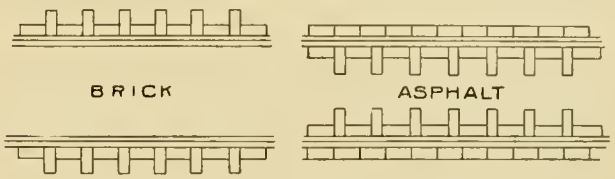
INTERURBANS SELL SAUSAGES.

What with trolley parties, straw parties, the innumerable attractions at street railway pleasure resorts, and other new-fangled ideas, one has to keep moving to be up with the developments brought about by electric railways. The very latest appears in a Michigan paper, in which a shrewd advertiser uses an interurban as the means to boom his sausages. The ad reads:

"The interurban is now running cars to Carrollton and Zilwaukie, and Stingel Bros. will give away street car tickets to every purchaser of every dollar's worth of meat at their People's Meat Market, 2010 North Michigan avenue. We make the best sausage in the city, and keep constantly on hand the best the market affords. Come and give us a call, and ride home on a street car free."

RAILS IN ASPHALT PAVING.

Street railway men do not take kindly to asphalt paving, and little wonder, when one considers the heavy expense, to say nothing of the trouble of removing asphalt to get at low joints, or for any desired repairs in the track. When once disturbed asphalt is never as good as before, and its greater expense than any other paver make it anything but desirable. But occasionally



there is an instance where the trackmaster has to take things as he finds them, not as he wishes they were. In Philadelphia there are in the down-town section some trunk lines paved with asphalt, but the company has reduced the trouble to a minimum by paving to the rail with brick, as shown in our illustration. An examination of this paving which had been down some time, by a Review editor, disclosed the fact that the plan worked well, and the bricks kept the vehicle wheels from cutting in at the rail, and held up well next the asphalt.

HOT WATER MOTOR.

Experiments have been going on for a year or more near New York, with a new motor, which its promoters expect to create a revolution in methods of transportation. The principle of the motor, as explained by the inventor, is to utilize steam at a high pressure in a stationary generator, by introducing it into a closed receptacle partially filled with water and almost wholly liquefying it under the double influence of the internal temperature of the water and the pressure. It is then intended to take it up again in the form of steam and make it operate the steam already obtained under the piston of the locomotive, thus lowering the tension in the receptacle and the temperature of vaporization of the water contained therein. It is claimed that the motor has made high speed on short runs, but it is questionable if it can be made a commercial success.

An incorporation has just been made under the laws of the State of Massachusetts by Winthrop Thayer, of Boston, Rodney Thayer and Frank A. Thayer, of New York, and W. C. Turner, of Philadelphia, under the name of Thayer & Co., Incorporated, having principal offices, 1015 Tremont Building, Boston, Mass., 115 Taylor Building, New York, and 415 Drexel Building, Philadelphia, to act as general sales agents throughout the eastern district for the Cahall vertical and Babcock & Wilcox horizontal water tube boilers, manufactured by the Aultman & Taylor Machinery Company, Mansfield, Ohio.

MORE BICYCLE INFORMATION.

In the issue of the Review for July, considerable space was given to reports from various cities showing the effect upon street railway business of the great popularity of the bicycle. In some instances the effect of the opening of the season was quite marked, while in others it was reported that the habit had little or no perceptible influence upon the number of passengers carried. Since that publication some additional information has been received, and is herewith presented.

WASHINGTON, D. C.

G. B. Coleman, secretary and treasurer of the Metropolitan Railroad Company, states that there has been no perceptible falling off in receipts chargeable to this cause, but that business is increasing every day. The company, through the new and excellent service given by the use of the underground system, is gradually educating the people to take a portion of their evening recreation riding upon the street cars. The number of bicycles in the city is estimated at 45,000.

KANSAS CITY, MO.

Owing to the peculiar topography of this city, it is impossible to ride over a great part of it with a bicycle, and much of the wheeling is consequently for pleasure. W. H. Holmes, vice president and general manager of the Metropolitan Street Railway Company, writes that bicycle riding has not had the effect upon that road that has been noticeable upon other roads for the reasons above stated. The travel upon the line is steadily increasing, a fact probably due to the increase in population. It is estimated that there are 7,500 bicycles in the city.

INDIANAPOLIS, IND.

In an interview published in a local paper, General Manager Elliott, of the Citizens' Street Railroad Company, is quoted upon this subject as follows:

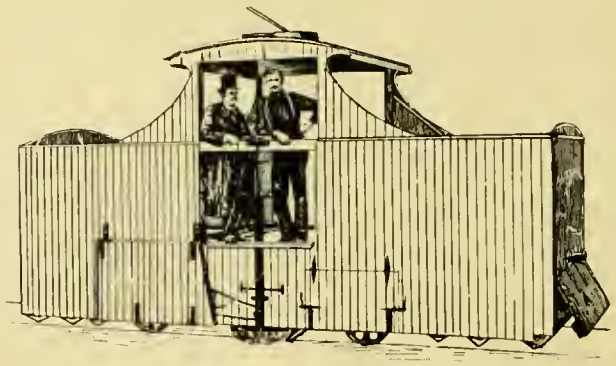
"The receipts have increased materially over those of last year, but there is no doubt that bicycles cost us a large amount of money each year. It was only this morning that I was informed that licenses had been taken out on 8,500 bicycles in Indianapolis. Now I have made a little calculation, and I figure that one-fourth of these bicyclists would use our lines twice a day. That would net the company an income of $80,000 each year. I think the company will lose in receipts this year $100,000 on account of bicycle riding, but notwithstanding this the receipts are above those of the corresponding period of last year."

MILWAUKEE, WIS.

The recent strike among the street car men of Milwaukee has given the bicycle business for this season something of a boom, most of the principal dealers reporting a considerable volume of business over what they had reason to anticipate, and now that the car service has been restored to its normal conditions, those who purchased wheels, or had them already, continue to use them. The wheels have come into very common use among mechanics and workmen of all classes. General Manager C. D. Wyman estimates the loss to his company to be from $150 to $200 per day, and is quoted as being readily able to see dollars instead of wheels rolling away from the cars.

ELECTRIC STREET SWEEPER.

A. Jackson Reynolds, of Montreal, has invented a street cleaning car which operates by electricity and is said to do excellent work. The motor and brakes are placed above the wheels and axles to allow perfect freedom for the brush, which works on much the same principle as a carpet sweeper. The brush fills the case in which it is contained and the mechanism is so arranged that the car can be reversed without change. The



CAR FOR STREET SWEEPING.

brush may be extended, if desired, so as to cover the whole street outside of the car tracks. The body of the car is of sufficient capacity to hold thirty-eight cart loads of dirt without dumping. For dumping purposes the car is constructed in sections and it is claimed that it can be dumped in thirty seconds. It is said to be capable of cleaning fifty miles of street per day and the one car which has been in use in Montreal has done its work so satisfactorily that a second one has been ordered. The car is 22 feet in length and has the usual trolley equipment. Its general appearance is well shown in the accompanying illustration.

MAY TUNNEL UNION SQUARE.

President Vreeland, of the Metropolitan Street Railway Company, New York, was given a hearing July 16, by the Aldermanic Committee, relative to the means by which delays could be avoided at the curves at Union and Madison Squares. Mr. Vreeland prefers a tunnel under Union Square, which, as he explained, could be made in four months at a cost of $260,000 and the square would be restored to its present condition. At the present time it is necessary to run around the curve at practically the full speed of the cable, seven miles an hour. The plan impressed the committee favorably and it is probable that the Park Commission will be asked to grant the necessary permit.

TROLLEY CARS FOR "BLACK MARIAS."

The hold which the trolley car has taken upon the public, is well illustrated by the variety of uses to which it has already been put, and the new services which it is proposed to make it render. Cars for the purpose of carrying mail were, it is believed, the first departure from what custom had caused to be considered the legitimate function of a street car. Mail cars are now so common as to attract hardly as much attention as a bobtail. Party cars, sumptuously furnished, gorgeously lighted, and supplied with everything in the way of refreshment that the heart of man—or his stomach—can desire are a part of the equipment of every important road. Instead of the heavy wagon "rattling o'er the stony street," or the panting suburbanite struggling homeward, laden with the numerous parcels which shall presently make up his Sunday dinner, or array his family in new attire, the trolley express picks up its load at convenient stations, and whisks it away to another convenient station, at which the owner of the parcels, cool and smiling, receives them in an atmosphere untainted by the sulphurous fumes raised by the profanity of overworked expressmen. If the citizen is run over in the street, what remains of life within him is not jolted out by a lumbering ambulance, but an ambulance-car may roll him gently home, or to a hospital, and provide means for proper attention on the way. If he dies, as all must, his last hours are not poisoned by the thought that his family may be impoverished by the provision of carriages necessary to convey the friends who wish to follow his mortal remains to their last resting place; but the funeral car furnishes means for the carrying out of the demands of sentiment without straining the conditions of fact.

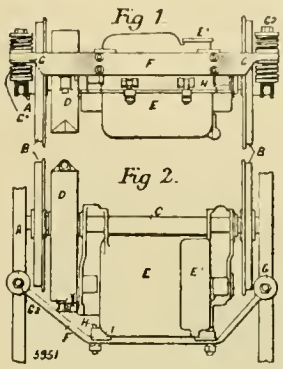
But yet another use has been found for the ever-obedient trolley car. In a presentment condemning the prison vans—commonly known as "Black Marias"—in which prisoners are conveyed from Coney Island to the county jail, the grand jury of King's county, N. Y., recommended that the city of Brooklyn enter into a contract with the trolley companies for the transfer of prisoners in special cars, constructed on sanitary principles, and so that there might be no possibility of escape. This would appear to be a move in the interests of humanity, economy and estheticism, for, from the outside at least, the ordinary prison van suggests the famous Black Hole of Calcutta. No one on the staff of the REVIEW is able to report as to the interior. Its appearance is an abomination to one imbued with the first principles of esthetics, and the expense of maintenance something considerable.

Let us have the prison cars by all means; but before the contract for their construction is made we might inquire if there is not some other means to which the same type of car may be put, in order that it may not be forced to run empty from the jail?

What next?

SPRING MOTOR SUPPORT.

An English patent has recently been granted to N. C. Bassett, of the General Electric Company, which accomplishes the same end as the General Electric cradle suspension in a somewhat different way. The supporting bar or yoke F is rigidly bolted to the motor case and bent in such a shape as to bring the spring support practically under the center of gravity of the motor instead of under the nose. The device is somewhat simpler than the cradle support. It is used on the new G. E. 1,000 motor described elsewhere in this issue.



NEW GENERAL ELECTRIC MOTOR SUSPENSION.

ROBERT A. CRAWFORD DEAD.

Robert A. Crawford, formerly of Allegheny, and well known as the inventor of the fender and wheel guard bearing his name, died at his home in Philadelphia July 21, after an illness of ten weeks. The cause was inflammation of the valves of the heart. He leaves a wife to whom he had been married but ten months. Mr. Crawford was a young man, having only just attained his majority when his device was invented, but his activity in pushing the invention soon secured indorsements from the municipal authorities of Pittsburg, Philadelphia, New York, Boston, St. Louis and other cities, though the device was then in an imperfect state. He first organized a manufacturing plant at Pittsburg, but a little over a year ago removed the works to Philadelphia, in which wider field the concern prospered as it had in the former city.

He was born and raised in Allegheny, where his parents still reside. His education was in the public schools in that city and a course in mechanical engineering, and for some time after graduation he was employed in the installation of manufacturing plants in the west and south. Of late he had devoted his entire attention to safety devices for street cars.

ADVERSE DECISION FOR THE DETROIT CITIZENS'.

Tom L. Johnson's Detroit Citizens' road received an adverse decision in the state supreme court. The case was on the claim of the Citizens' road that its franchise gave it the exclusive right to streets, in that all new franchises should be offered the Citizens' road before being granted to any other. The Supreme Court sustained the decision of the lower court, which was that a municipality has not the right to grant the exclusive use of the streets for street railway purposes.

NIAGARA GORGE ROAD NOW COMPLETED.

Until recently the Niagara Falls & Lewiston Electric Railway commonly called the "Gorge road" has been laboring under the disadvantage of landing its passengers some distance from the hotel district of Niagara Falls.

FIG. 1.—FALLS FROM THE GORGE ROAD.

It has now been completed to its intended terminus at the Tower Hotel. The line formerly ended at the bottom of the gorge some distance below the Grand Trunk bridge and to bring this up the side of the gorge under the bridge foundations and other things higher up on the cliff was no small task. With the exception of the termini the road follows the bottom of the gorge. Figure 1 shows the falls as seen from the gorge road. Figure 2 is the cantilever suspension bridge as seen from the gorge. These two also show well the double timber guards protecting the outside track. The inner guard is a 6 by 8 timber and the outer 12 by 12. Figure 3 shows a general view of the route along the rapids at a place where cribbing has been built to protect the road bed.

FIG. 2.—UNDER THE CANTILEVER SUSPENSION BRIDGE.

The West Chicago Street Railroad has a new trolley party car called the "Sunbeam," which was put in service during the last month.

DECISION ON GUARDS AND FENDERS.

A decision has just been filed by the Superior Court of Pennsylvania, at Philadelphia, relating to the failure of traction companies to put fenders and wheel guards upon their cars. The case was that of Buente against the Pittsburg, Allegheny & Manchester Traction Company, and the decision of the lower court was not affirmed on several grounds. In brief, the decision states that the lower court indicated a higher measure of duty on the part of the traction company than the law requires, in that it left to the common sense of the jury the question whether proper and reasonable precaution had been taken, whereas the law upon the subject distinctly states that companies are not required to employ

FIG. 3.—ALONG THE RAPIDS.

devices approved even by the highest scientific authorities, but only such as have been tested and put into general use. The lower court also erred in submitting to the jury the question whether it was negligence on the part of the company in not adopting inventions existing even only in an experimental stage. The city ordinance upon the subject was also decided to have been improperly admitted. The evidence, however, to the effect that the fender and guard employed were the best in use having been uncontradicted, the court finds enough evidence of negligence to warrant remanding the case for a new trial.

The extension of the Alameda, Oakland & Piedmont Electric Railway, Cal., was opened to Leona station June 21. There is a new pleasure resort at the terminus.

THE EXPENSE AND MISTAKE OF PROCRASTINATION.

Within the past few weeks three representative car builders in widely separate parts of the country have said to us: "How do you account for the fact that managers delay ordering cars until the last minute and then want them in a rush?"

We can easily account for wanting "them in a rush," but we confess it has always been a puzzle why managers, and some of the best and most progressive, too, delay such matters far beyond the time when they must know what and how many equipments will be needed.

We know of one case, which by no means is a solitary one, where the manager of a big road sent out for bids on eighty cars, and stated that it was not price as much as quick delivery which would decide the contract. He wanted them in sixty days. Now cars can be built in much less than sixty days, but where's the advantage? If the car adheres fairly close to a standard there is nothing impossible in quickly getting the mill work out, framing, erecting and into the paint shop, and even here the work can be done in a surprisingly short time. But look at the result. Even in the best shop, with a most careful inspection, it is not fair to expect quite as careful and painstaking work when crowded along under high pressure as when allowed to proceed in a more normal manner. And in a paint shop no skill can take the place of time, for one builder states that if he can have his own way he never allows a car to go through the paint shop under twenty-one days, in order that one coat may have ample time to harden and season before the next is applied. When the car comes out, even an expert may not be able to discern any difference between ten days and three weeks in the paint shop, but the lasting, wearing qualities of the same paints will be found to be very different in the two cases.

Then, too, in the matter of materials, where a builder has his own time, which is no more than a reasonable length of time, better opportunity is afforded for that close, strict scrutiny of every important timber which enters into the construction of a car, and even the most conscientious builder might reasonably excuse the use of a post or sill if discovered to be slightly imperfect after once in place, by the thought that this car must be at its destination by a certain fixed day. It is not within the possibilities that a rushed job should be quite as good as one allowed to take its usual course. Forced plants are less hardy than those of natural growth, and the same law applies with considerable truth to car building. As a rule, a manager knows a long time in advance that he will need cars at a certain season—spring or fall. He may not be absolutely certain that he will order even then, but as one builder suggests, he can have his specifications completed, his contract drawn and the order let subject to final decision later on. This would enable the builder to make all arrangements for the work, and even warrant him to get much of the material ready ahead, so that when the word was given the time necessary to get out the cars would be greatly lessened, and still allow plenty of time in which to do the work in a manner satisfactory to the builder and to the best interests of the buyer. The great diversity of materials which enter into the construction of a modern street car would surprise any who have never studied the subject carefully or watched day by day the progress of car building.

The lesson is plain, and can well be taken home by every one of our readers. And the moral is, if you are intending to add to your winter equipment today is none too early to take the matter earnestly in hand. The building of a house always requires a longer time than the owner expects, and the construction of ten street cars represents an amount of labor which would build a big and handsome residence.

In buying cars in a hurry the buyer has to pay more money for the cars and gets less in quality than if he gave the builder more time for them. The fact is, in hurrying cars the builder knows he has a big leeway to build poorer, and even with inspectors they cannot see it all where the work is going through with a rush.

PROGRESS ON THE ENGLEWOOD & CHICAGO STORAGE BATTERY ROAD.

Ground has been broken at Eighty-eighth street and Vincennes avenue for the car house and power plant of the Englewood & Chicago Electric Railway, the big storage battery system being built to Chicago's southwestern suburbs. It is intended to make this a model storage battery road with all facilities for cheaply handling the batteries and generating power for them. If the storage battery has any merit as a means of street car traction it will be brought out by this road, as everything is new and makeshifts will not have to be resorted to. The Arnold power station system for driving any generator from any engine is to be used, and for the present, two Willans engines will be put in. The charging of the batteries calls for three different voltages. When the discharged batteries come in first they will be put on the low voltage and put on the higher as they become more fully charged and their electromotive force becomes higher. Consequently three generators will be run constantly. The batteries are to be removed from the trucks by being lowered into the pits. From there they will be transferred to the charging room. The Dupont trucks are to be used, and the motors will be put outside the axles, leaving the space between for the batteries.

At a meeting held July 3, three of the creditors of the Mount Lowe, Cal., Railroad Company, were elected directors in the place of T. P. Lukens, P. M. Green and A. P. West, resigned. The new directors are J. M. Johnson, representing the Union Hardware & Metal Company, and I. B. Newton and F. L. Baker, of the Baker Iron Works. Professor Lowe will act as president and F. L. Baker as general manager.

FREIGHT HAULING BY THE WINSTON-SALEM (N. C.) RAILWAY AND ELECTRIC COMPANY.

BY F. W. M'CLEMENT, SUPERINTENDENT AND ELECTRICIAN.

By legislative grant this company was permitted to conduct a general freight business as well as passenger traffic. Its greatest energies were devoted, however, to the promotion of passenger travel, and freight service was practically limited to the transportation of our own materials, such as coal, oils, etc., from the railroad depots to our station. But "hard times" and consequent falling off in our passenger travel—a contingency with which all railway managers are familiar—induced us to enter the freight hauling field on a more extensive basis. Thus far its success has been quite marked and has exceeded our expectations. Our equipment consists of one 14-foot freight motor electrically equipped with two No. 6 Edison motors, two flat trail and one box cars. We work over heavy grades, our most difficult being an 11 per cent grade 1,300 feet long. Our best performance to date has been the hauling of a boiler and some smaller machine parts, aggregating 19,700 pounds (not including the weight of eight men) over the grade mentioned.

We have closed two contracts of importance, one being with a cotton mill located about three miles from the railroad. This is a new mill, and we hauled all bricks, lumber, etc., used in its construction. Under the provisions of the contract we have exclusive hauling of all raw and finished materials for a term of one year, with privilege of renewal if rates have proven satisfactory.

Our other contract is for exclusive freight hauling of all material used in the erection of a $50,000 court house now in course of construction.

Our schedule of rates varies according to material hauled and distance. A fair average of what we are getting is 40 cents per 1,000 pounds. We have frequently chartered motor car and trailer at $1.75 per hour, we furnishing a motorman only. In such cases all loading and unloading is done by the parties chartering. Chartered service counts from the actual minute the car leaves the shed until it is again housed.

The freight motorman carries blanks with him, of which the accompanying is a sample. This he has properly filled out and returns to the office. Due booking form is then made and bills rendered accordingly. The engraving shows cotton en route to the cotton mill mentioned.

Leeds, England, has received seventy bids for the construction of the experimental electric railway.

HAULING FREIGHT BY ELECTRICITY.

TWIN-CITY CONSTRUCTION CO., LESSEE.

Winston-Salem, June 1 *189* 6

Lot No. . . . . . *Motor Car No* 12

Total Weight of Lot 12500 *Trailer* " 13

Kind of Freight, Granite & Stone

From Southern Ry.

To Court House

For L. P. Hayes & Co. Contractors

C. F. V. & G. *Railroad Co., Car No* 8170

Rec'd 1 *load as dated below:*

1 *Load,* June 1 *189* 6.

" "

Remarks:

Received L. P. Hayes & Co.

Hauling and delivery completed June 1-1896

Signed J. F. Swaim *Fr't Cond'r.*

Time, 2½ hours.

Number of hands 3

Charged, A. P. D.

Book keeper.

Voucher Index.

Date.	Voucher Number.	NAME.	Department	For What Drawn.	Amount.
July 10	38	Standard Oil Co.	Ry & Light	Engine oil	8 50

FIGURE 2.

A COMBINATION BOOK KEEPING SYSTEM.

The Harris interests at Champaign, Ill., which own the Urbana & Champaign Electric Street Railway, also own and operate, under the same management, three other companies, the Gas Light & Coke Company, the Electric Light and Power Company and the West End Park Company. On July 1, a new system of vouchers was begun which simplified the keeping of the accounts for the various companies. Figure 1 shows the back of one of the vouchers, which indicates the distribution.

Urbana and Champaign Electric Street Railway Co. To Standard Oil Co. Dr.

DATE		Dollars	Cents.
	For Bill Attached:		
	Engine oil		8 50
	20% charge Ry Dept	1 70	
	80% " Elect. "	6 80	

Dated. July 10th 1896

Received of Champaign and Urbana Electric Street Railway Co.

the sum of Eight 50/100 Dollars ($ 8 50).

in full for the above account.

EXAMINED AND APPROVED

Standard Oil Co (Sample)

Gen. Supt.

President.

PLEASE RETURN THIS VOUCHER WITHOUT RE-FOLDING

VOUCHER.

It is an adaptation of the one recommended by the standard account committee of the American Street Railway Association. The voucher has 31 accounts which more properly apply to street railway work. In cases where the main item is not applicable to all four concerns, sub-heads are made, E referring to the electric light, G referring to gas, and P referring to the park. Thus, 15 is "lubricants and waste for cars," an item only applicable to the street railway department. Under it are 15 E, covering electric light carbons, 15 G, covering gas purifying material, and 15 P, covering band for park. Figure 2 shows the arrangement of a page of the voucher index where each voucher is first entered. Figure 3 is from a page of the operating expense ledger, where the vouchers are entered under their respective heads as indicated by the distribution of accounts. There

38 $ 8 50

URBANA AND CHAMPAIGN ELECTRIC STREET RAILWAY COMPANY.

For Engine oil Dept's

Name Standard Oil Co. Address Decatur

Paid July 10th 1896 Remarks

DISTRIBUTION OF ACCOUNTS.		ST. RY DEPT		ELEC. ST. DEPT.		GAS DEPT.		PARK DEPT
CONSTRUCTION AND EQUIPMENT.	1. Right Of Way							
	2. Building Construction.							
	3. Track and Roadway Construction							
	E. Lamps.							
	G. Mains and Pipe							
	4. Overhead Line Construction							
	G. Meters.							
	5. Car Equipment							
	G. Benches							
	P. Trees, Etc							
	6. Power Station Equipment.							
	7. Tools and Machinery							
	8. Improvements and Betterments							
OPERATING EXPENSES. GEN'L OPER'G EXPENSE	9. Salaries, Office.							
	10. General Office Expense							
	11. Legal and Damages							
	12. Contingent Expense.							
TRANSPORTATION EXPENSE.	13. Car Service, Wages.							
	E. Lamp Trimmer's Wages							
	G. Retort Men, Helpers							
	P. Keeper, Helpers.							
	14. Car House Expense, Wages.							
	P. Sw. Back, Casino							
	15. Lubricants and Waste for Cars							
	E. Carbons							
	G. Purifying Material							
	P. Band.							
	16. Supplies.							
	17. Operating Power House, Wages.							
	18. Fuel							
	P. Fireworks							
	19. Lubricants and Waste for P. H.	1	70	6	80			
	P. Casino Shows.							
MAINTENANCE OF WAY AND BUILDINGS.	20. Repairs Roadway, Track, Wages							
	21. Renewals of Rails, Bolts, Etc.							
	E. Renewals of Lamp Parts							
	G. Renewals of Retorts.							
	22. Renewals of Ties							
	E. Renewals of Rope, Pulleys.							
	23. Repairs, Renewals Buildings, Etc.							
	E. Repairs for Poles and Wires							
	24. R'p's, Renewals, O'rh'd Lines, Wages							
	G. Repairs, Wages							
MAINTENANCE OF EQUIPMENT.	25. Repairs of Cars							
	26. " " Trucks							
	27. " " Elect. Equipment.							
	28. " " Steam Plant.							
	29. " " Elect. Plant							
	30. " " Tools and Machinery							
	31. Miscellaneous Expense							
		$ 1	70	6	80			

FIGURE 1.

is also a small ledger where only about a half dozen accounts are provided for, and where taxes, insurance

Lubricants and Waste for Power House

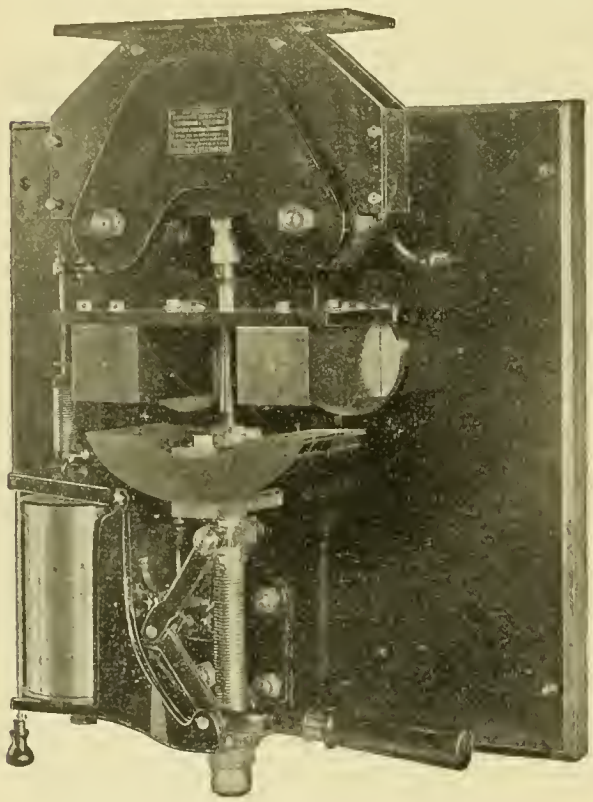
Month.	Voucher No.	From Whom Bought	Order No.	Inv.	Description	Price.	St. Railway	Elec. Light	Gas.	Park	For Whose Account Charged
July 10	38	Standard Oil Co	20%		Engine oil	8 50	1 70	6 80			

FIGURE 3.

and interest are taken care of. The adoption of the system is due to B. F. Harris, Jr., general manager, who has always sought the most advanced methods of book keeping. The combination of interests calls for much more skill in the plan of a book keeping system than usual, and Mr. Harris has succeeded very well.

EIGHT THOUSAND AMPERE CIRCUIT BREAKER.

The largest automatic circuit breaker ever constructed has recently been completed by the General Electric Company. It is designed to break a circuit of 8,000 amperes and is to be used on a 160 volt circuit, although made to handle the same current at 600 or 700 volts. This is a form K circuit breaker and differs only in size



EIGHT THOUSAND AMPERE CIRCUIT BREAKER.

from the well known K instruments used by the General Electric Company on its standard railway generator and feeder panels. The studs which carry the current are 3¼ inches in diameter, the base is 28 inches square. It is constructed to opened the circuit automatically at any point between 3,000 and 20,000 amperes, the opening point being arranged by the adjustment of a tension spring on the armature.

Six electric cars were put upon the F street line, Washington, D. C., July 7, in place of the same number of horse cars, and since then others have been gradually added. The process will be continued until the line is operated wholly by electricity. The underground system is used.

REMINDERS TO MOTORMEN.

Among other numerous suggestions and warnings to motormen issued by an eastern president of a very large system are some that are so frequently neglected or even left out of rule books that we reprint them, although they are by no means new.

"If motormen will always make it a point to go slowly where children are playing, regardless of the fact of how far behind their time they are, they will save many, if not all, the accidents that occur from children rushing across the street directly in front of the car.

"In the outlying districts, where you are in the habit of running fast, at all times when passing a team, whether going in the same direction with you or in the opposite direction, safety requires that you turn off your power and have your car fully under control so that if there is any foolish move on the part of the driver of the vehicle (which is often the case) you shall be prepared to stop easily and avoid an accident.

"When conductor goes ahead at railroad crossings, before starting your car, you must sound your foot gong and always look be hind.

"In stopping for passengers after the conductor has given you two (2) bells to go ahead, if you are detained for any reason and later you are ready to start, tap your foot-bell and get notice from the conductor again before starting, for passengers, especially women, often get up to get out while the car is stopped, having changed their mind for some reason and your momentary delay has given them sufficient time to attempt to get off, consequently you cannot be too careful in the observation of this rule.

"The old motormen on this line are especially warned about running too close to the car ahead. In the outlying districts you should never be within 200 feet of the car ahead and in the cities never within 100 feet. The excuse that the car slipped or the brake would not hold will not excuse you for running into the car ahead, for all such cases are the result of pure, unadulterated carelessness.

"Any motorman running by a car that is standing, that is, a car stopping to let passengers on or off, or for any other reason whatever, can under no circumstances manufacture an excuse for the same.

"None of the above are hard rules to observe, and any one showing a disposition to be careful has no reason to fear that his position will be taken away from him."

PRESERVATION OF STEEL TIES.

The Cincinnati Street Railway recently uncovered some steel ties laid about one year to see what condition they were in. In some cases B. L. Baldwin, mechanical engineer, reports that the rust had taken a deep hold on the ties, while in others the tar coating gave ample protection. The item of depreciation of steel ties is evidently not to be counted on as very low unless efficient preservative coatings are used.

ANOTHER MANXLAND TRAMWAY.

The Isle of Man in the matter of electric tramways puts the rest of the British Isles to the blush. It possesses a population of less than 50,000, yet it has three electric tramway systems. At the same time it must be admitted that these lines are not so much for the con-

SCENE ON THE MANXLAND TRAMWAY.

venience of the inhabitants as for the pleasure of the visitors, who, in the summer months, flock in thousands to the Island.

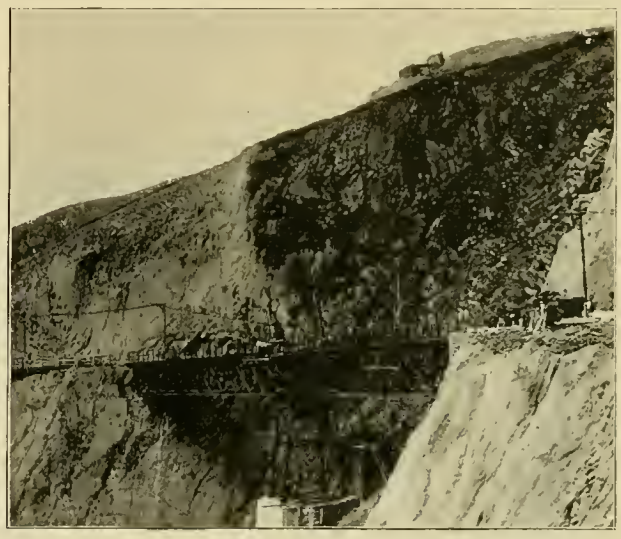
The Douglas & Laxey Electric Tramway, which was completed some two years ago, has achieved a phenomenal success. It paid a dividend of 7 per cent in the first six months of its existence, and this success has

SCENE ON THE MANXLAND TRAMWAY.

been more than maintained. The extraordinary popularity of this line soon led to the construction of a second railway which took the lazy tourist to the top of Snaefell Mountain. It was thought, however, that even this would not exhaust the patronage of the holiday maker, for a line has been now completed from Douglas in the opposite direction to the other two lines. This is known as the Port Soderick line, and unlike the other electric roads on the island is almost purely American in its make up.

A reference to the illustrations will show the nature of the newly opened electric line. It passes from the south end of the town of Douglas over the cliffs, a distance of three miles to within a stone's throw of Port Soderick, a place much visited on account of its famous caves and other attractions. The road abounds in engineering difficulties.

The track is not quite three miles long but there is scarcely a yard of straight travelling. It passes for the most part over a made road, the making of which nearly sent a company into the bankruptcy court. Here and there some alterations were necessary to ease the curves or widen the road. New bridges were also necessary in place of the wooden structures that have done duty previously. They are of the steel girder type and the total length of the largest is 230 feet. Although curves are frequent, the radius of the shortest one is only 45 feet on the center line. The gradients are long and the



SCENE ON THE MANXLAND TRAMWAY.

steepest one is 6.2 per cent. T-rails, weighing 65 pounds to the yard are employed and these are placed upon steel ties. The poles were furnished by Morris Tasker & Co. Owing to the great curvature on the line the side arms on the poles are made of different lengths. No attempt is made to follow the middle of the track with the wire, as a special form of trolley pole is used which permits considerable variation from the center. There was great difficulty in securing suitable flat ground for car and power house, as can easily be imagined on looking at our engraving of the power house under construction. No sane engineer would choose such an arrangement unless he were driven to it. The building is on the edge of a cliff and it was necessary to excavate about 20 feet deep into solid rock. The engines and dynamos are in the lower story, which is 20 feet below the level of the ground. The boilers are on the floor above, and the feed pumps are 12 feet below the engine room. Two 100-kilowatt Westinghouse generators are installed. There are six open, double deck motor cars and six trailers. The trucks are the

Lord Baltimore, made by the Baltimore Car Wheel Company. The work was done by the General Traction Company, which equipped the Coventry Tramways some months ago.

PAYING EMPLOYES IN COMPANY'S STOCK.

Manufacturers and supply men have been known to accept street railway bonds in part or whole payment of materials furnished, and occasionally have even taken some stock. In some cases the trade has worked out all right; in others, the accommodating seller wished he had not.

But to make a regular month in and month out business of paying its employes in part cash and balance stock is a novel proposition. This is what the Greensburg, Jeanette & Pittsburg Street Railway, of Greensburg, Pa., is doing, and has for some months past. The road is a small one, about three miles long, and only runs a few cars. Possibly the company cannot afford higher cash wages than it pays, but the scheme adopted

POWER HOUSE UNDER CONSTRUCTION, ISLE OF MAN.

does not appear to have been a grand final success from the standpoint of the employe contingent of the shareholders.

The company requires all employes to subscribe to $200 face value of stock as a condition to entering its employ. In other words, the men buy their job of the company. Payment is made on the installment plan, of which $50 in cash is paid in advance by the employe before he can go to work. After that the sum of $10 each month is deducted from his wages to apply on his $200 subscription. The wages are $40 per month, $30 in cash and $10 credit on his stock subscription. Twelve hours constitute a day's work. In case a man is discharged or leaves the company his $50 is not returned, but he is given stock for that amount and as much more as he has "earned" at $10 per month.

About the middle of June, one employe, Jacob Ruff, who had paid in $50 and $10 per month in wages for five months, making $100 in all, was discharged. Ruff was suspected of knowing something about a certain petition from the men respectfully asking the company to increase the cash payment of wages from $30 to $40 per month. His discharge was the immediate cause of Ruff becoming a highly dissatisfied minority stockholder, and he brought suit to recover his $100. The case went against the company, which paid the costs with the intention of taking an appeal.

The road is managed by the W. F. Sadlers, senior and junior.

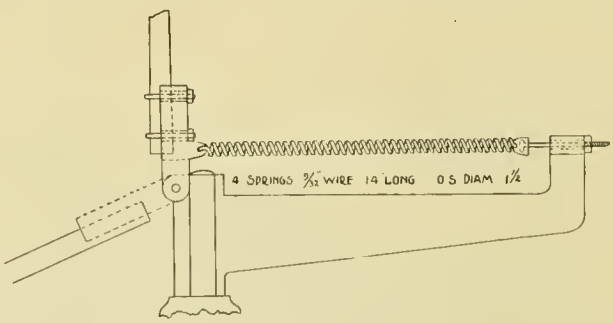
The Review has written W. F. Sadler, Jr., the general manager, repeatedly regarding the scheme, but no attention has been paid to a request for the company's side of the case since last March, at which time he wrote: "We have found it a first-class scheme, and one which I think the managers of new suburban roads will do well to follow."

During the intervening months he may have had occasion to change his mind, and, judging from the comments of the local press of the town, the "scheme" is anything but one for other managers to follow. It would seem to be one of the surest ways to engender dissatisfaction among the men.

If a company can only pay $30 per month it is better to hire on that basis than to claim to pay $40 and do it by forcing on the men something they do not want, and the value of which is questionable.

SIMPLE TROLLEY AT GRAND RAPIDS.

The Grand Rapids Consolidated uses a very simple form of home made trolley base, a sketch of which is



GRAND RAPIDS TROLLEY BASE.

shown herewith. There are four springs, each of 9-32 inch wire. Their length is 14 inches. The base is the design of Warren Annable, master mechanic.

BICYCLE CARS UNAPPRECIATED.

The experiment of running cars for the checking of bicycles between Brooklyn and Jamaica, which was mentioned last month in the Review, has not been as fully successful as was anticipated. The idea was to enable bicyclists to transport their wheels over the roughest part of the streets to the smooth roads beyond. The service will be improved to some extent and continued for a time. Then, if not better patronized, the cars will be discontinued.

THE SUCCESSFUL HANDLING OF STREET RAILWAYS WITH THE DISPATCHER'S TELEPHONIC SYSTEM.

BY J. L. M'LEAN, CHIEF DISPATCHER LOS ANGELES RAILWAY,

Never has the history of the nineteenth century been marked with such wonderful improvements as those which have been introduced in the method of operating street railways throughout the United States during the past five years, principally by electricity and bringing the telephone into active service, electricity proving itself such a phenomenal success from every standpoint that now nearly four-fifths of the street railway mileage of the United States is operated by its use. While the telephone is also used very extensively, and each day adds to the number used by the street railways, yet to use it directly in connection with the operating department of a street railway system, such as the writer will herein later describe in full, will prove itself as big an improvement over the ordinary methods employed as the electric motor surpassed the horse car. After changing from the "joggy, weather-beaten horse car," the "greasy, jerky cable," or "the blackened steam motor" to the electric motor car, where an assured and reliable service could be depended upon, the difficulties of knowing how to obtain such requirements from an economical standpoint baffled the minds of managers and superintendents of the various street railway companies of our advanced country, which have undergone such changes and reorganizations, and even at the present day there is not a slower class of people in the country to pick up a good improvement, or even investigate its merits, than the managers of eastern roads, who expend thousands upon thousands of dollars every year unnecessarily in the operation of their roads where the old-fashioned systems of "time cards" and "large numbers of stations" are used.

There is no reason why the service of an electric or cable railway, improperly managed, should not be looked upon as being even worse than the horse car, which occasionally does reach its destination on time, even though it may come two-thirds of the way with one set of wheels off the track, while there is every reason in the world why the service of such roads, properly managed, should surpass anything ever introduced.

A few things which are not only unpleasant to the public, and very expensive to the company, that are daily experienced in the operation of over half the electric and cable railways throughout the country at this advanced age (and for which we now have a thorough,

DISPATCHER'S OFFICE LOS ANGELES RAILWAY.

practical and cheap remedy) are the delays and interferences to the traffic; such as an electric car breaking a trolley, breaking an axle, burning out an armature or becoming disabled in other ways which cannot be repaired while on the road; as well as accidents and jumping the track. Where the ordinary system of running cars on time cards and by starters is used, the latter being at the ends of the roads only, are unable to observe any trouble or interference to the traffic that may be going on, until they find that the cars have stopped coming, and discover that they are all blocked at some point on the road. As is a natural result, where so much of the company's business interests and welfare are entrusted to the judgment of the trainmen, before it is possible for a person to catch a car going in either direction, he is ordinarily compelled to wait the length of time that it requires to make a round trip on such line that is blockaded. Besides the amount of expense attached, as well as the decrease in the daily receipts where several such things have occurred in one day, the service may yet further be impaired and irregular on account of such disabled car standing at some far out of the way side track, or perhaps in the car shops, leisurely awaiting the orders of the shop foreman. And it is but

LOS ANGELES RAILWAY COMPANY

DISPATCHER'S OFFICE

JUL 24 1896

CAR NO	LINE	HOUSE	IN	OUT	Displaced by No.	NATURE OF TROUBLE	MOTORMAN
#158	9th St	9th St	1070	1075	#153	Axl Boxs	M A Green
#350	7th	"	1030	1033	#357	Young axle at Alameda track	W B Reed

DELAY REPORT.

natural with the remaining cars on the line which have always been accustomed to running on a time card, and making just so many trips for a day's work, to continue running on such, regardless of the fact that there is a double and unprotected space in the service making its rounds, and that there should be some system when a car goes into the shops from any cause, whereby the remaining cars could be uniformly spaced apart during the course of such blockade. Then in most places when a car is started from the shops to run in place of some disabled car, nine times out of ten, the crew of such car will go to the wrong end of the line on purpose to have as much lay over time as possible before getting into their proper place. With cable cars they are invariably "breaking grips," dies or shanks, losing a brake shoe, breaking grip-lever or becoming delayed from street obstructions, such as lumber, coal or stone wagons breaking down across the track, which all consume from five minutes to three-quarters of an hour delay or lost time in the service. Seldom is there a delay of any description on a city railroad but what a double space in the service is caused, and on a cable railway where there is the ordinary service, a cable car cannot make up delayed time, but is liable to lose more time owing to the space there is

THE LOS ANGELES RAILWAY COMPANY.

Mr. John J. Astin, General Superintendent

DEAR SIR. The following cars are reported out of order on this date:

M. Lean, Car Dispatcher

JUL 24 1896 a m

CAR No.	LINE	TIME	NATURE OF TROUBLE	REPORTED BY	To Whom Reported
#158	9th St	900	Car hog hot Axle boxd.	M A Green	Foreman Gray
#350	7th St	1000	Off track Nigh Round at 7th & Olive Sts	W B. Reed	Foreman Gale
			Wrecking Car ordered to 7th & Olive Sts at 1000 a m		
#150	3rd Ave	1030	Needs a new Set of Brushes	Inspector	Foreman Gray
#173	W L	1100	Insulation burned off of field coils	Smith	Foreman Gray
#125	E P	1110	Light Current	Williams Conductor	Light Inspector

TROUBLE REPORT.

ahead of it, and the time of day, unless it be on a down grade when the grip can be released and run faster than the cable, only to endanger the lives of passengers as well as the gripman himself. Hence we have the same results here as from the derailment of an electric car, which is, that a double space in the service is making its rounds, and most generally at a time of day when the traffic is the heaviest and when the service should be at its best. The system and improved method of dispatching cars by telephone, is composed of an entire private telephone system, the central office of this system being known as the dispatcher's office.

Telephones are stationed at the terminus of each line at which conductors on arriving each trip report their car number to the dispatcher and from him obtain their

DISPATCHER'S OFFICE.

THE LOS ANGELES RAILWAY COMPANY.

Mr. John J. Astin, Superintendent

JUL 24 1896

DEAR SIR. The following are the delays on Grand ave division on above date

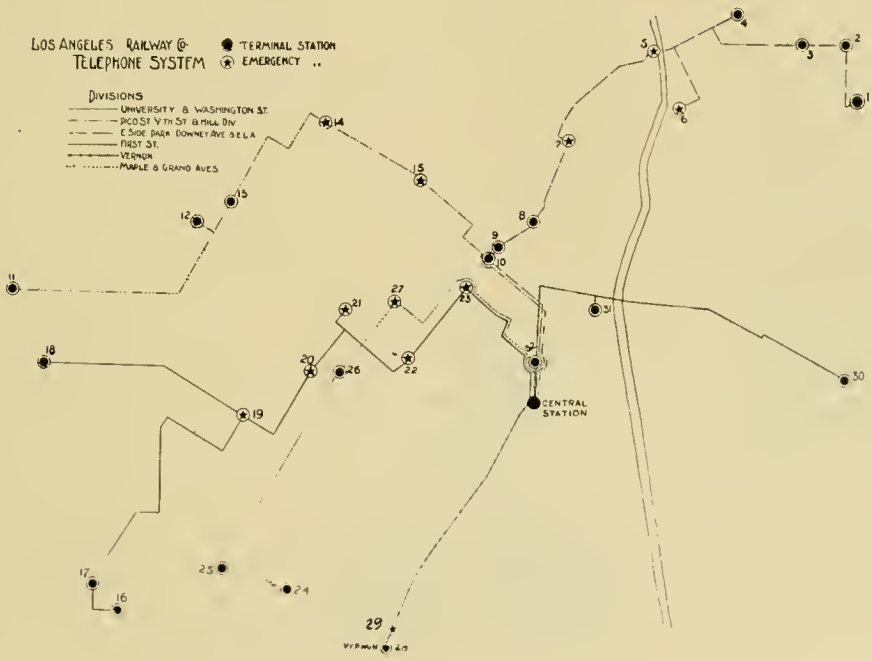
M. Lean, Car Dispatcher

CAR NO	LINE	No. of Minutes Delayed	TIME From	TIME To	PLACE	CAUSE	CONDUCTOR
#350	7th St	18	a m 1000	a m 1030	W L Park	Off track at 4th & Grand Ave	Johnson

HOUSE REPORT.

leaving time. In most places the instruments are placed in small canopy-top houses, built especially for this, and are thus protected from all sorts of weather; though they are sometimes placed on poles, in boxes, with lock and key, each conductor being provided with a key. On trunk lines that traverse one end of a city to another, telephones are placed at certain intervals and important points such as draw-bridges and steam road crossings, and are known as emergency 'phones, to report delays

breakdowns, trouble with overhead line or track or anything that the dispatcher should know to successfully operate and maintain an efficient service. The wires leading from all of these 'phones run directly to the dispatcher's office, where they are connected on to a neat glass front switchboard, about 20 by 12 by 8 inches in size, stationed on top of a neat oak desk, which is about 9 feet long, at which two dispatchers can work at the same time when necessary, and is known as a combination desk and switchboard. The transmitter, adjustable by means of weights and pulleys, also hangs directly in front of him, as will be seen in the cut showing interior view of the dispatcher's office of the Los Angeles Railway Company. A system of magnetic and gravity drops, works in connection with a signalling system of small incandescent lamps, the latter being placed back of a stenciled number representing each circuit, which,



when lighted, indicates the circuit calling. A set of cam lever switches which the dispatcher works with his left hand restores the drop to its normal position, which, when pulled down, also put out the corresponding lamps and puts him in direct connection with the party calling. He is provided with a large sheet, 21 by 24 inches, on which are listed the numbers of all cars in their regular order, under the proper headings of each line. He is thus enabled to dispatch two to seven cars per minute, recording the time each one should leave the terminus on his sheet. A glance at this sheet gives him the immediate condition of the entire system and exact location and direction of each car.

Of course, the calls do not come in uniformly, but vary a great deal owing to the number of cars in operation. The space between cars also varies as does the number of cars in operation, which is governed by the traffic at different hours of the day in most places. The dispatcher's duties have been largely increased owing to the many calls that come through the switchboard from the public telephone exchange to the circuit. But by means of a system of push buttons, running to each officer in the building, he is without the slightest exertion enabled to summon any officer to the public 'phone, which is stationed handy to everybody. He also receives reports from the trainmen, of which he makes a daily report to the general superintendent (a reproduction of which is shown) as to the condition of the cars; such as brakes, trolley, motors, brushes or lights, or anything being out of order that would likely prevent them from making their schedule time. To keep the car from going in the shops, if possible, this is also immediately reported to the proper departments by the dispatcher. He also gets a full report from the conductors, of all delays which have happened in connection with their cars during the day of two minutes or over, which, at the close of his shift, are forwarded to the general superintendent's office (a reproduction of the form of delay report is here shown), together with a report of all cars that have been run in the shops, showing name of motorman, cause, time of day and number of the replaced car (this is also shown.)

As I have before stated, the dispatcher is in close touch, by means of telephone, with all of the car houses, shops, division and general officers, including the general superintendent, claim agent, surgeon, foreman of overhead line and wrecking departments, in cases of any interferences to the traffic or accidents, so that on a moment's notice any member of these departments may be summoned.

In cases of blockades at any point, the dispatcher, by being able to communicate with both ends of any line, can maintain a certain service during the course of such blockade, as well as prevent the cars from all bunching at any point by lengthening the space between them, sending them out on a larger headway and, if necessary, he can on a moment's notice, order out extra cars or "trippers," as they are called by some, depending altogether on how long the blockade will last and the demands of the traffic at such time.

The watches of all the trainmen are compared from one to three times a day and kept regulated with the large clock in the dispatcher's office, which is the standard time of the system, and which governs the movement of all cars. This time is always obtainable at any point where an instrument is stationed for reporting.

The dispatcher is held responsible for the movement of each car. All report to him on each trip between 6 a. m. and 12 or midnight from the ends of their respect-

ive lines. No time card whatever is used where this system is employed. The cars are started in the morning from the various houses at a certain time, and are allowed so much time in which to run from the house to the end of the line, where they report to the dispatcher and from him obtain their leaving time from such point. Different schedules of running time between points are employed at different hours of the day, owing to the demands of the traffic. These schedules are regulated by the dispatcher. "Extra cars" and "trippers," before leaving the car houses at different hours of the day, in all cases report to the dispatcher, giving him their car number and the line upon which they are to run. In reply he gives them the leaving time and direction to go, as it often occurs that he can dispatch them to fill in a double space that may be coming or going in either direction on a line. The moment that a report is received giving notice of a blockade, the dispatcher ascertains the number of the car, and a glance at his sheet gives him the direction going; whereupon he immediately begins to lengthen the space between the cars ahead of the delayed one as fast as they report, taking into consideration the nature of the delay and about how long it will continue. In the meantime he may have summoned either the wrecking car or wagon. Then, the moment he receives the word that the blockade is raised, another glance at his sheet and the large clock in front of him, gives him the exact location of each car, when, as fast as they report, he begins to dispatch them from the ends on their regular space.

I claim for the dispatcher's system flexibility and quickness in the adjustment of all cars; also that one ordinarily bright man to act in the capacity of a dispatcher can do more from the standpoint of the company's interest towards maintaining a service during the course of blockades and interferences with the cars on a half-dozen lines, in fifteen minutes, than fifteen starters and men on the street can do in an hour. For illustration, take a line with thirty cars on, running on a three-minute headway, allowing ninety minutes for the round trip. We will say car No. 1, according to running time, is due to leave terminus "A" at 6 o'clock; car 2 in order at 6:03; car 3 in its order at 6:06; car 4 in its order at 6.09, but does not arrive until 6:13, being four minutes late, and having in front of it a seven-minute space at a time of day when it is impossible to "make up" time. Car 5 arrives on time, at 6:13, but is held until 6:17, hence all cars following have a lay over of four minutes at terminus "A," save those which were held an additional minute at terminus "B" to offset the delay at terminus "A" in running time, and thus have the seven-minute space of No. 4 protected by the time he reaches terminus "B." Whereas, under the ordinary system of "time card" this car would carry the seven-minute space a round trip over the line before catching up to the other cars on a three-minute space.

I, therefore, claim that street railways can be more successfully handled with "the dispatcher's telephone system" than any other method.

A map of the city of Los Angeles and relative position of the lines and telephones are herein shown. The round marks indicate telephones stationed at the terminus of the roads for reporting each trip, while the stars indicate telephones stationed at important points, such as crossovers and viaducts and known as emergency phones.

The dispatchers' system was put into active operation in 1890 on the Denver Tramway, operating one hundred miles of electric railway. The writer, later on, successfully installed the system on the City & Suburban Railway of Portland, Ore., operating fifty-five miles of electric railway, and in a recent letter received from the manager of that company he stated that the system was not only giving them perfect satisfaction, but that they would not attempt to operate their roads again without it.

The writer has just completed the installation of the system on the lines of the Los Angeles Railway operating one hundred and four miles of electric railway, comprising eleven different lines in the city of Los Angeles, Cal., which is considered one of the finest systems of electric railways on the Pacific coast.

J. L. McLean, the orginator of the telephone dispatching system for street railways is 26 years of age and began his street railway experience in the president's office of the Wichita & Suburban. He was soon appointed assistant superintendent and cashier and then assistant general manager. When the Wichita companies consolidated he became assistant superintendent of the consolidation. In 1890 he went further west and became associated with John A. Beeler in the construction of the electric lines of the Denver Tramway. In January, 1891, he was appointed chief dispatcher there. In 1892, he inaugurated the dispatcher system for the City & Suburban Railway of Portland, Ore., returning to the Denver Tramway three months later. In 1894 he went to New York and organized the American Car Dispatching Company, o which he is vice-president and general manager. Returning to his former office on the Denver Tramway, six months later, he remained until January, 1896, when he became chief dispatcher of the Los Angeles Railway Company.

J. L. M'LEAN.

The motormen and conductors of the street railway company at Houston, Tex., with their families and friends, held a trolley party July 11. The company assisted in every way to make the affair an enjoyable one.

A former street car horse in Portland, Me., was standing by the curbstone the other day, when an electric car passed by. He was stone blind, but his memory was unimpaired. At the sound of one bell he stood at attention. At two bells he started forward and only stopped when his head and shoulders had passed through a plate glass window on the opposite corner.

A PURELY FREIGHT STREET RAILWAY.

A venture that is full of interest is the Manufacturers Street Railway, of New Haven, Conn. It is a street railway constructed entirely for the purpose of transferring freight, and was incorporated under a special act of legislature.

There is a stretch of water front along the Quinnipiac and Mill rivers, about a mile and a half in length, located on which are a number of large factories. These factories had no railroad facilities, or any possible means of obtaining such, and there was also a large amount of unoccupied property which would have been very valuable for manufacturing purposes had there been any railroad connection.

In view of this, a number of the manufacturers got together and formed the above company. It connects with the Consolidated Railroad at Cedar Hill Junction, and runs for about three-quarters of a mile over private property, simply crossing several streets, until it reaches Chapel street (one of the principal thoroughfares in that section of the town, which is principally a manufacturing district), where it turns onto the street, and runs about two blocks on Chapel street, then turning into James, where it runs about one block to River street. River street is purely a manufacturing street which runs along the bank of the Quinnipiac river. It runs down this street the entire length; making three-quarters of a mile on streets.

The road is entirely run by electricity, and the World's Fair 30-ton locomotive has been bought for the service. By this means a number of large manufacturers are brought directly in connection with the railroad; and a great deal of property opened up, which, under the new conditions, will be very valuable for manufacturing purposes.

The company has had numberless difficulties and objections to overcome in obtaining its privilege; but the city authorities finally became convinced of its necessity to the present manufacturers, and also of the territory that it would open up for new enterprises, and granted the privileges wished for. The road is now in process of construction, and it is hoped to have it in operation early this fall.

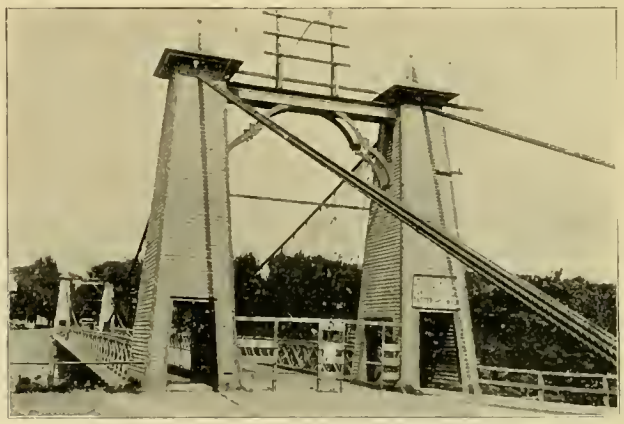
The officers are George S. Barnum, president; N. W. Kendall, vice-president; F. L. Bigelow, secretary, and S. J. Fox, treasurer.

A heavy storm at Pittsburg, July 15, washed away nearly two miles of road of the Citizens' Street Railway, and temporarily stopped most of the street car lines of the city.

President Hurt denies the rumor of a deal between the Consolidated Street Railway Company and the Atlanta Electric Railway, for a portion of the latter's track. He says the road now has plenty of mileage to maintain and operate, and has had no negotiations for additional track.

BINGHAMTON BRIDGE UNSAFE.

The Ferry street suspension bridge over the Chenango river, at Binghamton, N. Y., has been examined by Charles F. Stowell, C. E., consulting engineer to the railroad commissioners of the state and declared to be unsafe for the amount of traffic imposed upon it. The bridge was built some twenty or twenty-five years ago to accommodate a part of the city at that time undeveloped, and of late years the growth of that section has been such as to impose upon the bridge much greater traffic than it was ever intended to carry. One of the lines of the Binghamton Railroad Company crossed it until a few weeks ago, and J. P. E. Clark, general manager, writes us to the effect that when the lines were changed from horse power to electric the attention of the railroad commissioners was called to the condition of the bridge, with the result that certain changes were made with a view to strengthen it. Each year the travel has increased and a short time ago the



FERRY STREET BRIDGE, BINGHAMTON, N. Y.

attention of the municipal authorities was again called and inspection by expert engineers ordered, all of whom agreed that it was unsafe. Prior to the inspection the railroad company had petitioned for a line through another street and over another bridge, but opposition on the part of property owners was encountered. In lieu of property consents a commission was appointed and after a thorough investigation reported in favor of the company. The matter is now only waiting the confirmation of the appellate court which, being only a matter of form, will probably be obtained. The commission and the public at large united in recognizing the importance of increasing the street car facilities and, therefore, sided with the company.

The bridge is well shown in the accompanying engraving. Its length is 362 feet with a clear roadway of 16 feet and two sidewalks of 6 feet each. The report of the engineer shows that the cables are in bad condition and some of the exposed timber work rotten. The bridge is, however, left open to pedestrians.

Bangalore, India, a manufacturing city of 60,000 population, is considering an electric railway.

The cable railway to Upper Douglas, Isle of Man, has been completed.

Cork, Ireland, has practically consented to the construction of an electric railway system.

Brussels, Belgium, is the headquarters of a new company with $200,000 capital stock known as the Societe Belge des Tramways.

Construction is proceeding on the electric railway between Dorignies, Douai and Aniche, manufacturing towns in the Department Nord, France.

Glasgow's subcommittee on mechanical traction will recommend the immediate installation of the overhead trolley system between Kelvinside and Dennistoun.

The Dublin United Tramways Company has taken possession of its recent purchase, the Dublin Southern Tramways. This is the new line to Dalkey recently electrically equipped.

The French Thomson-Houston Company is negotiating the purchase, for $1,900,000, of the interest in the Paris street railways now held by the Continental Metropolitan Tramways Company.

J. Clifton Robinson, on his retirement from the position of managing director of the Dalkey & Dublin Electric Tramway Company, was presented with a handsome silver tea service by the employes.

Malmo and Limhamn, Sweden, five miles apart, will be connected by electric railway if the asked-for franchise is granted. Current will be distributed by the overhead trolley from a power house at Lilla Framnos.

Moving sidewalks will transport passengers at the Berlin Industrial exposition. The first platform will move at the rate of three feet per second and the fourth platform twelve feet per second. The latter will have seats and a roof.

Whitemore Clarke, manager of the Madras, India, Electric Tramway, met with an accident recently, his carriage having been run into by one of his own cars. The carriage was overturned and considerably damaged, but Mr. Clarke escaped with only a slight shaking.

Birmingham, Eng., has decided to lease its principal street railways to a syndicate composed of men interested in the Montreal, Canada, Street Railway Company. The Canadian syndicate will pay $24,300 a year, put in electricity, give 1-cent fares, and shorter hours for employes.

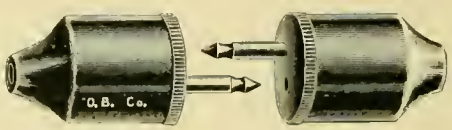
The directors of the Metropolitan and the District underground railways of London, desire to install electricity. Four or five electric construction companies stand ready to put in the new power. The change is delayed "until it is proved that the new system is commercially practicable." In the meantime experiments are being made to determine the power required to haul trains.

Sheffield, Eng., has taken possession of the street car lines. The first acts of the municipality were to reduce fares to 2 cents, shorten the men's hours and add to the number of employes. The decrease in working time is equivalent to three days a week for each man, with an additional expense to the city of $6,000 a year. Mechanical traction of some kind will be installed in place of horses.

Gas cars will be placed on the street railway between Lytham and Blackpool, Eng., which is nearing completion. The 15½ miles of track was laid by the Blackpool municipality at an expense of $90,000, and is leased to the Lytham Company. The latter has contracted for 25 gas motor cars to be furnished by the Gas Traction Syndicate, London, at $3,400 each, complete. The syndicate agrees to operate the line seven years for nine cents per car mile with a minimum of 163,000 miles per year. Aside from a brief experiment in South London, this is the first gas railway in Great Britain.

CONNECTOR FOR LIGHTING TRAILERS.

The growing use of trailers, not only on special occasions, but in regular service, emphasizes the need of some suitable connector for supplying current for the

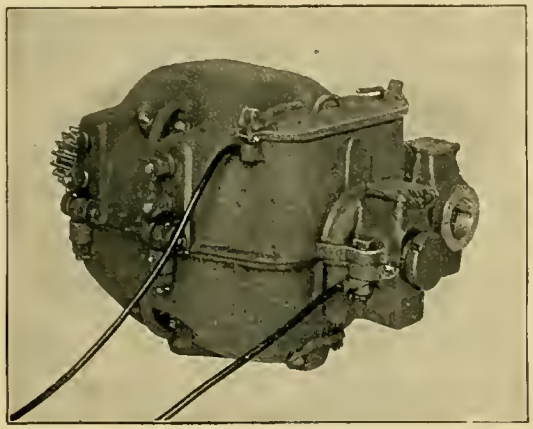


electric lights in the trail car. The Wood trailer connector, made by the Ohio Brass Company, Mansfield, O., has been in use two or three years, and is at once simple and effective, and very satisfactory. They can

be joined in an instant. In case of repair or desired inspection, they are easily taken apart by unscrewing the threaded caps. The illustrations fully explain the device.

NEW GENERAL ELECTRIC MOTOR,— G. E. 1,000.

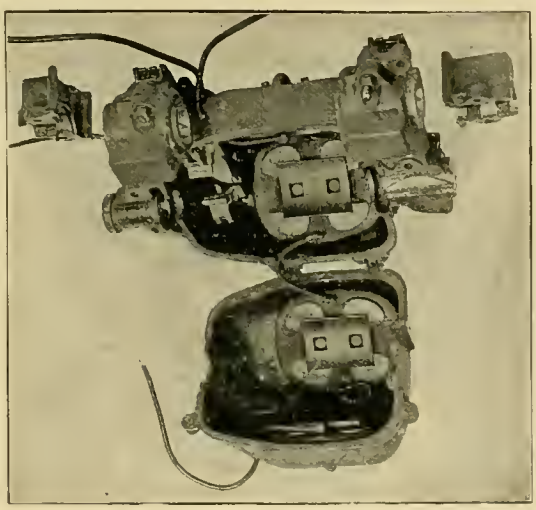
To meet the demand for a size of motor intermediate between the G E. 800 and the G. E. 1,200, the General Electric Company has put out a new motor called the



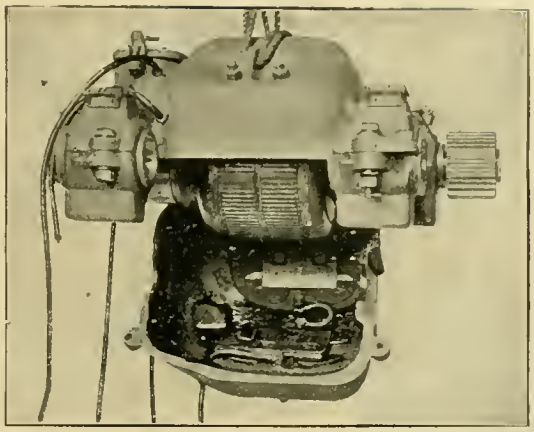
G. E. 1,000 MOTOR CLOSED.

G. E. 1,000. As this motor has some improvements over the G. E. 800 motor, as well as being a new size, a somewhat detailed description of it will be in order. The armature is of the usual iron-clad type, with slotted core built up of soft iron disks. The coils have been improved over those of the G. E. 800 by having the short commutator lead start from the center of the end of the coil. This makes removal of the coil for repair easier, as only half as many coils need be lifted when the armature is being fixed. There are in all 93 coils of four turns each. The diameter of the armature is only 14½ inches, and its weight 570 pounds.

The frame is designed so that the lower half can be lowered into the pit. It is hinged to the upper half at the front. A hand hole is provided in the bottom of the case, under the commutator, which allows any foreign matter to be easily removed. This hole is

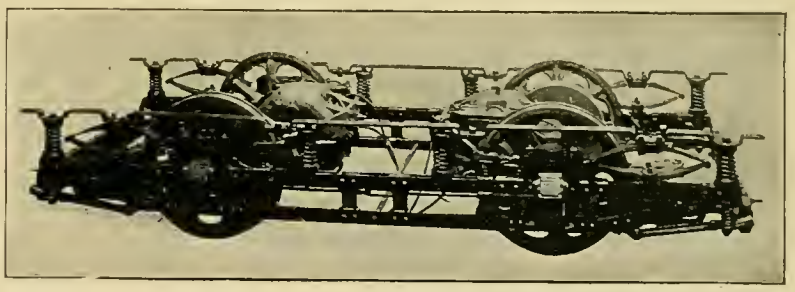


G. E. 1,000 MOTOR—ARMATURE REMOVED.



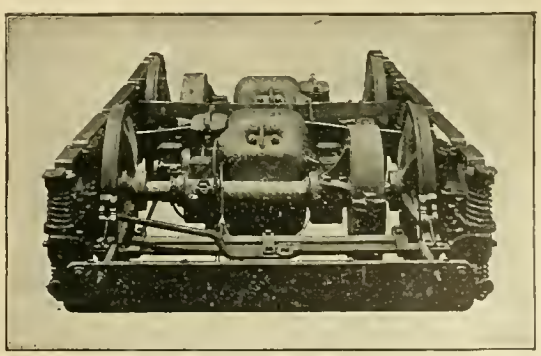
G. E. 1,000 MOTOR OPEN

covered with a water-tight lid. The weight of the top field complete is 884 pounds, and that of the bottom field 495 pounds. There are four field coils, so that heating is distributed over a greater surface than with two coils. The commutator consists of 93 bars of hard rolled copper, held in place by a ring nut. There is very little chance for oil to work itself underneath the segments. The commutator diameter is 8¼ inches. The brush holder is a modified form of that used in the



G. E. 1,000 MOTOR SUSPENSION.

G. E. 800. The brushes are held radially. The yoke is treated with an insulating compound with enamel finish to prevent surface leakage. The bearings are babbitt. Either oil or grease can be used without danger



G. E. 1,000 MOTOR SUSPENSION.

of leakage into the interior of the case. In case oil is used, wool waste is put in the grease box on top of the bearings, and the oil is discharged entirely outside. The

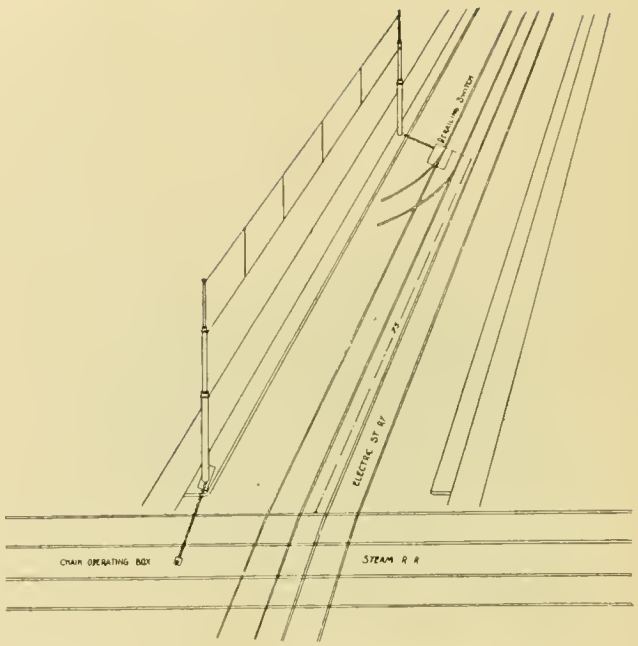
suspension of the G. E. 1,000 is something new, but very simple. The suspension of the motor, by its center of gravity on the truck, is accomplished by bending the ends of the suspension bar back so that where they rest on the side bars of the truck they are in line with the center of gravity of the motor. The suspension bars are thus yoke-shaped, and this suspension is known as the yoke suspension. The total weight of the motor is 1,950 pounds.

DECISION AFFECTING INDEMNITY DEPOSITS.

A decision was recently rendered in a justice's court of San Francisco affecting the status of indemnity deposits required by street railway companies of their employes. The plaintiff, a motorman formerly in the employ of the Oakland Street Railway Company, alleged that he had been obliged to deposit $25 upon entering the company's service, and also to take out a policy in a surety company to indemnify the railroad company against damage caused by carelessness or neglect.

The plaintiff's car ran into a woman, whose threatened suit against the company was compromised by the payment of $230. The motorman was discharged, his $25 retained and a demand made upon the surety company for the $225 balance. In the decision of the suit brought to recover the $25 it was decided the indemnity contract was designed to cover only loss or damage to the company's property, and that the matter having been settled out of court the transaction did not militate against the employe. Judgment was therefore given in favor of the motorman.

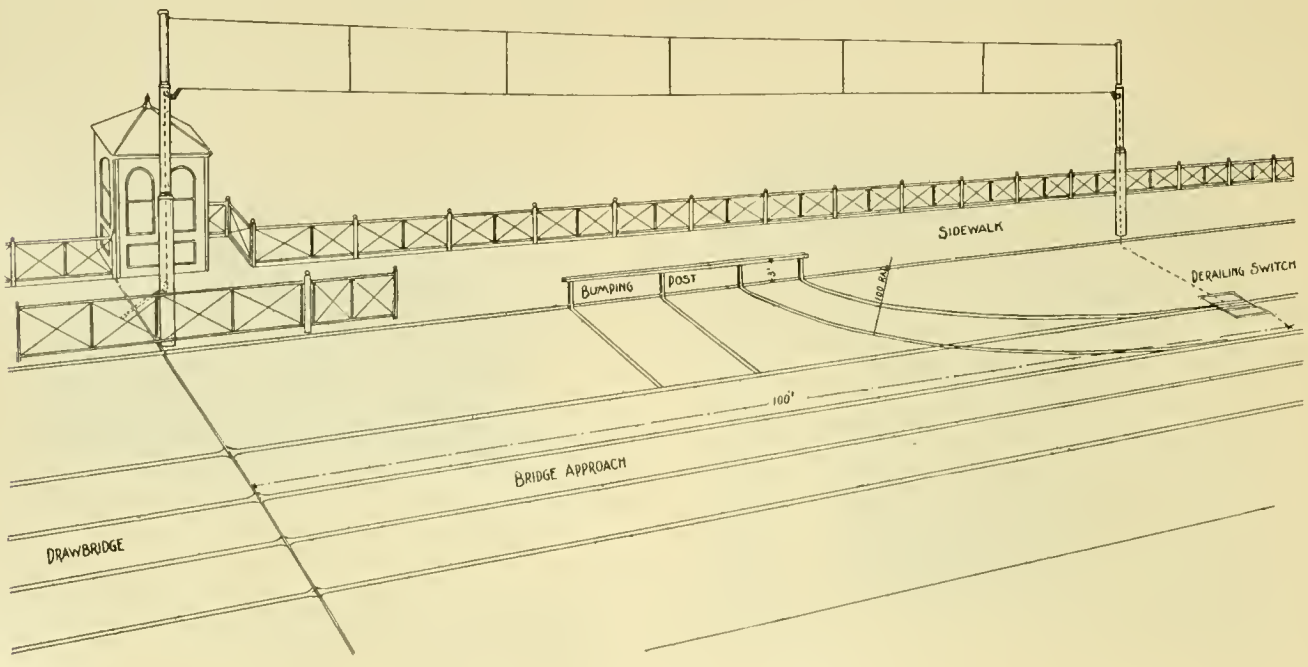
Two cars on the Manistee & Filer City Electric Railroad were held up July 30, and the available money was taken.



DERAILING SWITCH OPERATED FROM BETWEEN THE STEAM TRACKS.

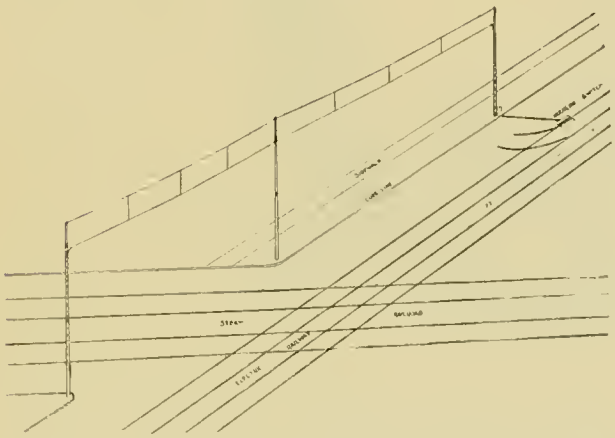
OVERHEAD CONSTRUCTIONS FOR DERAILING SWITCHES.

In our June issue we published an outline of the plan of connecting derailing switches to operating levers some distance away, by means of overhead wires, as used by the Cleveland City Railway at drawbridges. We now show the scheme more in detail, and as applied to steam railroad crossings as well. The poles used are the ordinary steel or iron poles, from which the span wires supporting the trolley wire are stretched. A wire is stretched between the two poles, from which carriers hang for keeping the sag out of the operating wire. The switch is held open by a spring, so that only one wire (for the purpose of pulling it open) is needed from



DERAILING SWITCH CONNECTIONS FOR DRAWBRIDGE.

the lever to the switch. Bell crank levers are used instead of pulleys where the wire changes direction. On the draws at Cleveland the operating lever is put at the edge of the draw, so that the conductor is in danger of falling into the river if he tries to open the switch when the draw is open. This plan comes very near being an absolute protection against a car going through a draw. For a bumper at the end of a derailing switch the rails are bent up, and a rail bolted across the ends three feet from the ground. The plan of overhead connection is specially valuable on drawbridge



DERAILING SWITCH OPERATED FROM BEYOND THE STEAM TRACKS.

approaches where it is difficult to put the wire underground. We show also the same method as applied to steam road crossings in two ways. In one a chain operating box is put between the steam tracks. In the other the lever is put on the far side of the crossing, so that the conductor must cross the tracks before he can close the switch.

FIGHT BEGINS ON MOTOR PATENTS.

The Thomson-Houston Company last month filed a bill in equity against the Gloucester, Essex & Beverly Street Railway of Essex, Mass., for infringement of a patent granted to Norman G. Bassett (number 457,102) on the details of construction of street railway motors. This is in reality a fight between the General Electric and Walker Companies, and is of a good deal of interest to street railway companies.

REAR SEATS FOR NEGROES.

A recent decision of a court at Atlanta, in the case of a negro who refused to move from the front seat of a trolley car when directed to do so, is to the effect that negroes have no right under the law to ride upon any part of the car except that designated for them, and that white persons have no right to ride upon the rear seats so designated.

Trolley President—How does that new fender work?

Superintendent—I never saw anything like it. They never know what strikes them.—Life.

CHANGES IN THE McKINLEY ROADS.

Since the McKinley syndicate, which controls the lines at Springfield, O., and Bay City, Mich., acquired the ownership of the Joliet Street Railway, there has been some shifting of offices among those roads. C. C. Rush leaves the management of the Bay Cities Consolidated Railway and takes that at Joliet. S. L. Nelson, general manager of the Springfield Railway, takes in addition to his present duties that of general manager of the Bay Cities Consolidated. He was at one time previous, manager of the latter property, but has been devoting all his time to Springfield recently. W. R. Morrison, who has been acting superintendent of the Springfield railway for several months past, goes to Bay City as superintendent under Mr. Nelson, and E. F. Tindolph, late manager of the Vincennes Citizens Street Railway, becomes acting superintendent at Springfield.

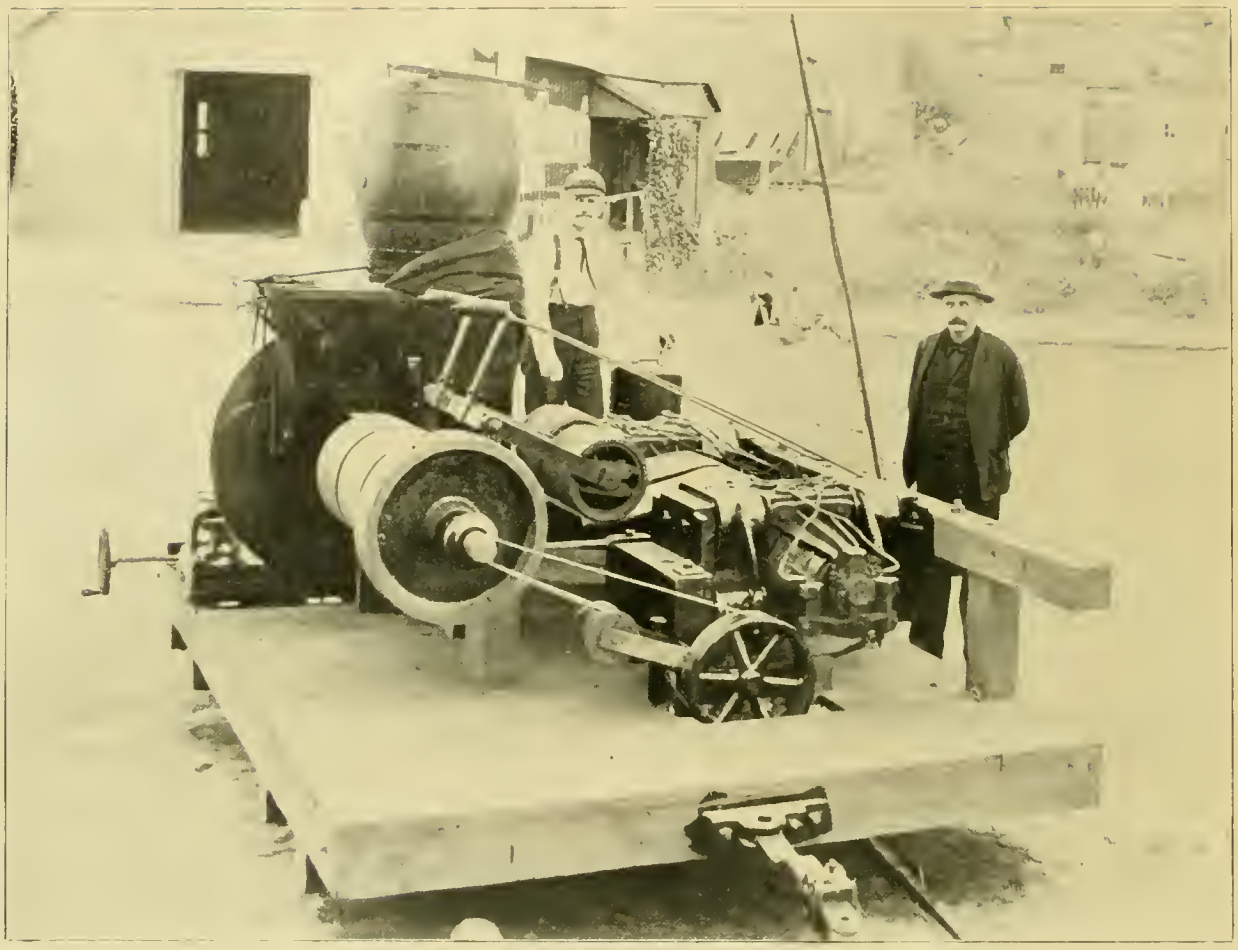
S. L. NELSON.

TROLLEYS FOR FARMERS.

A project is on foot in California to provide cheap and convenient means for the transportation of fruit and other farm products, as well as passengers, from the Sonoma valley to the landing place of the schooner which runs to San Francisco. The scheme is to build an electric line from Sonoma to Santa Rosa, twenty miles through one of the finest sections of the State. Bonds to the amount of $250,000 to $300,000 will be issued, but the English holders of them, in order to insure the interest for two years, propose the issuance of ticket books good for 1,000 miles of travel for $10, or 1 cent a mile. The tickets are to be transferable. The promoters expect to get to work within sixty days.

ELECTRICITY IGNITES COAL OIL.

A coal oil wagon was overturned at Detroit July 29, by an electric car of the Mount Clemens line and the street in the vicinity flooded with oil. A car upon another line came up and a spark set fire to the oil. The pavement, sidewalk and telegraph poles were considerably burned. A delivery team was driven into the oil before its driver saw it was burning, and the driver considerably burned. The horse was so badly burned that he was immediately killed. A girl with a baby in her arms became frightened and jumped from the car, falling against a pole. She was picked up unconscious, and with the baby, who was somewhat bruised, was carried to a place of safety. Her face and hands were somewhat burned, and she received a bad cut on the head.



RAIL SAW AT GRAND RAPIDS.

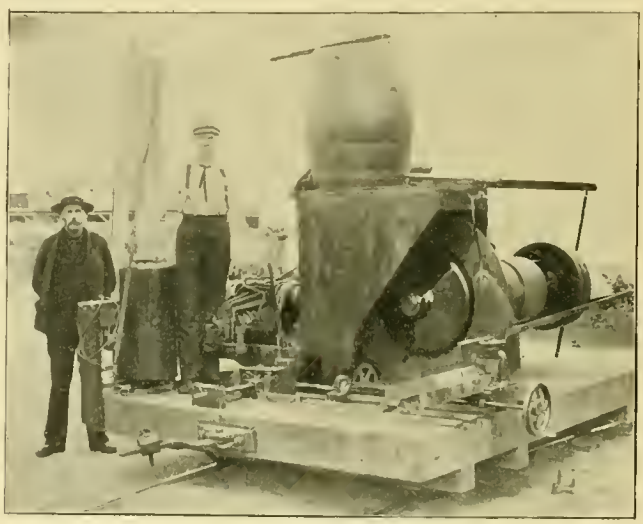
SAWING RAILS AT GRAND RAPIDS.

Electric Motors for Power—One Cut Per Minute Through 66½-Pound Girder Rail.

An enterprising management at Grand Rapids has devised and built a rail saw which we do not hesitate to say is superior to anything yet attempted in that line by an electric railway company. The railroad experience of G. S. Johnson, the general manager, convinced him that the road could make good use of a machine which would saw off the battered ends of the rails in some of its tracks so that they could be relaid and the purchase of new steel saved. He knew they would make tolerably good track after such treatment, and thought that a couple of old Rae motors the company had might be used to drive a saw if the other parts could be obtained without too great expense. The matter was laid before Warren Annable, the master mechanic, who took the matter under advisement, and soon had the necessary castings and forgings under way. The different parts of the machine, as it now stands, were arranged and put together by him. Our engravings show the apparatus, and give a good idea of how it is constructed. The two Rae motors are belted to the saw shaft and idler pulleys keep the belts tight. The saw is a smooth steel disk 42 inches in diameter, and making 1,800 revolutions per minute. In operation it is a success. It will cut off one end of a 66½-pound girder rail in one minute. Sawing off battered ends with this machine costs the company about $1.50 per ton, including bringing the rails to the saw and taking them away and all necessary handling.

The following are the dimensions:

Diameter of saw mandrel, 3¾ inches; length of saw mandrel, 7 feet; length of bearings, 12 inches; number of bearings, 2; two man-



RAIL SAW AT GRAND RAPIDS.

drel pulleys, 16-inch diameter by 12-inch face; two motor pulleys, 16-inch diameter by 12-inch face; two tightener pulleys, 10-inch diameter by 12-inch face; speed of mandrel, 1,800 per minute; balance wheel and flanges, 24-inch diameter by 6-inch face, cast steel; saw, steel disc, 42 inches diameter, ¼-inch thick; mandrel nut for holding the saw, 6 threads to one inch; feed table, 12 inches by 18 inches, dovetailed, 32 degrees; feed table bed, 13 inches by 14 inches; feed screw, 1¼-inch diameter, 7 threads to one inch; pulley on mandrel to drive feed works, 2½-inch diameter; receiver from above pulley, 16½ inches; pinion on same shaft, 11 teeth; bevel gear, 22 teeth; intermediate pinion, 30 teeth; feed screw gear, 50 teeth; ¾-inch stream of water fed on to saw from a tank above, stream divided into small jets.

Dimensions of car holding machine are:

Width, 8 feet; length, 12 feet; height from rail, 19 inches; diameter of wheels, 16 inches; diameter of axle, 3 inches; wheel base, 7 feet. The Rae motors are 30-horse-power each, and while at work, under a voltage of 500 or 525, consume 40 to 80 amperes.

The apparatus is not very expensive to construct, for roads having old motors and their own machine shops, and it certainly is a very cheap method of sawing.

COMPRESSED AIR IN SHOPS.

The use of compressed air around street railway shops can hardly be called a novelty, but nevertheless there are very few shops that are as yet equipped with it. In power plants it is more common than in shops. In the shops of the Oakland, San Leandro & Haywards Electric Railway, air is compressed by an ordinary pump belted to the line shaft. The pressure used is about 45 pounds per square inch. Its chief use is in blowing dust out of armatures, for which purpose a fine nozzle attached to a hose is employed. Secretary A. L. Stone says that this is the only inexpensive method that they have found to get rid of all the dust.

A car ran off the track while descending the Lookout Incline & Lulu Lake Railway at Chattanooga, Tenn., July 17. The cable was promptly stopped by a signal to the power house, and nothing serious resulted. This road and the safety appliances used on it were described in our issue of last June.

MILWAUKEE FIRE.

The Milwaukee Electric Railway had another car house fire July 20. In December, 1892, it lost its largest car house and repair shops. The last fire was not so serious, being the Third street barn. No cars were lost. The barn was insured for $18,000. It was a two-story brick-veneered structure about 150 feet square, and was built for $30,000 ten years ago. It is located at the corner of Third and Chambers streets, about four miles from the center of the city. The fire was first discovered in one corner of the second floor, and was under such headway that the men did not try to stop it, but went to work to get the few cars out that were in the barn. The house was a total loss, as is shown in our engraving. One fireman was seriously hurt by falling walls. There is no good evidence as to what caused the fire, but on account of the feeling against the company and the recent strike there is some reason to think it was incendiary. The house will be rebuilt.

INTERIOR MILWAUKEE THIRD STREET BARN AFTER FIRE.

THIRD STREET BARN—MILWAUKEE.

HALF FARES

Interesting Bits of Information from all Parts of the Country, Boiled Down for Busy Readers.

Captain John Strong, for many years superintendent of the old Central Street Railway, of Peoria, Ill., died July 19, at the age of sixty.

Some one with a grievance against the North Tonawanda Street Railroad Company entered the car barn one night recently and drove nails into two armatures.

Traffic on one of the street car lines of Dubuque, Ia., was suspended for a time July 26, the power house having been struck by lightning during a severe storm.

The John Stephenson Company on July 24, secured a judgment against the Fulton Construction Company, of New York, for $7,739, being the balance due on cars built in 1890.

Counterfeit tickets of the Citizens Street Railway, Detroit, keep the conductors of that line busy "guessing." They are a lithographed reproduction of the genuine, similar in size, shape and color.

A new labor law in Louisiana enacts that ten consecutive hours labor in twenty-four, with reasonable time for meals, shall constitute a day's labor in the operation of all street railroads owned or operated by corporations.

A Sunday observance war has broken out at Haverhill, Mass., and warrants have been sworn out against Franklin Woodman, of the Lowell, Lawrence & Haverhill Railroad and several others connected with a resort upon the lines.

Superintendent Durbin, of the Denver Consolidated Tramway Company, gave a trolley party on the evening of July 16 to the employes in the offices of the company. A new car lighted with 360 electric lamps went over all the lines of the road and the trip was thoroughly enjoyed.

The warden of the state prison at Columbus, O., failed in his object on a recent trip to Chicago to procure a dynamo for purposes of electrocution, the manufacturers informing him that the current from their machines would not produce death, and refusing to sell them for that purpose.

The suit brought by the county commissioners against the East Liverpool, O., Street Railway Company, to compel the vacation of four miles of road between the city and Wellsville, for violation of franchise, has been compromised by the payment of $2,500, and the line is in operation again.

Ground was broken July 15, for the Springfield, Vt., Electric Railway, with appropriate ceremonies. The road will extend to Charlestown, N. H., and there connect with the Boston & Maine. The stock is largely owned by local capitalists.

Boys at Paterson, N. J., have of late been amusing themselves by entering the car sheds, turning on the current and letting the cars run wildly into the street. A few days ago one of them sent a car against the closed doors and wrecked both them and the car. He was captured and committed to jail in default of $300 bail.

It is reported that the parties interested in the projected Benton Harbor & Eastern Electric Railway which was intended to reach Keeler, Decatur and Paw Paw, may change their plans on account of the apathy of citizens along the line. On the eastern end of the line the right of way is being granted without difficulty. The work on the tunnel at Benton Harbor will not be delayed.

Another step in the Blackstone Valley, Mass., Street Railway litigation has been reached by the filing of an involuntary petition in insolvency against Edward W. Shedd, of Worcester, by the George F. Mellen Company, of New York. Mr. Shedd is president of the engineering company which has built the road, and is the owner of a controlling interest in the stock. There are offset claims against the Mellen company, and the petition will be rigorously contested.

The Milwaukee Electric Railway is particularly fortunate in the number of parks and other public attractions reached by its lines, and General Manager Wyman is prompt to make the most of the fact by the issue of a little folder containing a list of the more important attractions, a map of the city and a list of the various lines, with a condensed schedule of first and last cars upon each. Among the leading points reached by the lines are Lake Park, Whitefish Bay, Mineral Spring Park, West Park, Juneau Park, Soldiers' Home, Mitchell Park, South Park, Schlitz Park and Summer Theater, the Chutes, etc., etc. At most of the parks various forms of amusement are provided. The little folder is a complete guide, showing where to go and how to go, and will undoubtedly be appreciated by the patrons of the road.

SUNDAY IN THE COUNTRY.

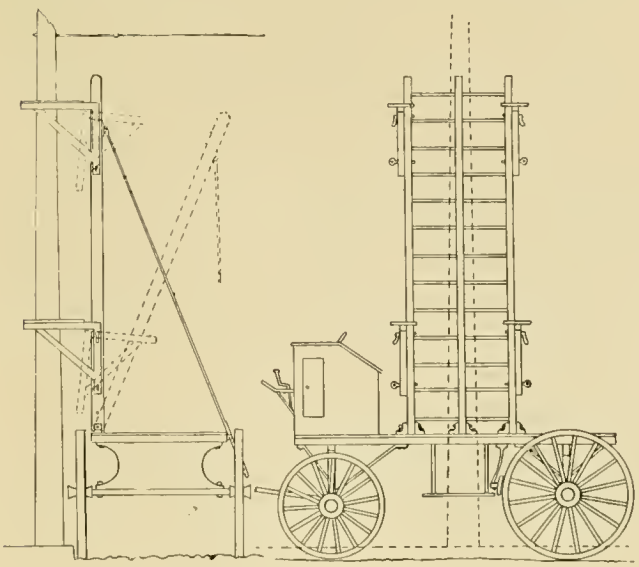
Cheap excursion tickets to Wisconsin resorts are sold every Friday and Saturday by the Chicago, Milwaukee & St. Paul Railway. Burlington, Delevan, Waukesha, Milwaukee, Elkhart, Oconomowoc, Madison, and many other attractive places, are within easy reach of Chicago. For rates and other information apply at ticket office, 95 Adams street, or at Union Passenger Station, Canal, Adams and Madison Streets.

RAPID POLE PAINTING.

A wagon which greatly facilitates the painting of poles has been designed by Henry A French, foreman painter at the Union Railroad repair shops, Providence, R. I., and put in operation with great success on that road. Our engravings show the apparatus in operation. The wagon platform is preferably mounted without springs, though the ladder can be applied to any heavy express wagon. The ladder has three sticks in order to

PAINTER'S WAGON, PROVIDENCE, R. I.

make it wide enough so that both sides of the pole can be reached at the same time. Each outside stick has a brace rod near its upper end. The supports for the painters consist of four knee brackets, which are put two on each side of the ladder. The space from the ground is divided, so that a man can reach to paint from the ground to the first bracket, from the first to the second and from the second to the top of the pole. These knee brackets are held by removable pins passing through the side of the ladder and bracket. The ladder



DETAILS OF PROVIDENCE PAINTING WAGON.

and brace are also held by removable pins. In practice the wagon is driven from pole to pole with the ladder erect and the brackets hanging by chains, as shown by

PAINTER'S WAGON, PROVIDENCE, R. I.

the dotted lines of the drawing. If trees interfere the ladder can be tilted over as shown by the dotted lines. The time required to move from one pole to another, including the placing of brackets, is less than a minute.

TROLLEY'S FINAL VICTORY IN CHICAGO.

The entrance of the trolley to the down town streets of Chicago will soon be complete. On July 30, Mayor Swift signed an ordinance giving permission to the North and West Chicago Street Railroads to put up trolley lines in the heart of the city which will give terminal facilities to all the lines that do not now run down town by electric power. The companies have been gradually acquiring permission for the erection of overhead work in the heart of the city for several years, but until the last ordinance was passed there were many lines that could not run to the heart of the city, and the makeshift of hauling electric cars by horses had to be resorted to. New York is now the only large American city without a network of electric lines.

The Lake Street Elevated Railroad has resumed the use of electricity on its Market street line, and within a short time it is expected that the whole line will be again so operated.

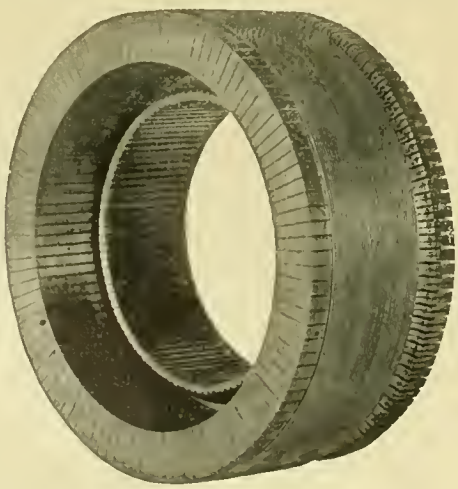
SECOND STREET RAILWAY GENERAL PASSENGER AGENT.

Last month we presented the portrait of H. W. English, the first street railway general passenger agent, who was appointed to that position on the Birmingham Railway, Birmingham, Ala. in June, 1892. We now present his successor, James E. Scott, who was appointed December 15, 1892, as the second street railway general passenger agent. He has held the position ever since. He has been in the street railway business since '89, and is therefore thoroughly acquainted with it in all its details.

JAMES E. SCOTT.

G. E. 800 COMMUTATORS.

The General Electric Company is now furnishing complete sets of segments and segment insulations for all types of railway motors, securely bound together by a band of wire to prevent movement, and finished ready for assembly on the old shell. In refilling the commutator sometimes considerable difficulty is experienced on account of the necessity for great accuracy in turning the segments to fit the cones of the shell. The assembled segments, as now sent out, are also slotted and tinned for the reception of the armature leads, and the only work necessary in the shops of the purchasing company is to screw together the cap and shell clamping



G. E. COMMUTATOR—COMPLETE SET OF SEGMENTS READY FOR SHIPMENT.

rings, solder in the leads and true off the face of the commutator. Nearly all the machine work on new commutators at the operating company's shops is thus done away with. As the segments are clamped together by hydraulic pressure, they are much firmer than those put together in most street railway shops. Hard rolled copper only is used for these segments. The large diameter of the commutator of to-day, and the greater width of segments facilitate connection of the armature leads, and remove the necessity for an eared commutator. To give a longer life, the depths to which the segments can be turned has been increased by 40 per cent. The new segments, known as form 6, can be used in the repair of form 4 commutators. No change in the brush holder is necessary—only a small readjustment of the yoke.

SPLICER FOR SOFT DRAWN COPPER WIRE.

This feeder wire splicer affords a practical means of making a quick, cheap and effective splice in feeder wires, and offers special advantages to use in connection with the larger gages, for the reason that it is very difficult to make a satisfactory connection in them, without employing some device of this kind. The splicer is made of two pieces in duplicate of each other (except that one is slotted to allow solder to be poured through it) which dovetail together when in position, being held by two nuts threaded externally on their ends. The inside diameter of the central portion of the splicer is somewhat larger than the wire, which permits of a sufficient quantity of solder being placed there to make a perfect electrical and mechanical connection. The

SPLICER FOR SOFT DRAWN COPPER WIRE.

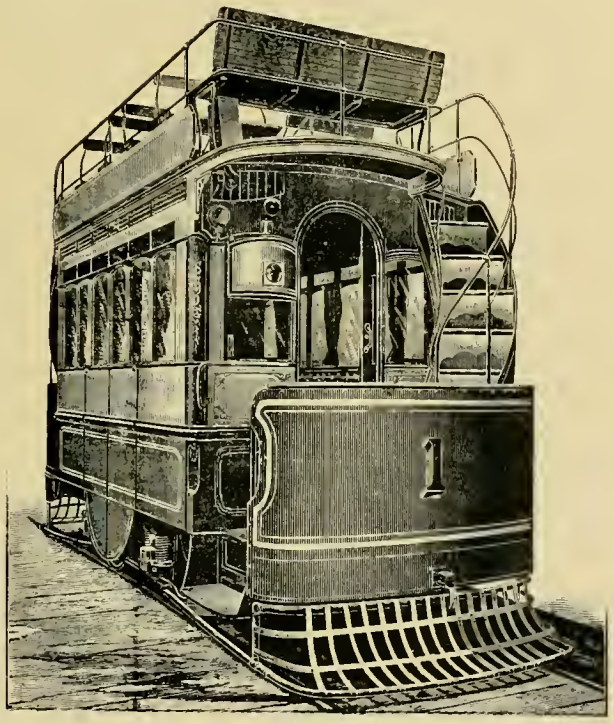
extremities of the splicer are tapered and slightly corrugated on the inside, and when clamped on to the abutting ends of the wire by threading the nuts into place, securely holds them in position. It can be used as a permanent or temporary connector equally well with solid and stranded conductors.

The splicer used with hard drawn differs but slightly in construction from that used with soft drawn wire. The greater tensile strength of the former requires a stronger method of splicing it, and to accomplish this the wires are headed on their ends, before being placed in the splicer. For this purpose a riveting tool is employed, which, in connection with an ordinary hammer makes the operation a quick and easy one. The inside of the splicer is so made that the heads seat themselves against a shoulder in it, which arrangement, together with the solder used, makes a joint the full tensile strength of the wire itself. This device is manufactured by the Ohio Brass Company.

Work on the Marion, Anderson & Indianapolis line, which was suspended on account of non-payment of the men, was resumed July 27. It is stated that the contractor is satisfied and will proceed to put the line through.

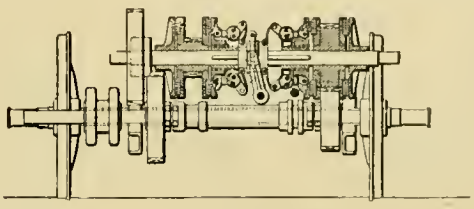
GAS MOTORS AT BLACKPOOL, ENGLAND.

The Blackpool, St. Anne's & Lytham Tramway's Company of Blackpool, England, has adopted the Luhrig gas motor which has come into prominence the past few years because of its operation at Dresden and Dessau in Germany. The cars carry 16 passengers inside and 24 outside. Their weight is 7½ tons. The engine is rated as 14-horse-power and is located at one side under the seats as shown in the engravings. It is in



EXTERIOR APPEARANCE GAS MOTOR.

reality two engines working on one crank. The cylinders are 7¼ inch diameter and 9¾ inch stroke. There are two gas tanks under the car and one under the seat not occupied by the engine. The water for cooling the engine cylinders circulates through tubes in the roof, a small pump being employed for that purpose. The governor is arranged so that when the load is light only one of the two cylinders does any work. When the car stops the engine is still kept running, but at a speed reduced from the normal 250 to 75 revolutions per minute. At the same the supply of lubricating oil is cut down so that the usual smell from the excess oil supply, when a gas engine of this kind is running light, is abolished. The car is started by means of wood faced fric-



FRICTION GEARING.

tion clutches which connect the engine with an auxiliary shaft, which in turn connects with the car axle by means of chains. The clutches and gear give two speeds, one 8¼ miles an hour and the other 4 miles an hour. The gas used is common city gas compressed to 11 atmospheres by an 8-horse-power gas engine at a compressing station. Our engravings are from Engineering of London.

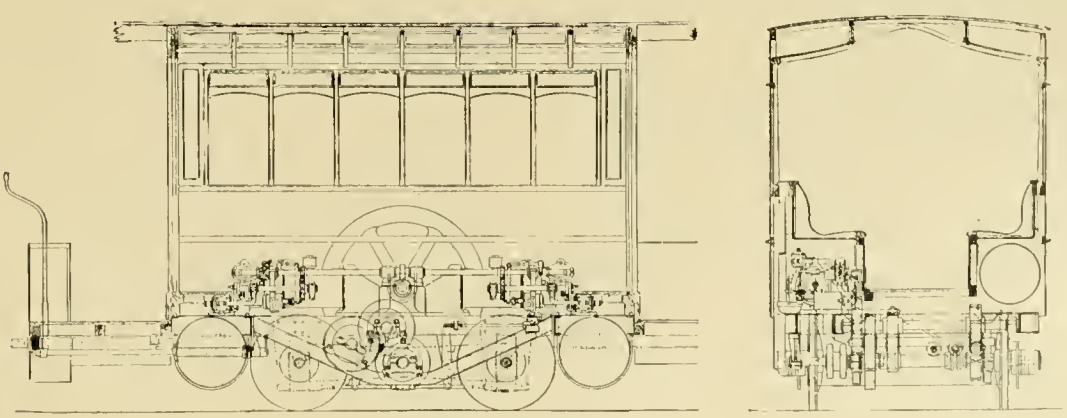
WHO GIVES THE LONGEST RIDE FOR 5 CENTS?

The question has never been settled as to what is the longest ride for 5 cents which can be had on a street car.

There are many roads making a long haul, but thus far Dallas, Texas, seems to be ahead, where, by using transfers, one can cover sixteen miles for 5 cents before being required to contribute any more money.

Who has a longer ride?

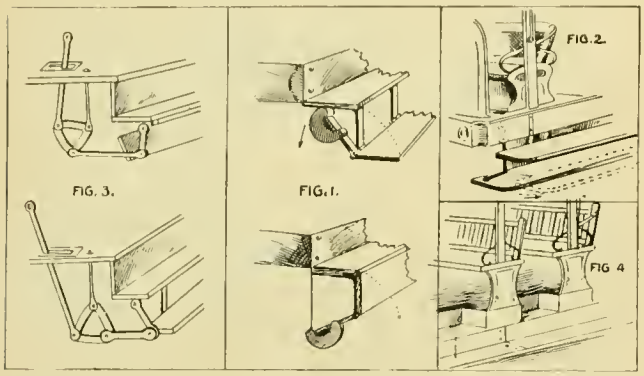
A motorman on the Homestead & Highland, Pa., Electric Railway, has been challenged to fight a duel with a Frenchman by the name of Holmes (?) whom he asked to step inside the car to make room for some ties which were to be loaded upon the platform. The challenge was turned over to the district attorney, who will probably choose weapons not commonly employed in affairs of honor.



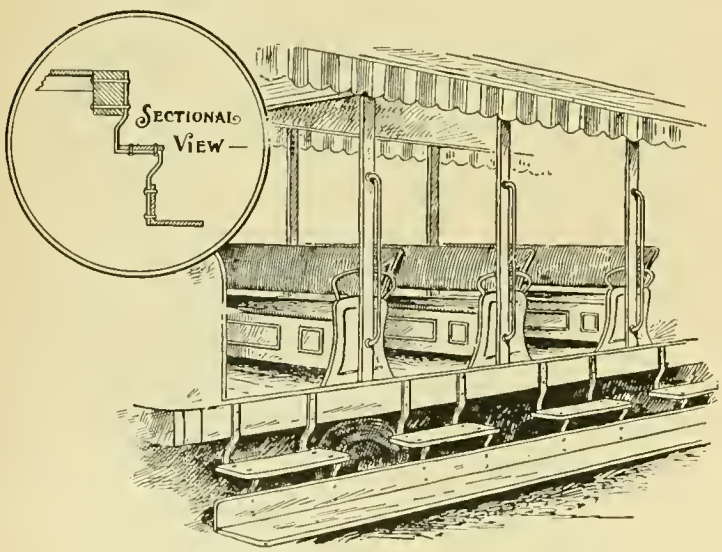
PLANS OF GAS MOTOR CARS.

LOW STEP IDEAS.

The latest agitation at Cincinnati is one for lower steps on open cars. Here are some of the suggestions that have been evolved from the brains of numerous inventors. The fold up idea seems to be predominant. Figure 1, shows a balanced folding step with a weight



attached which makes it easily operated by motorman or conductor. Figure 2 shows another step which is practically a folding step, although it slides instead of folding. It is mounted on L shaped rods, so that when swung out it projects out beyond the permanent step next above. When swung in it fits up close under the upper step. Figure 3 shows a folding step of another



MILLER CAR STEP.

design and the mechanism for working it. Another plan which the inventor says will be approved by tall women with feathers in their hats is to cut out the car floor and lower each running board as in Figure 4. Perhaps it would not be so popular with those on the end seats. Figure 5 shows a step belonging to J. A. Miller, of New Haven, Conn.

John E. Hartman, said to be a spotter in the employ of the Consolidated Traction Company, was found dead July 30, at Pittsburg. It has since been ascertained that he committed suicide.

NEW PUBLICATIONS.

The minutes of the first annual meeting of the Street Railway Association of California, held April 21, at San Francisco, have just been received. The papers contained are a valuable contribution to the literature of the street railway business and are creditable alike to the authors and the Association.

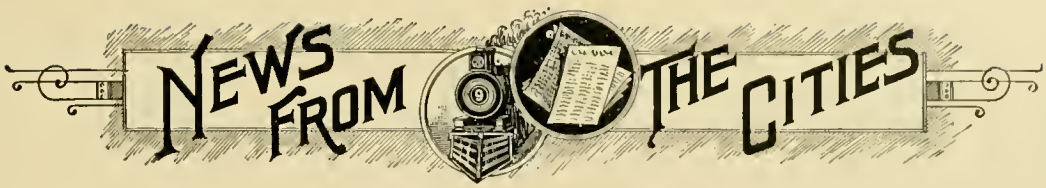
The third annual edition of "American Street Railway Investments" has been issued by the Street Railway Publishing Company of New York. The principal change from last year is the presentation of balance sheets and the arrangement of operating statistics for four years instead of for three.

"City Government" is the name of a new monthly magazine devoted to the practical affairs of municipalities. It is published in New York and Chicago, and the matter and appearance of the first number give promise of an interesting and successful publication. The special feature of this number is a comprehensive illustrated article on St. Paul, Minn.

The Aultman & Taylor Machinery Company, of Mansfield, O., has put in pamphlet form the report of tests made by Thomas J. Pray, the steam engineer of Boston, on a Cahall vertical water tube boiler, at the Armstrong Cork Company's works, at Pittsburg. The results are remarkable and we can recommend the book as valuable reading for all steam users and engineers.

"The Wisconsin Engineer" is a publication issued quarterly by the engineering students of the University of Wisconsin, of which the first number has just been received. It contains some excellent papers and illustrations from photographs of rooms devoted to mechanical purposes, and if the promise of the initial number is fulfilled the publication cannot fail to reflect great credit upon the institution.

The second volume of "The Engineering Index," published by the Engineering Magazine, New York, has just appeared. The volume is worthy alike of the board of management for the thoroughness and care with which its work has been performed and of the publisher, who has made possible its presentation in such satisfactory form. In connection with the first volume, published in 1892, by the Association of Engineering Societies, whose representatives have prepared the matfor the present volume, it makes a complete classified index of all important engineering literature published by the periodical press for the last eleven years. The work will be carried on in the monthly index of the Engineering Magazine, and these index notes will be republished annually in separate form in series with the two previous publications. Cloth, octavo, 474 pages. Price $4.



Arkansas.

FT. SMITH, ARK.—The Ft. Smith Street Railway Company has applied for right to change from horses to electricity.

BERRYVILLE, ARK.—Farmers and business men held a preliminary meeting at Berryville, July 11, to form a company to build a standard gage electric railroad from that place to Eureka Springs.

California.

SAN JOSE, CAL.—John Center, of San Francisco, has been given judgment for $45,077 against the Alum Rock Railway.

SAN LUIS OBISPO, CAL.—J. L. Howard and E. Goodall have been granted a franchise to lay single track on Marsh street.

MODESTO, CAL.—The Yosemite Valley Electric Railroad Company is arranging for right of way and a terminus at Modesto.

SAN DIEGO, CAL.—Right to run cars on First and Laurel streets has been granted the San Diego Electric Railway Company.

LOS ANGELES, CAL.—The Consolidated Electric Company has applied for right to extend from the Chapala street terminus.

SANTA ANA, CAL.—E. J. Tolle's bid of $10 for a street railway franchise has been accepted. For the present he will operate a steam motor.

PASADENA, CAL.—The Pasadena & Santa Monica Electric Railway Company has obtained nearly all the right of way for a line to Monrovia.

SONOMA, CAL.—Those interested in the talked-of electric railway to Santa Rosa are John M. Byxbee, of Palo Alto; John L. Boone and G. H. Mixer, of San Francisco, and N. W. Griswold, of Kenwood. It is estimated to cost $300,000.

SAN FRANCISCO, CAL.—Foundations for two engines of 1,200-horsepower are being laid in the Bryant street power house of the Market Street Railway Company. The company will take down the old electric power house on Carl street.

LOS ANGELES, CAL.—The Mt. Lowe Railway has been handed over to the creditors owing to the failure of the company to meet the interest due July 1 on its bonds. Mr. Baker, Mr. Johnson and I. B. Newton have been chosen as trustees, with full power to act. They will place a practical railway man in charge.

SAN FRANCISCO, CAL.—The Market Street Railway Company will begin the work of changing the Montgomery Street line to electricity. The reconstruction of the Post Street Cable Road will be undertaken about the same time and the Tenth street horse car system will also be rebuilt on Sansome street, and a single track narrow gage electric roadbed will be put down between Bush and Jackson streets.

SACRAMENTO, CAL.—A consolidation of the Folsom Water Power Company and the Sacramento Electric Power & Light Company has been effected under the name of the Sacramento Electric, Gas & Railway Company. Henceforth the street cars and lighting interests will be under one management. Directors, Albert Gallatin, president; Horatio P. Livermore, general manager and treasurer, W. S. Goodfellow, L. P. Drexler and Albert Gallatin, Sr.

Chicago.

CHICAGO.—The down-town trolley ordinances of the West and North Chicago Street Railroad Companies have been approved by the mayor.

CHICAGO.—The North Chicago Electric Railway Company, a Yerkes' corporation, has been granted rights on several streets in the northwestern suburbs.

CHICAGO.—The Chicago City Railway has just purchased a power house site on Forty-ninth street, 550 by 267 feet. The plant is estimated to cost $125,000.

CHICAGO.—The West & South Towns Railway Company has been consolidated with the Chicago General Railway Company. The change from lease to absolute ownership was made at the request of bondholders of the General Railway.

CHICAGO.—The North Chicago Street Railroad Company has been granted the right to adopt electricity on all remaining horse lines. This permits the electrical equipment of the Dearborn street line in the heart of the city, and the extension of the Clark street electric line to its terminus at Washington.

CHICAGO.—H. N. Cooper is acting president of the Suburban Construction Company in place of C. S. Leeds, who has been the promoter of the Suburban Electric Railroad. Ground has been bought and plans drawn for the power house. The company has leased the Chicago, Harlem & Batavia with a view to its electric equipment.

CHICAGO.—The West Chicago Street Railroad Company has been granted franchises for electric railways in Clybourn place, Augusta street, and California, Kedzie, North, Kimball, Armitage and Ashland avenues. The trolley lines also, which have been cut off at the edge of the business district, are permitted to penetrate to their proper terminals.

Connecticut.

NEW HAVEN, CONN.—An extension of its Lighthouse Point line is contemplated by the New Haven Street Railway Company.

ENFIELD, CONN.—Work is to begin within a month on the Enfield & Longmeadow Electric Railway, for which a franchise was recently granted.

ROCKVILLE, CONN.—Surveys of a line from Snipsic Lake to Talcottville, are being made by the Rockville & Ellington Street Railway Company.

HARTFORD, CONN.—E. P. Bartholomew is said to be promoting an electric railway between Hartford, Conn., and Springfield, Mass., for a syndicate of Philadelphians.

MERIDEN, CONN.—The Meriden Electric Railway Company will remove and enlarge its power house. All lines, including the Meriden & Waterbury, which is soon to be electrically equipped, will then be supplied with current from one plant.

Delaware.

NEW CASTLE, DEL.—Engineer George H. F. Wanger, of Pottsville, Pa., is surveying the proposed New Castle & Wilmington Electric Railway.

Florida.

PENSACOLA, FLA.—W. H. Bosley, the Baltimore, Md., capitalist, has accepted his electric railway franchise and expects to begin construction in thirty days.

Georgia.

SAVANNAH, GA.—The Savannah Electric Railway will be sold by United States Commissioner John D. Harrell. Bidders will be required to deposit $20,000 before bidding, and to make a first payment of $80,000.

SAVANNAH, GA.—On account of failure to meet the $15,000 interest due on its bonds July 1, the appointment of a receiver for the Electric Railway Company is requested by the Oglethorpe Savings & Trust Company, representing bondholders. John R. Young and J. S. Collins, receivers under the reorganization, have been continued as temporary receivers, pending the hearing of this last suit.

Illinois.

AURORA, ILL.—The Aurora Street Railway Company has been granted a 20-year franchise.

BELVIDERE, ILL.—The new Belvidere Electric Railway is to be extended to the fair grounds.

ROCKFORD, ILL.—The Rockford City Railway Company is getting consents on Kent street. The Rockford Traction Company wants right of way on North Winnebago street.

WAUKEGAN, ILL.—The Belle City Street Railway Company has accepted the franchise permitting the operation of the Milwaukee, Racine & Kenosha interurban over its lines.

Indiana.

JEFFERSONVILLE, IND.—The Jeffersonville Street Railway, a horse line, will be sold August 20 by auction.

MARION, IND.—Plans are being drawn for the Marion City Railway Company's new power house. It is estimated to cost $8,000.

ANDERSON, IND.—Construction of Noah Clodfelter's Indianapolis Anderson & Marion Electric Railway has been suspended suddenly

GOSHEN, IND.—The new Indiana Electric Railway was placed in operation on the evening of July 4, with great eclat. J. J. Burns is president of the company.

INDIANAPOLIS, IND.—The appointment of a trustee for the Citizens' Street Railroad Company is petitioned for by L. Dwight Church and Eleanor Church, of New York. They allege that Murray A. Verner and H. Sellers McKee, of Pittsburg, conspired to acquire control and wrongfully create stock and bond liabilities.

Iowa.

KELLERTON, IA.—The Kellerton Brick & Tile Company wants at once 1,000 feet of good, second-hand, 12 or 14-pound T rail.

KEOKUK, IOWA.—W. J. Roberts has sued to have H. C. Reiner reappointed receiver of the Gate City Electric Street Railway Company.

MASON CITY, IA.—W. E. Brice and L. H. Ong have been granted a franchise for an electric railway in Mason City with a 10-mile branch to Clear Lake. Work is to begin within 60 days and cars are to be in operation by June, 1897.

MASON CITY, IA.—W. E. Brice and L. H. Ong have accepted their electric railway franchise and assigned it to the Mason City & Clear Lake Traction Company, of which they are respectively president and treasurer. Col. L. B. Bradley, of Des Moines, is also interested. As soon as the right of way is obtained work will be pushed on the 17½ miles of road, estimated to cost $200,000. Success seems assured for the enterprise, as those interested have had experience in starting a similar road, the Tama & Toledo Electric Railway & Light Company, of which Mr. Brice, a merchant of Tama, Ia., is president, and Mr. Ong, general manager.

Kansas.

LAWRENCE, KAN.—The street railway, owned by the Lawrence Transportation Company, is reported to have passed into the hands of a receiver.

Kentucky.

COVINGTON, KY.—The South Covington & Cincinnati Street Railway Company will probably be granted a franchise for an extension in Newport.

Maine.

PORTLAND, ME.—The Portland Street Railway Company has petitioned for rights in Deering.

BATH, ME.—A. F. Gerald, of Fairfield, and I. C. Libby, of Waterville, have purchased one-half interest in the rights of the Brunswick & Topsham Railway Company, and will build the two miles of electric road. This is the project which Twitchell and Moses, of Bath, had in hand, and which was supposed to have been abandoned.

Maryland.

HAGERSTOWN, MD.—The Hagerstown Railway has been placed in operation.

BALTIMORE, MD.—Additional franchises are asked by the Edmondson Avenue, Catonsville & Ellicott City Railway.

HAGERSTOWN, MD.—The Hagerstown Railway Company has mortgaged its property to the Guarantee Trust & Safe Deposit Company, of Harrisburg, Pa., to secure $200,000 of bonds.

BALTIMORE, MD.—The Baltimore, Gardenville & Belair Electric Railway Company will build from the terminus of the Red Line Cable of City Passenger Railway to Gardenville. The road is to be in operation by January, 1897. Funds have been raised, and the right of way has been obtained of Simon J. Martinet, who controlled a majority of stock of the Belair Turnpike Company.

Massachusetts.

NEWTON, MASS.—The Newton Street Railway Company contemplates extending to Newton Corners.

WORCESTER, MASS.—Hon. T. C. Bates and William J. Hogg are promoting another street railway to Clinton.

SPRINGFIELD, MASS.—The directors of the Springfield Street Railway have accepted the Longmeadow franchise. Work will be pushed.

CONWAY, MASS.—The Conway Electric Railway Company has voted to extend its tracks. Work is soon to begin. A. M. Cook is superintendent.

BROCKTON, MASS.—Stockholders of the Brockton, Bridgewater & Taunton Street Railway Company have been assessed 10 per cent to begin construction.

BROCKTON, MASS.—The additional issue of $104,000 capital stock by the Brockton Street Railway Company has been approved by the state railroad commissioners.

BROCKTON, MASS.—A bond of $20,000, guaranteeing the construction of a line to North Easton, within 6 months, has been filed by the Brockton Street Railway Company.

HAVERHILL, MASS.—The Haverhill & Georgetown Electric Railway has been formally opened. Travel exceeds anticipations and the directors are considering an extension.

BOSTON, MASS.—The Newtonville & Watertown Street Railway Company has applied to the railroad commission for authority to extend into Boston over North Beacon street.

PALMER, MASS.—E. G. Hastings, Rufus Flynt, G. E. Buck and D. L. Bodfish, who have the project in charge, say the prospect is favorable for the construction of the electric railroad.

DEDHAM, MASS.—Authority has been given the West Roxbury & Roslindale Street Railway Company to issue $100,000 of original and $50,000 of additional capital stock and $150,000 of bonds to cover the cost of electric equipment.

HUDSON, MASS.—George A. Tripp, Henry Tower and W. H. Moulton, of Hudson, and A. R. Powers, W. N. Felton and H. N. Otterson, of Boston, have been appointed a committee to sell stock for the proposed Lancaster, Bolton & Hudson Electric Railroad.

BARNSTABLE, MASS.—The Barnstable County Street Railway Company has been incorporated to build an interurban electric railway. Capital stock, $100,000; incorporators, Samuel L. Minot, Willard Howland, Albert D. Bosson, Horace B. Maghathlin, George F. Baker, Boston, Mass.; William B. Bacon, Abel D. Makepeace, William S. Hixon and John Foster.

WORCESTER, MASS.—The Worcester & Wachusett Mountain Street Railway Company is being organized to build 20 miles of electric railway from the city up the mountain. Capital stock, $400,000; promoters, Col. Asa Kneeland, of Westminster; Daniel C. Miles, of Westminster; Col. M. V. B. Jefferson, of Worcester and Jefferson; and Proprietor Bartlett, of the Muschopang House, Rutland. Surveys will be made, and franchises obtained in readiness to begin work in the spring of 1897.

Michigan.

SAGINAW, MICH.—The Interurban Electric Railway has been placed in operation.

SAGINAW, MICH.—Ground has been broken for the new Carrollton power house of the Inter-Urban Electric Railway Company. The building will be 65 by 65 feet.

DETROIT, MICH.—Albert Pack, of the Detroit Railway Company, has purchased the Detroit & Saline Plank Road Company's rights with a view to building an electric railway.

ADRIAN, MICH.—William A. Jackson, of Detroit, trustee, has been granted a decree ordering the sale of the Adrian Street Railway, August 15, provided the $46,604 due on bonds is not paid.

ANN ARBOR, MICH.—The Ann Arbor & Ypsilanti Street Company has applied for an additional franchise for a steam dummy line, with leave to adopt electricity thereon within eighteen months.

ANN ARBOR, MICH.—Meetings of the Ann Arbor Street Railway Company and the Ann Arbor & Ypsilanti Street Railway Company were held July 31 to vote on a proposition to sell out to a new Company known as the Ann Arbor & Ypsilanti Electric Railway Company.

DETROIT, MICH.—The Detroit, Lake Shore & Mt. Clemens Railway Company has been incorporated to build between Detroit and Mt. Clemens. Capital stock, $300,000; incorporators, George S. Davis, Detroit, 495 shares; Thomas B. Balch, son of George W. Balch, New York City, 500; Thomas B. Balch, trustee, 150; Thomas N. Fordyce, 1; Annie M. Fordyce, trustee, 499; Frederick T. Ranney, trustee, 351; Frederick T. Ranney, 500; Frank C. Nall, 499; Louis J. Ranney, 5. In Mt. Clemens the new line will operate over the Mt. Clemens & Lakeside Traction Company's tracks, and in Detroit it will connect with the Ft. Wayne & Belle Isle and Detroit Railways.

Missouri.

ST. LOUIS, MO.—Thomas B. Harlan is attorney for an alleged syndicate which has applied for franchises for 50 miles of single track railway.

KANSAS CITY, MO.—The Brooklyn Avenue Railway Company has purchased the People's Cable Railway for $1,000, to legalize the reorganization.

ST. LOUIS, MO.—The Midland Street Railway Company has accepted and filed a bond to carry out the provisions of its franchise for the extension to Creve Coeur Lake.

ST. LOUIS, MO.—The report that Eugene Sweeney's City Central Railway bill had passed the council is incorrect. It has passed only one branch of the municipal government, the House of Delegates.

New Hampshire.

FRANKLIN FALLS, N. H.—The Franklin Street Railway Company has been incorporated with $20,000 capital, to build a road for which right of way is asked.

New Jersey.

RAHWAY, N. J.—The new road to Seawaren, of the Union & Middlesex Traction Company has been opened to traffic.

NEWARK, N. J.—The Newark Passenger Railway Company has been voted right to lay double track in Elizabeth avenue.

MILBURN, N. J.—The Milburn Electric Company has been incorporated by Isaac Smith, W. C. Whittingham and others of Milburn, to construct railways.

NEWARK, N. J.—The New Jersey Street Railway Company has renewed its application to construct a double track electric road on Springfield avenue.

ELIZABETH, N. J.—E. J. Field & Co., of New York, have purchased an interest in the Elizabeth Street Railway Company. They will ask a franchise for an extension through El Mora, Roselle, Cranford and Westfield to Plainfield.

CAMDEN, N. J.—Stockton has granted the Camden & Suburban Railroad Company the right to extend over State street, River road and Federal street. Merchantville has granted the right to lay another track in Maple avenue.

HOPATCONG, N. J.—Construction will begin September 18 on the trolley line of the Hopatcong Transportation & Power Company. President, Theodore F. King, Landing, N. J.; secretary, O. F. G. Megil, 76 Nassau street, New York.

RAHWAY, N. J.—The builders of the electric railway to Boynton Beach already reported in the DAILY BULLETIN have incorporated the Rahway Electric Company. Capital stock, $150,000; incorporators, Cassimer W. Boynton, Woodbridge, N. J.; Henry Maurer and Robert W. DeForest, New York.

New York.

FLUSHING, N. Y.—New rails are being laid on the Flushing & College Point Electric Railroad.

UTICA, N. Y.—Several extensions of its tracks are asked by the Utica Belt Line Company.

LEWISTON, N. Y.—The Lewiston & Youngstown Frontier Railroad has been placed in operation.

SYRACUSE, N. Y.—The Syracuse Street Railroad will be sold under foreclosure by order of court, within 5 weeks.

BUFFALO, N. Y.—Lorenz Keicher asks the appointment of a receiver for the Union Road & Trolley Land Company.

ROCHESTER, N. Y.—Franchises in Clarissa and German streets have been granted the Rochester Railway Company.

BRENTWOOD, N. Y.—An electric Railway to connect asylums at Kings Park and Central Islip may be built by the state.

ALBANY, N. Y.—The Albany, Helderberg & Schoharie Electric Railroad Company has been granted right of way into Albany.

PLATTSBURGH, N. Y.—The Plattsburgh Traction Company has begun to run cars. Power is leased, the new plant not being ready.

ONEONTA, N. Y.—The Oneonta Street Railroad may be electrically equipped, Frank Gould having an option for its purchase and conversion.

NIAGARA FALLS, N. Y.—A car barn, 200 by 200 feet, will be erected on land just bought by the Niagara Falls and Lewiston Railroad Company.

WHITE PLAINS, N. Y.—The New York, White Plains & Elmsford Electric Railway Company has been granted a stringent franchise for 1½ miles of road.

STATEN ISLAND, N. Y.—The wheels have begun turning in the Grassmere power house of the Midland Electric Railroad Company. Foundations have been laid for its new car barn at Concord.

SARATOGA, N. Y.—The Union Electric Railroad was sold July 18 under foreclosure of mortgage. Bertron & Storrs, bankers, of New York, bought the road for $8,500, subject to a mortgage for $100,000.

SAVONA, N. Y.—Frank H. Velie and W. H. Tylee, of Corning, propose to utilize the abandoned roadbed of the Corning & Sodus Bay Railroad for an electric line between Savona, Bradford and Penn Yan.

BROOKLYN, N. Y.—Work has begun on the car barn, power house and repair shop of the Long Island Electric Railroad Company south of Jamaica. The building, 540 feet long, is estimated to cost $200,000.

NEWBURGH, N. Y.—J. S. K. Hall, secretary of the Universal Surface Electric Railway Company, has been talking to Newburgh citizens with a view to building a storage battery railway between Newburgh and Cornwall.

ALBANY, N. Y.—Promoters of the Greenbush & Nassau Electric Railroad have authorized Jesse P. Van Ness, William H. Nichols, L. N. S. Miller and Gardner Morey to select eleven associates and incorporate the company when $12,000 stock shall have been taken.

PORTCHESTER, N.Y.—The Portchester Street Railway Company has been incorporated to build three miles of electric railway between Rye and Portchester. Capital stock, $100,000; directors, Winthrop G. Bushnell, New Haven; I. A. Kelsey, West Haven; Horatio N. Powers, Elmer E. Gilbert, C. T. Hughes, C. K. Cummings, and David J. Pearsall, of New York city.

ROCKVILLE CENTER, N. Y.—John Vincent, Thomas G. Knight, A. A. Pearsall, F. B. Driscoll and Charles W. Hayes, all prominent Long Islanders, have called a meeting to organize a company to build and operate a railway connecting Roslyn, Garden City, Hempstead, Rockville Center, Oceanside, East Rockaway and Long Beach. Electricity or compressed air will be the motive power.

BATAVIA, N. Y.—Promoter A. B. Wilgus has sold the franchises of the Batavia Street Railroad to a New York company headed by Nelson G. Green, an attorney, of 309 Broadway. C. Winfield Pratt, of New York, is president of the new company, Derwin DeForest, secretary; Mr. Green, treasurer, and H. A. Sage, manager of construction. It is not decided whether compressed air or electricity is to be the motive power.

SYRACUSE, N. Y.—The Onondaga Lake Railroad Company has been incorporated to build 7 miles of double track electric road from Clinton Square in Syracuse to Long Branch resort at the lake. Capital stock, $250,000; incorporators, John S. Kaufman, W. R. Smith, Bruce S. Aldrich, Edward A. Powell, James M. Belden, P. R. Quinlan, W. H. Gallup, Charles M. Warner, Edward Joy, Anthony Lamb and Howard N. Babcock, of Syracuse.

LYONS, N. Y.—The Wayne County Traction Company has been organized to build an electric railroad between Lyons and Newark. Capital stock, $60,000; president, A. C. Robertson, Athens; Pa.; vice president, Orlando F. Thomas, Lyons; secretary, D. N. Johnson, Athens, Pa.; treasurer, F. K. Harris, Athens, Pa.; directors, F. N. Dean, Ithaca; Burton Hammond, Charles T. Ennis, Clement R. Sherwood, all of Lyons, and N. C. Harris, of Athens.

NEW YORK, N. Y.—The Metropolitan Traction Company has increased its capital stock from $16,500,000 to $30,000,000. The increase is made in order to purchase property for extension, add to the equipment and to effect improvements in the system generally. Of the 180 miles of road operated by the Metropolitan Company, 140 are equipped with the old-fashioned horse cars, which must now be displaced by some modern mode of traction. Compressed air will soon be given a trial, the air compressor plant at Lenox avenue and One Hundred and Forty-seventh street being about ready for the test.

BUFFALO, N. Y.—The Buffalo, Orchard Park & Hamburg Electric Railway Company has been organized to build twelve miles of road. Capital stock, $120,000. Directors, W. W. Wheatley, New York, president; A. V. Brown, Buffalo, vice-president; U. L. Upson, Buffalo, secretary; I. W. Allan, Buffalo, treasurer; A. W. Hickman, Buffalo, attorney; other stockholders, F. K. Wing, Buffalo; S. A. Abbott, E. E. Hepp, O. L. Aga, H. A. Pierce, Armour; C. G. Briggs, Orchard Park. Surveys will soon be made by F. K. Wing. No contracts have been let, except for grading which will be done by abutters who have also given free right of way. The road is to be completed by December. The office of the company is at 500 Ellicot square.

North Dakota.

GRAND FORKS, N. D.—Mr. Pickenbrock, of St. Louis, is looking over the town with a view to taking up with the city's offer to construct an electric railway.

Ohio.

CLEVELAND, O.—The big Consolidated has been granted an extension on Cedar avenue.

TOLEDO, O.—The Toledo Traction Company has bought land for an addition to its car barn on Canton avenue.

ZANESVILLE, O.—The Zanesville Railway & Electric Company has been incorporated with $500,000 capital stock.

CINCINNATI, O.—The Cincinnati Inclined Plane Railway Company has applied for right to build lines in the village of Hartwell.

DAYTON, O.—The county commissioners have granted a franchise to the Dayton, Springfield & Urbana Electric Railroad Company.

DAYTON, O.—The Troy, Tippecanoe & Dayton Interurban Electric Railway Company has been granted a franchise through the county.

SIDNEY, O.—Directors of the Piqua, Sidney & St. Mary's Electric Railway Company have assessed stockholders 10 per cent to make a survey.

EAST LIVERPOOL, O.—The East Liverpool & Wellsville Street Railway Company has settled the suit for a receiver and none will be appointed.

PORTSMOUTH, O.—The Portsmouth Street Railroad & Light Company's directors voted July 10 to double the capacity of their power plant.

CINCINNATI, O.—The extension of the Mt. Adams and Eden Park line to Madisonville will be begun August 1, by the Consolidated Street Railway Company.

EAST LIVERPOOL, O.—The East Liverpool & Wellsville Street Railway has been levied upon in an action brought by Judge W. G. Wells and Alexander Smith.

CLEVELAND, O.—Surveys have been made and consents obtained for a portion of the twenty-five miles of electric railway planned by the Lorain County Rapid Transit Company. The promoter is F. M. Lewis, 239 St. Clair street, Cleveland.

CLEVELAND, O.—The Northeastern Railway Company has been incorporated to build an electric road from Euclid through Lake, Cuyahoga and Summit counties, to Hudson. Capital stock, $100,000; incorporators, Frank S. Lickens, Charles N. Sheldon and others.

ZANESVILLE, O.—The newly incorporated Zanesville Railway & Electric Company is backed by Tom L. Johnson, who is said to have obtained control of the Zanesville street railroad with a view to improving and extending several miles. Henry S. Newkirk, of New York, will be manager.

Pennsylvania.

MEADVILLE, PA.—The Meadville Street Railway Company has accepted a franchise in Vallonia.

SCRANTON, PA.—Double track is being laid in Lackawanna avenue by the Scranton Traction Company.

NEW CASTLE, PA.—Franchises in all the principal streets are asked by the new owners of the New Castle Electric Street Railway.

PITTSBURG, PA.—The Braddock Electric Railway Company will begin the extension over Bessemer terrace to East Pittsburg borough.

SCRANTON, PA.—The Olyphant & Winton Electric Railroad has been placed in operation. It is leased to the Scranton Traction Company.

BEAVER FALLS, PA.—The Beaver Valley Traction Company will lay several miles of additional track. A forty-acre pleasure resort will be laid out at Junction Park.

PITTSBURG, PA.—Right of way for a line to Manor has been obtained by the Greensburg, Jeannette & Pittsburg Street Railway Company. Work is to begin at once.

NEW CASTLE, PA.—The New Castle & Mahoningtown Street Railway Company has been incorporated with $12,000 capital stock, to build between New Castle and Mahoningtown.

PHILADELPHIA, PA.—The Union Traction Company will build another car barn at Forty-ninth street and Woodland avenue. The building will be 449 by 205 feet, of brick, with concrete foundations and iron roof.

PITTSBURG, PA.—The Pittsburg & North Side Traction Company has been incorporated to construct six miles of electric road. Capital stock, $36,000; incorporators, Charles H. Steele, Steubenville, O., president; W. E. Woodwell, James H. Hammett, H. H. Smith, Pittsburg, and Edward Whittish, Beaver, Pa.

Texas.

HOUSTON, TEX.—The Houston Electrical Street Railway Company has been incorporated with $200,000 capital stock. Incorporators, Albert N. Parlin and George E. Smith, of Boston, Austin Corbin, of New York, T. W. House, W. D. Cleveland, John H. Kirby, A. H. Hayward, H. C. Chase and E. P. Hill, of Houston.

Utah.

OGDEN, UTAH.—Receiver W. H. Rowe sold the Ogden Street Railway July 10 to Daniel Van Dam, of New York, representing Roland R. Conklin, of New York. The steam dummy on the Hot Springs line is to be displaced by electricity. Other extensions of the system are being favorably considered.

Vermont.

BARRE, VT.—No work will be done on the Barre Electric Railroad until June 1, 1897.

RUTLAND, VT.—The Rutland Street Railway Company contemplates an extension.

MONTPELIER, VT.—The Consolidated Electric Lighting Company has been granted the electric railway franchise.

BURLINGTON, VT.—Electricity is to be used in place of steam, as originally contemplated, on the new Burlington & Hinesburg Railroad, which is to be thirteen miles in length.

BURLINGTON, VT.—The principal stockholders of the Winooski & Burlington Horse Railroad Company have purchased the interests of Troy, N. Y., men in the Military Post Electric Railway Company. While nominally operated as separate concerns, the management will be practically the same. The Winooski & Burlington has elected the following officers: President, Elias Lyman; vice-president, Joseph A. Powers; treasurer, W. F. Hendee; clerk, B. H. Eagan. Directors—Elias Lyman, Joseph A. Powers, A. E. Richardson, W. F. Hendee, C. W. Brownell, F. C. Kennedy, A. O. Humphrey, J. S. Pierson, John J. Flynn. The Military Post has elected: President, F. C. Kennedy; vice-president, W. F. Hendee; treasurer, John J. Flynn; secretary, C. W. Brownell. Directors—F. C. Kennedy, A. O. Humphrey, J. S. Pierson, John J. Flynn, S. A. Brownell, M. A. Bingham, C. W. Brownell, Elias Lyman, A. E. Richardson, L. H. Turk, W. F. Hendee.

Virginia.

PETERSBURG, VA.—The Petersburg Electric Railway Company has given a mortgage to secure $50,000 of bonds.

West Virginia.

PARKERSBURG, W. VA.—General Manager George A. Burt, of the O. R. R. R., is at the head of the company newly organized to build an electric railway,

PARKERSBURG, W. VA.—Work was begun July 8 by the syndicate which is to build the electric road under the franchise purchased of the Park City Street Railway.

Wisconsin.

KENOSHA, WIS.—An electric road, seven miles long, to connect the railway station and new race track is proposed.

MENASHA, WIS.—The Menasha & Neenah Street Railway Company has accepted the franchise it was recently granted.

MILWAUKEE, WIS.—James T. Lentzy says the Milwaukee & Waukesha Railway Company will probably build a line to Oconomowoc.

MILWAUKEE, WIS.—The Milwaukee & Waukesha Electric Railway Company has been granted a franchise over 50 miles of streets. A force of men is at work laying a second track on the motor line, under supervision of Chief Engineer Vandergrift, of the company, and Contractor McLane. George W. Hommell is vice-president and general manager. Others interested are Jacob Wellauer, Charles Pittlekow, O. D. Bjorquist, Wm J. Morgan, J. W. Bingham, William Plankinton, A. Gettelman, H. M. Mendel, George Burroughs and G. Schroeschardt, all of Milwaukee, and James T. Lentzy, of New York; Calvin M. Brice, James T. Smith, Albert Kelly, Jr., J. N. Vandergrift, J. H. McLane, Winfield McLane, Brandon Lilley and John R. McDonald.

Canada

CORNWALL, N. S.—The Cornwall Electric Railway Company has successfully opened its lines.

QUEBEC, CAN.—H. J. Beemer must begin work on the electric railway in August or forfeit $10,000.

MONTREAL, QUE.—The power house and car barn of the Montreal Park & Island Railway were burned July 30, together with a number of cars.

TORONTO, ONT.—Dewart & Reney, solicitors, will apply to incorporate the Toronto Radial Railway Company, with power to purchase and install electricity upon the Toronto Belt Line Railway.

HULL, QUE.—The Hull Electric Railway Company at its recent annual meeting arranged for the building of loop lines and the erection of a summer hotel. Alexander Fraser was elected president and H. D. Spencer managing director.

NEW YORK STATE ASSOCIATION.

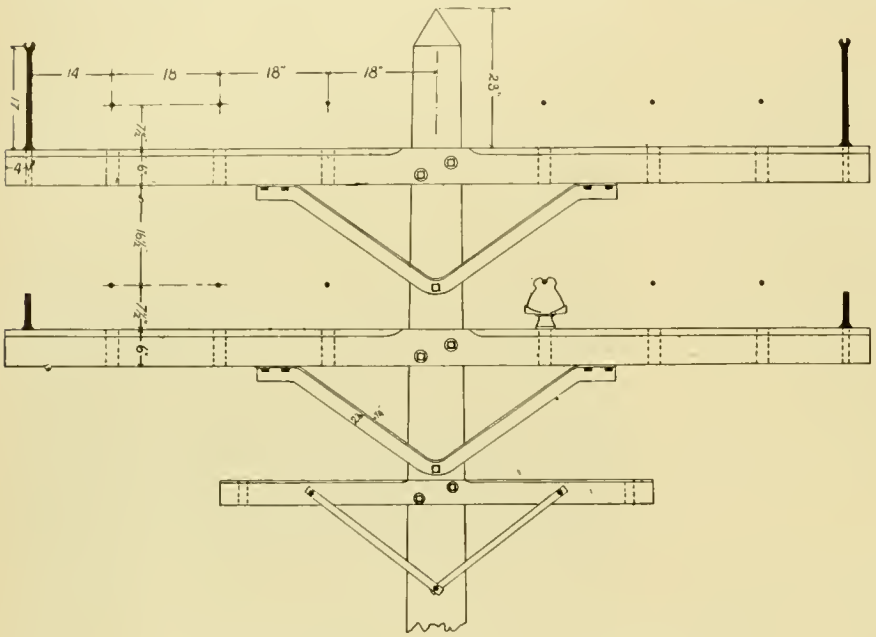
The New York State Street Railway Association will have its annual meeting at Hotel Bennett, Binghamton, on Tuesday, September 8, at 10 a. m. The city chosen is an excellent one and visitors and supply men may rest assured that they will get none but the best of treatment at the hands of the Binghamton street railway people.

The Northeast Electric Street Railway of Kansas City was sold at Sheriff's sale, August 6, to Roland R. Conklin, of New York, representing the bondholders, for $60,000.

NIAGARA POWER FOR THE BUFFALO RAILWAY.

First Power Transmitted to Buffalo Will Be for the Buffalo Railway—Important Contracts Let.

At last, after months of delay, the actual work on the transmission of power from Niagara Falls to Buffalo has been begun. The work is of special interest to street railway men, because the first power contract let in Buffalo is for 1,000-horse-power to the Buffalo Railway.



POLE LINE FOR NIAGARA FALLS-BUFFALO TRANSMISSION.

The distribution of Niagara power in Buffalo will be under the control of the Buffalo Power & Conduit Company, an organization auxiliary to the Cataract Construction Company, which owns the Niagara Falls power plant. The officers are George Urban, Jr., president; C. R. Huntley, vice-president and general manager, and William B. Rankine, secretary and treasurer. Contracts have been closed which call for all the machinery and transmission apparatus for delivering 1,000-horse-power at the station of the Buffalo Railway. The contract for the transmission line was let to the White-Crosby Company. The transformers for each end of the line, both rotary and static, will be built by the General Electric Company.

The system of transmission will not be the two phase as was evidently intended when the two phase generators were installed in the Niagara power plant. Instead, the three phase system will be used, thereby saving 25 per cent in cost of conductors over the two phase system, besides simplifying the transmission line by the use of three instead of four wires.

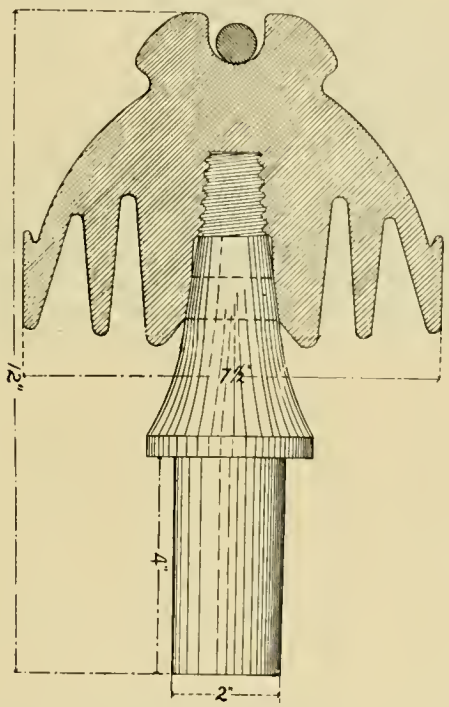
The Cataract Construction Company will put in its Niagara power plant three of the largest transformers ever constructed. They will step up the 2,200-volt two-phase current now being generated there to either 11,000 or 22,000 volts three phase. Any two of the transformers together will deliver 2,500 horse-power; the third is a spare one. It is the intention of the Cataract Construction Company to commence transmission operations at 11,000 volts, and later to increase the capacity of its transmission system by increasing the potential to 22,000 volts. The transformers will be designed and insulated to withstand the latter pressure. A complete system of air blast apparatus is also to be provided for cooling these transformers, as well as a marble switchboard with all necessary instruments for controlling their operation.

The pole line will be erected by the White-Crosby Company, and will have capacity sufficient to transmit 40,000-horse-power. This line will run from the transformer house at Niagara Falls, along the 2-mile line road, near the track of the New York Central and Erie Railroads, and from Tonawanda to the Buffalo city line follow the canal banks.

The work on the transmission pole line was given to the White-Crosby Company without competition. The officers of the Cataract Construction Company knew that the work would be carried out well if entrusted to that company. All the material used has been specially designed by the White-Crosby Company to meet the difficult requirements of this particular case. The line will be about 25 miles long, and has an ultimate capacity of 20,000-horse-power at 10,000 volts or 40,000 at 20,000 volts. One quarter of the wire will be strung before November 15, and the balance will probably be put in place early next spring. The completed line will consist of twelve 350,000 circular mil bare copper cables. It will run along a private right of way from Niagara Falls to Tonawanda. About 2,000 poles will be used. They are selected white cedar varying in length from 35 to 65 feet, and will be carefully shaved and painted. Where the soil requires it they will be set in concrete. Each pole will carry three cross arms,—two for power circuits and one for a telephone circuit. The power circuit cross arms are selected, heart, long leaf, yellow pine. The arms are secured to the pole by two lag bolts 5/8-inch diameter and 7 inches long, after the pole has been gained to a depth of 2 inches. The braces for the power wire cross arms are special bent angle irons supporting the arms from underneath. The insulators are best quality of porcelain, vitrified clear through and guaranteed to stand a pressure of 40,000 volts. They are triple petticoat and the inner petticoat is designed to give a long bearing on the pin. The insulators have gutters for carrying water around so that icicles will form only at the points which overhang the cross arm. This also tends to keep the cross arm

about the insulator dry. Pins are of selected locust. Guard pins are placed at each end of the cross arms and those on the top cross arm have notched ends to carry a barbed fence wire for lightning protection. Another barbed wire will be run along the top of the poles. Every 500 feet these wires will be grounded with a wire running down the pole on the side opposite the cross arm,

For transforming the power downand converting it into that suitable for street railway purposes, the Power



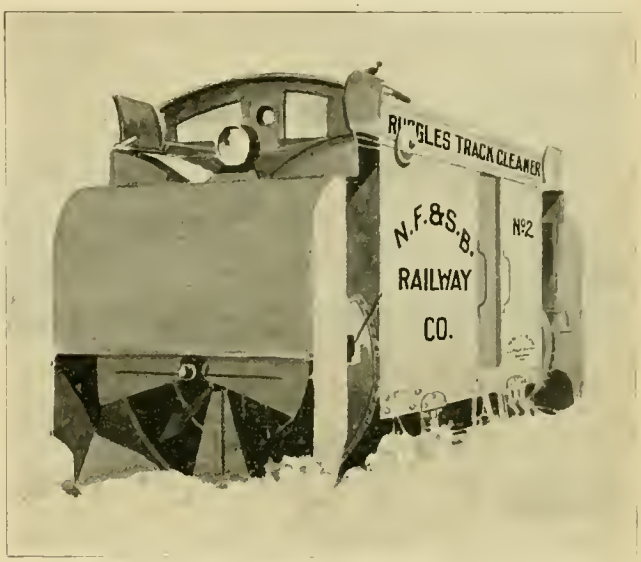
STANDARD PORCELAIN INSULATOR FOR NIAGARA FALLS-BUFFALO TRANSMISSION.

& Conduit Company purchases fourstatic transformers about 360-horse-power each, and two 500-horse-power rotary converters. The static trans-formers will reduce from the line potential of either 11,000 or 22,000 volts to 400 volts, at which voltage the 3-phase current will be turned into the rotary converters, and then converted into direct railway current of 550 volts. These transformers and converters will be set up in the Niagara street power station of the Buffalo Railway. The latter will be compound wound, and will operate in multiple with the steam-driven generators supplying the balance of the power necessary for the operation of the railway system. They will be of the iron-clad type with steel frames, with collector rings for the 3-phase current at one end, and a commutator for the direct current at the other. They will have six poles and will run at 500 revolutions per minute, and are similar to that placed in the Niagara power house to furnish current to the Buffalo & Niagara Falls Electric Railway.

Work is now going on, and the contracts call for the completion of the work by November 4. This is, of course, only a beginning, and there will follow a much larger use of the power from Niagara.

PECKHAM COMPANY'S NEW SNOW PLOW.

The street railway companies of this country will learn with pleasure that the Peckham Motor Truck & Wheel Company has arranged for the manufacture of the Ruggles rotary snow plow. Construction will be begun at once and the trade can be supplied by October 1. The operation of this plow is evident from the accompanying engraving which shows one as it appeared at Niagara Falls last winter. Its principle is the same as of those



RUGGLES TRACK CLEANER BUILT BY PECKHAM.

used in fighting heavy snow falls on steam roads. The revolving blades literally cut their way through any drift that is liable to form on the road, and the snow is deposited clear out of the way. At the same time it is very simple and the cost of maintenance is very low. Although radically different from anything yet used by electric railways it will probably find a warm (no, a cold) welcome. The plows have been in successful operation on the Buffalo, Bellvue & Lancaster Railway, Bellvue, N. Y.; the Buffalo Railway; the Buffalo & Niagara Falls Electric Railway, and the Niagara Falls & Suspension Bridge Railway.

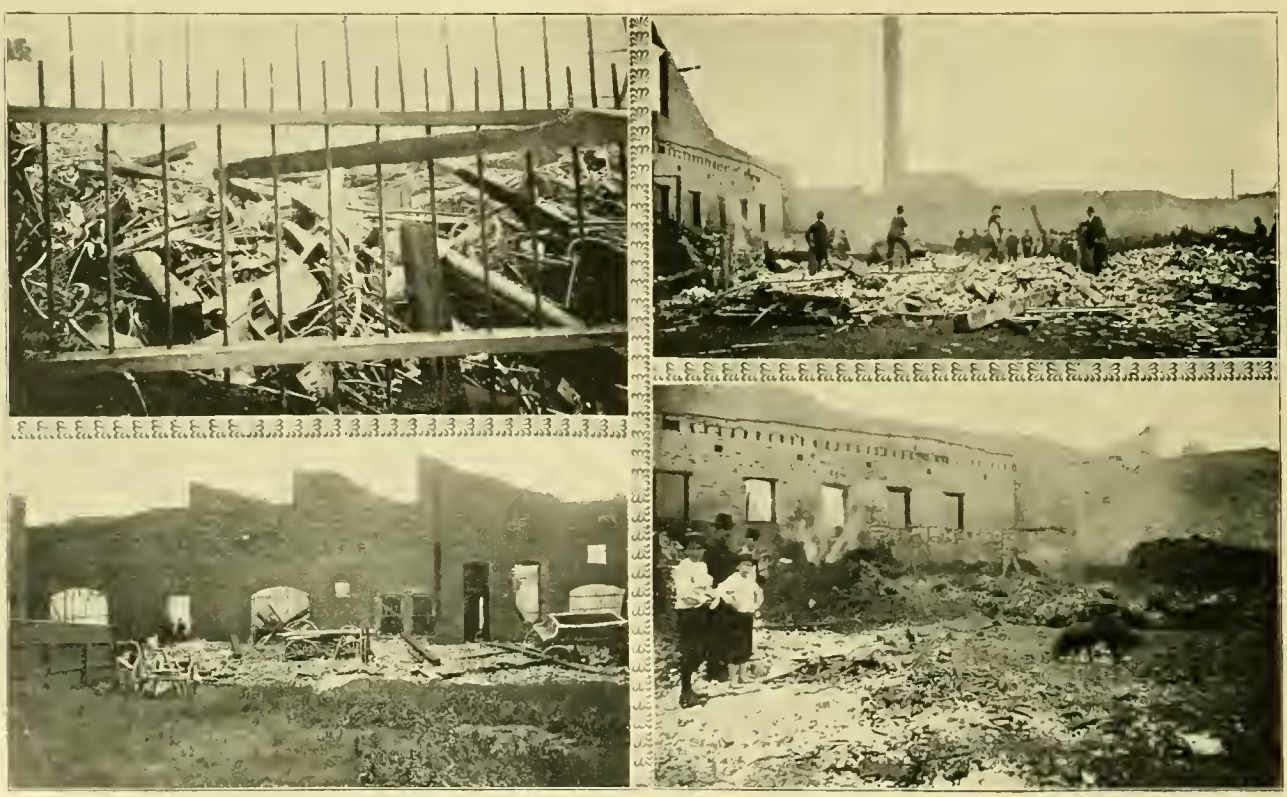
ANOTHER TROLLEY DECISION.

A decision has been handed down by the United States circuit court for the district of Connecticut, which somewhat modifies the situation regarding trolley patents. This decision, which is by Judge Shipman, is to the effect that worn or broken trolley bases may be replaced without infringing the Van Depoele patent of the General Electric Company. This is based on a previous decision that if a person legally buys a patented article he may repair and improve upon it. Together, with this, Judge Shipman held that the trolley base is only one feature of the trolley as a whole, and hence gave the order which practically again opens the doors to outside makers of trolley supplies.

CHICAGO CITY RAILWAY FIRE.

On the evening of July 18, the Chicago City Railway indulged in the luxury of a $500,000 fire. This is the most extensive conflagration that has visited the street railway industry for some time. The car house and barn at Thirty-ninth street and Cottage Grove avenue, where are housed all the cars that run on the Wabash and Cottage Grove avenue cable line was totally destroyed. The insurance amounted to $300,000. The company lost 60 grip cars, 72 open cars, 136 box cars and 1 platform work car, or a total of 269 cars, to which should be added 8 snow plows, 1 sweeper and 1 wagon. There were 109 horses quartered at this barn, of which only 27 were saved. About 40 or 50 cars were run out of the building after the fire started. Many were stored on the second floor so that rescue was impossible. Three employes lost their lives. None were members of the City Railway Mutual Benefit Association. The fire broke out in the hay in the stables and its origin is unknown. The traffic was not seriously deranged because the fire took place at 7:30 in the evening and most of the summer equipment was out on the road, and some cars could be taken from the company's other barns. The winter equipment, which was in storage, will have to be renewed, but plenty of time is offered for that. The view at the right hand lower corner of this page shows where the horses lay.

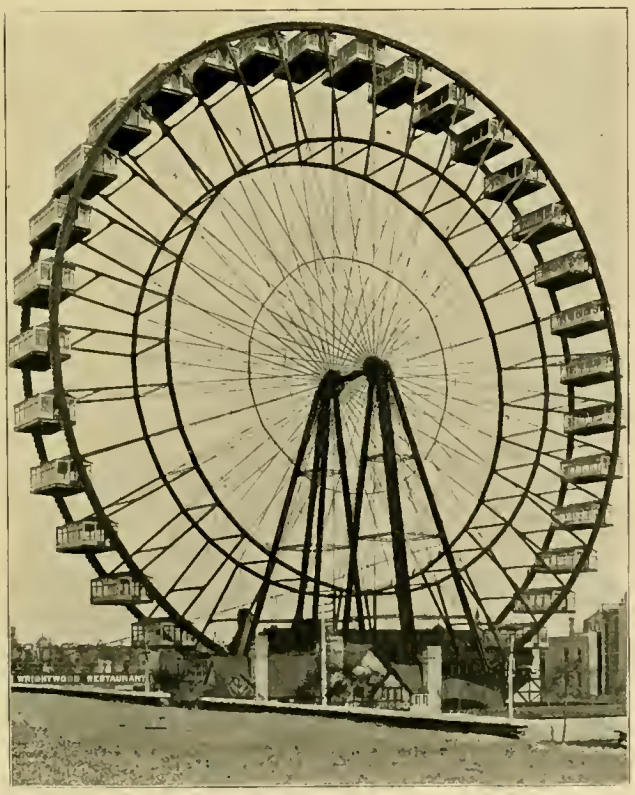
Huddersfield, England, has decided against the running of street cars on Sunday on the ground that it would disturb the rest day of factory employes.



The excessively hot weather which has prevailed in many parts of the country during the first half of the present month has made the matter of pleasure resorts capable of being reached by the investment of a street car fare an unusually interesting one. Chicago especially appears to have been temporarily afflicted with the climate of the torrid zone, and for this reason, in view of the possibilities of the future, it may not be untimely to devote most of our space to such resorts in this city. The indications that street railway companies are becoming more and more interested in such resorts as will increase summer travel are too apparent to require comment, and the promise for next year is in favor of more resorts and a larger number in which street railway managements will assume an entire or partial control.

FERRIS WHEEL PARK.

One of the most pleasant resorts reached by the street railway systems of Chicago, is found upon the line of the North Chicago Street Railroad. The Ferris wheel is, of course, well known, not only to the people of Chicago, but to many people in every part of the globe, civilized and uncivilized. This, however, forms by no means the sole attraction at this park. It is the central and doubtless the principal attraction, as a ride around the immense circle traversed by its cars is a form of enjoyment that cannot elsewhere be approached in novelty and attractiveness. But around the wheel, in the commodious park at the corner of Clark street and Wrightwood avenue, facilities are provided for a variety of entertainments and amusements. Concerts are given every afternoon and evening by a well-trained orchestra, and an excellent vaudeville programme, with frequent changes in the bill, is presented. A gypsy camp, imperial panorama and a "flying machine," furnish side attractions. Captain Bogardus, the famous rifle expert, gives daily exhibitions of fancy shooting. The wheel runs continuously from 11 a. m. to 12 p. m., and on week days riding in the wheel is free. The manager, L. V. Rice, to whose efforts the inauguration and carrying out of the enterprise are largely due, is indefatigable in his efforts to please his patrons, and has been endeavoring during this first season to feel the pulse of the public by a variety of changes in the character of entertainment afforded, in order to determine what class of attractions to provide for next season. The park has proved very popular during the hot weather, being easily reached over the lines of the North Chicago Street Railroad Company, and connecting lines from all parts of the city. Our engraving gives a good idea of the wheel and the offices and buildings of the park from the roof of the North Chicago car house.



THE FERRIS WHEEL.

ELECTRIC PARK.

This park, which is readily reached by any of the north and northwest lines of street cars in Chicago, has been extensively improved during the present season, about $150,000 having been expended upon the grounds and structures. The principal building is a handsome two-story pavilion 204 by 285 feet in size, and containing a stage as large and well equipped as is found in many theaters, being 100 feet long and 30 feet deep. The auditorium floor, which is also the dancing floor, is 100 feet square, and is surrounded on three sides by a wide promenade, which may also be used, if required, for seating purposes. The fourth side is occupied by commodious dressing rooms, refreshment stand, etc. The lower floor is taken up by shooting galleries, bowling alleys, promenades, refreshment stands and tables and general conveniences for public comfort. In front of the pavilion is the lagoon, provided with several gondolas. On an island in the middle of the lagoon was, until the

night of July 14, when it was destroyed by fire, a large open air stage, with accommodations for a company of 600 people, the seats for the audience being erected across the lagoon. This is being rebuilt. At one corner of the lagoon is a tower 80 feet in height, with a platform at the top for high diving, and 32 feet from the ground a second platform from which diving horses began their performance.

There are also a large bicycle track, a coasting railway 1,000 feet in length, numerous refreshment booths scattered throughout the grounds, a large band stand and open air dancing pavilion, and a variety of other facilities for amusement and comfort. A portion of the grounds is heavily wooded or covered with luxuriant shrubbery. The pavilions and grounds are amply furnished with electric lights, the current being obtained from the power house of the North Chicago Street Railroad across the street. The resort has been well patronized since its opening, July 4, and the business of the twelve street car lines reaching the gates of the park materially increased.

The Bristol and Plainville, Conn., Tramway Company, has purchased an electric fountain and erected it at its resort at Lake Compounce.

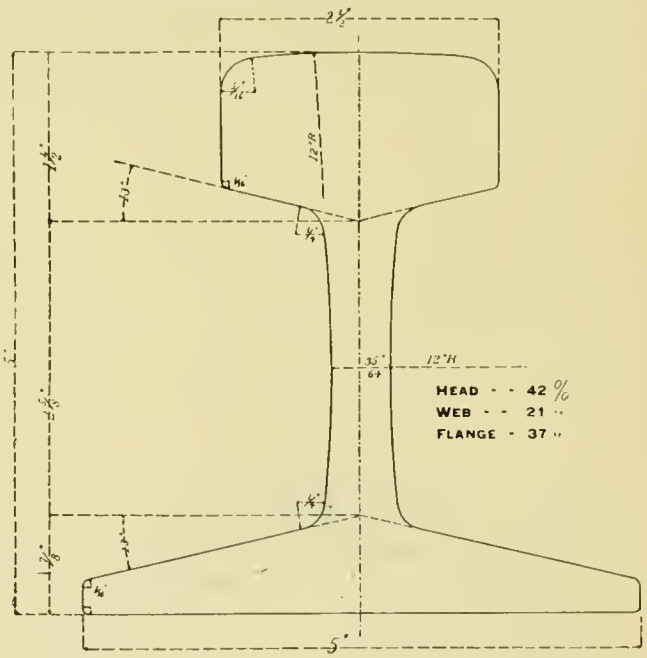
The Birmingham, Ala., Railway & Electric Company is making a great success of its resort at East Lake. It has a large, cool pavilion with floor for dancing, and the electric illumination is unsurpassed in that section of the country. The attractions are music, boating and bathing. The cars make fast time and run every twelve minutes. A special attraction is advertised for August 19 in the form of a genuine "southern darkey cake walk," to be participated in by twenty negro couples. The walk will take place upon a floating stage in the middle of Lake Como in full sight of every one. This is said to be the first genuine cake-walk ever presented publicly for the entertainment of white people and will be given free by the street railway company in the place of private parties.

STANDARD T RAIL IN MINNEAPOLIS.

Continuous Track Without Ties—Asphalt Paving.

The Twin City Rapid Transit Company of Minneapolis and St. Paul has adopted a new form of track construction for its work this year which is very different from any street railway track construction so far attempted. We are indebted to General Manager W. J. Hield for the following particulars, to which we may add that it has been laid on some of the crowded down town streets of Minneapolis.

The rail section adopted is the standard 80-pound steam road T of the section adopted by the American Society of Civil Engineers. This is 5 inches high with 5 inch base and is shown in section herewith. It is rolled by the Illinois Steel Company in 60-foot lengths and is the first 60-foot rail turned out by that plant. The track is being put in without ties and instead each rail is laid on a beam of Portland cement concrete, 15 inches wide and 8½ inches deep. In laying this track ties are first put in 10 or 12 feet apart to properly line the track. The concrete is then put under each rail and the ties are removed as soon as the concrete is sufficiently hardened to carry the weight of the rail. Tie rods are put in 12 feet apart to help maintain the gage. The joints are cast welded. The company has two cupolas for cast welding which it purchased from the Falk Manufacturing Company last winter and is working one in Minneapolis and one in St. Paul. Nearly all this new construction is on streets which have been ordered repaved and in nearly all cases this paving is asphalt. The thickness of the asphalt is 3½ inches, and it rests on a bed of American cement concrete 6 inches deep. The asphalt is rolled directly against the outer edge of the rail. The flangeway is formed by means of a row of granite



80-POUND STANDARD T LAID AT MINNEAPOLIS AND ST. PAUL.

blocks which are laid against a form one inch wide which keeps the blocks away from the head of the rail until the mortar they are set in has hardened sufficiently. The forming strip is then taken away. Specifications for these blocks are that they are to be not less than 4 inches nor more than 4½ inches in depth. A special mixture of grouting and hot asphalt is last poured into the flangeway filling it to within one inch of the top of the rail.

When the work is completed, therefore, the track will stand on a beam of concrete and will be bedded in 2½ inches of concrete. On the outside it will be supported by the asphalt which is rolled directly against it and on the inside by the combination of grouting and granite.

Since August 1 the Montreal Street Railway accepts no United States silver money or nickels in payment of fares.

PERSONAL.

E. O. Bradley, chief inspector of the Bridgeport Traction Company, has tendered his resignation.

R. L. Caldwell, of the Walker Company, called on the REVIEW on his way home from Denver last month.

General Manager L. M. Erb, of the Leavenworth, Kans., Electric Railroad Company made a pleasant call upon the REVIEW.

Peter Valier, superintendent of the LaCrosse, Wis., City Railway Company, is on a trip through eastern cities for pleasure and business.

A. C. Thomason, superintendent of the Mobile, Ala., Street Railway Company, was on July 22, married to Miss Minnie McHugh, of Mobile.

W. W. Wheatley, formerly division superintendent of the West Shore Railroad, has been appointed superintendent of the Brooklyn Heights Railroad.

T. J. Whedon has been appointed superintendent of the Mount Lowe, Cal., Railway, and will have charge of all the freight and passenger business of the road.

R. B. Goodman, of Niagara Falls, N. Y., has been appointed superintendent of the Lewiston & Youngstown Electric Railway, which has recently been completed.

C. F. Heath, division superintendent of the Lynn & Boston Electric Railway has resigned to accept a similar position with the Wakefield & Stoneham Street Railway.

T. H. Cooper, formerly of the Brooklyn Elevated Railroad has been appointed general manager and superintendent of the Bennington & Woodford, Vt., Electric Railroad.

H. S. Trout has been elected to the presidency of the Roanoke, Va., Street Railway Company in the place of S. W. Jamison, who takes the position of general manager.

Mrs. P. A. B. Widener, wife of the well-known street railway magnate of Philadelphia, was found dead in her stateroom on board the new yacht Josephine, at Bar Harbor, Me., August 2.

G. H. R. Preble, formerly superintendent of the Fitchburg & Leominster Street Railway, has been appointed to superintend the electrical work upon the new line between Springfield, Vt., and Charlestown, N. H.

Walter B. Brockway, of Toledo, has been appointed auditor of the new Toledo, Bowling Green & Fremont Electric Railway. He was previously connected with the Ohio Central Railroad in the auditing department.

Frank E. Colbert has connected himself with the Terre Haute Car & Manufacturing Company, and will act as assistant selling agent with D. B. Dean, who has offices at 1440 Monadnock building, Chicago.

William A. House, Jr., has been elected president of the Baltimore Traction Company, in place of ex-Governor Frank Brown, who resigned. When Mr. Brown started for Europe recently Mr. House was elected acting president, and was much surprised at being later elected to that office permanently at a special meeting of the board of directors.

J. W. Ritchie has resigned the position of assistant general manager of the Metropolitan Street Railway Company, New York, and the office is abolished. F. D. Rounds is appointed general superintendent.

Cyrus Robinson has been appointed general manager of the sales department of the J. H. McEwen Manufacturing Company. He was formerly manager and engineer of the Jeffrey Manufacturing Company, Columbus, O.

Capt. Robert McCulloch, general manager of the consolidated lines, St. Louis, attended the army reunion at Richmond, Va., where he was enthusiastically received by old comrades. There were 100 members of his own company present.

W. E. Barnhart has tendered his resignation as superintendent of the "L," road and west side lines of the Metropolitan Street Railway Company of Kansas City. He has been connected with the street railways of Kansas City for many years.

Edward E. Barney, president of the Virginia Navigation Company, and largely interested in the Barney & Smith Car Works at Dayton, O., was found dead with a pistol bullet in his head, at his home in Meadowville, Va., August 1. He leaves a widow and five children.

Arthur E. Chandler, track superintendent of the Atlantic Coast Electric Railway, and James Sweeney, a laborer, were thrown in front of a trolley car at Long Branch, N. J., July 14, by a team which they were trying to keep from running away, and both were instantly killed.

W. A. Larrabee, superintendent of the Gloucester, Essex & Beverly Street Railway Company, has been incorrectly reported as coming to that position from the Lynn & Boston. He was never with that road, but was formerly with the Athol & Orange Street Railway in the same capacity.

Louis E. Robert, agent of the Johnson Company, visited the REVIEW while in Chicago on his recent western trip. Mr. Robert reports great success with the Dupont truck, and many new and renewal orders. Some special trucks are being built for the Chicago & Englewood storage battery system.

T. E. Mitten, assistant superintendent of the Milwaukee Electric Railway, was a very welcome visitor at the REVIEW office recently. He has many interesting things to relate about the famous strike and boycott. Mr. Mitten has the immediate charge of the employment and supervision of the men on that system.

E. D. DuBois, who has been superintendent of the Citizens' Street Railway, at Muncie, Ind., for some months past, has been promoted to the position of general manager, to fill the vacancy caused by the resignation of C. N. Wilcoxson. This is a position that Mr. DuBois is abundantly able to fill, he having been at one time superintendent of the Calumet road, this city, to which place he rose by virtue of his excellent executive ability.

J. A. HANNA.

The newly appointed representative of the Peckham Motor & Truck Company, at Chicago, J. A. Hanna, has had about as varied an experience as often falls to the lot of even a man who is twice his age, and if such experience could always be counted upon to produce similar results, it might be safely prescribed as a preparatory course.

J. A. HANNA.

He was born at Wauseon, O., January 5, 1863, and attended school at the same place until he was seventeen. He then taught school for a time, but began business life putting in acoustic telephones in Southern Michigan. The next move was shipping on a whaler at New York for a three-years' cruise, but he ran away at Fayal, and returned to America to ship on an Atlantic coaster for a year. In 1883 he was running a hotel under a tent in South Dakota; 1884 found him at Coeur d'Alene and on the Pacific coast mining gold. At the exposition at New Orleans he took charge of the exhibit of J. G. Brill & Company, with whom he remained in a variety of positions until July, 1892, at which time he entered the service of the McGuire Manufacturing Company, remaining with them until a recent date.

With an experience of twelve years in the street railway supply business Mr. Hanna has a large number of friends in various parts of the country, and his present position proves that he is an efficient as well as hard worker.

The offices of the Peckham company at 1626 and 1627 Marquette building, are a model in the way of convenient arrangement and elegance of furnishing, and reflect credit alike upon the company and the representative who has supervised their fitting up.

Mr. Hanna is married and has one daughter seven years of age. His jolly disposition is evidenced by the fact that he is an enthusiastic "Shriner" as well as by the expression of the excellent likeness presented herewith.

THE MIAMISBURG BRIDGE ACCIDENT.

Since the article on the Miamisburg, O., bridge "failure," which appears elsewhere in this issue, was printed, certain facts have come to light which throw an entirely different light on the cause of the bridge going down. In justice to all parties, it is due that both sides be given the same hearing. The line was constructed by Stern & Silverman, Philadelphia, which had the contract for all the work for the new road. They lay the cause of the accident to the use of bolts instead of hot rivets in the bridge, which was built by the King Bridge Co., of Cleveland. In advising us of the facts, however, Stern & Silverman made no mention of the motor car having left the track, and gave us to understand that the makers of the bridge were alone to blame.

The King Bridge Company write us as follows: "In regard to the Miamisburg bridge, which was knocked into the canal by a motor getting off the track running at full speed, will say, we send you an item from the Engineering News of July 23, which states the matter about as it is:"

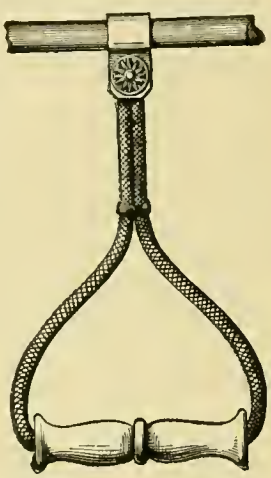
The item is as follows:

"We are informed that the bridge which fell under an electric car of the Dayton Traction Company, on July 1, as noted in our issue of July 9, was not a wooden structure, but a new steel bridge. What the merits or demerits of the structure may have been, we do not know; but it is evident that a steel truss is not proof against the impact of a derailed car, and that this accident ought not to be passed over merely as another case of a weak and flimsy bridge falling under a load. The lesson which these and other recent accidents ought to carry to engineers is that proper guard rail protection should be provided on all through-bridge spans crossed by electric railways, to prevent a derailed car from running into and wrecking the trusses."

This would certainly seem to clear the bridge company of blame, as no truss bridge would stand having a car run into it at certain points.

SANITARY CAR STRAP HANDLE.

The accompanying sketch shows an improvement on the ordinary car strap which is being made by the Sanitary Car Strap Handle Company, Bayonne, N. J. It is much cleaner and more attractive than a strap after a little use and less liable to transmit disease, besides being easier to grasp than a strap. The handle is of maple with a rosewood finish, and has a polished glassy surface which does not allow dirt to collect.



The Schuylkill Traction Company has made application to the United States postal department for the right to carry mails between the towns upon its line. It is not intended to interfere in any way with the railroad mail service, but the granting of the application will give a much more frequent local service, which will be greatly appreciated by business men.

The Lebanon & Annville, Pa., Street Railway Company, entertained large crowds of people, July 3, at its resort at Avon, with a display of fireworks.

Robert W. Blackwell, 39 Victoria street, Westminster, London, S. W., has been appointed European representative of Morris Tasker & Co., Philadelphia.

McIntosh, Seymour & Co., steam engineers, Auburn, N. Y., are doing a very large volume of business, having been obliged to run night and day for the whole year.

Bracy & Townsend, of Chicago, have been awarded the contract to build the St. Louis & Belleville Rapid Transit Company's line between East St. Louis and Belleville, Ill.

George A. McKinlock, president of the Central Electric Company, Chicago, has sailed for Europe, in the hope of fully recovering from a serious illness. He will return September 1.

The Carr Trolley Head Company has been incorporated at Bath, Me. The capital stock is $10,000, and the incorporators are W. H. Carr, of Bath, president, and C. R. Donnell, of Bath, treasurer.

O'Brien & Schindler, of Bridgeport, Conn., have been awarded the contract to erect the power house for the Stamford, Conn., Street Railway. Three miles of additional track will be laid with 74-pound rail.

The Wells & French Company, of Chicago, has been awarded the contract to furnish seventy cable trail cars for the Chicago City Railway. The bodies will be 20-foot, and mounted on the Wells & French cable gear.

The Johnson Company is putting in an unusually fine lot of special work for the Twin City Rapid Transit Company of Minneapolis. It is the company's usual guarantee construction and the Twin City management is much pleased with it.

Clift Wise has closed a contract for the placing of new curb and gutter on Wentworth avenue, Chicago, for two and a half miles, from Thirty-ninth street to Archer avenue. This includes both sides of the street, and is along the line of the Chicago City Railway Company.

The Lord Baltimore trucks are used on the new Port Soderick line on the Isle of Man. They are 6½-foot wheel base with 16-foot spring base. The engineers of this Manxland road (which is described elsewhere in this issue), evidently know a good thing when they see it.

Eugene Munsell & Co., New York and Chicago, have just issued a neat little illustrated pamphlet containing a descriptive price list of mica for electrical purposes. The firm carries at all times a large stock of standard types of segments and rings, and can furnish special designs at short notice.

H. Gore & Son, of Boston, have been awarded the contract to construct the electric railway between Stamford and Norwalk, Conn., for the Stamford Street Railway Company, which is owned by the New York, New Haven & Hartford Railroad Company. General Electric apparatus will be installed.

The General Electric Company has completed the electrical equipment for swinging the new highway bridge across the Connecticut river between Middletown and Portland, Conn. It consists of four G. E. 800 motors, two to raise the bridge from the piers, one to turn it and the fourth for reserve. The span is 450 feet in length.

"Recent Engineering Work" is the title of a handsomely gotten-up publication containing descriptions and illustrations of important engineering work, under the direction of Ford & Bacon, engineers. This includes extensive installations for the Orleans Railroad Company, New Orleans, and for the Bergen County Traction Company, New Jersey.

W. R. Garton read a paper before the Northwestern Electrical Association, at Marinette, in July, on lightning arresters. Mr. Garton is one of the few authorities on lightning in this country, and the subject was handled in a masterly and impartial way, in spite of the fact that the author is the inventor of one of the standard lightning arresters of today.

The Weston Engine Company, Painted Post, N. Y., whose plant was destroyed by fire May 16, has a new foundry nearly double the size of the old one about ready for occupancy, and a new machine shop in course of erection, which is expected to be ready in from sixty to ninety days. Sufficient orders for engines are on hand to keep the plant running for the next six months.

The Shultz Belting Company has recently delivered some big belts, one of 34 inches, for the Electric Railway Company at Joplin, Mo., one of 28 inches, at Webb City, Mo., and two of 24 inches and over 120 feet long, which went to Philadelphia. The company is also filling an order for a large lot of belting for Johannesburg, South Africa, and reports good trade all over the country.

The popularity of the Burlington uniform cloths, manufactured by the Burlington Woolen Company, Winooski, Vt., sold by Sawyer, Manning & Co., 86 and 88 Franklin street, New York, has received additional support in their use by the Metropolitan Traction Company, New York, and the Chicago City Railway Company. The men are thus assured of good clothing in advance.

The horse shoe rail bond, manufactured by J. M. Atkinson & Company, 1439 Monadnock building, Chicago, has recently been adopted by the Portland Railway Company, Portland, Ore.; the Enfield and Long Meadow Street Railway Company, Enfield, Conn.; the Aurora Street Railway Company, Aurora, Ill.; the Toledo & Maumee Valley Railway Company, Toledo, O., and the Aurora-Geneva road, Aurora, Ill.

The pleasure of having the laurel wreath of victory conferred by such a nice-looking young woman as is represented in the act of bestowing that honor upon the Lundell electric fan and motor, manufactured by the Central Electric Company, Chicago, in a handsomely-executed card just presented to its friends, is almost sufficient reward of itself to warrant the expenditure of one's best energies. Still, there are other prizes, and the company is getting them.

The Western Engineering and Construction Company, of Mason City, Iowa, has been awarded the contract by the Mason City & Clear Lake Traction Company to build seventeen miles of railway, put up overhead work, erect buildings, install power plant and furnish an equipment of twenty cars. The road is to be running by May 15, 1897. Materials, machinery and equipment will be purchased within four months by the Western Engineering & Construction Company.

The Japanese government has established at Osaka, a city of 600,000 people, a magnificent industrial exhibit. American manufacturers are invited to forward catalogs, and other descriptive printed matter. These will be properly cared for and filed in a department, where they can be consulted free by all who may so desire. The Review urges all its advertisers to send at once something in the line mentioned. Address should read Hon. Y. Hiraga, president the Osaka Commercial Museum, Osaka, Japan.

A. Groetzinger & Sons, Allegheny, Pa., are doing an excellent business in their "Dermaglutine" or improved process rawhide pinions for electric street car service and mechanical appliances, old customers continuing their orders and many new ones being added to the list. The pinions give excellent satisfaction and the sales are larger than ever before. They have recently added an improved Gould & Eberhardt gear-cutting machine by which the pinions can be turned out much more rapidly and the wants of customers can be more promptly supplied.

The P. Wall Manufacturing Supply Company presents a catalog of "everlasting steel specialties" which it manufactures. The most important articles mentioned are the well known steel gongs and oilers. These are made in a great variety of styles and sizes, and are said to be absolutely indestructible. The "copperized" steel oilers possess all the advantages of the harder material while presenting the appearance of burnished copper. The Wall gongs are made to give different tones, and the list includes all the forms necessary for street railway purposes.

The 50th anniversary number of the Scientific American has just appeared, and is such an issue as might have been expected from that source, and upon such an occasion. It contains a very complete resume of the past fifty years in the line of invention, and a good history of the paper and the publishing firm which have been so closely identified with it. The value of the publication is much enhanced by the use of numerous engravings, showing at a glance the advancement made, during the period covered, in some of the most important lines of science and invention.

The Automatic Circuit Breaker Company, Newaygo, Mich., manufacturers of circuit breakers and limit switches of all sizes and styles, calls attention in a little pamphlet to the necessity of protection to electrical apparatus and the economy of adopting at the start a safe and reliable form of apparatus for the purpose. The catalog gives tables including styles, sizes and prices of the different instruments manufactured, and a lot of valuable information about the particular instrument to be used in different connections. The illustrations and brief descriptions give all necessary information.

The Taunton Locomotive Manufacturing Company, as is very proper, is beginning now to push its snow plows for the coming season. It has just issued a catalog illustrating its very complete line of snow plows far all kinds of service They are very complete in all details, as this company has made a special study of electric railway snow plows for several years, and has a long list of roads as customers. One of the prominent new features of this year's shear plows is the boiler plate extension girder for supporting the forward end of the plow blade, giving great strength with very little weight.

W. Araki, of Osaki, a most accomplished Japanese gentleman, visited the Review while in Chicago on his way around the world. Mr. Araki is delegated by his government to visit the principal cities of the world in the interests of the new government permanent industrial exposition—the Osaki Commercial Museum. During the Japanese-Chinese war Mr. Araki served as interpreter and assisted at the drawing of the papers which declared the war at an end. Although a young man he has a large and prosperous busi- at Osaki, a city of 600,000, and handles a great variety of American electrical appliances and supplies.

Kohler Brothers, 1645–48 Monadnock building, Chicago, having the general sales agency of the Gibbs Electric Company, Milwaukee, furnish motors and dynamos for light and power purposes, special motors for direct connection to machine tools, portable flexible drill motors, and in fact everything required for electric power transmission in factories. The multipolar type A, motor or dynamo, is claimed to have the highest efficiency and to be most economical for the user, on account of its superior mechanical and electrical construction, having large wearing surfaces, and its general simplicity. The motor has given excellent satisfaction.

The American District Steam Company, Lockport, N. Y., which handles the Holly system of direct and exhaust steam heating, has just completed a contract for immediate work, with the Davenport, Ia., Consolidated Gas, Electric Light & Steam Heating Company, involving about $30,000. This company will build about 6,300 feet of steam mains for the distribution of exhaust steam. The same company also owns the electric light plant at Burlington, Ia., and is already using the system there. The sale of exhaust steam at Burlington is said to pay all station expenses, such as fuel, labor and incidentals, not only during the heating season, but for the entire year.

The Indiana Rubber & Insulated Wire Company, Jonesboro, Ind., has just completed a new addition to its factory, 80 by 160 feet and four stories high with basement. This has been equipped with a number of new insulating and cabling machines of the latest pattern for the manufacture of

all styles of telephone and telegraph cables, either braided or leaded. The company has had an unusual demand for cables for the past six months, and this enlargement has been necessary in order to meet the demand. The company is giving special attention to the manufacture of stranded and flexible cables for street railway use and has booked a number of good orders.

"Fifty Years' History of the Development of Green's Economizer, with Notes on Other Economizer Inventions," is the title of a work recently issued by E. Green & Son, Limited, Manchester and Wakefield, England, and Matteawan, N. Y., and whose scope is well indicated by the title. It gives a complete history of the Green economizer since 1845. This apparatus is in extensive use in England, and an immense plant is required for the conduct of the business. The notes concerning other inventions of the same class are carefully prepared, the work having been edited by W. H. Fowler, a prominent engineer. The volume is handsomely illustrated and well bound in cloth.

Among recent orders for street railway work recently received by the Edward P. Allis Company, are two 1,000-horse-power cross-compound engines direct-coupled to generators, for the Syracuse, N. Y., Street Railway Company; one 800-horse-power engine for the Brockton, Mass., Street Railway; and the work upon the 9,000-horse-power of engines for the Northwestern Elevated Railway, Chicago, is well in hand. Two tandem-compound direct-coupled engines of 700-horse-power each, have just been shipped to the Canal & Claiborne Street Railway Company, New Orleans. There have been received equally important orders in the other departments of the works, and the activity of business in all directions is a good indication of the high regard in which the company's work is held.

The Wells & French Company, Chicago, has just issued a handsome catalog of street railway cars containing engravings and descriptions of most of the principal styles of cars which it manufactures, including open and closed motor and trail cars of various dimensions and seating capacity. The company's standard truck, designed especially for high speed and easy riding, is also illustrated. This truck has a number of points which commend it to the attention of those purchasing new equipment, among which are the fact that the weight of the load is not carried by the truck frame proper, is always at a fixed point directly over the center of the journals and cannot come against the springs either laterally or longitudinally. Any desired length of spring base can be secured without additional strain upon the frame.

W. T. Van Dorn, 1428 Monadnock building, Chicago, has received lately some good orders for his coupler. Among the largest are those for the entire equipment of the Washington, Alexandria & Mt. Vernon and the Suburban Electric of Chicago. His ball joint coupling between coupler and body of cars has been made standard upon several roads. Good orders for couplers have been received from the Portland, Ore., City Railway Company and the Metropolitan Railroad, Washington, D. C. From the La Clede Car Company he has an order for the equipment of 200 cars intended for the Pittsburg Consolidated Traction Company; an order for 160 cars from the American Car Company has just been filled, and a large order from the St. Catherine's, Ont., Car Company is now in hand. Notwithstanding the hard times it seems that meritorious devices are appreciated and find a market.

The new catalog of the Dorner & Dutton Manufacturing Company, Cleveland, O., is a handsomely executed production, and with the combination of brief but pointed descriptions, and excellent illustrations, conveys a good idea of the construction of the company's trucks and other well-known appliances for street railways. In addition to several forms of trucks, considerable space is devoted to car wheels and axles, journal boxes, roller bearing and otherwise, and to gears and pinions for all types of motors. For cleaning purposes, the company's track cleaner is too well known to require description, having been in use for over five years and an electric snow-sweeper, brought out last winter, promises to give excellent satisfaction. Electric heaters are also included in the list, and the type for which special claims are made is guaranteed to last the lifetime of a car. New machinery includes a hydraulic wheel press, wheel-boring mill and automatic gear cutter, and armature lifts and buggies form interesting specialties.

The latest catalog of the Pennsylvania Steel Company, 312-319 Girard Building, Philadelphia, has just come to hand, and, as usual, is complete in its list of rail sections, etc., for the use of electric and cable railways. The work is handsomely printed, bound in cloth, and the engravings are such as to leave nothing to be desired in the way of complete illustration of the subjects treated, and gives evidence throughout in its subject matter and arrangement of the careful work of John Ostram, engineer and manager of the company's street railway sales department. In the matter of special work the catalog is unusually full. A number of handsome illustrations are given of work in the way of trestles and elevated structures which have been erected in various parts of the country, the material for which was manufactured at the company's works, at Steelton, Pa. Special attention is also given to a convenient and effective form of rail bender having a ratchet lever handle, capable of being operated in either direction by simply throwing a cam.

Wm. Baragwanath & Son, Chicago, have been doing a brisk business for the past two months and the outlook for future business is bright. They have now under construction three 2-000-horse-power steam jacket feed water heaters, for the Chicago City Railway Company's new plant at Forty-ninth street and Oakley avenue. These heaters are 5 feet in diameter by 22 feet long and have 2,010 square feet of heating surface each. These heaters will make a total of eighteen steam jacket feed water heaters now in their different plants aggregating over 15,000-horse-power. They have also on their order books; Great Northern Theater Building, two 1,000-horse-power heaters; Washington Gas Light Company, Washington, D. C., 250-horse-power; J. W. Smith & Sons, Youngstown, Ohio, 200-horse-power; Howe Scale Company, Chicago, 75-horse-power; Kewanee Electric Light Company, Kewanee, Ill., 100-horse-power; Phoenix Brewing Company, Chicago, 200-horse-power; State Prison, Waupun, Wis., 150-horse-power; Fraser & Chalmers, Chicago, 100-horse-power, and many others.

The Phœnix Iron Works Company, Meadville, Pa., has just finished the installation of the 400-horse-power direct

connected engine for the Rapid Railway Company, Detroit, Mich., where it has previously installed two 300 horse-power engines, and also a battery of special horizontal tubular boilers constructed for 150 pounds working pressure. It has also just completed a 300-horse-power steam plant for the Oakland Railway, Detroit, consisting of two simple engines, boilers, etc.; a 350-horse-power steam plant for the Lincoln (Ill.) Water, Light & Power Company, consisting of two compound non-condensing engines, boilers, etc.; two 125-horse-power compound non-condensing engines for the new state asylum at Polk, Pa.; two 150-horse-power simple engines for the Bureau of Engraving and Printing, Washington, D. C.; two 40-horse-power simple engines for the Syracuse (N. Y.) Gas Company; three 125-horse-power non-condensing compound engines, Union Trust building, Detroit; and three 125-horse-power non-condensing compound engines for Guaranty building, Buffalo. Both of these are direct connected. The company is constructing three boilers of 200-horse-power each, Strong's patent, for 150 pounds working pressure, for the new Great Northern building, Chicago; two 150-horse-power Manning boilers for Syracuse Gas Company. As the list shows, the company is quite busy, and has about all it can take care of for the next sixty to ninety days, in both engine and boiler departments.

The White-Crosby Company, Baltimore and New York, has been doing a magnificent business since the opening of the season, which may be considered as February 1. The work in hand includes ten miles of track and overhead construction for the Norwalk Tramway Company, five miles of which are completed and in operation; six miles of line for the Rahway & Sewaren Electric Railway, nearly completed; five miles of overhead work, including fifteen miles of feeder for the Bergen Traction Company, completed and in operation. The company has contracts for a large amount of work. These cover the Baltimore City Passenger Railway Company for special and overhead work connecting one of its cable tracks with an electric line; five miles of overhead work for the Baltimore Traction Company on its new Westport line; five miles of extra feed wire for the same company to furnish extra power for base ball business; the equipment of the Druid Hill avenue cable line for electric service (about eight miles): 2,000 feet of subway for the Baltimore & Ohio Railroad Company for lighting Mount Royal station from the present power house, which operates the Belt line tunnel, and equipping the overhead extension of the Gwynn-Oak line, and building and equipping the line which connects the Walbrook extension with the Baltimore Traction Company, both of which last named lines are owned by that company, and the latter of which is said to be the smallest electric road in the country, being only about 3,000 feet in length and complete within itself. The company also does the electrical engineering work for the Helena & Livingston Smelting and Reduction Company's new power transmission plant, which includes two 225 kilowatt and five 150 kilowatt Crocker-Wheeler 500 volt machines, the distance of transmission being one and a half miles, and for the Helena Water & Electric Power Company, which is installing Westinghouse alternating current apparatus to transmit power to East Helena and Helena, twelve and seventeen miles respectively. This latter station is planned for eight 650 kilowatt generators (four of which are now being installed), with step up and step down transformers and the necessary station apparatus. The voltage will be about 10,000 on the transmission line, distributing through Helena and East Helena at required voltages. The company has also completed about five miles of the Atlantic Highlands, Red Bank & Long Branch Electric Railway, and will finish the line this fall.

J. HOLT GATES WITH THE WALKER COMPANY.

There is probably no better known salesman in the electrical trade than J. Holt Gates, and the news that he has taken the Chicago office of the Walker Company, will be the cause of congratulations to both of the parties interested. Mr. Gates began selling electrical apparatus at the time the Westinghouse Electric & Manufacturing Company began operations, and he remained with that concern for seven years. When the Siemens & Halske Company, of America, started, Mr. Gates was secured as its sales agent. During his connection with this company he had the honor of selling the largest isolated electric light plant ever sold, viz: that of the Auditorium, Chicago. After a year with the Siemens & Halske Company, he started an office of his own as independent agent for various concerns. In fact he hardly needs any introduction to our readers, and the Walker Company would have to hunt long to find a better known man or better salesman.

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As MIGHT be expected, the cable dispatches reciting the recent runaway accidents, have set the English dailies wild over the awful horrors of the trolley. The Financial Times of London has especially laid itself out and proceeds to hear, argue, and pronounce judgment and final sentence on the case, all in one editorial. As a matter of fact the use of the trolley as the motive power had nothing to do with the case. Steam, compressed air, conduit system, or any other motor under similar circumstances might have had the same disasters. Why, only a few days ago, in Merry England itself, a man riding on a steam road roller moving only two miles an hour, fell off and was crushed into an unrecognizable mass. And yet nothing was said about the terrible horrors of the juggernaut road roller. Even the finest modern steamers occasionally go on the rocks, but that is no reason why we should return to the oar propelled craft of the Vikings.

THE time has come when we may expect to see the gearless railway motor come into use in its proper field. As is well known, the gearless motor was given a good trial in street car service several years ago and was abandoned. At the time it came to be generally accepted that the single reduction motor was the best for any electric railway service existing at that time. The single reduction motor has become so universally accepted as the proper thing that there is perhaps a little danger that it will be used on high speed work where a gearless motor would be better. However, manufacturers are not going to sleep and we predict that before many months a gearless motor will be offered for interurban work. With the ripened experience designers now have such a motor ought to be a decided improvement over those designed several years ago and for high speed work where there are four on a car, which can be connected in series for starting, (thereby keeping the starting current required down to a reasonable amount) they will probably find much use. Their use on large electric locomotives goes without saying.

PROGRESS in the adoption of improved brakes on electric cars has been much slower than the condition of affairs a year ago at this time indicated. In saying this we refer to the ordinary type of street car, not to the heavy interurbans which have adopted air brakes. There seems to be something wanting either in the way many of these devices are handled commercially or in the mechanisms themselves, and perhaps half-heartedness on the part of railway companies in giving them a trial has something to do with the general adherence to the old hand brake. It is hard to see why a braking principle that has been applied to cable cars and successfully operated for years, can not be put on electric cars as well. Certainly good brakes on this principle have been devised. We would say to the gentlemen in the brake business; stick to it and still further perfect your appliances. And to the managers; when you have once begun to try a type of brake that has some merit, don't drop the matter entirely the moment some slight defect shows itself, but keep on until you have the brake as you want it.

AFTER all that has been said in the last three years about the loss in the electric railway ground return, very few railway electricians have taken steps to make any tests as to what the actual loss on their road is. Some, even on very large roads, have been unable to do this because the company has no private telephone or other wires which could be used for testing purposes. Perhaps directors would be more willing to go to the expense of putting up such wires could they be made to realize better the amount of money that may be wasted through ignorance of the exact loss in the ground return of a company's system. This was well illustrated recently by a case that occurred on a very well known and recently built system. The ground return consisted, in part, of cast welded track, and the balance of channel pin bonding. The electrical engineer always supposed that there was very little drop in the return circuit until he had facilities for making tests. To his surprise he found a drop of from 18 to 24 volts, a large part of which was near the power station, and what was still more important, was able to go to work intelligently to remedy it, thereby stopping a constant source of loss.

A road in a certain city within a 400 mile radius of Chicago, is throwing out entirely some cars, trucks and motors, purchased six years ago at a cost of $5,000 per complete equipment. It is putting in their place longer, more attractive cars, heavier motors and double trucks. Does any one think for a moment that a city government owning a street railway would ever consider any such radical move as this looking to the comfort of patrons? True, the new equipment, owing to the fall in prices the last few years, is not as expensive as was the inferior original, but it cost a good round sum nevertheless, to say nothing of the fact that the old equipment was practically a total loss, bringing nothing more in the market than its price as scrap material. Had the car equipment not been changed the motors could have done service for many years under the lighter cars, so that it cannot be argued that the change was a matter of engineering rather than a move to please the public. If such "little expenses" as this were mentioned when municipal ownership advocates tell of how indifferent companies are to the wants of their patrons, and how much undeserved profit they are making, it would be somewhat of a damper.

It would seem that of all places on electric roads, smooth track is needed on bridges and viaducts, and yet it is just at these places that the roughest track is usually found. Very often the old tram rail of horse car days remains still on viaducts and bridges, and even where girder or T rail has been laid there is a temptation to let the joints get low because of the difficulty of removing planking to get at them. It is nevertheless ridiculous to see 10-ton electric cars permitted to run from six to ten miles an hour across a bridge on a tram rail, when teams are prohibited from moving faster than a walk. It matters not how low the joints are, or whether the car is galloping so that its steps nearly hit the floor, the same ironclad rule is laid down. If there is a rule to prevent horses weighing 1,000 pounds from galloping or trotting across a structure, there surely ought to be one to prevent electric cars weighing twenty times that much from galloping across. The fact that there may be low joints on a bridge seems often to be left out of account by engineers in calculating the safe loads for bridges, and in making rules governing them. There is not only great additional strain on the structure due to them, but the danger of derailment—which latter danger has resulted recently in the collapse of two bridges.

There is one aspect of the growth of electric railway systems in all parts of the country and through previously almost unpopulated districts which has, perhaps, often been thought of but not fully realized. This is the fact that the trolley is slowly but surely hastening the doom of the tenement house, the curse of modern city life. In stage coach days, population was too sparse to make crowding possible, but with the advent of the steam locomotive the people were forced for both business and social reasons to gather themselves together in groups at such points as the conditions of steam locomotion made stations necessary. From that time, about 1830, this species of congregation has gone on until at the present time a large proportion of our population has crowded itself together at a few points, comparatively speaking, and the crowding has from necessity been most manifest in the class of people whom it would be desirable to have located at wider distances apart. But the flood has been reached and the tide is now on the ebb. Every day new lines, made possible by the cheapness in time and money of electric transportation, are pushed forward into the country. Every such line opens up the opportunity for hundreds of homes and the opportunity is being taken advantage of by a class of people to whom the previous place of abode was a home only in name. The slight expense of fare is more than offset by the additional conveniences and increased health. As long as in the home lies the welfare of the American people, the electric railway should be given its due credit as a factor in promoting prosperity and good government.

As much as we may dislike to chronicle it, the fact stares us in the face, that there has been an unusual number of very serious accidents on street railways in the past ten months. It is often remarked by steam railroad people that accidents seem to come in groups. If there is anything in this theory the street railway companies turn at the accident record must have come during the past year. Perhaps that period will be followed by one of long immunity. Perhaps on the other hand it is only an indication of what may be expected as a result of present operating conditions. We hope the latter is not the case. Nevertheless it will not do to count on the tide turning and it must not be expected that accidents are going to be any less frequent than now, as long as conditions are the same, and it is well to look more thoroughly into the matter of safety precautions. In regard to protection at drawbridges we have used some very plain language since the accident at Cleveland, as to the importance of more safety precautions and devices than are usually used at draws and we fear that one or two more bad accidents will occur before the lesson has been thoroughly learned. The two bridges that have collapsed were both the result of cars running off the track and wrecking some essential part of the truss structure. The lesson in these two cases is plain. Either the speed over bridges should be reduced so that a car will stop immediately when it becomes derailed or adequate guard timbers should be provided to keep it from wrecking the structure if it leaves the track. The other accidents are of a too varied character to classify, but most of them go to show that the art of street railroading is suffering from an insufficient realization on the part of managers that they are no longer operating horse roads. It is with reluctance that we admit this, for we are generally proud of the industry we represent but the only way to do in a case of this kind is to look

the facts squarely in the face and set out to find a remedy, and that with the same energy and promptness that has characterized street railway management in the past.

During the past month there have been three notable runaway car accidents, which cannot but direct special attention to the consideration of the securing of some means which shall make a repetition practically impossible. At Columbia, Pa., a car heavily loaded dashed down a long grade and went over a thirty-foot bank, killing six and more or less injuring forty others. The lateness of the hour and consequent darkness added to the horror of the plunge. At Frederick, Md., a car ran down the mountain, and was also ditched on a curve, but none were killed and comparatively few badly injured. In both cases the equipment had been thoroughly overhauled within a few days, and to all appearances was in perfect condition. On the Pike's Peak rack road a descending train broke its driving rods, and but for the rare presence of mind and quick action on the part of the engineer, who cut the engine loose, thus enabling the train crew to stop the passenger car, all the occupants must have been killed. The enginemen jumped and were saved, though the engine dashed on and shot 150 feet out into a canyon, and will never be recovered. Electric car service is rapidly being required for work on heavy grades, for which on many accounts it is the best adapted of any motive power for hauling passenger business. The lines admit of construction where any other system would be prohibited on account of the construction expense, and where the standard steam locomotive could never climb. That mountain electric lines are destined to rapidly increase is certain; but with heavy grades must be provided ample means to insure the same safety and certainty of operation that is now possible on level tracks. Street railway men must at once set about supplying these safeguards, and they must be ample if heavy grade roads expect to continue to do business. The very fact that in the two electric roads above named the equipment was supposed to be in perfect condition (one car had been overhauled within a week, the other line had been operating only four days) simply emphasizes the necessity for some kind of additional protection. If it is possible, as in these cases, for practically new equipment to fail at the critical moment, what might happen when cars, motors and brakes have been in use several months? There seems to be one feature of both cases which may have been largely responsible for the accidents, and that is, both cars were heavily overloaded. One car was returning with a picnic party which had been delayed by rain, and all were anxious to get home as soon as possible. We know how extremely difficult it is to prevent such a crowd from climbing all over a car in their scramble to get the first car. At the same time passengers are not supposed to know what is the limit of safety in a load, and managers must exercise discretion for them. It would surely seem a wiser policy to restrict the loads on such cars as must travel heavy grades to a much less number of people than we know can be safely handled on level track. Managers operating over heavy grades and who have thus far been fortunate enough to escape accident, should take warning from these accidents and not rest secure in the belief that their cars are safe unless they absolutely know such to be the case.

CURTAILING EXPENSES.

Hard times due to the uncertainty of the coming election are beginning to have so much of an effect on street railway earnings that the cutting down of expenses has begun.

On August 25 the Fair Haven & Westville Railroad made a reduction in the number of cars and laid off several crews.

August 26 Robert Chappell, president of the Galesburg (Ill.) Electric Motor & Power Company posted a notice that the company felt compelled to make a reduction of 10 per cent in the wages of all its employes. The reasons given are the prevailing hard times and the consequent falling off of street car patronage. The company regrets very much the necessity for this cut, but the only alternative was to reduce the number of employes by having only one man on a car, and it was thought fairer to reduce the wages of all than to throw some entirely out of employment.

The Cincinnati Street Railway made a heavy cut in expenses the latter part of August, by reducing the number of cars and crews.

THRILLING ACCIDENT ON THE PIKE'S PEAK ROAD.

During the month, the rack road which carries passengers up the rocky steeps to the summit of Pike's Peak, was the scene of a thrilling accident. The motive power is steam, and the driving wheels of the engine are fitted with teeth which mesh in a rack rail. The engine, and one car containing a party of railroad officials, had started down the mountain, when on one of the heaviest grades the driving rods both gave way, and the engine brakes failed to stop the train. While the speed was accelerating, but not before it was too late, the crew uncoupled the car and applied the hand brakes. At the same instant the engineer and fireman jumped, and escaped with slight bruises. The car was finally brought to a stop, but the engine rushed on in its wild course, attaining a speed of 100 miles an hour. It had not far to go, however, before a sharp curve was reached. When the engine struck the curve it kept on in a straight line, shot out 150 feet into the canyon, clearing an immense rock in its flight, then dropped hundreds of feet into the abyss. The engine is a total loss as it was not only smashed into small bits but is inaccessible. The boiler exploded as the machine landed, with a tremendous noise, which was heard for miles. This is the first accident of note which has occurred on the road.

WHAT FREE COINAGE OF SILVER MEANS TO STREET RAILWAYS AND STREET RAILWAY EMPLOYES.

(CONTINUED.)

Street railway employes have much to lose and nothing to gain by the free coinage of silver. Free silver will not increase the number of people who ride on cars; it will not increase the price of a car fare, and it certainly will not increase the wages paid street railway men. Even in good times few companies could pay higher wages than they are now paying, for street railway wages have been shaded less than those of most lines of business. On the other hand higher prices for the things street railway employes buy is admitted by its advocates as a result of free silver. House rents, clothes, groceries, meat, coal, rails, cars—all are to cost more. Then where does the street railway man come in?

As we showed last month street car fares are fixed by law, and cannot be increased for a long term of years. Interest paid on street railway bonds is payable in gold. Free silver means gold at a premium. Interest must be paid or the company go into bankruptcy. Bankrupt roads are not noted for paying high wages. Even if a road succeeded in meeting its interest account, there would be less remaining with which to pay dividends, wages, and purchase supplies. Supplies are absolutely indispensable, but at higher prices the amount left after buying supplies is less than ever to divide between owners and employes. Owners naturally would expect some return and even though much smaller than now, what is left for the pay roll is seen to narrow down very materially. Even though the owners were willing to waive any return on their investment, it is doubtful if the present scale of wages could be maintained. The profitable operation of a road is just as important to the employe as to the stockholders, for it now takes more than half the earnings of every road to pay its employes.

And how about new roads and new extensions, and the cars and power-houses, and the days' work required to build all these and operate them? New roads mean more cars; more cars means steady work at good wages for more men; but even the possibility of free silver has made it impossible to secure money the past few months for such enterprises as these. We know, personally, of a large number of new roads of a most worthy and promising character; roads which, if built, would be a success, but which are now absolutely unable to place their bonds at any price. Hence, they have not been built, and the hundreds of thousands of dollars which would have gone, the past summer, to the men who build engines and cars and generators and lay tracks and erect power-houses, has been lost to them. These roads, if built, would have furnished steady employment to hundreds of men, this winter; but the very chance that free silver might prevail in the coming election has prevented the construction of these lines. If a threatened condition works such mischief, what must be expected in the event of the uncertainty becoming certainty.

It is always a safe plan, where one is not sure, to take the judgment of reputable persons of experience. A man in buying a good watch would not go to a grocer or tailor for advice, but to a first-class jeweler; nor for help in planning a house to a druggist, but to an architect. Hence, those men who have made a special study of street railways, who have made successes of the vast interests in those lines, are the best guides for the street railway employe to follow. We publish below a second installment of the views of well known street railway presidents, and what is their conviction as to the effect, on all street railway interests, of the free coinage of silver.

H. H. VREELAND,

President Metropolitan Street Railway, New York City.

Dear Sir:—In considering the probable effect of a debased currency resulting from the free coinage of silver at the ratio not warranted by its market value upon men and money concerned in the street railway interests, four salient points must be noticed:

First—That the company would receive its income in silver or its equivalent.

Second—That the amount of that income is limited by law or, speaking more specifically, by regulations restricting the fare to 5 cents.

Third—That both the principal and interest of money borrowed upon mortgages by the company are almost invariably payable in gold.

Fourth—That the company could and would necessarily pay its employes in the same depreciated currency which it would receive from the public.

The conclusion from these simple facts is irresistible. The interest burdens upon the company on the present market value of silver would be double. The bondholder therefore would be benefitted, unless, of course, the burden should be so great as to swamp the property and result in general disaster. The company would suffer to the extent of paying twice as much interest money as it is now required to pay. The men employed by the company would be the greatest losers, because their wages would be paid wholly in silver or its equivalent, whose purchasing power, speaking broadly, would be only one-half of that of the gold received in the form of interest by the bondholder.

JOHN B. PARSONS,

Vice-President West Chicago Street Railroad.

Dear Sir:—Replying to your favor asking my views of the present political situation.

Briefly stated, I believe the effect of free coinage of silver would be to increase the cost of living in all directions, and in the case of corporations, whose income is fixed, a probable reduction in wages. Street railways would be affected seriously. They would be compelled to pay higher prices for all supplies used without being able to increase the rate of fare. The result certainly would be the introduction of economies in all directions.

F. W. WOOD,

General Manager Los Angeles, Cal., Railway.

Dear Sir:—It seems to me that the probable effect of free silver coinage on street railway interests in this country is quite certain to be disastrous.

From the nature of our business we are required to accept all of our income in the subsidiary coin, or in the money of the people. We are, therefore, vitally interested in having this money as good as any other money, our dollar in nickels when we take it into the market of the world ought to be as good as the best gold dollar.

We are, therefore, interested in having silver circulated as freely as possible on a parity with gold. In my judgment this can only be accomplished on the theory laid down in the national platform of the republican party.

Every employe and every stockholder in a street railway in this country will be working directly against his own interests unless he votes for McKinley and sound money.

D. G. HAMILTON,

President National Railway Company, St. Louis.

Dear Sir:—In reply to yours asking my opinion of the effect of free coinage of silver on street railway interests, would say that whatever arguments the free silver advocates may advance as to the advantages to be derived from the free coinage of the baser metal, cannot be applied to the street railway interests.

Even the strongest corporations would be crippled and many destroyed, and it would be alike baneful to the investor and employe.

With a fare fixed by the municipality granting the franchise, with increase in cost of supplies and payment of interest in gold at a premium, but few corporations would be strong enough to withstand the increase in its total expense.

Wages, the largest item of expense, could not be increased, and the employe would suffer by increase of cost of living, which even the strongest supporters of this free silver coinage admit would ensue. The street railway interests would suffer more than any other.

HENRY M. WHITNEY,

Formerly President West End Street Railway Company, Boston,

has written a letter to the former employes of that company, which he has since emphasized over his signature in the columns of the daily press, in which he says:

"Many of us have heretofore acted with the Democratic party, which has hitherto claimed to be the especial friend of the laboring classes, and so far as it has been enabled to carry its principles this has been true in fact. It has insisted that labor should be paid in the soundest money in the world, and has otherwise endeavored to lighten the burdens of labor, but the platform which has been laid down at the Chicago convention proposes that labor shall be paid in the cheapest money in the world, is entirely contrary to Democratic principles, approves certain theories of public policy which would, in my judgment, be destructive to enterprise, to prosperity, to the large employment of labor, and is, moreover, especially opposed to the interests of all those whose income depends on their daily labor.

"It is gravely proposed that the money in which labor and all commodities shall be paid shall have but about one-half the value of the money which is at present used for the payment of wages and commodities of the world. It means that, as compared with the present value of the money you now receive, you would with the same wages be able to purchase but one-half a barrel of flour for what you now pay for a whole barrel, and one-half a pound of tea, coffee, or sugar for what you now pay for a whole pound, but one-half as much clothing and the numerous things for which wages are spent; and all this is claimed to be in the interest of the laboring man. We are asked to vote in favor of the proposition that employers may hereafter pay their workmen in money which at present is worth only one-half the money now used in the payment of wages.

"It is nothing more nor less than a gigantic scheme for the reduction of 50 per cent in the wages of every laboring man in the land. The only advantage that can be expected to come either to the mine owner, the farmer, or the manufacturer is from a reduction on the cost of producing goods; that is, by a reduction in the wages paid to labor.

"None of us can afford to be made the tools of the owners of silver mines, or demagogues, or any honest, misguided men who preach a doctrine so fraught with disaster to ourselves and families.

"I am sincerely interested in your welfare, and I venture to urge you to do everything in your power to defeat this movement. The best way to do it is to come out and vote for the representative of sound money, whether we do or do not agree with him on other matters. As for myself, always a Democrat by inheritance and by conviction, I have not the slightest doubt as to what is my duty at this juncture, and if I live until November I shall cast my vote for William McKinley."

EDWARD WHITAKER.

President Lindell Railway Company, St. Louis.

Dear Sir:—Replying to your favor of the 23rd inst., would say, that in my opinion the free coinage of silver would work the same hardship to street railway employes as to all men working for fixed wages or salaries.

Street car companies are limited to a fixed charge per passenger, and under free coinage the employes would be paid in silver, the only money the company would earn.

The value of a silver dollar would be controlled by the bullion value of the metal in the markets of the world, for the government would find it impossible to keep up a parity between the metals.

Street car employes being paid in silver dollars, would find that a silver dollar, under free coinage, would buy

only half as much as a silver dollar under the present gold standard.

I think free coinage of silver to street railway employes is equivalent to a cut of 50 per cent in their wages.

JAS. H. CUTLER.

Treasurer Public Works Company, Bangor, Me.

You ask our opinion as to the effect of free silver coinage on roads and employes where the roads have to pay gold interest on their bonds. We can only answer in a very few words that to us it seems as though it would be ruinous. Of course, if a road could increase its fares or reduce wages enough to recoup itself, it could probably manage to go through the trial. In paying wages in silver, provided the rate per day was not advanced, there would, of course, in fact be a reduction of the wages, but enough could not be saved in that direction, in our opinion, to make up for the injury that would come to any road with interest payable in gold.

In Chicago, Cleveland, and many other cities the street railway men are organizing sound money clubs. The movement should include every street railway in the United States. Already over 300 sound money clubs have been organized by the steam road employes, numbering thousands of members, whose interests are equally threatened with street railways. These clubs are formed regardless of the usual party lines, for this time it is not a question of democrats or republicans, but one of national honor; a money that is good the world around; and a return of financial confidence, which means a return of prosperity and the opening of the thousand avenues of manufacture and industry which are now closed.

FREE SILVER AND STREET RAILWAYS.

"Lightning" is the striking name of a well known London Journal, which is an authority and devotes special attention to the financial features of electrical industries in Europe, South America, Africa and Australia. In a recent issue Lightning says editorially:—

The experience of the tramways of South America in the matter of the gold premium has been especially unfortunate. In many cases their concession was accompanied by a proviso that fares should not exceed a certain maximum in local currency. The depreciation of that currency entailed most serious results to the shareholders, who were mostly English investors, for the proceeds of the "paper" when turned into gold were often inadequate to provide for standing charges, to say nothing of dividends, and the troubles still continue. It is not therefore extraordinary that in the northern States the mere suggestion of such a state of things has created a flutter in the cognate industry there, where the lines have, as a rule, a statutory maximum fare, and where a gold premium would be the inevitable result of a silver policy. Many companies would be ruined by the depreciation of the 5 cent nickel, and many others would be docked of dividends by the double affliction of higher wages and general expenses and reduced purchasing power. No surprise, therefore, can be felt at the street railway press taking the matter up, and advocating not only strenuous opposition on the part of the officials to the new heresy, but an "educational propaganda" amongst the employes generally, lest they should be stricken by the plague and not vote straight for "sound money."

POWER FROM THE TROLLEY CIRCUIT.

Abstract of Paper Read by H. S. Newton, Before New York State Street Railway Association, September 8.

It is my intention to first point out to this convention the chief advantages possessed by our railroad systems as producers of power for private consumption and then to follow with a statement of the objections raised by the Board of Fire Underwriters and others towards it adoption throughout the cities of New York State. Hitherto the electric light station has figured as the chief factor in the production of power for stationary motors. It is too often hampered, though, by circumstances of small units and insufficient reserve to consent to take hold on a large scale of a business necessarily offering what is as compared with that accruing from lighting, a reduced margin of profit. In lighting stations, too, employing large engines driving many machines, the variation in load always attendant on the use of motors is also objectionable, from the fact that the lights are affected to some extent. In these particulars the railroad station is prepared. The compound condensing corliss engines, which are showing themselves in all our power stations, are run at an economy in coal consumption which converts what would seem a very poor price for power into a figure containing a neat margin of profit.

The objections as advanced by the Board of Fire Underwriters to the use of the trolley circuit for stationary motors, seem to be embraced in one feature, the ground return. The insurance man will relate to you long tales of the disastrous effects produced where the experiment has been tried, will suggest to you that you build a fire-proof house outside your building to hold your motor and run your machinery inside by means of a belt and line shaft (the very thing you do not wish to do) and will conclude by assuring you that if you will install a motor on the plan proposed, he will have to increase your rate by two per cent on the face of your policy. This, he claims, is because a reliable method of insulating has not been discovered to make the installation a good risk.

Over in Syracuse we are using, for supporting our various lines, some four or five hundred iron poles. Every pair of poles is to the trolley wire suspended between them a dead ground, and yet in the last three years, during which time I have held my position on the street railroads there, we have never had one ground on these poles. And yet these insurance men tell us that they cannot find an insulation secure enough to warrant their insuring a building into which the trolley circuit runs, with every precaution taken for most careful insulation, without an addition to the premium, such as I have noted.

To bring the insurance bosses to our way of thinking and to gain entrance for the trolley circuit into the factories and work-shops, would seem to be an imposing task. These men have been known to yield to pressure, however, in other things, and there is always the rivalry and greed among them, arising from competition, to favor an effort in any direction. The power business itself is one that is assuming more importance every day, and with an assured profit in sight, the railroad companies (in this time of three cent fare agitation) will not long consent to remain without their share of the spoils.

RAILWAY POWER STATIONS.

Paper Read Before the New York State Street Railway Association by Thomas Henning.

At no time since the advent of the now ubiquitous trolley, has there been more energy, ingenuity and enterprise expended upon its improvement than at present.

Of course, the commercial view is the all important one to business men, notwithstanding which, when one follows the peregrinations of the various factors which, combined, turn the wheels of a trolley car, and observe the thousand and one loop holes by which energy is allowed to escape without performing useful work, one would imagine for a moment that one or two roads had been constructed and maintained for amusement.

Permit me to call your attention to a few of the errors made in years gone by.

The first question of vital importance presenting itself will be the site. Should an experienced man be called upon to choose a site it would cost a few dollars. For this reason inexperienced persons have at times done the work, and chosen the site, for the reason that it was in the vicinity of the work to be performed, regardless of the

questions pertaining to fuel and water, or they may have chosen it owing to the contiguity of one factor and disregarding the remaining factors. This is a more expensive method than paying for having the matter properly attended to.

In the construction of a plant heavy losses are frequently borne owing to misplaced material, which, being lost sight of, necessitate duplicate requisitions, etc. A clerical force sufficiently large to keep an accurate account of all material required, ordered, received and used will pay a handsome profit on the outlay.

In operation we are again confronted with many wasteful outlets. The pumps may be kept in service without examination until convenience or absolute necessity compels action. The boilers with scale on one side of the tube and soot on the other. The steam pipe covering defective. The engines in service without overhauling until they quietly refuse to do further duty. The dynamo commutators rough, or brushes not properly fitted to them. Switches and leads of insufficient capacity, switches unclean, their faces rough and lug joints not properly made. The feeders inadequate for the work required of them. Motor commutators and brushes neglected and, finally, the rails not properly bonded, if bonded at all.

I have known of instances of units having been kept in service under full loads and overloads (notwithstanding the fact that they were units idle) upon the theory that the larger the output from each unit the greater the economy. I believe that this is a delusion and should be avoided. It is not economical to overload any part of the plant unless absolutely necessary.

In stations of 2,000-horse-power or over, it will pay to extract the oil from the wipers, which may be done by enclosing them in a tank, into which a steam jet has been inserted. The oil upon rising to the top of the tank may be drawn off for purification, the wipers dried out and used again, repeating the operation until the wipers are worn out.

There is nothing connected with a power station that will pay a larger dividend than cleanliness. If the station is kept scrupulously clean the employes will take more interest in their work, and the treasurer will not be called upon to pay for so many tools and other things lost and misplaced.

Of course, as science and capital are moving along rapidly, hand in hand, we may reasonably expect in the near future to be able to eliminate some of these factors which tend to swell the cost of power. The success of long distance transmission and the improvements quietly but continually being made in motors, dynamos and other electrical appliances, indicate that the time is approaching when we may expect a higher efficiency in all branches of the service.

As an earnest of this, I may instance the bold but brilliant move of General Manager Littell, of the Buffalo Railway Company, in arranging to carry his patrons to Divine service on Thanksgiving day, 1896, by power generated by the water fall of the Niagara river over twenty miles away.

Before concluding, permit me to draw your attention to a matter which is frequently overlooked: The cost of operating a power station is frequently figured upon the basis of car miles. This is liable to be very deceptive, and may militate against a well managed station, for the reason that insufficient copper, poor bonding and defective car equipments would necessarily make a bad showing for any station.

The correct method will be to note the output at the bus bar and figure upon the basis of electrical horse power.

STANDARDS FOR RATING APPARATUS.

Abstract of Paper Presented to New York State Street Railway Association by W. J. Clark, September 8.

I will briefly impose upon your patience with some suggestions upon the more thorough standardization of electrical railway apparatus, the necessities of which you are already familiar with. So, this paper should be considered more as a reminder of something that ought to be done rather than as an argument as to why something should be done. And, of course, it is fully understood that what is suggested herein is a more proper theme for action on the part of the National Street Railway Association than that of any individual state, yet in street railway matters, as in national affairs, New York leads the way, so it is extremely proper that the reminder should be first given to you.

We all know that in street railway operation there is not the necessity for the full and constant study of standardizing rolling stock that is being carried on by the master car builders and master mechanics of the steam roads.

It is also true that the conditions and service of no two electric railways are alike, and that the necessities of one road as to character of car body, style of track, type of motors, kind and size of engines and generators may be entirely different from the road next to it. So from the steam-road standpoint, standardization would be impossible, but in the practical operation of a street railway different conditions exist from those met with in operation of a steam road, so you must view the special features of your business from a different standpoint than they. Unquestionably it would operate to your advantage, as it would most certainly to the electrical manufacturer, if some definite positive rule for the rating of all of the electrical apparatus were fixed. It makes but little difference what this basis of rating is, provided it is universal, well understood and thoroughly insisted upon by street railway men; and I wish to be distinctly understood as not advocating the particular method of rating which has been followed by the corporation which I represent, but I do most emphatically place myself on record as being in favor of some system to be evolved through the wisdom of the street railway fraternity, and based upon such methods as may seem most just to them, which will fix definitely what a motor of, say, 25-horse-power or 800 pounds tractive effort is, or what for instance constitutes a 500-kilowatt generator, and of even going farther than this, and define the capacity of switches, circuit breakers, and kindred devices. No one can suffer from such an arrangement which is entirely just to both the manufacturer and user; and with the adoption of such a rule the little remaining mystery concerning the practical side of electrical apparatus would disappear as it should do.

The electrical manufacturer, while justly entitled to much credit for the advancement of the science, and the making of electrical railroading practical, has many sins to answer for under this heading of mystery, and the only power on earth which can absolve him from his remaining sins of this description is the united action of the users of his product to define distinctly and clearly what his product shall be called. And it makes no difference to him whether some particular article of his production is called a horse or an elephant, providing his competitor's production, which should do the same work, is similarly designated. But, if he uses the term horse, and his competitor that of elephant, he is of course at a great disadvantage. While the purchaser who may not be thoroughly conversant with the different terms as applied, may supposedly buy the larger animal, and when too late, discover that he has only secured a moderate-sized pony.

The manufacturer who has used the larger term is not altogether to blame either, for, no class of machinery has ever yet been produced which was susceptible to so many different methods of rating as electrical apparatus, and all of which may be considered honest, all such methods being entirely dependent upon the standpoint from which its producer views the matter, as, for instance, one producer may say, I will rate a certain generator so that it will give a product of 300 kilowatts continuously, and never rise to a dangerous limit of heating, so he calls this a 300 kilowatt machine. Now, this very machine would, for instance, develop, say, 400 kilowatts capacity for a period of two hours without rising to a dangerous degree, so some other manufacturer says that in practical operation no generator ever had a continuous load, up to its rated capacity, so a safe basis to go on is to rate the machine at what it will do for two hours, and he calls it a 400 kilowatt. The natural sequence is, that some one buys a machine that is either larger or smaller than what he supposed he was purchasing, and if he is fortunate enough to escape paying more money than he should for a certain capacity machine, he is exceedingly liable to get tangled up on the proper sized engine unit to go with the machine, and following in the wake of the transaction is the old story of engines being found too large or too small for the generators which they are coupled with. For this trouble, our brethren of the engine trade, are not by any means guiltless, for, as some of you have learned by experience, methods of engine rating are about as flexible as those followed on generators, and I trust that I will not be accused of giving away state secrets when I say that instances have come within my observation where the engine man and electrical agent have stood in together to make it appear to some prospective purchaser that he was getting at least all that he paid for in both engine and dynamo capacity. These evils have, of course, not troubled the

larger roads, with their skilled engineers, so much as they have the smaller roads and the newer ones which were about to begin business, yet it is unquestionably wise and just that all opportunities for mistakes, misunderstandings and misrepresentation on such features should be forever done away with.

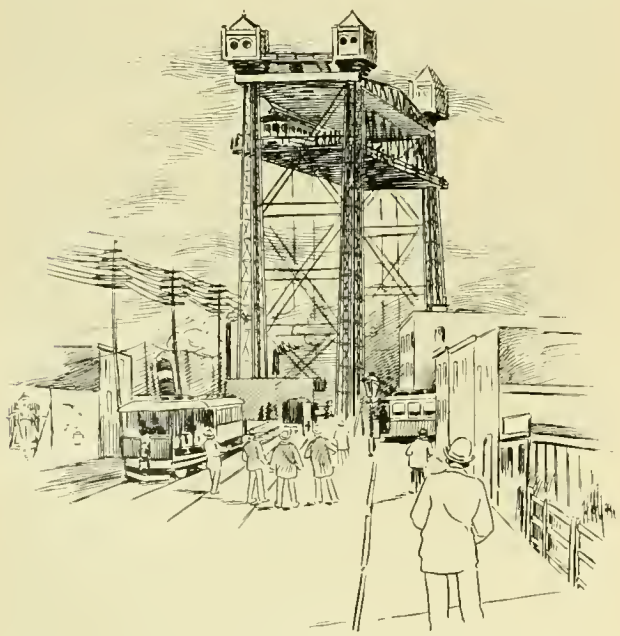
What has been said on generator rating applies with equal or even greater force to the rating of street car motors; for even greater differences exist in defining their capacity than is met with in generator practice. In fact, the varying features necessitated by the construction of motors for various characters of service, renders greater opportunity for mystery than in connection with stationary machines, and the best of engineers are occasionally imposed upon by misused terms in connection with some particular class of motor, consequently some definite rule is even more necessary for their rating.

For both generators and motors it is imperative that there be some prescribed rule as regards the character and method of their insulation. In natural sequence to the question of motors comes that of car wiring. It is customary with all the manufacturers of car equipment to furnish a liberal quantity of good material for this purpose, and as to a great extent the work of installing the same is done by the railway companies themselves, troubles from this source are not nearly so numerous as formerly, yet there are cases where installation is done by manufacturing companies, car builders, and outside contractors, which would never pass inspection were the wiring done in any building of our larger cities.

On every feature of the business, the manufacturers will gladly conform to your actions and requests; and to sum up the whole situation in a nutshell, they exist for your benefit, not you for theirs, and that they now look to you for suggestions instead of making them to you.

CAR GOES UP ON LIFT BRIDGE.

An electric car of the Chicago City Railway was accidentally taken up 150 feet in the air on the Halsted street lift bridge recently. The incident excited the passengers almost to a panic and created a stir in the daily papers the day following. It seems that the bridge tender became rattled and fearing he was not going to have time to lift the bridge for a coming boat started it up with the car on. Some of the passengers wanted to jump off the bridge, but the trainmen managed to persuade them that a 150-foot drop was less desirable than a journey down the regular way.



CAR ON HALSTED STREET LIFT BRIDGE.

UNREASONABLE SEWER CONTRACTORS.

The most high handed and unreasonable attempt on the part of sewer contractors to block a street railroad that has recently come to our notice, was that in St. Louis, last month, when Anderson Brothers, who have a big sewer contract, attempted to cut directly through the Olive street cable line of the Missouri Railroad. So little a thing as blocking half of a great system of transportation was evidently considered of no importance by the contractors as long as they thought they had the legal right to do it. The courts thought otherwise, however, and granted the Missouri Railroad an injunction against tearing up the tracks. Several days before the excavation reached the cable line the contractors notified the Missouri Railroad to protect its tracks so that as little damage as possible would be done in cutting through! This little kindness on the part of the sewer contractors put President P. C. Maffitt on his guard, and an attempt was made to get the contractors to tunnel under at the expense of the railroad. The contractors offered to do this for the paltry sum of $3,000. To be sure, almost any other contractor in the city would be glad of the job at $300, but these men thought they had a lead pipe legal cinch, (as their contract with the city authorized them to remove obstructions) and proposed to make their own terms. No agreement was reached. Meanwhile, James F. Davidson, superintendent of the Missouri Railroad, was keeping an eye on the progress of the big steam shovel which the contractors were using for digging the ditch, and when it got uncomfortably near, a blockade was started. Each cable train stopped on the track in front of the steam shovel, and as soon as the train behind it came up the blockade duty was assumed by the rear train. In this way the shovel was kept off the tracks until an injunction could be served. When will house movers and sewer contractors learn that the traveling public has rights they must respect?

PECKHAM'S BIG CINCINNATI ORDER.

August 26 was the day to which the truck builders looked forward as the date when the big contract would be given out by the Cincinnati Street Railway. As the order is one of the largest of the year, calling for 175 trucks, the bidding was naturally strong and the hustling on the part of the various agents unusually active.

The Peckham Motor Truck & Wheel Company, was the victor, being awarded the full number, and the order was secured by the company's Chicago agent, J. A. Hanna, whose smiling countenance now beams brighter than ever.

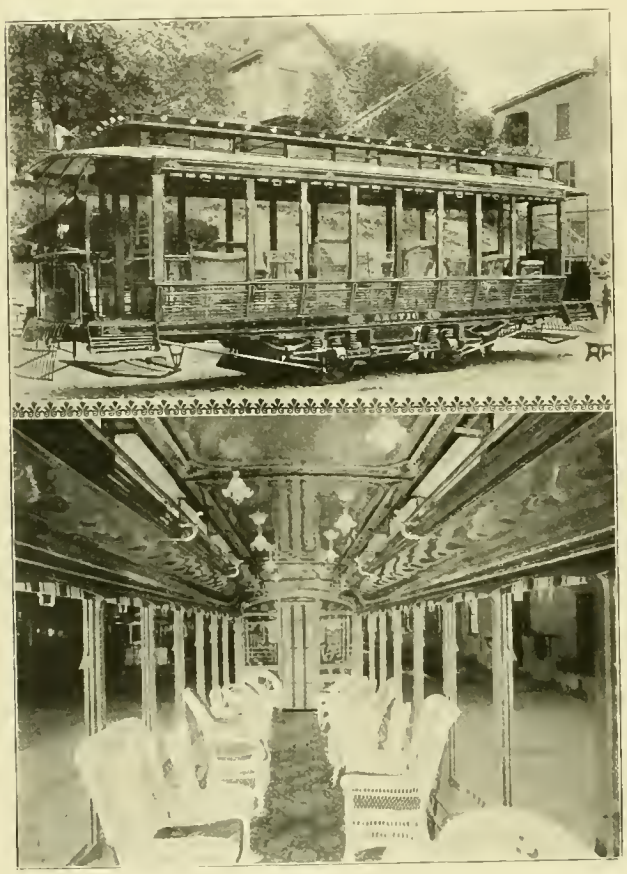
It is announced that the Cincinnati Street Railway Company will hereafter carry its own insurance. The plan proposed is the common one of providing a sinking fund and putting into it the premiums heretofore paid to other companies.

STREET RAILWAYS AROUND BOSTON.

In no place in the world is there such a network of suburban electric road as in and around Boston. This was never more forcibly illustrated than by the Street Railway Guide for Eastern Massachusetts, recently published by Robert H. Derrah, 286 Washington street, Boston. The accompanying map is reproduced from this guide, and shows how extensive the street railway lines are in that region. The desirability and necessity of such a guide are evident. Thirty-two roads are on the list embraced by the guide, and the information contained therein has the official sanction of the roads which are included in its pages. The companies use 4,232 motors and their power stations have a capacity of 49,656 horse-power.

CINCINNATI PLEASURE CARS.

The Cincinnati Street Railway Company has recently built four handsome pleasure cars and has put them into active service upon its lines. They are entirely open, handsomely finished and furnished with movable rattan chairs, having a seating capacity of twenty persons. A large number of incandescent lamps distributed over the interior and exterior of the car furnish means for thorough illumination and decoration. The accompanying engrav-



ings give an excellent idea of the handsome appearance of these cars. The motor cars have double trolleys.

As the principal objective point for excursion parties over these lines is Chester Park, the company has arranged a schedule covering a number of routes by which this resort may be reached, and the time required for completing the round trip, the return being over the same or a different route. All parties taking the circuits passing the park are entitled to free admission thereto, and by a carefully prepared system of menu cards may order at the time of chartering the cars a luncheon, dinner or supper, for any number of people, to be in readiness at the park at the time of arrival.

A crossing war at Bradford, Pa., between employes of the Bradford Electric Street Railway and of the Western New York & Pennsylvania Railroad, was ended by two companies of the fire department, who turned the water upon the contesting parties by order of the mayor.

LOW OPERATING PER CENT.

The Brooklyn Heights Railroad Company has forwarded its report for the quarter ending June 30, 1896, to the Railroad Commission. This report shows gross earnings from operation for the quarter of $1,160,790.13, an increase of $74,707.08 over the same quarter of 1895; operating expenses $591,282.79, a decrease of $144,919.02; net earnings $569,507.34, an increase of $219,626.10. The income from other sources than operation was $66,009.43, an increase of $6,156.67. The fixed charges and taxes were $501,026.95, a decrease of $39,836.93. The surplus for the quarter is $134,489.82, against a deficit for the same quarter of 1895 of $131,129.88. The operating cost was 50.09 per cent of the earnings excluding taxes, or 57 per cent including taxes, as against 67.8 per cent and 74.4 per cent respectively for the same quarter of 1895.

The filing of this quarterly report completes the statement for the fiscal year ending June 30, 1896, and the figures for this year compared with those for the fiscal year ending June 30, 1895, are as follows:—

	1895.	1896.
Gross Earnings	$4,052,189.35	$4,272,392.53
Operating Expenses	2,859,806.04	2,503,226.18
Net Earnings	$1,192,383.31	$1,769,166.37
Income from Other Sources	220,875.19	232,599.51
Gross Income	$1,413,258.50	$2,001,765.88
Fixed Charges and Taxes	2,075,865.44	2,044,875.32
Deficit	$ 662 606.94	$ 43,109.44

The operating cost for the year was 58½ per cent of the gross earnings, not including taxes, as against 70½ per cent for the year ending June 30, 1895. The general balance sheet of June 30, 1896, shows a deficiency of $238,013.65, against $547,086.16 on June 30, 1895.

MASSACHUSETTS MEN MEET.

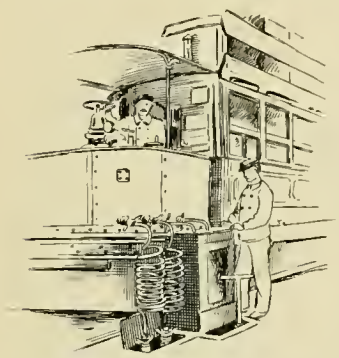
A very enjoyable occasion was that of the annual outing of the Massachusetts Street Railway Association, August 11, as guests of the Dartmouth & Westport, the Union and the Globe street railway companies, of Fall River and New Bedford, Mass. This was the third annual meeting of the kind and was participated in by about fifty members and guests, representing fifty-nine corporations, with nearly forty million dollars of capital stock, and operating 59 miles of horse and over 1,000 miles of electric roads. These roads have 4,377 cars in service and give employment to nearly 9,000 persons.

But at this meeting the members mostly forgot how many men they employed and how many miles of road they collectively or individually represented and gave themselves up to the hospitality so pleasantly offered by by the railway companies and citizens of the two cities. They were entertained at the club houses, parks and theatres, and with the peculiar institution of that section, a genuine clam bake. The officers of the association are Prentiss Cummings, West End Street Railway, Boston, president; P. F. Sullivan, manager Lowell & Suburban, vice-president, and Charles S. Clark, Boston, secretary.

MEKARSKI AND HIS AIR MOTOR.

The experiments in New York and Baltimore with compressed air as a motive power for street car service have caused some interest to be felt as to the systems used in Paris and other cities of France. The one principally in use is known as the Mekarski, from the name of its inventor.

M. Mekarski first began working on his scheme when he was a student in Paris, before the Franco-Prussian war, but when the war broke out he entered the military service as an officer. In 1874 he was so far successful as to have suburban lines working upon his system, and a year later a start was made in Paris itself. Concessions were successfully obtained in and between a number of cities. At the present time over 100 tram cars are equipped with the system and 28 locomotives, each hauling four cars on the Paris lines. In Paris each car will hold 50 persons, the weight of trailers being 8 tons and that of the locomotives 18 tons.



CHARGING STATION.

At Nantes, the inventor states, cars that have been running for seventeen years are still in good condition, and he is convinced that not only is the wear and tear much less than by any other system, but it is much cheaper than horse power. Upon some lines the reservoirs are charged with air at the shops, but upon others a system of transmission is used by which cars may be charged at several points along the line, and this is the system now generally adopted. The manner of charging in the street is shown in the accompanying illustration. The air is transmitted about two miles, and the time of charging is said to be two and a half minutes.

The other principal system in use in France, the Popp-Conti, is running in Paris and St. Quentin. This system includes a method of charging reservoirs while on the road without the necessity of stopping the car, by the wheel passing over a pedal in the rail and operating the necessary valves. This system employs lighter reservoirs on account of the lower pressure employed, and that and the automatic system of charging constitute the chief difference between the two systems.

Speaking of the time when the elevated roads of New York did not run on Sundays, a story has been told of the late John Stetson. He wanted to go somewhere, and was much disgruntled at finding no trains. His friend Haverly, hapening to catch sight of the initials "M. E. R. R." on the Manhattan Elevated Railroad cars, inquired what they meant. "Blest if I know," replied Stetson; "Methodist Episcopal Railroad, I guess."

SAMUEL L. PHILLIPS RESIGNS.

President Samuel L. Phillips, of the Metropolitan Street Railroad Company, Washington, D. C., has tendered his resignation of that position, to take effect October 15. It is understood that this action is in accordance with a statement made by Mr. Phillips at the time he assumed the duties of the office, to the effect that as soon as the contemplated installation of electric lines was completed he would sever his connection with the company. The management of Mr. Phillips has been remarkably successful, and the tangled affairs of the company have been thoroughly straightened out.

DON'T TALK TO THE MOTORMAN.

The front platform, which in the by-gone days, was the scene of many a pleasant visit as the well-to-do merchant or banker smoked his morning cigar and chatted familiarly with the driver, is fast becoming a "solitary," although the motorman of to-day never gets that lonesome feeling which was incident to prodding the horses.

Many roads now absolutely refuse admission of passengers to the front platform, believing that nothing should be permitted to distract attention from the one thing of running the car. Of course increased speed, which has made an object on the track 100 feet away as near in point of time as half that distance ten years ago, has had much to do with this.

The West End of Boston, one of the model roads in the world to-day, recently posted the following notice.

West End Street Railway Co.

SPECIAL NOTICE TO PASSENGERS AND EMPLOYEES.

The motorman upon an electric car should be relieved from any liability of an accident which might occur by having his attention drawn from his duties by any conversation addressed to him when in service upon a car. No one can more fully realize the importance of this than the motorman himself.

The passengers upon the cars of this Company are respectfully but earnestly requested to avoid conversation with any motorman while on duty.

The Board of Police have issued an order prohibiting any member of the Police Department holding any conversation with the motorman when riding on a car of this Company.

The Board of Fire Commissioners have issued a similar order to the members of the Fire Department.

The employees of this Company are reminded of the rule prohibiting such conversation on their part with a motorman when on duty. Any violation of this rule will be considered a cause for discharge from the service of the Company. Superintendents, Foremen, Inspectors or employees detailed as Instructors, are exempt from this rule as to necessary conversation or instructions given in the discharge of their duty.

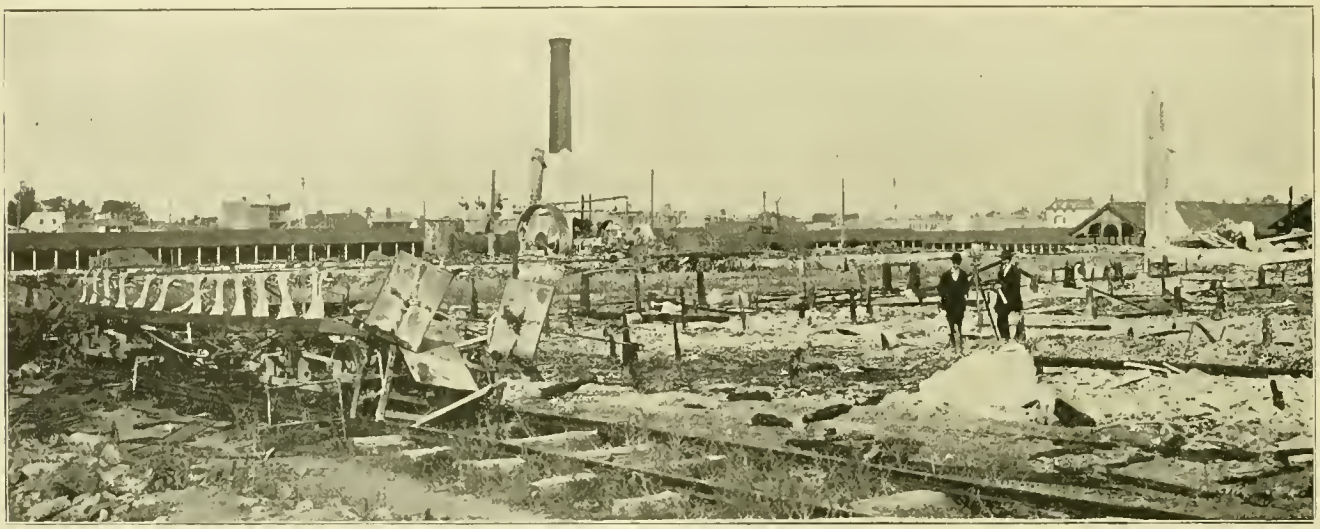
It is printed on fairly heavy white paper, and the side which bears the printing is gummed. The sheet which is 8 by 16 inches is then stuck on the inside of one of the front platform windows, making it plainly readable from the platform.

DETROIT FRANCHISES CASE APPEALED.

The famous case of the Citizens' Street Railway Company against the Detroit Railway Company, which, as stated in our last issue, was decided adversely to the the Citizens', will be carried to the United States supreme court on a writ of error. The point which will be made, it is announced, is the constitutional one that "no State shall pass any law impairing the obligation of contracts," and it is probable that the case will be stubbornly fought.

MONTREAL PARK & ISLAND FIRE.

The Montreal Park & Island Railway was the third road to suffer by fire the past summer. The fire originated in a small building belonging to the Montreal exhibition company and spread rapidly among wooden buildings to those of the Park & Island Railway. The destruction was complete. The cause is unknown. The power plant was but temporarily located there and at the time of the fire arrangements were in progress for building a permanent plant. The fire stimulated the company's efforts in that direction. In the meantime the Montreal Street Railway is furnishing power. The views are furnished us by the kindness of Henry Holgate, manager.

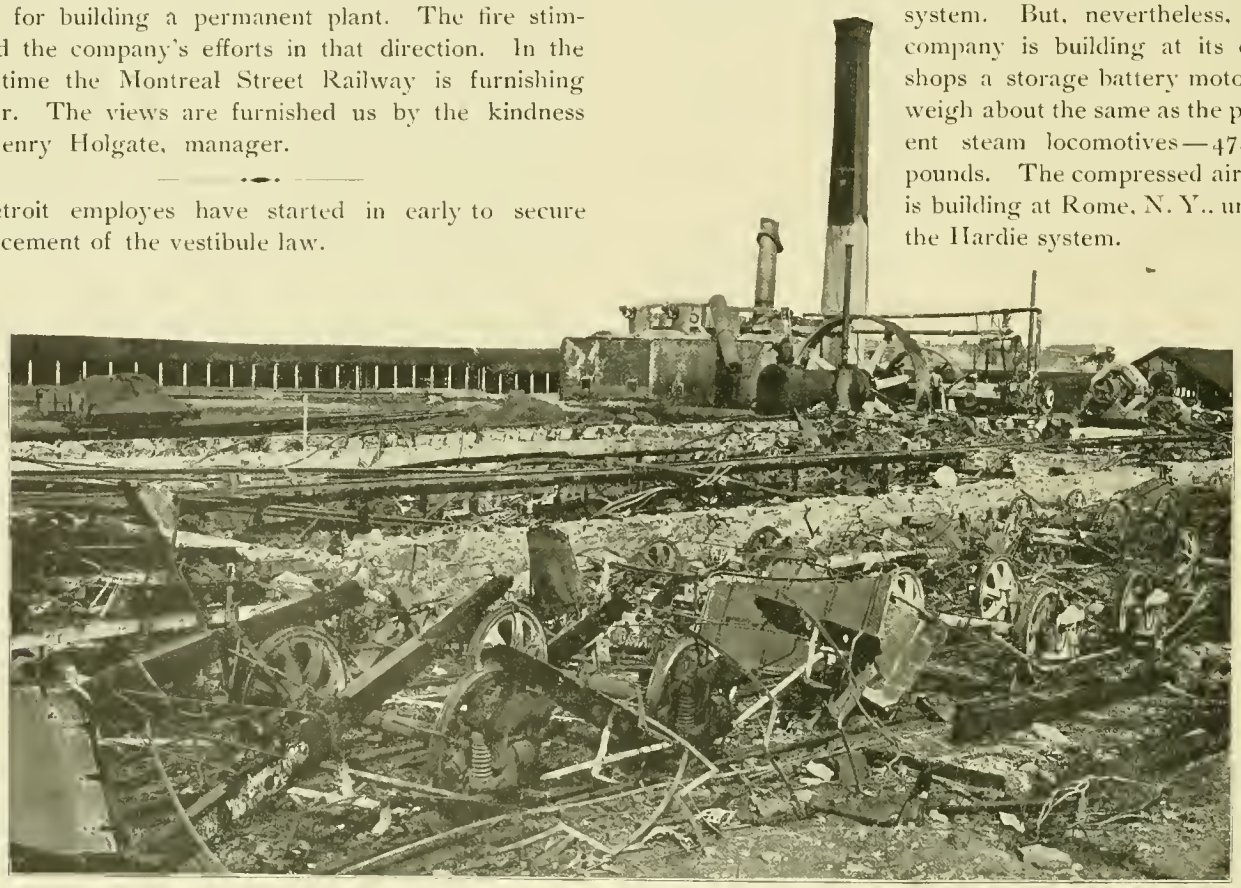


MONTREAL PARK & ISLAND RAILWAY'S FIRE.

Detroit employes have started in early to secure enforcement of the vestibule law.

NEW YORK MANHATTAN TO EXPERIMENT WITH AIR AND STORAGE.

The Manhattan Elevated in New York, whose revenue has been so seriously cut into by the Broadway and Third avenue cables, is beginning to seriously consider some cheaper motive power than steam. Nothing in the history of the past experiments would seem to warrant any hope that either compressed air or storage batteries can commercially compete with the third-rail electric system. But, nevertheless, the company is building at its own shops a storage battery motor to weigh about the same as the present steam locomotives—47,000 pounds. The compressed air car is building at Rome, N. Y., under the Hardie system.



MONTREAL PARK & ISLAND RAILWAY'S FIRE.

Selection of Motormen and Conductors

With the idea that it might be interesting to the readers of the REVIEW to learn something of the methods employed by different street railway companies in selecting men for employment and the basis upon which those who may be employed as "extras" are singled out for promotion to the permanent force, a number of letters have been addressed to various roads in different sections of the country asking such questions as seemed necessary to call forth the desired information. It will be seen from the replies published below that practices vary almost as widely as the personnel of the operating departments. In some instances a plan is followed which in many respects resembles Procrustes' bed of classic fame, in which every visitor was forced to lie and if found too long the superfluous length was lopped off, but if too short he was stretched. In each instance he was made to fit the bed before he could enjoy Mr. Procrustes' hospitality. Modernized, the conditions of the fable are changed to the extent that the visitor (or applicant) sometimes assumes an active rather than a passive role, and does both the lying and stretching himself.

Another plan, the successful operation of which would seem to depend largely on the knowledge of human nature possessed by the selecting officer and his skill in applying it to individual examples, is to choose men for the position of conductor or motorman in the same manner, as one of our correspondents puts it, as a man would select a wife. This system, it is readily seen, is more fully applicable to small than large systems. The chances of the final selection being a successful one are in inverse ratio to the number of individuals from which the choice is made. The REVIEW, therefore, does not assume to pass judgment upon any of the methods, but presents the replies received in answer to its letter of inquiry. The questions asked were as follows:

1. How large an extra list do you maintain?
2. What number of applications do you ordinarily have on file?
3. What is your method of selecting men?
4. What length of time is it ordinarily necessary for a man to stay on the extra list before he gets a run?
5. What is the average length of time in service before a man gets a day car or other desirable run?
6. What nationality do you find most in evidence among your employes and applicants for positions?

Baltimore City Passenger Railway Company.

F. L. Hart, general manager, gives the following answers to the questions in the order in which they were presented:

1. We carry an extra list of about 30 per cent of the number of men employed on the lines.
2. We do not file applications—not necessary on account of the number of men seeking employment.
3. a. From their personal appearance. b. From their political "pull."
4. About one year.
5. It takes about five years to get one of the best runs on our lines.
6. The men employed on our lines are principally native born.

Cleveland Electric Railway Company.

John J. Stanley, general superintendent replies:

In answer to question No. 1: Our extra list is about one-third of the regular list.

In answer to question No. 2: We do not keep applications on file, but we hire the men as they come.

In answer to question No. 3: Our method of selecting men is that they are compelled to go through the hearing and eyesight examinations the same as on steam railroads. We also have a man to look up their record. This man does nothing else. He goes to applicant's former employers to find out his former record. He goes to his house to see his way of living, and also goes to the neighboring saloons to find out if he is a drinking man. This has proved very satisfactory to us.

In answer to question No. 4: It takes a man from eight to twelve months work on the extra list before he gets a swing run. Would also state that a man working on the extra list can make from $1.50 to $2 a day.

In answer to question No. 5: Will say that it takes a man from two to three years to get a day run.

In answer to question No. 6: We hire as many Americans as we can; of course we have a few foreigners.

Lynn & Boston Railroad Company,

through E. C. Foster, general manager, reports:

We keep about 225 extra men on the list, and have a large number of applications on file at all times. It is impossible to state how long a name might be kept on the list, as many on the list are not selected. We select men from their general appearance and recommendation. From six months to two years is the time required before a man can obtain a regular car. We find very little difference in the nationality, as we have many excellent men of various nationalities.

Cedar Rapids & Marion, (Ia.) City Railway Company.

Report furnished by F. L. Diserens, superintendent:

1. Three motormen and three conductors.
2. About 100.
3. We never take a man not a resident of this city or immediate vicinity for a year or more. Preference given to the ones raised here. He must give us references that we also look up.
4. About a year.
5. About two years.
6. Americans.

Columbus Central Railway Company.

J. F. Barry, acting general manager writes:

1. We are maintaining an extra list of motormen and conductors, thirty-five each.
2. We have on file usually about 150 applications.
3. We select men paying especial attention to good eyesight, hearing and sobriety. Men of nervous temperament make the best conductors; men of phlegmatic temperament make the best motormen.

4 and 5. Your fourth question is a little hard to answer. Most of our men are married and are not therefore liable to go from one city

to another. They prefer to keep steady employment, and it will take from six to nine months before an extra man is liable to get a steady run. And in answer to the fifth question, as the same conditions have a bearing, it is likely to be a year or more before a man gets what he calls a desirable run.

6. In this locality most of the applicants are native born, with a sprinkling perhaps of Irish and German. I regard them all, however, as Americans, as no application would stand a chance of favorable consideration unless the person was naturalized.

Terre Haute Electric Railway Company.

President Russell B. Harrison gives us these answers:

Many of your questions are as difficult to answer as if you asked a man how he would select a wife. Experience, record of

OFFICE OF
Terre Haute Electric Railway Co.
00 NORTH NINTH ST.

Application for Employment

TERRE HAUTE, IND. ____ 189

Gen'l Manager

I hereby apply for a situation as motorman, conductor, and if accepted, agree to faithfully observe all rules and regulations, to pay all my bills promptly each month, to maintain strict integrity of character, to abstain from the use of intoxicating liquors, to avoid visiting saloons or places where liquor is sold, and to perform my duties to the best of my ability, waiving all claims for damages by reason of any injury I may receive while in the service of this company.

Married or single
My age is ____ years
Height ____ feet ____ inches
Weight ____ pounds
Color of Hair
Color of eyes
General Health
Previously employed for past five years

Names of all other railroads on which I have been employed

Reasons for leaving last situation
Family resides at
Names and residence of nearest relatives besides parents

Have you the necessary deposit of ____ dollars, and a reliable watch, as motorman or conductor?
Give name and address of two responsible persons who will vouch for your good character

Applicant

Witness
Dated this ____ day of ____ 189

Certificate of Character

I hereby certify that I know ____ (applicant herein named) to be a man of good standing, sober, honest, upright and worthy of confidence and believe him to be fully competent to fill the position applied for.

Name ____ Name ____
Address ____ Address ____

NOTE—Persons are requested not to sign this certificate unless they personally know the applicant to be as represented.

APPLICATION BLANK—TERRE HAUTE ELECTRIC RAILWAY.

work, appearance and general surroundings have much to do with the selection of the men, following some general rules.

In reply to your first question, I would say that our extra list is from 10 to 20 per cent of the total force.

As to your second, I would say that the number varies.

Your third is the most difficult question of all, and can only be answered in a general way. After the blank application has been signed and examined, then age, experience, appearance, intelligence, disposition and record for faithfulness of the man are considered, and if we think he will make a desirable motorman or conductor, he is broken in and put on our extra list.

In answer to your fourth, I would state that it depends entirely upon resignations and dismissals.

I must make the same answer to your fifth question.

Chicago City Railway Company.

From M. K. Bowen, superintendent, we have received very complete replies, and the method employed in the selection of men is probably typical of that employed in most large cities. Mr. Bowen says:

1. Our extra list consists of two extras for every nine regular runs.
2. We usually have about 10,000 applications on file that are seldom referred to in hiring of men.
3. A notice is posted in the superintendent's office that applications will be received at a specified time, and men of pleasing address, able to write and speak English intelligibly, with ability and a good record for honesty and sobriety are selected, and appointments made from those found to be healthy and intelligent, free from all serious bodily defects, with good sight, hearing and speech.
4. Our extra list contains no more names than will insure each extra man five days' work out of every seven.
5. Extra men are employed an indefinite period before getting a regular run. The time consumed for the promotion from the extra list to regular runs depends entirely upon the fluctuation in number of cars run and number of men resigning and discharged. In some cases the men work on the extra list but a short time, while in other cases it has taken a considerable time before they get regular runs.
6. We have found in our experience that nationalities of applicants are about equally divided, including American born, Irish, Swedes and Germans.

Los Angeles Railway Company.

Our report from John J. Akin, superintendent, gives very complete information as follows:

1. We generally have an extra list of about 40 for each position.
2. Number of applications ordinarily on file 30 to 40 conductors, and the same number of motormen.
3. Method of selection, personal interview, letters of recommendation and names of persons to whom they refer to whom we write for information. We seldom take men under 25 years of age or over 40. For motormen we require men weighing at least 160 pounds and not less than 5 feet 6 inches tall.
4. Have no definite basis to determine from, as the present company has been in operation a little over a year, during which time we have been changing from cable to electricity and changing the manner of previous working lists.
5. Beg to answer this same as above.
6. Nationality preferred, American.

Joseph S. Wells, secretary,

Salt Lake City Railroad Company,

answers the proposed questions in order as follows:

1. Twenty-five men.
2. We do not keep a file of applications at all.
3. We generally select men that we are acquainted with or that come highly recommended from people with whom we are acquainted.
4. From six months to a year, ordinarily.
5. We do not make a rule to permit any of our men to continue on the day or most desirable run continually. We give all our regular men an opportunity to work on all runs. We change from one run to another every four weeks.
6. Americans; generally natives of Utah.

The Albany Railway, Albany, N. Y.,

through John W. McNamara, treasurer and general manager, in addition to the information conveyed by way of answer to the questions propounded, furnishes us with a copy of an application blank containing some questions not usually found upon such papers, and which give so

much additional light when answered that they seem to to be worthy of special commendation. Mr. McNamara says:

We employ about sixty conductors and sixty drivers. We have two divisions and operate about an equal number of cars on each division. We aim to have at each division fifteen extra conductors and fifteen extra drivers, making thirty extra conductors and thirty extra drivers.

We do not keep applications on file. If we are not in need of extra men we do not receive applications. If we do need men blank pplications are given to them, and if the answers to questions are satisfactory they are assigned to good conductors and drivers for the purpose of being broken in. We herewith inclose one of our blank applications. In addition to what is stated on the blank each applicant is personally examined by the assistant manager, and if a driver by one of our foremen of shops, and finally by the general manager. This examination includes hearing, eyesight and general physical qualifications for the position sought. If any defect is discovered the applicant is referred to our physician. We do not accept men for either the position of conductor or driver who are not able to see and hear perfectly.

Extra men usually obtain a steady run within two weeks after their appointment.

Most of our conductors and drivers are native born Americans.

We reproduce herewith a few of the questions contained in this application blank which seem worthy of special notice:

If not married is any one depending upon you for support?

Is your wife living or boarding with you?

Is your life insured?

Are you a member of any benevolent association?

Are you a member of a military company?

Are you a member of any company or association the rules of which would interfere with the discharge of your duties if employed by the Albany Railway?

Have you ever had a fit?

Have you ever fainted?

Do you know that while training you will receive no compensation?

Do you know that if employed you will be placed on the "extra list," and will only be employed in your turn when "regulars" or "reliefs" are off duty?

Do you know that you will have to wear full uniform within two weeks after day of your appointment?

Were you ever arrested?

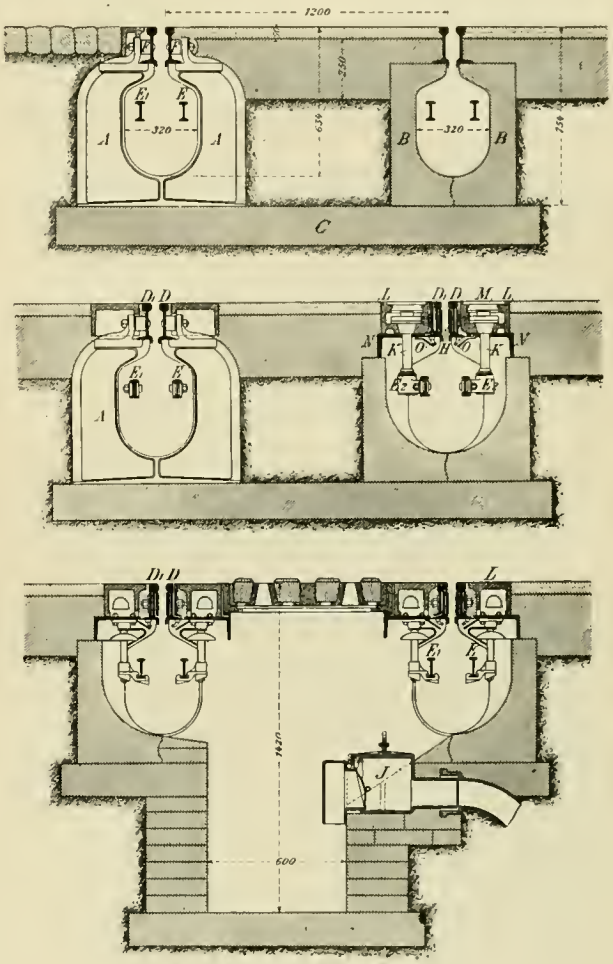
Were you ever convicted of any crime?

Do you know that section 570 of the penal code provides that a person who obtains employment or appointment to any office or place of trust by color or aid of any false or forged letter or certificate of recommendation, or of any false statement in writing as to his name residence, previous employment or qualification is guilty of a misdemeanor?

At the annual meeting of the stockholders of the Enfield & Longmeadow, Mass., Electric Railway Company, it was voted to increase the capital stock to $125,000, and to proceed with the building and equipping of the road at once. Officers were elected as follows: Charles E. Graham, president; Charles H. Briscoe, vice-president; James B. Houston, secretary and treasurer.

A BERLIN CONDUIT SYSTEM.

The Berlin exposition this year necessitated better street car facilities for carrying people to and from the exposition, and the Great Berlin Horse Railway Company saw fit to change part of its lines from horses to a conduit system. Dr. Kollman presented a paper before the German Street Railway Association, which gave an



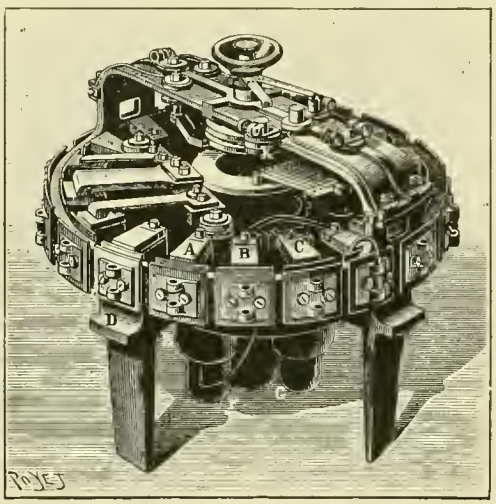
UNION CONDUIT SYSTEM AT BERLIN.

account of this undertaking as well as some others which the exposition made necessary. The system is put in by the Union Electric Company, which uses the apparatus and patents of the General Electric Company in Germany. The conduit is somewhat similar to that of the General Electric Company, laid on Lenox avenue, New York. We reproduce herewith sections of the conduit taken from the Zeitschrift fur Kleinbahnen which show the construction.

The Oakwood Street Railway Company of Dayton, O., has brought an action against the New England Engineering Company for damages to the extent of $28,000 for failure to properly erect boilers and machinery to furnish power with which to run its cars. The defence is that the company refused to make the necessary preparations to enable the work to be done.

NEW ELECTRIC UNDERGROUND SYSTEM AT PARIS.

J. Laffargue, in La Nature, gives a complete account of a new system of electric traction, known as the Claret-Vuilleumier, which has been in operation in Paris since June 1, running from the Place of the Republic to Romainville, a distance of over ten miles as we recall it. It is a system having contacts in the paving at intervals between the rails. These contacts are dead except when a car passes along and the current is supplied to them through a distributor, which automatically switches the current on and off of the contacts as the car passes along. The potential used is 500 volts. The return is through the rails as in an ordinary road. The outgoing feed cable from the power house is connected to distributors



DISTRIBUTOR CLARET-VUILLEUMIER SYSTEM.

placed under the sidewalk every 328 feet. The mechanism of this distributor is shown in the illustration. It has 20 contact segments around its periphery and these contact pieces are connected to the contacts, which are placed every 8.2 feet along the track. By means of an electro magnetic mechanism the contact arms of the distributor revolve and connect the track contacts under the car with the feed line as the car goes along. At all other times the street contacts are dead. To provide against any possibility of the street contacts remaining alive a metal contact is placed at the rear of each car which touches both rails and contacts. If any contact remains alive after the car has passed over, a short circuit is made; the cut out of the distributor is opened. In case any distributor fails to work the box can be opened by the motorman and it can be turned by hand.

The workings of this system will will be closely watched as it is the first extensive road to be equipped with surface contacts on the street and automatic switch boxes.

Butters' system of electric street railways was opened at Cape Town, South Africa, August 6, and cars are now running throughout the city.

STORAGE BATTERY AUXILIARY AT SYDNEY.

The government electric railway at Sydney, New South Wales, of which P. B. Elwell is electrical engineer, has for three years past had a storage battery operating as an auxiliary to its power plant. These are the original plain sheet lead Plante type of battery, and were not only low in first cost, but according to Mr. Elwell, are now apparently no worse for wear than when first installed. The total cost of the set of 225 cells was about $1,000, or less than $5 per cell. Each cell has about 14 square feet of active surface. The cells and plates are cylindrical. The outer plate also serves as the containing vessel, and is 12 inches in diameter by 10 inches high. They were "formed" by a few reversals of the current when first set up, and soon their capacity was raised so that they would discharge for five minutes at the rate of 100 amperes without harm. The battery is located at one end of the line, 2½ miles from the power station, which is at the other end. The generators for the electric road are driven from a corliss engine, which also drives two cable lines. The battery averages up the generator load so that only one-half the usual generator capacity is necessary. A durable battery costing $1,000, which will take the place of an engine and generator capacity sufficient to deliver 70 to 100 amperes in a small plant is certainly a good investment. An extension of the electric line is now being made which will be provided for by an increase in the amount of battery, but no increase in power plant. The new batteries will be the English Electric Power Storage Company's type K, and will be put in parallel with those already in service, thereby giving a high emergency discharge in addition to the advantage of no increase in the power plant. The large capacity of the battery will carry the road through the busy hours of the day. The extension will be 1½ miles beyond the present terminus where the battery is installed, and at the far end of the extension is a grade of 8.3 per cent, up which two cars with trailers must at times be started. With this point in view Mr. Elwell has designed a booster, driven by a 500-volt shunt-wound motor on the same shaft, which is to be placed at the battery house. This will raise the voltage of the charging current when the line is feeding the battery, and when the battery is helping the line it will raise the voltage of the discharge by means of an automatic switch short circuiting and reversing the fields of the booster. The booster is simply a 60-volt series-wound machine constantly running in the same direction, and driven by the shunt motor just mentioned.

This will make the batteries give more assistance at times of heavy load than they otherwise would, besides keeping the trolley line voltage nearer constant. These experiments are of course on a small scale, but Mr. Elwell says they are being carried on with a view of adopting a similar system on all of the lines in Sydney.

A LIGHTNING EXPRESS RAILWAY SERVICE.

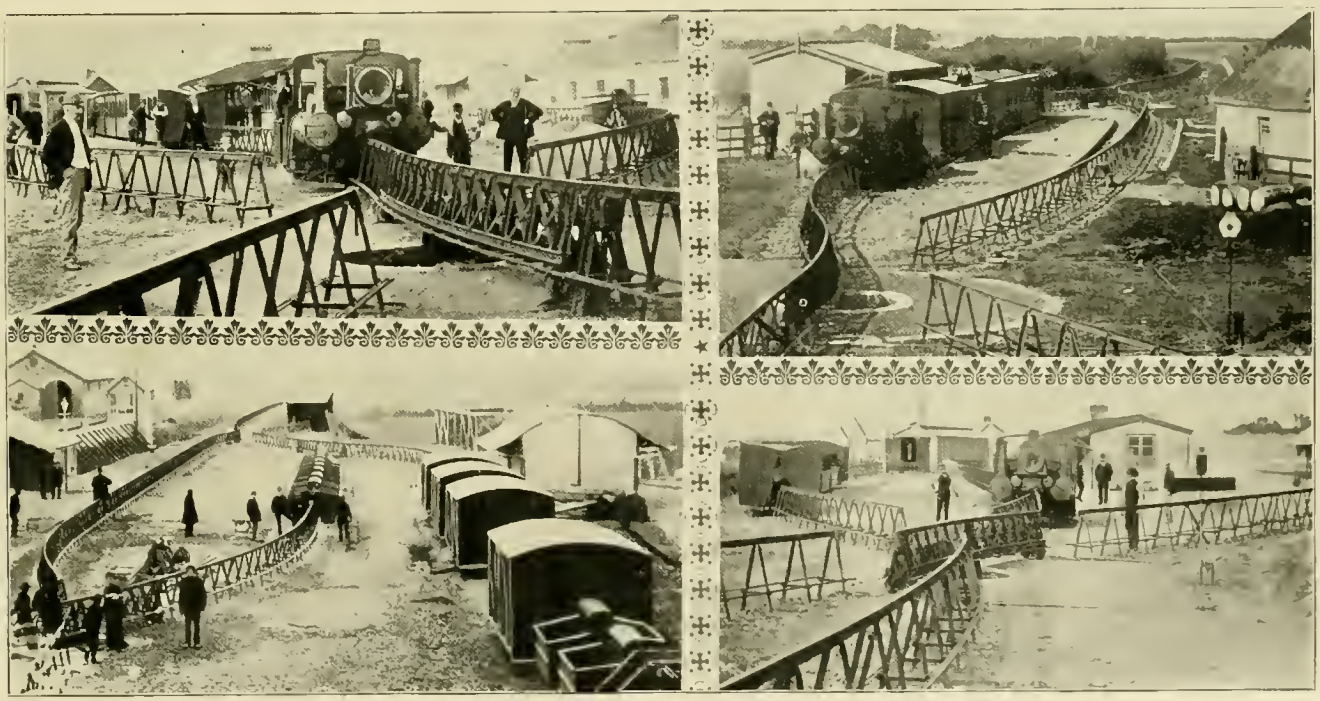
One has heard so much about lightning express trains, both in America and in Europe, that it is satisfactory to know that we are likely to have some real experience at speeds of 100 and 150 miles an hour. Some five or six years ago the electrical fraternity in Great Britain was much exercised by a proposal of F. B. Behr to run high speed electrical trains on a Lartigue rail, and it may be said that the matter was very seriously considered by at least one great railway company. During the time that has elapsed since Mr. Behr came forward with his novel suggestion he has continued to work experimentally on the subject of high speed trains, and he has so far succeeded in impressing the state engineers of Belgium with his designs that arrangements have been made for the construction of a line three miles long at the Brussels International Exhibition to be held next April. The track will be of oval shape, and from the agreement which a REVIEW representative has seen the inventor guarantees a speed of ninety-five miles an hour on the end curves, which have a radius of some 500 yards. The electrical part of the work is in the hands of Thomas Parker, who was mainly responsible for the electrical equipment of the Liverpool Overhead Railway.

and if electrical experience goes for anything the problem of high speed at the Brussels Exhibition should come near being solved.

The great feature in the Behr railway system is the employment of a single rail on which the vehicle is placed astraddle, with parts projecting down on each side carrying horizontal guide wheels, the function of which is to run on guide rails fixed on each side of the inverted V-shaped structure. The inventor holds that it would be dangerous to accelerate the present speed of trains on ordinary steam railway tracks, and the type of line which he has selected he considers to be the only practicable form of structure that combines safety with economy.

RAILWAY FROM FEURS TO PANISSIERES—LARTIGUE SYSTEM.

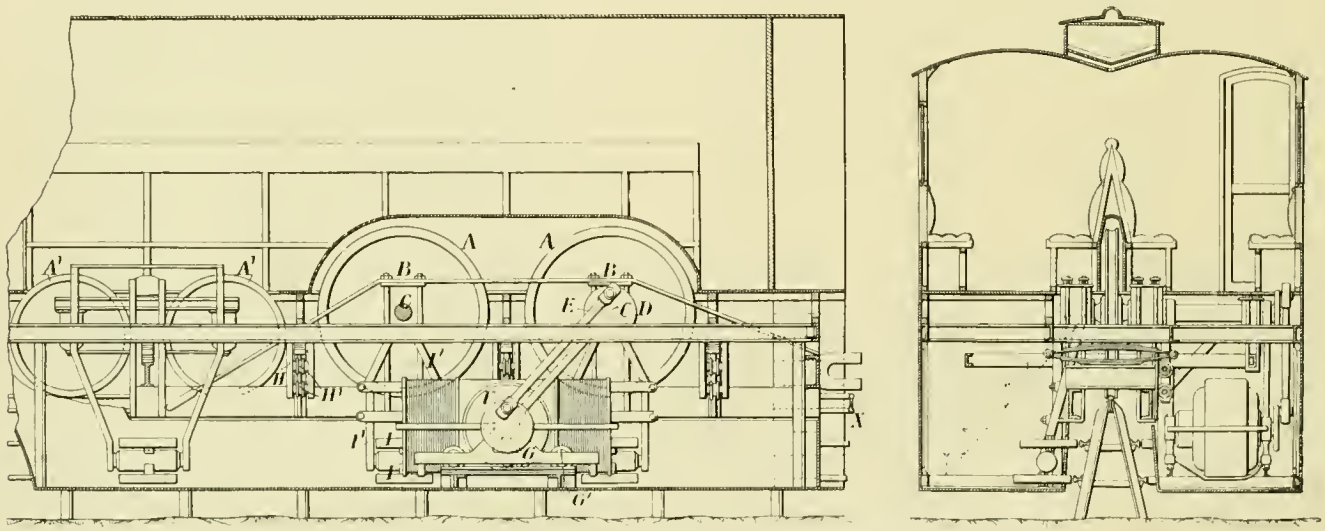
This single line rail, or the Lartigue system as it is more commonly called, consists of a girder carrying a double-headed steel rail supported on trestles which are framed on a ground sleeper. About three feet below the upper surface of the rail the trestle is consolidated by cross bracing, which also carries on each side a steel guide



SCENES ON LISTOWEL & BALLYBUNION RAILWAY, IRELAND—LARTIGUE SYSTEM.

rail. The function of this guide rail is to maintain the equilibrium of the vehicle, which is seated on a longitudinal center plate, running on a single row of wheels over the axis of the wedge-shaped framing. Briefly, the permanent way has a continuous triangular section and is braced longitudinally and diagonally at the trestle. Where any obstacle has to be traversed, such as a road,

a brook, a river, or even a hollow in the ground, the rail girder is trussed, the intermediate trestles omitted and special trestle piers erected. The inventor proposes at curves to cant the rail girder transversely according to the speed, and if this were not sufficient to neutralize the centrifugal force the surplus would be counteracted by the rail and the inner guide rail. It is something to be said in favor of the Brussels experiment, although it has no direct bearing on the high speed questions, that the Lartigue rail has been used with considerable success on two railway systems. The first one, nine and a half miles in length, extends from Listowel to Ballybunion in Ireland, and the second one is in France, in the department of the Loire, the system running from Feurs to Panissieres. On these two lines passengers and merchandise have been carried without the slightest hitch. On both lines steam locomotion has been employed, and the curious appearance of the track is well depicted in the illustrations. It is, of course, practically impossible for a train to be derailed, and Mr. Behr is confident that he can make the track strong enough to avoid shifting at sharp curves. If it were necessary he could also render the sleepers more stable by driving in piles at the ends.



SECTIONS OF ELECTRICALLY OPERATED CAR—LARTIGUE SYSTEM.

The real invention of Mr. Behr, however, relates to the construction of motor vehicles for the Lartigue rail, and his recent improvements have mainly for their object: To allow of the carriages which have a considerable total length to pass readily round sharp curves; this is effected by constructing the carriage in two or more separate parts which are identical in construction and are joined together by a pivot or universal joint and a flexible enclosure covering a platform between the two adjoining parts from which access is gained to each part. Each half is supported on the rail on the one hand by two driving wheels, placed as close as practicable together, so as to obtain a comparatively small fixed wheel base, and on the other hand by a two-wheel bogie. The carriage is so arranged that the center of gravity is below the level of the line of rail, even when the entire floor for the passengers is raised above the line of rails. This is effected by placing the motors at the bottom of the two lower parts of the vehicle as shown in the drawings, and so arranging them that although they partake of the vertical motion of the carriage body upon its springs, the distance between their driving shafts and the driving wheel axles by which they are connected by driving gear shall always remain constant. Means are provided whereby the carriage body, though having a vertical motion on springs, cannot move laterally. This is effected by constructing the framing carrying the driving wheels and bogie entirely separate from the framing of the carriage body and guiding the former in a vertical position by means of guide wheels running on lateral guide rails on the line rail supports, while the framing of the carriage body, which rests upon the wheel framing with springs, is prevented from lateral motion thereon by providing the wheel frame with vertical rails against which bear rollers attached to the carriage body. On the inverted V-shaped structure are provided two guide rails situated one above the other, against which bear two corresponding guide wheels on each side of the wheel frame of the carriage, and in order to insure that both wheels shall always be kept automatically in contact with both the guide rails so as to distribute the lateral strains on the carriage uniformly over both, the guide wheels are mounted upon vertical arms projecting upward and downward from a horizontal axis that can turn in brackets on the wheel frame.

There is little doubt that the inventor has brought a good deal of persistence and ingenuity to the problem of high speed, and it remains to be seen what success attends the line which is being laid down in Brussels.

The Citizens' Street Railway Company, Kalamazoo, Mich., has been exempted from the payment of its share of the paving tax for one year.

STREET RAILWAY LAW.

EDITED BY FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Use of Street Railway Tracks by Competing Carrier; Injunction to Prevent Laying of Tracks.

The habitual and continuous use of street railway tracks by a coach company engaged in carrying passengers for hire, in competition with the railway company is an infringement of the latter's rights which may be enjoined.

A court of equity will not interfere to prevent the construction in the streets of a city of a public railroad to be used equally for the benefit of all the public, but will remit the parties to a court of law and such relief as that tribunal affords.

This is an appeal from an interlocutory order of the Circuit Court, restraining the General Electric Railway Company from laying down, locating, constructing or erecting in or over or upon any part or portion of certain named public streets and highways in the city of Chicago, any railroad track or tracks, or wires or any other thing, or structure whatsoever, constituting the route of the right of way of the proposed railway of said company as described in an ordinance of the City of Chicago, and also enjoining the said Electric Railway Company from disturbing or interfering with the railway tracks, ties and railway bonds of the Chicago City Railway Company, or the paving within the right of way of the said Chicago City Railway Company, and enjoining the Commissioner of Public Works from issuing any permit or license to the General Electric Railway Company to construct or erect in any of said streets any track. The streets named in the injunction, to place and operate upon which a street railway, the General Electric Railway Company, appellant, claims to have a right by virtue of an ordinance to it granted by the City of Chicago constitute a route of about ten miles. The injunction was issued without bond. The Chicago City Railway Company, the complainant below, at whose instance the injunction was issued, claims to be entitled to maintain such injunction because of certain tracks it has in Dearborn street, running from 20th to 21st street, together with three switch tracks therefrom, to its blacksmith and machine shops, situated upon its property on the east side of Dearborn street, and also because the proposed track of appellant will cross the track of appellee at a number of streets, more particularly, at the intersection of Dearborn street with 22nd street, and also because the complainant below is the owner of several hundred feet of property abutting upon Dearborn street, along which appellant is proposing to construct its railway.

Waterman, J.—The tracks of appellee mentioned in the bill in this case, as well as its right to operate cars thereon, is valuable property, and a property right which is entitled to protection. Neither for public nor private use can the property of appellee be taken without giving to it adequate compensation. It is the settled law in this state that private property cannot be taken, that is, actually entered upon, seized and appropriated for public use without just compensation having been first made to the owner. Where property is merely damaged it is not necessary that such just compensation should be made before the damage takes place, and this for a most obvious reason, as whether property will be damaged by the taking of other property and the making of a public improvement is a matter concerning which there is room for great dispute, and most frequently of great uncertainty. If no public improvement could be entered upon until the damage to all the property done thereby had been ascertained and paid, no public work could be constructed until all the world had been made parties to a proceeding to determine whether any other property than that actually taken would be damaged by the proposed improvement. We are, therefore, in this case first to consider what is the nature of the property which the complainant has in the streets of this city, and what its rights in respect thereto are, and, second, whether the defendant is proposing to enter upon, seize and appropriate to its purposes anything to the use of which the complainant has an exclusive right. The rails which the complainant has placed in the streets of Chicago are doubtless its property; it paid for and placed them there, and may, consistent with its obligations to the public, in a reasonable manner remove such rails, replacing them with others. But it has no exclusive right to the use of such rails. Indeed it has no right to use them at all in the street except as part of it. These rails are for its cars to run upon, but thousands of other vehicles may and do incidentally, lawfully make use of such rails in the ordinary course of traffic. It has been held that the habitual and continuous use of street railway tracks, by a coach company engaged in carrying passengers for hire, in competition with a railway company, is an infringement of its rights. Camden Horse Railroad Company v. The Citizens Coach Company, 28 New Jersey Equity, 145 and 31 New Jersey Equity, 535.

* * * * * *

It is strenuously insisted that appellant is, under the stipulation in this case, to be regarded and treated as a mere trespasser, and we are asked if the complainant is to see its property interfered with by a gang of freebooters, and if we will permit appellant, whose ordinance was, it is said, admitted to have been conceived in fraud and begotten in iniquity, and thereunder construct and operate a railroad in the streets of Chicago. Even freebooters have rights. The police may arrest, but the courts will not by injunction, restrain them from walking along the streets. The vilest reprobate is happily, in this land, entitled to be heard and tried in accordance with the law of the land, and whatever may be our opinion of the conduct of appellant, we are in this proceeding to accord to it as to appellee, such rights as by the law, each is entitled to. This court has not heretofore, and will not in this proceeding, give any permis-

sion to occupy the streets of Chicago for railway purposes. It is not to this court that parties come to obtain such permission. The only question presented to this court at this hearing, is whether the injunction obtained by the complainant in the court below, shall be dissolved. The dissenting opinion of Mr. Justice Mulkey in the suit of Truesdale, et. al. v. The Peoria Grape Sugar Company, 101 Ill., page 561, is thought to afford support for the injunction issued in this case. In such dissenting opinion, Mr. Justice Mulkey says: "If the proposed railway, when put in operation, would be open to the public generally, then I concede, under the previous decisions of this court, an injunction would not lie at the suit of a private individual, however much he might be injured, by the building and operating of such a road. But such is not the case here. The city had the right to permit a railway to be constructed in one of its streets, which, when completed, would be open to the public generally, for the carriage of goods or passengers, or both, on equal terms to all: but it had no authority to permit such a road to be constructed or operated for the exclusive use of a mere private company. In the one case the city has the discretion to do or not to do: in the other, there is no power to act at all. In the former case, equity will not interpose, but remit the parties to a court of law, and such relief as that tribunal affords. In the latter case, there being a total want of authority on the part of the city to act at all, and the attempt to do so being a clear breach of a public trust, with respect to the ownership and control of the streets, a court of equity, according to all the authorities, should and does interpose."

It thus appears that Mr. Justice Mulkey in his dissent, distinctly announces the doctrine of the Supreme and this court, that a court of equity will not interfere to prevent the construction in the streets of a city, of a public railroad, to be used equally for the benefit of all the public, but will remit the parties to a court of law, and such relief as that tribunal affords. This court is not in this case called upon to say whether appellee has a right to construct and maintain a street railroad in the city of Chicago. In respect to questions of a similar nature presented in other cases, this court has merely held that a court of equity will not, at the suit of an abutting property owner, restrain the construction of such road, and has repeatedly called attention to the fact, that in a suit brought by the attorney general, such injunction may be issued. If appellant be but a lawless trespasser, having no right whatever to construct a railroad in the streets of Chicago, the executive authorities of the city are armed with ample power and have sufficient force in this as in all other cases, to prevent unlawful trespassers upon the public streets. In the nature of things, the public domain and the public streets continually invite attack. The rich prize is so open to attack, and the wealth to be obtained so great, that private greed will succeed in wresting to itself control over the streets, unless not only the public be vigilant, but courts firm in maintaining the ancient authority of the public over all its highways. It is at the present time of the utmost importance that such authority be maintained, and that courts be alert to protect public property and public ways from lawless private aggression. The order of the Circuit Court will be reversed.

(Appellate Court of Illinois, General Electric Railway Co., v. Chicago City Railway Co., 1 Chicago Law Journal Weekly 451.)

Getting On Car After Having Been Put Off.—Trespasser.—Injury in Ejecting from Car.

On the last trial at the instance of the appellee, special questions were submitted to the jury, which questions, and the answers by the jury thereto, are as follows: "Was the plaintiff a trespasser when he got upon defendant's car the second time? A. No. Did the plaintiff conduct himself in a disorderly manner or use any improper language or conduct himself in any way to give offense to any passenger of defendant? A. No. Was the plaintiff put off of defendant's car when the same was in motion, and was he put off in a dangerous place? A. Yes."

The first question is of law, and the answer not to be considered. On the testimony of the appellee himself, he was a trespasser. He testified that he was shoved off, followed the car and got on again. We are bound by the law we laid down on the first appeal. Union Mut. Life Ins. Co. v. Kirchoff, 51 Ill., App., 67, 149 Ill. 536.

We therefore hold that the appellee was a trespasser, having been put off the same car but a few moments before by the conductor, and without right re-entered upon the car of the appellant, and that, without unnecessary force, he was put off said car by the conductor for good cause, and without other injury to him than such as resulted from his own wrong, and we reverse the judgment without remanding the case. This course will enable the Supreme Court to decide whether the bill of exceptions is properly in the record; if it is not, this judgment is wrong, and that of the Superior Court should be affirmed.

(Appellate Court of Illinois, West Chicago Street Railroad Co. v. Olds, 1 Chicago Law Journal Weekly 356.)

Injury to Passenger Alighting From Car.—Negligence of Conductor.—Joint Liability for Tort.

It is as much the duty of a carrier of passengers to provide them with reasonably safe places to alight as it is to carry them in safety to their stopping places, and a conductor is bound to know where under the circumstances, it is prudent to stop the car for a passenger to get off, and where a passenger alighting is injured by reason of the conductor having stopped the car in a perilous place, the company is liable.

Where one has received an actionable injury from two or more wrong doers he may sue them jointly or separately—a tort being in its nature, the separate act of each.

(Appellate Court of Illinois, West Chicago Street Railroad Co. v. Cahill, 1 Chicago Law Journal Weekly 341.)

Riding on Platform of Car.—Negligence.—Duty of Passenger.

We may not say that, as a matter of law, for a passenger to ride in the place appellee did, and that he stood there facing the inside of the car and holding to the railing, was negligence. C. W. D. Ry. Co. v. Klauber, 9 Ill. App. 613.

So long as passenger carriers in a crowded city tolerate and encourage such methods of transportation of persons, the rule of law which demands the highest degree of diligence on the part of the carrier, must not be relaxed.

The evidence on the part of appellant was, that the train was moving four or five miles an hour when the emergency signal to stop was given, while that on the part of the appellee was, that it was moving at full speed. It is difficult to understand how, even with the train moving at the lowest speed testified to, a person standing upon the footboard, could have jumped off with safety in the presence of a wagon crowding against the train. It is probable from the evidence, that appellee did not see the peril he was in until he heard some one call out, "Look out!" and it seems to be certain that he was struck at about the same instant of time. Counsel for appellant says: "If he had attended to his safety with ordinary prudence, he would have been able to avoid the injury as the other passengers did." The record does not disclose what was done by other passengers, nor does counsel say what appellee should have done. But though with nothing before us except the description of the occurrence, we might see ways to avoid what did happen to appellee, he was not bound to act with unerring diligence and wisdom in making his choice of what to do. All that was required of him to do was that which would ordinarily be done under like circumstances by an ordinarily careful person. The instinct of self-preservation will ordinarily prompt one in danger to act quickly, and in his best judgment at the moment, but it is not required as a matter of law, that he should make no mistake in what he does when so confronted.

(Appellate Court of Illinois, West Chicago Street Railway Co. v. McNulty, 1 Chicago Law Journal Weekly 373.)

Eminent Domain.—Condemnation by Street Railway Company of Franchise of Turnpike Company.—Injunction.

A statute (act 1894, ch. 162) which authorizes a street railway company to acquire by condemnation proceedings a necessary easement and estate in the roadway of a turnpike company for the operation of its line of road does not violate a constitutional provision forbidding the impairment of the obligation of contracts, as all corporations hold their franchise subject to the right of eminent domain.

Where a law by which condemnation proceedings are authorized, and which directs the course of procedure in such cases, is constitutional, equity has no power to arrest proceedings thereunder by injunction.

(Court of Appeals of Maryland, Baltimore & Frederickstown Turnpike Road v. Baltimore, etc., Passenger Railroad Co., 3 Am. & Eng. R. Cas. (N. S.) 177.)

Trolley Line.—Injury by Breaking of Telephone Wire. Joint Liability.

A private telephone wire broke, and coming in contact with the trolley wires of defendant company, inflicted injuries upon one accidentally coming in contact with it. Held, that defendant company was jointly liable with the owner of the telephone wire.

(Supreme Court of Arkansas, City Electric Street Railway Co. v. Conley, 3 Am. & Eng. R. Cas. (N. S.) 365.)

THE MOTORCYCLE IN FRANCE.

The motorcycle, autocycle, horseless carriage, or whatever name it will finally receive, is no longer a mere curiosity in France, but is advertised and placed upon the market as a regular article of commerce.

Our illustration shows the one designed by Léon Bollée, and called by the maker a "voiturette." It is described as having a total length of 7 feet 6 inches and width of 4 feet; its weight in working order is 352 pounds; a petroleum motor is used. The motor runs without water or electricity, and cooling takes place by means of wings or ribs. Three speeds are used, the lowest of 5 miles per hour is said to enable grades of 10 per cent. on muddy roads, to be overcome without difficulty. The highest speed is a continuous one of 15 miles per hour.

One lever only is required for starting and for changes of speed as well as for putting on the brake. No chains are used, the transmission being effected by means of a leather belt, which can be tightened at will by a movement of the lever for changing the speed. The wheels have ball bearings and large pneumatic tires, which latter are so stout as to be practically puncture-proof. The petroleum reservoir holds sufficient for a run of over 60 miles, and the cost for petroleum is said to be 1 cent per mile. The advertised price of the "voiturette" complete, is 2,600 francs, about $500.

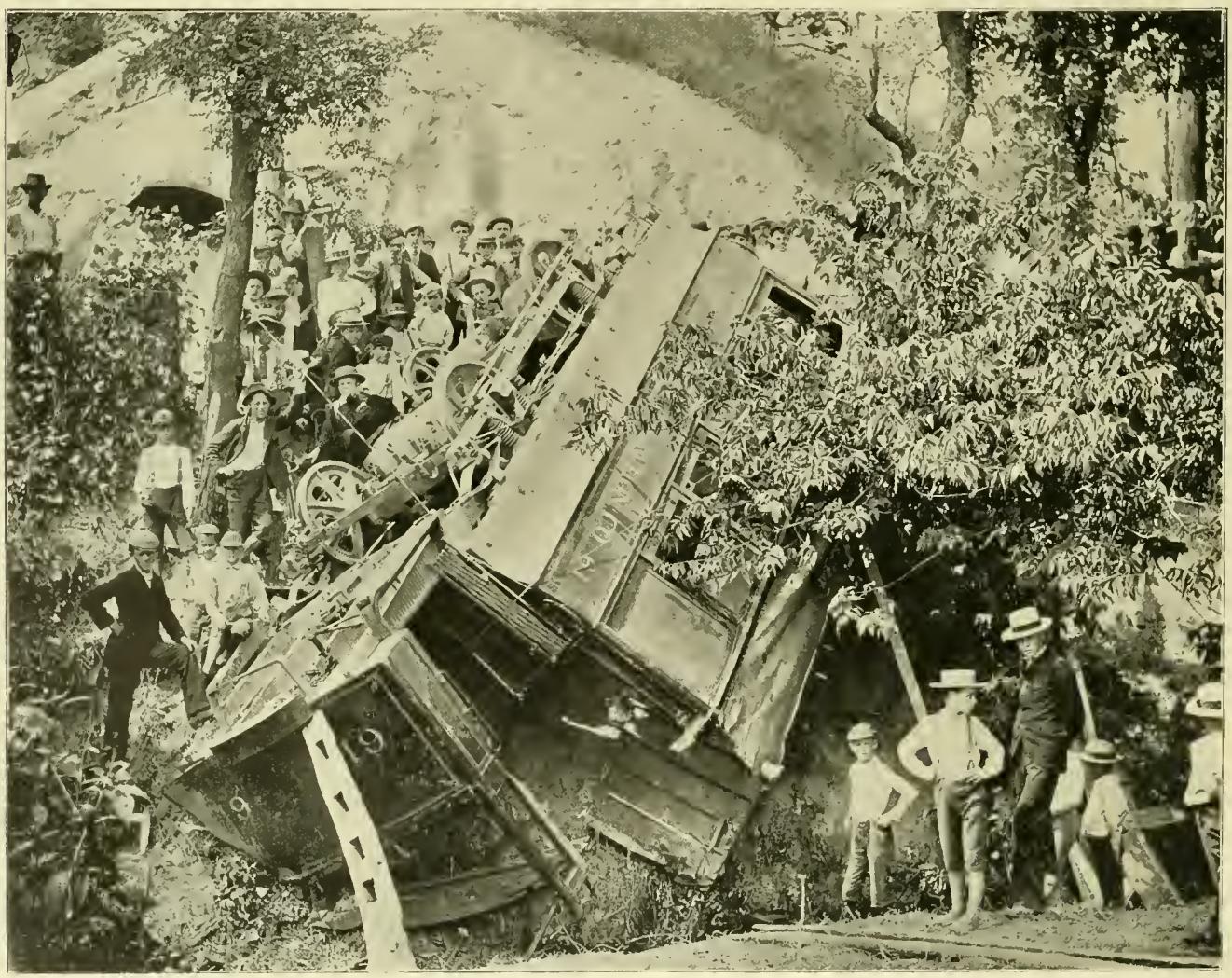
ACCIDENT AT COLUMBIA, PA.

One of the most unfortunate accidents which has been recently reported in street railway service was that at Columbia, Pa., on the evening of August 9, in which six persons lost their lives and sixty-eight were injured, some of the latter perhaps fatally. The list of dead includes the motorman and chief burgess of Columbia. The car was an extra which had gone out to Chickie's park, a resort a few miles from the city, and was returning heavily loaded on account of a shower which had detained many at the park until a late hour. On the return trip to Columbia there is a hill of 1,800 feet in length, commencing with an 8 per cent grade and ending upon a curve at about 1 per cent grade. The rails are of T form, weighing 48 pounds to the yard. The car was an 18-foot body, closed, built by the Lamokin Car Company.

The cause of the accident has not been fully developed by the coroner's inquest, but it is certain that a gear wheel of the motor was broken, as it was found some distance back at the side of the track. It is supposed that this breakage caused a bending of the brake rigging, so that it became partially inoperative. The rails also were wet, and it is stated also that they had become slippery through the great numbers of potato bugs crushed upon them. The evidence seems to indicate that the motorman did everything in his power to stop the car. The car had been thoroughly inspected the day before, and it also appears that it was in good condition generally, having been overhauled but a short time before.

When the motorman lost control the car plunged down the hill with constantly increasing speed, and on striking the curve was overturned and rolled down a 30-foot embankment, where it landed with wheels in the air. After leaving the rails everything was in intense darkness. The injured people were mostly from Columbia, and many of them have been cared for in hospitals at that place and at Lancaster.

As a result of the introduction of electricity the number of street railway corporations in Pennsylvania, as reported by the Department of Internal Affairs, has increased from 60 to over 500, though 161 of them have no lines in operation. The rights and franchises in these cases were mostly secured for speculative purposes.



THE WRECKED CAR AT COLUMBIA, PA.

MANCHESTER COMPANY OPPOSED PITTSBURG SYNDICATE PLANS.

The plans of the syndicate which intends to supply Allegheny with extensive street car facilities have met a possible check in the attitude of the Pittsburg, Allegheny & Manchester Traction Company, which already operates a considerable mileage in a part of the territory proposed to be covered by the new lines. By act of the assembly of May 21, 1895, it is provided that a street railway company may use the tracks of any other company to an extent not exceeding 2,500 feet when necessary as a connecting link. It is claimed by the Manchester company that the lines of the syndicate have been so planned as to make frequent loops over its lines in the best part of the former's territory. Also that it has never accepted the provisions of the act of 1895, but is still operating under its old charter. Theophilus Sproull, president of the new lines, says:

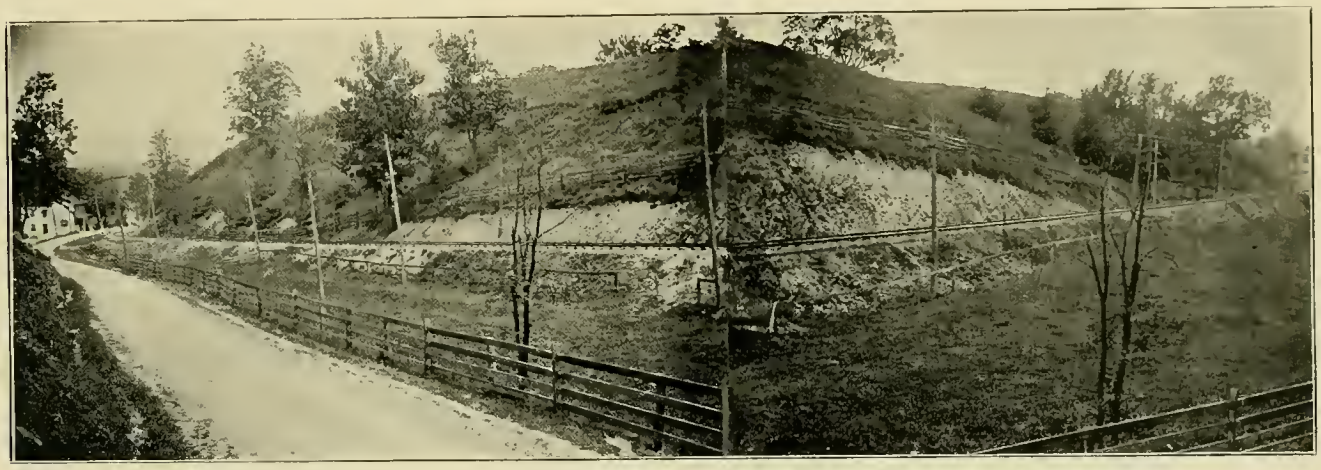
"I expect to fight the Manchester people in court, but I am prepared to do it. I have made no mistakes. Everything has been carefully planned, and if we lose we will find a way to overcome the difficulty. I don't think we have lost sight of any point. We canvassed the subject very carefully before we made a move. We have a grand scheme. We have the money and we are going to build it. And we are not going to wait several years before we do it. I cannot reveal any of our plans now. They will become public at the proper time."

WILKES BARRE & NORTHERN.

The Wilkes Barre & Harvey's Lake Electric Railway enterprise has been abandoned, owing to right of way difficulties, but another company, the Wilkes Barre & Northern Railroad Company, has taken up the project, and has the first ten miles between Wilkes Barre and Dallas nearly ready for operation. The grading is completed and 60-pound T rail in 60-foot lengths is being laid. The road from Wilkes Barre to Harvey's Lake will be fifteen miles in length.

BABIES AS A MEANS OF CREATING TRAVEL.

It is a common remark that babies often cause their parents to take exercise by way of travel at unholy hours, but it is seldom that they are utilized as a means for increasing the revenues of a street railway company. The Birmingham, Ala., Street Railway Company, however, evidently believes in turning to profit "the gifts the gods provide," and hence advertised for August 31 a grand baby show at East Lake Park, a resort on its line. The entertainment was free, since the principal performers did not demand enormous salaries. In order that there might be no ill-feeling between those who were entitled to make entries in the competition and those who were not, small prizes were also given to the handsomest young lady and the handsomest bachelor, it being specially understood that no prizes were to be given to bald heads. The prizes were articles of utility presented by local merchants, and the committee of award was selected from commercial travelers temporarily domiciled at the hotels. General Manager McClary apparently believes in making the most of his opportunities.



GRADE AT COLUMBIA, PA.—WHITE CROSS AT LEFT IS WHERE THE CAR WENT OVER THE BANK.

CONSOLIDATION AT WEBB CITY, MO.

All the electric lines of Jasper County, Mo., and Cherokee County, Kan., have been consolidated under one management, known as the Southwest Missouri Electric Railway Company. This includes the Joplin & Galena and the Jasper County electric railways. Trains will be run every half hour between Joplin and Carthage. The total mileage covered by the consolidation is about 32 miles. The officers of the company are A. H. Rogers, president; E. L. Wallower, vice-president; Wm. M. Donaldson, secretary and treasurer, and F. H. Fitch, superintendent, the same being the former officers of the old company of the same name with the exception of Mr. Fitch, formerly of the Jasper County road. Three of the former directors of the latter road are added to the new directorate.

JOHNSON'S DETROIT ROAD RESTORES OLD FARE RATE.

Tom Johnson's Detroit Citizens' road, which for a short time met the 3-cent fares of the Detroit Railway with a cut to the same figure, has been wearied of the much-lauded scheme to haul millions, and after having its revenue badly crippled, has restored the old six-for-a-quarter schedule; which was bad enough. The workingmens' tickets, morning and evening, will be continued. It is understood that the two roads have actually passed into the same ownership; anyway there will be a consolidation of management, and a consequent reduction of officers. The car service will also be very materially decreased on what have been competitive lines, and every effort made to make the roads not only self-supporting but to pay some return. Under the consolidation an effort will be made to secure the passage of a new thirty-year ordinance for a universal six-for-a-quarter fare rate, thus abandoning the Pingree system which has been tried, and, of course, found wanting. The car service on the 3-cent lines will be so reduced as to force passengers, who do not want to lodge on the street, to take the lines where the higher rate is permitted. It is also said that Tom Johnson and Henry Everett will now retire from Detroit and leave it to Albert Pack, who expects to soon gather into his fold the Fort Wayne & Belle Isle.

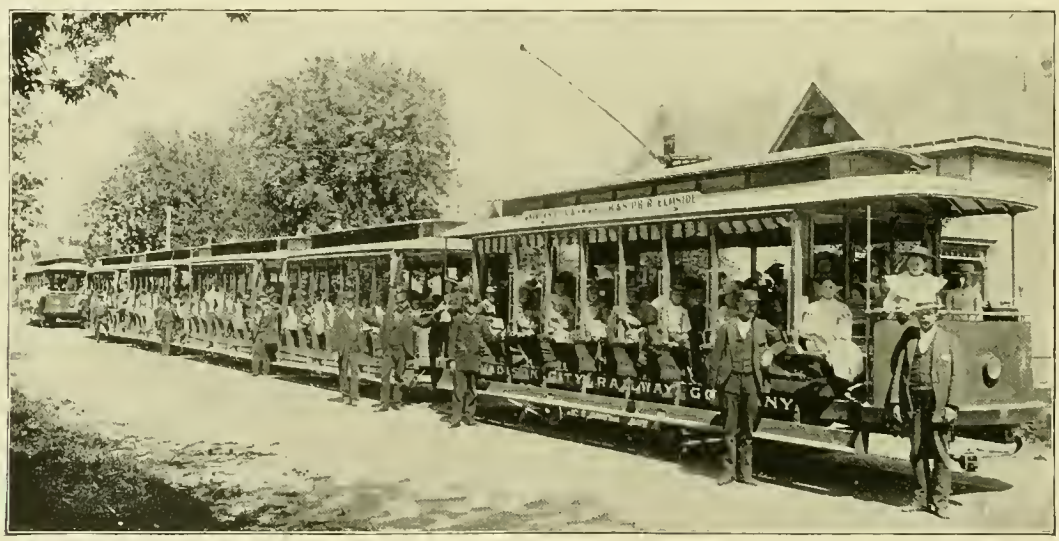
A controversy some years ago between the Oneida, N. Y., Street Railway Company and the West Shore Railroad was settled under an agreement by which the street railway was allowed to be extended over the West Shore land in consideration of carrying employes of that company free of charge. It is said that of late such employes have had to pay fare, and in retaliation the street car company's tracks were on July 24 torn up and thrown into the street.

A BIG LOAD.

The amount of overload that a common double motor equipment will take care of is remarkable. Our engraving shows the performance of a couple of G. E. 800 motors at Madison, Wis., where one motor car is hauling four 10-bench open trailers. In all there were not less than 500 passengers, according to F. W. Oakley, receiver, and a speed of seven miles an hour attained. The heaviest grades were mounted without difficulty.

TELEPHONES ON THE MAHONING VALLEY ELECTRIC RAILWAY.

The Mahoning Valley Electric Railway, of which A. A. Anderson is manager, will run a telephone line along its route, connecting the power house in Youngstown with the power house in Niles. A complete metallic circuit of No. 12 hard drawn copper wire, furnished by John A. Roebling's Sons Company, is to be used. The wires will be transposed every 1,000 feet to prevent trouble from induction. Besides the two office telephones each car will carry a telephone, and at certain points along the line, about 1,200 feet apart, cut out boxes, or plugging in stations, will be put in, at which the trainmen can connect their telephones so that they can call up either Niles or Youngstown stations. The telephones are furnished by the Simplex Interior Telephone Company of Cincinnati. It is expected that this system will be a great help, not only in the way of prompt notice of accidents, but in times of heavy travel at certain points on the road.

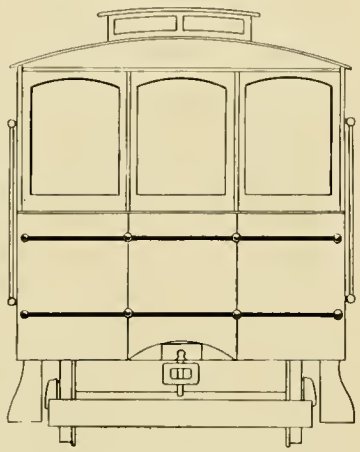


A HEAVY TRAIN AT MADISON, WIS.

About 1,500 feet of wire was removed from the poles on the line between Arlington and Falls Church, Va., August 1. Rewards are offered for the arrest and conviction of the guilty parties and also for the return of the stolen wire.

GRAB HANDLES INSTEAD OF FENDERS.

A. K. Grim, superintendent of the Oakland Consolidated, is, we understand, adopting the plan of putting grab irons around the front dashes of cars. The idea is that the majority of people when they are struck by a car make an attempt to grab hold of something and save themselves, and that if something is provided that they can get hold of they will often be able to save themselves. The lower bar is about 3 feet and the upper about 5 feet from the ground.



GRAB HANDLES INSTEAD OF FENDERS.

TRAMWAYS AT HAMBURG.

The tramways at Hamburg, Germany, appear to have had a very successful year, the principal company having been able to pay a dividend of 5 per cent. They have been allowed by the city corporation to erect overhead wires, the only condition being that they should buy power from electric light works to which a monopoly had already been granted. The favor in which the electric cars are held is shown by the fact that, though there has been a perceptible falling off in passengers carried by the horse car lines and a consequent reduction in receipts, the number of passengers carried by the electric car lines has increased 32 per cent and the receipts about 35 per cent. The contract between the light and power company is such that if it is unable to furnish the required power it shall pay a certain amount for every car mile which the tramway company has been unable to run, and on the other hand, if the tramway company uses more power than the amount guaranteed to be used, it gets the benefit of a reduction in cost per unit. As a matter of fact the tramways last year consumed more than twice the amount of power they guaranteed to use.

STOLE A STREET CAR.

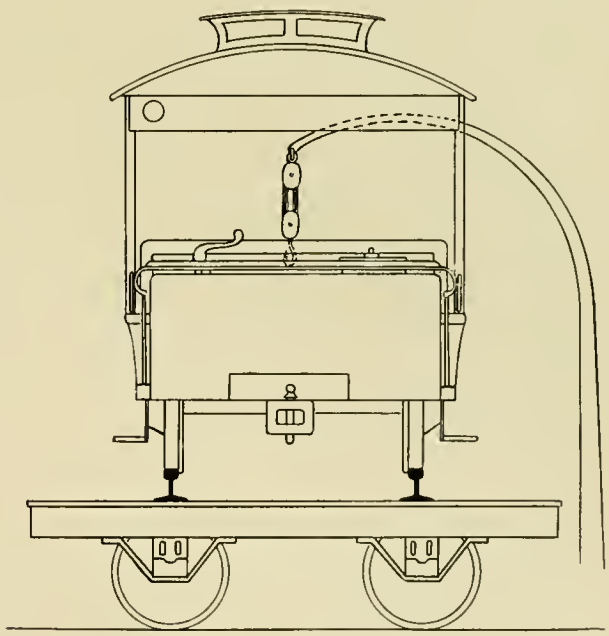
John S. Preissecker, who is familiarly known as "Frogs' Legs George," was before the courts at Rochester, N. Y., August 20, on the charge of stealing a street car. He first bought the car from the railroad company and paid for it, intending to use it as a shop for the sale of popcorn. He contracted with a carpenter for the changes necessary, but the bill being $25.80 it was refused on the ground that $10 was all the job was worth. It is charged that George feloniously removed the car from the carpenter's shop. The case was continued.

NOVEL FEATURES IN NORTH CHICAGO SHOPS.

The electrical repairs of the North Chicago Street Railroad and allied lines are taken care of at a very neat and up to date machine shop at the "Limits" barns on North Clark street. The shop is under the charge of Mr. Lynch, formerly superintendent of the Connelly gas motor works. One of the old gas engines has been made over into an air compressor for the shops. It is belted from the line shafting of the shop, which is run by an electric motor. The compressor has tight and loose pulleys, and has an arrangement which automatically throws the belt onto the loose pulley when the pressure is above ninety pounds and throws the pump in action again when the pressure falls.

The compressed air is used at present for working a steam hammer. It makes the work of the men in the blacksmith room much cooler during the summer than if steam was used. It also saves keeping up steam in a boiler for the express purpose of running the hammer. Other uses of compressed air will probably be made later.

A convenient arrangement for taking G. E. 800 armatures out of open cars is also in use. At one end of the transfer table pit are two cranes with arms just long enough so that the block and tackles attached thereto come directly over the motors when a car is put on the transfer table and shoved to the end of the pit. When the armatures have been lifted above the seats the car is shoved back out of the way so that the cranes can be swung around.



DEVICE FOR REMOVING ARMATURES.

The Consolidated Street Railway Company, Worcester, Mass., is changing its cars from double to single trucks.

TROLLEY PARTIES AND PARTY CARS.

Rates Charged Upon Various Roads—Special Cars Profitable—The Form of Amusement Growing in Favor.

Within a short time the part of a street railway company's business, which consists in catering to the wants of pleasure-lovers among its patrons by providing special cars which may be chartered by parties, or arranging for the exclusive use by such parties for specified periods of the cars such as are in daily use, has grown to magnificent proportions and forms an important part of many companies' revenues. Many companies are increasing their facilities as rapidly as possible, for, even now, in some cities the demand exceeds the supply. Dates are made weeks in advance and companies are obliged to make large investments in appropriate rolling stock. The result has been to arouse a certain degree of rivalry among different companies as to the luxuriousness of the accommodations furnished and the number of attractions supplied, and many of the cars now in service for this purpose rival in beauty and completeness the traveling palaces of the steam roads, though the latter have been for a long time a recognized institution and are intended to accommodate their patrons for days consecutively instead of for a few hours.

All of this should be interesting to the street railway manager, especially as the expense to his company for such service, aside from the extra investment in specially equipped cars, which indeed is not absolutely essential, is comparatively small. To bring about an interchange of ideas among managers as to the rates commonly charged for such special services under varying circumstances, the REVIEW has addressed letters to several managers inquiring as to the rates and the rules established to govern parties chartering cars. It speaks well for the character of the people with whom this form of amusement has become most popular, as well as for the care with which contracts are entered into on the part of the companies, that in but very few instances has it been found desirable to establish rules.

Some replies to our letters are given below:

CALUMET ELECTRIC STREET RAILWAY COMPANY, CHICAGO.

H. M. Sloan, general manager, writes:

"Our charges are $15.00 for motor and $5.00 for trailer. I will say, however, that the cars we use for trolley parties are our regular cars with aisles in the center, seating thirty-two people, besides which, the cars having large platforms, we are enabled to get in twelve camp stools, leaving ample room besides.

"I have fittings made for the cars, so that we can put the decorations on and take them off very quickly and easily; we have no specially fitted cars for trolley parties.

"For large parties, such as we had July 15, upon which occasion we had out fifty-four cars, I charged a rate of $7.00 per car, one motor pulling two trailers. I charged the same price for two other trolley parties of thirty cars each, each train consisting of one motor and two trailers, which are booked for August, $7.00 per car, using one conductor for the three cars."

CLEVELAND AND ELYRIA ELECTRIC R. R. COMPANY.

F. T. Pomeroy, general manager, writes:

"In reply to yours asking for information as to how we handle trolley parties, would say that we make a reduction from our regular rates in order to encourage such business (of which we are having considerable). Our regular rate for round trip from Cleveland to Elyria is 75 cents. We furnish special cars for trolley parties at the 50-cent rate, with a guarantee of $20, which allows for forty people, which our cars comfortably seat.

"We are making a specialty of this business, and find it profitable.

"For a shorter ride than to Elyria we charge accordingly, but not less than $10 per special car.

UNION RAILROAD COMPANY, PROVIDENCE, R. I.

Following is an extract from a letter of A. T. Potter, general manager:

"We charge $5 per hour for trolley party cars. We have never thought it necessary to establish any rules for the government of such parties, as we are very careful not to let any cars to any parties who we think would not conduct themselves in a proper manner."

METROPOLITAN STREET RAILWAY COMPANY, KANSAS CITY.

This company has a very convenient form of receipt for payment and order to the ticket agent for chartered cars which is reproduced herewith about one-half size.

Martin H. Holmes, vice-president and general manager, writes us as follows:

"We have equipped three party cars for our Independence Electric Line. They are new summer cars made by the Brownell Car Company and have Brill trucks under them. One of these cars is illuminated on the exterior by 600 colored incandescent lamps and has a small buffet built in one end. The other two are without buffet and are each illuminated by 120 colored lamps.

"For the buffet car we charge $20, and $15 for each of the others. Parties chartering these cars are allowed to use them at their reasonable discretion from 8 o'clock until 11 o'clock p. m. We have no printed rules."

KANSAS CITY, MO., _____ 189__

Received from _____

_____ Dollars,

SAID SUM BEING FULL PAYMENT FOR THE USE OF ___ PARTY CAR ___ No ___

_____ FROM 8 O'CLOCK UNTIL 11 O'CLOCK, _____ EVENING.

_____ 189__

One Buffet Car—Refreshments served by _____

SHOW THIS RECEIPT TO TICKET AGENT AT 15TH AND ASKEW. WHEN YOU ASK FOR YOUR CAR

Kansas City Park Diversion Co.

By _____

METROPOLITAN RAILROAD COMPANY, WASHINGTON, D. C.

This road is entirely a city one, and there has been very little demand for party cars. A. N. Connett, chief

engineer, informs us that the road has in only one instance chartered trains for parties, when a charge of $15 was made from 7 to 11 o'clock for each train.

BINGHAMTON, N. Y., RAILROAD COMPANY.

J. P. E. Clark, general manager, writes that his road has no regular schedule of charges for trolley parties, it depending largely upon the territory they desire to cover, length of time they consume and size of car furnished them. They generally desire the best rolling stock and considerable attention, and charge is made accordingly.

BROOKLYN HEIGHTS N. Y., RAILROAD COMPANY.

H. Milton Kennedy, general passenger agent, furnishes a schedule of rates for party cars, and adds that for evening service six hours' time is meant, and that no charges are made upon a mileage basis, chartering parties selecting their own route and the resort to which they desire to go. Following are the list of rates and necessary collateral information:

"Cars of the regular type can be chartered for from $6 to $12 each, according to circumstances. The brilliantly illuminated and handsomely decorated special cars for trolley parties are chartered at $20 for an evening; special straw party cars at $15 for an evening. The private palace cars, which are fitted with buffets and coolers for refreshments and tables for playing cards, including porter service, may be chartered as follows: To and from the theater or any place of amusement, $15; for exclusive use during the morning or afternoon, $20, for exclusive use during an evening, $25.

"In addition to the extensive system of lines throughout the city, the Brooklyn Heights Railroad Company now has a trackage agreement with other railroad lines in the city, by which special parties can charter cars for trips to every point around Brooklyn connected by the trolley wire."

W. J. Hield, general manager of the

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS,

informs us that road makes a charge of $4 per hour for large interurban cars, regardless of the time the car may be out, except that it does not take a car out for less than $10.

The local cars are chartered at $3.50 per hour, but there is very little call for these.

ATLANTA, GA., CONSOLIDATED STREET RAILWAY.

Joel Hurt, president, informs us that the rates for illuminated trolley party cars are $5 for the first hour and $3 for each additional hour the cars are in service. A deposit of $5 is required to be made when the car is ordered, and the charge is from the time the car goes in service until it returns to the car barn. The rules prohibit a greater number of passengers than can be comfortably seated on the car. The seating capacity of the car is forty passengers on single truck cars and sixty on double truck cars. The double truck cars are not illuminated. The crews are instructed to carry the trolley parties on any lines, but the schedule cars always have the right of way.

The company has built two cars at its shops which are used exclusively for trolley parties, and has had a very nice income from this source this summer.

WEST END STREET RAILWAY COMPANY, BOSTON,

informs us, through C. S. Sergeant, general manager, that the road has no special rules governing parties who may charter special cars, and the rates vary according to the distance to be carried, and the time of day or night when the trip is to be made. They would, therefore, hardly be a criterion for other places.

CHICAGO CITY RAILWAY COMPANY.

In our issue of June, in connection with an illustrated description of the luxurious party car recently put in service by this company, we published the schedule of rates established for this as well as other cars when chartered for purposes similar to those for which that is specially intended. In order to increase the value of the present article by combining as much information as possible under one head this schedule is reproduced as follows:

Electric cars for picnic parties, each car, one way, $3.50; round trip, $6.50. For trolley and theatre parties, round trip not exceeding thirty miles, palace motor car, $18.00; with trailer, $25.00; common motor car, $10,00; with trailer, $15.00. Cable cars are furnished for picnic parties at a charge of $2.00 for grip car for special train one way, and $3.50 for round trip. For each coach attached to regular or special train there is a charge of $3.50 one way and $6.50 for round trip. Horse cars may be chartered to run between points not exceeding five miles at $4.00 for one way and $7.00 for round trip, with an additional charge of seventy-five cents for each mile or fraction thereof. In the case of electric cars for parties, stop overs may be made at convenient points not to exceed a total of three hours.

CINCINNATI STREET RAILWAY COMPANY.

This road has arranged a very complete schedule of circuits for trolley party cars, giving the route, the time required and the usual stopping places on each. The rate for special cars is $5 for the first hour and $2 per hour for each additional hour. The company also furnishes a variety of menus for luncheon, dinner or supper at Chester Park with the price attached to each, and orders may be given in advance.

HIGHLANDS SCENIC RAILROAD COMPANY, ST. LOUIS.

This company claims the honor of having the finest buffet trolley car in the country, with a seating capacity of 36 persons, best of china and glass service, 8 portable tables, and an ample commissary. The rates are: one round trip, during the day, 21 miles, with one hour layover, $10; six hours use in the evening, $25; afternoon and evening, nine hours, $35.

A REAL LIVE TROLLEY PARTY.

At last, through the kindness of H. Milton Kennedy, general passenger agent for the Brooklyn Heights Rail-

road, we are able to show a trolley party car with a trolley party on it. The photographs were taken on the occasion of an afternoon trip given by Mr. Kennedy to

a party of friends, the scene of the photographs being North Beach. The car is the company's new "Columbia."

PROTESTS AGAINST ASSESSMENT.

The Milwaukee Electric Railway and Light Company has made a vigorous protest against the assessment of its two lighting plants, on the ground that the exemption law comprehended all property owned by the company, whether used for street railway purposes or not. The board of tax review, however, confirmed the assessment, and justifies its action by the recent decision of the supreme court, which says that no corporation can evade taxes by allowing itself to be absorbed by another corporation created for a different purpose. If the legislature had intended to pass a measure to include all property owned by a street railway company, then there would be nothing to prevent the company from erecting a hotel and running it without paying a cent of taxes upon the property.

BUFFALO'S BIG BUSINESS.

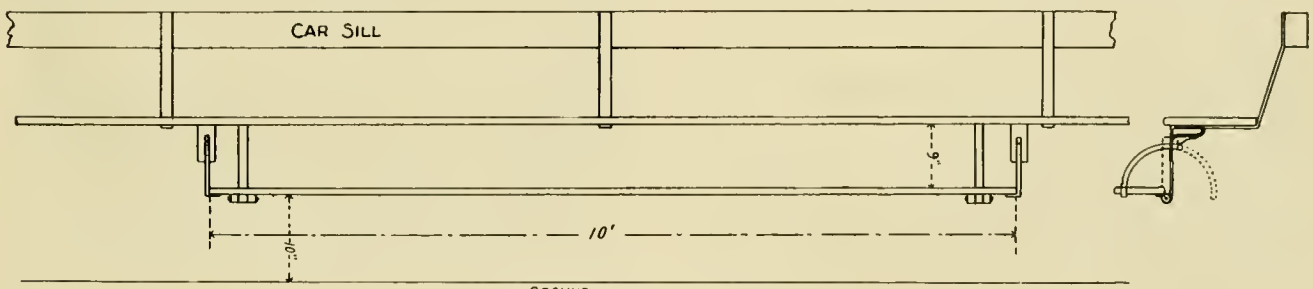
General Manager H. H. Littell has good reason to wear a smiling countenance these days, for do not the earnings of his roads show an increased revenue of a quarter of a million dollars over last year. The gross receipts of the Buffalo Railway Company and the Crosstown Railway for the year were over $1,800,000, about $450,000 coming from the latter company. Of this over $45,000 will be paid to the city, being 2½ per cent on the gross receipts, the contract with the city containing a provision to the effect that when the gross receipts should exceed $1,500,000, the percentage should be raised from 2 to 2½. The business of the year is therefore equally gratifying to the city and companies.

TRAMWAYS INSTITUTE OF GREAT BRITAIN MEETS.

The Tramways Institute of Great Britain and Ireland held its annual meeting at London, July 31. The report of the council of the Institute which was first taken up showed that a valuable work had been done the past year in the way of opposing legislation detrimental to tramways. W. J. Carruthers-Wain, who has been chairman for several years retired, and J. Fell, of Leamington, was elected chairman for the ensuing year. The vice-presidents for the next year are W. J. Carruthers-Wain, William Turton, and W. Mason. The executive committee consists of R. Whittaker, John Waugh, Wilborn Stansfield and John Coomer. J. G. B. Elliott remains secretary. Two papers on car starter brakes were read, devices which have been scarce in this country for the last few years, though one of the editors of the Review can testify that "the woods were full of 'em" when he was in street railway operation several years ago. T. H. Brigg read a paper on the mechanics of horse-haulage, maintaining that the trace is generally attached to the wrong place. He also incidentally maintained that the horse is the best and cheapest motor going. This created an extensive discussion. A paper was read on the Brand electric railway conduit system. Whatever the merits or demerits of the system the paper was deservedly condemned by those who discussed it as showing a lack of a most elementary knowledge of electricity, and making gross misstatements of facts. For example, induction was defined as "dissipation of the current scattering broadcast through the earth." J. Sturgeon read a paper on "Mechanical Haulage on Tramways" which advocated the cable system and maintained that the history of electric traction for tramways had been one continuous record of financial failure. As the other statements in the paper were in a line with this it is useless to follow it further. As one of the speakers remarked in the discussion, if the cable system was so good there was no necessity for Mr. Sturgeon to have devoted so much space to condemning electricity. The annual dinner of the organization took place the same evening, and was a very enjoyable affair.

LOW STEP FOR OPEN CARS.

Until some car manufacurer shall have solved the problem of making two spears of grass grow where but one grew before, or in other words, finds himself able to put a flight of steps upon the side of a street car without taking up any more room than the present footboard, suggestions looking toward that desirable end will always be in order. The latest in this line which has come to our notice is an expedient devised by F. B. Lee, superintendent of the Norway & Paris Railroad Company, Norway, Me., for use on such occasions as necessity demands. It is shown in the accompanying illustration. The device consists simply of an extra step hinged to brackets depending from the foot board in such a manner that when not required for use it is folded up and stands vertically like a "riser" to the footboard. When lowered it is supported by two curved bars, one at each end, which pass through slots in arms attached to the underside of the footboard. A spring attached to the same arm engages with a notch in the curved bar to hold the step in place when raised.



LEE'S LOW STEP FOR OPEN CARS.

It is intended to use these extra steps only in case of necessity, as when accommodating aged people or at those points where the body of the car is considerably above the ground. The device has been in use for about a year and has given good satisfaction. The officials of the road consider that a step operated by the conductor, as is this, is safer than one operated by lever from the end of the car.

WOMEN MAY SMOKE.

President Vreeland, of the Metropolitan Street Railway Company of New York, has issued a general order to the effect that women have equal rights with men upon the smokers' seats of street cars. The matter was brought up by a conductor requesting a woman to cease smoking or leave the car, having been requested to do so by another passenger. The fare was returned and the woman left the car. The result was the issue of the order above mentioned, and a reproval of the conductor.

The Portland (Me.) & Cape Elizabeth railway offered a prize to the car crew which safely carried the largest number of passengers fair week.

IN MEXICO CITY.

The Two Republics, a daily paper printed in English, in the city of Mexico, contains the following under date of August 17:

After long waiting the Federal street railway system has been officially turned over to the new company. This was accomplished last evening. The board of directors of the old company held a meeting between 5 and 7 o'clock yesterday afternoon, at which all minor details were satisfactorily adjusted and the property was officially turned over to Thomas H. McLean, as president and general manager for the recent purchasers. The operation of this great system, hundreds of miles in length, and comprising nearly the complete complement of tram cars of this city, together with its suburban lines, will from this morning be under the management of Mr. McLean.

The new company has nothing at present to say concerning its plans for the betterment of the street car service, but it is understood that some important changes will be made in the near future. Mr. McLean has had many years of experience in managing similar roads in the United States, and is, in consequence, familiar with recent innovations which tend to give the public a good service and at the same time protect the company's interests. The general offices will continue to be located at Santa Clara, No. 12.

THE PITTSBURG & BIRMINGHAM LETS CONTRACTS.

The Pittsburg & Birmingham Traction Company, of Pittsburg, Pa., has let contracts for 6 miles of its Brownsville avenue extension. The road will be a model one in every respect, track and equipment being designed for high speed. Booth & Flinn, of Pittsburg, will construct the 1¼ miles of double track, and Sloan, McIlwaine & Ott Bros., of Allegheny, the 3 miles of single track. The Johnson Company, of Johnstown, will furnish the special work and the rails, 90-pound, 9-inch girders, in 60-foot lengths. Meede & Speer will supply 8,000 ties. The 22 cars will be equipped with 50-horse-power motors, built by the Westinghouse Electric & Manufacturing Company, of Pittsburg, which is also building two 500-kilowatt generators for the power plant.

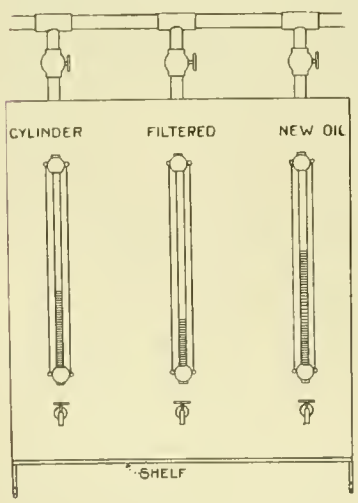
THE POWER HOUSE

This department is devoted to the construction and operation of electric railway power houses. Correspondence from practical men is specially invited. Both the users and makers of power house appliances, are expected to give their views and experiences on subjects within the range of the department.

The Calumet road, this city, has resorted to the expedient of using a locomotive to furnish steam on days of heavy traffic. On account of great increase in travel it was suddenly confronted one Sunday with the fact that its boiler capacity was not sufficient so that steam could be kept up. There was not time to get in a boiler in the power house so as to do much good this summer, so a locomotive was run in on the coal siding back of the station, and connection made with the steam mains so that it can be connected in with the other boilers in case of heavy loads.

* * *

The Fair Haven & Westville Railroad power plant at New Haven, Conn., has an arrangement for raising its oil which is not as elaborate as some where piping is run to all the oil cups, but which gives good service and saves much work nevertheless. Oil is delivered on the floor of the boiler room considerably below the engine room, where it is used. Up in the engine room is a handsome cabinet with three oil tanks for the three kinds of oil, viz,: cylinder, new oil and filtered oil. Each has its gauge and faucet. In the basement is a small steam pump for raising the oil as it is wanted into these tanks. The used oil all runs to a tank, where it can be raised by the pump as well as the new oils.



FAIR HAVEN & WESTVILLE OIL CABINET.

* * *

An explosion of a live steam pipe in the power house of the Sioux City, Ia., Traction Company, August 5, startled every one in the vicinity, and caused each of the waiting motormen and conductors to think every other one was killed. The power house was filled with hot steam for a time, but no one was injured.

* * *

We have made mention before in this department of the utility of a big water rheostat to put in series with the generators and burn out grounds which may be made on the lines, especially in times of strikes. It may also be useful for burning out grounds at other times, though it is not commonly so used. On the Metropolitan Railroad at Washington, which operates the conduit system altogether, this method is in regular use for disposing of grounds which may occur in the conduit. It will not often happen that any metallic object which would drop through the conduit slot will be large enough so that it cannot be melted by this method, and much time saved in hunting. The water rheostat used for this purpose should be capable of absorbing for a short time the full capacity of the generators.

* * *

As mentioned previously in these columns, the Calumet Electric Railway, under the direction of H. M. Sloan, general manager, has installed apparatus for

POND AND TROUGHS FOR COOLING CONDENSING WATER—CALUMET ELECTRIC RAILWAY, CHICAGO.

cooling water for condensing purposes at its plant at Burnside, in this city. As there are very few arrangements of this kind, except on the Pacific coast, and as we believe that self-cooling condensing apparatus will be used much in the future, this plant is worthy of more than passing mention. The Calumet road has plenty of land around its power house, so that it was an easy matter to find room for a pond 80 by 200 feet, and 6½ feet deep. This was dug in the stiff blue clay of that

region, and there is practically no leak. Back and forth across the pond run three troughs, one above the other, supported on piles. These troughs are 15 feet wide and 185 feet long. The discharge from the condensers is into the top trough. After running the full length of the top trough the water falls to the one below, running the length of that in turn, and so on to the bottom. Part of the time recently, however, owing to the water being a little too high in the pond, the bottom trough has been submerged, so that only the two upper ones were in operation. This apparatus has cooled condensing water for an average load of 1,800-horse-power, 24 inches vacuum being maintained. As some of the warmest days ever experienced in Chicago have

COOLING TROUGHS FOR CONDENSING WATER—CALUMET ELECTRIC RAILWAY, CHICAGO.

occurred since the cooler was put in operation, there is no doubt but that it will give satisfaction, as it will never be called on for service under more trying conditions than have occurred so far. The condenser discharge is usually at a temperature of 125° to 130° and the water at the bottom of the pond, where the condenser intake is placed, 105° to 110°. The area of the water exposed to the air in the troughs is 8,325 square feet, to which should be added the surface of the pond, which is over 16,000 square feet, making in all over 24,325 square feet of cooling surface. As has been said, this has cooled water for condensing for an average load of 1,800-horse-power (running much higher, of course, at times) on the hottest summer days. The capacity of the cooler could be increased very much by adding more troughs. The work was carried out under the supervision of Mr. Caldwell, chief engineer of the company. General Manager Sloan deserves much credit for seeing and taking advantage of the opportunity of saving coal with but a small investment, and being one of the first in this part of the country to start a self-cooling condenser.

* * *

Rope Driving.

The Electrical Review, London, in its issue of July 10, publishes some interesting notes on rope-driving, and among other matters discusses the proper form of groove for rope driving and rope driven pulleys. The diagram shown for laying out grooves is so well planned and seems to be based upon so solid a foundation of common-sense that we reproduce it here, together with a description of the process and some further matter upon the general subject. The diagram is explained as follows:—

"Draw the circle of the rope with intersecting vertical and horizontal axes. Draw the chord, a b. From the center of the rope mark off on the vertical line a distance equal to a b, this will give the center of the root circle. Next mark off a further distance equal to a b, this gives the point of intersection of the sloping sides. Draw these sloping sides through the ends of the horizonal diameter of the rope and carry them forward till they cut the dotted line drawn horizontally across the top of the vertical diameter of the rope. The intersection is the center of the narrow flange curve. The flanges are made thin and joined by an easy curve to the inclined sides of the grooves; but this curvature should cease as shown at a distance about equal to $\frac{1}{8}$th the rope diameter above the horizontal diameter of the rope, for it is of importance that the groove sides should be flat and not curved or they will prevent the rope from bedding itself to shape. It will tend to revolve, and a rope which rotates about its own longitudinal axis wears more and never assumes the solid shining appearance which characterizes a well-wedged rope. We do not say this is the the sole cause of rotation but it is believed to have an important influence and, therefore, grooves should have flat sides. In the diagram the flattening of the rope circle by the inclined sides about represents

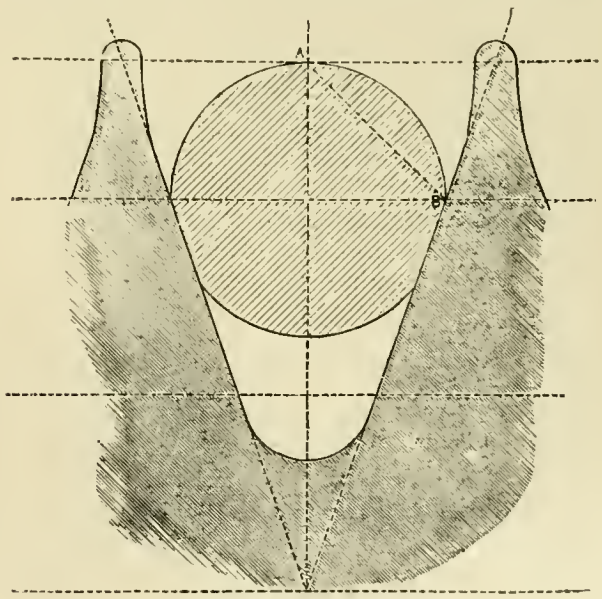


DIAGRAM FOR LAYING OUT GROOVES.

what actually takes places in shaping a rope to its groove. Any angle sharper than about 40° would cause too severe a wedging action; any more obtuse angle than 45° would too seriously reduce the wedging action. It must be noted that as a rope enters a groove slack and leaves it stretched, and therefore so much smaller in

diameter, the tendency is for it to occupy a lower place in the groove as it nears the point where it leaves the pulley again. The rope lies as it were between the sides of a very long pair of inclined planes, and it is thus held from slipping by this longitudinal wedge action as well as by the frictional grip of the inclined sides. The base curve of the groove is, of course, simply made to touch the sloping sides; this fixes its radius. Sometimes the vertical portion of the flanges is omitted, and the sloping sides are simply joined by a curve which does not always extend so high as the top of the ropes. These do not give quite so great safety against jumping of the ropes from groove to groove. To be easy in working, ropes must not be too short, the distance apart of the shafts being conveniently three times the joint radius of the driving and driven pulleys. Any excess over this is apt to allow too much sag in cases of horizontal driving, and generally too great length is not desirable, especially in dynamo work, as the large amount of slack is a source whence a sudden change of stress may give rise to wave motion and shock. Too short a distance between shafts is, however, undesirable, especially where the pulleys differ considerably in diameter, as it reduces the grip arc on the small pulley to what may prove too small to secure a proper grip.

The length given is, therefore, a fair average. In a factory of several floors the ropes to the upper floors are obviously much longer than the others, but the distance in plan is not necessarily so, and the sag of the slack side is not therefore excessive. Direct vertical driving is to be avoided where possible. When a nearly direct vertical drive is unavoidable allowance has to be made for the fault by using more ropes to the extent of 15 or even 20 per cent or more, while, where the slack side in a horizontal drive is the lower side, a percentage of 10 to 15 per cent should be added to the number of ropes to make up for the less desirable arrangement. In calculating the power that a rope will transmit, it must be remembered that there is a wide margin of strength, but for ordinary speeds the horse-power that a rope may be safely made to transmit may be set down as H. P. $\frac{d^2 s}{5{,}000}$, where d is the rope diameter in quarter inches, and s is the rope velocity in feet per minute. Thus a 1¾ rope at 5,000 feet figures out at nearly 50 H. P., and though speeds of 6,000 and even 7,000 may be employed, it must be remembered that for the stresses used in practice, 5,000 feet per minute is the maximum velocity beyond which the stresses due to centrifugal tension increase at a faster rate than the increase of power. Beyond 5,000, therefore, a rope is really less efficient. The limits of practice are conveniently from 2,000 to 6,000 feet velocity, but there is no objection to slower speeds when needful. One should aim to get a speed of 3,600 to 4,800 where possible. Between these limits a rope has practically an equal efficiency. As regards material the first driving ropes employed in heavy driving were of hemp, because it was in Dundee that rope driving was first employed. Americans use manilla very much, but manilla is a very rough fibre, and works its own destruction, and nothing has proved so good as cotton. Egyptian and American cotton are those most suitable. There is practically no difference between them.

As regards the question of electrical driving it may be thought that an elastic rope which has a considerable slack will be more objectionable than a tighter rope. In this respect we understand that arrangements are being made to test the properties of Rhea fibre as a material for driving ropes. Rhea fibre, which is the strongest fibre known, and is a fine smooth fibre of great length and capable of being spun fine like cotton, has exceedingly little elasticity and would therefore make ropes that would stretch very little, and would, at the same time, be as free from internal friction as cotton.

The question of strands is one of importance. Anyone who will draw three circles in contact, and four circles in contact, will see at once that there is only one arrangement for the three circles in a rope. With a four-strand rope two opposite circles may touch, and the other two may not touch, and a four-strand rope tends to become irregular in shape. There is, therefore, no reason for having more than three strands to a rope. They form a more solid rope than any other number. A four-strand rope requires a core to help it in its proper laying. A core makes a rope stiffer, and, moreover, it is very apt to take above its share of load. This may break it, and the vacant gap between its broken ends is occupied by the rope getting out of shape and the space becoming filled by one of the strands. Other numbers of strands also require a central core, and are exposed to the same liability to get out of shape as the four-strand rope, and three strands have now become the standard.

With a material like cotton, the pliable nature of the strands allows them to so interbed themselves as to practically fill solid the central space, and, after some time of working, a rope which has become bedded assumes an almost triangular shape and gets hard and compact, and, if suitably dressed with a minimum of dressing, becomes polished on its bedding sides and runs almost like an iron bar in appearance. Dressing should only be very sparingly applied, and on no account in sufficient quantity to soak the rope. Dressing contains plumbago and while this helps the rope to become polished the liquid portion of the mixture is supposed to be present simply in sufficient quantity to lay any fluffy ends. A mixture much used on machine ropes is one of plumbago and treacle. Oil must not be used. It is usual when making a cotton rope to lightly serve with plumbago and tallow the outer surface of each strand before laying up the rope, but this is all that is needed; there should be no composition between the individual threads.

In splicing a rope a special man ought to be employed, and at least 72 diameters of a rope ought to be the length of a splice. Carefully spliced, with due regard to the

gradual tapering down of the strands, a splice neatly finished is very little less in strength than the body of the rope, and after a short run it is often impossible to find the spliced portion. The approximate weight of a good cotton rope is as follows:—

Diameter of Rope.	Weight per foot.	C.
1¼"	0·5 lb.	64
1⅜"	0·6 „	53
1½"	0·72 „	44
1⅝"	0·844 lb.	38
1¾"	0·98 „	32
2"	1·3 „	25

a good figure to remember, being that a 1¾ rope weighs 1 lb. per foot, and other sizes in the ratio of their diameters squared. The coefficient, c, is useful in determining the stress due to centrifugal force for any velocity, the square of the velocity in feet per second divided by c, giving the stress in the rope due to the speed, and serving to calculate the stress for any speed from which the margin remaining for useful work can be deduced. Thus for a 1¾ rope the centrifugal tension at 80 feet per second is $\frac{6400}{33}$ or 193 lbs."

TO THE CONVENTION.

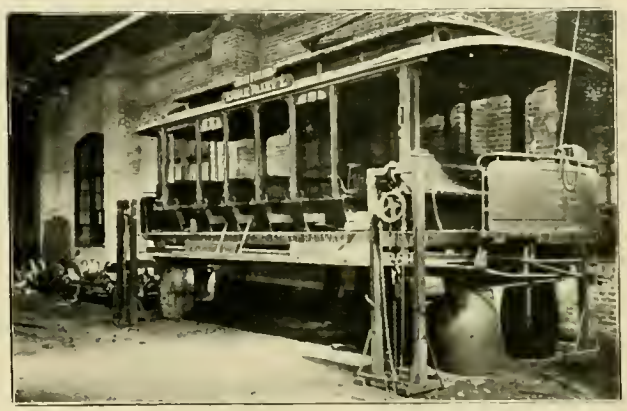
One of the pleasures, in past years, of attending the National Street Railway Association has been the very enjoyable trip to and from the convention city. Each year large delegations have journeyed together, in a number of cases in special trains. Arrangements are already under way to make the trip to St. Louis, for the eastern delegates the most pleasant of any. The "Southwestern Limited," which reaches St. Louis at 7 o'clock every night is no doubt the finest train from the east. Leaving Boston, as it does, at 10:30 a. m. and New York at 1 p. m., it will bring all the eastern delegates together. It leaves Albany at 4:20 p. m. It runs over the best roads to be found in the country, following the New York Central to Buffalo, the Lake Shore and Michigan Southern to Cleveland and the "Big Four" to St. Louis. At many of the stops delegates will be taken on, and it is expected the party will be so large that it will necessitate running a special train from Cleveland to St. Louis. A day run is made from Columbus, O., to St. Louis, across Ohio and Illinois and will give all a chance to renew old acquaintances and spend one of the most enjoyable days of the trip. All meals will be served aboard on the finest of dining cars and delegates will arrive at St. Louis in time to spend a pleasant evening, the night before the opening day of the convention. Rates will be reduced and information can be had of any agent of the lines named.

A test of the carrying capacity of the North Chicago Street Railroad Company's cars was made July 28, when a trolley party was given by the Fat Mens' Club. The qualification for membership is 200 pounds or better, but no difficulty was experienced except the necessity of a careful distribution of passengers to prevent dragging of wheel guards at one end of the car.

HANDY CAR LIFTERS.

There are a good many ways to lift cars, but one of the best that has recently come to our notice is one that is being used by W. S. Blauvelt, master mechanic of the Calumet Electric Railway of Chicago. Although it is not as rapid as a hydraulic or pneumatic hoist, it has the advantage that it can be used anywhere in the barn, and the car does not have to be run onto any special track.

The plan is to have four frames—one for each corner of the car, as shown in our engraving from a photograph. In each frame is hung a chain block and tackle.



CAR HOIST ON CALUMET ROAD.

A timber is put under each platform and the block and tackle attached to the ends. It is only the work of a few minutes for two men to have the car body clear of the trucks with this arrangement. After the body has been raised a couple of oil barrels placed under each timber make a good support for the car body so that the hoists can be taken away and used elsewhere. The advantage of oil barrels is that they are easily and quickly handled, besides making a strong support not liable to tip.

LOS ANGELES RAILWAY AFFAIRS.

The Los Angeles Railway, whose checkered career has kept its affairs prominent in street railway gossip the past five years, is now, it appears to pass into the hands of foreign owners. With it will go two other roads in that city. The local holders of bonds and stocks have agreed, and there is little question as to the willingness of outside holders to join in the deal.

The buyers are the South African Syndicate, and the plan calls for the payment of $100,000 on November first. The South Africans will come into possession of 2,923 of the 3,000 bonds of the Los Angeles Railway; 51 per cent of its capital stock; and 95 per cent of the capital stock of the Main street and Agricultural Park, and all the property and franchises of the Fifth Street line.

The subsequent payments call for $823,000, February 1, 1897, and $2,000,000 August 1, 1897, with interest. Chicago holders of securities expect to receive $28.00 on each $1,000.

BALTIMORE, MIDDLE RIVER & SPARROW'S POINT VIADUCT OVER WILMINGTON & BALTIMORE RAILROAD.

THE LONGEST RIDE FOR FIVE CENTS.

The Brooklyn Heights Five-Cent Ride Hard to Beat.

In our August issue we spoke of the long ride of 16 miles which the street railway at Dallas, Texas, furnishes for one nickel, and inquired if any road could go them better. H. Milton Kennedy, general passenger agent of the Brooklyn Heights Railroad, sets up a pace that is hard to beat. He says:

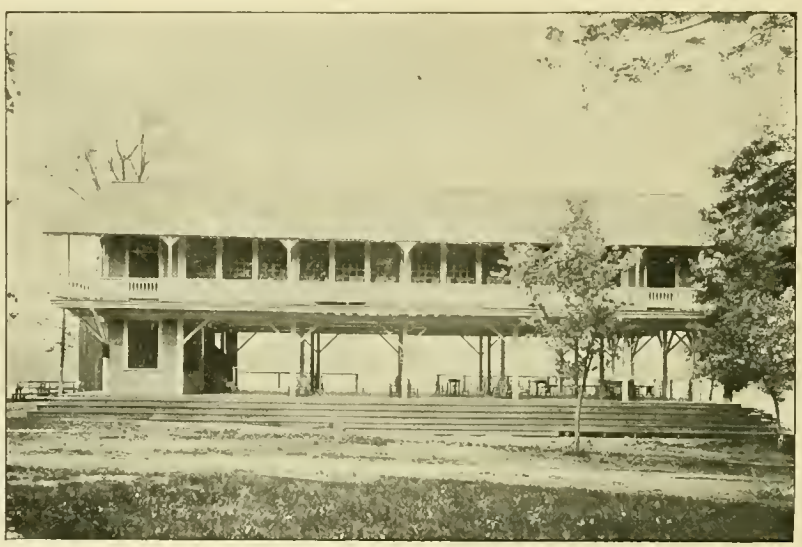
"Noting your question, 'Who gives the longest ride for five cents?' as a head line in your August edition, and noting that the longest ride quoted by you for a single fare is in Dallas, Texas, namely, 16 miles, I am pleased to advise that the Brooklyn Heights Railroad Company gives a continuous ride by transferring twice, from Jamaica to Ulmer Park, a distance of 21 miles. As to the distance which might be covered by transferring from one line to another over our system to various parts of the city, this distance could be far exceeded, but as I have never figured out exactly how much, I should not care to quote it. One could ride continuously forever on our lines by successive transfers. Beat this!"

The Brooklyn system is indeed very liberal, and lest any lay brother who is not conversant with street railway operation should read this and be led into unintentional error, we hasten to explain that these long possible rides for five cents do not constitute the bulk of the travel, or even a large part of it. There is no money in a 16-mile haul for five cents, and it is simply one of the possibilities which in the nature of route combinations is possible, and which, being so small a portion of the whole, do not seriously affect earnings.

Milwaukee and Los Angeles are likely to get mail cars.

A BEAUTIFUL COUNTRY ROAD.

One of the most thoroughly enjoyable rides to be found anywhere is that furnished by the Baltimore, Middle River & Sparrow's Point Railroad. The present line runs from Highlandtown, where it connects with the City & Suburban to Back River, and from near Patterson Park, the terminus of the line of the Baltimore Traction Company. It nearly follows the shore of Chesapeake Bay, making the route delightfully cool and refreshing on account of the salt breezes. At the time of our going to press an extension to Middle River is being completed, which will give five miles additional through a road shaded on both sides by overhanging trees.



A PAVILION BY THE WAY-SIDE.

A feature of especial interest in the line of safety is the fact that the road does not cross any railroad at grade. The means required in one instance is shown in our illustration of the viaduct over the Philadelphia, Wilmington & Baltimore Railroad. This is 712 feet in length and indicates the expense to which the company

has been to secure a line free from causes of delay, and especially to insure the safety of its patrons.

There are on the line a number of pleasant resorts where boating and fishing can be had, and where the inner man may be delighted with all manner of sea and farm food fresh from the water and the ground. There

RACE TRACK ON SPARROW'S POINT ROAD.

are also facilities for other forms of amusement. As a whole, the line is remarkably well adapted to the needs of those who wish to secure an outing at merely nominal expense, and the road can hardly fail to prove a success. It is certain that no efforts will be spared by President Young and Secretary Duvall, if the enterprise shown in the past is an indication.

THE CRAZE FOR EXTRANEOUS KNOWLEDGE.

The London Electric Review says, under the above head:

"The Street Railway Review discusses the propriety of teaching a motorman more than what is necessary to properly handle his car. Superintendents differ on the subject. One man will try and have his employes taught the theory of electricity and the working of the motor, and gives each man a kit of tools, and looks to him to make small repairs, and be familiar with all the electrical apparatus on the car. Another man forbids them to open a motor, and expects a mere narrow but rigid adherence to rules of operation. This man considers very properly that more harm arises from tinkering with motors than is recouped by any good that may be effected. He looks upon the motorman as being hired to run cars, and expects the repairs to be done in the shops. Our contemporary would steer a middle course, and would be disposed to allow that the motorman should be competent to the extent of remedying such troubles as arise from blowing of fuses, or breaking of ground circuit by the car running onto a dirty track, and even loose brushes might be included in the category of remedial faults. But beyond these points it would ask merely an honest attention to work and care of the rolling stock. It is suggested that proper records should be kept of the efficiency of motormen as done with locomotive drivers on the steam roads. Doubtless the most useful man is not he who can turn his hand to all kinds of little repairs on the road, so much as the careful operator whose handling of the car renders such little repairs unnecessary. We all know the man who is forever tinkering with machinery and varying things to suit some fancy notion of his own when he has not intelligence enough to perceive the object of certain details of construction. A recent example came before us where the omission by a workman of a single screw, because he did not think it was necessary, caused the wrecking of the whole machine, and only then was the omission discovered. Half the accidents that occur are due to subordinates acting on similar lines. The shop alters things to show its contempt for the drawing office, but the drawing office has to shoulder the blame when an accident occurs. An organized business is best conducted on fairly rigid lines as to separate duties, and the car shop is the best place for repairs."

H. M. LITTELL TO MANAGE METROPOLITAN, NEW YORK.

The most important appointment which has recently been made is the election of H. M. Littell as first vice-president and general manager of the Metropolitan, New York. Mr. Littell has been in railway work all his life, commencing with the Louisville City Railway, as clerk, in 1874. From 1883 to 1885 he was general manager of the St. Paul City Railway Company, and then took the position of general freight and passenger agent of what is now the Chicago-Great Western Railroad. In 1888 he was made manager of the Cincinnati Inclined Plane Railway, and resigned that office to take a similar position with the New Orleans Traction Company, on January 1, 1893. He was the president and general manager of the Atlantic avenue line in Brooklyn until its absorption by the Nassau Electric Company.

He was born in Corydon, Ind., in 1856. His connection with the American Street Railway Association has been a prominent one, and he is now president of that organization. He is a pleasant gentleman, a hard worker and fine executive officer.

The street railway at Newcastle, Pa., has passed into the hands of a company of which R. R. Quay is president, Arthur Kennedy, vice-president, and DeWitt Dilworth, formerly of the Washington, Pa., Electric Street Railway, is secretary and treasurer.

H. P. HIRSCH.

Henri P. Hirsch, recently appointed eastern representative of the McGuire Manufacturing Company, is a young man of twenty-nine years of age. He was educated at the University of Michigan, from which school he graduated with high honors in the class of '88.

H. P. HIRSCH.

While this is Mr. Hirsch's debut in the street railway fraternity, he has had a wide experience, and until his recent present appointment has been on the editorial staff of one of the leading Chicago daily papers. Mr. Hirsch enjoys the honor in Chicago newspaper circles of being the youngest journalist ever given an assignment as a war correspondent. During the Indian disturbances at the famous Pine Ridge agency, the reports sent in by him of the state of affairs existing at that place were printed in full by the Associated Press.

MAMMOTH TROLLEY PARTIES.

The Calumet electric road, of this city has been breaking records all along this year on big trolley parties. On two occasions parties requiring for their transportation 54 cars have been taken care of. The last of these was on the evening of August 20, when the members of the Royal League on the South side of Chicago got together to the number of 3,000 and took a 50-mile ride over the road. The custom in handling these large parties is to run trains of one motor and two trailers. The business has been immense this season, as these two highest records will show. In fact the capacity of the road has been severely taxed to supply them. Hardly a day passed without one or two.

KINGS COUNTY ELEVATED IN RECEIVER'S HANDS.

The Kings County Elevated has gone into the hands of a receiver, and stockholders will make a heavy loss on their holdings. The more popular service of the surface trolley roads has been the cause of the failure. In this connection may be noted the fact that the elevated lines in Berlin, owned by the state, make no profits, though keeping even. The two underground roads in London are poor investments, and none of the elevated roads in Chicago are making money. The Liverpool overhead, operated electrically, has made money from the start, but enjoys an enormous revenue from sightseers who ride to get the view of the docks and shipping along which the road runs. The tremendous expense of overhead and underground construction, as compared with cable and surface trolleys, and the excellent time made by the two latter, furnish conditions which have brought the limits within which elevated roads can operate at a profit, down to very narrow lines.

The Kings County L was chartered in 1879; construction begun in 1886, and until the trolleys got into Brooklyn, was doing a good and increasing business.

SUICIDE OF C. J. HEIMS.

C. J. Heims, an inventor, said to have once been a business associate of Thomas Edison, suicided by carbolic acid and chloroform, in his apartments in this city, where he had lived for two years past. Although he always had plenty of money he lived the life of a recluse. His body was not discovered for six days He was a large man, 45 years of age, and on the occasion of his frequent visits to the Review office always seemed in the best of spirits. Among his street railway inventions was a hose bridge to prevent blocking of cars during fires. It was illustrated and described in our issue of last May.

THE HARMLESS OCTOPI.

Pingree's celebrated Detroit system of street railway management has proved an unqualified fizzle and a consolidation of the railway interests there, with reduced car service has become necessary in the attempt to get expenses down to balance earnings. The Detroit Free Press says:

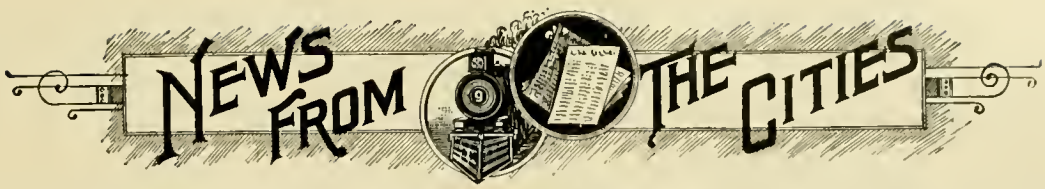
"Does anyone stop to think that when we have the big street railway trust here, one corporation for one town, that his honor, the mayor, has been the real creator of this genuine 'octopus'?" asked one of the doubters yesterday. "Talk about octopi, the mayor has been the occasion of our having the biggest on record—or we soon will have. And what's funnier—no one seems to mind the 'octopus' much now. He doesn't seem to terrorize people nowadays any more than would an exhibition whale."

MacCURDY & SMITH ASSIGN.

MacCurdy & Smith, electrical supplies, Indianapolis, assigned, on August 28, to Charles S. Tarlton, of that city, without mortgage or preference to any one. The firm has tried hard to pull through, but slow collections and inability to secure bank accommodation has made the above action unavoidable.

The percentage which creditors will realize on accounts promises to be rather small.

The Colonial City Traction Company, of Kingston, N. Y., has been granted its application for the appointment of commissioners to fix damages for the use of a portion of the Kingston City Railroad Company's tracks.



Arizona.

PHOENIX, ARIZ.—D. A. Abrams has petitioned for an electric railway franchise.

California.

SAN JOSE, CAL.—Repairs costing $5,000 will be made by the First Street Railroad.

LOS ANGELES, CAL.—J. H. Spiers will try to get a franchise for an electric line to Santa Monica.

LOS ANGELES, CAL.—Another track to Santa Monica may be built by the Pasadena & Pacific Electric Railway Company.

SACRAMENTO, CAL.—Car shops are being equipped by the Sacramento Street Railway Company to build new rolling stock.

SAN JOSE, CAL.—Assignee W. C. Andrews is trying to get possession of Jacob Rich's First Street Railroad, of which of J. W. Findlay and H. B. Alvard were appointed receivers.

Connecticut.

NORWICH, CONN.—Henry C. Smith, of Plainfield, N. J., is directing the survey for the proposed Sea View Railway.

NEW HAVEN, CONN.—The New England Street Railway Company is selling shares of the Winchester Avenue Railroad to get funds for extension and improvement.

Chicago.

CHICAGO.—The Consolidated Car & Track Company has been incorporated to operate lines and build cars. Capital stock, $500,000; incorporators, George C. Mastin, Catharine Mastin and Sherley Schooler.

CHICAGO.—The Suburban Electric Railroad Company is defendant in a suit for lien brought by C. E. Loss & Co. to secure a balance of $10,218 alleged to be due on their contract. Of the $40,218 said to be due $30,000 has been paid.

District of Columbia.

WASHINGTON, D. C.—The Capitol Railway Company has applied for a permit to construct the road from Congress Heights to the navy yard.

WASHINGTON, D. C.—Permission to lay double track on Rhode Island avenue has been granted the Maryland & Washington Railway Company.

Illinois.

PEORIA, ILL.—The Glen Oak & Prospect Heights Railway Company has been granted an electric railway franchise.

AURORA, ILL.—The Aurora & Geneva Railway Company, now constructing, has certified to an increase in its capital stock from $10,000 to $60,000.

OTTAWA, ILL.—J. McMillan Smith, of South Bend, Ind., has given up the street railway. George Paul, of Chicago, is looking over the property with a view to its operation.

Indiana.

JEFFERSONVILLE, IND.—At auction, August 20, the property of of the Jeffersonville City Railway Company was purchased for $8,200 by Captain Edward J. Howard, representing the original stockholders. It is a horse line 5 miles long and was laid in 1888 at a cost of $35,000. The line has had a fair traffic, but expenses have been too heavy. The purchasers expect to place it on a paying basis by installing electricity.

MADISON, IND.—The Madison Light and Railway Company has been organized with $75,000 capital stock, by John S. Ward, John E. Sutherland and Lewis J. Highland, Chicago.

Iowa.

BURLINGTON, IOWA.—Right of way to Crapo Park has been granted the Burlington Electric Railway Company.

Maine.

BANGOR, ME.—H. L. Mitchell is interested in the Bangor, Hampden & Winterport Electric Railway, which is to be 40 miles long.

Maryland.

HAGERSTOWN, MD.—A site for 100-acre park has been selected by the new Hagerstown Railway Company.

BALTIMORE, MD.—President George H. Blakistone, of the Central Railway, is preparing to adopt compressed air.

BALTIMORE, MD.—The Central Railway has been granted a compressed air ordinance by the first branch of the city council.

BALTIMORE, MD.—Trolley wires will be erected on Fells and Wolfe streets by the Baltimore & Ohio Railroad Company to haul freight cars.

Massachusetts.

HOLYOKE, MASS.—Another street railway project is on foot, to build from Holyoke to Springfield.

SOUTHBRIDGE, MASS.—The Southbridge & Sturbridge Electric Railway has been formally opened for traffic.

MILFORD, MASS.—Right of way through Medway will be asked by the Milford, Holliston & Framingham Electric Railway Company.

SPRINGFIELD, MASS.—The Springfield Street Railway Company has petitioned for an electric railway franchise in West Springfield.

MILFORD, MASS.—A car house will be erected at once on a site just purchased by the Milford, Holliston & Framingham Street Railway.

MEDWAY, MASS.—The Medway & Franklin Street Railway Company has been organized with $40,000 capital stock to build 16 miles of road from North Bellingham through Caryville, West Medway, Medway and Franklin to Wrentham.

BRAINTREE, MASS.—The Randolph, Holbrook & Nantasket Beach Electric Street Railway Company is being organized to build very soon. When completed the road will be operated by the Braintree & Weymouth Street Railway Company.

HUDSON, MASS.—The Hudson, Bolton & Lancaster Electric Street Railway Company is being organized with $200,000 capital to build through Bolton and form the connecting link between the Marlboro and the Clinton, Leominster & Fitchburg systems.

Michigan.

SAGINAW, MICH.—The Saginaw & Bay City Rapid Transit Street Railway Company has been granted a franchise in Saginaw.

DETROIT, MICH.—The Detroit Electric Railway Company has been formed to consolidate the Detroit Railway and the Detroit Citizens' Street Railway.

BAY CITY, MICH.—The Bay Cities Consolidated Street Railway Company early this fall will rebuild some lines and make other improvements at a cost of $40,000.

ANN ARBOR, MICH.—The Ann Arbor & Ypsilanti Electric Railway Company wishes bids from contractors for the entire electrical equipment of the 9 miles now run by steam. Requests for plans, specifications, maps, etc., should be addressed to John Winter, president, 29 State street, Detroit, or Ann Arbor, Mich.

ANN ARBOR, MICH.—Junius E. Beal writes with regard to the new Ann Arbor & Ypsilanti Electric Railway Company, of which he is secretary, that "We expect to equip the interurban part with electricity at once, and are going to call for bids as soon as specifications are finished. The road is a consolidation of the Ann Arbor Street Railway Company and the Ann Arbor & Ypsilanti Street Railway Company."

Minnesota.

MINNEAPOLIS, MINN. The Twin City Rapid Transit Company will construct double track for electric express trains between the two cities.

Mississippi.

JACKSON, MISS.—A. H. Kirkland, of the Jackson Bank, wishes to correspond with contractors for the construction of one mile of trolley road in Jackson.

Missouri.

ST. LOUIS, MO.—The Southern Electric Railway Company is considering extensions north and east. Routes are being decided upon and a franchise will soon be applied for.

KANSAS CITY, MO.—Roland R. Conklin, of New York, bought the Northeast Street Railway, August 6, at auction, for $60,000. He repsents the holders of $292,000 bonds. Grant I. Rosenweig bid $58,000 on behalf of the Westinghouse Electric & Manufacturing Company and the McGuire Manufacturing Company.

New Hampshire.

DOVER, N. H.—Rochester, N. H., men have bought the Union Street Railroad for $105,000.

New Jersey.

PLAINFIELD, N. J.—An extension to South Plainfield is being considered by the Plainfield Street Railway Company.

BRIDGETON, N. J.—The South Jersey Traction Company has been granted the right to lay tracks over Broad street bridge.

CAMDEN, N. J.—Right to build a double track electric railway over the Moorestown turnpike has been granted the Camden Horse Railroad Company.

ELIZABETH, N. J.—W. A. Topping, of New York, is one of the promoters of the Elizabeth & Rahway Traction Company, which is asking right of way.

New York.

ALBANY, N. Y.—A loop line is said to be contemplated by the Albany Railway.

KINGSTON, N. Y.—Right to build extensions is asked by the Kingston City Electric Railroad Company.

BROOKLYN, N. Y.—Gen. Jourdan has been appointed receiver of the King's County Elevated Railroad.

STATEN ISLAND, N. Y. Double track will be laid in Richmond road by the Midland Railroad Company.

NEW YORK, N. Y.—The Rapid Transit Commission is planning a new route to cost not to exceed $30,000,000.

SYRACUSE, N. Y.—The Rapid Transit Company has purchased the Syracuse Street Railway, and now owns all lines in the city.

ALBANY, N. Y.—Watervliet has granted the Albany City Railway the right to lay tracks on Broadway connecting with the Cohoes City Railway.

NEW YORK, N. Y.—The auction sale of the Twenty-eighth and Twenty-ninth Streets Railroad was postponed for the fifth time, until September 10.

PATCHOGUE, N. Y.—The Patchogue & Port Jefferson Traction Company has applied to the highway commissioners of Brookhaven for permission to build.

SYRACUSE, N. Y.—An extension of time in which to begin construction has been granted Syracuse & Oneida Lake Railway Company. Work need not begin until April.

GARDENVILLE, N. Y.—Charles Schoepflin, president, writes that the Buffalo, Gardenville & Ebenezer Railway Company is in the market for 2 trailers and 3 sets of registers.

BROOKLYN, N. Y.—The Brooklyn, Newtown, Jamaica & Flushing Railroad Company has been organized to build trolley lines. N. R. Appleton, of New York, is president; B. F. Frick, secretary, and Louis Besemer, promoter.

ALBANY, N. Y.—Promoters of the Greenbush & Nassau Electric Railroad have appointed the following committee on finance and construction: John F. Lape, William H. Nichols, Jesse P. Van Ness, Fred Carr and James Gray.

WHITE PLAINS, N. Y.—The White Plains & Elmsford Electric Railway Company proposes to build its road through Greenburg at once, trusting Tarrytown to grant a fair franchise. Stages will be operated over the incomplete section.

ONEONTA, N. Y.—The car line has been transferred to the Oneonta Street Railway Company. The latter has just been granted a franchise for electric equipment and additional tracks. Orlon Harmon is making surveys and buying rails, which are to be 67-pound. Work will be pushed. Power will be taken from Pruyn Bros.' mill.

GREENBUSH, N. Y.—An electric railway company is being organized by Jesse P. Van Ness, William H. Nichols, Gardner Morey, Lewis N. S. Miller, John F. Lape, Sylvanus C. Curran, John H. Finnerty, Frederick Carr, James Gray, Bradford R. Lansing, J. Perry Beaver, George W. Whitbeck, Thomas D. James and Joel T. Morey.

NEW YORK, N. Y.—The Sea Beach Railway Company, a reorganization of the New York & Sea Beach Railway, has been incorporated. Capital stock, $650,000; incorporators, Edward C. Hinsdale, John J. Carolan, James K. Carbiere, Edward P. Shields, Duane P. Cobb, Robert Martin, Terry Parker, Edward A. Petitt, of New York City, and Daniel W. Ryan, of Long Island City.

NEW YORK, N. Y.—The Third Avenue Railroad Company has increased its capital stock from $9,000,000 to $12,000,000. The purchase and improvement of the Forty-second street line absorbs $2,000,000 and the extension of the Kingsbridge line will require $1,000,000. Horses will be displaced by some other power, not yet decided upon. Both conduit and trolley systems are looked upon with disfavor.

NEW BRIGHTON, N. Y.—The Richmond Borough Electric Company has been incorporated, to operate in New Brighton, Edgewater, Port Richmond and other towns in Staten Island. Capital stock, $400,000; directors, Albert E. Leon, of Boston; Henry Dun Wiman, Daniel Campbell, of West New Brighton; William L. Douglass and John J. Whipple, of Brockton, and William A. Clark, Jr., and William B. Littlefield, of Lynn, Mass.

Ohio.

WARREN, O. Improvements are being made on the Trumbull Electric Railway by Superintendent C. S. Bidwell.

COLUMBUS, O.—George H. Worthington has been appointed receiver of the Columbus Central Street Railroad.

EAST LIVERPOOL, O.—Rumor has it that the East Liverpool & Wellsville Street Railway Company will be reorganized and take a contract for city lighting.

CLEVELAND, O.—The Cleveland, Painesville & Eastern Railroad Company has increased its capital stock from $250,000 to $500,000.

CLEVELAND, O.—An electric railway will be built for the land company controlling Euclid Heights, and will be operated by the Big Consolidated, the Cleveland Electric Railway Company.

CLEVELAND, O.—Grading and masonry contracts are being let by the Lorain & Cleveland Railway Company for the road between Rocky River and Lorain. A. P. Ruggles, chief engineer, 617 Garfield building.

IRONTON, O.—The Ironton Electric Light & Railway Company has been incorporated. Capital stock, $250,000; incorporators, R. T. McDonald, Ironton; Charles H. Warden, Ft. Wayne; J. R. Cook, E. J. Hathorne, and John Hamilton, Ironton.

AKRON, O.—The Akron, Bedford & Cleveland Electric Railroad Company has forfeited the $1,000 guaranty that the road would be built in Kent. Notice has been given the Akron & Cuyahoga Falls Company also that its deposit of $1,000 will be likewise forfeited if work is not begun.

Pennsylvania.

FRANKLIN, PA.—A park will be created by the street railway on a large tract just purchased.

BRADFORD, PA.—E. B. Sage, of Red Rock, is forming a company to build an electric road to Red Rock.

CONNELLSVILLE, PA.—Right of way has been granted the Connellsville Suburban Railway Company.

BRADDOCK, PA.—The Braddock Electric Railway Company is said to have forfeited its franchises in Braddock.

ALLEGHENY, PA.—Franchises are asked for the ten street railway companies recently incorporated with Theophilus Sproul as president.

ALTOONA, PA.—The Altoona, Mountain Spring & Ashville Electric Railway Company has been incorporated to build ten miles of road. Right of way will be asked.

PITTSBURG, PA.—Booth & Flinn, contractors, have placed 2,000 men at work taking up the Fifth avenue cable road and putting down new rails for the change to electricity.

PITTSBURG, PA.—George B. Austin and other real estate owners contemplate constructing an incline railway to give easy access to their property. The cost is estimated at $75,000.

UNIONTOWN, PA.—The contract for the 6-mile extension of the Uniontown Electric Railway to Fairchance has been awarded to the Chicago Construction Company. Work is to be completed in two months.

PHILADELPHIA, PA.—A syndicate of Philadelphia men, headed by George S. Gandy, president of the Fairmount Park Transportation Company, has acquired control of the Central Jersey Traction Company and the New York & Philadelphia Traction Company.

PITTSBURG, PA.—The South Side Railway Company has been incorporated to build from Bridgewater through Rochester, Pa., and across the Ohio river to Steubenville. Incorporators, J. J. Hoffman, T. H. Javens, Hartford P. Brown and Henry M. Camp, all of Rochester, Pa.

NEW CASTLE, PA.—A steel barn, to contain 35 cars, will be erected by the New Castle Street Railway. The new officers are R. R. Quay, president; Arthur Kennedy, vice-president, and DeWitt Dilworth, secretary and treasurer. Franchises are asked for new lines in Mahoningtown.

ALLEGHENY, PA.—The Lacock Street Railway Company has been incorporated to build two miles of road. Capital stock, $12,000; president, Joshua Rhodes, Allegheny; directors, William Bradford, M. W. Brennen, Pittsburg; Samuel H. Grass, Allegheny; James A. McDevitt, Lancaster,

PHOENIXVILLE, PA.—The abandoned D. R. & G. R. R. will be converted into a trolley line by a Hartford, Conn., syndicate.

LANCASTER, PA.—The George S. Lee syndicate, of New York, will assist in the reorganization of the Pennsylvania Traction Company under the charter of the Keystone Traction Company. The proposed lines to Ephrata, Manheim, Adamstown, New Holland and Terre Hill will now be completed.

PITTSBURG, PA.—Franchises for extensions, double tracks, etc., have been granted the Brownsville Avenue Street Railway Company, the Park Avenue Street Railway Company, the Highland Park Passenger Railway Company, the Penn Street Railway Company, the Central Passenger Railway Company and the Duquesne Traction Company.

ALLEGHENY, PA.—Ten electric railway companies have been incorporated, with Theophilus Sproul, of Allegheny, as president, and Jay R. Jenkins, O. C. Burgdorf, Allegheny, Oscar R. Cratty, Grafton, and M. J. McCann, Pittsburg, directors, in each. The names and capital are: Evergreen Hamlet, $12,000; Howard street, $6,000; Herr Island, $9,000; Juniatta street, $12,000; Marion avenue, $6,000; Madison avenue, $7,000; Peaceful Valley, $15,000; South avenue, $6,000; Benton avenue, $9,000; Bouquet street, $6,000. The aggregate length of the system will be 13¼ miles. The lines will be built entirely within the city of Allegheny. Rumor has it that H. Sellers McKee, of Allegheny, is the real backer of the project.

Rhode Island.

BRISTOL, R. I.—Right to lay rails, set poles and erect a power house for an electric road is asked by the Bristol Land & Investment Company.

South Dakota.

HOT SPRINGS, S. D.—Eastern capitalists are negotiating a lease of Wind Cave with the object of constructing an electric railway to that resort.

Tennessee.

CHATTANOOGA, TENN.—A receiver has been appointed for the Chattanooga Electric Railway Company on petition of the Union Trust Company, Philadelphia, which alleges a default of $550,000 on the first mortgage bonds.

Utah.

SALT LAKE CITY, UTAH.—R. O. Boswell is routing the proposed electric road to Ogden, where the Pioneer Electric Power Company will generate the power.

Virginia.

STAUNTON, VA.—The City Street Car Company, R. D. Apperson, general manager, would like prices and full information as to weight, etc., of street car fenders, at once.

Wisconsin.

FOND DU LAC, WIS.—Ths city council wants some one to build a street railway. A liberal franchise will be given.

MILWAUKEE, WIS.—A bond of $100,000 has been filed by the Milwaukee & Waukesha Electric Railway Company in acceptance of its franchise. The Fidelity & Deposit Company of Baltimore is the surety.

MILWAUKEE, WIS.—The Racine & South Milwaukee Electric Railroad Company has let the contrct for grading to Whalen & Williams. The Milwaukee Electric Railway & Light Company is surveying its extension to connect with the Racine road. The latter is enlarging the Farwell avenue station with an addition 90 by 80 feet, to provide barn room.

RACINE, WIS.—The Milwaukee, Racine & Kenosha Electric Railway Company, which has been undergoing promotion for several months, has now been incorporated with headquarters at Racine. Capital stock, $250,000; incorporators, George H. Hopper, Edmond Deane and Park Phipps. The route is from South Milwaukee through Cudahy, Lake, Oak Creek, Caledonia, Mt. Pleasant, Racine, Somers and Pleasant Prairie to Kenosha.

MILWAUKEE, WIS.—The mayor has approved the $100,000 bond of the Milwaukee & Waukesha Electric Railway Company. John R. McDonald has resigned the presidency and severed all connection with the company. The new officers are J. M. Bingham, president; B. A. Eaton, vice-president; James Petley, secretary, and Charles Pettelkow, treasurer. Other directors: Jacob Wellauer, George W. Hommel and Stutley I. Henderson. The council will be asked for an extension of time in which to begin work on the part of the line within the city.

Canada

HAMILTON, ONT.—Permission to adopt electricity has been granted the Hamilton & Dundas Railway.

MONTREAL, QUE.—Power houses will be built at Lachine and at St. Laurent by the Montreal Park & Island Railway Company.

Mexico.

MONTEREY, MEXICO. J. A. Robertson, of Monterey, is negotiating the purchase of Monterey's street car lines with a view to their electric equipment.

ALLOTMENT OF EXHIBIT SPACE AT ST. LOUIS CONVENTION.

The local committee have accepted and allotted space on the following list of exhibitors. The showing is an unusually good one, and exhibitors have availed themselves of the opportunity for plenty of room, so even at this early date the display promises to be the best ever made. Already 17,000 feet have been taken. The hall contains 25,000 square feet, including the aisles, so it will be seen that quick action is necessary for intending exhibitors who have not already applied. Secretary T. C. Penington desires us to urge other exhibitors who intend to be present to apply at once to George W. Baumhoff, St. Louis. Space is 10 cents per square foot, with a minimum of 100 feet. As far as possible exhibits are classified.

EXHIBITOR.	NO. SQ. FT.
Shickle, Harrison & Howard Iron Co.	200
Commercial Electric Supply Co.	400
STREET RAILWAY REVIEW	300
National Lead Company	100
American Electric Heating Corporation	—
Consolidated Car Fender Co.	300
Missouri Car & Foundry Co.	100
Missouri Malleable Iron Co.	100
General Electric Co.	2,000
Johnson Co.	1,200
Mica Insulator Co.	100
Heine Safety Boiler Co.	500
St. Louis Register Co.	200
Devlin Street Car Brake Co.	100
Stirling Boiler Co.	—
Hartford Woven Wire Mattress Co.	100
Standard Air Brake Co.	200
Leschen-Macomber-Whyte Co.	100
Meaker Manufacturing Co.	200
H. W. Johns Manufacturing Co.	250
Diamond Truck Co.	500
Paige Iron Works Co.	400
J. G. Brill Car Co.	1,100
Peckham Motor Truck & Wheel Co.	1,250
E. T. Burrowes Co.	150
Scarritt Furniture Co.	800
Sargent Co.	100
Wm. Wharton, Jr., & Co.	225
Creaghead Engineering Co.	250
Theodore Fletcher	100
Chas. G. Smith	100
Munson Electric Conduit Co.	1,632
Partridge Carbon Co.	100
Graham Equipment Co.	100
Safety Car Heating & Lighting Co.	200
American Car Co.	1,200
Consolidated Car Heating Co.	320
Central Union Brass Co.	—
Walker Co.	800
Trojan Button Fastener Co.	100
Given Campbell	100
Adams & Westlake Co.	100
R. D. Nuttall Co.	100
Shultz Belting Co.	250
Western Electric Supply Co.	—
Ohio Brass Co.	150
International Register Co.	100
Gold Car Heating Co.	100
Bundy Manufacturing Co.	100
Brussels Tapestry Co.	200

MUTUAL CASUALTY INSURANCE.

Casualty insurance for street railways seems at last to have been put on a basis and at a price which already commends itself to many managers, and it is reasonable to expect that the number will rapidly increase as fast as the scheme of operation becomes better known.

The company which is incorporated under the Pennsylvania laws, under the title of the Electric Mutual Casualty Association has been organized by practical street railway men for street railway business. As no high salaries are paid, the company is operating for only 10 per cent of premium income, as against 55 per cent required to carry the high salaries and agents' commissions of other companies. The company was organized March 31, 1896. At that time it was found that fifty suburban and interurban roads paid for losses in two years less than 1 per cent of gross traffic receipts; and it is firmly believed that by accepting only well managed roads of this class, with a good record as regarding accidents, insurance may be obtained upon this plan at actual cost, and as cheaply as the roads could carry their own insurance.

The secretary says: "The premium rate was fixed at 2 per cent of the gross traffic receipts, with a further liability of assessment up to 3 per cent additional, providing the losses exceed the premium; but in no case shall the liability of any member exceed 5 per cent, including premium and assessments. After four months of organization the losses of the association have been surprisingly small, owing to the care taken in the selection of risks, and it is hoped and firmly believed that the association will be able to declare a dividend to its members, and thus materially reduce the premium rate.

"The management of the company is entirely in the hands of railway officials, and has, in addition, an able legal board with skillful adjusters and detectives, who give prompt attention to claims, make immediate investigation of casualties, and if liability exists, endeavor to compromise all claims for damages. In fact, it is the object of the association to avoid litigation where there is liability if a settlement can be obtained upon just and equitable terms. Fraudulent claims for fictitious damages are resisted and speedily disposed of. Technicalities will not be taken advantage of to avoid settlement of just claims, and every member will be treated fairly and upon an equal basis." Full details will be furnished upon application to the secretary, Scranton, Pa.

THE MATTER OF TRANSFERS.

Abstracts from a paper read before the New York State Street Railway Association, by J. H. Stedman.

One of the most important things to do, and to do promptly, is to educate the average man and woman to ride. That this is largely a matter of education every street railway manager knows. When a new line is opened, even through a thickly settled district, the people for some time continue to walk. Bad weather, the necessity of haste or some other thing induces a person to ride once. The next time he rides with less inducement, especially if the cars are clean, the service prompt, and if he does not have to pay more than five cents to get to his destination. So the habit grows, and soon the rule is to ride, when before it was the exception. A liberal transfer system, properly guarded to prevent fraud, pays. This is, I think now generally recognized. Local conditions and arrangements of lines must be considered in determining the regulations to be adopted. The rules intended to safeguard the company are important. Perhaps equally important is the making of rules broad enough to encourage riding.

A large road in Baltimore, three years ago, employed me to arrange a transfer system. They yielded to my advice to the extent of four transfer points, but I argued in vain for more. One year after, the manager again sent for me, and said, "When you urged me a year ago to increase my transfer privileges, I thought you were a fool; and I am now convinced by a year's experience that the fool was another party." The expediency of a liberal transfer system is beyond argument—it is an established fact—it does increase cash receipts. The more liberal, the more advantageous.

We must, of course, protect ourselves against the abuses of the tickets by the passengers, and against the frauds of the conductors. The passenger can be held in check by the short time limit and specific conditions.

Whether it is better to ring up transfers is a subject which has provoked much discussion. To ring them up does, of course, give them at once a cash value; but not to ring them paralyses the spotter or detective, and the latter, I think, is generally admitted to be of greater importance. No detective can properly check up a car unless the conductor of that car is compelled by the company's rules to take up cash, transfer ticket, or pass coupon from every passenger, and to ring the register for every passenger. The weight of opinion seems now to be to ring up transfers, and preferably on a separate register. Nothing is absolutely a safeguard except the transfer method itself. With a protective transfer, guarded by the coincidence of time and consecutive number in sequence of issue, honesty may be secured.

DISCUSSION.

President Rogers—We have adopted transfers on our road with a great deal of benefit to ourselves and also to the public.

Mr. Moffitt—We have used them on one part of our system in Syracuse for two years, and are much pleased. We think they offer an inducement to the public to ride. Families are induced to come out on pleasant afternoons and Sundays and ride for pleasure. We have been educating the people to walk, and not to ride. I think the transfer is a means of helping them to get into the habit of riding.

Mr. Rossiter—We have a very liberal system of transfers in Brooklyn. I would inquire if any gentleman can express an opinion as to whether bicycles are seriously hurting the revenues of the different roads; and also how you can ascertain whether the transfers increase your cash receipts. We are all in the habit of making comparisons with previous months—the corresponding month a year ago. Of course the conditions are not the same in any of the larger cities. We do give a good many transfers, and have made a very good showing. We might have made doubly as good showing if we had not given any transfer. We carried 2,600,000 passengers on free transfers last month, and increased our earnings about $40,000. The other roads in the city which publish their reports monthly report a decrease, but there are a number of reasons why we should increase. We give a transfer to a passenger who is riding on a transfer. We have considered this question carefully, and believe the percentage is, comparatively speaking, very small, where passengers take a second transfer; and if you eliminate certain lines where we do not run our cars direct to the bridge or ferries, or some other point, I doubt if 2 per cent of the passengers having a transfer take a second one.

Mr. Deming—In Buffalo there are a number of lines where it is necessary to give a second transfer, and in some cases a third.

We have more or less trouble with the people abusing the transfer system, and it is hard to devise means to stop it. It is a matter which must be left to the intelligence of the conductor in a great degree. But I do not think there is a very large part of the public that endeavors to beat the transfer system. We find more trouble with them on a pleasant Sunday afternoon, when they are riding around for pleasure, than any other time. Our system is laid out in such a shape that it is possible to ride all day long on a transfer. [Laughter.] I have been studying a new form of transfer, which may put a stop to it. That is the idea of having every street that we run by printed on each transfer. When a passenger gets on one line and wishes to go to a certain part of the town, he must ask for a transfer to that street, and that transfer is good on any car connecting the two lines. The transfer will be taken up by the conductor, and another issued to the passenger punched for the same street, and the moment the street is reached the ride ceases. I think we will have to come to something of this kind to prevent them from riding too much. It may work or it may not work.

Mr. Stedman.—Would they not be inclined to "play the limit," and go as far as they wanted to?

Mr. Deming.—Not any more so than they do now. I think a good deal of the transfer figuring is problematical; I do not see how you are going to get at it.

President Rogers.—Are there any roads transferring from one company to another company?

Mr. Cole.—We do that in Elmira, but only on special occasions, when there is some combined attraction at the park; it is a sort of intermittent affair.

Mr. Robinson.—A great deal of difficulty arises in New York from the use of transfer tickets. There are some lines on which persons can get five or six transfers. We also have difficulty at the points where we have transfer agents and the tickets are punched. The passengers give the tickets to boys (and the boys sell them) or they put them in places where other people can get them. Some of our economic residents have found various methods of obtaining and using them to the disadvantage of the company. When a Houston street car is approaching Broadway, these gentlemen station themselves along the street, get on the rear platform, conductor is busy, the car crosses Broadway, and the gentlemen walk through the car, go out of the front door, walk over to the transfer agent, get a ticket and ride home. Once in a while a case of conscience turns up. On several occasions we have received refunds of five cent pieces; evidently from people who used this means of transferring. The travel is so great at some points that it is impossible to use punched tickets, and we have to use them unpunched. Some investigations have been made to see whether people use tickets illegitimately, and although no record is kept of it, it is found from general observation that the abuse is not great. There are not many transfers to one person of more than three in number; such cases are few and far between.

Mr. Rossiter.—What do you consider the result of issuing transfers, as to increasing cash earnings?

Mr. Robinson.—We consider that on some lines it has been of great benefit; large increase of travel, particularly in the retail dry goods district.

President.—I think the general adoption of the transfer system is an indication that the street railroads are anxious to serve their patrons. There is no law compelling us to give the transfers, but the roads have done it, and they have found that in accommodating the public they have increased their revenues.

Mr. Moffitt.—What percentage of transfers are received as compared with cash fares? In Syracuse we carry about 25 per cent of our passengers on transfers, which I think is a low average.

Mr. Deming.—In Buffalo, it is from 30 to 35 per cent; about 32 per cent.

Mr. Clark.—In Binghamton our percentage is 22 to 25; a little under 25 per cent.

Mr. Rusling.—The Rochester Railway Company used to issue from 35 to 40 per cent. Recently we have introduced a new transfer system, and we now issue from 27 to 30 per cent.

Mr. Rossiter.—We issue from 22 to 25 per cent in summer, and from 16 to 20 per cent in winter.

Mr. Frick.—The Atlantic Avenue system in Brooklyn issued from 16 to 20 per cent; 16 per cent the average for nine months in the year.

CONSTRUCTION AND MAINTENANCE OF ELECTRIC STREET RAILWAY TRACKS.

Abstract of Paper Read by George H. Neilson, Before the Pennsylvania State Street Railway Association, September 3.

In preparing this short paper on street railway track construction and maintenance, I have not lost sight of the fact that there are many members of this association who are better informed on the subject than I am. But one man's experience is not necessarily another's, and if I am able to call your attention to any points heretofore unobserved, I will rest satisfied.

Track work is very much more important and complex than the average public has any idea of, and nothing but theory and practice combined will ever give us the practically absolute "Permanent Way" which is every trackman's dream. It is therefore the duty of us to give freely what knowledge we have of the subject, and although we will differ on some points, in the end we will all be the better informed. It was with this idea in mind that I ventured to write this paper, and if I make suggestions which find no favor with you, I will be more than glad to discuss the points upon which we disagree.

CITY CONSTRUCTION.

I will first take up the construction of track laid in city limits where girder rail is required.

FOUNDATION.—In preparing the foundation, or subgrade it is a great mistake to make any arbitrary specification as to the thickness of the concrete. It should depend on the solidity of the ground on which it is laid, in many places four inches is ample, and in others six or eight inches may be necessary. The engineer, or whoever has charge of the construction, should watch this carefully, as it is very important, and if the work is properly done it will be of lasting benefit. A few soft spots, if not taken care of, will soon make themselves felt, and will spoil the effect of the balance of the work. The excavation for the foundation should not be any wider than necessary. Eight feet for a five feet three inch guage is ample. The depth of course depends on the height of rail, thickness of concrete, etc.

CONCRETE.—The concrete should consist of one part of cement, two parts of sharp sand, and five parts of stone, not larger than will pass through a two inch ring. The sand and cement should be mixed dry and turned over at least four times before water is used. The stone must be wet before being added to the sand and cement, and the whole thoroughly mixed on a board platform with tight joints. After the concrete is spread it must be rammed hard; the ramming to continue until water comes to the top; care being taken to keep it uniform and smooth. About one inch of coarse sand or gravel should be spread over it to make a bed for the ties. The space between the ties should be filled with broken stone, sand or gravel.

TIES.—Ties should be at least 6 inches on face, 7 feet, 6 inches long, and of white or rock oak, and thoroughly seasoned. If practicable, it would be well to treat them with creosote, or wood preserver, of some kind. They must be hewed, and not sawed. They should be laid with 26-inch centers, or 14 to every 30 feet.

RAILS.—The rails should be at least 70 pounds to the yard, and heavier if the traffic over the line will warrant it. They should be in 60 feet lengths. The usual 30-foot rail is harder to keep in shape on account of the numerous joints, and does not ride as well. * * * In fastening the rail to the ties, if the tie plates are not used, care should be taken to give the rail a good bearing across the entire face of the tie. As the average hewed tie will not allow this, they should be adzed off before the rail is laid. If this is not done the rail will work under the pressure of the cars. The most satisfactory way to fasten the rail to the ties, would be by means of tie plates. Plates with a raised lug to prevent the rails spreading, and with claws to hold them to the tie, answer several purposes. They hold the track to guage, which is very important, and is more than spikes will do; they lengthen the life of the cross ties and hold the track in surface better. Rail chairs, which bolt or spike to the tie, and upon which the rail rests, are practically useless where traffic is heavy, as they will work and break, and are a constant source of annoyance. The preservation of the guage is very important, and to my mind tie plates will do this better than any other method now in use. If put on every other tie they would hold the rail, although if used on every one, would make a more solid and lasting piece of work.

FROGS, ETC.—Frogs should be solid. Solid frogs last longer than those that are made up of several pieces bolted together, and do not get loose and rattle. The same is also true of the switches and mates. If the track is properly laid, the maintenance will be a small item for some time, but when repairs are necessary they should be made at once. It is far better to take hold of the work in time, than to wait until the whole line is in bad condition. It is very poor policy to construct a road on a cheap scale, as it takes but a short while for it to need repairs, and the result will be a constant drain on the company for maintenance, which will in the end be far more expensive than a well-built road would have been.

SUBURBAN CONSTRUCTION.

Suburban traffic on trolley lines has grown to such an extent in the last few years that the proper location of roads has become of great importance. Not only must we take into consideration the localities to be touched, but we must get to them by the shortest and most economical way. By economical, I mean both from a construction and operative standpoint. Before a road is definitely located, many things must be taken into consideration, such as the future of the country through which the road is to be built, and how great a factor in the encouragement of suburban living the road will prove. Travel over the road must be attractive, and unless it is well located and laid, it cannot be made so, and people will not patronize it to the extent they otherwise would. Any points which will cause the public to use the road should not be lost sight of, and many trolley companies have built parks and places of amusement on their lines with this idea. The Altoona & Logan Valley recognizes this fact, and we think we have in Lakemont Park a public benefit, which in usefulness and beauty is second to none in the state.

SUB-GRADE.—When the road has been located, the alignment and grade should be staked out, and not laid out by the eye, as is sometimes done. The grade should be as nearly uniform as possible, all humps, short dips and sudden changes in grade being avoided. Hills must, of course, be climbed, but the short dips can be worked out, and should be, as they cause an uncomfortable lurching to a rapidly moving car, which cannot be remedied except by raising the track. High places should be kept out when the grade is first made; once they are in they can only be gotten rid of by digging down—a very expensive piece of work after the track is laid.

If the company constructing the road cannot afford a good grade at the outset of its career, it must never lose sight of the fact that its grade is faulty, and gradually work it into proper shape. If the road is adjacent to a wagon road, it should be at least a foot higher in order to avoid drainage. The roadbed should be drained and protected from water as thoroughly as possible. The absence of the proper channels for the escapement of water has very often resulted in serious damage, and the eventual expenditure of more money than serviceable ditches would have cost. Before ditches are constructed the water sheds adjacent to the road should be studied, as it is a useless expense to provide larger ditches than are necessary, but it is worse not to have them large enough. Ditches along a single track road should be well outside the trolley poles, and if the line is double track they should be at least seven feet from the ends of the ties. If they are too close, the roadbed will work out and become unsettled, and the result will be pumping ties if the ground is at all soft. Water should not be carried under the track, if possible to avoid it; if it must be, iron or terra cotta pipe, or stone culverts should be put in. The ordinary wooden box decays and in the end is the most expensive.

BRIDGES.—Where it is necessary to cross a creek or ravine deck girders or I-beams should be used. Timber rots out and is not serviceable when compared to iron. The girders should rest on stone supports, solidly built and on a good foundation. If this is done they will last for years. If the bridge is over a creek it should be high enough to allow the water in time of freshet plenty of headroom. If this is not done floating timber is liable to prove destructive.

TIES.—Cross ties should be of white or rock oak, well seasoned and hewed. Chestnut ties are too soft, and are more affected by the weather. They should be at least eight feet long, six inches on face and laid twenty-six-inch centers.

RAIL.—Rails should be at least 70 pounds to the yard and 30 feet long and laid with joints staggered 15 feet apart. Splices should be six-holed, with full complement of bolts and nut locks. In spiking the rails to the ties the inside spikes should be opposite each other, and the outside spikes opposite, the reason for which is obvious.

CURVES.—In laying out curves the regular curvature should not be carried through the entire length of the curve. If it is done the change from the straight line on to the curve is so abrupt that the

wheels will strike the point of the curve instead of traveling easily on to it. To avoid this, the ends of the curve should be flattened, or "eased off," as trackmen say. This flattening should be short so as not to extend too far into the curve and destroy its regularity.

The proper elevation of curves is important and no set rule can be made for it. It depends principally on the rapidity of the car movement. If elevation can be avoided at all it should be, as it is hard to keep in shape if the road is not solid and the track well ballasted.

Road Crossings.—Where the wagon traffic over the road crossing is heavy it should be planked solid; if the traffic is light it can be made of wooden strips parallel to the rail and across ends and the center filled with stone.

Ballast.—The track should be well ballasted; broken stone or screenings are much preferable to cinder, as they hold the track better and are not so hard on the ties.

Maintenance.—The gnage of the track should always be exact. Any inequalities will effect the riding of the cars to a very appreciable extent. Line and surface should be kept in as good shape as possible. A rough road is not apt to attract passengers besides being anything but a credit to the management. The road bed should be kept as clean and neat as finances will permit, and the ditches lined up and free from dirt and weeds. The patrons of a road notice many things which some managements overlook, and a road which attracts attention on account of its smoothness and clean appearance has done much that will encourage travel. In the fall the track should have a thorough lining and surfacing in preparation for winter, especially if it is laid in soft ground. If well ballasted it will not be easily affected by the frost, but if it is not, the cold weather will heave it. The only resort then is to shim up the worst places, and wait until the frost is out of the ground. As soon as the weather opens in the spring, extra trackmen should be put on so as to go over the track in a short time; putting in ties where needed, and giving it a thorough fixing up. After this has been done, the regular force should be able to keep it in first-class shape. Three good men can take care of eight miles of track if it is well laid and ballasted.

Before concluding I wish to call your attention to one thing and that is the proper education of your track foreman. Most superintendents pay little or no attention to the methods employed by their trackmen—they only look for results, and if the result is not satisfactory off goes the trackman's head. Conductors and motormen get the benefit of instructions and so should the trackmen. If the men go over a piece of track and it shows no good result their method of ramming, lining, etc., should be looked into before they are condemned. The trouble may lie elsewhere than in the men. Make your men feel that you are interested in their work, that the work is important and that your mission in life is not to jump on them for things they cannot better, and which you do not show them how to better.

LONG DISTANCE AND HEAVY DUTY ELECTRIC RAILWAYS.

Paper Read Before the Pennsylvania Street Railway Association, September 3, by F. W. Darlington.

This subject may be treated at length from two standpoints, the scientific and commercial, either of which to fully discuss would take up more of your time than I feel justified in doing to-day. I will, therefore, occupy you with glances at both sides of the subject, and call your attention to a few of the important thoughts which I deem pertinent to the times, and of supreme interest to all of you who have roads, suburban, interurban and local, to operate and earn dividends therefrom.

There are already in operation many long distance and also some heavy duty electric railways. The majority of these roads do not fairly come within the scope of this paper, for the reason that they have been built as ordinary trolley roads, with roadbeds insecure and unsafe for high speeds. Our subject refers more properly to roads designed to supplant the steam locomotive both for high speed and heavy freight service.

Some few roads have been built which, though not longer than ten or twenty miles, and consequently not long distance roads, yet are convincing proofs of the ability of the electric motor to perform all work demanded of a steam locomotive. These roads have been installed as experiments and by such corporations as the P. R. R. Co., the N. Y., N. H. & H. R. R. Co., and the B. & O. R. R., and with all the success obtained on these the corporations named are yet unconvinced of the advisability of adopting electricity for their entire systems.

The incredulity is not prejudice in favor of steam, as asserted by many writers, for the men at the helm of affairs in these big companies are too broadminded and too alert for the companies' interests to be blinded by prejudice. Their slowness to be convinced is to be attributed more to the lack of proofs of its desirability from their point of view, as handlers of heavy traffic.

The first electric railway motors were designed to supplant horses in street railway work. And from this point the advances have been made by meeting and overcoming difficulties long since met and overcome by the steam railroad man.

For it must not be forgotten that the first railroads were horse roads, and when the steam locomotive was put upon them it had to undergo changes, and its use necessitated alterations in the construction of cars and roadbed.

Does it not seem absurd, therefore, to ask steam railroad men to go backward some fifty years and begin over again, for this was the proposition advanced when they were asked to take hold of the subject in the shape it was only two years ago. It is to the method in which the question has been taken hold of by these men that is due the credit of the advanced position the electric motor holds to-day as a rival of the steam locomotive.

So far as the motor alone is concerned there is no longer a possibility of doubting its ability to do the work of a steam locomotive. It can make a car move as fast and faster. It can pull heavier loads by reason of its power being supplied from some exterior source and hence, having practically an unlimited supply, it can climb steeper grades, and it can reduce expenses. Can more than this be asked of it? I think not.

There remains, however, the question of how to transmit the electricity from the stationary engine and boiler plant to the motor on the car. It has been proved beyond doubt that power can be developed in a stationary power-house at a very large saving of coal and other expenses. Of this fact, and that of the ability of the motor to do all the work demanded of it, there is no difficulty in convincing the steam railroad man. But the inability to prove beyond a doubt that the power can be transmitted satisfactorily for long distance is where the failure lies. This is the one point to be worked out and demonstrated before there will be any general adoption of electricity for long distance roads.

There have been many theories advanced and systems proposed, but as yet but an insignificant number of them have been tried, and they only for short distances.

This question must be solved, and all are looking for the solution, in the alternating current system, but whether this or the direct current system is the solution, is still an open question. There are many who think that the only solution is to come from the alternating current, but in the meantime devices are being added to the art that tend to making the direct current more and more of a success in overcoming long distances. Ultimately, no doubt the ideal alternating current system will be at our service, and by the ideal system I mean that one requiring no actual current-carrying contact between the car and the track; in other words some modification of the induction system. But unless this system is developed and made practical before long it will find the older direct current system so well established and so generally in use that it will be difficult to have it adopted except for new roads.

It must be borne in mind that the depression in the financial situation for the last two years is the reason more than any other that steam roads have not been changed to electricity, so that with the country enjoying even moderate prosperity there is sure to be extensive and widespread experiment in this line, and it is not too much to say that in five years there will be such a change in minds of financial and railroad men that there will be a rush to obtain the benefits of the reduced operating expenses to be derived from using electricity. This assertion may seem wild and romantic, but any close observer of the thought and the attention given this subject by the large steam railroad companies, will bear out this statement. The statement does not mean that people will go wild over it, for that period in electric railroad history is past and all should be thankful for it. But it does mean that with money available there will be a general start to equip both long and short roads, and the start once made, the work will be pushed, on increasing numbers of roads, which taken all together will constitute the equivalent of a rush.

The same conclusion is reached when it is remembered that the very conservatism of the steam railroad man, of which so much is said in electric circles, will keep him and has kept him from adopting electricity until that same wonderful power shall have demonstrated its ability to do, and do continuously and satisfactorily, all of his work. This demonstration once having been made, and made in the manner those engineers abreast of the times are confident it will and can be made, that is, to prove beyond all possibility of doubting that money can be saved by discarding the steam locomotive for the electric motor, even when such change requires an enormous outlay of new money, then the conservatism must give way to progress and all will be only too anxious to obtain the advantages to be gained.

What has all this to do with suburban and interurban railways as existing to-day? It is a question of vital interest to all those companies operating such roads. For all managers of local roads, whether they be running between towns or are purely local, if they in any measure parallel steam roads, have this fact staring them in the face, that it is only a matter of time and a short time at that before they will have real competition from those same roads, whose territory they so profitably invaded.

They (the local managers) must know that a trunk line supplied with such power as it will require, can be tapped at any point to run a local road or branch line, at but small expense in comparison with that required to operate the local road independently. Then, too let him think what it would mean to him to have a competing line with frequent service, and maintaining high speed on safe road beds.

All these things must be faced sooner or later, and while the above statement may seem alarming, yet it need not be so to the wise manager, who will keep his eyes open and prepare himself in the time at his disposal.

Just what this preparation consists of will have to be worked out by each individual. But it is very safe to say here that one of the most important points he will have to consider, will be that of expenses; he will have to reduce coal bills and bills all along the line. He will also have to guard well his policy of management, but as this point is not included in the scope of this paper it will not be elaborated upon, though there are interesting points for discussion which might be brought out.

The question of expenses is mentioned here for the reason it is safe to say that at least seventy-five per cent of the electric railroads in this state are paying too much for their power. By power is meant available power at the car axle. Some develop power cheaply and waste it on the line; others may develop it at high cost while they distribute it, and utilize it economically; while others again may be losing, at only the motor end of the line.

Then, again, some roads may be so full of heavy grades they may be eating up their earnings in maintaining them.

At any rate, the fact remains that few, if any, are paying dividends, and many are in the hands of receivers, when it would be possible to make all pay, excepting, of course, those wild cat schemes floated to fleece people of their good dollars. The sooner these latter are weeded out, or reorganized on a more reasonable basis, the better it it will be for all. There is one thing very sure, and that is that there is no excuse for any electric road, not saddled with interest for imaginary money spent to spend more in expenses (which includes salaries and interest) than its receipts amount to.

The reports obtained from many roads vary to such an extent that it is impossible to assume any given amount at any given place without knowing the conditions existing there.

It might be stated here that a car mile should be produced for a given number of cents, based on these reports, and nothing of real value towards the solution of the question at hand would be gained, for all the calculations and reports made on power questions have been based on results at the power house, or at the switch board, which is only a part of the proof, for they take no account of interest or line losses and motor repairs, which are all necessary for determining definitely as to the cost of a car mile. For of what use is it to calculate your power in kilowatt hours at the power house, and in that calculation consider only your coal, water, supplies and labor, when you omit all account of your interest except as a lump sum. And of what use is it to define your motor repairs and car expenses in car miles, when here, too, you lose sight of interest.

How can you tell how these several items compare unless you base them all on the same unit. This unit should be in car miles, for expenses of every description, and when they are so calculated you have the true basis, for all expenses are incurred for the one object of propelling cars a certain number of miles.

By this means the manager can determine the value of each department under him, and when economies must be undertaken he knows exactly where to turn to accomplish them.

It would also enable the manager to at all times tell in what shape his engineering force was, whether his engineer was competent, and if he was attending to his duty. Again, he would be able to calculate to a nicety what each improvement would cost, and in what way it would benefit him. His receipts being readily reduced to earnings per car mile would enable him at a glance to determine the prospects of his road.

All these points are of importance to know in order that the manager may keep himself posted as to the working of his system as a whole. The managers who do this are not many, and why they do not is to be attributed to the fact that the necessity for so doing has not been made clear to them. There are many who keep elaborate books with the expenses divided up into different classes, when they are principally only of value to keep the book-keeper busy, and really do not enlighten any one as to the scientific conditions of the road.

This association can broaden its scope of usefulness to its members and at the same time advance the interests of all electric roads by appointing a committee to gather data from its members and tabulating them, by numbers, not names, for it is not wise or of value to publish the names of roads making reports, and it is not necessary.

This committee can then digest the reports and each year draw impersonal conclusions for the benefit of all. This same method is employed by the National Electric Light Association and though it has been in use only a few years it has proved a great benefit to those desiring to avail themselves of its lessons.

It will be well to return once more to the subject of grades and curves to say that both are expensive luxuries, not only because they cost more to maintain than straight level roads, but also because they are more expensive to operate, and are the cause of greater original investment. And as we have seen in the case of the Columbia & Donegal, they may be the source of many and expensive damage suits.

Suppose A and B each build a road from X to Y, and A builds his with long radius curves and as little grade as possible, say a maximum of 1 per cent, while B does not appreciate the gain in this method and so has some heavy curves and some heavy grades. What will be the result? It is well known that it takes more power to climb the hill than to run on a level, but you say that the motor on the level averages the same power for the whole round trip. That is true, but here is the point, for A can do his work with smaller motors, which will be running more continuously and will be calling for a more even supply of power from the power house, which in itself will be a source of economy both at the motor and at the power house. B will be drawing power intermittently and creeping up the hills to rush down the other side at great risk. B's motors will cost more than A's, because of their larger size, and B's engines and generators will have to be larger. His feeders must be larger. Just what those several items will amount to can be determined, and I maintain that they should be calculated before a road is built, and the economical grades figured out.

When it comes to competing with the steam roads, as they exist to-day, the electric road attracts local travel because of its cars being run at frequent and regular intervals, whereas a traveler must consult a time table before taking a train on a steam road. Again, in summer time the electric road offers the additional inducement of a cool, clean ride, while on the steam road, if one opens the window for fresh air, he is treated to a shower of coal-dirt, cinders and dust, to such an extent that when the journey is over the passenger is more uncomfortable than when he started.

All this is destined to change, however, for the undoubted tendency of steam railroad travel, between large cities, is to move trains at more regular and frequent intervals. This is indicated by time table records for some years back. The clean travel will come when electricity is adopted.

The question of the real meaning of the difference in number of trains running on competing roads is shown very clearly on the roads operating between Philadelphia and New York. Of these two roads, the Pennsylvania gives by far the most trains, and the result is that it gets the most of the travel. This is natural, for the reason that a man bound to New York from Philadelphia, will buy his ticket by the route that will give him the greatest choice of times to start on his return. Carrying the comparison farther, suppose an electric road was built between the two cities, and built so that it could land pas-

sengers in New York as quickly as the steam roads, and a train service every fifteen minutes or a half hour be maintained, there is no doubt that it would get the bulk of the travel.

As for speed, if a speed of seventy-two miles an hour can be obtained on a road seven miles long, and maintained for three miles, as has been done on the electric road installed by the P. R. R., in New Jersey, it certainly would be no more difficult to obtain a speed of eighty to ninety miles an hour on such roadbed as possessed by the P. R. R. on its Philadelphia-New York line.

As for the length and weight of train, the same road has demonstrated that it can handle a train of three cars, i. e., motor car and two regular Pennsylvania day coaches as trailers, and fulfill its schedule requirements.

I have observed with interest the fact that the majority of trains leaving the Broad street station, Philadelphia, are composed of a combination car and two or three trailers, and that trains of more than four trailers are not frequent. It therefore seems to indicate that a motor car of sufficient capacity to draw these trailers at the desired speed could be made a standard and do all the work. This might necessitate making two sections of the through trains, but this would prove a benefit to the traveler, especially if the two trains were scheduled to run at different times.

Right here it might be interesting to consider what we are to have in the place of the steam locomotive. It can be demonstrated conclusively that when we discard the steam locomotive the most economical and convenient method will be to put the motor under a baggage or combination car, for if we attempt to follow steam railroad practice, and carry enough weight on an electric locomotive to provide traction for a train, we will have to add useless weight, and one of the chief sources of economy of the electric system over the steam is from the reduction of the weight of the train. The weight can be done away with, because of the fact that the even pull, at a tangent to the circumference of the motor armature, produces an apparently greater possible traction effort per ton of weight, and in addition reduces the tendency of the wheels to slip at starting.

This feature of the electric motor is the one above all others that establishes the fact that it has come to stay, no matter what developments may be made in air, gas, or other motors which have to convert a reciprocating into a rotating motion.

And the fact that an electric motor supplied directly from a central power house, gives to that motor a practically unlimited supply to draw from, puts it far ahead of any motor which carries its supply on its back, whether it be in air tanks, storage batteries, oil reservoirs or coal and water bunkers. Any storage reservoir must be refilled, and this takes time. And all time used in this way is dead loss, and means that the motor cannot make as many miles in a day.

One more point in favor of the electric motors is that where they are equipped with double motors and two controllers, there is no one thing can happen to prevent the motorman from getting his train to its terminus, for with the modern apparatus he can cut out the motor or line giving trouble, and proceed with one motor. To be sure, his speed will be decreased, but still he will be able to move his train, whereas in any of the above cases there are a number of accidents, and trivial ones. that may happen to cause the train to wait for a new motor. Of course, the question of the supply line or feeder system is ignored in this statement, but with the advent of electricity on steam roads will, undoubtedly, come a feeder system practically impossible to interrupt.

The question arises when considering cars for high speed work as to what kind of motor trucks should be used.

The advocates of maximum traction trucks refer to the steam locomotive as their model, but there are some principles in use on the steam roads which we must avoid, and this is one. The steam locomotive is of necessity a maximum traction machine, but it has been demonstrated that a car can be started and propelled with less power when the trucks have a motor on each axle (i. e. four motors on an eight wheeled car) than where equipped with a motor on each pair of axles, (i. e. two motors to an eight wheeled car) and this too when the four motors are of greater weight than the two larger motors.

These so-called maximum traction trucks with one pair of small wheels are lately provided with some kind of device to hold down the small wheels to keep them from jumping the track. This deprives the truck of most of the efficient traction obtained by putting the weight nearer the axle of the larger wheels, so that the results obtained are practically no better than were the light wheels made the same size as those carrying the motor and the weight of the car placed centrally over the truck.

It will be noticed too that a maximum traction truck rides more roughly than a regular truck; this for the reason that the car support is placed more over one axle than the other and thus gets practically the same hammer motion that the motor does and does not get the relief by equalizing and dividing the motion of both axles as found on regular trucks. In this question of trucks, as we approach nearer the practice of steam roads in other respects, we will find it to our advantage to be guided by their experience and not attempt to drag with us the crude ideas heretofore held. It is only just to say here that most builders of trucks have recognized this point since the building of these roads mentioned at the beginning of the paper and have been trying to educate their customers to this belief, and with some measure of success.

In closing, I will remind you that the era of long distance, high speed and heavy duty electric railways is at hand. The first experiments have been made and steam railroad men are awake to the facts. And those of you having roads that must come in competition with them must bear in mind that the steam railroad men will bring to the subject an experience of great value and that there are certain matters in connection with your roads that will bear your closest inspection, such as power house, distributing system, motor repairs, track, grades and trucks. I have only outlined the bearing of these subjects on your work on account of the time at my disposal.

HOW CAN WE PREVENT ACCIDENTS AND INCREASE THE GENERAL EFFICIENCY OF EMPLOYES?

Paper Read Before New York State Street Railway Association, September 8, by W. W. Cole.

There are certain accidents which occur upon the best regulated railroads that can never be averted. They are the results of two agencies—fate and the fool killer. And there are others which occur through defective apparatus, poorly conditioned motormen, or gross carelessness of employes. One of the first and most important requisites to improving the efficiency of the road and preventing accidents is in the selection of employes, and to this end the application blank is an important factor, and such questions should be asked as to generally outline a man's past.

I submit a blank that I have used, and will point out the inferences to be drawn from the more important questions.

The question, Do you own real estate or personal property, is important. As a man who has accumulated property while working for small pay, must necessarily be economical, and appreciate laws governing the protection of property, and is apt to have care for the the property of others.

To what extent are you in debt? I think we will concede that a man who is in debt will not only prove a nuisance to a company, but be apt to take but a short lived interest in his work and become careless. Constant requests are made upon a company to compel a man to back his bills, and a company loses many friends unless such matters are given attention.

Do you use intoxicants, and have you ever been addicted to the use of intoxicants? These questions need no comment.

What are the highest wages you ever received? Now, the best man for a place is the satisfied man who thinks he is doing well. And a man who has commanded higher wages than you pay is sure to believe, sooner or later, that you do not appreciate his real value, and he becomes dissatisfied, and will either take more interest in looking for another place or in airing his troubles before the other men, and he becomes careless in his duties either way.

The other questions are all such as will tend to deliniate a man's stability and character. I believe that all men should be placed under at least two hundred dollars bonds, as it not only has a restraining influence upon the men, but so many business men in order to get rid of a man with little trouble, will give him a first class recommendation, but they will hesitate to go upon his bond unless they know something of his ability, reputation and personal habits. When you employ a man under bonds, you have practically got him registered with his friends approval.

Great care should be taken in the choice of instructors of motormen and conductors, and to the end it is well to keep a book recording all acts of disobedience or carelessness of each employe, and then select as instructor the men having the best record. It has been

my experience that a new man is apt to learn very readily any little tricks of carelessness his instructor may have acquired. After a man has been turned in as competent to run, by his instructor, I think he should pass an examination as to his duties, and upon the rules and regulations of the company. I submit examination papers containing such questions as generally apply to the operation of street railroads.

Such an examination is beneficial in several directions, as it makes a man think about his duties, and he will discuss the questions with other employes and get their ideas, and the men will generally take more interest in their duties, and it also enables them to frame readily into words intelligent answer to questions as to their duties, and the rules and regulations. It is sometimes very important that a man should be able to make proper answers to such questions. I think all motormen should be furnished with a blank report, to be filled out each evening, or after his run, as to the condition of his car; and to report all trouble with brakes or any defects with running gear or apparatus, and place his report on file for the foreman of the shop, who should have an immediate inspection made of car reported. The report should be O. Kd. by the man making such inspection, and then sent to the master mechanic or superintendent. Where verbal reports are made by motormen, the men in the shop are apt to give them careless attention, and when an accident is the result of defective brakes, or an armature runs out from a broken connection run too long, it is difficult to fix the blame upon the individual, as when the motorman makes a verbal report, no man in the shop can be found who heard it. Or when a car has been reported twice for the same trouble, you have a check upon the man who has made the inspection, and he has either been careless, or the motorman is the fault finder, but these are facts for individual inferences.

One of the most important preventives of accidents is a thorough system of shop inspection, and such reports should be made as would show when a car is in shop just what repairs were made and the time and material consumed. If, when a car is in the shop for brake shoes, it is allowed out of shop, and two hours later is again pulled out of service for a split trolley wheel or some loose contact, I should consider that the system of car inspection was faulty, and cars liable to be let out of shop when they were defective, and either the man or the system needed a change. A system of reports in all departments that will form a connected chain, to check the work of the individual, is of benefit when such reports are not complicated, and are always attended to. I do not claim that such a system will make a good man out of poor one, as my experience has been that it is much easier, and the result more satisfactory, to discharge the poor man and get a good one in his place, as the process of educating a careless or incompetent man is too much like the horse that fed on excelsior. When he got used to it and relished it, he died. Accidents are frequently occurring from loss of power when it is most needed. No road, from an economical point of view, should try to run too close on a theoretical consumption of power. This is especially so in the case of small roads operating from five to fifteen cars, and is of special significance where there are grade crossings, as in case a trolley flies off it is apt to be replaced in a hurry, with the power on, and this means a sudden jerk, especially on a jump-over crossing; and where a road is running close to its full power and capacity, and the power goes off, it is very likely to be several minutes before the circuit breakers can be kept in and the car got under motion again.

When it becomes necessary to reverse a car to prevent an accident, it is very liable to pull the circuit breakers out at a most critical moment.

I doubt if a too slow schedule decreases the number of accidents, as I have found that on a diviston where the cars run slow, the public are inclined to take dangerous risks, rushing in front of moving cars, that they will not take where the cars are moving at a brisk rate of speed.

To prevent accidents, and increase the general efficiency of employes, select the employes scientifically and with care; provide a good system for your car inspection, and have a surplus of power.

RAILS FOR STREET RAILROADS.

Paper Read Before the New York State Street Railway Association, by J. Loomis Allen, September 8.

In the construction and equipment of street railroads some particular specifications as to quality and finish of materials to be furnished are generally prepared. This is is done for two reasons: First, to obtain materials of a certain standard and quality, and prohibit makers of cheap material, or poor quality, from submitting bids; and second, to compare on a uniform basis the bids of different manufacturers. I may say that this is true of the construction of the power plant, car houses, repair shops, cars and their equipment, overhead material, and to a certain extent in the construction of the track. We are careful to purchase ties of certain kind, quality and size, spikes of a particular type and size, and to have joints of such a length, thickness and weight; the rails to be of a certain section, weight and height being specified, but as to the character and quality of the metal to be used in the rails and their appurtenances nothing generally is said. In other words, we buy our rails, taking what the rail makers give us so far as quality of material is concerned. I do not condemn the rail makers, or believe that there is any intention on their part to give railroad companies any material other than that which will be of good quality and finish; but when the wear of traffic shows that there are certain defects in the rail, we naturally seek the cause, and if possible the remedy. Some of our 9-inch rails, after a traffic of two years, have shown such signs of wear, considering the length of time they have been laid, that after investigation we have concluded that rails of a harder quality of steel would not have shown the wear of traffic to such an extent.

Rails of hard steel, the analysis of which showed a greater per centage of carbon that the standard specification of rail steel have been advocated by some of the steam railroad systems for some years, and I might add that their use has been a success in every way. The most notable instance of high carbon rails is that of the New York Central Railroad, upon the Hudson River division, near Spuyten Duyvil. These rails have been subject to as heavy traffic as any rails laid on this continent. They have been under traffic for nearly six years and up to this time, I believe none have broken. When these rails were first delivered by the makers, so certain were they that the rails would become broken under traffic, that due warning was given the railroad company by the makers, that they would not be responsible for the damage which would most certainly occur from breakage. It was my good fortune early this year to consult with one of the firms of inspectors of steel in regard to the wearing quality of high carbon rails as compared with that of rails known as standard Bessemer rail steel, and their judgment was that high carbon rails will give from 40 to 60 per cent, greater life than rails of standard Bessemer steel. When steam roads began to ask for steel rails the composition of which called for high carbon an extra price from $2 to $4 per ton was asked by the rail makers, but to-day these rails are obtainable for the same price as those of standard rail steel specifications. In Syracuse this year we are laying rails 60 feet in length, 9 inches in height and the half groove section. Our joint is the ribbed or corrugated twelve bolt, thirty-six inch joint. Our contract with the rail makers calls for rails the composition of which is as follows:

Carbon from .53 to .63 per cent.
Phosphorous not to exceed .095 per cent.
Sulphur not to exceed .07 per cent.
Manganese .80 to 100 per cent.
Silicon .10 to .12 per cent.

We have had five miles of track of this specification, and are in hopes to lay this year twenty miles, and we are expecting great results from these rails. I have noticed that the wear on the head of the rail by car wheels in the course of a month does not make any impression other than brightening the head of the rail, while in rails of standard specification I have seen the traffic of two weeks roll the metal in the head of the rail to the outside of the head to a very perceptible degree. The fact tbat there is a longer life to rails of hard steel will appeal to every railroad man as an economy which cannot be sacrificed.

THE DAILY INSPECTION AND CARE OF CAR EQUIPMENTS.

Paper Read Before New York State Street Railway Association, September 8, by J. B. Cahoon.

In carrying out a system of daily inspection, or any system for the care of car equipments, we have in view a two-fold object.

1st. To prevent break-downs when the car is out on the road, and the consequent annoyance to passengers, as well as the blocking of traffic and the throwing of the cars off their schedule time.

2nd. The reduction to a minimum of the repairs necessary to maintain the equipments in good working order and the prolongation of their life. We have, then, to determine how we can best accomplish these objects and in so doing obtain the best results with the least expense. * * *

In general there are three systems in vogue at the present time, the first being to let the motors take care of themselves until something gives out and then it is replaced and such repairs made as seem necessary at that time. Second, and the one followed by many of the smaller roads, is, when the car comes in at night to have one or more men examine the boxes to see that they are filled with grease, rub off the commutator, and see that the brushes are not too far gone for the next day's use, and if they are to replace them with new ones, examine the trolley wheel and see that that is in good shape, and see that the brakes are repaired properly. Then the car is washed or wiped on the outside and is ready for the next day's run. Following this, whenever a breakdown occurs the car is run over the pit and given a thorough overhauling. The brasses, pinions and gears are examined and replaced if deemed necessary, and the motor is painted if it so requires and put into fair shape, or, in some cases, it is taken down entirely and thoroughly overhauled.

The third system consists of a rigid daily inspection of the motors, trucks and car-bodies, in all their parts, everything being gone over by competent inspectors and the car not allowed to go out if any defects exist. This last system seems to be the only one by which we can hope to get perfectly satisfactory results, but it can be elaborated so that the expense would be more than the gain, though, as a rule, I have not found this to be the case. The system whose adoption I would advocate is that which we have put in practice on our road and suggested to some other roads, which from actual experience has shown itself to be an eminently satisfactory one. This system is as follows: a trip inspection, a daily inspection and a monthly inspection. The trip inspection may be made in one of two ways; if the car runs into the car barns at the end of each trip, it may be gone over by inspectors ready to receive it, who examine the boxes, see that there are no signs of heating, that the grease cups are properly filled, that the armature and fields are all right, and that the brake mechanism is in proper condition. On small roads where cars are not run into the car barns, perhaps, until the end of the day, this inspection can be made by the motorman at the end of each trip, it being a brief one can be made in a couple of minutes, and if anything is out of order the trouble can be remedied on the spot. To this end, as well as to any repairs en route, each car should be provided with a tool bag containing a small ball pein hammer, a 10-inch monkey wrench, pair of 8-inch pliers and 10-inch screw driver.

The daily inspection: When cars are run into the car barns after the day's work is over, two inspectors board each car and go over every part of the car and equipment, removing dust and dirt from around armatures and fields as far as possible with a hand bellows, wiping commutator, removing brushes and seeing that they are in good order and the copper peeled back on them so they will not wear into the copper coating during the next day's run, thus avoiding the squeak which this would cause. Every electrical connection is carefully examined to see that it has not become jarred loose and if any defect exists in any part, it is immediately repaired, if such repair will not involve over ten minute's work; if it does then the car is left over for the machinists to put in order on the following day. The same care is exercised in going carefully over all the nuts, bolts and washers, cotter pins, etc., connected with both motor and truck; brake rods are gone over and brake shoes examined and everything seen to be in proper working conditinn for the morrow. The car is then turned over to the car washer who goes over the outside of the car, cleaning all parts carefully, the inside of the car being swept out by the conductor who brings the car in, and the conductor who takes the car out in the morning cleans the brass work and windows and dusts off the seats and the inside of the car. In this manner we have caught a great many troubles just commencing which cost comparatively little to fix at that stage but which, if allowed to continue, would have entailed quite a serious outlay.

Third, Monthly Inspection: Once a month in rotation each car is run over the pit and motnrs dropped down, taken apart and thoroughly cleaned; gears, pinions and brasses, if they are so far worn that they will not last another month, are replaced. The armatures and fields are carefully cleaned and painted and the commutator turned down if necessary; in fact, the equipment is put into first-class order throughout, so that to all intents and purposes, it is as good as new when again replaced on the car. The car-body and truck receive the same care and attention and are also put into first-class running condition.

We have found by experience that a shoe having sections of harder material cast in it has effected quite a reduction in the cnst of brake shoes, the average life of these shoes being about three and a half times that of the ordinary cast iron shoe, these shoes lasting a little over two months on our road, while the old style cast iron shoe only lasted about eighteen days.

A comparison of figures on our own road of the two different plans of the careful system of inspection and the old way of letting things go until they go to pieces, shows that the saving effected more than equals the total wages of the men employed on inspection, and the machinists employed in the day time repairing the cars. This, however, would not hold true on a large road, probably, but certainly the saving effected would considerably more than offset the wages of the men on inspection alone, and I believe that a system such as outlined above will, if carefully followed out, accomplish the best results with the least expense.

THE USE OF OLD RAILS AS UNDERGROUND CONDUCTORS.

Paper Read Before the New York State Street Railway Association by F. O. Rusling.

While the writer was the superintendent of the Buffalo Railway Company, serious indications of electrolysis of the pipes within a half mile of the power house made it necessary to call in expert advice to put a stop to the trouble. A careful and thorough electrical survey was made of the entire district. This was a long and difficult matter, since there were three systems of natural gas pipes, two of illuminating gas, one of water and two conduit systems.

Although the pipes were already connected to the negative bus bar by large copper cables it was found that these were entirely inadequate and that there were two points where the pipes at heavy load were three to five volts positive to the adjacent rails. One of these points was 1,500 feet north and the other 1,800 feet east of the power house.

The expert calculated that until extensive changes could be made in rail returns, the former point would deliver about 1,000 amperes and the latter about 3,000. To bring this current to the dynamos with but five volts loss would need over $8,000 worth of copper. While hesitating over this large expenditure it occurred to us that there were about 300 tons of old tram rail on hand that might be used for the purpose. These were flat, center bearing rails, originally weighing 56 pounds to the yard, but worn down to 50 pounds or less; they were high in carbon, hard and brittle.

The best scrap price obtainable was $8 per ton delivered. Our expert carefully tested their conductivity with 1,000 to 1,500 amperes, using an instrument reading to one-thousandth of a volt in order to secure accuracy. As the showing was satisfactory he persuaded us to let him try the rails on the 1,500 foot length which would require four rails in parallel to give the desired results. As he guaranteed to bond them so as to make a continuous conductor he was allowed to go ahead. A trench was dug between curb and sidewalk, and a continuous trough of rough lumber put into it. The rails were bolted together in pairs back to back, and arranged so that the end of one rail was at the center of its mate. The bonding was effected by scraping contact spots with a file near the end of each rail and amalgamating them with the Edison solid alloy. A steel washer ¼ inch thick, 1⅝ inches inside diameter and 4 inches outside, was dipped into hot insulating compound and placed against one rail so as to inclose the contact spot. The hole in the washer was then filled with the Edison-Brown plastic alloy, inclosing an amalgamated steel spiral spring. The upper rail was then bolted on and the completed conductor lowered to bottom of trough, resting on one edge so that gravity would maintain the contacts. It will be evident that with this arrangement two of the bonds on any one rail would have to give way before the circuit could be broken. Each bond was made sufficient to transmit 1,500 amperes. When the second set of rails was lowered into place the trough was filled with a hot insulating compound and a cover nailed down. This compound was cheaper and better than asphaltum. It remains viscous even in cold weather and has high insulating qualities. It is a product of petroleum distillation much lighter than asphaltum and costing about $25 a ton.

This four rail conduit was connected up and carried at heavy load 1,100 amperes, 1,500 feet with a loss of but 4 volts. This result was so surprising that our expert suspected his instruments were wrong and sent them back to Weston for recalibration; they were returned, but proved that the measurements were correct. To appreciate the magnificent performance of those old rails and their bonds, I need only say that to give the same result, it would require 3.55 square inches of copper, and 1,500 feet of this would weigh 20,532 pounds, and cost at 12c. per pound, $2,462.83. Our four rail lengths weighed 50 tons, and cost, as scrap, but $400. The resistance of steel as compared with copper is usually considered to be between 7 to 1 and 9 to 1, but this, including 50 bonds in each length, was about 5.63 to 1. The tests proved that the plastic bonds actually did make an "electrically continuous rail," and after a year's service they are still maintaining their conductivity. This is more than can be said of any copper bond ever used. It will be noted that steel like this, even at $30 per ton, would be cheaper than copper as a conductor.

Our expert was then told to go ahead with the 14 rail conduit.

As the steel was so hard and brittle a great deal of time was required to file the contact spots and to bore holes for the bolts to hold them together, so another method was adopted. In the power house is an air compressor for cleaning out armatures and removing dust from the boiler house walls. An iron pipe was connected from the air reservoir to the yard and a single layer of rails, bottom up, was put on each wagon. Each load was carried into the yard and the contact spots were rapidly cleaned with a reciprocating pneumatic tool borrowed from a boiler shop. To avoid drilling the rails, pieces of ¾-inch iron about 24 by 8 inches were placed in the trough every 15 feet. These were bored at the ends for a pair of countersunk ¾-inch bolts and had four contact spots cleaned with an emery wheel. On these were laid the plastic bonds and four rails side by side, with base down. The spaces between the treads were just right for a second layer of three rails bottom side up. Then another set of bonds and an iron plate ¼-inch thick, 20 inches by 8 inches. On these more bonds, other layers of four and three rails and finally a ¾-inch by 24 inches by 8 inches top, bolting all layers together. The sides of the trough were but ½-inch from the rails between clamps so as to save wasting insulating compound, with wider spaces to accommodate the clamps. Rail joints were broken as before.

This construction allowed very rapid and satisfactory work compared with the first. The performance was also satisfactory, as the 14 rails transmitted 3,250 amperes, 1,800 feet with but 4 volts drop; an insulated pilot wire was put down with this conduit and permanently connected with a voltmeter in the power house. The rails used in this conduit weighed about 210 tons, which at $8 would amount to $1,680. It would require 12.48 square inches of copper to equal the 70 square inches of steel. This copper, figured at 1,000 feet by one square inch, weighing 3,854.2 pounds, would weigh 86,580 pounds, and at 12 cents per pound would cost $10,389. The total cost of the rails and bonds for both conduits was about $3,322, as against $12,852 for equivalent copper. The labor to install the copper would, of course, be less, but on the other hand we had the rails in stock, and the only actual outlay was for labor, bonds, lumber, bolts and insulating material. I have not the details of these now at hand; my recollection is that the total expenditure did not exceed $2,500, and that we thus secured results which would otherwise have cost nearly $15,000.

From my experience with copper bonds I should not advise the use of buried rails for conduits if copper is used for connections. Even when new, it is impossible to get the full conductivity of the rail, and the contacts get worse and worse as time passes. The copper, when covered with the damp earth, will oxidize at a rate determined by the composition of the soil and the amount of current transmitted.

But following the lines indicated on our second rail conduit, any road with a lot of old rails on hand can cut down its transmission losses at a slight cost. This subject is well worth careful consideration on the part of railway managers.

The motion of the Sun Printing and Publishing Company, of New York, to have the Rapid Transit act declared unconstitutional and the commission restrained from further action, was on July 28 denied by the appellate division of the Supreme court. Two of the five justices filed dissenting opinions.

Siemens & Halske, of Berlin, have been awarded the contract to construct electric railways in Basle, Switzerland.

Cheltenham, Eng., is negotiating with Thomas Nevins, of Nevins Park, Gorey, Ireland, for the construction of an electric railway.

Pretoria, Transvaal, South Africa, will equip its car line with electricity. A portion of equipment has been purchased. Johann Rissikis president of the Pretoria Street Railway Company.

Cairo's electric railway was inaugurated August 1 by the minister of public works with appropriate ceremonies. A multitude of admiring Egyptians gazed with awe upon the enchanted cars.

Freight haulage over street railway lines is favored by the Manchester, Eng., Chamber of Commerce. Since the completion of the great ship canal the streets near the docks are congested with laden teams. The freight cars will be operated at night when the streets are clear of other traffic.

The Dublin United Tramways Company has been granted the right to install electricity on the Clontarf line. Traffic has greatly increased over the company's new electric lines. On the last bank holiday 105,000 persons were carried as compared with 70,000 a year ago, when operating with horses only.

TROLLEY CAR BIRTH.

The passengers on a crowded street car on the Citizens' Railway of St. Louis were somewhat surprised a short time since by an unusual incident, being the birth of a child to a woman who was returning to her home. She was carried to the residence of a physician and cared for until removed to the hospital. Superintendent Michael Whelan was on the car and his services in caring for the mother and procuring clothing for the infant were so valuable that the people present voted unanimously that its name should be Michael Whelan, the mother concurring.

A 2-year-old girl at St. Louis was saved by a fender from being run over by a car on the Cass Avenue line. The car was running at a good rate of speed, and was unable to stop in time. She was picked up by the fender, and with the exception of a few scratches was unhurt.

NEW YORK STATE MEETING.

Fourteenth Annual Convention Is Held at Binghamton—Big Attendance—Excellent Papers—Fine Banquet and a Good Time Generally.

The fourteenth annual of the Street Railway Association of the state of New York was held in Binghamton, September 8, and was the best state convention ever held. Attendance was large, interest keen, the papers excellent and the banquent elaborate. The reports on timely topics, and discussions which followed, have seldom been equaled in the American Association.

President G. Tracy Rogers, of Binghamton, made an excellent presiding officer, and all the arrangements were well planned and carried out. The president's address was followed by report of executive committee. Secretary and Treasurer Benj. Frick, Brooklyn, reported receipts, $6,997; disbursements, $6,700, and balance on hand, $296. J. H. Stedman, Rochester, read a paper on "Transfers;" C. Loomis Allen, Syracuse, "Rails for Street Railways;" W. W. Cole, Elmira, "How to Prevent Accidents and Increase the General Efficiency of Employes;" H. S. Newton, Syracuse, "Power from the Trolley Circuit;" J. B. Cahoon, "Daily Inspection and Care of Equipments;" H. S. Cooper, Schenectady, "Desirability of Forming a Board of Claim Agents;" F. O. Rusling, Rochester, "Use of Old Rails as Underground Conductors;" Thomas Henning, Buffalo, "Railway Power Stations;" W. J. Clark, Manager Railway Department General Electric Company, "Electrical Development."

Officers were elected as follows:

President, G. Tracy Rogers, Binghamton.
First vice-president, W. Caryl Ely, Niagara Falls.
Second vice-president, John N. Beckley, Rochester.
Executive Committee—H. H. Vreeland, New York; John W. McNamara, Albany; Henry M. Watson, Buffalo; C. L. Rossiter, Brooklyn.
Secretary and treasurer, H. A. Robinson, New York.

The next meeting will be held in Niagara Falls the first Tuesday in September, 1897.

In the afternoon the visitors were given a ride over the Binghamton lines, in special cars, ending with a fine lunch at the company's new casino at its pleasure resort.

The banquet in the evening was a most enjoyable affair, the following being the list of toasts and speakers:

"City of Binghamton," George E. Green, Mayor.
"Our Hosts, The Binghamton Railroad Company," W. W. Cole.
"Our Lady Riders," Joseph M. Johnson.
"Our Pro and Con Friends—the Lawyers," Hon. Edmund O'Connor.
"Our Dearest Foe and Our Warmest Ally the Press," Col. Sam Payne.

THOSE IN ATTENDANCE AT NEW YORK STATE CONVENTION.

"Our Friends Who Keep us Guessing—the Legislature," Hon. C. F. Tupper.
"Children of a Larger Growth the Steam Railroads," C. D. Hammond.

Following is a list of those in attendance:

DELEGATES OF STREET RAILWAY COMPANIES.

Allen, C. Loomis, superintendent track, Syracuse R. T. Ry. Co.
Clark, J. P. E., manager Binghamton R. R. Co.
Cole, W. W., manager West Side R. R. Co., Elmira.
Cooper, H. S., superintendent Schenectady Ry. Co.
Danforth, R. E., superintendent Buffalo, Bellevue & Lancaster Ry. Co., Buffalo.
Deming, P. C., superintendent Buffalo Ry. Co.
Evans, H. C., Nassau Electric R. R. Co., Brooklyn
Frick, Benj., Whitestone and College Point R. R. Co., Whitestone.
Gould, Frank, president Oneonta R. R. Co.
Haven, William E., superintendent Citizens' St. Ry. Co., Fishkill.
Johnson, J. M., secretary Binghamton R. R. Co.
Hallock, F. M., director West Side St. R. R. Co., Elmira.
Hallock, H. H., secretary West Side St. R. R. Co., Elmira.
Lamfield, J. B., vice-president Binghamton R. R. Co.
Maloney, F. J., superintendent Elmira & Horseheads R. R. Co., Elmira.
Moffitt, John H., general manager Syracuse R. T. Ry. Co.
Mooney, F. P., general superintendent Cortlandt & Homer Trac. Co., Cortlandt.
McCormack, Ira, general superintendent Brooklyn Heights R. R. Co.

McKeever, R. T., gen. supt. Fonda, Johnstown & G. R. R. Co., Gloversville.
O'Connor, Edmund, counsel Street Railway Association, Binghamton.
Rehn George T., treasurer Hornellsville Electric R. R Co.
Robinson, H. A., vice-president Metropolitan St Ry. Co., New York.
Rogers, G. Tracy, president Binghamton R R. Co.
Rogers, John B., treasurer Binghamton R. R. Co.
Rossiter, C. L., president Brooklyn Heights R. R. Co.
Rusling, F. O., general manager Rochester Ry. Co.
Seixas, E. F., general manager Amsterdam St. R. R. Co
Sliney, George H., purchasing agent Nassau Electric R. R. Co., Brooklyn.
Stedman, J. H., Rochester & Irondequoit Ry. Co., Rochester.
Story, C. B., superintendent Hoosick Ry. Co, Hoosick Falls.
Van Etten, Amos, counsel Kingston City Ry. Co.
Williams, Timothy S., treasurer Brooklyn Heights R R. Co.
Youngiove, James L., Fonda, Johnstown & G. R. R. Co., Johnstown.

OTHER ATTENDANTS

Allison, Giles S., St Louis Register Co, New York.
Boran, T., General Electric Co, New York.
Billings, William R., Taunton Locomotive Mfg. Co., Taunton.
Boyd, J. Coleman, New Haven Register Co., New Haven.
Brady, Paul T., Westinghouse Elec. & Mfg. Co., Syracuse.
Brown, Harold P., Plastic Rail Bond, New York.
Bruckel, F. W., Johnson Co., New York.
Blake, H W., Street Railway Journal, New York.
Calhoun, W. S., Brussels Tapestry Co., New York,
Clark, W. J., General Electric Co, New York.
Cockey, Marston R., John A. Roeblings Sons Co., New York.
Cockroft, C A, Chenango Engineering Co., Binghamton.
Crossman, T. E., stenographer, Brooklyn.
Crowell, H. H., General Electric Co., Syracuse.
Davis, Isaac N, Life Guard, Binghamton.
Doolittle, A. B., flue cleaner, Binghamton.
Dunning, E. A., representing A. O. Schoonmaker, Mica, New York.
Dutton, W. A., Dorner & Dutton, Cleveland.
Evans, H. C, Johnson Co., New York.
Field, Arthur W., Eastern Agt. Peckham Motor Truck & Wheel Co., Boston.
Fitch, C. K., Erie Railroad Co., New York.
Flanders, C. Y., Morris, Tasker & Co., Philadelphia.
Frenyear, T. C., Westinghouse Elec. & Mfg. Co., Buffalo.
Granger, J. A., New York Car Wheel Works, New York.
Hague, Chas. E., Edgemoor Iron Works, Wilmington, Del
Hawes, W. C., secretary Stow Mfg. Co., Binghamton.
Hammond, C. R., Delaware & Hudson Canal Co., Albany.
Haskell, G. M., J. G. Brill Co, Philadelphia.
Hotchkiss, C. F., president Stow Mfg. Co., Binghamton.
Hurley, Thomas A., Holmes, Booth & Haydens, New York.
Jackson, Newton, Electric Mutual Casualty Insurance Assn., Scranton.
Johnson, F. O., Stow Mfg. Co, Binghamton.
Jones, J. G., Hazelton Boiler Co., Carthage.
Kenfield, Fred S., STREET RAILWAY REVIEW, Chicago.
Lawless, E. J, American Car Co., St Louis.
Mailloux, H. Jules, The Car, Philadelphia.
Maguire, J. F., Erie Railroad Co, Elmira.
Meek, S. Glenn, H. W. Johns Co., New York.
Mercur, R. J, N. Y. Car Wheel Works, Buffalo.
Miner, Willard M., Bi-Metallic Electric Transmission Co., New York.
Nicholson, S. L., Cutter Elec. Mfg. Co., Philadelphia.
Packer, F., Drummond Detective Agency, New York
Parker, L. H., General Electric Co, Schenectady.
Pratt, Mason D., Pennsylvania Steel Co., Steelton.
Pugh, John S., John Stephenson Co., New York.
Ransom, H. N., Consolidated Car Heating Co., Albany,
Russell, F. D., Rochester Car Wheel Works, Rochester.
Seeley, John A., Belden & Seeley, New York.
Sjoberg, Car Wood Work, New York.
Sweet, D. C., wheel grinders, Springfield.
Taylor, John, Taylor Electric Truck Co., Troy,
Taylor, W. H., Street Railway Journal, New York.
Zinn, D. E., Ramsey Signal System Allegheny.
Vosburgh, A. C, New Process Raw Hide Co., Syracuse.
Wallace, J. E., Smith & Wallace, Boston.
Washburne, W. A., Cambria Iron Co., New York.
Wharton, W. W., Mutual Casualty Insurance Ass'n., Scranton.
Woodworth, A. C., Consolidated Car Fender Co., Providence.
Woodworth, A. C., Jr., Consolidated Car Fender Co., Providence.

President Rogers' address was as follows:

GENTLEMEN OF THE CONVENTION:

In behalf of the Binghamton Railroad Company, and as a citizen of this, the Parlor City of the State of New York, I extend to you a most cordial welcome.

The Street Railway Association of the State of New York, I am proud to say, ranks first in importance among all the State Street Railway Associations. Nearly all the principal roads in the State are active and interested members, all working for the greatest good to the greatest number. We have the metropolis of the United States, as well as the small villages to care for, and there is but one sentiment, and that is, mutual assistance and protection.

We can point with pride to the work of our association as well as to the standing of the street railroads of our state. Each year tends towards better building and more conservative management in all departments. While the roads in this state have made a decided gain in gross receipts during the past year, we more than ever realize, not only the importance, but the necessity of the most prudent and careful management.

The past year has not been marked by any startling or radical changes in the street railway world. The same tendency toward better building seems to prevail. The extension of roads into the country, the construction and adoption of high speed motors and larger cars, and the rolling and laying of sixty foot rails, have all been tried successfully. The exercise of greater care in providing for the return current is to be observed, but, perhaps, the most important advance is in the universal adoption by large plants of the direct connected generators: indeed, I am informed that over eighty per cent of the generators produced during the past year are of this character.

G. TRACY ROGERS.

However, it still remains a question whether the adoption of direct connected units is true economy in smaller cities and towns where the total demand for power is not great, real estate comparatively cheap and the load variable, necessitating the use of several small units. The relative cost is greater than where the sizes are larger. The advantage of connecting several small units to shafting to avoid an entire shut down is also to be considered. In short, each type of generator is adapted to certain conditions to be met.

The experience of the past year has demonstrated that where very long lines of street railways are to be operated, power can be economically delivered twenty miles or more from the power station by the three phase system and the use of high tension current. The experience of the year has also demonstrated that with direct current machines longer lines than we had previously supposed can, by the addition of boosters, be operated economically. Some fifteen or twenty different roads in the United States are now using this system. All of these improvements are enlarging our field of business and opening the sole available field of connecting suburban towns.

The adoption of the third rail by the N. Y. N. H. & H. R. R. Company and by the elevated roads in Chicago, with the success which has attended it, although not a new idea, may indicate a step in advance.

The new subway in Boston is rapidly approaching completion. It is unique in many respects. The cars on the overhead trolley system will leave the surface, and by a rapidly descending grade enter a double track subway with underground stations at frequent intervals. The subway will relieve the streets in the congested sections of the city very considerably. A unique feature of the system will be the terminal arrangements at points where the different routes end. Instead of returning upon the same track or by means of a crossover passing to the other track, the car will continue forward past an "island" station, and by a descending grade and a loop with an ascending grade return to the former level and the opposite track. High speed can be maintained in sections of the city where it would otherwise be impossible.

The great city of New York, which should be at the head and front in all matters of progress and improvement, is forced to confess that she is far behind all other cities of the state in modern transportation facilities. The fact that she occupies this out-of-date position in respect to the construction of surface roads is not a reflection on the enterprise of the railroads of that city, but upon the municipality, because of the restrictions put upon the railroad people by the authorities.

New York is debarred from the up-to-date overhead trolley construction that prevails in all neighboring cities and country towns. It is forced to content itself with the old horse-car method of transportation, together with a limited mechanical system, which many smaller cities have abandoned for the trolley. While the unpopular elevated assists largely in serving the demands of three or four million people, still the principal city of the United States should have the most approved facilities and means of rapid transit.

The Empire City has declared absolutely that she will have none of the trolley on her thoroughfares, and on account of this prejudice the existing conditions cannot be improved until something as good or better than the present overhead trolley has been discovered. The railroad people are forced to experiment with what has heretofore been considered impracticable, with the hope of developing something that will take the place of the horse, and be a good and acceptable substitute for the very efficient service of the overhead trolley.

The remarkable growth of traffic in New York City during the past thirty years, and the necessity of the most improved facilities for transportation, and the best possible method of traction, is plainly illustrated in the following table:

		TOTAL TRAFFIC.
In 1865, 11 street car lines carried.....		79,618,818
In 1875, 13 street car lines carried.....		140,588,793
(With the elevated's first year, 3rd and 8th avenues.....	644,025)	
In 1878, 15 street car lines carried.....		169,105,739
(With the elevated open on 6th and 2nd avenues.....	9,236,670)	
In 1883, 15 street car lines carried.....		266,164,236
(With the elevated carrying.....	92,124,943)	
In 1893, 16 street car lines carried.....		453,658,964
(With the elevated carrying.....	219,621,017)	

A number of interurban and suburban trolley roads have been completed and operated during the past year with almost phenomenal success. A well-built road of this character, starting from a fair-sized city, owned and operated by the city company and tributary to its system, connecting one or more thrifty villages with the city, to my mind will pay. Such has been our experience with the Binghamton, Lestershire & Union Railroad. In this case we own most of the right of way, obtained where necessary by proceedings under the laws as amended in 1895. We generally found the farmer along the route welcomed the trolley road since it served him personally, which a steam road would not, and he was very reasonable in his demands. I would also suggest that such a road cannot be too well built or graded. The first cost is staggering, but in the end it will pay.

The question as to the profit from carrying freight, express and the U. S. mails has been fully discussed. There is no doubt but that ultimately this traffic will be profitable and we are ass'sting in building up our territory in a most substantial manner. I consider carrying the mail less profitable than the freight and express business, but it has many obvious advantages to the road as well as the convenience to our patrons.

Never in the history of this Association have there been so many questions of vital importance confronting us. I will but call your attention to a few and I trust that in case some of you do not agree with me or my views, you will pardon my alluding to the present political situation. In my opinion it is bad policy for the railroads to enter the political field, but we should as far as possible, see that good clean men are elected to make the laws under which we act. The street railways of this country can take but one position on the money question which is now forced upon us. Our bonds, both principal and interest, are almost uniformly payable in gold, and should this country adopt the silver basis we must pay gold and accept the depreciated currency of the country for our fares, which are fixed and cannot be advanced. We cannot place the situation before our employes any too forcibly or plainly, as they will be the greatest sufferers. The situation is a grave one for all railroad interests and demands our careful consideration.

From the railroad commissioner's report of 1895, I find that it has cost all roads of the state 91½ per cent of their gross receipts for operating expenses, interest, taxes and rentals. Ninety one and one half per cent of the five cent fare we receive is four cents, five and three quarter mills, leaving but four and one quarter mills profit for dividends. This fact should put at rest all question of cheaper fares. In New York City, one can legitimately ride twelve and one half miles for five cents, transportation $.004 per mile; in Brooklyn eighteen miles, transportation $.0028 per mile and in Buffalo thirteen and three quarter miles, transportation $.0037 per mile. The street railways in the state of New York to-day afford the cheapest transportation in the world.

No doubt we have all laid too many miles of track, from a dividend paying standpoint, but not for the convenience of our patrons. We may not be considered philanthropic, but we are, when prosperous and building for the future, more generous and far sighted in our treatment of the public than would be warranted were there any further concessions to be demanded.

Dividends are being withheld and turned back into the property. There is no business which demands closer attention and more careful management than the street railroad business. We are a target for the public and the press, while in fact, we are their servants. The street car is the poor man's coach, and the better the service the greater the business, and the more favor we may expect from the city government. The business of a street railway is done on a very close margin and in our large cities we find that in order to do more than pay operating expenses and interest, the management must force the business in many ways. In fact we must educate people to ride, by erecting pleasure resorts, etc. In the effort to pay dividends the street railway manager endeavors to increase gross receipts by attracting passengers, not by reducing operating expenses in such a manner as to repel them. It is a question for your consideration gentlemen, how far a street railway company should go in providing for the comfort of its patrons. In many cases, however, we must await the increase in population and the extension of our city area before the period of large dividends comes to us.

The question of fenders is still confronting us and is a most perplexing problem. More patents for street car fenders have been granted during the past few years than for any other class of inventions. It is stated upon good authority that there are upwards of four thousand on the market, and I dare not estimate the number left in the brain of would-be inventors. It is the opinion of many street railway men that the fender is a menace.

Your executive committee were anxious that an act be passed regarding the use of fenders. There were a number introduced. The one introduced by the Chairman of the Assembly Railroad Committee seemed to meet the approval of the public and was heartly endorsed by your executive committee, but for some reason it never became a law. The street railways are anxious that the state share some of the responsibility. I stated last year and still believe that the best fender for the front end of the car is a clear headed motorman.

Now that the limit for indemnity in this state is removed by the Constitutional Amendment, the question of accidents and accident insurance is one of the most important questions of the day. A street railroad company before the average jury is at a great disadvantage. It is a grave question whether it is wiser to take our own chances without insurance, or to pay the high premiums asked by the indemnity companies and still take chances of being indemnified. If some of the principles of state insurance now in operation in Germany could be incorporated in our American practice, or if perhaps some system of mutual insurance could be adopted, railway companies might be relieved from the tremendous injustice frequently done by juries. It is gratifying to state in this connection that during the past year there has been a decided decrease in the number of accidents.

The spirit of emulation in employes can be cultivated to good advantage and will materially better the service and be of benefit to the company. The manager of our road has adopted a system of keeping the records of the performance of each man in his department, also a daily average for purpose of comparison. The plan has been very successful with us and I think a benefit to the employes. Some plan of this character, I am satisfied, is being followed by nearly all roads. Too much pains cannot be taken to educate our help in all departments. The interest taken in them is many times reciprocated in their efforts for our interests and their own advancement.

No question is of greater importance to the street railway companies and the manufacturers of equipment and electrical apparatus than that of having some definite standard as regards the rating of motors and generators and as regards the features involved in application of the same, such as diameter of car axles, wheels, height of car bodies from track, etc. The steam roads of the country have done much towards fixing standards and rendering interchangeable material and parts. This gives to the railways, aside from all other advantages, a cheapened cost to the manufacturer and consequently to the road, due to the reduction of the number of different parts and sizes. These and many other points which will suggest themselves apply even more forcibly to street railroads then to steam railroads.

The pleasant relations now existing between the steam railroad and the street railway companies of this state are a subject for congratulation, although in many instances the interests are conflicting. In many states it is almost a case of the Kilkenny cats. It is a pleasure

to be able to state that the existing situation in New York has been largely brought about by the executive committee of our association. A proposition to consolidate the two organizations into one association is now under consideration.

The history of railways in this country shows the progressiveness of the Anglo-Saxon race better perhaps than anything else that history records, and yet there is room for the ever busy inventor and the diligent manager. The inventor has been busy during the past year with compressed air and the production of cheaper electrical power. In my opinion the discovery of Dr W. W. Jacques, whereby he produces electricity direct from coal gives promise of great things. Whether Dr. Jacques will succeed in working it out to a successful finish and a completed practical piece of apparatus for producing the current directly from coal is not yet assured. It is, of course, an impossibility to estimate the advantages of such a system if practically developed. The refuse culm piles of the coal producing sections will be brought into use, and the great loss between the coal units and the current at the switch board will be almost entirely eliminated. Of course it is impossible to determine what the ultimate efficiency of the method will be, but it would have to be very low not to be far more economical than the multi-conversion method now in vogue. An ordinary steam engine does not realize more than 6 or 7 per cent of the total amount of power resident in the coal. The remaining 90 or more per cent is absolutely lost. The loss of mechanical power in the engine when belted to the generator, and the loss through conversion into electrical energy by the dynamo, all combine to make the existing system entirely incomparable with the Jacques system if practically developed. I understand that the Jacques method has been investigated by some of the most careful and competent electrical engineers and scientific men, and on the strength of this a company has been formed with ample capital and composed of men of acknowledged financial and business ability. This looks as if the result of the investigation had convinced them that the foundation was there, as stated above, for the practical development of a great system.

During the past year I have called a number of meetings of the association and of the executive committee and have addressed you through the mails. I wish now to thank you most heartily for your prompt response as the occasion required, for the kindly treatment I have received at your hands and for the confidence you have accorded me in every respect.

Wishing my successor the same hearty co-operation and courteous treatment which I have received during the past two years from the members of the association, I thank you for your kind attention and wish you all prosperity for the coming year.

EXECUTIVE COMMITTEE REPORT.

The report of the executive committee was then presented, from which the following is taken:

LEGISLATION.

Never before in the history of the Association has there been such a large number of measures introduced in both branches of the legislature in a single year, pertaining to the organization, operation and maintenance of street railroads. This result is in accordance with the prophecy embodied in the executive committee's report submitted at the last annual meeting, viz., "With increased number of representatives comprising the next session of the legislature it is consistent to anticipate the presentation of an increased number of bills affecting our interests." This has been more than fulfilled by the introduction during the last session of the legislature of eighty-seven assembly and fifty-three senate bills, making a total of one hundred and forty bills and amendments directly affecting street railroad interests. Heretofore street railroad measures introduced in both branches of the legislature to a large extent were so unimportant and even ridiculous in their text and construction that they were not worthy of even passing notice. However, the majority of bills introduced the past year were important in character, and would, had they become laws, have seriously affected the physical and financial operation of street railroads throughout the state.

SPECIAL WORK.

We most heartily approve of the zeal, fidelity and persistency displayed by the officers of this association in advancing and protecting mutual business interests throughout the year. We also heartily commend the counsel of the association, Hon. Edmund O'Connor, and hereby express our appreciation of his activity, and effective work in our behalf. We believe that his forcible arguments and wise counsel have proven an important factor in the advancement of our interests. We also desire to commend the general interest displayed by the individual members of this association and their liberal attendance at all hearings and special meetings.

OUR FUTURE.

That this association has a work of importance and usefulness ahead, none who are familiar with its record for the past few years will gainsay. The benefits and advantages arising from entrusting our important general business interests into the hands of a well organized association, equipped to properly care for and foster the same, is apparent. Questions of great moment and emergencies of a grave character are liable to arise at any time, which individual companies might experience great difficulty in confronting, whereas as an association, the same issues and emergencies might be easily encountered and overcome. A business of the magnitude and extent of the street railroad interests of the state of New York requires careful attention and the combined deliberation of the representative men from the various companies.

In view of these facts we urge a membership comprising every company in the state. Our board of officers should consist of men who will devote proper time and attention to the administration of the affairs of the association, and every individual member should take a live, active interest in the association and its work.

While the finances of the association are in good condition at present, and we are entirely free from debt, we believe that a sufficient sum in keeping with the importance of the organization should be kept in the treasury at all times to defray necessary expenses and to meet any emergencies that may arise. As the street railroad business of the state increases the necessity and benefits of the association and its work will become more apparent.

THE EXECUTIVE COMMITTEE.

We recommend that the executive committee be given sufficient latitude in administering to the affairs of the association to enable the committee to act quickly and decisively upon all important questions that may arise requiring immediate attention, as a meeting of the executive can be called with much less trouble and delay than a meeting of the association.

THE ANNUAL CONVENTION.

An important, if not the paramount factor in the usefulness of the association is the annual convention, affording representatives of the various street railroad companies of the state an opportunity of forming pleasant acquaintance with each other, discussing important practical questions of organization, operation and maintenance, and a beneficial interchange of ideas.

We are pleased to note an increased attendance each succeeding year, and suggest that as far as practicable every company send one or more representatives, including the practical man, to the annual convention.

In view of the increased attendance and volume of business to be transacted, we recommend that two days should be devoted to the convention, in order that one entire day may be given up to the business sessions and the second day to the entertainment of visiting delegates and guests.

We are confident that the extra day suggested would prove beneficial and profitable and serve to stimulate and enhance a general interest in the Street Railway Association of the State of New York.

CONVENTION EXHIBITS.

The railway department of the Brussels Tapestry Company, New York, presented a fine line of samples.

Mr. Boyd, of the New Haven Register Company, exhibited some handsome specimens of his company's work.

A. O. Schoonmaker, New York, had a nice line of his mica segments.

The Ramsey Signal Company, Allegheny, had an exhibit, and called attention to its signal system installed on one of the Binghamton lines.

The H. W. Johns Manufacturing Company had an interesting display of the "H. W. J." electric car heater.

Giles S. Allison, New York, agent of the St. Louis Register Company, had several registers in his attractive exhibit.

The Stow Manufacturing Company, Binghamton, had one of its flexible shaft track drills running, which received much attention.

D. C. Sweet, Springfield, Mass., exhibited one of his new wheel grinders, for grinding wheels without removal from the car

THE HUNT AIR BRAKE.

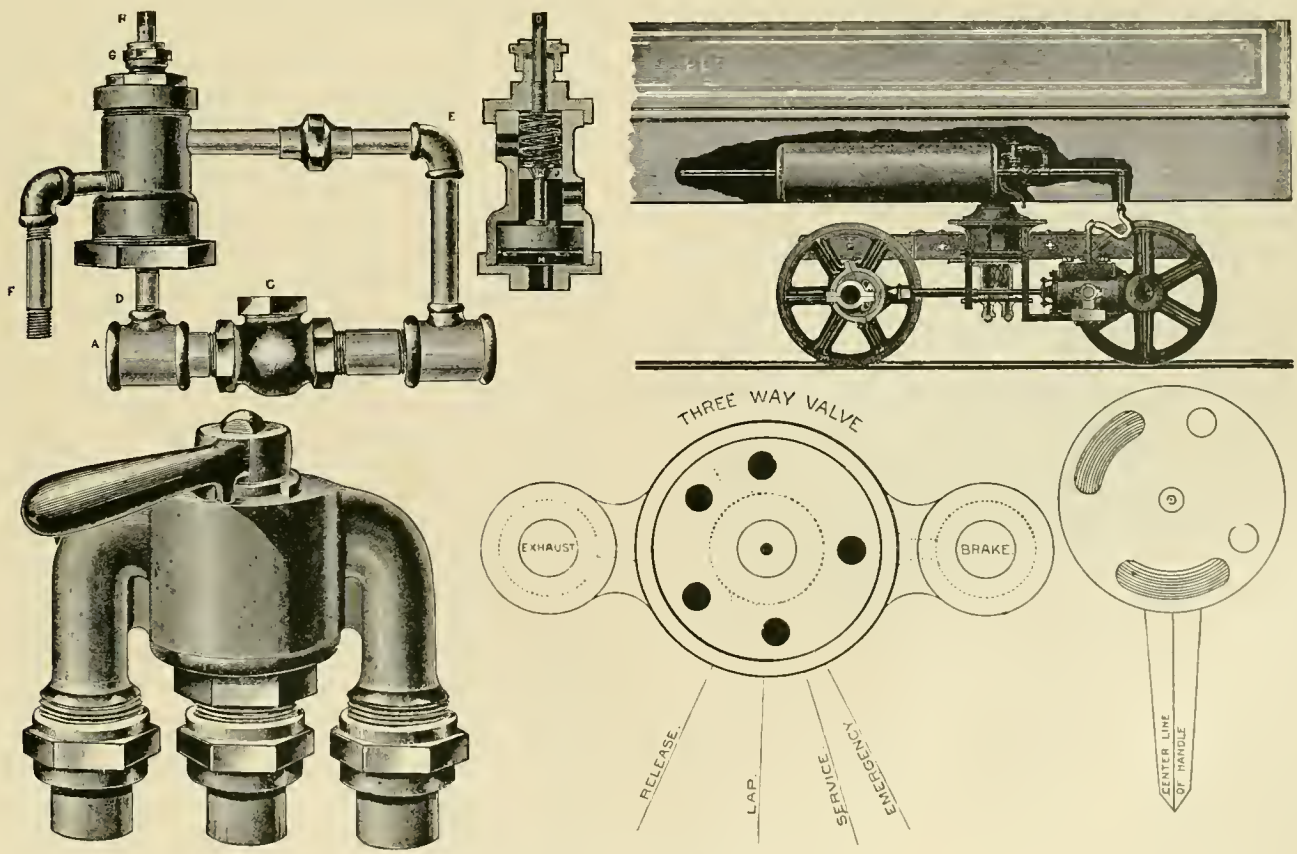
The development of electric railway systems capable of furnishing transportation at a high rate of speed has brought with it a necessity for a corresponding improvement in means for checking that speed within necessary limits. The Hunt air brake system has been so well developed after several years of experimentation as to afford a high degree of protection to the public from accidents, and to the traction companies a well-made and reliable device which is at the same time simple in construction, easily operated and inexpensive in the matter of maintenance.

The system combines an air pump, worked either by the movement of the car itself or by a separate motor by means of which the pump may be operated continuously whether the car is in motion or not. This arrangement is illustrated herewith. Ordinarily, however, the pump is operated by means of an eccentric connection with one of the car axles, as shown in the cut representing the attachment to a Pullman truck. The brake is operated by a three-way valve under the control of the motorman, connections being also furnished by which it may be actuated by the conductor from any part of the train.

The system consists of a pump, reservoir, automatic regulator, valve, pressure guage, brake cylinder, eccentric connection for the pump, and hose connection for trailers. Of these only the regulator and the three-way valve require description. The brake cylinder is substantially similar to that in use in the Westinghouse system of air-brakes in general use upon steam railroads, and the air pump is a plain cylinder with the necessary valves having a solid piston with soft charcoal iron rings closely fitted.

The regulator is shown in one of our illustrations. It consists of a pipe leading from the pump to the reservoir and containing a check valve and connection to an equalizing valve, as shown in sectional view. This connection is below the valve shown, and consequently the pressure upon the under side of the valve is the same as the reservoir pressure, and when the pump is working the air follows both pipes A and E. When the pressure has reached the desired limit on account of the greater area of the piston than that of the valve, the piston raises and with it lifts the valve, allowing the air to escape to the atmosphere through the pipe F. The pump is, therefore, relieved of all load so long as the valve remains open. With the reduction of pressure consequent upon the application of the brake, the spring closes the valve and the work of the pump is again resumed.

The operation of the three-way valve will be understood by reference to the diagram showing the valve seat and the rotary valve. The various positions of the valve handle are also shown. When the conductor's emergency valve is not used, the handle may be at extreme release position or on the lap for running position; but if the car is equipped with an emergency brake, or is a double-ender, the running position must be on the lap; it

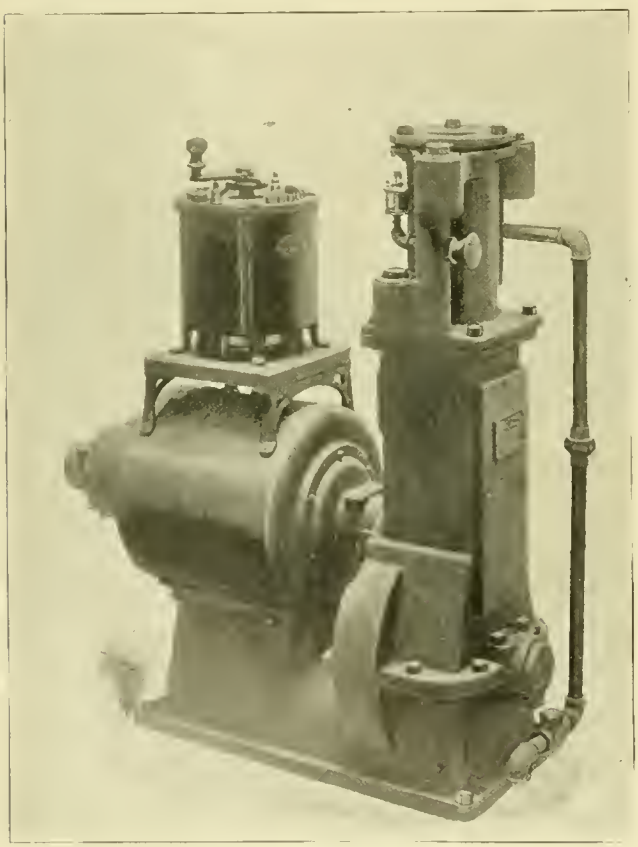


DETAILS AND CONNECTIONS—HUNT AIR BRAKE.

is, however, preferable that the handle should always be at lap position while running, as there is thus less liability to confusion or error.

George E. Pratt, well known in street railway circles as contracting agent for the Jackson & Sharp Company, and formerly acting in a similar capacity for the Lamokin Car Company, has been appointed general manager of the Hunt Air Brake Company, of Pittsburg, a position for which he is excellently fitted. He was born in Brooklyn in 1856, and received his education at Flushing Institute, Long Island. He served an apprenticeship at the Taunton locomotive works, and from there went as private clerk to the superintendent of motive power of the N. Y. & N. E. Railroad. He remained in the steam road field until 1884, when he resigned the position of mechanical inspector for the Pullman Company to become contracting agent for the Lamokin Car Company. He was for some time secretary of the New England Railroad Club, and is well known in both steam and street railway fields.

GEORGE E. PRATT.



ELECTRICALLY DRIVEN COMPRESSOR FOR HUNT AIR BRAKE SYSTEM.

PERSONAL

Colonel Clay Stacker has been elected superintendent of the Clarksville, Tenn., Electric Street Railway Company.

W. G. Rock, superintendent of the Flushing & College Point (N. Y.) Electric Railway, has resigned.

The street railway fraternity will regret to learn of the death of Mrs. G. W. Baumhoff, at her home in St. Louis, August 31.

Fred H. Allen has been appointed superintendent of the street railway company at Kokomo, Ind., in place of C. F. Geddes, resigned.

William E. Davis, who was electrician on the Detroit Railway until the consolidation, goes to the Bay City Interurban in the same capacity.

D. G. Hamilton, Chicago, president of the consolidated lines, St. Louis, accompanied by his wife and daughter, is in Europe for a short rest.

George B. Lindsay, president of the Chester (Pa.) Traction Company, has gone to Europe on a pleasure and business trip of a month or so.

Edward V. Thehaud, of Madison, N. J., has been elected first vice-president of the Compania de Tranvias de Merida, of Merida, Yucatan, Mexico.

C. D. Hotchkiss has been elected vice-president of the North Shore Electric Railway Company of Chicago, to succeed J. E. Montrose, resigned.

Walter L. Adams is now superintendent of the Norwich (Conn.) Street Railway. E. P. Shaw continues with the company as secretary and director.

President Peckham came on to Chicago the past week to meet his wife and daughter, who have been spending the past year in travel on the Pacific coast.

F. Haynes, formerly an engineer in the employ of the Johnson Steel Company, has been appointed superintendent of the Lorain, O., Electric Street Railway.

Nelson Perin, president of the City & Suburban Railway Company of Baltimore, has been taking a vacation this summer, with his family, at Watch Hill, R. I.

Charles Barnes, of Plymouth, Mass., has been elected general manager of the Leominster & Clinton Street Railway Company, in place of Harry L. Pierce, resigned.

Harry L. Pierce, general manager of the Leominster & Clinton, Mass., Street Railway, resigned that position, taking effect August 14. He will remain as one of the directors of the road.

R. E. McDowell was presented with a handsome gold watch by the employes of the Pittsburg and Duquesne traction companies on the occasion of his retirement from the superintendency.

W. E. Barnhart, who recently resigned as superintendent of the "L" and west side lines of the Metropolitan Street Railway, Kansas City, was presented with a diamond ring as a mark of esteem by his former employes.

G. A. Wurdeman has been appointed receiver of the St. Louis & Kirkwood Electric Railway. W. H. McClelland is still retained by the receiver as general superintendent and the other employes will remain the same.

C. S. Bidwell, who has been electrician and mechanical superintendent of the Ashtabula, O., Rapid Transit Company, has been elected general superintendent of the Trumbull Electric Company, of Warren, O. The line is eight miles long, extending from Warren to Niles, and connecting at the latter place with a line to Youngstown.

F. B. Cook has resigned the position of chief engineer of the Central Union Telephone Company after seventeen year's connection with that corporation. During this time he has filled probably every technical position in the company's service. Mr. Cook is succeeded by S. G. McMeen, formerly assistant engineer and one of the brightest electrical men in the west.

W. S. Duckett, formerly manager of the Altoona & Pottsville, Pa., Electric Railroad, and previously to that with the General Electric Company, has been appointed superintendent of the Great Falls Electric Railway, Washington, D. C., and has entered upon his duties. J. J. Camp, who has been discharging the duties of that office, has been placed in entire charge of construction.

R. S. Wakefield, formerly of the Queen City Railway, Dallas, and one time assistant superintendent of the Galveston City Railway Company, has accepted a position as superintendent of the San Antonio Edison Railway, taking effect September 1. Mr. Wakefield is only 25 years of age, and, beginning at 16 years of age in Chicago with the Chicago Telephone Company, went into the electrical trade at 19, and has since had a general education in the street railway business. He is an enterprising, progressive man, and undoubtedly will make a fine record in his new work.

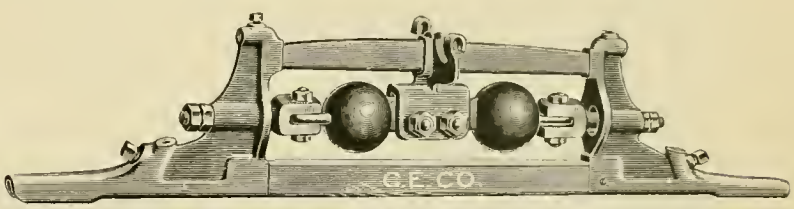
SILICON-BRONZE SPAN WIRE.

The down town trolley lines of the North and West Chicago Street Railroads, recently constructed, have been equipped with silicon-bronze span wires instead of the usual galvanized iron. J. R. Chapman, manager of the electrical department, informs us that it is found that galvanized iron span wires, in the heart of the city, do not last nearly as long as in outlying districts, and that it is expected to make a much more lasting construction by using silicon-bronze. The galvanized iron is affected by the acids and other chemicals deposited from the city air.

President Johnson, of the Nassau Electric Railroad Company, Brooklyn, recently discharged 55 men as a part of the action necessary to carry out his determination to put a stop to the accidents happening frequently of late.

CENTRAL ELECTRIC SECTION INSULATOR.

Span wires will break, trolley wires will break, overhead fixtures will in some accountable way break and other things happen to worry the soul of the man who has charge of the maintenance of way. Various devices have been invented from time to time to prevent emergencies of this kind. One of the latest of these is the section insulator manufactured by the Central Electric Company. This particular insulator has several new features which are of sufficient importance to attract attention. The arrangement of this insulator is such that two like metals do not come in contact, thus overcoming the possibility of rust or corrosion interfering



CENTRAL ELECTRIC SECTION INSULATOR.

with a re-adjustment or replacing of any of the parts after having been in use or exposed to the weather for a long period. Tests to which it has been subjected show that it has a very much greater breaking strain than any trolley wire. While being particularly strong, it as at the same time symmetrical in every proportion and is as light as any section insulator of equal strength. It can be placed in position without cutting the span wire and has a removable runway which can be taken out and replaced without taking the fixture from the line. These insulators are being made to fit either the round or figure 8 wire. A great many of them have been sold to important electric railways and in every instance have given perfect satisfaction. The Central Electric Company is very much gratified with the success of the several specialties which they have introduced and regard the outlook for October business fairly encouraging.

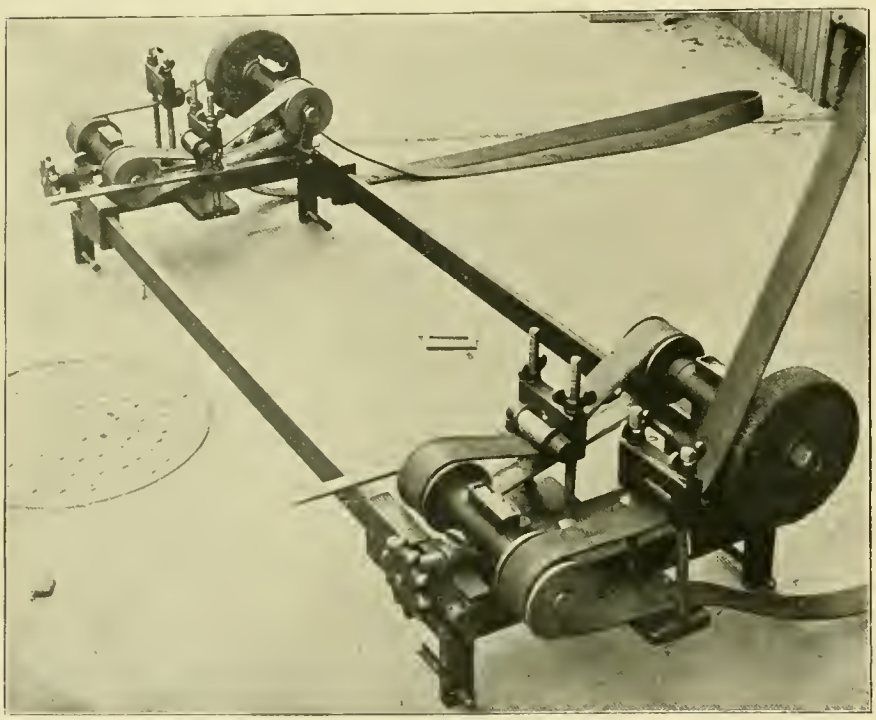
WALKER COMPANY'S SAN FRANCISCO WORKS.

The Walker Company has established a large branch factory and repair shop in San Francisco, which is one of the most complete of its kind on the coast. The western works will be a great convenience to customers west of the mountains, who will not now have to wait for shipments from Cleveland. The arrangement gives excellent system of distribution with the main works at Cleveland for the central portion of the United States: one in New Haven for the Atlantic states, and now the new one at Frisco for the far west.

The Sedalia, Mo., lines make a school ticket rate of $2.50 per 100 rides.

SWEET WHEEL GRINDER.

A wheel grinder that is very simple in construction and designed to turn down worn and flat wheels without removing the wheels from the trucks is being put on the market by D. C. Sweet, of Springfield, Mass. That there is an abundant field for such a machine every one who is familiar with the number of flat wheels in winter on our large systems well knows. Taking out wheels and putting them in a machine to grind them down is an expensive process. All that is necessary to prepare a pair of wheels to be ground with the Sweet grinder is to jack up that end of the car, put the grinder under and put the belts which drive the grinder on the treads of the wheels to be ground. Our engraving shows the grinder alone, but it is manifest how it operates. The motor of the pair of wheels not jacked up is put out and the other motor is run to furnish the motive power for grinding its own set of wheels. The use of this grinder promises



SWEET WHEEL GRINDER.

to be a great economy, as two men can ordinarily grind down a pair of wheels and have the car ready to run out in an hour.

COMPRESSED AIR AT BALTIMORE.

The Central Railway Company has not, as reported in the daily press, decided to adopt compressed air. What it is doing is to investigate the subject, and will run, experimentally, one or two extensions, where, if the air answers all requirements as to mounting grades, economical working, etc., the company will then, and not until then, seriously contemplate its adoption.

RECEIVER AT FT. WAYNE.

John H. Bass, of the Bass Foundry & Machine Works, Ft. Wayne, and M. S. Robison, manager of the Ft. Wayne Consolidated, have been appointed receivers of the road under order of court September 8. The receivers were appointed on application of Frank De Hass Robison, of Cleveland, representing a majority of the stock, which is held in that city. President J. J. Shipherd has resigned. Manager Robison says the road will be able to pay all its indebtedness in full. The application for receiver claims the president has diverted stock and bonds of the company, which has so embarrassed it, time is necessary to adjust its affairs.

TROLLEY APPLIANCES FOR FIGURE 8 WIRE.

The figure 8 trolley wire, though of recent origin, has already found favor with many of the leading electrical engineers engaged in railway construction, as its adoption by some of the largest systems recently installed conclusively proves. Its selection made new requirements in the design of the construction material necessary to suspend it in position, as its peculiar and novel shape would not permit employing those devices which had been used heretofore without making radical changes in their form and detailed construction. Two of the principal factors which had to be considered in this connection, were the increased weight of the trolley wire, and the application of the various devices so that the contact surface of the wire would present a free and uninterrupted passage for the trolley wheel.

To fill these conditions the Ohio Brass Company, of Mansfield, O., has placed on the market a full line of improved designs of trolley wire devices for use with this style of wire, and has already equipped a number of roads which use figure 8 trolley wire for their overhead construction.

A FREIGHT LINE FOR PHILADELPHIA.

The Philadelphia & Newtown Square line has converted one of its old combination dummy cars into a freight car, and will carry milk from the farmers in the vicinity of Newtown Square to Sixty-third street, Philadelphia. The Pennsylvania Railroad, which runs to the same place, will try to stop this by action of court, as it is claimed that the road has no right to carry freight.

FIFTH KEYSTONE ANNUAL.

Pennsylvania Street Railway Association Holds An Interesting Convention at Altoona, September 2 and 3.

The Pennsylvania State Association, which has 27 active member companies and 12 associate members, held its fifth annual meeting at Altoona, September 2 and 3. The attendance was fairly good, and the gathering a very pleasant and profitable one. The first session convened at the Casino, Lakemont Park, at 11 o'clock a. m., and was opened by an address of welcome by Hon. Martin Bell, county judge, to which response was made by Hon. B. F. Myers, president of the Wilkes-Barre Traction Co., and president of the association.

President Myers, in his address, touched on the opposition and legal obstacles thrown in the path of street railways by the steam roads of the state, and some of the court decisions, and incidentally related the following story:

The other day an electric railway official had a dream; a dream that he had shuffled off this mortal coil and descended down to eternal shade. When he arrived in that place of doom the monarch of that region treated him very cleverly, very politely, showed him around, and finally he mustered up courage to ask the devil whether there were any street railway people there—trolley people. "Yes," he said, "there were some, and I assure you I have a good deal of trouble with them." "What is the matter?" "Well they want to cross my tramway to the sulphur mines with grades and I can't permit that." "Well," says he, curiosity seemed further to speak, "Are there any steam railroad people here?" "Well, yes, we have some and we have more trouble with them than we have with the electric railway people; the trouble with them is that every mother's son of them wants to hold a judge between him and the fire." Then he said, "It isn't possible that you have judges here?" "Well, we have a few, but we have no law judges, they are all old lay judges and they are so green that they won't burn, that is the reason that these steam railroad people want to hold them between them and the fire."

The following papers were then read and discussed by the delegates: "Long Distance and Heavy Duty Electric Railways," by F. W. Darlington, electrical engineer; "Construction and Maintenance of Electric Railway Tracks," by George Nelson, civil engineer, of Altoona; "Transfer Tickets," by J. H. Stedman. "Street Railway Law and Liability Insurance" was also discussed by the delegates.

At 3 o'clock p. m., officers were elected as follows:

President, John Lloyd, president of the Altoona & Logan Valley Electric Railway.

First vice-president, Albert Johnson, president of the Allentown & Lehigh Valley Electric Railway.

Second vice-president, Robt. E. Wright, Allentown.

Secretary, S. P. Light, of the Lebanon & Annville Railway.

Treasurer, W. H. Lanius, president of the York Street Railway.

Place of next meeting Allentown.

Thursday was devoted to an excursion to "Wapsononock," and a trolley ride over the tracks of the Altoona & Logan Valley Electric, with a fine banquet in the evening at the Mountain House.

Delegates Present.

F. H. Allman, superintendent, Harrisburg & Mechanicsburg Railway.

J. C. Luger, general manager, Roxborough, Chestnut Hill & Norristown Railway.

E. C. Felton, F. G. Mussey, Harrisburg Traction Company.

P. D. Pratt, Middletown, Highspire & Steelton Railway.

E. W. Ash, general Manager Schuylkill Traction Company.

N. H. Larzetere, Schuylkill Valley Traction Company.

R. H. Kock, president, and M. H. Hubbell, general manager, Schuylkill Electric Railway.

B. F. Myers, president, and John Graham, general manager, Wilkes-Barre & Wyoming Valley Traction Company.

E. H. Davis, general manager, Williamsport Passenger Street Railway.

Capt. W. H. Lanius, president, and C. H. Mayer, treasurer, York Street Railway.

Others Present.

H. E. Webb, Solar Carbon Manufacturing Company, Pittsburg.

W. J. Ashmead, Ajax Metal Company, Philadelphia.

F. W. Darlington, electrical engineer, Philadelphia.

J. J. Kinzer, Kinzer & Jones Mfg. Co., Pittsburg.

A. C. Vosburgh, secretary and treasurer New Process Rawhide Company, Syracuse.

Robt. W. Welch and Wm. L. Doyle, John A. Roebling Sons Co.

H. J. Crowley, manager Philadelphia office, and R. E. Moore, General Electric Company.

D. C. Sweet, Springfield, Mass.

Wm. B. Durfee, National Jack Company, Boston.

Thos. H. Dibble, Scranton, Washburn & Moen Mfg. Co.

Chas. M. Mitchell, New York, Chas. A. Schieren Co.

Frederick A. Lex, Wilmington, Del., Lobdell Car Wheel Company.

Thos. A. Hurley, Holmes, Booth & Haydens.

John S. Pugh, New York, John Stephenson Co.

Frank Randall, Philadelphia, J. G. Brill Co.

Mason D. Pratt, engineer street railway department, Pennsylvania Steel Company.

J. Emory Meek, New York, H. W. Johns Co.

Giles S. Allison, manager New York office, St. Louis Register Company.

H. P. Hill, Taunton Locomotive Manufacturing Company.

F. S. Kenfield, business manager, STREET RAILWAY REVIEW.

D. C. Sweet, Springfield, Mass., exhibited one of his machines for grinding wheels without removing from the car, which attracted much interest. The National Jack Company also made a demonstration of its car lifting and car replacing device, and "set 'em up."

ELECTED OFFICERS.

A meeting of the stockholders of the Pittsburg & Allegheny Traction Company and of the Allegheny & Evergreen Traction Company, was held August 7. Edward J. McIlwaine was elected president of the first named company, Charles A. Muehlbronner, of the second, and W. R. Klein, secretary-treasurer of both. It is thought there will be little opposition to the granting of the necessary franchises.

An organized attempt on the part of several conductors of the Consolidated Traction Company, of Newark, N. J., to defraud the company by exchanging punched transfers, was recently discovered. Seven have been dropped and others are suspected.

HALF FARES

Interesting Bits of Information from all Parts of the Country, Boiled Down for Busy Readers.

H. M. Whitney has been elected president of the Halifax electric railway.

The women ticket sellers on the Lake street L, this city, have had their hours of work increased from 8 to 12 hours a day.

The Brooklyn L roads are considering elevators at such stations as are very high—some on a level with the top of a three story building.

President House, of the Baltimore Traction Company, reports a larger business than ever this summer especially on the two resort lines.

The express office of the electric railway at Conway, Mass., was robbed of $136 by unknown parties who cracked the safe and smashed the office generally.

An unusually rapid piece of construction has been that of the road bed of a street railway at Moncton, N. B., the entire line 12,000 feet or 2¼ miles, having been built in 47 days.

The Baltimore, Middle River & Sparrow's Point Railroad of Baltimore, Md., is now running over the new viaduct, 700 feet long, on Lombard street. The bridge over Back River, 1,220 feet long, is also nearly completed.

Thieves have again stolen about 1,200 feet of feed wire from the lines of the Baltimore Traction Company. The public, as well as the company, is interested in finding out the guilty parties, as the service is necessarily impaired.

Twenty Bridgeport Traction conductors are in grief, owing to detection in reporting more transfers than they turned in, keeping the cash value of the difference. Careless work in the auditing department made the scheme possible.

An elderly man was standing up in a street car in a city not many miles away, when a kind-faced young man exclaimed, "Uncle, you are too tired to stand; sit on my lap." The offer was gratefully accepted, but "Uncle" thinks the $20 extracted from his pocket was a big price for the seat.

In a dispute over the right of way for the electric road between Bowling Green, O., and Toledo, the objector, a man whose land the line crossed, emphasized his gestures with a stick of dynamite, and finally lighted it. He continued his argument too long, and his hand and arm were blown to pieces. No one else was injured.

The Main Street & Agricultural Park Railway of Los Angeles, Cal., issued $350,000 in bonds July 1, for the purpose of changing its power to electricity. The work will probably be completed before January 1, 1897. The company owns 4.38 miles of road and operates 1.28 miles under lease.

The Concord, N. H., Street Railway, for the year ending September 1, carried 971,160 passengers, against 1,013,705 last year. Earnings, $50,431; expenses, $41,731; net, $8,700. Considerable renewals were made. No passengers injured. Officers: John H. Albin, president; A. B. Cross, treasurer; N. E. Martin, clerk.

The case of the County Commissioners against A. L. Johnson and others for obstructing the county road by the electric railway between Wellsville and East Liverpool, O., was settled July 22, by the agreement of the defendants to improve the highway according to certain specifications. The matter has been in litigation for several years.

The Street Railway Company, Columbus, O., gave 600 of its employes a picnic at Olentangy park. Including families there were about 2,000 in attendance, and all were given every privilege of amusement the park affords. An arrangement was made by which one-half the employes spent the morning and the others the afternoon at the park.

The Citizens' Street Railroad Company, of Indianapolis, has been made defendant in a suit for $1,000 damages on account of race discrimination. A colored man went to Fairview Park and bought tickets for a ride in a pony cart, but was refused on account of his color. The refusal having been made in the presence of many people, he claims to have suffered much from humiliation.

The superintendent of the Rahway, N. J., electric, advertised in a New York paper for two motormen, and by noon had 60 men clamoring for the places. The old men became alarmed, and a general misunderstanding was the result, which was not settled until the mayor took a hand and the company paid the return car fare of the 58 for whom no work was available. And yet some people say advertising don't bring returns.

The handsome open cars, to be used for smoking cars, which the Broadway cable road recently put into service, have attained as great a degree of popularity with the public as have those which have for some time been run upon the Third Avenue competing line. These are practically smoking cars. Upon the Broadway line it was at first thought that ladies would not use them, but cars are not infrequently seen carrying as many ladies as men. This is considered a triumph for the smokers, many of whom think smoking will soon be allowed upon any part of an open car.

PUNCTURES THE COMPRESSED AIR SYSTEM.

B. Abdank, a prominent Frenchman, who is consulting and constructing engineer for several electric roads in his country, has been in the states a month past studying our various urban systems. Before sailing he consented to an interview with a reporter for the New York Press, to whom he said:

"I find a curious condition, in this country, you are trying to get away from the trolley system after giving a trial to it. You are leaning just now toward the compressed air system. In Europe we are getting away from the compressed air system, which we have had on trial for fifteen years, and are coming to the trolley system.

"What your engineers consider an open question, we consider closed. We entertain not the slightest doubt that your experiments with compressed air will fail. For us the compressed air system has not proved satisfactory to either the companies or the public."

"But are not the appliances by which our Third avenue and Metropolitan companies and the Elevated Railroad Company propose to utilize the compressed air better than any heretofore used?" was asked.

"I do not believe so," replied Professor Abdank. "The compressed air system is like a steam engine, in that it cannot be improved much. Your appliances for the air motors are practically the same as ours.

"In the fifteen years compressed air has been used in in France, only sixty kilometres of track have been operated, while in the three years since electricity has been introduced more than 500 kilometres of track for trolley cars have been installed.

"Here is the point: It is a rule with engineers who have to do with transportation, that the fewer the working movable parts in the machinery the better. The trolley car has only the armature and gearing. The air motor car has more movable parts than the steam locomotive has.

"Danger is another consideration. In America the danger of the trolley car has been exaggerated. All the danger is from speed, and the speed can be regulated by the authorities. The wires carry only 500 volts, and that strength of current never killed anybody. With compressed air, explosions of the tanks are common. I myself have witnessed two explosions of tanks, pipings and valves. In each of them the motorman and his passengers were maimed frightfully. Besides, in Europe, the pressure in the tanks is only fifty atmospheres; it is proposed to use 120 atmospheres here. That means more danger of explosion.

"For these reasons I predict that the craze of Americans for air motors will be short lived.

"A further prediction I can make is that electricity will eventually supplant steam in attaining high speed on railroads. Yesterday I rode on the Nantasket Beach line out of Boston behind an electric motor at sixty miles an hour. We will ride seventy and eighty miles an hour with safety when electricity is installed on the railroads. Connection by trolley from overhead is all right for railroads, but connection by means of a strip between the rails is better. The central rail is the thing for your 'L' roads."

"How about storage batters for traction?"

"You may set that down as a failure. The trolley system will be the survivor unless some undreamed of discovery is made."

ANOTHER TROLLEY EXPRESS.

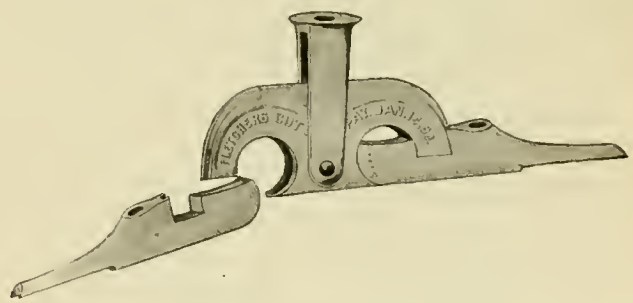
The success of the trolley express lines is drawing more attention to this feature of electric railroading, which has so long been emphasized in these columns.

The latest is an express company, organized independently of the railway for an express service on the Bangor, Me., Orono & Oldtown Electric Railway. The company, which is capitalized for $10,000, proposes to collect, carry and deliver goods; fill business orders, collect bills and notes, carry U. S. mail, and perform all the functions in a smaller way, of the big express companies. One car is already in service and more are building. A. F. Gerald, of Fairfield, is president, and James Weymouth, Oldtown, treasurer.

FLETCHER'S TROLLEY CUT-OUT.

An automatic trolley cut-out, the invention of Theo. Fletcher, is being put on the market by Fletcher & Stone, whose office is in the Terminal Hotel building, St. Louis, and for which the Metropolitan Electric Company, is the Chicago agent and distributor.

The manufacturers present the following claims for their device: It is simple, strong and easily and quickly

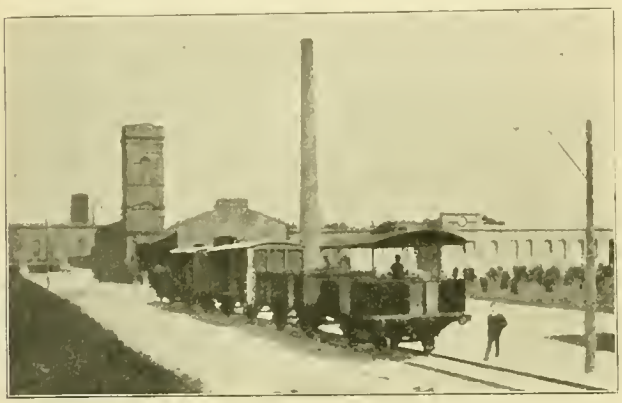


FLETCHER'S TROLLEY CUT-OUT.

put up. It prevents live wires getting down in the street, and as the line cannot ground, repair cars can run to the point where the line is down, thus effecting much saving in time. The cut-out presents no obstacles to the passage of the present trolley wheels. When the hangers are up they are as rigid as a solid one, and the only wear is from the trolley wheel running under. Already the cut-out is being tested in nearly all the large eastern cities, and prospects for its very general adoption are good. The illustration conveys an excellent idea of the device.

MECKENBEUREN-TETTNANG ELECTRIC RAILWAY.

This interesting road at Wurtenberg, Germany, is described in the London Electrical Review, from which our engravings are reproduced. This road corresponds in Europe to our Nantasket Beach road, as it is the first in Europe with standard steam road equipment to use electricity as a motive power. It has been running since



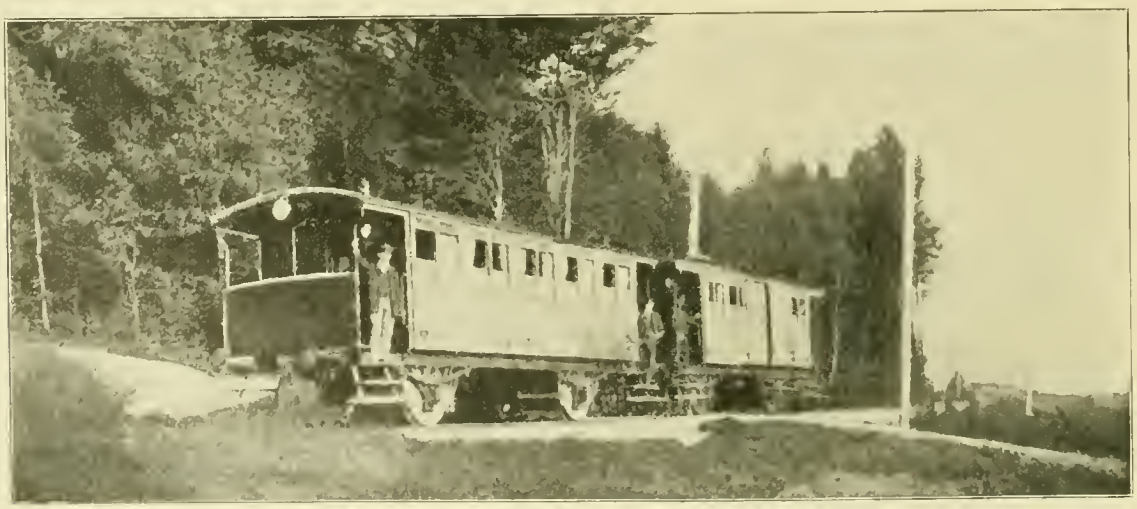
SWITCH ENGINE MECKENBEUREN-TETTNANG LINE.

December 4, 1895, and is both technically and commercially a great success. The track is the standard German gage and 26 trains a day are run. The installation was designed by O. von Miller and supplied by the Maschinenfabrik Oerlikon.

There are at present two power stations, water being the motive power in one, and steam in the other. This latter, however, is only used as a reserve when the water is rather low, or when there is a larger amount of traffic than usual. In the first station there are two Jonval turbines, one of 45 the other of 75 brake horse-power. Both these turbines drive by ropes on to a countershaft. This countershaft is in two parts, which can be connected by means of clutches. The electrical plant consists of one railway generator rated at 43 kilowatts, but which can be worked up to 60 kilowatts if required. The current for the railway line is supplied at a pressure of 700 volts. There is also a 40 kilowatt alternator furnishing current at 2,100 volts. This is of the well-known Oerlikon type, having no rotating winding, and direct connected to its exciter. This machine is used for lighting purposes and for supplying power to stationary motors. Under ordinary circumstances the parts of the countershaft are not connected together, one section driving the railway generator and the other the alternator. The water-power is derived from a small river, by means of a canal about half a mile long a fall of .652 meters is obtained, the quantity of water being equal to 6 cubic meters per second.

The steam power station is designed to furnish 120 horse-power, but at present only 60 is installed. The plant consists of a water-tube boiler having a heating surface of 737 square feet, of one engine of 60 brake horse-power, and of a railway generator and alternator exactly similar to the one in the water-power station. Both the railway generators and the alternators in both stations can be put in parallel whenever required. The current from the water-power station is brought to Tettnang by means of an overhead line. Span wire construction has been adopted in the overhead line, the poles on one side carrying the telephone, telegraph, and test wires, those on the other side carrying the feeder cables for the railway as well as those over which the high pressure alternating current is transmitted. The trolley wire is suspended at a height of 18 feet over the track.

The negative poles of the railway generators are connected to the rails, and these are bonded in such a fashion that the resistance of the track does not exceed .016 ohm per mile. The feed wire is connected with the trolley line every 656 feet. The feeders at each railway station pass through a switchboard, and are connected in such manner that any section can be cut out from any station. The water-power station is about .93



VIEW OF ROLLING STOCK AND TRACK—MECKENBEUREN, GERMANY.

miles away from the end of the line. The total length of the line is 2.8 miles, all of which is up hill; for 1½ miles the grade is 2 per cent. The radius of the sharpest curve is 492 feet. The rails used are of the Vignoles type, and weigh about 44 lbs. per yard.

The rolling stock of the line consists of two motor cars divided into three sections, one carrying the mails, the other luggage, and the third passengers. Two motors are used to drive each motor car, each one of 24 brake horse-power. The motors runs in series all the time. All the insulators used are of the well known Aetna material. It is intended to heat the cars in winter by electricity.

The weight of each car is 30,300 pounds, and the wheel base 14.7 feet. These motor cars often haul trains weighing up to 55 tons, and at speeds which often go as high as 18 miles per hour.

The great development taken by goods and parcel traffic has made it necessary to install a battery of accumulators at the water-power station, so as to be able to utilize the water-power to the utmost degree.

DOWN A MOUNTAIN.

What could hardly have escaped being an appalling accident, had not every portion of the equipment been in excellent condition and the nerves of the trainmen of a kind not easily upset, occurred at Frederick City, Md., August 23. The line of the Frederick & Middletown Railway extends to the top of Catoctin mountain, and is naturally well supplied with curves and grades. The grade on which the difficulty first started, but not where the accident actually occurred, was 6.78 per cent, and 3,000 feet in length. The rail is 60 pounds to the yard, of the section recommended by the American Society of Civil Engineers, laid on heavy hewn ties and rock ballasted. The car first got beyond control on the 6.78 per cent grade mentioned, and the distance covered by the slide was 3,000 feet of this grade, 350 feet of 2.5 per cent, 1,000 feet level and 400 feet 4 per cent grade, the whole including seven curves. On the eighth curve the rear trucks left the track and ran upon the ties 100 feet, finally dragging off the front trucks, when the car slid down the embankment and overturned. The car was heavily loaded, but only one person was seriously injured. With the exception of flat wheels the trucks and motors were not injured, and only side parts of the car were broken.

The car was an open summer car, built by the Newcastle Car Company. It was mounted on Brill maximum traction trucks, with 33-inch wheels, and equipped with two 50-horse-power Walker motors. In addition to the regular ratchet handle brake operating on all eight wheels, there was an entirely separate set of brake rigging for use in case of emergency, operating on four wheels, and on account of the road having been opened only a few days before, the unusual precaution was taken of having a man stationed upon the heaviest grade to sand the rail. As soon as the car started down the grade, it seems that passengers applied the rear brakes. The trolley slipped off, but was replaced by a lineman, who climbed on the roof and held it in position. The motorman states that upon releasing his brake and reversing the motors there was no result apparent, the fact being, as was seen afterwards, that all the wheels were locked. The wheels, therefore, did not turn at any time during the descent. The fact that the car remained on the track as long as it did under the circumstances, indicates the excellence of the construction. The speed at which the car made the descent is said to have been terrific.

CONDUCTIVITY OF STEEL RAILS.

In considering the conductivity of the rails in return circuits it has usually been assumed that steel used in rails has a conductivity one-sixth or one-seventh that of copper. This might hold true were the rails of pure iron, but high carbon steel, such as is used in modern rails, is not pure iron by any means, and its conductivity ought to be appreciably lower. Richard McCulloch, electrical and mechanical engineer of the Chicago syndicate roads at St. Louis, recently made some tests on the conductivity of steel rails which show the ratio between steel rail and commercial copper to be about eight to one. The tests were all made on Johnson girder rail weighing eighty-five pounds to the yard. The drop was measured with a Weston millevoltmeter reading to one-thousandth of a volt. Voltmeter connections were made by filing the rail bright and holding the voltmeter wires firmly against the bright places. The results were as follows:

Length of rail.	Amperes current.	Drop in volts.	Total resistance of rail.	Resistance per foot of rail.
44 feet 1 inch	88	.039	.000470	.00001065
44 feet 1 inch	96	.042	.000438	.00000995
52 feet 1 inch	88	.046	.000522	.00001002
52 feet 1 inch	93	.049	.000527	.00001010
60 feet 2 inches	92	.0565	.000614	.00001020
60 feet 2 inches	94	.0580	.000617	.00001022
62 feet 3 inches	94	.060	.000639	.00001028
62 feet 3 inches	110	.069	.000628	.00001010

The average resistance per foot from these tests is .00001019 ohms. Calculating this into resistance per mil foot (that is the resistance of a wire one-thousandth of an inch in diameter and one foot long, made of the same material as the rails) gives a result of 86.61 ohms resistance per mil foot. The resistance per mil foot of copper wire is 10.875 ohms, so that, according to these tests, the resistance of steel rails is about eight times that of copper. There is no reason to think that these results err on the side of giving steel too high a resistance, because if there were any errors due to poor voltmeter contact (the most likely place for error) it would give results too low instead of too high.

The Manhattan Elevated Railroad Company has begun the installation of recording turnstiles in the place of ticket choppers, thereby effecting a reduction in force of four men at some stations and two at others. The saving is calculated at $120,000 per annum. The stiles will not, at first, be used at the busiest stations.

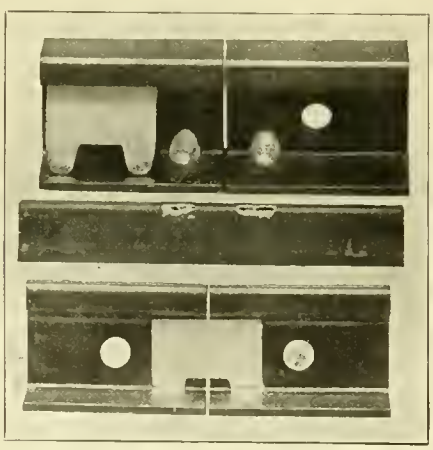
A CHEAP RAIL BOND FOR 50 TO 500 AMPERES.

Thos. A. Edison and Harold P. Brown have designed a new form of the plastic bond for electric roads where the full conductivity of the rail is not required. One inch from the end of each rail a shallow hole is drilled diagonally downwards into the junction of the base and the web. This hole is amalgamated by the Edison process and filled with the plastic alloy. A U-shaped loop of amalgamated copper is inserted into a pair of these holes at each joint and is held upright by the angle plate. The copper is not clamped nor riveted and is therefore free to adjust itself to every movement of the rails, since the plastic alloy adheres tightly to the amalgamated surfaces and forms a pair of flexible socket joints. These joints will allow the rails to move a quarter of an inch in any direction without disturbing the electrical contact.

There is no mechanical stress on the copper and it can never break nor crystalize, and since it is amalgamated by the Edison process it can never rust nor be injured by electrolysis. The electrical loss at the contacts is very much less than that of any other form of copper bond. Since so small an amount of material is required, this bond, which is called the plastic socket, is cheaper than other copper bonds of equal conductivity.

Its maker is prepared to guarantee its permanence when properly applied, which is more than can be done with any other copper bond.

The first of the accompanying cuts shows the holes bored in the rails for copper strips equal to two 0000

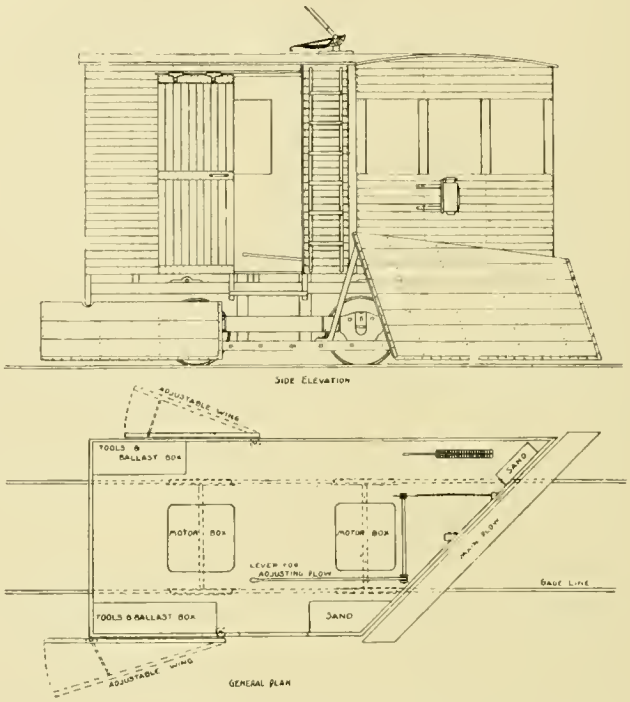


wires; also the amalgamated copper and the angle plate with amalgamated contact spots over the bond holes so that the plate will carry a portion of the current. The second cut shows the completed bond ready for applying the angle plate. For rails where heavy conductivity is desired, the holes are bored so as to penetrate the web, and a copper strip is inserted on each side.

Where necessary, a small piece of flexible cork is placed on each side of the holes to prevent any of the plastic alloy from jarring out, but with ordinary rails this is not needed. There is a great future for this permanent bond, which will not rust, break nor lose conductivity.

DENVER SNOW PLOW.

As the snow plow building season is upon us again we show the plan of a plow built for use last winter by the Denver Tramway Company. As will be seen, it is a shear plow with spread wings on each side. It is on



Bemis truck with two W. P. 50 motors hung from sub axles suspended above the wheel axles to keep them out of the dirt and slush. The plow proper is all steel.

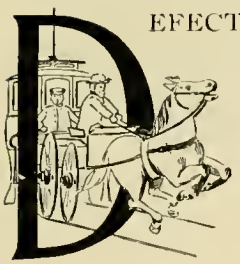
ILLINOIS CENTRAL TO ST. LOUIS.

Wellington Adams' 100-mile-an-hour Chicago-St. Louis electric air line never materialized, but the service furnished by the Illinois Central, between Chicago and St. Louis, leaves very little to be desired. In point of speed, comfort and luxurious accommodation, it is excelled by no similar route in the west. The "Diamond Special," leaving Chicago at 9 o'clock, every evening, is a train in which the company takes special pride and will be found a convenient train to take to the convention.

PROGRESS AT PORTLAND.

The Portland Railroad Company, Portland, Me., has obtained the right to extend its Forest avenue tracks in Deering. Cars will be operated over the new line before winter sets in. A double track of 90-pound, 60-foot girders is being laid on the Deering line, from Portland to Morrill's corner, to replace the single track of T rail. All the overhead work on this line will be rebuilt, 35-foot, 12 by 12, Georgia pine poles being erected at one side to carry feeders. Work has begun at Morrill's on the new car house, which will be 275 feet long, of brick and iron, with seven tracks.

NEW WAY TO CLEAR TRACK.



DEFECTIVE bonding has frequently been known to cause horses to get shocks by causing a large difference of potential between one rail and the ground or rail near it. Indeed, we believe a certain road once ordered no cars to enter a draw bridge it was operating over until all horses were off the bridge, the reason being that the bonding was so defective that horses on the bridge were almost sure to get shocked and start to run if a car was using current on the bridge when the horses were in positions to make bonds of themselves. On a road near Brooklyn, however, we hear that defective bonding has been put to good account by the motormen in keeping the track clear of what were formerly stubborn teamsters. The "modus operandi" is to leave the current on when coming up behind an obstreperous teamster and cut down the speed with the brake. Under this process the car of course takes considerable current, and the chances are that before long the horse as he goes along the track will find himself bridging over some defect in the return circuit. Now a horse does not relish this kind of thing. He would much prefer to let something else perform the function, and he generally cuts numerous capers until he gets off the track. It took the teamsters some time to find out what was the matter, but now they turn out promptly when they hear a car.

Indeed the "shocking" condition of affairs along the tracks at Jamaica drew forth a special resolution from the village trustees ordering the company to put its tracks in safe condition for public travel within 15 days.

BOOMING BIRMINGHAM.

Some of the enterprising business men of Birmingham, Ala., have organized a series of excursions from various other cities and towns in the South, with a view to advancing the commercial importance of their own city, by a demonstration of its advantages. Prominent among the promoters of the enterprise is J. B. McClary, manager of the electric lines, and who is also president of the excursion company. One recent excursion brought in 1,000 guests, while nearly as many more were left behind, the special passenger train being unable to haul the unexpected crowd. A feature of the day was a war dance by forty-three Choctaw and Turkey Creek Indians, who were brought in fifty miles for the occasion, and who performed in the street railway's pleasure resort park.

Charles F. Gunckel, president of the Middletown, O., Street Railway Company, and prominent in many other business enterprises in that city, died at his home, August 11, after an illness of two months.

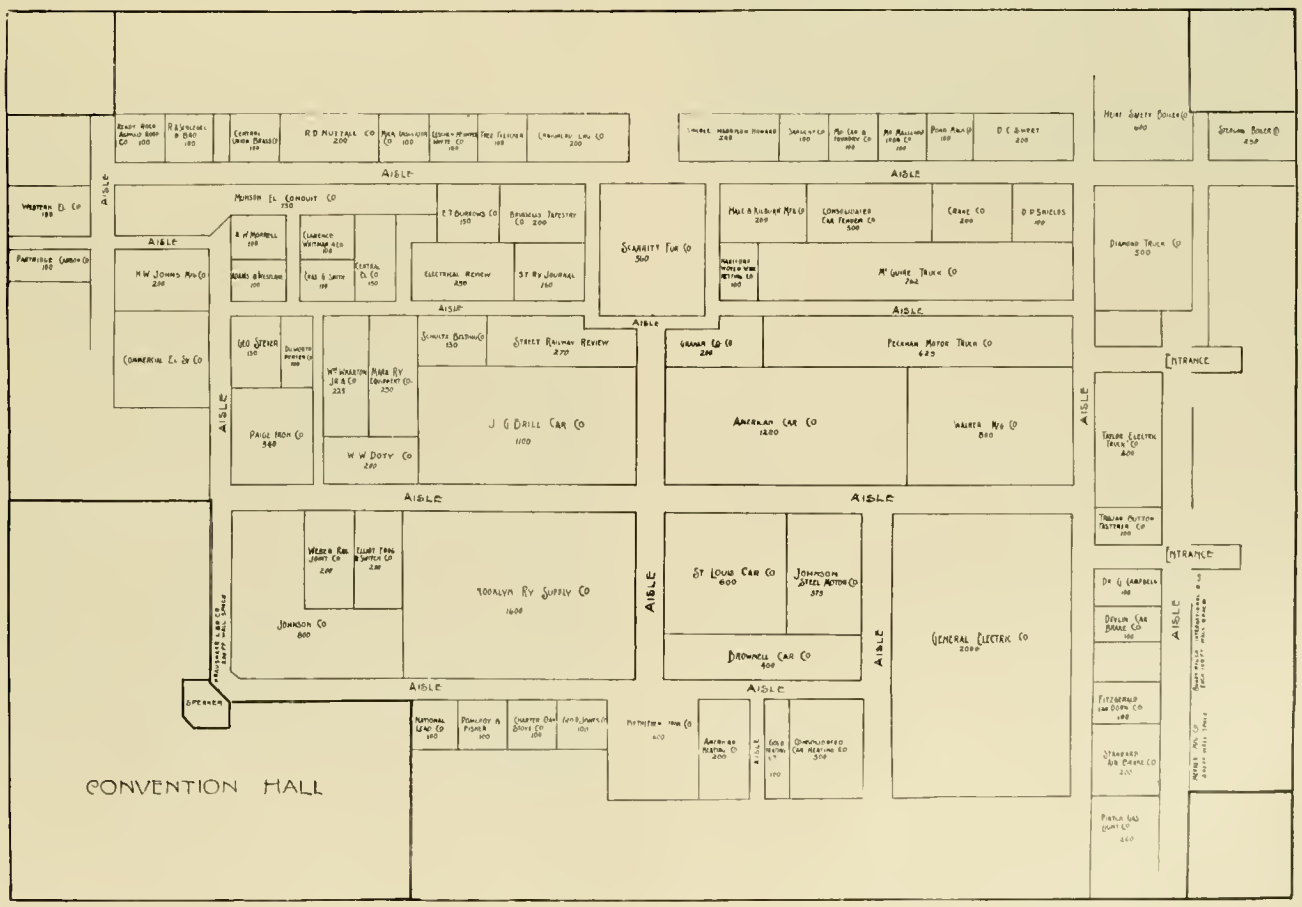


DIAGRAM SHOWING ALLOTMENT OF EXHIBIT SPACE AT ST. LOUIS CONVENTION OF AMERICAN STREET RAILWAY ASSOCIATION, OCT. 20-24, 1896.

FIRE AT McGUIRE SHOPS.

Fire started in the shops of the McGuire Manufacturing Company, Chicago, at 2 o'clock, A. M., September 10, and soon destroyed the brass foundry and stove department. A portion of the stock, that used for the days' work, was burned. Fortunately the main stock and the machine shops are uninjured. The company is prepared to fill all orders for trucks, stoves and sweep-

FIRE AT MC GUIRE SHOPS.

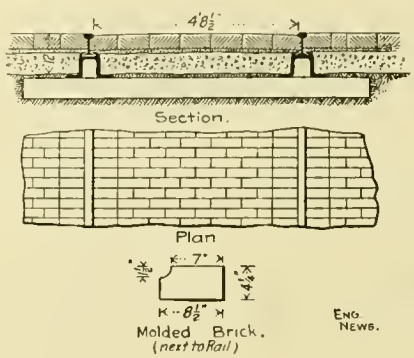
ers without delay. Work has been resumed in the different shops, and the re-building of those burned has already begun. The loss is fully insured. It is expected the burned buildings will be ready for use again in ten days. Fortunately the main building was unharmed. Since the fire the company has taken "quick delivery" orders from Pittsburg, Toledo and New Castle, and will be able to fill them on time.

FISHED FOR THE CURRENT.

A 15 year-old boy in this city undertook a demonstration for the benefit of some other boys, and tying a light wire to a stone threw it over a south side trolley wire. There was the usual prompt response on the part of the current, which enabled the small boy to execute a war dance which took him across the street in two jumps. Spectators managed to sort him out from the tangle and in two hours he was able to be taken home. The boys down that way have all signed an agreement not to look at a trolley wire for six months.

BRICK PAVING TO T RAIL, AT CORTLAND, N. Y.

A large amount of brick paving has been laid in the streets of Cortland, N. Y., during the past summer. The street railway, which uses a T rail, also paved with brick, and the completed paving makes a very fine appearance.



In order to place the ties under the concrete the rail was laid on chairs, as shown in the cut, which we reproduce from Engineering News. The pavers next the rail are of special form to fit snugly to the web of the rail, being flush with the head on the outside, and leaving room for flanges to travel inside. Between rails the paving gently crowns to center of track.

TEARING UP CABLE TRACKS.

The Consolidated Traction Company, of Pittsburg, has been doing some rapid work tearing up the Fifth avenue cable tracks by means of the big portable steam

crane shown in our engraving. Workmen precede the crane with sledges and cold chisels to get the track and conduit apart for handling in sections by the crane.

The Weston Engine Company, Painted Post, N. Y., has on its books all the orders that can be handled in the next four months.

M. A. Coolidge, of Fitchburg, Mass., will be given the contract to build the Brockton, Bridgewater & Taunton Street Railway.

Soule, Dillingham & Co., of Boston, Mass., have begun work on their contract to build the Brockton & North Easton Electric Railway.

D. McLauchlin Therrell, is organizing a company at Charleston, S. C., to promote the introduction of his electro-magnetic conduit system.

The Degnon Construction Company, of Cleveland, O., has been awarded the contract to construct the Ironton & Petersburg Street Railway.

One of the motors constructed on the Patton electric system, described in our July issue, has been purchased by M. Seiberling for use upon his line at Peoria, Ill.

J. Holt Gates, Chicago, has removed his office from 311 Dearborn street, to suite 1143 Marquette building, where the agencies of the Walker Company and the C. & C. Co. will henceforth be.

Van Akin & Co., of New York, have been awarded the contract to put in an electric street railway and lighting system for the Jackson & Suburban Street Railway Company, Jackson, Miss.

James G. Biddle, selling agent for the Ward Leonard Electric Company and the Western Electrical Instrument Company, has changed his address from 944 to 910 Drexel building, Philadelphia.

In its long burning arc lamp the General Electric Company has a good thing that should be better known to railways. One trimming gives 150 hours' continuous service. A pamphlet is sent on application.

The Wells & French Company, car builder, Chicago, has removed its general office from the Monadnock to the new Fisher building, where Secretary Carry presides over as fine a suite of offices as heart could wish.

E. G. Long, of the New York office, and Charles S. Ackley, of the Kingston office of the Peckham Motor Truck & Wheel Company, paid a visit to Chicago on their return from a vacation trip among the lakes.

The White Manufacturing Company of New York, is now actively at work on the turning out of its famous snow plows for the next winter's supply. The West End Street Railway of Boston, has over 100 of these plows; the Brooklyn City Railroad 30; the Consolidated Traction of New Jersey, 30, and many other roads a smaller number.

The Stow Flexible Shaft Company, Binghamton, N. Y., has just sold rail drilling equipments to lines in Cleveland, St. Louis, Albany and New York city, at all of which places the drill is giving excellent satisfaction.

The American Electric Heating Corporation, New York and Boston, has opened an office in the Monadnock block, Chicago. F. P. Luther, formerly manager of the Western Electric Heating Company, St. Paul, is in charge.

The Scarritt Furniture Company will furnish the seats for twenty-six closed cars, which are being built for the Southern Electric Railway, of St. Louis. The cars will have 28-foot bodies, and will be equipped with twenty reversible rattan covered seats each.

The Forest City Electric Company, Cleveland, O., has issued a very neat and attractive circular, descriptive of the rail bond described in the July issue of the Review. The illustrations of the bond are printed in bronze, which is an excellent imitation of copper color.

The United States Circuit Court for the district of Western Pennsylvania has modified the injunction held by the Thomson-Houston Electric Company against the Simonds Manufacturing Company, of Pittsburg, permitting the defendants to sell trolley parts of all kinds.

A. Groetzinger & Sons, Allegheny, report a continued good demand for their "Dermaglutine" pinions, and are quite busy in this department. Most of their old customers, who have been with them now five years, are still using these pinions, and many new ones have been added.

The Sanitary Car Strap Company, Bayonne, N. J., reports a good business. Three orders have just been received from the Dry Dock Railroad Company, New York, for 120 straps. Arrangements have been made to be represented on the Pacific coast by Hall J. Lawson, San Francisco, Cal.

J. M. Jones & Sons Company, of West Troy, N. Y., has just finished four new closed cars for the New Haven Street Railway. They are unusually fine cars, being finished in mahogany and having plate glass windows. The street railway paid a handsome price for them, but it got its money's worth.

The Westinghouse Machine Company, of Pittsburg, Pa., has issued a neat catalog of 44 pages giving full-page views of Westinghouse Standard and Junior engines in use. A remarkable steam economy at full and partial loads is shown by figures from three tests of Westinghouse compound engines running non-condensing.

Thayer & Co., incorporated, of Boston and Philadelphia, have placed the New York office for the sale of Cahall and Babcock & Wilcox boilers in the hands of H. H. Montgomery, who has for some time been associated with the Goubert Manufacturing Company, and for several years previously with the Babcock & Wilcox Company.

The Joseph Dixon Crucible Company, Jersey City, N. J., is putting on the market a new lubricant called "Graphit-oleo." It is a preparation of very finely pulverized graphite and a pure petrolatum warranted not to become rancid. The

merits of Dixon's flake graphite are well known, but the present preparation is a combination of a perfect lubricant and rust preventative, useful alike to bicyclists, hunter and yachtsman, as well as in the household and office.

The street railway managers organization, the Electric Mutual Casualty Association, Scranton, Pa., will be represented at the convention of the American Street Railway Association, to be held in St. Louis, Mo., October 20. At that time the aim and object of the association, and the result of its experience in casualty insurance will be placed fully before the roads represented there.

D. C. Sweet, Springfield, Mass., is putting out a wheel grinder which can be used for turning down wheels without removing the wheels from the trucks. All that is necessary is to jack the car up over the pit and put the grinder under. The motor on the axle furnishes the motive power. An investment in one of these machines is a paying one on all roads of five or more cars, and the matter is by all means worth investigating.

The New Process Rawhide Company, Syracuse, N. Y., is gratified by the receipt of letters similar to the following, from the Aurora Street Railway Company, Aurora, Ill. D. A. Belden, general manager, says: "The rawhide armature pinions we purchased of you about a year ago, for our 25-horse-power Walker equipments, have given very good service, and we would ask you to send us at once by freight six of these pinions of your best quality of stock."

Elmer P. Morris has been appointed eastern agent for the Electric Railway Equipment Company, of Cincinnati, and has taken offices at 36 Dey street, New York. The company is a heavy manufacturer of all kinds of line material, motor parts and iron and steel poles for electric railway work. Its facilities have recently been largely increased and a handsome line of samples will be carried in New York. Mr. Morris has also the agency of the Bradford Belting Company and the Simplex Interior Telephone Company, both of Cincinnati.

Electricity performs a very large part in the new steel plant of the Apollo Iron & Steel Works, at Vandergrift, Pa. The electrical power plant consists of three 400-horse-power side crank, medium speed engines of the latest type recently brought out by the Ball Engine Company, Erie, Pa., which are direct connected to Westinghouse generators. These generators furnish power to thirty-six different power motors operating various machinery, including the electrical centrifugal pumps furnishing the water supply of the steel works, which comes from the river 1,200 feet away.

The J. H. McEwen Manufacturing Company, Havemeyer building, New York, is highly gratified at the receipt of numerous orders for generators and engines, from former patrons who thus bear testimony to the merits of the goods. One of the latest of these is from the well-known firm of A. M. Rothschild & Co., New York and Chicago, which firm has had in operation for the past eighteen months two 100-kilowatt Thompson-Ryan generators, direct connected to 15 by 16-inch McEwen automatic engines. This firm expresses entire satisfaction with the plant, and has just placed an order for a third machine.

One of the neatest and most attractive booklets which has reached us in a long time is that now being mailed by the Goubert Manufacturing Company, 14 Church street, New York It is printed in two colors, and in addition to a comprehensive discussion of feed water heating, contains detailed descriptions of the Goubert heaters and condensers, fully illustrated with excellent half tones and wood cuts. Thirteen pages in small type are required to publish the list of users of Goubert machines, one of whom has recently sent in his 48th order, and who evidently has become a "regular customer" by this time.

A handsome catalog is generally an indication of superior goods, and the rule holds in the case of the publication recently issued by the Steel Motor Company, of Johnstown, Pa. The book is artistically executed in every respect, and contains illustrations and brief descriptions of the various parts which go to the make-up of motors, controllers and car fixtures generally. There are appended facsimile reproductions of letters from a number of roads upon which the motors are used which attest more conclusively than volumes of other matter the estimation in which they are held. George W. Henry, 1505 Monadnock building, Chicago, is the general sales agent.

The Electric Mutual Casualty Company, of Scranton, Pa., has been able to furnish a very favorable report for the first four months of its existence. On a membership basis of thirty electric roads for three months it has paid out but $1,200 in settlement of liability claims, with no suits pending and no claims unsettled against any of its members where liability exists. This affords a good indication of the careful selection of risks and the especial fitness and ability of the railway officials and attorneys who are at the head of the association. The members are particularly pleased with the business-like management displayed in handling claims and the association is growing in strength daily.

J. M. Atkinson & Co., of 1439 Monadnock block, Chicago, report a fine business with their horse shoe rail bond. They have recently taken large orders from the following roads: Milwaukee, Racine & Kenosha Street Railway Company, Racine, Wis.; Citizens' Street Railway Company, Memphis, Tenn.; Joliet Street Railway Company, Joliet, Ill.; Bay Cities Consolidated Street Railway Company, Bay City, Mich.; Marietta Electric Company, Marietta, Ohio; Citizens' Street Railway Company, Muncie, Ind.; Louisville Street Railway Company, Louisville, Ky.; Aurora & Geneva Street Railway Company, Aurora, Ill.; St. Joseph Street Railway Company, St. Joseph, Mo.

The Barney & Smith Car Company, Dayton. O., is sending an equipment to the Joliet Street Railway, of its excellent convertible summer and winter open and closed cars. These cars are handsomely finished, and will be a great addition to the Joliet road. Some of the cars are double truck: the smaller cars seating twenty-eight passengers, having fourteen of the Walkover pattern seats per car; the long cars seating forty passengers, having twenty Walkover seats per car. This convertible car is becoming very popular, having large window openings, the space below being filled with screens in summer, and solid wood panels in winter. It was described and illustrated in our issue of July, 1896.

The R. Bliss Manufacturing Company, Pawtucket, R. I., is very busy upon orders for Wood's platform gate, and orders sufficient for the next two months are now on hand. A special set has recently been built for the Chicago & Alton Railroad according to furnished specifications. The gate hangs from the corner of the car and is designed to cover the car step completely, and the operation is entirely different from the regular style. Among some of the deliveries which the company is making is 150 sets for cars of the West End Street Railroad, Boston; 50 sets for Brooklyn Heights Railroad Company, Brooklyn, N. Y.; 20 sets of a 48 set order, from New York & Queen's County Railroad Company, Long Island City.

The Fuel Economizer Company, Matteawan, N. Y., is having a brisk business at present, and has recently closed a large number of orders. Among the more important of these are the following:

Edison General Electric Company, New Orleans, La., for	2,000	H.P.
Montreal Street Railroad Company (second order) for	1,500	"
Lake Cities Electric Railroad Company (second order) for	300	"
United States Projectile Company for	1,000	"
Pfister & Vogel, Milwaukee, Wis for	500	"
Dominion Cotton Mills Company (twelfth order) for	600	"
Otis Falls Pulp Company for	1,000	"
H. Waterbury & Son, Oriskany, N. Y. for	600	"
Toronto Paper Company for	300	"
Ontario Government, Orillia Asylum, for	500	"
Lyondale Bleachery, Rockaway, N. J. for	1,000	"

The thirty-six combination cars recently delivered by the G. C. Kuhlman Company, Cleveland, O., to the Detroit Street Railway Company, are models of design and finish, and are giving excellent satisfaction to the purchasers. The company is at present engaged upon an order for twenty-four vestibule car bodies thirty-four feet in length over all, with monitor roofs extending the entire length of the car. Ten cars also constructed according to the latest ideas in car construction, to which Mr. Kuhlman has added several features increasing the life of the car and the convenience of passengers, have been shipped to Brooklyn. The outlook for fall and winter business is reported very bright. The company's new and commodious factory indicates one of the reasons why its work is of the best quality.

The Consolidated Car Fender Company, Providence, R. I., has issued an eighty-page pamphlet giving full official record of all the front end accidents of the Consolidated Traction Company of Jersey City since October 17, 1894, and the Union Depot Railroad Company of St. Louis since August 18, 1895. Both roads are equipped with the Providence fender, and the data thus presented is of such a character that the thinking manager cannot but acknowledge that the fender has certainly saved these companies thousands of dollars and, doubtless, many lives. The published record is complete, giving name, date, place, circumstances and resulting injury, if any, with names of witnesses in every one of the several hundred cases, and being taken from the record books of the companies is absolutely reliable.

The Standard Paint Company, 81 and 83 John street, New York, whose well-known "P. & B" materials have found great favor among electric railway and light companies, has this season made a very decided improvement upon motor cloth by which it is of considerably less weight and of better body, being therefore not only more pliable, but stronger. It is known as the "P. & B. Ruberoid" motor cloth, and its ingredients are the same as the roofing of that name which is in use extensively in all parts of the world. It is claimed that it will afford perfect protection to motors against storms and winter weather. A full size curtain will be sent as a sample without cost except a two-cent stamp for postage. The company will also send to any electrician enough of any of its materials for a practical test, free of charge, upon application.

The McGuire Manufacturing Company of this city, has already received a large number of orders for its rotary track cleaners for fall delivery and in most cases they are duplicate orders from last year's users. That these sweepers are successful cannot be doubted after reading the stack of commendatory letters in regard to them on file at the company's office. The truck department is running to its fullest capacity and although a decrease in this line is naturally expected at this season, the McGuire Company claims enough orders on hand to keep it busy until very near the holidays. Preparations are being made to handle a very large trade in the stove department this year, and the fact that there are already on hand double the amount of orders at this time last year is very encouraging. The patented ratchet brake handles are growing in popularity, many orders being on hand from large companies, some of which have adopted them exclusively.

The Peckham Motor Truck & Wheel Company, has issued the following notice, over the signature of its president: "I beg to call your attention to the following United States patents which have been granted to me for improvements in car trucks: Patent No. 481,704, August 30, 1892, car truck gear; patent No. 555,526, March 3, 1896, car truck and its gear; patent No. 560,816, May 26, 1896, truss brace for railway cars; patent No. 563,685, July 7, 1896, car truck. Having been advised by my attorneys that the trucks being manufactured by the Diamond Truck & Car Gear Company, of Kingston, New York, are an infringement of the above named patents, I have begun an action in the United States Circuit Court for the Southern district of New York against said company for an injunction and accounting. All users of the infringing trucks will be held responsible for the infringement due to such use. This notice is sent for your protection."

The question of mechanical stoking is more and more coming into the serious consideration of engineers in planning a power plant where economies in steam production are sought after. With many, the value of mechanical stokers is readily admitted, but, who at the same time, class them as very desirable appliances, but not absolutely indispensable adjuncts. When once installed, however, they soon pay for themselves. Considering the sharp lines, which in these last few months have been drawn on the constructing engineer, the business of the American Stoker Company, Dayton, Ohio, has been especially gratifying, and equipments recently installed are as follows: Pennsylvania Railroad Company shops, Columbus, O., (second order); Davis & Egan Machine Tool Co., Cincinnati; Toledo Brewing & Malting Co., Toledo; Michigan Carbon Works, Detroit, (second order); John C. Roth Packing Company, Cincinnati, and Cleveland City Water Works, Cleveland.

The new and large works of the Q. & C. Company, manufacturers of railway supplies and special machinery, which has recently been erected at Chicago Heights, a suburb of Chicago, is kept quite busy on orders for the well-known goods made by this company. It has recently secured orders for six large metal sawing machines, a number of which will carry saw blades 36 inches in diameter, and all but one of these machines are to be run by electric motors. The Bryant patent metal saw, as manufactured by this company, requires such a small amount of power to operate successfully that there is a growing demand for these machines equipped with motors, as the saving in actual cost for operation is considerable, at the same time giving equally efficient results. The company also states that the sales of the Servis tie plate for the present year will be in excess of of those of any previous year, aggregating many millions, and considerable interest in the plate is being manifested by street railway people.

The Hazard Manufacturing Company, of Wilkes Barre, Pa., well known manufacturers of street railway cables, has recently issued an attractive circular, concisely worded, calling special attention to another important department of their business, the manufacture of standard elevator ropes. Attention is called to the fact that human life constantly depends upon the safety and reliability of elevator ropes, and hence the necessity of the use of material and methods of construction tested by long and favorable experience. Standard elevator rope is composed of 6 strands, 19 wires in each strand, or 114 wires in the rope, the several strands laid firmly about a hemp center, which forms a cushion and gives elasticity to the rope. Of the 19 wires in each strand 12 are outer or wearing wires and contain 60 per cent of the total strength of the rope; 7 are inner or pulling wires, are never subjected to wear, and contain 40 per cent of the total strength of the rope. The center wires form a reserve strength after the outer wires are worn or broken.

Eugene Munsell & Co. report that their mica business has been established more than fifty years, so that when there began to be a call for mica for electrical insulation, they had experience which enabled them to meet the demand, and that they have since been constantly enlarging their facilities and studying to meet the varying and increasing requirements of the electrical trade. They also state that their mica is received direct from the mines, and not through second hands. Franklin Brooks, the junior member of the firm, has recently spent much time among the rich mines in Bengal, India, perfecting arrangements by which they receive the finest electrical mica in the world, selected and prepared according to their own instructions. They also have extensive relations with the Canadian miners which enable them to furnish the best amber mica where that quality is desired. The electrical trade, as a rule, prefers to have its orders filled promptly, and this is one of the features of Eugene Munsell & Co.'s business of the past, and they guarantee almost immediate delivery of any orders placed with them. The company have recently established a branch house at Chicago to supply their western customers.

The Hazelton Boiler Company, New York City, reports recent sales of boilers aggregating 2,450-horse-power, among which we notice the following: The Rochester Gas & Electric Company, Rochester, N. Y., 500-horse-power; the Bristol Electric Light & Railway Company, Bristol, Conn., 200-horse-power; the Canadaigua Electric Light & Railroad Company, Canandaigua, N. Y., 250-horse-power. The Hazelton Company reports that nearly all of their orders now being received are for the very earliest possible delivery, and that many of their recent sales have been made to old customers, who are now enlarging their plants. The original boilers sold to these customers have been in constant operation for from eight to ten years, without repairs, still carrying high pressure, and giving the same fine results as when new. This, together with the fact that the Hazelton Company has made various improvements in the construction and setting of its boilers, increasing their efficiency and economy, and improving their appearance, makes it much easier for them to make sales now than formerly. These facts are not only gratifying to the company, but also seem a pretty sure indication of an improved feeling and condition in manufacturing business generally throughout the country.

The Clonbrock Steam Boiler Company of Brooklyn, reports a rush of business, its order sheets being so full that it is necessary to have on a night force to complete orders already booked for January 1, 1897. Among the latest orders are for the American Manufacturing Company, Brooklyn, 500-horse-power; Hazelton Light Company, Hazelton, Pa., 800-horse-power; People's Light & Power Company, Jersey City, N. J., 800-horse-power; Municipal Electric Light Company, Brooklyn, 2,000-horse-power, and one steel self-supporting smoke stack 16 feet diameter and 175 feet high; Economy Light Heat & Power Company, Scranton, Pa., 1,000-horse-power; Johnson Coal Company, Priceburg, Pa., 400-horse-power; Marshall Paper Company, Turners Falls, Mass., 150-horse-power; People's Light & Power Company, Orange, N. J., 200-horse-power; Geo. Watkinson Rubber Works, Philadelphia, Pa., 250-horse-power; Esperanza Plantation, Bayou Lapourche, La., 600-horse-power; Mathieson Alkali Works, Providence, R. I., 300-horse-power; Brush Electric Company, Providence, R. I., 300-horse-power; New York Steam Company, New Station, New York, 3,000-horse-power; Brush Electric Company, Baltimore, Md., 1,000-horse-power; Coney Island & Brooklyn Railroad Company, Brooklyn, N. Y., 700-horse-power.

The Hoppes Manufacturing Company, of Springfield, Ohio, manufacturer of the well-known "Hoppes" purifiers and heaters, has been fairly busy for the past sixty days, having sold over 9,000-horse-power of its product. Among those of their recent sales we note the following:

PURIFIERS:—Indianapolis (Ind.) Hominy Mills, 850-horse-power; Wadsworth (O.) Salt Company, 250-horse-power; Salem Wire Nail Company, Findlay, Ohio, 750-horse-power; Shelby (O.) Mill Company, 300-horse-power; Abendroth & Root Manufacturing Company, New York City, (for export), 50-horse-power; National Cash Register Company, Dayton, Ohio, 400-horse-power and 400-horse-power exhaust steam feed-water heater; College of Agriculture, Mesilla Park, New Mexico, 50-horse-power; City of Quincy, Mich., 100-horse-power; Kansas City (Mo.) Gas Company, 300-horse-power; Atlanta (Ga.) Gas Company, 150-horse-power; Springfield, Ohio, Light & Power Company, 850-horse-power.

HEATERS:—Browning, King & Co., Chicago, Ill., 200-horse-power; Modern Heating Company, St. Louis, Mo., 500-horse-power; Kirkhoff Bros., Indianapolis, Ind., 150-horse-power; J. B. Speed & Co., Speeds, Ind., 600-horse-power; Ellwood Wire & Nail Company, DeKalb, Ill., 1,200-horse-power; Gibsonburg (O.) Electric Light Company, 100-

horse-power; Victor Milling Company, Wichita Falls, Tex., 100-horse-power; Harper Hospital, Detroit, Mich., 200-horse-power; Suburban Gas & Electric Company, Revere, Mass., 500-horse-power; F. A. Elsner, Clinton, Mo., 150-horse-power; J. W. Cottingham, Leipsic, Ohio, 150-horse-power; Preston (Minn.) Electric Light & Water Works, 100-horse-power; Greenville (Miss.) Water Works, 150-horse-power; Arbuckle Bros., Kansas City, Mo., 75-horse-power.

The Ball Engine Company., Erie, Pa., reports an encouraging increase in orders during the past few weeks for engines for electric work. Shipments for the past month are as follows: Bradford Electric Railway Company, Bradford, Pa., one 200-horse-power Cross compound engine; Village of Willmar, Willmar, Minn., one 100-horse-power engine; Fox Pressed Steel Company, Pittsburg, Pa., one 100-horse-power engine, direct connected to Westinghouse generator; Henry Sonneborn & Co., Baltimore, Md., one 25-horse-power engine, direct connected to General Electric dynamo; Rogers, Peet & Co., store building, Broadway, New York City, one 100-horse-power engine, one 25-horse-power engine; National Galvanizing Works, McKeesport, Pa., one 175-horse-power engine; National Tube Works, McKeesport, Pa., one 175-horse-power engine, direct connected to Crocker-Wheeler dynamo; Iowa Agricultural College, Ames, Iowa, one 60-horse-power engine; J. Q. Howe's Sons Electric Light Plant, Phelps, N. Y., one 100-horse-power engine; Cambridge Fuel Company, Byersville, Ohio, one 125-horse-power for electric mining; Institute for Blind, Janesville, Wis., one 40-horse-power engine; Bertha Mineral Company, Bertha, Mo., one 70-horse-power engine; Crook, Horner & Co., Baltimore, Md., one 35-horse-power engine; Gobierno del Distrito Federal, Mexico City, one 80-horse-power engine; H. V. Phelps, Nitta Yuma, Miss., one 25-horse-power engine; Toledo Glass Company, Toledo, Ohio, one 100-horse-power engine.

The Walker Company, Cleveland, O., has recently received orders for incandescent lighting machines as follows: Two 100-kilowatt and one 50-kilowatt, direct connected, multipolar generators for Murray Hill Hotel, New York, and switchboard complete; two 75-kilowatt, direct connected, multipolar generators for Windsor Hotel, New York; One 50-kilowatt, direct connected, multipolar generator and switchboard for Cochin, China. For railway multipolar generators as follows: Six 600-kilowatt, special rope driven, for Chicago City Railway Company; four 200-kilowatt, direct connected, for Englewood & Chicago Railroad; One 400-kilowatt, direct connected, for London Street Railway Company, London, Ontario; One 300-kilowatt, direct connected, for Pacific Power Company, of San Francisco, Cal.; two 150-kilowatt, direct connected, for Albion Construction Company, Chicago, Ill.; One 1,200-kilowatt, direct connected, for Metropolitan Street Railway Company, of Kansas City, Mo.; two 400-kilowatt, direct connected, for Brooklyn bridge; one 800-kilowatt, direct connected, for Albany Railway, Albany, N. Y.; two 600-kilowatt, direct connected, for Syracuse Street Railway Company, Syracuse, N. Y.; two 100-kilowatt, belted generators, for Bamborn, Germany; two 250-kilowatt, direct connected, for Newcastle Electric Company, Newcastle, Pa. Among recent orders for equipments may be mentioned: Twelve double No. 3 narrow gauge motor equipments for Hamburg, Germany; forty No. 5 double motor equipments for Brooklyn Heights Railway Company, Brooklyn Heights, N. Y.; twenty-three No. 10 special storage battery equipments for Englewood & Chicago Electric Railway Company, of Chicago, Ill.; four double No. 10 motor equipments to Union Railway Company, of New York; five double No. 10 motor equipments for Albany Construction Company, of Chicago, Ill.; one double No. 3 motor equipment for Meridian Street Railway Company, of Meridian, Miss.; one double No. 3 motor equipment for Market Street line, San Francisco, Cal.; eleven double No. 15 motor equipments for Rapid Railway Company, Detroit, Mich.; eight 50-horse power for Union Railway, New York.

NEW PUBLICATIONS.

One of the most useful bulletins recently published by the University of Wisconsin is "A Complete Test of Modern American Transformers of Moderate Capacities," by Arthur Hillyer Ford, fellow in electrical engineering in Wisconsin University. The results he publishes are of great practical value to the electric light station operators. Price 35 cents.

Lippincott's Magazine for September, contains the usual variety of interesting matter and is calculated to to prove an attractive number to all classes of readers. An article on "The Natural History of Fiatism" doubtfully compliments the advocates of free silver by saying that the American people have accomplished so much already they think they can do anything. Fiction, verse and miscellaneous articles make up the number.

It is a surprise even to those conversant with the state of the art that such a varied and complete line of electric locomotives should be available in the market as is shown in the publication entitled, "Electric Locomotives," published jointly by the Baldwin Locomotive Works, Philadelphia, and the Westinghouse Electric & Manufacturing Company, Pittsburg. The fact that D. L. Barnes is the editor of it is sufficient proof that the subject is well handled technically.

It is difficult to say anything new about a publication which for twenty-nine years has stood alone in its particular field, and which, while following the same general lines has improved with each year. Such is "Poor's Manual." The work has during its existence been the standard among those who wish for reliable information upon almost any detail of railroading, whether steam, electric or otherwise. The edition for 1896, just issued, contains revised figures upon every point hitherto included, and to this are added the chief features of "Poor's Directory of Railway Officials." The Manual therefore virtually includes two volumes in one and hence will have an added value without increased cost.

The Chicago City Railway Company will rebuild its burned Cottage Grove avenue barn. Its dimensions will be 242 by 642 feet, with a wing 150 by 242 feet. Trackage for 450 cars will be provided, and rooms for wreck and hose bridge wagons, library and reading room.

CITY RAILWAY CONDUCTORS SPRUCE UP.

Chicago City Railway has issued an order requiring conductors on duty to wear white shirts, a collar and a necktie. Carelessness in personal appearance on the part of many of the conductors was the occasion of the general order, which does not include gripmen or motormen.

FROM CHICAGO TO CONVENTION.

The Wabash Railroad will carry many convention visitors from Chicago to St. Louis, as it is one of the leading routes between those two centers, and its service is of the best. Its many connections, east and west, will also serve to attract delegates to travel over its lines from all over the northern central states. The Wagner buffet compartment sleeping cars are used on this line, and every comfort of the traveler is looked to.

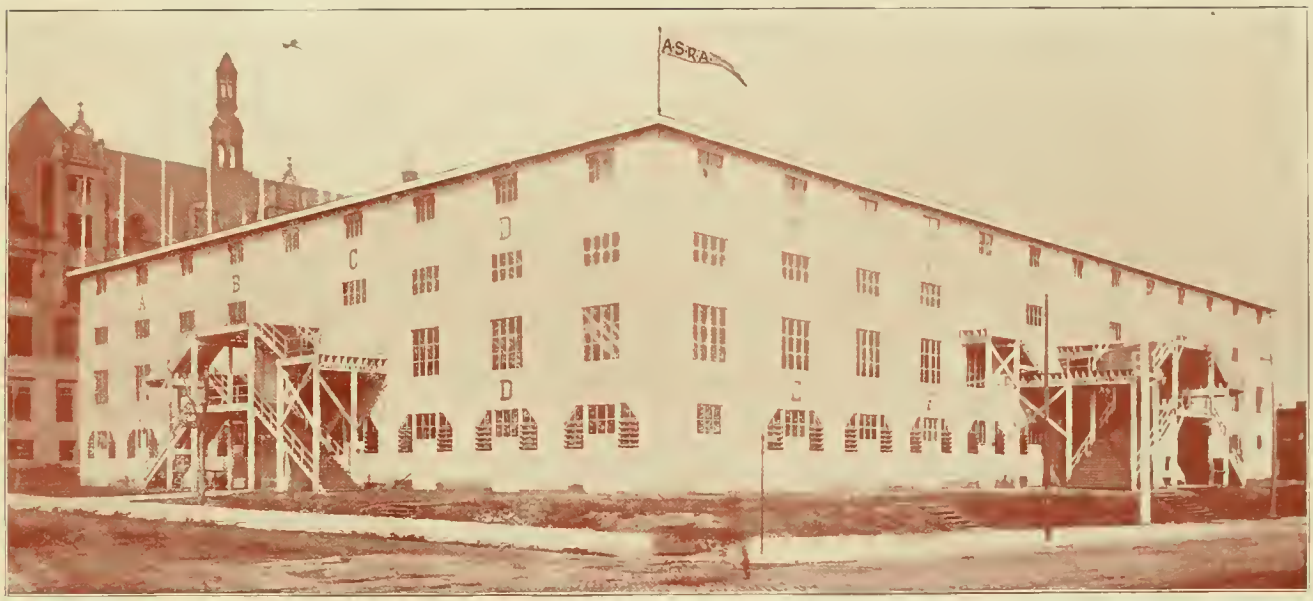
SUNDAY IN THE COUNTRY.

Cheap excursion tickets to Wisconsin resorts are sold every Friday and Saturday by the Chicago, Milwaukee & St. Paul Railway. Burlington, Delevan, Waukesha, Milwaukee, Elkhart, Oconomowoc, Madison, and many other attractive places are within easy reach of Chicago. For rates and other information apply at ticket office, 95 Adams street, or at Union Passenger Station, Canal, Adams and Madison streets.

ST. LOUIS AND CONVENTION.

The Convention City—Its Street Railways, Railway Men and Interesting Features of Operation—Programs and Portraits—What the Visitor Will Want to See.

The Fifteenth Annual Convention of the American Street Railway Association convenes in the city of St. Louis on Tuesday, October 20, and continues in session four days. The meeting promises to be at once in point of attendance, program and exhibits the best in the history of the organization. The following pages contain a succinct yet complete description of the city, its principal features, and particularly those points in its street railway construction and operation which will prove suggestive and instructive to the visiting street railway official.



CONVENTION HALL, A. S. R. A., WHERE MEETINGS WILL BE HELD AND EXHIBITS LOCATED.

The hall in which the sessions of the convention will be held and in which the exhibits will be displayed is situated at the corner of Clark avenue and Twelfth street, convenient to hotels and the business center of the city. Its exterior is severely plain, but the accommodations for both the convention and exhibits being under one roof and so arranged that the entrance to the session hall is through the exhibit space have never been excelled. The building was erected for the Republican national convention.

The appreciation in which the opportunity of having ample exhibit space is held by the dealers in railway supplies is well shown by the alacrity with which the space has been applied for and the amount taken by individual firms. The amount available is 25,000 square feet, and it is understood that more than this quantity has been applied for. Arrangements, however, have been made so that no intending exhibitor is liable to be debarred or seriously restricted.

EARLY SETTLEMENTS IN ST. LOUIS.

It is not generally known that St. Louis is entitled to rank among the older cities of the country. Such is, however, the case, and it also enjoys the distinction of having belonged to three different nations. The first settlement was made in 1764 by Pierre Laclede Ligueste, who established a trading post which he named in honor of Louis XV of France. The next year it became the capital of upper Louisiana, becoming thus a place of some importance. Under a treaty between Spain and France, which had been made in 1763, it was formally taken possession of by Spain in 1770, up to which time it had been practically a French post. The territory of Louisiana, and with it St. Louis, was restored to France in 1800, finally coming into possession of the United States by purchase April 30, 1803. The formal transfer of the territory took place at St. Louis in the following year. The town was incorporated in 1809.

The first steamboat which, with those that followed it, may be said to have had more to do with the establishment of the place as a permanent commercial point than any other one influence, landed at the dock August 2, 1817, and in 1819 John Jacob Astor established the western department of his trading company there. The first city charter was granted September 9, 1822, but it was repeatedly amended until 1836, when the city was organized as a separate municipality. From this point may be said to have begun the rapid growth and remarkable prosperity of the city. For the next forty years the city held an important position between the old and new sections of the country and contributed as largely to the development of the latter as to its own welfare.

Growth and Progress.

It was not, however, the lot of the city to escape the series of disasters which continually fall to the lot of important cities, and by which some are hopelessly swamped and so forgotten. The panic of 1837 fell heavily upon the young city, supported entirely as it was by the kind of commerce which was the first to feel the fluctuations of the money market. This wound having healed, as a physician would say, "by first intention," the Mississippi took upon itself in 1844 the work of removing some of the remaining vestiges of its former prosperity and obliterating the traces of recovery from financial difficulty; the Asiatic cholera in 1848 struck another severe blow, and the fire of the following year assisted in the same direction, though at the same time removing many of the conditions which had made the previous visitation possible. Having had these troubles in its infancy, it is not remarkable that there should have been a speedy and unaided recovery from the visitation of the present year, leaving only scars, though deep ones in many individual homes.

The growth of the city is best shown by a record of the increase in population. In round numbers the figures are as follows:

1840	16,000
1860	160,000
1880	350,000
1896	600,000

There seems no present reason to doubt that the record of the past will be substantially maintained.

(Illustration copyrighted. Used by courtesy of Woodward & Tiernan, St. Louis.)

Notable Buildings.

The growth of the city of St. Louis, in the line of commerce and manufacturing, gives an indication of what may be expected in the way of public and office buildings. The new city hall is not only one of the finest municipal buildings in the country, but is also interesting from the fact that it is constructed almost entirely of native material.

The new union depot is so well known from the extensive publicity which has been given to its general appearance and the details of its construction, through the columns of the press, as to need no further comment than the statement that it is unique in size, beauty and convenience among structures of its class. Among business blocks, the Wainwright, the Commercial, the Boatmen's Bank, Union Trust, Century, and others in process of erection, are such as would do honor to any city; the national government has its local representatives as comfortably housed as the most fastidious official could desire; and the court house is a massive structure, containing costly works of art, and affording from its dome a magnificent view of the business part of the city below.

It has not been found necessary, as in Chicago, that many business blocks should exceed eight or ten stories in height; but the solidity of the business interests is evidenced by the substantial appearance of the places in which they are housed.

BUSINESS & MANUFACTURE

St. Louis is a cosmopolitan city, equally so in the character of its manufactures as in the nature of its population. There are several branches of manufacture in which the output exceeds that of any city in the United States and some in which it claims to lead the world. The United States census of 1890, the latest figures available, gave the number of persons employed in manufacturing as 91,000; wages paid, $52,000,000; capital invested $130,000,000, and the value of goods manufactured $225,000,000. The increase since that time has been sufficient to show a substantial growth, many new manufacturers having sprung up and older ones having increased their plant.

The leading manufactures are boots and shoes, brick and kindred articles, including building material of every description, tobacco, beer, drugs, stoves and ranges, general hardware, saddlery and harness, carpets, clothing, etc., etc. It claims the distinction of being the largest horse and mule market in the world; that one of its tobacco houses has the record of paying the largest government tax ever paid in the United States, and that it is the largest winter wheat and flour market between the two oceans.

IN RIVER DAYS

With all the increase in magnitude and variety of business which St. Louis has experienced in its history, there was one part of the city which in earlier days developed a degree of activity, which it is probable has never since been surpassed. In the days before the railroads had stretched out and brought close together widely separated localities, the Mississippi was the great artery of communication between north and south, as were its branches to a less extent between east and west. Upon this line St. Louis fulfilled the part of a principal stopping place between the cities at the head of navigation and New Orleans at the river's mouth. In those days a Mississippi pilot was king, and whether on board his boat or on land, between times, he seldom failed to claim the allegiance adjudged to be his due. Even around the toughest specimen of the genus "roustabout" something of a halo seemed to hang. To be sure, his work was never done. There were no nights or Sundays or holidays in his calendar. There were lulls sometimes when he slept while at work. He sang always; and his name was legion. In those days the arrival of a passenger boat from up or down river was an event looked forward to with more general interest than it is conceivable that anything could occasion in these later days. The levee was the town; the forum, the market, the place of public assembly for whatever

LEVEE SCENE IN 1870.

purpose. Politics were discussed and the destinies of nations settled by long-haired statesmen from a cotton bale as a rostrum. The balance of the town was simply an eating and sleeping place with some little latitude allowed to such avocations as did not call for the glare of publicity.

The opening of the bridge across the Mississippi may be said to have sounded the death knell of "river days" in St. Louis. Our engraving gives a view of the part of the levee south of the bridge at the time when the foundations of the latter were being laid. With its completion every train that crossed it meant one or more less in number of boats. One by one the interests which had centered on the levee moved uptown in the wake of the railroad trains and became scattered. One by one the boats were drawn up to the bank to rot or were destroyed by fire or snags or sand banks and never replaced. The glory of the pilot departed and the halo

of the roustabout not infrequently slipped from its place and became materialized in a collar of hemp. The days of hams under the boilers for fuel and a "nigger on the safety valve" to keep up the steam are over. But there are those now living who sigh at the retrospect.

THE BIG BRIDGE

No less an authority than the Encyclopædia Britannica is responsible for the statement that "the bridge across the Mississippi at St. Louis is one of the most remarkable structures in the world in character and magnitude." It is composed of three arches, the center span 520 feet and the two side spans 502 feet each. The roadway is 54 feet wide with a double line of street car track occupied by the St. Louis and East St. Louis Electric Railway, and below the roadway are two tracks upon which the steam roads enter the city.

The foundations, both piers and abutments, rest on solid rock, work having in some instances been done at a depth of 110 feet. The frame work or supporting members of the arches are steel tubes 18 inches in diameter and were erected without the use of false work. The bridge was begun in March, 1868, and it was opened for traffic July 4, 1874. The total cost, including approaches, was six and a half millons of dollars.

THE WATER SUPPLY

Nature has not done so much for St. Louis in the matter of water supply as in some other respects. The quantity is ample, but in respect to quality there is something to be desired. However, the waters of the "Big Muddy" are passably well purified before they are delivered to serve their ultimate purpose. The settling basins have a capacity of 20,000,000 gallons, and in these the water pumped from the river is allowed to remain for twenty-four hours. Thence it is pumped eight miles to Baden and allowed to settle again.

(Illustration copyrighted. Used by courtesy of Woodward & Tiernan, St. Louis.)

The water is taken from a tower built on a rock bottom, 1,600 feet from the shore, and passes to the pumping station through tunnels. The maximum capacity of the pumping station is 116,000,000 gallons. The engines used are two Worthington, each having high and low pressure cylinders of 21 and 42 inches diameter, respectively, and 80 inches stroke; they each weigh 500 tons; and two Allis compound condensing engines with cylinders 27 and 52 inches in diameter, and 108 inches stroke.

The plant is more than ample to supply all the water needed for every purpose, and the expensive arrangements alluded to go far toward securing a good degree of purification.

As a Railroad Center

St. Louis as a railroad center occupies a fortunate position, being a natural terminus of roads from the south and southwest, and on the line of the roads traversing the central portion of the country from east to west. It is the connecting link between twenty such systems. It has been estimated that the total mileage of roads entering St. Louis is some thousands of miles greater than the total mileage of the roads of either England, France or Germany. The terminal facilities for handling both freight and passengers are unsurpassed. The tonnage of freight hauled by roads centering at St. Louis is in the vicinity of 20,000,000 tons, carried by about 400 trains daily, and the number of passenger trains arriving and departing is from 300 to 350 daily.

(Illustration copyrighted. Used by courtesy of Woodward & Tiernan, St. Louis.)

The Veiled Prophets

With all its devotion to matters of a business nature, St. Louis has not forgotten that there are other things as necessary to round out a city's life as in the case of an individual. The particular form in which for the last seventeen years it has taken its vacation is in the annual pageant of the Veiled Prophet. So different, however, is St. Louis' potentate from his prototype of Khorassan, who wore the veil to conceal the hideousness of a vissage upon which no man might look and live, that he invites his subjects from the farthest bounds of his domain to join in the festivities attendant upon his visit, and they obey. In the tenth month, on the sixth day of the month, in the seventeenth year of his reign, or, generally and modernly speaking, on the Tuesday following the first Monday in October, the prophet appears, and no man works. He represents all that is pleasant and unselfish, and each citizen strives to see which shall most nearly emulate his characteristics.

On Veiled Prophet's day St. Louis vies in population with the largest of American cities. Every railroad entering the city is taxed to the utmost to handle the body of visitors, some of whom have crossed the continent to be present on that day. The route of the progress is signalized by a lavish display of illumination and decoration of the most artistic design. And though standing and seeing room are at a premium for a brief space, the immediate followers of the prophet see to it that the guests who have been attracted by the splendor of the occasion shall suffer no detriment in the loss of

creature comforts, or in the things that tend to the relaxation of the spirit. Great is the Veiled Prophet and St. Louis is his seneschal!

The Annual Exposition

The Mechanical and Agricultural Exposition of St. Louis has long been the greatest fair in the West or South, and each year witnesses an improvement upon the preceding. It is not only a complete exhibit of the vast agricultural and mineral resources of the section of which it is the commercial center, it becomes also an important element in the development of those resources by the presentation of the appliances and processes of other sections which from natural causes have been able to make greater advances along the lines which its once neglected and neglectful tributary population are striving and being aided to follow. A showing of the immense manufacturing facilities contained within the city itself is, of course, no small part of the exposition. The business enterprise and public spirit displayed by St. Louis manufacturers in the support of the exposition constitute a part of the foundation on which the city's prosperity has been built up.

EXPOSITION BUILDING.

New City Hall

What is destined to be one of the handsomest and most striking of the buildings of St. Louis, is the new City Hall, as yet uncompleted as to the interior. Its roomy site, covering the space between 12th and 13th streets and Market street and Clark avenue, gives an excellent opportunity for the display of its architectural beauties, though it must be confessed the same causes exaggerate its present unglazed windows and roughly boarded entrances. The structure was begun in 1891, under the supervision of Eckel & Mann, St. Joseph, Mo., architects, and the estimated cost was $1,000,000. There has already been expended about $1,150,000, the city having appropriated up to the present time $1,368,000.

The basement and first story are laid in Missouri granite. The upper stories are of brick with Amherst, O., sandstone trimmings.

St. Louis' Biggests

St. Louis takes great pride in her "biggests" as compared in some cases with other cities of the United States, and in not a few instances with the world. She claims, as compared with the world, the largest railroad station, the largest hardware, drug and wooden ware houses, the largest tobacco factories, lead works and brickyards, and the largest manufactory of stoves and ranges.

In comparison with other cities of the United States the claims embrace the largest brewery, the largest shoe factory, the most extensive street car factory, the finest street cars, the most beautiful and extensive botanical garden, and the largest output of hardwood lumber, shoes and saddlery. It is the second largest shoe distributing point in America, and the third in rank as a dry goods, clothing and grocery market. It also "points with pride" to the fact that it is the only municipality in the world which has held eleven consecutive, annual self-supporting expositions.

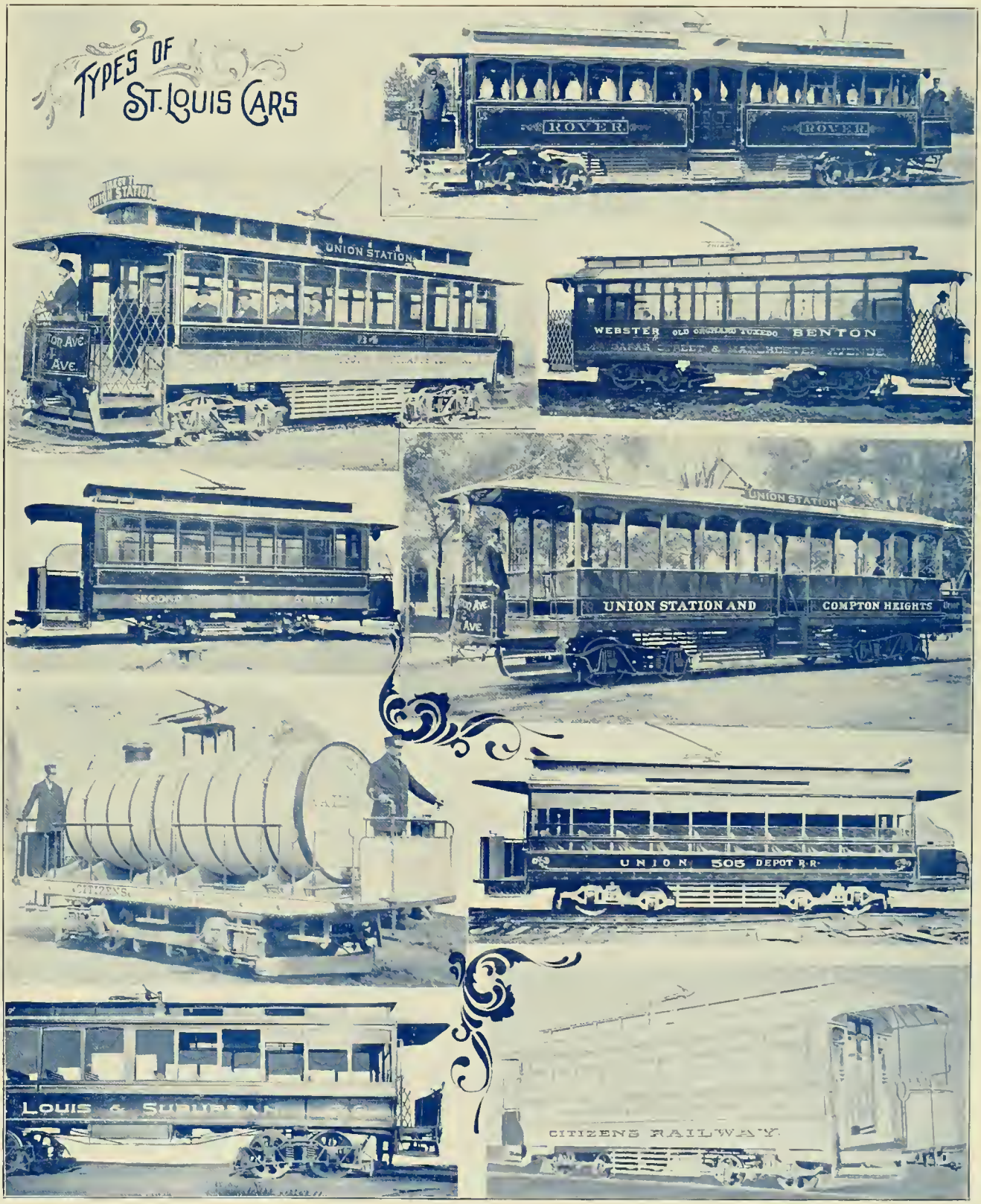
It has 317 miles of electric street railroad, and was the first city to run electric mail cars, to sprinkle its streets by municipal contract, and to light its streets and alleys uniformly with electricity. Its street car lines carried in 1894 98,000,000 passengers, and in order that people outside of the city may know these things, or having once known them, not forget them, it has established a permanent bureau of information in the form of a Business Men's League, incorporated for the purpose of representing the commercial and financial interests of the city and encouraging manufacturing and other enterprises. The list of "biggests" is therefore in a fair way to be increased.

Educational Work

The educational facilities of St. Louis rank with those of any similar city in the United States. Its citizens in the earlier days had faith that it would at one time come to be one of the large cities of the country and planned its public school system on a liberal scale. The foundation thus laid has been built upon with equal liberality. The present school equipment is, in round numbers, 100 buildings and 1,400 teachers, caring for 60,000 pupils, at

an expense of one and a half millions of dollars per annum. A magnificent high school building has recently been erected. The methods of teaching and the school system in general are models.

In the matter of higher education the city has ample facilities. Washington University is a nucleus around which are gathered the Manual Training School, the Mary Institute, the Law School and the Museum of Fine Arts, and the whole furnishes possibilities in the way of educational training surpassed by few cities.



CYCLONE.

The cyclonic visitation which came upon St. Louis, May 27, paralyzing business and especially the street railway service, left but few visible traces which have not at the present time been removed. It is possible that this statement should be so qualified as to include only those who are not residents of the city, since some natural landmarks were destroyed which can never be replaced, and those which the hand of man has replaced can never be quite the same.

The principal present indications of the path of the cyclone to the casual visitor are found in the pieced-out chimneys and fire-walls which bear evidence of having been recently rebuilt. These are to be seen in widely separated sections of the city. Occasionally there appears a wooden structure whose windows and doors were evidently blown in and whose walls are too much out of plumb to suggest to the most sanguine the possibility of habitableness. In East St. Louis this condition is especially noticeable and the splintered ruins of many houses are not far to seek.

Among the street railroads, the Union Depot Railroad Company was the greatest sufferer; but the debris of the tall chimney whose fall caused the greater part of the havoc was cleared away, and in 13 days a new chimney built. Meanwhile, borrowed power helped to bridge the gap in the regular service. The power house of the People's Railway had the roof and part of the walls removed, and the line was forced to run for a time with uncovered power plant. The service is now regular, though the power-house bears evidences of haste in its temporarily reconstructed condition. The Lindell Railway lost a car house and repair shop and sustained some damage to its power houses, but its cars were running regularly after a few days. The Bridge line lost its cars and car house.

Parks, churches, residences and miscellaneous buildings have retained evidences of the visitation for a longer time, since in most cases the necessity for their immediate rehabiliment was not so apparent. Our illustrations present some of the scenes immediately following, and it is easy to judge that the marks are not easy to be erased. That the traces have been so thoroughly removed, however, speaks well for the public spirit of St. Louis' citizens.

Evangelist—My dear man, don't you believe in a guiding power overhead?

The Reprobate—No, sir! I'm an advocate of compressed air motors. No overhead system for me.—Brooklyn Life.

SHAW'S GARDENS.

One of the most attractive spots in St. Louis and one of which its citizens are justly proud, not only for the reason that it excels anything of its class in the country, but also for the reason that it is a monument to the public spirit of one of their own fellow-citizens, is known from the name of its donor as "Shaw's Gardens." For many years Henry Shaw occupied an unpretentious residence upon this site and devoted himself to securing for its adornment in future generations every rare or beautiful plant and shrub which temperate or tropic zone could furnish and unlimited wealth transplant and care for. And for many years prior to his death it was his great delight to see that such care was assiduously given, though even then it was generally known that the city of his adoption would become his residuary legatee. A magnificent stone sarcophagus, built according to the orders of its future resident and on hand for some time prior to his death, marks the resting place, in the midst of tropical scenes, of the one whose munificence made possible their enjoyment by rich and poor alike.

The gardens are easily accessible by various street car lines and are well worthy of a visit from even the busiest. Our illustration conveys a partial idea of some of the views which the gardens afford.

(Illustration copyrighted. Used by courtesy of Woodward & Tiernan, St. Louis.)

The Greenfield & Turner's Falls, Mass., Street Railway is entertaining its patrons at Lake Pleasant, the present season, with balloon ascensions, trained dog shows, etc., and provides an excellent orchestra for dances and concerts.

AIR BRAKES SAVE A LIFE.

The compressed air cars running in New York city, are, of course, equipped with air brakes. A few days ago, a mother with a child in her arms, a little over four years old, alighted from a cable car and started across the tracks behind the car when the air car came along going at a high rate of speed. The child ran directly in front of the car and the motorman realizing the peril of the woman, put on air brakes and reversed the car, stopping it within six inches of the child. The motorman said that when he first discovered the child he was satisfied he must run over her but for the air-brakes, as it would not have been possible to have stopped in time.

THE A. S. R. A.

The American Street Railway Association was organized in Boston in 1882. It now numbers 170 members. Membership is composed of street railway com-

HARVEY M. LITTELL, PRESIDENT A. S. R. A.

panies, not individuals. Place of meeting, year and president to date are as follows:

Place.	President.	Year.
St. Louis	H. M. Littell	1896
Montreal	Joel Hurt	1895
Atlanta	Henry C. Payne	1894
Milwaukee	D. F. Longstreet	1893
Cleveland	John G. Holmes	1892
Pittsburg	Henry M. Watson	1891
Buffalo	Thomas Lowry	1890
Minneapolis	George B. Kerper	1889
Washington	Chas. B. Holmes	1888
Philadelphia	*Thomas W. Ackley	1887
Cincinnati	Julius S. Walsh	1886
St. Louis	*Calvin S. Richards	1885
New York	William H. Hazzard	1884
Chicago	H. H. Littell	1883

Boston, organization meeting, Moody Merrill, chairman, Dec. 12, 1882.
*Deceased.

OFFICERS.

President—H. M. Littell, New York.

First Vice-President—Granville C. Cuningham, Montreal.

Second Vice-President—Wm. H. Jackson, Nashville.

Third Vice-President—J. Willard Morgan, Camden.

Secretary and Treasurer—T. C. Penington, Chicago.

EXECUTIVE COMMITTEE.

The above and Joel Hurt, Atlanta; Prentiss Cummings, Boston; C. G. Goodrich, Minneapolis; A. Markle, Hazelton, Pa.; W. F. Kelly, Columbus, Ohio.

The Baltimore City Passenger Railway Company has put in service some new grip cars. The grip and brake are each controlled by wheels on the front platform, doing away with the former system of levers.

WHAT WE TALKED ABOUT IN ST. LOUIS IN 1885.

As a striking illustration of the revolution which has occurred in street railway practice in a few years past, the subjects which were uppermost in the minds of managers then form an interesting comparison now.

The report on diseases of horses was as long as all the other reports combined, and the discussion over meningitis and glanders waxed warm. The cable was then believed by most present to be the power which would be most generally adopted, and electricity was looked upon as a curiosity rather than a practical solution. The following was the

PROGRAM IN 1885.

Diseases common to Car Horses and their Treatment.
Progress of the Cable System of Motive Power.
Progress of Electricity as a Motive Power.
Repairs of Track.
Rules Governing Conductors and Drivers.
Taxation and License.
Ventilation, Lighting and care of Cars.

The papers, however, were all good; the discussion earnest and instructive, and after having attended this convention, and all since, the writer does not hesitate to affirm, that for its day and generation, the last St. Louis Convention has never been surpassed.

CHECKING BAGGAGE.

The Seashore Electric Railway of Asbury Park, N. J., of which C. A. Hammond is general manager, has been handling baggage the past season in connection with a boat line running to New York. A separate baggage car is run to connect with boats and baggage is checked the same as on steam roads. Baggage is transferred and delivered by wagon. Through express was handled and the road received a pro rata amount of the entire charge of 60 cents to New York. This includes delivery.

THOMAS C. PENINGTON, SECRETARY A. S. R. A.

EXECUTIVE COMMITTEE A. S. R. A.

C. G. GOODRICH.

A. MARKLE.

How thoroughly the selection of the executive committee represents the various portions of the country is shown in the location of the cities in which the members live:—New York, Chicago, Atlanta, Camden, Boston, Montreal, Columbus, O., Minneapolis, and Hazelton, Pa.

MOTORWOMAN AT NEWARK.

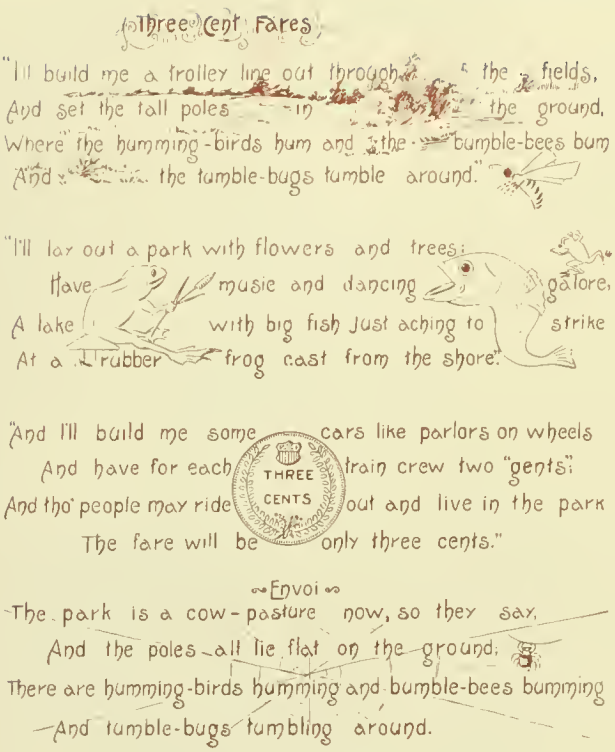
The official car of the Consolidated Traction Company, Newark, N. J., was recently run from Newark to Jersey City by the wife of one of the directors of the road who was taking a party of friends on a trip to Bergen Point. Presumably on the theory that though a director runs the road, a director's wife runs the director, the motorman had nothing to say when requested to yield up the levers. No lack of confidence was displayed by the party in the car, and the result showed that they were quite correct. The car rounded up at the Jersey City ferry in the regulation style.

TROLLEY IN THE FIRE DEPARTMENT.

A short time since the REVIEW enumerated some of the various purposes for which the accommodating trolley car has been utilized, but since that time a new field of service has been brought to notice. The trolley lines of Brooklyn reach far out upon Long Island. During a big fire at Bath beach recently, the engines of the Brooklyn fire department were hitched to trolley cars and hauled to the scene in so much shorter time than horses could have done it that the New York papers, even, have made extensive use of the opportunity to say a word in favor of the trolley. The same thing has been done on a steep hill at Wayne, Pa., and it would not be surprising if a short time should see the trolley enrolled under certain conditions as a regular member of a city fire department.

HEAT SIGNALS USED AT COLUMBUS.

With the approach of the cold months it will interest those roads employing electric heaters to know of the system adopted last winter by W. F. Kelly, superintendent of the Columbus, O., Street Railway, for regulating the use of current for heating. Mr. Kelly thinks that the matter of the use of heaters can not be well left to the discretion of conductors, because, except when collecting fares, they are outside the car, and the car may be uncomfortably warm without seeming so to the conductor. In addition to preventing the overheating of cars there is a decided saving at the power house by having heaters turned off when they are not needed. Consequently, at Columbus, the conductors are governed, not by their feelings as to whether cars are too warm or too cold, but by a red target placed at the office door. With the exception of three or four cars, all cars of the system pass this point. An attendant in the office regulates the position of this target according to the temperature, which he obtains from a thermometer hanging near. When the target is visible heaters are to be used. When it is not visible all heaters are to be turned off. Mr. Kelly reports the unique fact that before this system was adopted there were frequent complaints of too warm cars.



NEW DOUBLE REGISTER.

The International Register Company, of Chicago, announces that its new double register, in perfecting which many months have been spent, will be on exhibition at the St. Louis convention. This machine is finer in appearance than anything the company has heretofore produced, and the superior quality of its mechanism will be admitted by all who examine it. It has one trip register and two totalizers, all of which can be read from the opposite end of the car. There is also a large sign showing in the center of the dial which indicates plainly whether the last fare registered was "cash" or "transfer." The totalizers on this machine will warrant the attention of all who are interested in mechanical safeguards against tampering with the permanent record. The numeral stationary register produced by this company last year is now giving satisfaction on a large number of railways on account of its durability and the many new safeguards against "beating" which it offers. New types of this machine will be exhibited at the convention.

OPENING FOR BOWLING GREEN.

The opening of the new line of the Toledo, Bowling Green & Fremont, O., Electric Railway, which practically annexes Bowling Green to Toledo, was celebrated September 16, by a trip of the officials and prominent citizens over the line. The new part of the road is from Perrysburg to Bowling Green, a distance of 13½ miles, and on this trip it was covered in 28 minutes. The line is almost perfectly straight, and it is said that the car moved as smoothly as a carriage over asphalt pavement. The track is laid with 60-pound rails in 60-foot lengths on 180 ties to the mile and with broken and suspended joints. The trolley wire is of figure 8 pattern and the feeding is done on the booster system. The cars are of modern design, 42 feet in length, equipped with two 50-horse-power motors each and weigh 18 tons. Each has a seating capacity of 45 persons, is lighted with 15 incandescent lamps and heated by steam. J. N. Bick, of Toledo, was the contractor for the construction of the road, and the work has apparently been most thoroughly and substantially done. C. G. Geddes is the new manager of the road.

LEAKAGE TESTS ON LAKE STREET ELEVATED.

The Lake street elevated road of Chicago was put in electrical operation a second time September 20. About the time it was started tests were made to find out how the insulation was standing up under the influences of time and weather. The third rail and feeder system has been down since last spring. The details of construction were shown in our issue of March, 1896. The third rail is supported every five feet by an insulator having a metal bell covering an insulated bolt of Aetna insulating compound. The feeders on the structure are on vitrified clay supports and boxed over, but have no insulating covering. The entire feeder and third rail system was designed by the electrical department, of which J. R. Chapman is manager. The tests for insulation resistance were made with a Weston voltmeter of 70,991 ohms resistance, having a scale of 0 to 600 volts. The leakage was measured with a low reading Weston ammeter having a 15-volt scale.

A test was made on the night of September 16 on the feed line which feeds one section of the elevated road from the Hobbie street power station. This feed line is 7,000 feet long, and is composed of four cables, making a total of 28,000 feet of cable. The feeders were disconnected at the structure at the time the test was made so that the test includes simply the line running from the power station to the elevated structure. It is on iron poles with Aetna feed wire insulators except where it goes under the Chicago river. The weather was fair. The insulation resistance was 171,752 ohms. This is about 910,800 ohms per mile of cable.

The same night a test was made of the entire third rail and feeder system of Section 1 of the road. This is the section including the down town terminus. It comprises two miles of trolley rail and a lot of special work at terminals. The insulation resistance of this was 150,333 ohms.

A test was made on the night of September 19 on the feeders and third rail of Section 4. This is at the extreme outer end of the road and is fed from the Cicero & Proviso power station. It is composed of two miles of third rail and 7,000 feet of feed line on poles. The weather was fair and the insulation showed up at 283,964 ohms.

The feeders and trolley of Section 2 fed from the Western avenue station were tested on the night of September 16, and found to have an insulation resistance of 19,600 ohms.

This section has six miles of third rail and seven miles of 1,000,000 circular mil bare copper feed cable on the structure.

The same night Section 3 feeder and trolley were tested and found to leak .1 ampere at 530 volts. This section has seven miles of bare copper cable and five miles of third rail.

On September 17, after it had been raining all day, Section 2, mentioned before, was tested and leaked 1.4 amperes at 525 volts.

PICNIC TRAIN AT WINNIPEG.

The Winnipeg Electric Street Railway Company has provided excellent facilities for taking care of picnic and excursion parties at small expense, and the public appreciation of the company's efforts is shown in the accompanying engraving. A train consists of one motor car and four trailers. The special novelty of the outfit is found in the trailers. These are made out of old horse cars with the same axle and end gear, but having new platform and sills and a railing about two feet high all around. Seats are arranged on both sides and across the ends with room for a passageway from the steps at each end. Poles are erected at each end and wires carrying a string of lamps supported by the poles light the car.

G. H. Campbell, manager, writes us that the open trailers are highly appreciated for picnic parties and moonlight excursions, and with a large train load such as that shown the trains present a very attractive appearance. The plan is one that can be put in service by almost any road and a small investment should yield good returns.

HOME-MADE EXCURSION CARS—WINNIPEG.

HEATING BY EXHAUST STEAM.

In the June number of the REVIEW was presented some account of the Holly system of heating by exhaust steam from street railway and other power plants. One of the principal installations of the system is that of the Springfield, Ill., Electric Light and Power Company, and the experience of this company furnishes such an amount of valuable information generally upon this important source of economy and profit that no apology is necessary for presenting substantially in full the reply to our letter of inquiry upon the subject. A. L. Ide, president, writes the REVIEW as follows:

"In reply to your letter, will state that the Holly system, which was installed for our company by the American District Steam Company, of Lockport, N. Y., six years ago, has proven successful and satisfactory in every respect, both to ourselves and to our customers. We are at present heating between four and five million cubic feet of space. Our station is centrally located, and the greatest distance steam is carried is one-half mile from the station. We have seven Ideal engines of 150-horse-power each, connected with the main service pipe, and in addition to this we have a 10-inch main connected with the street railway power house, where they have one engine of 150-horse-power and one engine of 300-horse-power, so that we utilize steam from both the street railway and our electric light station, the two stations being located about a quarter of a mile apart.

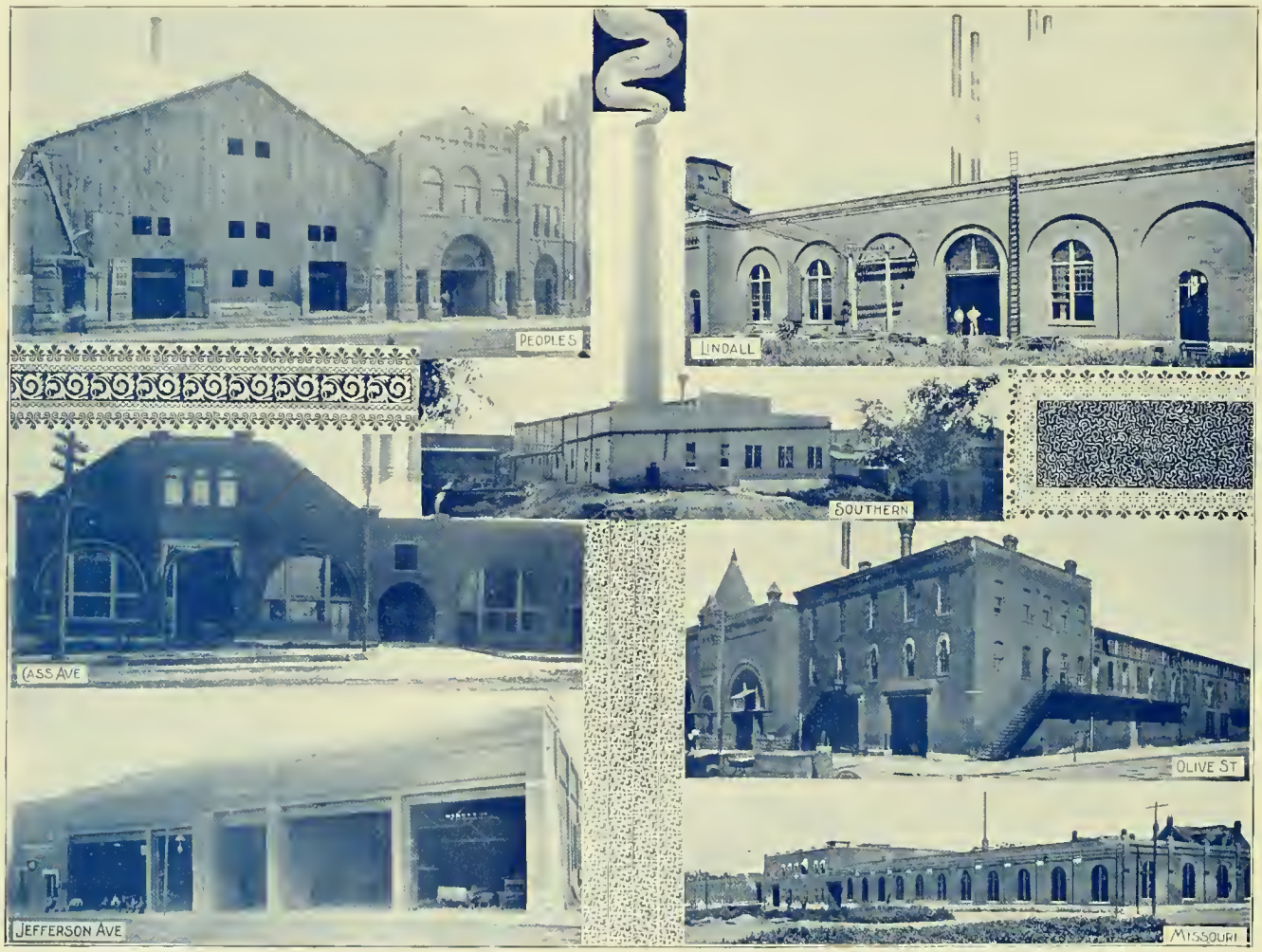
"We find it requires about 6 pounds back pressure to supply steam at 2 pounds pressure in the service pipes to the farthest customers when the temperature of the atmosphere is above freezing, and when the temperature drops in the neighborhood of zero we carry 8 to 10 pounds back pressure at the engines, which supplies 4 to 6 pounds pressure in the service pipes of our customers. To offset or compensate for this back pressure

on our engines and avoid reducing the power of our engines we carry 8 to 10 pounds additional steam pressure on our boilers, and this extra pressure requires but 2 to 3 per cent additional fuel and gives us the same power from the engines as though they were exhausting into the air. Two pounds pressure in the radiators is sufficient to heat the buildings comfortably with the temperature below zero, providing sufficient radiating surface is provided in the building.

"We find the average amount of radiating surface required in business buildings is about 1 square foot for each 100 cubic feet of air. Buildings in the center of the block require only 1 foot of heating surface for 150 cubic feet of air, and corner buildings, that is, rooms where two corners of the room are exposed, require 1 foot of surface for every 80 to 100 cubic feet of air, according to the amount of glass exposure. We find fully one-third less radiating surface is required in radiators in buildings that are heated from the central station than would be required if boilers were placed in the building, because steam from the station is supplied twenty-four hours per day and is never shut off during the heating season of nine months, and where buildings are warmed with low pressure boilers it is usual and customary to dispense with the engineer during the night and allow the steam to get down, and the radiators become cold and filled with air and this loss of radiation must be compensated for by installing a greater amount of surface than would be required if the radiators were kept constantly filled with steam.

"The system is profitable to the extent that we are receiving $12,000 per annum for our exhaust steam, which otherwise we would be throwing away. The cost is only a fair interest on the investment and depreciation of the system. The price we charge our customers is 25 cents per square foot per annum for the radiating surface in the radiators in the building. This price is much below the cost of their furnishing their own steam and is entirely satisfactory, and is proving a profitable investment for our company, as the revenue received from exhaust steam more than pays our entire fuel bill for operating electric lights and street railway.

"During the six years' service the entire repairs have cost us less than $50, having had only one leak, which was a split service pipe, caused by the bursting of a city water pipe connection which flooded the conduit through



SOME ST. LOUIS POWER AND CAR STATIONS.

which our service pipe passed, thus condensing the steam and causing a water hammer which split the service pipe. We are not required to keep any extra help or attendance on account of supplying exhaust steam. We are supplying heat for over 200 buildings, including the county court house, jail, government building, the principal stores and a few residences. Our steam heating system is the most profitable part of our business."

JUVENILE CONDUCTORS.

In the old horse car days, so full of pleasant reminisences to those who were in street railway work ten years ago, the tow boy was one of the fixed institutions of the road. Usually he graduated into a conductor or driver. And there are not a few of the best known and most successful managers of big roads to-day who point with pride at the time when they reached the first step in the ladder, and that step was the humble position of tow boy, whose meager monthly earnings make small comparison with their present salaries now counted by several thousands each year.

But boys as conductors is a feature seldom found, and a diligent search the country over has disclosed thus far only two cities where small boys collect nickels and ring up fares. Oddly, too, these cities are widely apart, one being St. John, New Brunswick, the other, Oakland, California. We have thought it interesting to publish the photograph of one of these, and our portrait illustration is that of Burton C. Waring, of St. John. In answer to our inquiry Burton writes he was 15 years old on May 27 last, and has been with the company most of the time during the past two years. When not so employed he attended school. He is a bright, manly little fellow, whom we can well believe is polite to the ladies young and old, and who, doubtless, can by tact manage an obstreperous passenger where an adult conductor would have to use physical force. We hope he will be president of this road or some other some day. Burton received his appointment as a reward for good service in the company's general office, though he ought to have something of a "pull" as his father is an alderman.

CONDUCTOR WARING.

The East Oakland, California, Street Railway employs six boys, the other of its cars using adult conductors. One of these boys, who is only 13 years old, has a run down into the business district. The five others run in the suburbs. The conductor on the Broadway line is a wee little fellow, who takes his car at noon and runs until 11 o'clock at night. The boys receive $15 per month, a saving on the six over what is paid the men of $270 per month. The fact that the road is in receiver's hands is given as explanation for the employment of the boys, and that it was a case of boy conductors at boy's wages or less cars. Some one tried to get an ordinance through prohibiting the employment on a street car of any person less than 18 years of age, but it was lost, and instead one was substituted requiring two persons on a car. It reads as follows:

Section 1. It is hereby declared to be unlawful for any motorman, gripman or driver operating or controlling any street car within the limits of the city of Oakland to leave the position occupied by said motorman, gripman or driver in operating or controlling the machinery, horses or other motive power of the car while said car is in motion.

The boys are said to be bright little fellows and ambitious workers, who rarely miss a fare, neither do they "frequent saloons or drink."

In most cities where the ordinance mentions age it requires the men to be not less than 21 years old. The Oakland road has been quite free from accidents though, as one of the motormen says, "Oh, the boys do well enough for boys, but you know boys are not men." At the same time the boys attend strictly and faithfully to their duties, and leave undone some things which their elders might omit with advantage. So, all credit to the little workers and a bright and successful street railway future.

ABOUT RAIL SAWS.

The Q. & C. Company, this city, whose rail saw is being adopted in all parts of the country, hand us the following:

"There is considerable interest now being taken in this subject by the street railway people generally, and we have noted your issue of August 15 containing description of a rail saw at Grand Rapids, and which, while doubtless effective, is exceedingly cumbersome, dangerous, noisy and attended by objections which are entirely overcome by the use of our No. 10. For instance, the disc saw running at immense speed requires a large amount of power to operate, and the temper is drawn from the metal cut, at the place where it is cut, and the surface requires hand trimming after the cut has been made. The Bryant saw only requires 2-horse-power to operate at full capacity, and we have already rigged up a number with electric motors, and as nearly every street car line is now provided with electric power, it is possible to use the machine at any point with little drain upon their power supply, and with the very best results, as the slow motion of the saw in our machines does not interfere with the temper of the metal cut, is not noisy or dangerous, and at the same time leaves a cut practically square and free from burrs, necessitating no hand trimming whatever after the cut has been made."

There will be sample saws in operation in Exhibit Hall.

TROLLEY EXPRESS SERVICE IN BROOKLYN.

A Big Success—Five Deliveries Daily—The Banking Feature.

The Brooklyn Heights Railroad Company, operating something over 250 miles of track in the city of Brooklyn and suburban towns, was asked during the winter of 1895-96 by the Manufacturers' Association of Kings and Queens counties to consent to an arrangement by which high class express matter could be transported between different points in the city and suburbs, and as well to points outside of the city upon trolley express cars, and do away with long and expensive wagon hauls. A contract was entered into with the National and American Express Companies, and the new service was opened on June 15, 1896. The system as put in operation is as follows:

Two central receiving and distributing stations are located at convenient points on the river front, and into these places the express cars run and receive and deliver all merchandise collected. From these points wagons are used to make transfer to New York city and Jersey City by boat. At some twenty central points throughout the city branch offices have been established in buildings belonging to the railroad company, and into each of these buildings the express cars run direct. According to the importance of the business each of these branch offices embraces from one to two square miles of territory, and wagons are used to pick up and distribute and bring to these central points. Five trips are made daily, reaching all points on the company's system, including not only every point in the city of Brooklyn, but Jamaica, Flushing, Newtown, Corona, Richmond Hill, Coney Island and other similar points.

The express company not only handles single packages, but in a number of cases is handling the entire business of the retail merchants and marketmen who, by this system, can make five deliveries to any point in the city where with their wagons they found it difficult to make even a single delivery to the points of longest haul. Goods that are now collected in New York or Jersey City, or brought in by the railroads from the west and south are now delivered at any point in Brooklyn within three to five hours, where, oftentimes goods purchased in New York, would not be delivered until the following day at distant points in Brooklyn.

In addition to these central points the express company has established upward of 100 branch offices in drug stores, where packages can be left or orders for calls left. All of the stations are connected by long distance telephones, and promptness in answering calls has been made a special feature of the business. At all of the regular offices money orders and travelers' checks are sold and payable practically everywhere throughout the commercial world, and the company also executes commissions to purchase goods or transact business at any points in the United States where its agents are located.

The business is constantly being developed, but it has already proved of very great benefit, not only to householders, but to retail merchants and marketmen and others throughout the city. Owing to the connections of the express companies with nearly all of the other express companies they are enabled to bill through to nearly every point not only in this country but to foreign cities. The movement of the cars is not permitted to interfere in any way with the passenger service, and there has not been a case where there has been cause for complaint in this respect, as the cars take the lines of travel which are least used for passenger traffic. The mileage made by the cars at the present time is about 600 miles per day. President Rossiter of the Brooklyn Heights road has had his expectations fully realized thus far in the development of the express business, and that means a good deal, for Mr. Rossiter is a very progressive man and one who always aims high.

RUBEROID CLOTH FOR WINTER.

The Standard Paint Company of New York has for some years made a cloth known as P. & B. motor cloth out of jute burlap. This is strong but quite heavy. An improvement has been made this year by substituting canvas for burlap, making it much lighter in weight than the old style motor cloth, more flexible and easier to handle. At this season of the year when managers are looking for something to protect their motors against snow and sleet Ruberoid motor cloth will be a very welcome article. The cloth is saturated with Ruberoid, the same material that is used for making the P. & B. Ruberoid roofing used all over the world.

HUMILIATED.

She was a well dressed young woman, who looked haughtily upon her fellow beings in the crowded cable car and seemed to marvel at the class who could habitually patronize that plebeian mode of conveyance. Those who noticed her scornfully inquiring air resented it, but not until the transfer station was reached did they have their revenge. The well dressed young woman had taken her transfer slip and crammed it into her card case absentmindedly. When she boarded the second car and the conductor demanded her ticket, she was for a moment at a loss to remember what she had done with it. Then remembering, she drew it forth, handed it to the waiting collector of fares and looked scornfully about her. He gave a look at the slip she had offered him and returned it, remarking loudly:

"Pawn tickets don't go on this line."

The haughty young woman had lost something of her Vere de Vere air by the time she had made the correction in her fare, and the plebeians who habitually patronize the cable roads were smiling happily at her.—New York Journal.

TROLLEY IN EGYPT.

Cairo Welcomes the Trolley—Unexpectedly Large Traffic—Donkey Boys Retire—Natives Are Liberal Patrons.

[FROM OUR OWN CORRESPONDENT.]

The opening of the electric tramway line in Cairo on August 12, was an event that partook of considerable formality and not a little of the circumstance and pomp of an oriental official function, for his excellency Fakhry Pacha, Minister of Public Works, the diplomatic representatives of Belgium, whose countrymen were the fortunate contractors, and a host of picturesque personalities of various nations had been invited to make the first trip, and afterwards celebrate it by speeches and a banquet.

The concession to construct the line was granted on December 5, 1894, and a condition of the grant was its completion within two years after that date. Work commenced in the following spring, and on the first of August last, the first trial trip was made with such satisfactory results that two weeks afterwards a portion of the double line, running from the Boulac district (the old port of Cairo on the Nile) across the most central business section of the city at the Opera Square, thence passing the foot of the "Mouskee," that street of stores and bazaars dear to the tourist heart (and pocket) on up the long rising Mehemet Ali avenue to the foot of the Citadel, was opened for traffic.

This section is the only one opened so far, and has proved remarkably renumerative: the native population even more than European patronizing the line extensively. Other train crews are being drilled, and the network of lines which runs through and about the city to all points of traffic importance will shortly be in use.

INAUGURATION OF THE TROLLEY SYSTEM AT CAIRO, EGYPT.

The station capacity is 900-horse-power, distributed between three condensing Sulzer engines, running 120 revolutions per minute. The boilers are equipped with fuel economizers. The boilers were furnished by the firm of Tosi, of Milan, Italy. Condensing water is furnished from the Nile by three electrically driven centrifugal pumps.

The installation of the entire electric plant of the tramways was entrusted to the Union Electricitats Gesellshaft of Berlin which works under the General Electric Company's patents. The motor cars are provided with two motors of the G. E. 800 type, and can easily pull two trailers on the heaviest slopes, the cars being small.

Many predictions were made that there would be a vast number of casualties, as the lower classes of the natives are singularly apathetic in their movements, a characteristic that renders driving oneself a very mixed pleasure. However, I have not been able to learn of any serious accident so far.

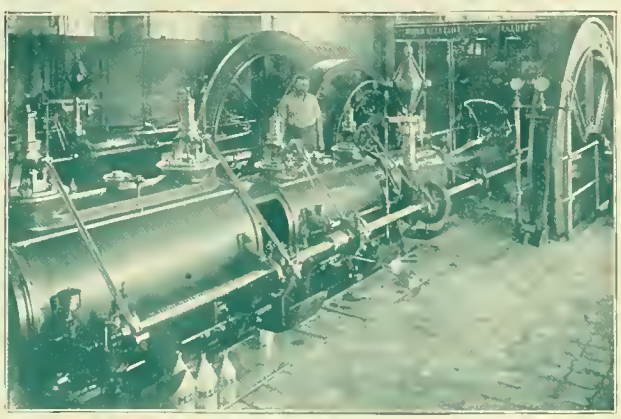
In compliance with the police regulations of Cairo the

DECORATIONS IN HONOR OF THE TROLLEY—CAIRO, EGYPT.

speed will be limited to not exceed 6.2 miles an hour, but the speed could be readily carried to 12.4 miles with the above indicated power.

The gage is 3 feet 9 inches. Including the double tracks and sidings about 20 miles have been laid. So far 135 cars have been contracted for. This includes both the motor cars and the trailers. After nightfall the cars are illuminated with five incandescent lamps.

It is proposed to place "first class" cars at a higher fare upon the line shortly, as a bid for the patronage of a part of the population whom it is thought will not patronize trams to any general extent if the chance of per-



RAILWAY POWER STATION—CAIRO, EGYPT.

sonal contact with the lower classes of natives presents itself, from sanitary reasons if from no other.

An important annex is the proposed iron ferry boat which is to run from the tuia of the Pyramid road where it joins the river bank directly across to the terminus of the tram line at old Cairo. This will save something over three miles of following the road down the river to the bridge, and will greatly accelerate communication with the many villages and esbers, (farms) that are scattered through the country, lying back from the Pyramid road.

It seems practically assured from the trial so far, that the road will be a great paying success. As this result was confidently predicted some time ago, the Egyptian government has been overwhelmed with applications for concessions to construct lines in all directions, and to erect electric plants at the barrages (dams of the Nile, 15 miles below Cairo) and other points on the river.

It may be mentioned that the most original of these applications contemplates the construction of a "funicular railway to the top of the Great Pyramid." The proposal, for obvious reasons, was not considered by the Egyptian Ministry. It is stated that it was petitioned by a Frenchman.

HONOR STRIPES FOR LONG SERVICE.

ANY police departments have adopted the practice of conferring a stripe on the arm of the uniform for each five or ten years of honorable service. The plan commends itself, in many ways, to street railways, and already several have adopted the scheme. Among them the Montreal Street Railway is the most recent, and it is distributing gold stripes to its men, giving one stripe for each five years service. While the new conditions of operation and the largely increased number of cars, in the last three years, has given employment to many new men, there is still quite a goodly number of men who can claim their two and even more bars. The scheme has a tendency to elevate the standard of faithful and continuous service, for any man who serves a long term of years in one corporation, evidently must be a pretty good man, or he never would have lasted, and the emblems of long service are a modest recognition, on the part of the company, which proclaims to all who see, the faithful and conscientious service of the wearer. It is fair to presume the boys will cherish each succeeding bar more highly than all before, and the man who can wear four or five, bears evidence of a life's work.

We know of one conductor who has been collecting fares for the same company for nearly 40 years, and who has several grown sons with families of their own, who are also standing on the front and rear platforms of the same road.

The Chicago General Railway Company, by an opinion of the appellate court August 6, is given permission to lay its tracks in front of the property and across the lines of the Chicago City Railway. The action of the lower court in granting an injunction in favor of the latter company is reversed.

Many amusing things happen on the trolley lines. One day recently there was an incident that especially tickled all the passengers on the car on which it occurred.

Two ladies boarded a Willard car about noon to ride over to the Casino. As soon as they were comfortably seated they entered into a conversation with high pitched voices that could be plainly heard by all on board. "There, Sarah, I knew my watch was slow," said one. "How do you know?" asked the second lady. "Because it only says five minutes past two, and that clock says ten past," answered the first, and she pointed to the fare register where the honest conductor had rung in twenty fares.

"That's not a clock; it's a thing to tell how many passengers there are," explained her companion, while everybody tittered.

"No, you can't fool me," insisted the other in a superior tone. "I know an electric clock when I see one," and she proceeded to set her watch to agree with the fare register.

In vain her companion tried to explain. She knew a thing or two, so she declared, and was not to be bluffed. When she counted the passengers and found 14 on the car she was triumphant, indeed, and her more intelligent companion gave up in despair the task of enlightenment.

MAIL AND EXPRESS ROADS.

For the benefit of readers who are interested in knowing the extent to which mail, express, baggage and freight business is carried on by street railways, we have compiled the following lists from such data as is at hand. It is understood that under the head of express are classed those roads which carry baggage or freight.

U. S. MAIL ROADS.

Mobile & Spring Hill Ry. Co., Mobile, Ala.
Oakland, San Leandro & Haywards Ry. Co., Oakland, Cal.
Ottawa Electric Ry. Co., Ottawa, Ont.
Consolidated Ry. & Light Co., New Westminister, B. C.
Skowhegan & Norridgewock Street Ry. & Power Co., Skowhegan, Me.
Portland & Cape Elizabeth Ry. Co., Portland, Me.
Brightwood Ry. Co., Washington, D. C.
Wilkes Barre & Wyoming Valley Traction Co., Wilkes Barre, Pa.
Westport & Saugatuck Horse R. R. Co., Westport, Conn.
Norfolk & Ocean View R. R. Co., Norfolk, Va.
Fox River Electric Railway Co., Green Bay, Wis.
Denver Consolidated Tramway Co., Denver, Col.
Houston City Ry. Co., Houston, Tex.
Lowell & Suburban Street Ry Co., Lowell, Mass.
Cincinnati Street Ry. Co., Cincinnati, O.
Sandusky, Milan & Norwalk Ry. Co., Sandusky, O.
West Street & North End Electric Ry. Co., Seattle, Wash.
East Side Ry. Co., Portland, Ore.
Mousam River R. R. Co., Sanford, Me.
Omaha Street Ry. Co., Omaha, Neb.
Salt Lake Rapid Transit Co., Salt Lake City, Utah.
Consumers' Electric Light & Street Ry. Co., Tampa, Fla.
North Chicago Street R. R. Co., Chicago, Ill.
Chicago City Ry. Co., Chicago, Ill.
West Chicago Street R. R. Co., Chicago, Ill.
Chester Traction Co., Chester, Pa.
Conway Electric Street Ry. Co., Conway, Mass.
Miami Valley Ry. Co., Piqua, O.
Cleveland City Ry. Co., Cleveland, O.
Northampton Street Ry., Northampton, Mass.
Mt. Adams & Eden Park Inclined Ry. Co., Cincinnati, O.
Ithaca Transfer Co., Ithaca, N. Y.
McKeesport, Duquesne & Wilmerding Ry. Co., McKeesport, Pa.
Rockland, Thomaston & Camden Street Ry. Co., Rockland, Me.
Cincinnati, Newport & Covington Ry. Co., Cincinnati, O.
Citizens' Street Ry. Co., Memphis, Tenn.
Cortland & Homer Traction Co., Cortland, N. Y.
Tri-City Ry. Co., Davenport, Ia.
Omaha & Council Bluffs Ry. & Bridge Co., Omaha, Neb.
Hamilton, Grimsby & Beamsville Electric Ry. Co., Hamilton, Ont.
Hartford & W. Hartford Street Ry. Co., Hartford, Conn.
Union Depot R. R. Co., St. Louis, Mo.
Brooklyn Heights R. R. Co., Brooklyn, N. Y.
West End Street Ry. Co., Boston, Mass.
Brooklyn City Ry. Co., Brooklyn, N. Y.
Peoples' Traction Co., Philadelphia, Pa.
Third Avenue R. R. Co., New York, N. Y.
Market Street R. R., San Francisco.

EXPRESS ROADS.

Miami Valley Ry. Co., Piqua, O.
Conway Electric Street Ry. Co., Conway, Mass.
Eau Claire Street Ry., Light & Power Co., Eau Claire, Wis.
Norfolk & Ocean View R. R. Co., Norfolk, Va.
Everett Ry. & Electric Co., Everett, Wash.
Fox River Electric Ry. Co., Green Bay, Wis.
Park City Ry. Co., Bowling Green, Ky.
Newburgh Street Ry. Co., Newburgh, N. Y.
Sandusky, Milan & Norwalk Ry. Co., Sandusky, O.
Skowhegan & Norridgwock Street Ry. & Power Co., Skowhegan, Me.
Brightwood Ry. Co., Washington, D. C.
Westport & Saugatuck Horse R. R., Westport, Conn.
Mousam River R. R. Co., Sandford, Me.
Salt Lake Rapid Transit Co., Salt Lake City, Utah.
Consumers' Electric Light & Street Ry., Tampa, Fla.
East Side Ry. Co., Portland, Ore.
Spokane Street Ry. Co., Spokane, Wash.
Seattle & Rainer Beach Ry. Co., Seattle, Wash.
West Street & North End Electric Ry. Co., Seattle, Wash.
Ithaca Transfer Co., Ithaca, N. Y.
McKeesport, Duquesne & Wilmerding Ry. Co., McKeesport, Pa.
Rockland, Thomaston & Camden Street Ry. Co., Rockland, Me.
Akron, Bedford & Cleveland R. R. Co., Cleveland, O.
Binghampton R. R. Co., Binghampton, N. Y.
Albany Ry. Co., Albany, N. Y.
Brooklyn Heights R. R. Co., Brooklyn, N. Y.
St. Louis & Suburban Ry. Co., St. Louis, Mo.
Southern Electric Ry. Co., St. Louis, Mo.
Consolidated Ry. & Light Co., New Westminster, B. C.
Hartford & W. Hartford Street Ry. Co., Hartford, Conn.
Elmira & Horseheads' Ry. Co., Elmira, N. Y.
Hamilton, Grimsby & Beamsville Electric Ry. Co., Hamilton, Ont.
Galt, Preston & Hespeler Electric Ry. Co., Galt, Ont.
Butte Consolidated Ry., Co., Butte, Mont.
Cortland & Homer Traction Co., Cortland, N. Y.
Oxford Lake Line, Anniston, Ala.
Cedar Rapids & Marion City Ry. Co., Cedar Rapids, Ia.
Owosso & Corunna Traction Co., Owosso, Mich.
Mobile & Spring Hill Ry. Co., Mobile, Ala.
Cincinnati, Newport & Covington Ry. Co., Cincinnati, O.
Negaunee & Ishpeming Electric Street Ry. Co., Negaunee, Mich.
Citizens' Street R. R. Co., Memphis, Tenn.
Lynn & Boston, R. R. Co., Lynn, Mass.
Bellaire, Bridgeport & Martin's Ferry Street Ry. Co., Bridgeport, O.
Chattanooga Electric Ry., Chatanooga, Tenn.
Capital Ry., Frankfort, Ky.
Seashore Electric Ry., Asbury Park, N. J.

STREET CARS FOR POLICE PATROL

FROM OUR MEXICAN CORRESPONDENT.

In Merida, Yucatan, Mexico, a police service has been recently established in connection with the tramway company of that city. All the lines start from the Plaza de la Independencia, situated in the center of the city, and run in all directions out to the suburbs. A policeman is detailed for duty on each car of these various lines, and he keeps traveling all day, so that practically the whole city is patrolled in that way. The middle and lower classes in Merida being composed of peaceful and law-abiding citizens, there has never been a necessity for the city to go into the expense of having the suburbs regularly patrolled by the police. It was the custom, before the new system was established, that when a disturbance of any kind arose to send a messenger to the police station, far away, to notify the officers. As it is now, however, when a citizen needs the assistance of an officer of the law, he has simply to walk over to the nearest street on which a tramway runs, and there await the coming of the first car. As this approaches, he signals the policeman, who must always be standing on one of the platforms of the car. The officer then gets off the car and attends to his business, which he generally finds to be only attending to two laborers fighting over a bottle of "aguardiente" (native whiskey), or arresting some fowl-thief. Beyond this the services of a policeman are very seldom required in the suburbs of Merida. Thus without great expense an efficient patrol is kept over the entire city with a relatively small number of officers.

Another great service which the street cars render the working classes in the suburbs of Merida, is to inform them of the time. Each car is provided with a clock, the dial of which is about six inches in diameter. This clock is placed near the fare register. As the car speeds through the streets in the outskirts of the city, one may notice from time to time how men, women and boys, standing on the sidewalk, stoop forward and look attentively into the car. One unacquainted with this queer proceeding would easily think that all these persons are detectives employed by the company for the purpose of checking the fares registered by the conductors. Their aim, however, is far from that. They simply look into the car to ascertain what is the time. The explanation of this is that clocks having to pay heavy duties are quite a luxury not to be found in the homes of the poor, and hence the necessity of their going to the street car whenever they want to know exactly what time it is.

Thus it will be seen that the street cars in Merida, besides furnishing cheap means of transportation to the laboring class, serve two other distinct and novel purposes, namely, to ascertain the time and to obtain the assistance of the police.

AN EFFICIENT SWEEPER.

The Brooklyn & New York Railway Supply Company, Elizabeth, N. J., is putting on the market a sweeper which possesses some apparent advantages. The car itself is driven by two motors on the axles, while the brooms are driven by a separate motor carried on the deck, the advantage of this arrangement being that the car can be moved forward slowly while the brooms are rotated at full speed. Both brooms are driven by a single counter shaft parallel to the broom shafts, the connection being by sprocket wheels and chains. The sprocket chain raises and lowers on a fixed radius and is provided with a tightening device to prevent its slipping off. The broom shafts run in brass bearings, with a check key which prevents their getting out of line. The brooms are raised and lowered by a

A SNOW FIGHTER.

system of compound levers working from below, and are set at an angle of forty-five degrees, thus insuring perfect cleaning of the track.

The sweepers are constructed without a vestibule cab when desired, and with a short cab having end doors. The vestibule cab with side doors is, however, recommended. The construction is designed with a view to practicability, efficiency and durability, and the possession of these qualities has been demonstrated in many parts of the United States and Canada. Snow to the depth of twelve or more inches is readily disposed of by them.

TROLLEY PARTY RECORD BROKEN AGAIN.

The Calumet road of Chicago broke its own world's record again Saturday evening, September 19, by conveying a trolley party of 60 cars over its road, the best previous record being 54 cars as mentioned in our issue of last month. The affair was held under the auspices of the Cook County Cyclists Association. Had the night not been an unexpectedly cold one, so as to prevent many from going, over 100 cars would have been required and until a few hours before the event took place the company was expecting to be called on for 125 cars. A ball was held at Gardner's park and the road was kept at the service of the party all night.

THE DOUGLAS SOUTHERN ELECTRIC.

(FROM OUR OWN CORRESPONDENT.)

In your issue of August 15th, just come to hand, I have read with interest the account of the Douglas Southern Electric Tramways under the heading of "Another Manxland Tramway."

The franchise for this tramway was acquired by W. S. Graff Baker, M. Inst. E. E., and the plans for construction were prepared under his direction. Graff Baker is the son of W. S. G. Baker, the well-known president of the Baltimore Car Wheel Company, of Baltimore, Md. Coming to England some six years ago as sole representative for traction work in Great Britain of the Thomson-Houston Company, he constructed the first trolley line in England, at Leeds, Yorkshire. Leaving the employ of the Thomson-Houston Company he purchased the Coventry Steam Tramways, which as the name implies was a "dummy street railway," and converted them into electric tramways, which are now earning probably larger dividends than any other similar tramway in England, averaging, I believe, over 12 per cent upon the ordinary shares.

The Manxland Tramway is the latest undertaking inagurated by Graff Baker, though I understand he has several traction schemes of importance in hand. In connection with his past work he has also established a construction company, which on a paid-up capital of $25,000, and under his management, acquired assets that were sold at a profit of $170,000 within three years. Joining the company purchasing such assets, as managing director and engineer in chief, Mr. Baker earned for that company the sum of $130,000 in a period of ten months.

In April of the present year he severed his connection with that company and is now carrying on the business of engineer and contractor, assisted by his brother, A. E. Baker, formerly connected with the Baltimore Car Wheel Company, who has joined him on this side.

DRAW BRIDGE SAFETY APPLIANCES AT MONTREAL.

G. C. Cuningham, who is manager and chief engineer of the Montreal Street Railway, has been creditably far sighted enough to have a system of interlocking safety devices put at the Wellington swing bridge over the Lachine canal. The signals and derails have been constructed on the plans of Saxby & Farmer, prominent steam road signal engineers and manufacturers of England. The bridge is turned by an electric motor and controlled by a bridge tender in the bridge house at the center of the bridge. The working is as follows:—

When a vessel signals to have the bridge opened the first thing the bridgeman does is, by pulling one lever, to lower the gate barriers stopping the entrance to the bridge. He then pulls another lever that throws a derail upon the tracks approaching either side of the bridge. This derail is a simple tongue switch which is set so as to turn the car off the track when the bridge is opened, and is placed about 80 feet back from the bridge. The next handle that he pulls is to disengage the bridge plungers, so as to allow the bridge to open. He is then at liberty to set the electrical apparatus at work to open the bridge. All these handles are interlocking and can only be opened in the order named. In the same way, when the bridge closes, the signals are thrown back in the same order. It is thus impossible with the bridge opened, the derails having been previously set, for a car to come nearer than within 80 feet of the bridge without being thrown off the track. The arrangement is very simple and works very perfectly. There is in Montreal similar interlocking apparatus with derails at the various crossings of steam railways, and the management has found them to be very satisfactory in their work.

THE CROSS OIL FILTER.

The accompanying illustration represents the Cross oil filter, which has been on the market for six years and in use by some of the largest firms in this and foreign countries. They are made in various sizes, having from 3 to 120 gallons filtering capacity per day. The Burt Manufacturing Company, Akron, O., in addition to the manufacture of the filter, make a specialty of furnishing filters

CROSS OIL FILTER.

for large power houses and will submit plans for the economical handling of oil. The plan of operation is simply that of passing the oil through waste and warm water, so that impurities are thoroughly removed, preventing waste of oil which sometimes amounts to 75 per cent of the whole amount consumed. The filters are sent on approval.

STREET RAILWAYS ABROAD.

What with the "committay" who want wages lengthened and runs shortened; the alderman who thinks we should light, sweep and pave the whole ward, and the man who wants free rides in exchange for his valuable information that the span wire at 961st street sags in the middle; and the few other pleasantries which combine to prevent the manager's life becoming one of absolute monotony, we are apt to forget that there are others, and that the street railway is fast coming to be a very cosmopolitan institution. For instance, that the longest cable road in the world is in Australia, or that South America has horse car lines 300 miles in length. A brief glance then around the globe is not without interest.

In Great Britain street railways are making slow but sure progress. During the past year the two notable events there have been the opening and very successful operation of the trolley system of the Imperial tramways in Dublin, and its recent sale to the old horse company there, the Dublin United Tramways. The introduction of the trolley was desperately opposed all the way from the cab drivers to lords in parliament, but the trolley finally won, and now the people want more of them. In Glasgow, the new underground belt line, seven miles long, operating a double track by cable system in a magnificent double tunnel, was successfully inaugurated in August. Several other smaller trolley lines have been opened, and the hostility of the daily press is gradually weakening. What delays the change to mechanical power more than all else, is the fear of confiscation under the municipal ownership bill, which makes capital hesitate to invest the large amounts necessary to conversion from horses to electricity. The storage battery is at last voted a failure and conduit electrics or compressed air have made no notable progress. Gas engines get a hearing occasionally, but the overhead trolley and cable are the two systems generally endorsed by the tramway fraternity.

Austria and Germany have a growing mileage of overhead trolleys, and now make a very respectable showing in number of such cars running. The celebrated conduit line in Buda Pesth is still in successful operation, but it is suggestive that none has been built this year, while a goodly amount of overhead wires have been strung in that city and are hauling cars today. Gas motors are still in use in several cities, principally on suburban work, but horses continue to furnish the major part of motive power for city lines.

In Paris, several prodigious schemes for a grand system of intramural transit have been proposed, but thus far have not advanced beyond the paper stage. Considerable interest is manifested in compressed air systems, and a few cars are so operating in the city, and also in several smaller towns on light work. The scheme to cable Paris has fallen through, but a general system of overhead lines would work wonders in Parisian transportation, which is mostly done in busses restricted to a load limit.

Italy makes a fairly good showing with interesting trolley lines at Florence, Varese, Milan, Rome and Genoa, all of which are well equipped though the patronage is not a liberal one on the part of the natives. Tourists find the cars very convenient and use them freely. At Genoa a "corkscrew" road is building which winds up the mountain with numerous tunnels. Interurban lines will also connect with three other towns, requiring in all forty miles of track and 200 cars. A lighting station now being built to contain 12,000 horsepower, will furnish power.

In Africa the principal advance has been the construction during the year, and opening to travel in August, of a trolley system in the old city of Cairo. An extension to the pyramids is also planned as a lively competitor of the camel. In Cape Town the lines have done a good business since purchase by the African syndicate of London capitalists, and extensive additions have been made to rolling stock. Of this a considerable portion was built and shipped from this country.

As Africa develops as it is destined to do in the next twenty years, there will be opportunities for attractive work in organizing and constructing electric lines, in proportion as the light of civilization penetrates the dark continent.

Taking a long jump we reach India, where the tramway interests center in Calcutta, Madras and Kurrachee. With the exception of Madras, where an electric conduit system was installed with English apparatus last year, matters are in a deplorable state from an operating standpoint. The horse service is slow owing to the climate, and the cars small, uncomfortable and uninviting. The people are, however, good patrons, as no one walks who has the price of a ride, and with the introduction of mechanical power,

and higher speeds there would be a big increase in morning and evening riding for pleasure.

In Kurrachee, a city of 30,000, the East India Tramways Company, earned about $25,000 last year, at a loss of $2,000. The Calcutta Tramways carried over ten million passengers, earning $375,000 and making a profit of $50,000 last year. The Madras lines have experienced some financial difficulties.

The trolley party car and pleasure resort adjunct is a stage of delight to which the Hindoo has not yet attained.

Japan, the intensely progressive, is already looking forward to street cars, and electricity is the favored means of propulsion. Osaka, a city of 600,000, offers exceptional inducements for some enterprising Americans to secure concessions which could now be had on very liberal terms, and a road there would certainly do a big business from the start. There is a trolley line operating a few cars at Tokio, but is capable of large extension. At Kiota, a trolley road was opened during the past summer, using water power to generate, and running twenty-six cars. The cars and equipment, and power plant machinery of this road are American throughout.

Dropping down into Australia we find the magnificent cable system of the Melbourne Tramway and Omnibus Company with its ninty-four miles of cables. The improved business conditions in Australia have been manifest in the revenue of the company which shows a gratifying comparison with the previous year. No new construction work is being done, but the property is kept up in good condition.

At Brisbane, on the east coast, a trolley system is replacing the horse lines, the materials and machinery coming mostly from England. The new lines will be ready for use, it is expected, about the first of next month.

The cable lines at Dunedin, New Zealand, are reported as doing a good business.

In the Sandwich Islands the conversion of the horse lines at Honolulu to trolley system, has been delayed owing to the political disturbances on the island, which made it impossible to secure the necessary capital. That this will be done eventually and probably within the next year or two, seems reasonably certain.

Altogether the most important event of the year in foreign tramway affairs, was the purchase in the early summer by English capitalists, of the entire line in the City of Mexico, and the decision to convert to trolley system as soon as possible. The road does an enormous business even for so large a city, but the introduction of a quick service, good cars, and American ideas and methods of management will undoubtedly double the profits, which are already good.

Thomas H. McLean, recently of Indianapolis, one of the most capable and popular men in the street railway fraternity was honored with the election by the new owners to the important position of president and general manager, and he is now perfecting plans for the retirement of the horses and mules and the introduction of the trolley. The work involves a vast amount of difficult engineering not experienced in construction in the United States, and affords Mr. McLean abundant opportunity to demonstrate his well known executive ability and energy. A better selection could not have been made, and while his many friends greatly regret his absence at our annual convention where he has long been so prominent, they congratulate him on the larger scope and magnitude of the interests intrusted to his care.

ABSENT, BUT NOT FORGOTTEN.

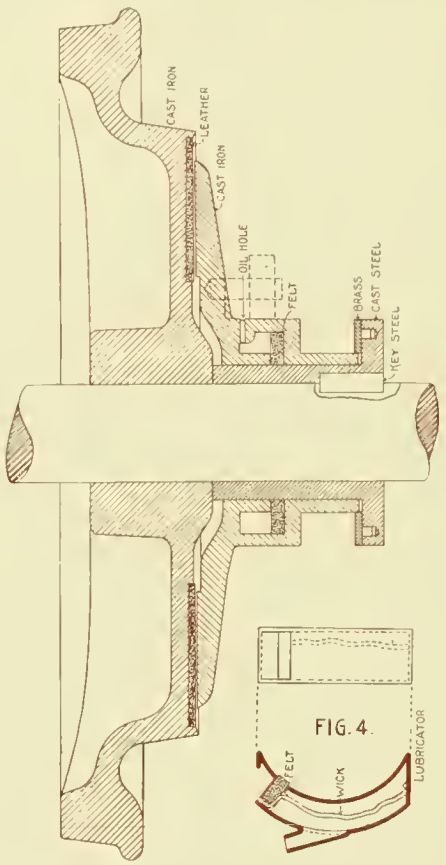
Canadian street railways have now been pretty well converted to electricity and no great amount of extensions or conversions have been made during the year. The largest work at present in hand is a 4,000-horse-power engine which is now building for the Montreal Street Railway, and which may fairly be classed as a "large unit." The snow plow equipment and facilities for handling snow with sweepers have been brought up to a high standard and most lines are in excellent shape to take care of the big snow falls which annually visit that latitude. In Toronto, the sheep and the goats are still fighting the Sunday car question, but it looks now as though the goats were going to knock the stay-at-homes out. Business has been fairly good on Canadian lines, showing some improvement over last year.

The tramway interests in South America are much more important than is generally realized, and offer a fine field for the electrical engineer. The improvements at Buenos Ayres which were postponed by reason of the depressed financial condition, are again being considered and the indications are that a large amount of electric railway supplies will find a market there. Trolleys are regarded with favor and the difficulty in raising capital alone delays their adoption.

ELECTRIC CAR BRAKE ADOPTED BY CHICAGO CITY RAILWAY.

The Chicago City Railway is equipping all its electric cars with a friction momentum brake, and it is expected to have every electric car on the road fitted out before winter sets in. The brake is the result of nine months' experiment and it has now been brought to such a state of perfection that it is felt no mistakes will be made in adopting it. The brake is the design of W. G. Price, of the Chicago City Railway, who has had this matter in charge, working under Superintendent Bowen. Although not radically different from some other friction brakes that have been introduced, it has some essential details perfected and has been put in a very compact, substantial form. As in most other friction brakes the power for the brake is supplied by a friction clutch disk with leather between the rubbing surfaces. Figure 1 shows a truck in plan and elevation, supplied with the brake and with rods and equalizers for connecting to trailers. It is operated by a lever on the platform. The lever is removable and is taken from one end of the car to the other just as a controller handle. The motorman pulls back on the lever to set the brakes whichever end of the car he is on. This is accomplished by changing the fulcrum of the lever as shown, so that the rod operating the brake is always moved from left to right in Figure 1. The short rod from the lever at the left end of the car is made of 1¼-inch pipe to give it stiffness so that it will not bend under the strain of compression which comes on it. The long bent rod by which the brake is operated from the right hand end is ⅞-inch in diameter. The arrangement of equalizer and trailer rods is so shown as to be plainly understood. If desired, the trailer rods can be disconnected but the brake will operate successfully on a motor alone even with the trailer rods connected. The truck is the McGuire, used on all the City Railway electric cars.

In order to learn the details of the friction clutch disk it will be necessary to study Figures 2 and 3. Figure 2 shows a section through the car wheel and friction clutch. A special car wheel is used which has a tooled surface 21½ inches in diameter, against which the clutch



FIGURES 2 AND 4.

acts. A leather disk is put between brake disk and wheel. Keyed to the axle next to the wheel is a cast steel sleeve which performs the double function of a bearing for the cast iron friction disk and a collar against which the mechanism can act, which forces the friction

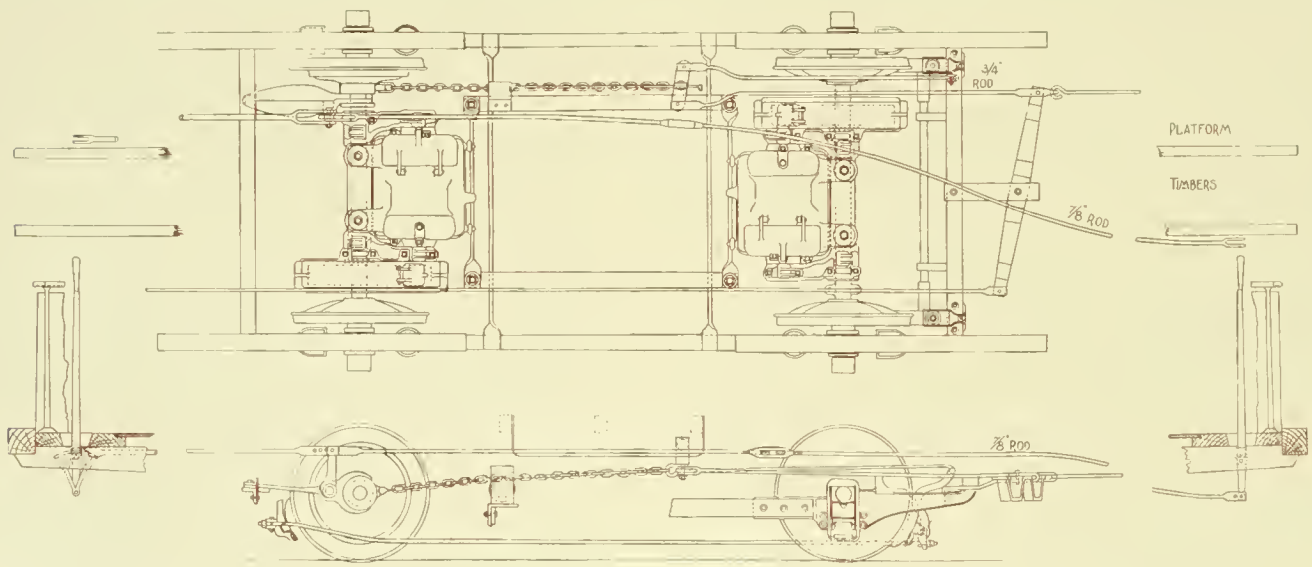


FIGURE 1.—CHICAGO CITY RAILWAY BRAKE.

disc into action. The brake chain shown in Figure 1 is of course, attached to this disc, and when the disk is forced against the wheel the brakes are drawn up. An oil chamber is provided between the disk and axle sleeve with a felt washer for feeding it gradually to the bearing. The entire device occupies 6¼-inches on the axle.

The mechanism for forcing the disk against the wheel to operate the brake is shown in Figure 3. It consists of a pair of forks which are made to spread apart like a pair of pliers between the brake disk and the collar. The spreading apart is accomplished by a double threaded screw and the screw is worked by the rod from the motorman's lever. The forks are made of cast steel and are not rigidly attached to the truck, but

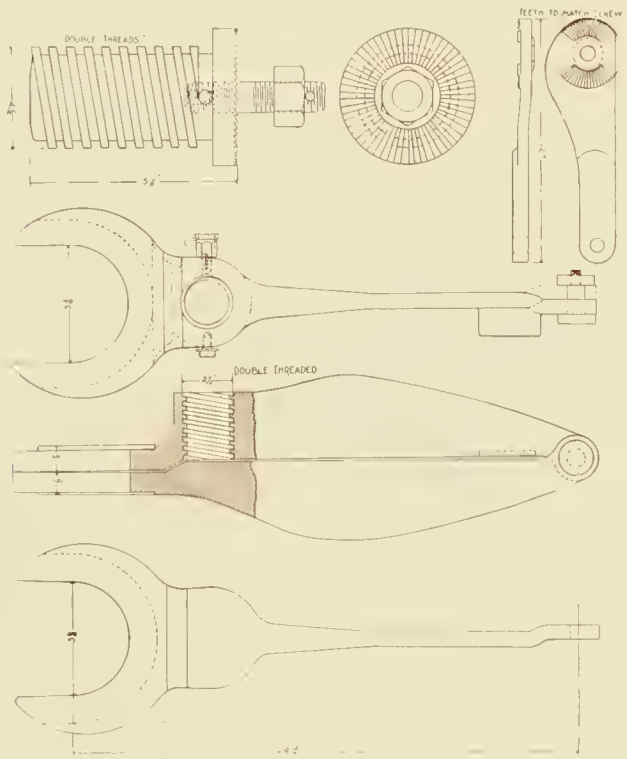


FIGURE 3.

are so mounted that they can move with the car axle in whatever slight motion it may have. The greater part of the leverage the motorman exerts is in the double threaded screw and as the screw and forks are practically axle mounted, any motion of the axle with reference to the car body does not seriously affect the adjustment of the brakes. This is one of the strong points claimed for it. The brake is very smooth in action, and this is said to be due to the fact that there is a slight spring in the forks, which cushions the roughness that would otherwise be felt when it is applied. Oil between the disk and wheel does not seriously affect the working, and in fact, this disk is kept slightly lubricated on purpose to make its action smooth. It will be noticed in Figure 3 that a ratchet adjustment is provided on the double threaded screw. This is to compensate for any wear in the parts, for it must be remembered the motion of the motorman's lever is limited. This adjustment can be made in a few minutes either on the road or in the barns. Figure 4 shows a lubricating device which is put in between the prongs of the forks and feeds oil onto the sleeve on the axle. It is filled with oil and a wick feeds the oil up into a piece of felt resting against the sleeve.

MUNICIPAL OPPRESSION AT LANSING.

Some small cities seem to think a street railway can stand almost anything. Some months ago the city council at Lansing, Mich., ordered a lot of paving along the tracks of the Lansing City Railway. The management protested its inability to sell bonds at the present time necessary to raise the money to do the work, and asked a postponement of the paving, and stated the road would have to shut down if the order was enforced. At that time the matter was supposed to have been settled by granting the desired extension of time. A few days ago the city fathers suddenly concluded to go back on their agreement and proceeded to enforce the edict. The public generally and all the newspapers are on the side of the company, which opened its books to a committee of leading business men, to whom it was shown that the receipts the past year exceeded the operating expenses by only $2,600. Out of this the road has to pay interest, taxes and insurance. The manager kept his promise by shutting down the road, and says the company will pull up its tracks and leave the town if the legal persecution is continued.

The city council of Lansing ought to be ashamed of itself. The road is an excellent one for a city of its size; the management has strained every nerve to give the people a good service, looking to the future for some possible return on its investment, and for the council in such times as these to try to hold up the company for thousands of dollars of paving, without which the city has got along all these years, and can continue to do without for a few more, is downright contemptible, to say nothing of being shortsighted and the poorest kind of business policy. The citizens sent in a big petition in favor of the road, but the council ignored it, and the result is they have, temporarily, at least, deprived the town of any street car service. Street railway men looking for an opening to build lines, and other capital seeking investment will be apt to give such a town a wide berth. If the camel sinks beneath a last straw, it is little wonder that whole blocks of paving stones fracture the spinal column of a street railway into fragments.

A MONON FLYER.

The Monon has recently put on a "fast flyer" for Cincinnati. It leaves Chicago at 11:50 A. M. and arrives at Cincinnati at 7:45 P. M. The night trains leave Chicago at 8:58 P. M. and 2:15 A. M. Ticket offices, 232 Clark street, Auditorium hotel and Dearborn station.

Our Improved Class of Employes

One of the marked advances since the last convention in St. Louis eleven years ago, is the great change for the better in the mental and physical condition of employes. Of course a higher grade of men are necessary to the operation of a big power plant, with its big boilers, engines, generators and delicate electric motors; than was required to shake down bedding and adjust the meagre rope harness in the immense horse barns.

* * *

But out on the line the change has been both an advance and a revolution. Then most any able bodied man was considered competent to hold the reins or pull the bell cord, and while we accord all due credit to the hundreds of faithful honest fellows who stood on the platforms in those days, the fact remains, that as a body they would make a very poor comparison with the bright, neatly uniformed men found in the car crews of 1896. Quicker speed and larger cars, with better wages and a radically different system of selection, with the examinations for qualifications now in force on all the large roads in the country and most of the smaller ones, have called into the work men quick of thought and action, and possessing a much higher degree of intelligence.

* * *

The passing years have, of course, brought advanced ideas to all classes of people, and the influence of cheap reading has had much to do with the improved mental condition of all, but the fact remains that the rank and file of street car employes of 11 years ago would not be considered available to appointment now.

In this connection it is gratifying to note the rapid decrease in strikes which used to be of frequent occurrence. Indeed, during the last St. Louis convention, a big strike was in progress on one of the roads, during the entire meeting. This improved relation between managers and men is due to a combination of circumstances, but largely to a closer and better mutual understanding, and a greater interest in the welfare of the company they serve than existed among the old employes. Both managers and men have come to a better appreciation of the rights each of the other, and to the careful consideration of the situation and the facts in the case. In the old days a strike would spring up like the growth of a mushroom; and the superintendent—there were fewer managers then—never knew when or what spark would set off the men. Now a strike is rarely called on the spur of the moment, but gives evidence of its presence weeks or months in advance.

* * *

Since street car work has become so desirable both as a healthful occupation and one in which few of the men could earn as good wages in any other employment they might secure, the boys hesitate to lay down their work at the throw of somebody's hat. The position, too, has come to be looked upon as a calling in which none may be ashamed to engage. Another influence unfavorable to strikes has been the ability of companies to bring in from other cities hundreds and even thousands, if necessary, of experienced men to fill the vacant places. Hence a man who knows there are five others waiting and anxious to fill his place when vacant, naturally does more deliberate thinking and less thoughtless acting than he would have done 10 years ago. All these conditions combine to make easy and possible the adjustment of those differences which arise alike in small families and big corporations. It is only fair to add on the other hand, that managers are more considerate of the rights and comforts of their men, and may justly be said to have their best welfare at heart.

* * *

Altogether the backward glance, and comparison of the now with the then, may well be viewed with satisfaction and pride alike by the "Old Man" and "The Boys."

Bravest of the Brave

Grace Duffie Boylan.

My papa's the bravest man in town,
He ain't 'fraid of a single thing;
I ride on his wheel when he goes down,
An' my! but the trolley bells ring!
We ride on the track just awful far,
Right straight ahead of the 'lectric car,
An' I laogh when the trolley bells ring.

The motorman he looks awful mad,
An' he comes behind me as near's he dares,
But I don't care. I'm as glad as glad,
For he is a wicked man 'at swears,
An' my papa rides as cool an' slow—
They dassent' run over him, you know
An' he lets the old trolley bell ring!

The motorman he yells loud to us,
An' the old conductor comes and cries:
"Get off the track!" An' cuss an' cuss—
(He will jest go somewhere when he dies!)
But papa he jest laughs an' slows
Up till the smarty in there knows
He ain't 'fraid of the trolley bell's ring.

When I get big as papa men are
I will take my little boy with me
An' ride in front of a trolley car,
An' he'll think I'm brave as I can be.
I'll keep a train load of people back
By riding ahead of 'em on the track,
An' I won't hear the trolley bell ring.

Damages have been awarded to the plaintiff in an action against the Cincinnati Inclined Plane Railway Company for injuries sustained by a fall from a car. The plaintiff was a woman, and the defense was contributory negligence, the woman's dress being so long as to catch upon the car.

STREET RAILWAYS OF ST. LOUIS

To the student of street railway practice—and what progressive street railway man is not—St. Louis offers unequaled advantages for observation. Few delegates who go to the convention with the hope of learning something from the street railways of the convention city will be disappointed. It has been the fortune of the association, for the past three years, to meet in cities in which the street railways, although considerable in extent, were small in corporate number. In St. Louis, they are not only extensive, but they are run by such a large number of companies that it naturally follows there is diversity of practice and opportunity to see the good and bad points of these various methods of accomplishing the same end. Nor are St. Louis companies novices in the electric railroad business. They were among the first to adopt the cable extensively, when its success had been demonstrated, and they were by no means comparatively slow about adopting electric traction, even to the extent of substituting it for the cable, in some instances.

Competition has always been strong among St. Louis roads. This impresses the visitor at every turn. Every line has a competitor, and this has led to the greatest exertion on the part of each management to find out what catches the public fancy in the way of transportation facilities. This competition has also led to the multiplication of franchises, until the streets are thoroughly covered, and by the interlacing of the various lines, an immense number of curves and crossings have been made necessary. That this is very undesirable, all companies admit, but there seems to be no way out of the difficulty but consolidation—a matter which has, by the way, been much talked of, but never accomplished. There is certainly no city in the United States where consolidation is more desirable, financially.

Competition has made itself most evident in the matter of rolling stock. Big cars catch the crowds, it has been found, and big cars the companies have been adopting as fast as possible. These long cars are a characteristic feature of St. Louis roads, and it will be a surprise to those who think that such cars are unfitted for use in a great city, to see the way crowds are handled on them. The most popular and generally adopted style is with center aisle and cross seats, with about 28-foot bodies, seating 40 people; mounted on double maximum traction trucks. The popularity of these lies partly in their smooth riding qualities, and partly in the greater comfort in the cross seats. From the standpoint of the companies, they are desirable, not only on account of their traffic drawing capacities, but because of the greater load that can be properly taken care of by a crew of two men.

Special open summer cars are by no means universal. The summer car season will be nearly over when convention convenes, but it will be of interest to the convention visitor to know that the greater part of the rolling stock he sees on the streets was in service all summer, and that too, in St. Louis, where the temperature, at times in the summer, is anything but cool. That winter cars should be continued in use all summer in this city cannot be accounted for by indifference to public comfort, for, as stated before, competition is severe. The real reason lies in the fact that the center aisle cross seat car is practically a convertible car, and can be turned into a very fair summer car by simply lowering the windows. There are also a number of the old style closed cars with side seats which are run all summer, but owing to the fact that they are not often crowded cannot be called inferior to open cars in point of comfort.

Fenders are required by an ordinance, which went into effect August 1, 1896, and some lives have been saved by them.

Another St. Louis practice that will seem peculiar to most of the convention visitors is that of allowing motormen to use stools on the outlying lines. This is practically universal, and it is believed the comfort of the men is added to enough by this to more than make up for any possible disadvantages. In the heart of the city they are required to stand.

As mentioned before, the operation in the heart of the city of so many companies, has given rise to various complications. In some cases several companies operate over the same track. On Sixth between Pine street and Lucas avenue the novel sight of three trolley wires over the same track may be seen. Each of these wires belongs to a different company, and is supplied by a different power house. Two separate sets of poles are used.

A visitor among the power houses will notice that the plan of having several small stacks, rather than one large one, finds very general favor.

The health department of the city, some time ago, took up the matter of spitting on car floors, in conjunction with various managers, and the nuisance has been almost entirely stopped. Some lines have notices posted, signed by the health officers, saying that conductors will be required to enforce the rules against spitting. Others have delicately suggestive notices, after reading

which very few passengers would care to violate the rules. Conductors had a little work, at first, quietly reminding some people of the order, but have very little trouble now.

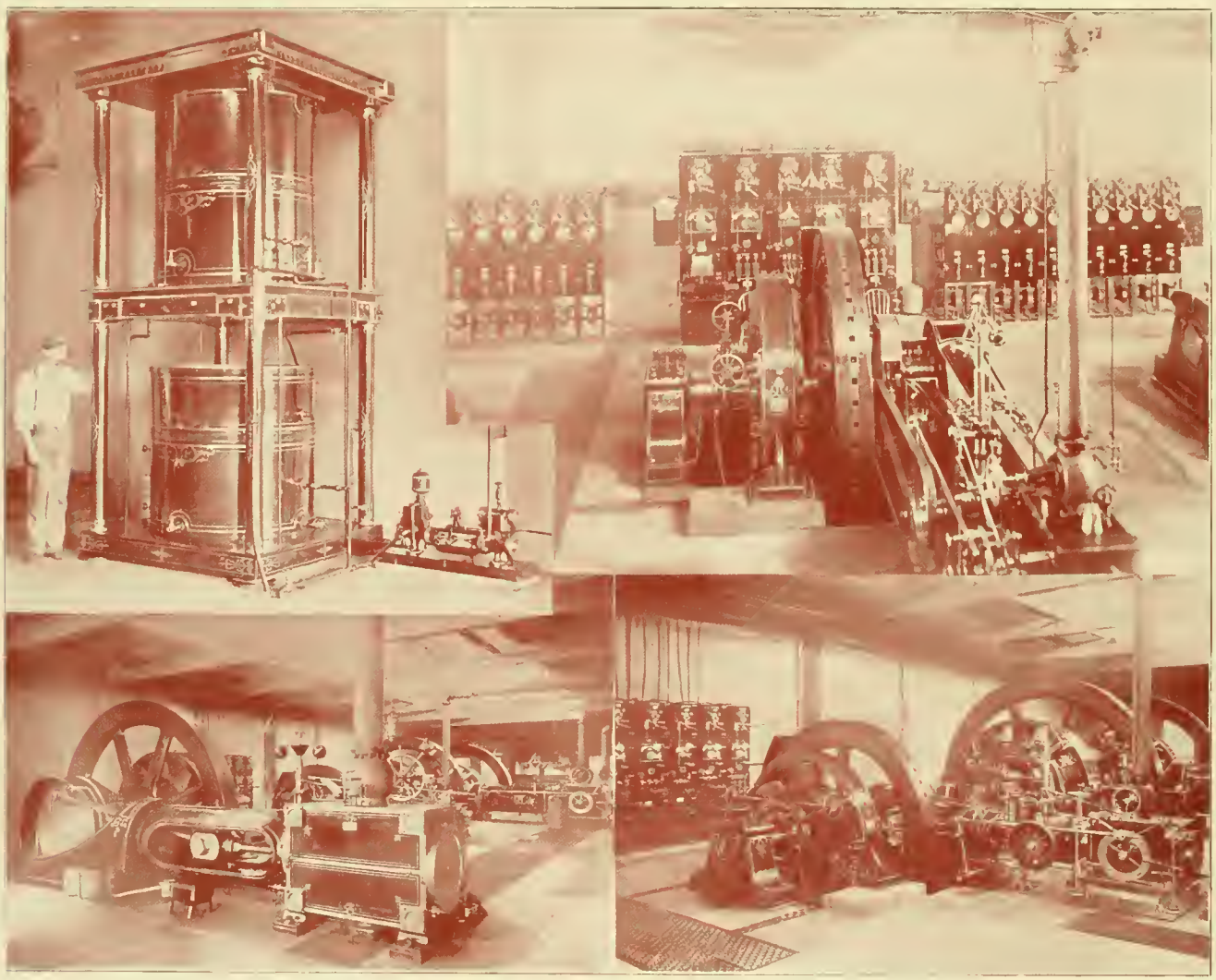
Nearly all cars, on all lines, are equipped with push buttons, opposite each seat, for passengers to signal the conductor to stop.

Summing up the street railway industry of the city, we find it giving employment to about 4,900 men, and operating over 355 miles of track. The power stations have a combined maximum capacity of 28,600 horsepower, of which about 3,300 is in cable plants. There are, in the city, 910 motor cars, all with double equipments.

Having briefly reviewed some of the general features of St. Louis roads, we can now turn our attention to the various individual systems.

The Chicago Syndicate Roads.

It is not necessary to enter into a detailed investigation of the legal relations of the roads controlled by the National Railway Company, of Chicago. It is sufficient to say that by various means that company has secured control of the following roads, all of which are under the management of Captain Robert McCulloch, and some of which are consolidations of several lines: Cass Avenue & Fair Grounds Railway, Citizens Railway, Baden & St. Louis Railroad, Southwestern Railway and St. Louis Railroad. The latter, the Broadway cable, is the only cable line now owned by the syndicate. The Citizens, operating on Franklin and Easton avenues, formerly was cable, but has been changed to electric.



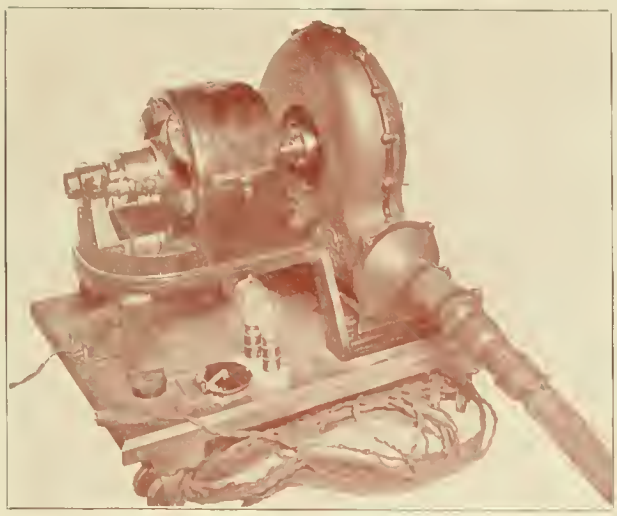
CASS AVENUE & FAIR GROUNDS POWER PLANT.

D. G. Hamilton, of Chicago, is president of all these companies. C. N. Duffy is secretary of the Citizens and Cass Avenue, and R. B. Jennings of the others. The Cass Avenue & Fair Grounds Railway has 70 motor cars, 65 open trailers and 65 closed trailers, owns 37 miles of track and employs 300 men. The Citizens Railway has 67 motor cars, owns 17 miles and employs 250 men. The Southwestern Railway has 20 motor cars, employs 100 men and operates over 12 miles of track. The Baden & St. Louis is an electric extension at the north end of the Broadway cable line and requires 10 motor cars. It owns 6½ miles of track. The St. Louis

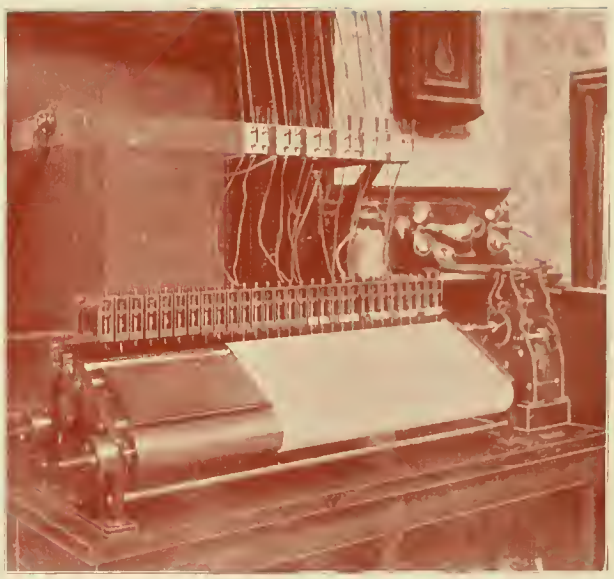
Railroad or Broadway cable employs 500 men, has 14.7 miles of track, 80 grip cars, 80 closed trailers and 80 open trailers.

All the power for the electric roads is generated by a thoroughly modern station at Prairie avenue and North Market street. This was the first plant in the world to use large direct connected railway generators throughout. The generators were ordered October 1892 and started June 22, 1893. Many were the doubters as to their desirability, but times have changed now. There are three 800-kilowatt General Electric direct connected generators and one of 200-kilowatts. They are all driven by Allis simple corliss engines. The small one runs 150 revolutions per minute. Steam is supplied by 16 return flue boilers. An elevated wagon way runs between the engine and boiler rooms and after being weighed at the entrance, each load of coal is hauled along this passage and thrown down through trap doors in the floor of the passage directly in front of whatever boiler it may be needed. This station is in charge of C. E. Wilson, chief engineer, who has arranged among other things a neat system of oil filters and piping to all bearings. The oil is pumped from the machinery back to a settling tank and then up into a filter, from where it is fed to the bearings all over the station. The plant has a small centrifugal blower direct driven by a small electric motor and used for blowing dirt out of the generator armatures. During very hot weather or heavy loads, it has also been put to good use in keeping one of the armatures ventilated. On such occasions it was run all the time the station was in operation.

Adjoining the power house are the shops and car houses of the Cass Avenue & Fair Grounds Railway, and also the office of Richard McCulloch, electrical and mechanical engineer of the syndicate. In his office is the recording chronograph mentioned in connection with the Lindell Railway. The signal wires which run to various parts of the road are number 10 insulated copper. Fuses are put in before they enter the instrument, and a bank of lamps is used as resistance to cut the current down. These wires can very easily be disconnected and used as voltmeter wires for testing the drop in the ground return. Mr. McCulloch has been carrying on such tests and has been enabled to make some important improvements in the return circuit with the tests for guidance. The repair shops of the Citizens Railway are at 3820 Easton avenue, beside the offices of the Cass Avenue and Citizens roads. The Broadway cable shops and offices are at 3710 North Broadway.



BLOWER CASS AVENUE.



RECORDING CHRONOGRAPH.

To the management of these roads is due much of the credit of demonstrating the practicability of the continuous rail. At the north end of the Broadway cable, on the Baden & St. Louis, will be found the 6½ miles of track electrically welded in the spring of 1894. In November of the same year the first cast welded joints ever laid were put on Chippewa street, now run over by the Southwestern Railway. The line on Franklin and Easton avenues, 14 miles, has since been cast welded, as has also 2 miles on Cass avenue near the power house. The rail is a 60-foot, 7-inch 85-pound girder with 135-pound joints. The casting is done by the company itself and the rail ends are very carefully cleaned with an emery wheel driven by a motor before the joint is cast, so that good electrical contact is insured.

This management has not adopted the long car quite as extensively as some of the other roads yet, but some very fine specimens are running on Franklin and Easton avenues. They were built by the American Car Company and are on double trucks made by the same company. They have the advantage of being lower than some of the other large cars. The Broadway cable has two power houses with duplicate engines for a load of 1,000 horse-power at each station. The two plants are counterparts of each other. The northern station is at the offices, and shops at 3710 North Broadway.

General Electric motors are used exclusively on the National Railway roads. Cars and trucks have been furnished by the Brownell, American and St. Louis Car Companies.

Lindell Railway.

The life of this road dates back to 1864. It was the first of St. Louis roads to experiment with and adopt electricity. Some Julien storage battery cars were run in 1887. The first cars on the trolley system were run in 1889. The pay roll carries 1,000 men. It owns and operates 60.1 miles of single track, 128 motor cars and 16 trailers. The fine new offices are on a 24-acre tract of land at Park and Vandeventer avenues, where are also two car houses, the new power plant, a wash house, a small blacksmith shop and a shop and yard for turning out special work. Here also probably the main repair shop will be finally located. This 28-acre yard has also on it two springs which furnish 16,000 gallons of water daily. A siding from the Missouri Pacific runs into the yard and power house. Cars are also housed at three other points on the system. Visitors will find a trip to this yard of interest. Among the first things to attract attention is the shop for turning out special work. Adjoining the shop, which itself has considerable floor space, is a yard large enough to lay out any piece of work the company may need. This yard was made suitable for its purposes by ballasting with cinders and laying ties in the ballast at the usual distance apart and carefully leveled. The manufacture of special work is in charge of T. L. Hanley, civil engineer for that branch of work, and some excellent designs have been turned out. The switch now used, an engraving of which is here shown, has a cast steel tongue and center and is designed so that the first wheel that passes over cannot reverse the switch for the following wheels. The cast steel is cast in St. Louis from patterns made at the company's main repair shops. It is said to give a life fully equal to that of the surrounding rail. Switches for use in car houses and yards are now made of T rail with cast steel centers high enough so that the wheel flanges ride the centers and relieve some of the pounding of the frog. The shop equipment needed for this is very simple, requiring only four machines, as follows: One variable stroke rail bender and punch combined, one circular saw, one planer and one drill. As said before the amount of special work required by the peculiar local conditions in St. Louis is something enormous.

E. WHITAKER.

The company has two power houses. The new one, located in the yards, is of a present capacity of 1,500 kilowatts, in three 500-kilowatt generators driven by 4½-foot belts from Porter-Allen medium speed engines. The engine room is 100 feet square, with concrete floor and a double roof 24 feet above the floor. The lower roof is of arched cement, with a space of 4½ feet between that and the upper roof, which is of composition. The entire station is absolutely fireproof and no insurance is carried. The feed wire tower is 40 feet high 12 feet wide and 40 feet long. Between the engine and boiler rooms is a pump and heater room 24 by 100 feet. The boiler room, 40 by 150 feet, contains 4,800-horse-power in Stirling water tube boilers. The coaling facilities of this plant are specially worthy of note. Back of the boilers are port holes opening into the coal storage, and coal as unloaded from the cars into the storage slides down directly in front of the furnace doors. The railroad siding passes

FIFTY-FOOT CAR—LAYING OUT SPECIAL WORK—POWER PLANT, LINDELL RAILWAY.

Street Railway Men of St. Louis


HARRY SCULLIN


D.G. HAMILTON


C.N. DUFFY


J.F. DAVIDSON


H.K. CONKLIN


ROBERT McCULLOCH


RICHARD McCULLOCH


W.H. McCLELLAND


G.W. BAUMHOFF


W.H. WILLIAMS


C. ALLEN

over weighing scales just before entering the storage. In the storage the track is elevated, and coal is thrown directly to the boiler room port holes on one side and to the storage on the other. There is capacity for storing 150 car loads of coal. The old power house has a capacity of 2,800-horse-power, and is composed of Porter-Allen high speed engines direct belted to Sprague No. 60 generators. The boilers are three Stirling water tube of 350-horse-power each and ten horizontal return flue of 200-horse-power each.

The Lindell Railway has always been advanced in the matter of large cars. Several notable types are used. The most recent is an open car with a side center entrance, built by the American Car Company, the appearance and comfort of which speaks for itself. Its body is 28 feet long and the outside width is 8 feet 4 inches. The inside width is 7 feet 10 inches. This allows a very comfortable cross seat with wide aisle. There are 11 of these seats on one side and 10 on the other, the space of one seat being taken up by the middle entrance, which is on one side only. This, of course, necessitates always running the car in the same direction if the middle entrance is to be made use of. The platforms are 4½ feet, and the sand box is placed on the right hand side of each platform and made about the right height for a seat. This makes it easy for the motorman to get at it if it is clogged, and furnishes two seats on the back platform when the car is crowded. A type of closed car of the same dimensions is also shown, and also the company's center vestibule trolley party car "Rover." This car was built recently, but in exterior appearance it is much the same as some cars made several years ago, by splicing together two old horse cars. The plan was devised by G. W. Baumhoff, superintendent, and a number of winter cars are so constructed. All double truck cars have a simple truck of the company's own make, the latest form of which is shown under the "Rover." Westinghouse motor equipment is chiefly used. A fender is used which is carried several inches above the pavement and it is let down to the surface of the pavement by a lever just under the brake handle. For reconstructing track with 60-foot rail and cast welded joints a rail car 50 feet long has been built. To provide for the extension of the rails over either end the coupler is put on the end of a pole. The regular load of this car is twenty 60-foot rails. Wood pole tops are used, and in the yard is an iron kettle of linseed oil in which these tops are boiled before being put up.

The main repair shops are at present at Choteau and Jefferson avenues and are under the charge of Otto Smith, master mechanic.

The road is officered by E. Whitaker, president; James Adkins, secretary and treasurer, and George W. Baumhoff, general superintendent.

Mr. Baumhoff is the originator of a recording chronograph for recording the headway of cars as they pass various points on the system, which he has used for nearly two years and which has also been adopted by the Chicago syndicate lines of which Robert McCulloch is general manager. Both roads are much pleased with it and would not think of trying to get along without it now that they know its merits. This was fully described in our issue of January, 1895, but we give a few words here. A continuous roll of paper is revolved by a drum at a certain fixed rate per hour. In passing over this drum it passes under a row of electro magnetic punches. Now it is evident that as the chronograph is revolving at a fixed rate it is easy to determine what moment any particular spot on it passed under the punches. These electro-magnetic punches are connected by wires to various points on the system and these wires are connected to contacts fixed over the trolley wire so that a trolley wheel in passing under makes contact and operates the punch furnishing a means for recording the intervals between cars at any point desired. All delays are accurately shown.

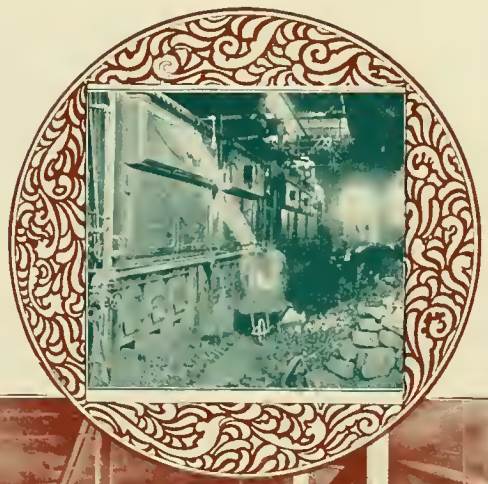
UNION DEPOT RAILROAD POWER PLANT AFTER THE CYCLONE.

Some of the cars on this system have a double fare register, one dial being outside on the roof of the car and in plain sight from the street.

The equipment includes cars from Brownell, Stephenson, American and St. Louis car companies.

Union Depot Railroad.

This road comprises an extensive system reaching in every direction from the city, and is under the control of John Scullin, president and Harry Scullin, general manager. It was organized in 1876, and now owns and operates 75 miles of track most of which is 73 and 78 pound 6-inch girder rail. About 1,200 men are on the pay roll, and the rolling stock consists of 338 motor cars, 263 of which are closed and 75 convertible for summer or winter use. Only 88 cars are on single trucks. There are 165 on double trucks and the remaining 85 are on Robinson radials. All the newer cars and trucks were built by the American and the St. Louis car companies. The motor equipment is General Electric and Walker. Cars are housed at five stations. The offices of the company, main repair shops, and largest power house are at Geyer and Missouri avenues. It was at this latter place that the tornado in May wrought great destruction, as noted in our June issue. Its condition soon after the storm is here shown, and it is certainly a discouraging sight but the road was not shut down. Power was borrowed for a short time and then by erecting temporary stacks and forcing all machinery the road was pulled through. The brick chimney which has now been replaced was 162 feet high, and 8 feet inside diameter at the top. This fell on one half of the engine room wrecking two direct connected units and some old engines, shafting and generators no longer in use. The present equipment of this station is eleven 250-horse-power Heine boilers, and two 250-horse-power of the same make; seven D 62 Thomson Houston generators driven by a Hamilton corliss from a line shaft, one 1,500 Kilowatt General Electric generator driven by a twin Allis corliss simple engine, one 800 kilowatt direct connected generator driven by a single cylinder Allis corliss and two 450 kilowatt generators direct connected to Porter-Allen engines. The largest of these, the twin Allis, was a bad wreck and W. L. Patterson, the chief engineer of the Union Depot power houses did a very creditable piece of work in getting it running again. The engine was running at the time the building was wrecked and the bearings were full of dirt and mortar. What bad condition they must have been in, anyone knows who has been through a wreck of any kind. It looked very much as if the bearings would have to be rebabbited and on a 1,500 kilowatt direct connected unit this is an expensive thing. Mr. Patterson accomplished the scraping of the bearing without lifting the journal from its place. A sharp edged groove was cut in the axle. This was not exactly parallel to the axis of the journal but was made slightly spiral. The tops of the bearings were then put on and the machine was revolved slowly. The groove scraped the bearing as effectively and more accurately than if done by hand and the slight spiral trend of the groove forced the metal shavings out at one end. After the bearing was smoothed out in this way the edges of the groove were rounded off and the machine put in regular operation.



VIEWS IN UNION DEPOT POWER PLANT.

This power house well illustrates the changes that have taken place in electric railway power plants since electric traction was introduced. The large direct connected unit and the old corliss driving a whole "herd" of small machines through a line shafting, stand side by side. The saving in room is evident to any observer and the saving in coal, oil and attendance is very manifest to the company that pays the bills. This company also has another power plant for driving its northern lines, known as its Bellefountaine station and located at Twentieth and Ferry streets. This is a direct belted plant having two 450 kilowatt and four 250 kilowatt generators driven by corliss engines of Porter Allen and St. Louis Iron & Machine Company make. The boilers

consist of four 300-horse-power Babcock & Wilcox and six horizontal return flue. Excelsior heaters are used at both plants.

The repair shops are at the offices at Missouri and Geyer avenues and are in charge of Master Mechanic Pierson. These shops were not destroyed by the storm, but the large car barn adjoining was a complete wreck.

The lines—track and overhead—are in charge of John Lichter, the civil engineer. A novel feature in the line construction is the running of a 750,000 circular mil cable to connect the two power plants for purposes of running owl cars and taking emergency loads. This is about the heaviest feed cable yet put overhead.

The officers are John Scullin, president, H. Scullin, vice-president and general manager, J. H. Roach, secretary and treasurer, and T. W. Murphy, superintendent.

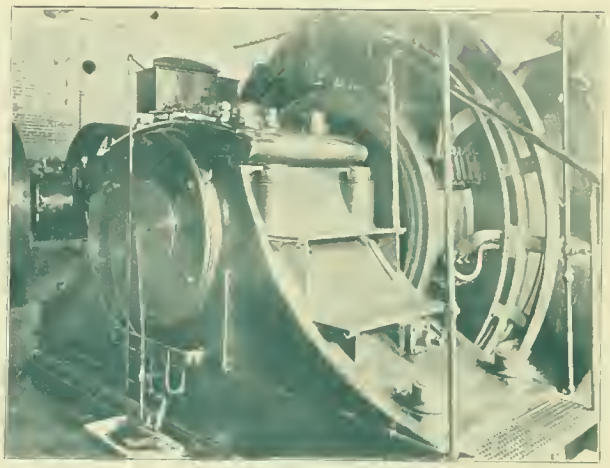
This company also practically controls and operates the Grand Avenue Railroad having 19 miles of track and 30 motor cars.

The street railway mail service of St. Louis is carried by this company.

Southern Electric Railway.

The Southern Electric Railway has a route extending from the heart of the city, to Jefferson Barracks, a United States military post, 12 miles south. This road was the first in St. Louis to operate an overhead trolley line on the down town streets, which event took place in November, 1890. It is under the management of J. C. Minary, with C. Kilpatrick as president and J. C. Allen as superintendent. About 200 men are employed and 52 motor cars, 41 closed trailers and 32 open trailers are kept available for service. Cars are American and Stephenson and motors Westinghouse and General Electric. There has been considerable change recently in the way of substituting long cars and modern motors for the small cars and old motors which formed the original equipment. Twenty-four miles of single track are owned and operated. The offices, power house, car houses and repair shops are all at 4041 South Broadway.

Shops and power house are under the charge of T. W. Shelton, mechanical and electrical engineer. The company does all its repairs here. Mr. Shelton has invented a cheap and indestructible form of rheostat which is used on many of the cars. It consists of grooved plates 20x20 inches made of fire clay with strips of sheet steel running back and forth through the grooves. Each plate has about ½ ohm of resistance wound on it and as the resistance used with the series parallel controllers on this road is about 3 ohms, six plates are piled on top of each other to make a car resistance. These are put under a car without any protection and the water and mud which covers it soon, has no effect whatever. Steel strips are used for the windings instead of iron because it is found they do not rust easily. This rheostat is very cheap to construct because there is no tedious building up process and unskilled labor can be used. These have been used since April, 1894, and the way they will run through mud and water without short circuiting is



GENERATOR AND OIL PUMP.

remarkable. Nothing but the entire burning in two of the steel resistance strips can disable it.

The power plant was first equipped with Ball high speed tandem compound engines of 150-horse-power, each belted to a 75-kilowatt multipolar generator. To these were added two Reynolds corliss engines of 300 horse-power, each belted to a 200-kilowatt generator. The latest addition is an 800-kilowatt generator direct connected to a simple corliss engine built by Rankin & Fritsch, which takes the entire load during the day. The high speed engines are not used except for owl car load. The two main bearings of the direct connected unit each have their own little oil pumps connected to the generator shaft for supplying the oil cups automatically as long as the generator is running. These pumps were made on the premises by putting a piston in a length of brass pipe and connecting ordinary check valves in intake and outlet. A novel steam pipe problem was solved when the direct connected unit was installed. This unit was put at one end of the station and some distance beyond the row of boilers which run parallel with the engine room. Consequently all the steam from the boilers for this unit had to pass the entire length of the header and some additional pipe besides. Now the header was designed to supply steam for a row of small engines running parallel with the boilers and was not large enough to properly and safely feed so large an engine at one end. To obviate the necessity of re-piping the whole length of the boilers a receiver and separator was placed just back of the 800-kilowatt unit for the purpose of preventing too rapid flow of steam through the header in case of sudden heavy load for a few strokes. This is 5 feet in diameter by 8 feet high and has a partition extending half way down from the top. Steam enters and leaves at the top on

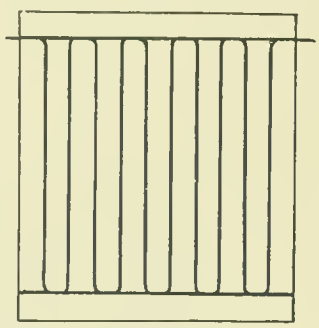
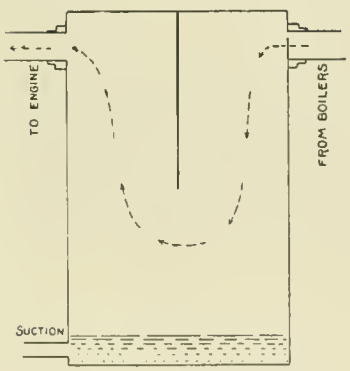


PLATE OF SHELTON RHEOSTAT.

opposite sides of the partition and in passing around drops its water. Water is drained off by a pipe at the bottom running to the suction pipe of a pump which is turned on and off automatically by a float in the separator. The boiler room contains seven 6 by 18-foot horizontal boilers with Hawley down draft furnaces, connected to a brick stack designed by Mr. Shelton. This is one of the few railway plants in the city employing only one stack. It is 150 feet high with a flue 8 feet in diameter. The base is 19½ feet outside diameter, which tapers to 10 feet 2 inches at the top. The plant has two Baragwanath closed heaters.

An express service has been maintained by this company ever since this road has been changed to electric. While it has not proved a big money maker it is considered useful as helping to build up and make desirable the territory the road runs through. The express business is under the charge of Frank C. Graves, and a down town express office is maintained on Sixth street between Market and Walnut streets. There are three other express offices along the route. One at Arsenal and Jefferson avenues, four miles out, is at a drug store. The next at Carondolet, eight miles, and the one at Jefferson Barracks, twelve miles, are in charge of company men. The express car makes two trips daily, morning and afternoon. Articles requiring immediate handling are taken on passenger trains. A mutual benefit association is maintained by the employes, and enjoys a membership of 130. It is primarily a mutual insurance order, but the company furnishes a meeting room, and it is made an educational organization as well. Discussions are held on electrical and other topics and much interest manifested. In case of sickness a member gets $10 50 per week from the association and in case of death his family gets $1.00 from each member in good standing. Before the association was started the employes were much troubled with subscription papers passed around in case of sickness or death of fellow employes. This was naturally considered a nuisance. Now no such papers are allowed and the men greatly prefer joining the association and paying regular dues and assessments to signing subscription papers.



RECEIVER AND SEPARATOR—SOUTHERN ELECTRIC STATION.

Jefferson Avenue Railroad Company.

This road is a sort of compromise route; a crosstown line controlled by men interested in the Union Depot Railroad, the Lindell Railway, the Missouri Railroad and the Cass Avenue & Fair Grounds Railway. It has no power house of its own, but power is furnished by the four companies enumerated. It was one of the last roads to give up mule power, but owing to its recent construction is one of the best equipped in the city, especially as to car house and shops. It employs 75 men, has 7.26 miles of track and 15 motor cars on double trucks, each seating 36 passengers. They are 36 feet over all, with 25-foot bodies, built by the LaClede Car Company, and are equipped with McGuire bicycle trucks and G. E. 800 motors. The car house is near the corner of Jefferson and Choteau avenues, where Superintendent H. R. Conklin may be found. One of the first things to attract attention here is the arrangement of pits. Each pit runs clear across the width of the barn, and the two pits are the same distance apart as the trucks of the cars. They are brick lined. The iron roof girders are so placed that when a car is over the pits, blocks and tackles attached to the girder can be used for lifting the car. Part of the power house has concrete floor and is used as a wash room. Under the house are two cisterns 12 feet in diameter and 15 feet deep, where the water off the roof is collected for washing cars. The city water of St. Louis is so full of clay that it is not good for washing cars. The wash room and repair shops is entered by two enormous doors, one of which is 16 by 18 feet, but so hung on machined journals that it opens easily. The building is 170 feet deep and fronts 146 feet on the street. The storage

PITS JEFFERSON AVENUE CAR HOUSE.

PITS AND CAR HOIST.

house is 84 by 170 feet. A thick walled brick vault with iron doors is placed in one corner of this house for storing oil and lamps, and the insurance rate is thereby made the same as if it was in a separate building. The arrangements for drying sand are very convenient. On one side of a partition is green sand. The sand stove is in the partition and sand is shoveled directly from the bin to the stove and falls from the stove into the dry sand bin on the other side. The stove used weighs over a ton without the sheet iron case and can dry sand as fast as one man can handle it. This road does all its own winding and blacksmith work.

Fourth Street & Arsenal Railway.

This is practically operated by the People's Railroad. It was changed from horse to electric, in August last, and rents power from the Laclede Power Company. It has about 6 miles of single track, employs 30 men, and owns 12 motor cars. These cars have 21 foot bodies, and have 12 cross seats and 2 end seats at each end, making the seating capacity 32. The side seats at the end, of course, facilitate movement somewhat. These are the latest single truck cars in the city.

St. Louis & East St. Louis.

This company has a short but valuable mileage of 3.5 miles of track on the Eads bridge, from the foot of Washington avenue, in St. Louis, to East St. Louis. The fare is 10 cents, one-half of which goes to the bridge company. As the maximum haul for 5 cents is 1¼ miles, there is, of course, a good margin of profit. The officers are D. R. Powell, president, D. T. Breck, secretary, and W. H. Williams, assistant superintendent and electrician. The company owns 7 motor cars, and has a power plant on the Illinois side of the river of two high speed engines and two 62 kilowatt generators. The road requires the services of 21 men. The road lost all its cars, carhouse, terminal and repair shops, in the cyclone, and came near losing its superintendent. Mr. Williams was in the wreck, and was laid up three months "for repairs." The car barn and contents was deposited, bodily, in a near by ditch. Much of the upper portion of the bridge, over which the tracks run, was destroyed, and, altogether, the road suffered severely. Mr. Williams can show and tell visitors many interesting and curious things about the freaks of the storm in that vicinity. His office and the car house are near the East St. Louis terminal. The road will be found equipped with new St. Louis cars.

Missouri Railroad.

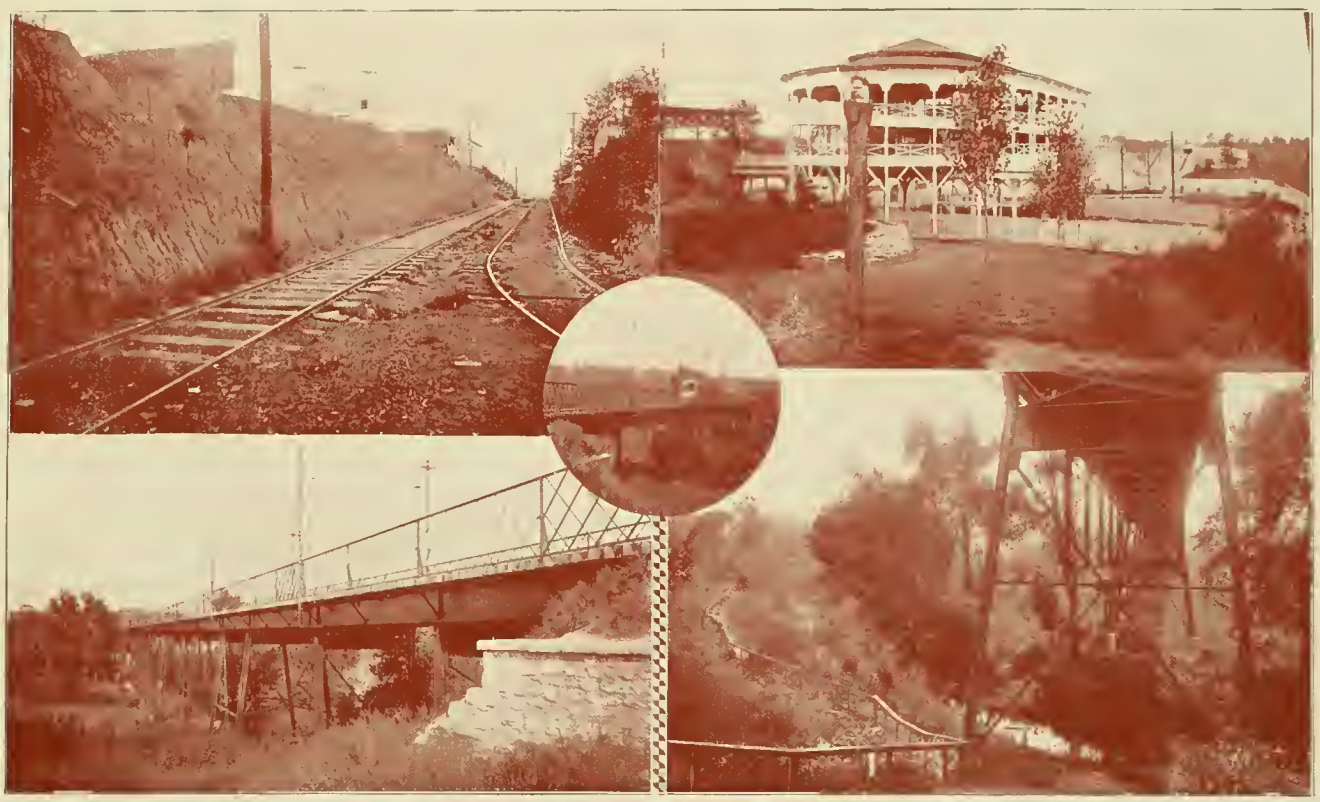
The Missouri Railroad was incorporated in 1859. It owns and operates 25.5 miles of track, of which 9 are cable. It employs 500 to 550 men; has 60 motor cars, 48 grip cars, and 48 cable trailers. President P. C. Maffitt is the general manager, F. R. Henry, secretary and treasurer, and J. F. Davidson, superintendent. The company has an extensive car house and repair shop at 10 South Compton avenue, where all the electric cars are taken care of, and where are also the general offices. Cars are all kept on one floor, and communication with the main entrances is by means of diagonal switch tracks. One corner of the car house is partitioned off for repair pits, and steam coils are put in the pits for the workmen's comfort in winter. Painting, varnishing, winding, and blacksmith work, are all done in the building. The Olive street cable car and power house is at Thirty-third and Olive streets, but a few blocks from the offices. This cable line, last spring, underwent a complete change of car equipment. The cars now used are suitable for either summer or winter, being of the cross seat center aisle type, and built by the American Car Company. The grip cars have front platforms vestibuled, and the gripman has exclusive use of the front platform. The grip is a modified form of that used on Third avenue, New York, and has a vertical hand wheel for operating the grip. The Murrey brake is employed on the train. A little device is used, which gives a click every revolution made by the grip wheel, so that the gripmen may know when they have revolved enough turns to release the grip. The cable trains are lighted with Pintsch gas, supplied by the local company. It is stored in tanks in the barn, and can be tapped to charge the car tanks at numerous hand holes in the barn floor. J. B. Richards, foreman of the Olive street car house, is the originator of a simple device for preventing lost motion between draw bars, which is used on this road and on several others in the city. It is simply a horseshoe-shaped wedge, which is placed astride the coupling link between the bumpers, after the train is coupled. It automatically takes up all the slack and holds it. The electric power house of the system is at Boyle avenue and Clayton road, some distance from any of the company's lines—the idea being to get on a steam road for coal supply. The plant is under the charge of T. P. McCormick, chief engineer. The generating machinery consists of two 500-horse-power Corliss engines, direct belted to generators, with idlers to take up the slack. The other generators, to the capacity of 1,000-horse-power, are driven from a line shaft by a 1,000-horse-power Corliss. The latter engine has one of the largest fly wheels in the city. It is 28 feet in diameter, with 6-foot face. There is also a high speed 50-horse-power engine for owl car load. Probably the most interesting thing about this plant is, that the shunt fields of all machines are separately excited by a 25 kilowatt dynamo, driven by a high speed engine kept continually running. The main advantage of this is that it facilitates starting up machines, because it is not necessary to wait until they build up. It is also claimed to have a tendency to keep the voltage more constant when a sudden load comes on. The horizontal boilers are arranged in four batteries of 250-horse-power, each with a separate stack to each battery. A steam jet is used over each fire for smoke prevention purposes. The Olive street cable power-house has duplicate equipment for 750-horse-

WEDGE TO GO BETWEEN COUPLERS.

power. Upon starting the new heavier car equipment, this spring, it was found necessary to increase the capacity of these engines over 25 per cent. The motor equipment is Walker and General Electric.

Midland Street Railway.

This road, although a small one at present, is being extended, so that next year it will be an important independent system. At present, it only operates 2½ miles, connecting with the St. Louis & Suburban, at Page avenue, and the city limits. Power is rented from the latter road. Four men are employed, and the equipment is 2 motor cars. The office is at Page and De Hodiamont avenues, and the officers are E. H. Benoist, president, Fred E. Allen, vice-president, and Breckenridge Jones, secretary and treasurer.



CASINO AND SCENES ON THE ST. LOUIS SUBURBAN.

St. Louis & Suburban Railway.

The St. Louis & Suburban occupies a somewhat unique position. It was the first road in St. Louis to put in a cable system, which was done on the down town end of the line in 1886. This was operated as any other street railway (except perhaps that it broke down more frequently) from the heart of the city to Vandeventer avenue. There the passengers were transferred to a narrow gage steam road, which ran far out beyond the city limits. In the city it ran on its own right of way. Finally the whole road, both cable and steam, was changed to electric and operated as one continuous route. It is not often that a street railway runs through many miles of a city as this does on its own right of way. It is not fenced in, and at the far crossing of each street a small platform is built. A high speed is maintained over much of the route. The power station is located at De Hodiamont, 6½ miles from the down town terminus, and power has to be transmitted 13 miles to the outer terminus.

At the city limits a park is maintained known as the Suburban Garden. Admission to the park is free, but admission is charged to the reserved seats of the open air theater which is maintained. Minstrel shows have proved the best attraction the past season. There is also a switchback railway on the grounds. The garden is beautifully located between two bluffs, and in the valley between, is a double loop and terminal of the railway. The city cars use one loop, and those running on the outer end of the line the other. The terminal facilities are excellent as, indeed, they must be, for as high as 16,500 people, by exact count, have visited the garden in one evening. This company also operates the St. Louis & Meramec River Railroad, which is owned by a separate company, having the same officers as the Suburban. The two roads together employ 450 men and own 46.5 miles of track, 129 passenger cars and 2 express cars.

This was one of the first electric roads in the world to do an electric express business, and it now keeps one car in service all day over its line.

The first cars used on the line after it was changed to electric were on double trucks with 36-inch wheels

throughout. These are very high cars, and the maximum traction type of swivel truck is employed on all new cars. St. Louis Car Company's cars are used and General Electric motors. Sand boxes are put on both sides of all cars, and it is not thought that it is good policy to sand one side only

The St. Louis & Meramec River branch has the distinction of crossing what is the second longest electric railway bridge in the world. This is over the Missouri Pacific Railroad and the River Des Peres, and is 900 feet long. The track is 75 feet above water in the river.

C. H. TURNER.

The power station well illustrates the growth of traffic on the road as well as the evolution of the railway power station. It is about 3,000-horse-power in maximum capacity, and has some small 75-kilowatt generators, driven through a countershaft by Hamilton corliss engines, some of larger capacities, direct belted, and last, but not least, a direct connected Hamilton corliss, 30 by 60. Generators are General Electric. Coal is furnished by a siding of the Wabash Railroad.

The officers in charge of the road are, C. H. Turner, president, R. Lehmann, secretary and treasurer, and T. F. Sneed, general superintendent. H. O. Rockwell is the electrician, and L. Puirrier, master mechanic.

St. Louis & Kirkwood Railroad.

"Trial and tribulation" have marked the course of this enterprise ever since its beginning. The road was completed early this spring, and since that time legal disputes have been constant up to present writing. Added to this came a terrible collision soon after it started, and floods and washouts, owing to the peculiar character of the country it traverses and the unusually stormy season. We will leave it for the courts to find out who really owns and controls the road, and take a glance at the property itself, which is under the charge of W. H. McClelland, superintendent. It is a purely suburban road, 10.5 miles in length, and running from the end of the Choteau avenue line of the Lindell Railway to the Meramec Highlands, a pleasure and summer resort 700 feet above the Mississippi river. The highlands have considerable to boast of in the way of scenery. Numerous springs and the Meramec river at the foot of the bluffs, add still further to the attractiveness of the terminus, and, altogether, the property ought to be a good one were it not legally "in the mud." The road is single track, limestone ballasted throughout, of 60-pound T rail, and has many cuts and fills. There are 10 very heavy double truck motor cars, with wheels approximating those on steam roads. The cars are 40 feet over all, of American Car Company build, and of about the dimensions of the larger ones in use in the city, but are much heavier in construction, especially as to trucks, which were built by the Missouri Car & Foundry Company. One of these cars was, the past season, fitted up as a dining car by putting in removable tables and elaborate trimmings. This was the first regular electric railway dining car ever run. Two 50-horse-power Westinghouse motors are mounted under each car.

THOMAS F. SNEED.

The power house and headquarters are about three miles from the city terminus. The power house is one of the smallest direct connected electric railway plants yet installed and is made absolutely fireproof, with concrete floor and double roof. There are at present two 150-kilowatt Westinghouse generators direct connected to Porter-Allen engines, running 200 per minute. One generator will pull five of these heavy cars. Those wishing to investigate the merits of small direct connected plants will do well to make this plant a visit. It is presided over by E. A. Schricker, chief engineer. The road is run on a fixed time table, but for cases of emergency a telephone line has been put up the entire length of the line with plugs on poles every 2,000 feet where the conductor can attach a portable instrument he carries and talk with the office at the power station. The road is partly on its own right of way and partly on streets. Many delegates will find a trip over this line both enjoyable and profitable.

C. E. Wurdeman is receiver.

The Peoples' Railway.

This is popularly known as the Fourth street cable and has a route starting on Fourth street and exending southwest with numerous curves. It has 10 miles of track, 40 grip cars and 80 trailers. Cars and trucks were built by the John Stephenson Company. The officers are Charles Green, president; J. Mahoney, general manager, and D. J. Mahoney, secretary and treasurer. About 150 men are employed. The offices, shops and power house are at Eighteenth street and Park avenue. The power house building suffered severely in the cyclone, but the machinery was run in the open air until a temporary cover could be put up. This plant has two Hamilton-Corliss engines of 500-horse-power.

The mail service system of Philadelphia is to be increased so as to connect all the sub-stations of the city with the central office. The Union Traction company is building 14 new cars for this especial purpose. They will be 16 feet in length, with steel framing and fitted up in the most complete manner as traveling postoffices. They will be equipped with motors to run independently, and each will carry two clerks.

STREET CAR CIRCUIT BREAKER.

The Automatic Circuit Breaker Company is putting out a new circuit breaker for street cars which is intended to replace the slow acting fuse. The particular advantage that a magnetic circuit breaker offers over a fuse, for use on a car, is that in case of a sudden ground on the car the breaker will open the circuit immediately, as soon as the current for which it is set flows through it, whereas the sluggish action of a fuse sometimes allows a greatly excessive current to flow, thereby opening the circuit at the power station and interrupting the whole road. With a magnetic circuit breaker on the car, troubles on the car do not have as serious an effect on the power station. The new circuit breaker is shown in the accompanying engraving. The current enters at the lower left hand corner, flows through the magnet

shown, up through the switch arm and out to the motors at the upper right hand corner. The horizontal piece on top of the magnet is an armature, which in case of an abnormal rush of current is pulled down, thereby releasing the vertical switch arm. At the upper end of this arm is a roller carbon. When the circuit breaker acts the roller carbon passes over a variable resistance which cuts the current down before actually breaking the circuit. The final break takes place when only 20 amperes of current is flowing, even though the breaker may be set for 200 amperes. With this instrument set to open at 50 amperes a short circuit can be broken before a 5 ampere fuse in the circuit is blown, which shows the breaker to be very sensitive and quick in its operation. The device is put in a handsome case of any finish to suit the car, with dimensions 8 by 8 by 4 inches. The adjustment is made by the thumb screw at the right end of the magnet. The resetting is done by the handle projecting out of the case at the right hand lower corner. The push button at the right is for operating the breaker by hand. It is manufactured by the Automatic Circuit Breaker Company, of Newaygo, Mich.

DYNAMITER'S TRAGIC DEATH.

Tried to Blow Up the Railway Plant at Portsmouth, Ohio—Suicides When Arrested.

The good people of Portsmouth, O., breathe easier now and retire to slumber without fear of waking up in Kingdom Come. During August a series of mysterious explosions occurred in different parts of the city, in which heavy explosives were used, but no fatalities resulted. The police were satisfied it was the work of some one in the town, but so cleverly was the work covered, it was impossible to secure any positive evidence. Just as people were beginning to think the danger had passed the city was startled by an attempt to blow up the power house of the Portsmouth Street Railway & Light Company. A jar containing giant powder and dynamite was placed in one of the front windows of the power station about 2 o'clock in the morning and exploded by means of a slow burning cotton fuse. Through some kind providence the building and contents were not wrecked, nor any employe injured, the damage being confined to shattering the window and casing, though the night crew was badly frightened. Suspicion at that time pointed to a man living diagonally across the street from the power station, and while the police went to work with renewed efforts, it was not until recently that convincing evidence was secured. An officer was sent to arrest the man, who was perfectly cool and collected, and readily assented to accompanying the officer. He asked the privilege of going into his house to get his hat. They entered the house, when the prisoner stepped into the cellar, and when in the dark took a revolver from a shelf and committed suicide. A considerable quantity of dynamite and other explosives, fuses and the accessories for wrecking buildings were found. The man was, doubtless, insane.

COPYRIGHT ON CAR-ACCOUNT BLANKS WORTHLESS.

A correspondent of the Railroad Gazette details his experience in attempting to copyright a new form of blank for car accounting purposes, and suggests a pertinent query. He had known of other somewhat similar blanks which were copyrighted, but was, upon application, informed by the librarian of congress that under a decision of the Supreme Court, blank forms and books could not be so protected, with a citation of Baker vs. Selden, 101 U. S., 99. He also found upon further investigation that in a certain case quoted in Baker vs. Selden it was stated that, "to say that a particular mode of ruling a book constituted an object for a copyright is absurd." The query is, why any railroad has paid royalties on blanks and the like since 1880, the date when that decision was rendered.

It has been decided by Judge Wheeler that the Brooklyn Heights Railroad Company must pay royalties to Tom L. Johnson on the gridiron fender.

A STUFFED BEAR.

By Opie Read.

[WRITTEN FOR THE OCTOBER REVIEW.]

NOT LONG ago I was on an electric car, rather late at night, when there came aboard a man carrying a stuffed cub bear. The conductor stared at the man, shuddered, I thought, and muttered something as he collected the fare.

"Don't object to cub bears, do you?" the passenger asked. "About as fine a specimen as you'll ever see. Going to take him out to my place and stand him in front of my store to attract attention."

The conductor wheeled about and looked hard at him but said nothing, though I thought he seemed much disposed to say something harsh. After a time the man got off with his cub bear, and the conductor passing through said to me, "I'd rather he'd come on with a live snake than that thing." I was now the only passenger, and I had become so much interested in his whimsical objections to the stuffed bear that I encouraged him to go on.

"Why so?" I asked. He did not answer my question, but proceeded to tell me a story.

"Once," said he, "There lived at Conway, Arkansas, a fellow named Bill Hyde. Bill had a clothing store, and he wasn't slow, either. One day a friend of his that lived out in Colorado sent him a stuffed grizzly, the biggest thing you ever saw. Bill put him out in front of the store, and there he stood, rearing on a pole with his mouth open. The people of the town soon got used to Hyde's bear, but it always attracted strangers. And it helped the town, for many a drummer got off there just because he saw that bear.

"Bill was an ambitious sort of fellow, but had never found an outlet for his genius. He had gone up in a baloon once to advertise himself, but was dropped into the Arkansas river and almost drowned, so he had to give up that line of work. But he stuck to the belief that his time was coming. And it came. One day a man named Peters returned from a trip to St. Louis, and the first thing he did after he brushed some of the dust off was to walk straight to Bill's store. Bill and a number of the boys were sitting at the rear end."

"'Hyde,' said Peters, 'I was all over St. Louis the other day, and I'll be blamed if I saw a bear as big as yours.'

"'That so?' said Hyde.'

"'Yes, sir,' said Peters, 'and I looked all over the town, after the idea struck me that probably you had about the biggest bear on record. I went up one street and down another, and I looked through all sorts of directories, seeing if I could find a man with a bear. A man down on the levee told me that he knew a fur dealer that had a stuffed bear that would make any village stuffed article look sick, and I told him I reckoned not, and asked him to show me the fur dealer. He told me where to go, and I went there. And sir, there was his bear, white as they make 'em, but he wan't nothing compared with your bear, Hyde.'

"'Is that a fact?' Bill asked.'

"'True as off-hand preaching,' said Peters. And then Bill let out a link of his pride. 'Boys, said he, 'I've done this town some good. I've made it known as the bear center. We haven't any big telescope, or church bell, or man that can pick a chicken quicker than anybody else, but we've got the finest stuffed bear on earth Let's go out and have something.'

"Well, they went out, and while they were standing at the bar in came a fellow named Hitt, a drummer. 'Helloa, Hyde,' said he. 'I was about to write to you the other day, but thought I'd wait and tell you personally. I was at the St. Charles hotel, in New Orleans, the other day, and I heard a party of men talking about the distinguishing features of the different towns of the country, when one man spoke up and said, 'Well, maybe old Conway, Arkansas, ain't much of a town, but I'll tell you what she's got —she's got the biggest stuffed bear in the world, and that's something. It's American, you can bet.' And then a man from New York spoke up and said: 'You are right. I saw that bear at Conway and it impressed me, and when I went back to New York I thought I'd look 'round and see if we had a bigger bear, being proud of my town, and not wanting to be overshadowed by a town 'way out in Arkansas, but sir, I hunted all of one day and part of the next, and I'll be hanged if I could find anything to equal that bear. It stirred me up and I got a fellow to help me, and we found stuffed bears from all parts of the world, Russia and Norway, but I couldn't find a marker for that Conway bear.'

"'Boys,' said Hyde, 'what are you going to have? Say, Hitt, I wish you'd write that thing up for the paper here. Of course, I'm doing well with my store—don't owe a dollar in the world—but I've got a pride in our town, and I want the people to see that I am a sort of public benefactor. I want a name to leave to my family. It isn't every man that could have gathered together as big a bear as this one is, and I am the cause of business and importance coming to the town. Write it up, will you, Hitt?' Hitt said he would, and he did. He said that the people of Conway ought to be proud of Hyde—said that he had sent the name of the town to the furtherest ends of the country, said that he would be willing to bet that the next geography would have a picture of that bear. It was the best advertisement the town ever had, and it would undoubtedly attract immigration. The piece in the paper made a great stir in the town, and the next day several prominent citizens brought Hyde a petition asking him to come out as a candidate for sheriff. He was proud, and for a long

time his mouth had been set for office, so he yielded to what he was pleased to call the irresistible pressure, and stepped forth to run against Jim Smith, a man already in the office. Bill Hyde knew that the people were dissatisfied with Jim Smith's administration, for they had said so. Well, the campaign opened, and it was warm. Hyde made a good many speeches, and in each one he reminded the people that he had made their town celebrated. 'A stuffed bear may not mean much to some of the old European cities,' said he, 'but in this country where people pride themselves on living close to nature, it means a lot; and when a man brings to his town not only a stuffed bear, but the biggest stuffed bear in the world, the people generously acknowledge him a benefactor.' It was generally conceded that Hyde would be elected. Smith had no stuffed bear. He tried to excite the public with a stuffed coon, claiming that it was the biggest on the face of the earth, but along came a farmer with a coon that in point of size could stand godfather to Smith's coon, so he was forced to hedge about and look for another issue. Hyde was about the happiest man you ever saw, with the wind blowing his way. But it took money to run the campaign, and as he was compelled to be out of his store his business suffered. One day his creditors came down upon him, and the first thing Hyde knew, Jim Smith, the sheriff, was taking his stuffed bear over to the court house. He got out a writ of replevin, but it was decided that the stuffed bear was a part of his legitimate assets, so the writ was denied. And old Jim Smith wasn't slow to see the advantage that had fallen to him. He issued a card to the people of the town and county, telling them that he had acquired for the community the biggest stuffed bear on earth, that it no longer belonged to an individual who could strut in pride over its ownership, but was the property of the people. Well, sir, the tide turned, and Hyde was swept from the field. He was the worst beat man you ever saw, with no assetts but the memory of a stuffed bear."

"Yes," said I, after a moment's silence, "but why should that campaign down there in Arkansas so prejudice you against stuffed bears?"

"Because I am Bill Hyde." *Fing!* "Forty-seventh street."

MUST PAY FOR PACKAGES.

The Scranton, Pa., Traction Company has put in operation a rule to the effect that passengers carrying packages must pay extra for them, and transfers will not be given for the packages. The rule includes grips as well as larger packages, and the amount charged is five or ten cents, according to size. The question has been raised whether such articles can be classed as freight. The charter permits the carrying of freight.

The street cars of Alexandria, Va., are now run without conductors to reduce expenses. Registering fare boxes are provided as a substitute.

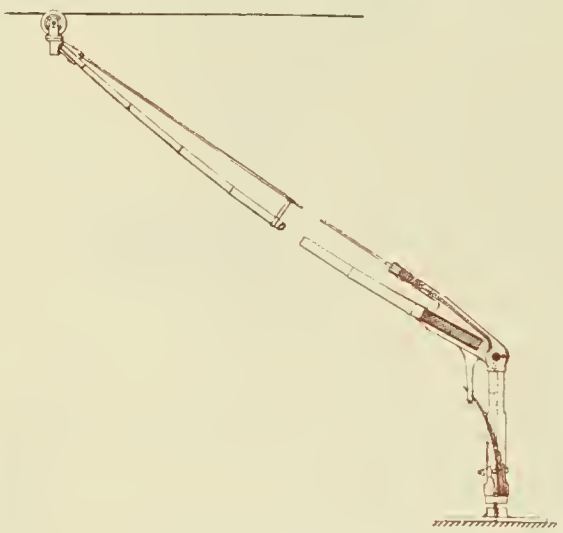
ELECTRIC CAR AS A THIEF TRAP.

Daring Capture of a Highwayman by a Train Crew of the Metropolitan Electric.

A Metropolitan "L" train made a series of wild runs up and down the North avenue division in the early hours of Sunday morning, September 27, the object of the train crew in so doing being to hold as prisoner until the police could be summoned, a man who was caged as sole passenger in the motor car and who was recognized as the highwayman who had robbed a passenger a few nights before on the stairway of a station. The crew had seen the man who was robbed and his companion, and had heard cries for help just after the two had left the car together. When he again appeared two nights later on the same train they succeeded in holding him, in spite of his attempts to jump from the windows. Stations and speed rules were ignored until an opportunity presented itself of making an appointment with the police at Western avenue station where he was taken care of.

BAMBOO TROLLEY POLE.

Ernest K. Scott, of Wolverhampton, England, has designed a bamboo trolley pole which is claimed to be lighter for a given strength than steel. It is here shown as arranged for the long double swivel side trolley used on several roads in England. On account of the length and peculiar conditions of service of these poles, lightness is even more desirable than with the American style. A bamboo pole alone is too flexible for a trolley pole.



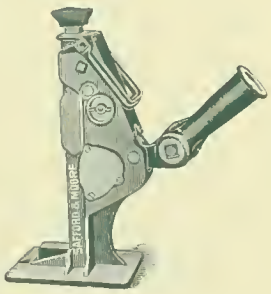
BAMBOO TROLLEY POLE.

Mr. Scott therefore makes his pole a kind of truss structure with the bamboo stick held in compression by a light metal tie rod. It is claimed to be possible to thus make a trolley pole of equal strength to the usual tubular steel pole but only of one-fifth the weight. The main difficulty to us appears to be that it would most certainly be broken and entirely ruined if it flew off and hit a bracket or span wire. The illustration is from the London Electrical Review.

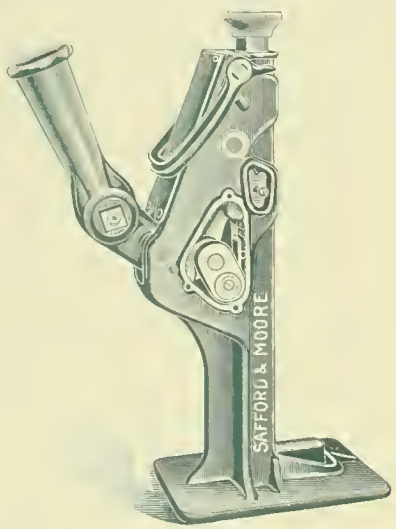
MOORE'S RAILWAY JACK.

A very convenient and efficient railway jack for use on track or car work is now being introduced to the trade by the Safford & Moore Railway Jack Company, 1324 Monadnock block, Chicago.

The operating lever works directly upon the joint of the knuckle, thus securing the most powerful form of leverage. The lifting bar may be raised two notches or one at a time, according to the amount of movement given to the operating handle, the levers acting, however, much more powerfully when working one notch at a time.



The trip device is arranged in connection with a handle by which the jack may be carried. Raising the handle throws the holding dog out of engagement with the rack. The pin shown upon the side of the jack should first be thrown into the left hand notch while the lifting handle is raised. The trip will then work instantly. This is the "safety" position.



but if it is necessary to raise the load still higher the lifting dog returns to working position by gravity.

For lowering slowly it is only necessary to give a thumb nut a half turn. This reverses the action of the lifting and holding dogs.

By means of an adjustable clutch connection the handle may stand at a horizontal position, or in a nearly vertical position either above or below the body of the jack, for work between cars, on embankments, or the like.

The Cincinnati Street Railway Company has purchased all the property, rights, franchises and equipments of the Mt. Adams & Eden Park Inclined Railway Company and the Mt. Auburn Cable Railway Company, making all but one of the street railways of the city practically parts of one system.

ONE ON THE CON.

"How old is that child?" the conductor asked;—
His countenance brightened with glee,
As the lady presented a single cash fare,
Though a youngster sat at each knee.

"He'll be three in November next," she replied;
"Sixteenth of November," said she;
"And the other?" The fare-taker greedily eyed
The next one, who older might be.

"This fellow is three in November, too;
The first;" with a motherly touch;
"That seems rather strange," said the con with a smile,
"Two children a month is too much."

"You'd better attend to your business," she snapped;
"What's funny or strange I can't see
When one of the children's my sister's boy,
And the other belongs to me!"

RAIL BOND TESTS.

Some very interesting tests of all the leading forms of rail bonds were made recently by the Cutter Electrical & Manufacturing Company at their Philadelphia laboratory. Each type of bond and its rails were carefully cleaned and polished and the contacts made as near perfection as possible, so as to give its results under ideal conditions. Each bond was given currents varying from 100 amperes to full carrying capacity of 90-pound rail and frequent readings made of current and drop in voltage. The results showed that all the various kinds of copper bonds designed to loop around the angle plate, caused a loss of from $\frac{1}{8}$ to $\frac{1}{4}$ of a volt with 1,000 amperes, and were smoking hot after ten minutes run. The various flexible copper bonds to be placed under angle plates caused a loss of from $\frac{1}{10}$ to $\frac{2}{10}$ of a volt at same load and were too hot to touch. A special Weston milli-voltmeter reading to 0.0001 of a volt was required to determine the losses on the various types of plastic bonds, which at 1,000 amperes load, ran from 0.0045 volts to 0.04; these bonds carried 1,500 amperes for 5 to 10 minutes without heating. The full report of these tests will be of great practical value to electric railway managers.

MELBOURNE TRAMWAY BALANCES WELL.

The report presented at the recent annual meeting of the shareholders of the Melbourne, Australia, Tramway & Omnibus Company indicates that the finances of the company are steadily improving. The details of the report shows that this is due quite as much to the exercise of care and economy in the matter of operating expenses as in increased receipts. A material reduction in expense resulted from the use of Victorian coal. The profits of recent months show a marked increase over corresponding months last year.

The City & Suburban Railway Company of Baltimore has applied for a permit to lay a third rail between the tracks and one foot below the surface for conveying the return current.

A PRETTY ROMANCE.

Interesting Historical Associations of the Brownell Car Company's Office Building—Jefferson Davis Was Married There.

Perhaps no city in America has had linked with its early history more sentiment and chivalry than St. Louis, and to this day many of the "old families" cherish some romance of bygone days as a legacy.

Associated with the early days of St. Louis there is one name conspicuous for public enterprise, liberality and earnest desire to build up the city and make it great and attractive. It is that of Major William Christy, who came to St. Louis in 1804, and in the year 1819 completed and occupied as his residence the stone building at Second and Monroe streets, in which he used to dispense his hospitality in the large and warm hearted style

PRESIDENT BROWNELL'S OFFICE.

of the "genuine southern gentleman," and now used by the Brownell Car Company as its offices.

And connected with this same office building are not a few interesting facts, the principal one being that in which the name of Jefferson Davis is concerned.

In 1792, Major Christy, then living in Kentucky, married Martha Thompson Taylor, a relative of Gen. Zachary Taylor, who subsequently became president of the United States, and thus the families of Taylor and Christy were united.

While Gen. Taylor was in command of the United States military post at Prairie Du Chien, Jefferson Davis, then a lieutenant in the army, was assigned to duty there, but shortly after his arrival and before his baggage had been received, he was ordered to attend court martial as one of the court. Now, it is a rule that officers sitting in court martial shall do so in full dress uniform. Davis could not do this because his uniform was not there, and so he was forced to break this rule. This greatly displeased Gen. Taylor, the presiding officer, who construed the action of Davis as a personal slight to the dignity of the court, and he did not hesitate to denounce the young lieutenant as being no gentleman.

The impression formed of Davis by Gen. Taylor was quite different from that of the latter's daughter, who was living with her father at the post. Perhaps it was the spirit of opposition on the part of the general that aroused admiration in the heart of the young lady. At any rate Lieut. Jefferson Davis and Miss Taylor became lovers. This increased the wrath of the general, but a truce was agreed upon, and the daughter promised not to marry Davis for at least one year, but if, in the meantime, nothing developed to confirm the opinion formed by Gen. Taylor that Davis was not a gentleman and unworthy of his daughter's hand, then the opposition to their marriage should be withdrawn. On the other hand, if the opposite should result, then the engagement was to be broken.

The time passed away, and Davis determined to visit St. Louis. The boat was at the landing, and he sent for Miss Taylor reminded her of the agreement, and asked if she was ready to go with him.

She consented, and the couple came to St. Louis together. After reaching that city nothing would be more natural than that they should go to her relatives, Major Christy and family, and so they did, and that is how it came about, that in the room now occupied as an office by the Brownell Car Company, Lieut. Jefferson Davis became the husband of Gen. Zachary Taylor's daughter.

CYCLE RACK FOR STREET CARS.

An eastern concern has recently brought out a rack for bicycles, which may be used either in baggage cars or upon the dash of street cars. It folds flat against the wall or dash when not in use, to economize space, occupying in that position only four inches in depth. The parts of the holders which come in contact with the wheel are covered with rubber to insure against scratching.

SHE TRANSFERRED.

"I WANT a transfer to the depot," said the lady with a feather in her bonnet. "Certainly, madam; which depot?" asked the conductor. "I want it to the depot," repeated the lady of the feather. "But I don't know which depot you mean," replied the conductor. "Never you mind what you know and what you don't know," snapped the woman; "you do as you are told. You give me a transfer, do you hear?" "But"— "I won't have your but. Just you give me that transfer or I will report you." And the conductor gave it to her, while every one on the car hoped he had sent her to the wrong place, and that she would have to walk back.

VISITOR'S CONDENSED GUIDE.

Telling Where Various Appliances and Apparatus May Be Seen Installed and In Actual Use and Operation.

For the benefit of those in attendance at the convention who may desire to see in actual operation in street railway service and allied lines of business the products of many of the firms dealing in street railway supplies, we have compiled a list of some of the more important dealers and a directory of the places in St. Louis where the articles may be seen in actual service.

NEW HAVEN CAR REGISTER COMPANY, New Haven; double and single fare registers; in use on the line over the big bridge.

CONSOLIDATED CAR FENDER COMPANY, Providence, R. I., maker of Providence fender; fender used on all the cars of the Union Depot Railroad.

DETROIT STEEL & SPRING COMPANY, Detroit, Mich.; elliptic and coil springs; in use by most of the street railways and car builders of St. Louis.

R. BLISS MANUFACTURING COMPANY, Pawtucket, R. I.; Wood's patent car gate for steam, electric and cable railway cars; in use by the St. Louis & Suburban.

WALKER COMPANY, Cleveland, O.; electric machinery in use by Union Depot Railway, 46 motor equipments; Missouri, 12 equipments; Lindell, 1 equipment.

MEAKER MANUFACTURING COMPANY, North Chicago; registers; the Citizens, Cass Avenue & Fair Grounds, and the St. Louis are fully equipped with Meaker registers.

FULTON TRUCK & FOUNDRY COMPANY, Mansfield, O.; car wheels, trucks, turn and transfer tables; have furnished a very large amount from time to time to the St. Louis road.

E. T. BURROWES COMPANY, Portland, Me.; car curtains and fixtures; used by the Cass Avenue & Fair Grounds, Lindell, Missouri, St. Louis & East St. Louis and Union Depot.

Q. & C. COMPANY, Chicago; metal sawing machines, tie plates, wood preservative, etc.; one large No. 10 power sawing machine in use by the Citizens' Street Railway Company.

CREAGHEAD ENGINEERING COMPANY, Cincinnati, O.; flexible pole brackets, etc.; the Lindell Railway is equipping Washington avenue and Page avenue lines with flexible brackets.

MORRIS TASKER & COMPANY, Philadelphia; iron poles; material used by Union Depot, Lindell, and St. Louis & East St. Louis Electric; represented by Arthur S. Partridge, Bank of Commerce.

CHARLES SCOTT SPRING COMPANY, Philadelphia; car springs; in use on cars of Union Depot line, Southern Electric, and St. Louis & Suburban; represented by Arthur S. Partridge, Bank of Commerce Building.

JOHNSON COMPANY, Johnstown, Pa.; girder and T-rails and special work; used by Lindell, and to some extent by nearly all roads; special work and straight rails almost exclusively on Broadway cable line.

JOHN A. ROEBLINGS' SONS COMPANY, Trenton, N. J.; iron and steel wire rope, bare and insulated copper wire; used by all roads in St. Louis to some extent; Fourth Street and Arsenal line equipped throughout.

ALFRED G. HATHAWAY, Cleveland, O.; electric railway material and supplies; transfer tables used by Lindell, Missouri and Union Depot railroads exclusively; 40 Murrey brakes in use on Missouri Railroad cars.

AMERICAN ELECTRIC HEATING CORPORATION, Boston; American heaters; in use on all cars of the Fourth street and Arsenal extension of the People's Railway, a number of cars on the Union Depot and some on the Lindell.

PARTRIDGE CARBON COMPANY, Sandusky, O.; carbon brushes; used by Lindell, Union Depot, Citizens, Cass Avenue, Suburban, Southern Electric and Jefferson Avenue; represented by Arthur S. Partridge, Bank of Commerce.

STIRLING COMPANY, Chicago; water tube safety boilers; Lindell Railway uses 3,500-horse-power in units of 350-horse-power each. The new plant is entirely equipped with Stirling boilers and there is one battery in the old plant.

BRADFORD BELTING COMPANY, Cincinnati; "Monarch" insulating paint, electrical supplies, etc.; "Monarch" paint used by Union Depot, St. Louis & Suburban, St. Louis & Meramec, Cass Avenue & Fair Grounds, Citizens and Lindell.

STANDARD PAINT COMPANY, New York; P. & B. armature varnish, compound and paint; all in use by Lindell, St. Louis & Suburban, Southern Electric and St. Louis & Kirkwood. Represented by Commercial Electrical Supply Company.

INDIANA RUBBER & INSULATED WIRE COMPANY, Jonesboro, Ind.; "Paranite" rubber-covered wire and cables; represented by the Western Electrical Supply Company, and the material is in use to some extent, upon nearly all lines in St. Louis.

CAMBRIA IRON COMPANY, Johnstown, Pa.; rails, feeder wires, structural iron, special work, etc.; represented in St. Louis by E. H. Linley, 714 North Second street; material in use by Lindell, St. Louis & Suburban, and other roads; also by car manufacturing companies.

OHIO BRASS COMPANY, Mansfield, O.; overhead specialties, hangers, trolley ears, switches, etc.; in use by Southern Electric, Missouri, Jefferson Avenue, Cass Avenue & Fair Grounds, Benton-Bellefontaine, Venice, Madison & Granite City, and St. Louis & Suburban.

STOW MANUFACTURING COMPANY, Binghamton, N. Y.; Stow flexible shaft for portable drilling, reaming and grinding machines; used in grinding ends of rails on St. Louis roads by Falk Manufacturing Company; represented in St. Louis by Central Union Brass Company.

Mica Insulator Company, New York; "Micanite" rings, segments, etc.; used by Union Depot, St. Louis & Surburban, St. Louis & Meramec, Southern Electric, Missouri, Citizens, and Cass Avenue & Fair Grounds; represented by Arthur S. Partridge, Bank of Commerce.

J. T. Schaffer Manufacturing Company, Rochester, N. Y.; hydraulic presses for car wheels, etc.; Benton-Bellefontaine, 100-ton press; Wiggins Ferry, 200-ton; Citizens, 100-ton; Cass Avenue, 100-ton; St. Louis Bridge & Terminal Company, 150-ton; George J. Fritz, 100-ton.

American Electrical Works, Providence, R. I.; feeder and span wires; used on lines of Union Depot, Lindell, St. Louis, Citizens, Cass Avenue, Southern Electric, St. Louis & Suburban, Missouri and Jefferson Avenue; represented by Arthur S. Partridge, Bank of Commerce.

A. Groetzinger & Sons, Allegheny, Pa.; "Dermaglutine," improved process rawhide gears, pinons, etc.; used largely by the Lindell and roads in the surrounding country. Represented at St. Louis by the Central Union Brass Company, T. C. White, manager of street railway department.

Hamilton Corliss Engine Works, Hamilton, O.; two direct-connected 36 by 60 engines with heavy rolling-mill frame, in power station of the St. Louis & Suburban; other engines in use by People's and Union Depot Railway companies, Laclede Gas Company and Edison Illuminating Company.

Washburn & Moen Manufacturing Company, Worcester, Mass.; trolley, feed and suspension wires and "Chicago" rail bond; in use to some extent by all railways in St. Louis; especially by Lindell and Union Depot railroads. Represented in St. Louis by Central Union Brass Company.

Central Electric Company, Chicago; overhead material, gears, station supplies, etc.; material in use on Lindell, Southern Electric, St. Louis & Suburban, St. Louis & Kirkwood and Union Depot railroads; also used by American, St. Louis, Brownell and LaClede car manufacturing companies.

Abendroth & Root Manufacturing Company, New York, N. Y.; Root's improved water tube boilers; represented in St. Louis by L. G. Read, 602 Security building; in use by Belleville Street Railway Company, Belleville, Ill.; Liggett & Meyers Tobacco Company, St. Louis, 2,500-horse-power.

R. D. Nuttall Company, Pittsburg, Pa.; gears, pinions and trolleys; in use by Lindell, Union Depot, Citizens, Cass Avenue, Suburban, Missouri, St. Louis & Meramec, Southern Electric, East St. Louis Electric, Southwestern and Jefferson Avenue; represented by Arthur S. Partridge, Bank of Commerce.

William Wharton Jr. & Co., Philadelphia; rails and special work; in use on nearly all railways of St. Louis, but particularly by Union Depot, almost exclusively; Jefferson Avenue, entire equiment; Grand Avenue, entire equipment; Missouri Railroad, St. Louis & Suburban and Citizens, the latter using particularly unbroken main line special work.

Hoppes Manufacturing Company, Springfield, O.; feed water heaters and purifiers; in use in St. Louis, live steam feed water purifiers, Lindell Railway, 3,000-horse-power; manufacturing companies, etc., 2,700-horse-power; exhaust steam feed water heaters, American Car Company, 300-horse-power; Columbia Incandescent Lamp Company, 200-horse-power; office buildings, manufacturing establishments, etc., 6,500-horse-power.

Falk Manufacturing Company, Milwaukee, Wis.; cast-welded rail joints; in use in St. Louis, two miles of Southwestern Railway track Chippewa street from Broadway to Grand avenue; thirteen miles of Citizens Railway track Morgan street, Franklin and Easton avenues from Fourth street to western city limits; Missouri Railroad, Laclede avenue, Chestnut and Market streets; Lindell, Vanderventer avenue and Choteau street; Suburban, Franklin and Vanderventer to Washington, to Fourteenth, to Locust, to Twelfth.

Southwark Foundry & Machine Company, Philadelphia; Porter-Allen engines; the Lindell Railway has in its new station three horizontal tandem compound non-condensing 22 and 38 inches by 36 inches stroke; in the old station four 16 by 20 inches, one 20 by 36 inches and one 28 by 42 inches, a total of 5,000-horse-power; the Union Depot Railway, four 22 by 36 inches, 2,400-horse-power; the Missouri Railroad, one 12 by 20 inches, the East St. Louis two 18 by 20 inches, and the St. Louis & Kirkwood, two 14½ by 24 inches.

THE MERCANTILE CLUB

is composed of business men, is the strongest and most influential in St. Louis, and one of the strongest of its kind in the country.

Actions claiming between $400,000 and $500,000 have been begun against the corporation of Victoria, B. C., and the Consolidated Railway Company on behalf of persons whose relatives were killed or injured in the bridge accident May 26, when 63 lives were lost.

Manufacture of Street Railway Supplies in St. Louis.

St. Louis is not only the largest street car building city in the world, but is the home as well of a large number of other appliances and supplies. The following sketch, though necessarily brief, gives an excellent idea of these interesting industries, a visit to which will repay every delegate.

Brownell Car Company.

The works of this company are situated "at or about" No. 2,300 North Broadway. The indefinite expression is used with reason since the gradual growth of the plant since its establishment in 1858 has necessitated the addition of new buildings, or the acquisition of neighboring structures already in existence, to such an extent that the site proposed, even at a time far subsequent to the original establishment to be eventually covered, has been so greatly overrun that the buildings and yards now occupy opposite sides of at least three distinct streets. The office and the shops where most of the wood working is done occupy the north side of Twenty-Third street, the paint shops and lumber yards are on the South side, while there are buildings used for various purposes and other yards on the opposite sides of the intersecting streets. The arrangement, however, is convenient. The raw material is delivered at such a point that it can go through the various machine processes necessary in a continuous course to the erecting shop, whence the cars are returned to the finishing and paint shops and delivered upon the cars of the railroad by which they are shipped away.

The lumber yards are at this time well filled. An interesting feature in the handling of raw material for sills is the system of marking. Each piece is marked and the special mark recorded with the date, each invoice of material having a separate date, the record thus showing exactly how long each piece has been in process of seasoning.

SCENES AT THE BROWNELL CAR COMPANY'S WORKS.

The plant is now engaged upon an order of 30 cars for the Metropolitan Railway, of Kansas City, one of our views showing the first four finished and loaded for shipment. These are of the one-door accelerator pattern, 26 feet in length with Brill trucks and Barr wheels. The interior finish is cherry. Each platform has also the Minneapolis style of gate operated from the opposite end of the car. There is in the finishing shop an exceptionally handsome car for party purposes.

Storage rooms are provided for finished lumber or left over over material and for that which has only been through

the roughing out process. On the upper floor of the office building is a storage room for odds and ends, sample parts, etc., and a well equipped and lighted drafting room.

The company was incorporated in 1875. F. B. Brownell, whose portrait is presented herewith, is president, and M. B. Richardson, secretary. The work of the company is seen in St. Louis in the whole equipment of the Broadway Cable line, and in many cars of the Missouri, Lindell, Cass avenue and Peoples' railways.

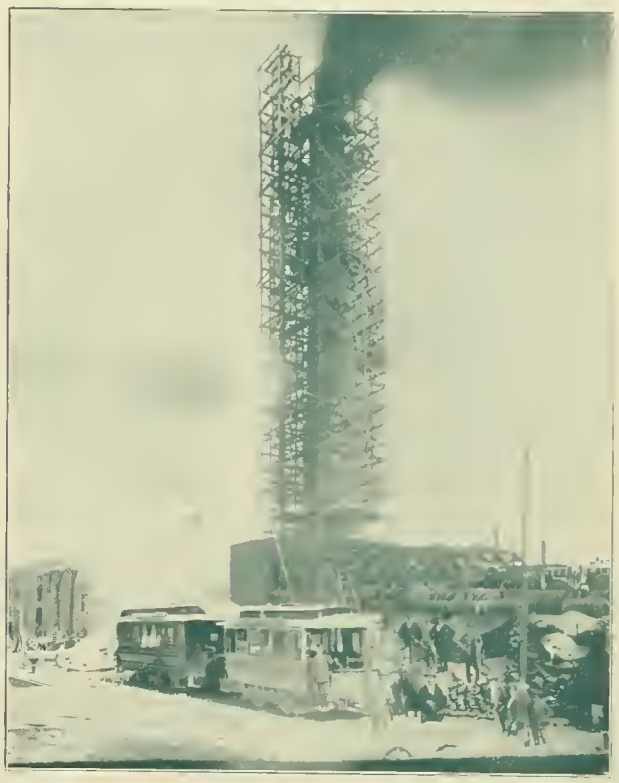
Not the least interesting feature of the plant is the ancient stone building in which the offices are located. This has historical associations which are described in another place in this issue.

Heine Safety Boiler Company.

The Heine boiler is too well known for its service in power plants of every kind to require any description. That its merits are recognized in street railway service is shown by the numerous plants of this character in different parts of the country where the Heine is used exclusively. In St. Louis the Union Depot Railroad Company has in use 3,250 horse-power in Heine boilers, the East St. Louis Electric Railway Company, has 750-horse-power, and the People's Railway Company 300 horse-power. Two of these plants are shown in the accompanying engravings.

The company is composed of E. D. Meier, president, Theo. G. Meier, vice-president and treasurer, and S. D. Merton, secretary. Its handsome and commodious offices are at 421 Olive street.

Colonel E. D. Meier is also an expert stack designer and builder, and a remarkable specimen of his work is presented in the case of the new stack of the power house of the Union Depot Railroad Company, which was demolished by the cyclone of May 27. Col. Meier was the designer and builder of the original stack, which was 162 feet in height and 8 feet in diameter. The cyclone left almost a total wreck in the place of the power house and chimney. The boilers, however, remained intact and in a day or two the removal of the debris showed that the engines and electrical machinery were comparatively uninjured. In five or six days the plant was put in operation, two 500-horse-power Heine boilers, not shown in our engraving, furnishing the steam, and forced draft being used in lieu of a tall stack. The necessity of having the remaining boilers, all of which

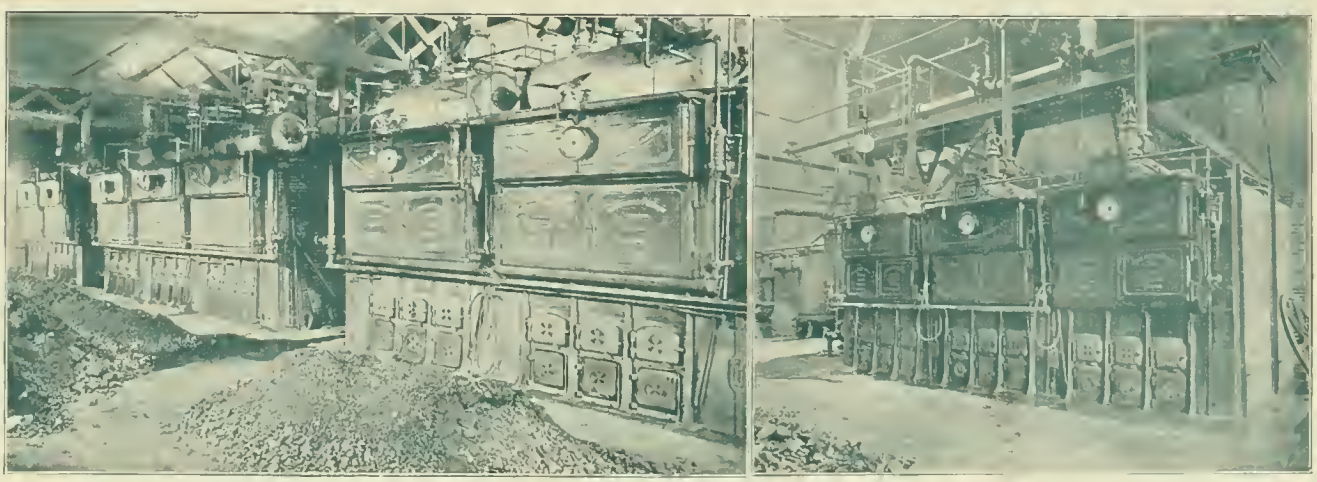


STACK BUILT IN THIRTEEN DAYS.

connected into the brick stack, again in operation, was imperative. The stack problem being placed in Col. Meir's hands was solved by the erection, in 13 days, of the stack shown in the accompanying engraving from a photograph. The work was carried on continuously day and night, and so far as known, breaks the record in point of rapid construction.

Scarritt Furniture Company.

The Scarritt Furniture Company may be considered one of the oldest of St. Louis institutions, having been in existence in one form or another for fifty-six years. The present business, however, at least in so far as it is of interest to the street railway service, may be considered to have had its beginning about twelve years ago, being founded upon sev-



HEINE BOILERS AT UNION DEPOT AND PEOPLES' RAILWAY.

eral patents granted to Sanford G. Scarritt, the present manager, for certain improvements in the construction of car seats. The seats may now be seen in the cars of many of the principal street and steam railroads in all parts of the world. The offices and salesrooms of the company are at 412 and 414 North Fourth street, but the plant is widely scattered, the woodworking shops and yards being isolated on account of the necessity of having a large amount of room at a reasonable cost, and in order to reduce insurance rates. The woodwork is done in a large four-story building, with convenient yards adjacent. The metal work, upholstering, finishing, etc., are provided for in a six-story building at 612 North Second street, a point convenient for shipping purposes as well as for customers. The work in the railway line embraces nearly every variety of seat, both reclining and stationary, and settees for station purposes.

The Scarritt seats are in use in St. Louis to a very large extent, the Lindell Railway having 2,587 seats, the Union Depot system, 2,040, the National, 1,500, Missouri Railroad, 1,060, St. Louis & Suburban, 800, and other roads numbers sufficient to make a total of 9,200 seats. These are all reversible cross seats, the prevailing type in that city.

Arthur S. Partridge.

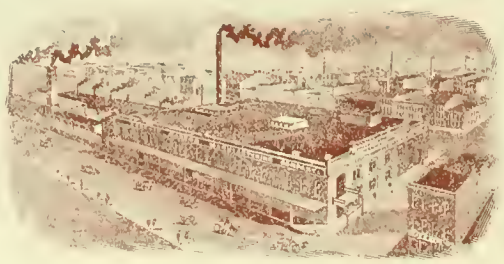
This gentleman needs but little introduction to the street railway fraternity, on behalf either of himself or the various firms he represents. His office is in the Bank of Commerce building, and his present clientele includes the R. D. Nuttall Company, whose specialty is gears; Eugene Munsell & Co. dealing in mica in a variety of forms and other appliances for electrical purposes; the Mica Insulator Company, who make a specialty of manufactured mica, and are extensive importers and dealers; the American Electrical Works, whose wires are in extensive use in every section of the country; the Billings & Spencer Company, copper commutator bars and motor gears; the Kissinger-Ison Company and Morris Tasker & Co.

A. S. PARTRIDGE.

The goods of each of these companies are in extensive use upon all the street railways of St. Louis.

Phoenix Carbon Manufacturing Company.

This company has an extensive plant at 2,134 DeKalb street, with S. G. Booker in charge as superintendent. The



S. G. BOOKER.

principal building occupies a space of 200 by 60 feet, is two stories in height, and the work employs 75 men. The manufactures include electric light carbons, cylinders and plates for batteries, telephone disks of all sizes and forms, brushes for street railway motors, and a vast variety of specialties. In fact it may be said that everything which may be made of carbon is made here. Supplies of some character are furnished to every street railway company in St. Louis, and with some roads the dealings are exclusive. Though the company makes a specialty of battery material, yet, as suggested before, everything in the line of carbon which is susceptible of formation by dies may be furnished. The dies used are entirely of tool steel, operated under hydraulic pressure ranging up to 100 tons.

The company was organized two years ago, with S. N. Dodd, president; S. B. Pike, vice president and general manager; H. L. Page, secretary and treasurer.

The Abendroth & Root Manufacturing Company,

of New York, has convenient offices in St. Louis at 602 Security building in charge of L. G. Read. There is at present no plant of these boilers in use by any of the street railways here, though the street railway plant at Belleville, Ill., near by, is so equipped with 300 horse-power. The boilers are, however, in operation at the Liggett & Meyers Tobacco Company's works, 2,500-horse-power; at the Gauss-Shelton Company's plant, 250-horse-power; Huse & Loomis Ice Factory, 750-horse-power. At the latter place there has just been completed the installation of two Root boilers set in battery and one single. The plant is a model one in every respect. Tests recently made showed an efficiency of 81 per cent. Mr. Read invites the inspection of convention visitors who desire to see the boilers in operation.

L. G. READ.

Wm. Baragwanath & Son.

The Pacific Boiler Works of Chicago, better known under the above name as manufacturers of feed-water heaters, purifiers, power boiler feed pumps, etc., are represented in St. Louis by Richard Williams, Odd Fellows building. The heaters are used by the Southern Electric Railway Company to the extent of 1,200-horse-power, this being the only street railway at present using them. They are, however, in extensive use in many of the principal buildings of the city.

block, 700-horse-power; Union Trust building, 500-horse-power; Rialto building, 200-horse-power; Columbia building, 125-horse-power, and in many others, including the Boatmen's Bank, Union Telegraph, Planters and St. Nicholas hotels, etc. These are only some of the larger plants.

American Car Company.

As indicated by the accompanying engraving the plant of the American Car Company is one of the most extensive of those engaged in car building in the country. The manufactures include, as a specialty, street railway cars and trucks for all classes of motive power, and also elevated and suburban railway coaches.

The company was organized and opened for business in August, 1891. The plant has been gradually increased until it now occupies 9½ acres, and gives employment to about 600 men. The capacity of the works when running with full force is about 100 cars per month.

A catalog which was recently issued, and of which the company is especially proud on account of its handsome appearance as a trade publication, contains one unique feature which is of great assistance to buyers of cars for new lines, in the matter of selection of harmonious color combinations for the exterior finish. This is the insertion in the catalog of a dozen or more colored plates giving exactly the effect to the eye, of the finished car. The accuracy with which the color scheme has been worked out by the lithographer and the shop artist is readily recognized by a glance at many of the cars now running in St. Louis—those of the American Car Company's build being operated on the Olive street, Laclede avenue and Market street lines, the Citizen's

VIEW IN PAINT SHOP—AMERICAN CAR COMPANY'S WORKS.

Railway Company, Mound City line, Southern Electric Railway, including connections to Jefferson Barracks, the Lindell Railway and Highlands Scenic Railway to Meramec Highlands.

The organization of the company is as follows: William Sutton, president; Theophile Papin, first vice-president; Ferdinand Meyer, second vice-president; Emil Alexander, secretary, and Louis H. Tontrup, treasurer.

Three handsome cars, built in the regular run of work and in fulfilment of orders, will be on exhibition at the convention. The works are located at Old Manchester road, near Tower Grove avenue, and the down town office is at 626 Chestnut street.

Shultz Belting Company.

The large and prosperous concern located at 402 Barton street, may justly be considered a worthy monument to the indefatigable energy and business ability of one man, J. A. J. Shultz, the president of the company. The buildings now embraced in the plant cover an area of 200 by 166 feet, with additional sheds, etc., for subsidiary purposes.

The present system of manufacture was begun in 1877 in

IN THE SHULTZ FACTORY.

accordance with an invention of Mr. Shultz, and the entire work from the time the hides are received from the Chicago packer until the finished belt is ready for shipment is done at this plant. The present company was organized in 1877 with a capitalization of $300,000, and the growth of the business has been something remarkable. The entire belting of the St. Louis & Suburban Street Railway system is furnished by this company, and includes three 72-inch, two 34-inch and ten 16-inch belts, these being some of the largest. The Union Depot Railroad Company has three 54-inch Shultz belts in constant use, and the Southern Electric Railway Company a considerable number.

The peculiar feature of the process covered by one of the patents worked by the company is that in the process of preparing the leather only the surfaces are tanned, leaving the interior in the nature of rawhide with all the well-known strength and lasting qualities possessed by that material.

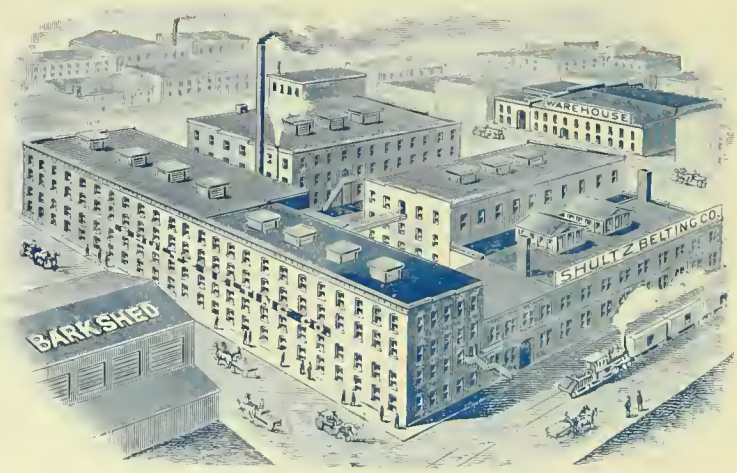
Other manufactures of the concern are woven leather link belting, rawhide lace leather, pulley covering, belt dressing, belt cement, etc.

Mr. Shultz was born in Maryland in 1838, and learned the tanning business in his father's tannery, of which he afterward became the proprietor. He first engaged in the hide and leather business in St. Louis in 1864, but in 1872 formed a partnership with C. W. Ford in the tannery business. At his death, shortly after, Mr. Shultz bought out his interest and continued it up to the time of the formation of the present company. He is an enthusiastic lover of blooded stock, which he breeds at his splendid farm near Lexington, Mo. His principal associate in the belting business is B. C. Alvord, secretary of the company.

The Safety Car Heating & Lighting Company

whose main office is 160 Broadway, New York, is represented at St. Louis by Clarence H. Howard, the secretary of the company, and manager of its western business, with fine offices in the Union Trust building. Here, as elsewhere, the chief work among the street railway companies is the introduction of the Pintsch system of gas lighting. St. Louis has now 100 Pintsch lighted cars running on Olive street. Denver is now equipping the last 62 of its 190 cars. The introduction of the system has naturally been most rapid in cities farther east, Chicago having about 1,000 cars so lighted and in New York nearly all the cars are so equipped. There is a large demand for Pintsch light in trolley cars. The manager of the Columbus, O., Central is quoted as saying he considers it cheaper, better and more reliable than light dependent upon the trolley. The Washington & Baltimore electric line has contracted for this light. The light is standard on 70 steam railroads, and is recommended by the U. S. mail service on account of safety.

C. H. HOWARD.



SHULTZ BELTING CO., ST. LOUIS.

Laclede Car Company.

The plant of the Laclede Car Company is well situated at 4500 to 4600 North Second and Main streets, near the line of the Broadway cable, and with the excellent shipping facilities afforded by the lines of the Merchants' Terminal Association, connecting with all railroads entering the city. The company was organized in 1883, by James P. Kiely, the present president of the company. The other active officers are E. L. Robinson, vice-president and general manager, Abe Cook, secretary and Thomas F. Colfer, treasurer.

The plant is excellently arranged for the delivery and working up of material without unnecessary rehandling. Spur tracks lead to each of the several buildings used as mills and erecting shops, so that the raw material may be delivered and run practically a continuous course until the finished product is ready for shipment. In front of the erecting shops are located the various smaller departments. These include blacksmith shop, panel room, supply room, machine shop, iron store house, etc. A long building fronting on Douglas street, has its lower floor devoted to the heavier kinds of woodworking, while the upper floor is fitted up for the more delicate cabinet work. The office is on the second floor at the front corner of the plant, convenient to all parts of the establishment. Close by is also a large and well lighted drafting room.

The erecting shops are at the present time well filled, and considerable activity is noticeable in all departments. The principal orders on hand and in process of fulfillment are for 205 cars for the Second Avenue Traction Company, of Pittsburg, including both closed and open, and 115 closed cars for the Cincinnati Street Railway, and three private or observation cars for the latter company. The latter are to be masterpieces of the car builders art.

Some of the noticeable features of the work of this company are the excellent quality of material used in body framing, the substantial character of the vestibules upon such cars as have this adjunct, and the strengthening of the roof by steel carlines which extend from side to side following the lines of the deck or clear story. There is evidence throughout of good judgment in selection of material and design and careful supervision in all stages of construction.

The shops employ about 350 men and have a capacity of 800 cars per year Samples of the work are to be seen upon many of the principal street car lines of St. Louis, and in a large number of cities in all parts of the country.

The entire plant covers five acres including a large lumber yard situated across Second street opposite the shops. Both the yards and the shops, even during the present rush of business, display evidences of care in the way of neatness and order, that are well worthy of imitation.

Cambria Iron Company.

The Cambria Iron Company, of Johnstown, Pa, is well represented at St. Louis and in the southwestern territory by E. H. Linley, whose office is located at 714 North Second street. The product of the company is found among the street railways, especially on the lines of the Lindell, for which company a special pattern is furnished, and on the St. Louis & Suburban. Though the principal business with street railway companies is in the line of girder and T-rails, a considerable business is done in rail joints, track bolts. tools and waste. Feeder and armature wire is supplied in large quantities, the St. Louis & Suburban being supplied almost exclusively from this source. The car manufacturing companies use I-beams, channels and angles of this company's manufacture in the framing of cars. Mr. Linley has acted as agent for about 10 years.

A GLIMPSE OF THE LACLEDE CAR COMPANY'S ERECTING SHOP.

Columbia Incandescent Lamp Company

This company occupies a large and conveniently arranged building at 1910, 1912 and 1914 Olive street, and has facilities, when running at full capacity, for the manufacture of about 10,000 lamps per day. At the present time there are in the neighborhood of 175 employes, mostly girls, the reason for this being not only their greater dexterity in handling delicate materials, but that such a variety of ingenious devices have been developed during the company's experience that it is not necessary to employ what was before necessary in the way of skilled labor. One of the most effective of the devices of home design which may be mentioned is the double-acting pump for exhausting the lamps which doubles the capacity without greatly adding to the plant. Several of the operations employed in the plant con-

vey even to the layman an understanding of the excellent quality of the product notably, various steps in the manufacture of the filaments, the care exercised in pumping and the close checking of photometer tests.

The company was established in 1889, and is the oldest of the kind, with the exception of the Edison, in a controversy with which a few years ago it acquired considerable prominence. The officers are: President, J. H. Rhotehamel; vice-president, W. O. Garrison; secretary and treasurer, A. C. Garrison.

General Electric Company.

The St. Louis interests of this company are looked after by George D. Rosenthal, an excellent portrait of whom is presented herewith. The success of his labors is shown by the number of direct-connected generators and equipments in use by the street railways. Of these the Cass Avenue & Fair Grounds Railway has 4 generators and 75 W. P. 50 double equipments; the Citizens, 60 G. E. 800 equipments; the South Western 20 G. E. 800 equipments; St. Louis, 10 G. E. 800 equipments; Union Depot, 6 generators and 250 G. E. 800 double equipments; Missouri Railroad, 2,000 horse-power inbelted generators and 60 double equipments; St. Louis & Suburban, 2 generators, 40 G. E. 1,200 and 30 W. P. 50 equipments; Southern Electric, 1 generator, 30 double equipments; St. Louis & East St. Louis, 10 equipments. This list includes only the principal installations and does not embrace the numerous belted machines. The generators vary in capacity from 200 to 1,500 kilowatts capacity.

GEO. D. ROSENTHAL.

Walker Company.

The Moses P. Johnson Machinery Company, 715 North Second street, has for nearly 30 years been the leading house of the southwest, handling medium priced machinery of all kinds. It has recently made a departure from its established lines and has added a department devoted exclusively to the highest grades of machinery. In this department is included the account of the Walker Company, of Cleveland, O., for generators and street railway equipment, and complete railway power and lighting systems, water-tube boilers, corliss and automatic cut-off engines, heaters, pumps, etc.

The president of the company, Moses P. Johnson, is a level-headed, up-to-date business man, with ample capital, a member of several principal clubs, a charming entertainer and altogether a desirable man to represent the interests of a great company like the Walker.

M. P. JOHNSON.

Elliott Frog and Switch Company.

This company occupies the whole of a triangular block in East S. Louis, just south of the east end of the great Eads bridge. The ground is occupied by several large buildings, including foundry, machine shop, erecting shop, paint shop and a variety of sheds for storage and other purposes. Until a comparatively recent date the bulk of the company's work was in the line of steam railroad work in frogs, crossings and switches, but as the requirements of street railways, especially those using the T rail, are to a considerable extent of the same character, it was considered advisable to increase the scope of the business so as to include every description of track work for both classes of roads. There are at the present time manufactured a great variety of crossings, curves, frogs and joints, switches and switch stands, and a large list of track tools. Colonel H. Elliott is the president of the company, and is too well known to the railroad business and supply fraternity to require an extended introduction. There are associated with him H. Elliott, Jr., as vice-president and secretary, and W. H. Elliott, treasurer.

ELLIOTT FROG AND SWITCH COMPANY'S PLANT.

Shickle, Harrison & Howard Iron Company.

The business of this company is essentially the founding of open hearth steel castings of every description. The street railway part of the business is comparatively a small portion of the whole, yet if the different parts of this business were brought together the aggregate would, by itself, form an immense business. A specialty is made of steel motor gears, and a part of the machine shop has been fitted up for this work alone, the machinery being the latest improved work of the Gisholt Machine Company and Gould & Eberhart. The gears are in use upon every electric street railway system in St. Louis, and the same companies also use a variety of steel castings which are also made here. These include switch castings, pedestals, equalizer bars, platform brackets, frogs, cams, dies and other parts of machinery. Indirectly, also, the street railways use the product of these works in the shape of generator frames and gears which are furnished to the electrical supply companies. The business with one of the street railway companies amounts to between $2,500 and $3,000 per month.

The works are located on Twelfth street, near Choteau, and cover three city blocks. An addition is now being made which will double the capacity of the steel foundry. The buildings display the usual variety shown in the case of a business established as long ago as 1860. The firm at that time was Thomas Howard & Co., and the business was the

SHICKLE, HARRISON & HOWARD IRON COMPANY'S WORKS.

manufacture of cast iron pipe, which, indeed, forms no insignificant part of the business to-day. Afterward the business was extended to include all manner of castings for steam railroads, and these continued to form the principal product after the incorporation of the company under its present name in 1881. The works when running full give employment to 2,000 men. What is virtually the same company owns a plant at Bessemer, Ala., in which $1,000,000 has been invested up to date.

The St. Louis Iron and Machine Works.

The leading works of the Mississippi valley for the manufacture of the modern steam engine, as well as other large

EXTERIOR ST. LOUIS IRON AND MACHINE WORKS.

and powerful machines, are the St. Louis Iron and Machine Works on Choteau avenue, occupying the two blocks running from Main to Second streets.

This enterprise, so extensive now, was founded on a comparatively small scale in 1854, by G. H. Timmerman, who still takes an interest in the management. In 1875 the con-

INTERIOR OF PRINCIPAL SHOP ST. LOUIS IRON AND MACHINE WORKS.

cern had won for itself a position in the front rank of the mechanical and steam engineering profession of the world, and its interests had extended so largely that it was desirable to incorporate it with an authorized capital of $500,000, of which $200,000 is paid in. G. H. Timmerman is president, but the actual management and the control of things technical appear to be in the hands of H. Krutzsch, the restless and energetic vice-president and general manager, who has a reputation as a mechanical engineer in Europe as well as here.

The great shops and the foundry are exceptionally well equipped with every modern appliance, and it is only in this place that the well known St. Louis corliss engine is made. During the past year the company has brought out its "heavy duty" St. Louis corliss engine, especially designed for electric railway power service, where an engine is required which combines unusual strength and power capacity with economical operation.

We illustrate elsewhere one of these engines of the simple high pressure type. It has a nominal capacity of 700 horsepower, and is in use at the Bellefountaine power plant of the Union Depot Railroad.

St. Louis Register Company.

This company was organized in 1890 with a capital stock of $100,000, fully paid. The officers of the company are E. F. Wickham, president; J. W. Allison, vice-president; and J. A. Stephenson, secretary. The present works occupy three floors of a large building at 217 North Third street, but are so inadequate to the business of the company that a move is in contemplation. The works are now running night and day with forty-five men. The "Security" registers are in use on all the street car lines of St. Louis with the exception of the Broadway line. In other places large numbers of both single and double registers are in use Among the principal lines are the Metropolitan, Washington, D. C.; the City & Suburban and Baltimore City, Baltimore; West End, Boston, and a large number of important roads in all sections. The company is bringing out a new register, which will be seen at the convention, in which the mechanism will be the same but the dial entirely different. The company is now completing the equipment of the Lindell Railway with registers having the Baumhoff attachment.

PERSONAL.

W. E. Baker, general manager of the Metropolitan West Side Elevated Railroad, of Chicago, will lecture during the coming year at the University of Wisconsin on the electric equipment of elevated roads.

Charles F. Heath, general manager of the Wakefield & Stoneham, Mass., Street Railroad and formerly of the Lynn & Boston road, was recently presented a silver service by the employes of the last named road.

George H. Mellen, of Worcester, has been engaged as associate counsel by the West End Street Railway of Boston. Mr. Mellen has practiced law in Worcester since 1882 and has been twice a member of the state legislature.

IN THE ST. LOUIS REGISTER COMPANY'S WORKS.

C. L. Harry, who has for the past four years been superintendent of the Bay Cities Consolidated Street Railway Company, Saginaw, Mich., has been appointed to take charge of the Kokomo railway and electric light plant.

James S. Hagerty and Richard Emory have been elected vice-president and general manager, respectively, of the Baltimore Traction Company, to fill vacancies existing since the promotion to the presidency of W. A. House, who formerly held both positions.

IN THE ST. LOUIS REGISTER COMPANY'S WORKS.

THE Street Railway Review

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DON'T fail to attend the convention. No railway man can afford to miss it.

AND bring the ladies. The local committees have provided a series of excursions and entertainments expressly for the ladies, and everybody will be treated with that hospitality for which St. Louis is famous.

WE devote ample space this month to a recital of the most interesting features in connection with the construction and operation of the St. Louis roads. Delegates should read the articles carefully, with a view to visiting such plants as contain those appliances the visitor desires to study.

AT the Montreal convention the facilities for displaying and examining the exhibits were such, that there was little wonder so little interest was apparently taken in this most important feature of conventions. As a matter of fact, the exhibits have come to constitute the major part of the convention, for it is very certain, the reading of a few papers, and discussion, and even the local entertainments and a banquet, if unaccompanied by any exhibits, would draw a smaller crowd than assembled 10 years ago, when the exhibits found ample space in one good sized room. The opportunity to examine, and compare and study in the company of such managers as are using any given apparatus, is of incalculable value, and the committee have not only wisely, but justly set aside plenty of time in which the "business before the house" is to inspect the display, which this year will be the largest ever gathered. It is also due exhibitors who spend thousands of dollars to provide this exposition, that they receive courteous and generous attention and time of visiting delegates. There will not be a single exhibit but will possess some feature of merit and interest, and each deserves an inspection. So do not miss any.

AT the last St. Louis convention, 1885, the subject of electricity for street cars was briefly reported on by a a committee which closed its report with the words, "your committee consider the application of electricity to the propulsion of street cars as entirely feasible." Nevertheless the recommendation was made to very unbelieving hearers. At that time there were seven electric lines in Europe, and the Leo Daft road in this country was mentioned with special interest. It is pleasant therefore, in this our October issue of 1896, eleven years from the date electricity was discussed for the first time in convention, to publish an account of two early day pioneer roads, and from the pen of that honored pioneer himself, Leo Daft. This valued historical contribution appears elsewhere in this issue. It seems almost incredible that only eleven years have been sufficient to work the gigantic revolution in the street railway business which marks the interim between the last St. Louis convention and this. It seems absolutely impossible that when the Association meets in St. Louis again in 1906 that anything like the progress of the past decade can then be chronicled; but not one who was present then dreamed of what has since become an accomplished fact. So who knows what is yet to be?

THE easiest way in the world for a grocer to cheat his customers is by doctoring the scales and measures. If he sells poor quality of goods is is manifest as soon as they are used, but a small error in weights and measures goes unnoticed and gives the dealer an unfair advantage over his competitors. In the same way, the easiest way for the manufacturer of electrical apparatus to fool buyers is to give his apparatus a high rating. This is mainly because so many buyers do not realize that the term horse-power or kilowatt when applied to machine rating may mean a good many things and unless the conditions of performance are defined more fully the manufacturer is given a great latitude in the machine he may honestly give a customer for a given rating. Of course each railway, if it has engineers competent to do so can draw up specifications which will be so plain that there can be no mistake as to the machine called for, but it would be vastly more convenient if the American Street Railway Association would adopt specifications by which all manufacturers could rate their apparatus. This has been done by the American Society of Mechanical Engineers in the case of boilers.

THE REFRAIN OF THE TROLLEY

The trolley was quietly dozing one day,
Hadn't killed any people who got in its way;
Was behaving as docile and good as a lamb,
When a man came aboard, shut the door with a slam,
And proceeded to state in a confident tone,
Which the trolley could hear with its ear at the 'phone,
That the days of the trolley were numbered and few,
And into the scrap heap it shortly would go.
The trolley awoke with a shock of surprise,
And thus with himself began to surmise:

What with talks of three-cent fare,
And motors run with compressed air;
Besides cars worked by storage bat.,
And going to do all this and that;
With suits against the overhead
And hostile threats that I hear said;
With roads that in a conduit go,
All guaranteed, both fast and slow;
I really sometimes stop and wonder
How long I'm going to last, by thunder!

And if when ten years have rolled by,
I'll still be found twixt earth and sky.
But when I pause and think a bit,
I find I'm not so badly hit;
And folks who used to cuss the most,
Now find in me a welcome host;
I haul both people live and dead,
And carry trunks and mails, instead
Of carting them upon a dray,
As was the good old-fashioned way.

And when one wants to do things brown,
A trolley party round the town
Is sure to be the choice of all,
The old and young, the big and small.
I'm run all day, nor rest at night,
And do my work with all my might;
I serve you well, I've come to stay,
I'll still be young when you are gray.
When you are old, I'll still be jolly,
The rushing, sparking, lightning trolley.

NEW TRANSFER TABLE.

Alfred G. Hathaway, the well known street railway supply man of Cleveland, has just introduced a new transfer table shown in the accompanying engraving. The tables are made 12, 15 and 20 feet in length, with 18-inch wheels, and each is equipped with a geared hand starter, by means of which one man can transfer a 20-ton motor car without difficulty. The limit of carrying capacity is 20 tons. The New Orleans City & Lake Railroad Company has three of these tables in use and others have just been shipped to the J. G. Brill Company, Philadelphia, and the Cincinnati Street Railway Company. The Hathaway transfer table is used in St. Louis by the Lindell, Missouri and Union Depot railroad companies exclusively. Mr. Hathaway has also recently supplied the Englewood & Chicago Electric Railway with the Murrey brake fitted to the Dupont truck. Over 40 of these brakes are in use on the Missouri Railroad in St. Louis.

WHY THE CZAR RODE IN A STREET CAR

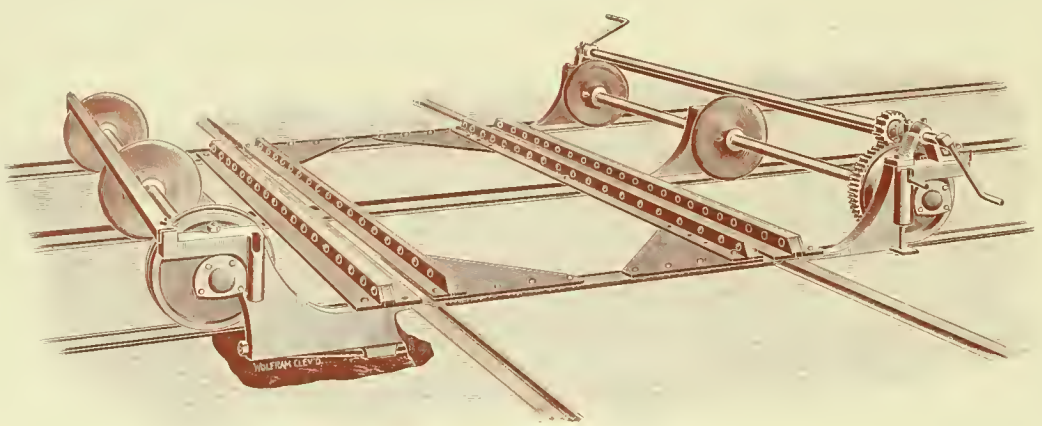
Russian military etiquette is inflexible, and the Czar is rather liberal. One of the reforms Nicholas has been trying to inaugurate is to discredit the notion that an army officer demeans himself by riding in a street car, officers having heretofore been considered too rich and too far above the civilian to associate with the common crowd.

Recently, however, an officer more courageous or rash than his fellows rode to his barracks in a street car, alighting in front of the swell Cavalrymen's Casino. He was at once taken to task for disgracing his uniform and his references to the Czar's desires on the subject were unheeded. After days of persecution and urging that he should resign his commission, he appealed to a friend in the ministry who laid the whole matter before the Czar.

Nicholas immediately ordered his adjutant to attend him, boarded a street car, rode to the barracks and returned on the next car. He then wrote out a brief account of his trip and sent it to the commanding officer of the offender's regiment adding the question,

"Am I still worthy to wear the uniform of a Russian officer? NICHOLAS."

And the officer who rode on the street car has since been treated as one who pulls wires that make kings dance.



HATHAWAY 20-TON TRANSFER TABLE.

THE CAST WELDED JOINT.

Remarkable Progress of This Great Track Saver—100,000 Joints Already Down—60,000 Laid in '96—Rail Life Doubled.

When the Falk Manufacturing Company, of Milwaukee, started on its first contract for cast welding rail joints, at St. Louis, the REVIEW was not only the first to illustrate and describe the new invention, but was the first by many months to pronounce it a great success and the most important advance in track work in many years. That was in the fall of 1894, and subsequent events have more than proved the truth of our prophesy. In spite of the extreme reluctance of managers to spend money the past two years, the record of the cast-weld is remarkable. This year 60,000 joints have been cast, which brings the total up to over 100,000. The work in '96 is divided as follows: At Minneapolis about 12,000 joints, part on old track, balance new. The Twin City road is cast welding all its new track as fast as laid, and old tracks will be welded next season.

On the Chicago City Railway 18,000 joints were cast of which two-thirds were on old track. The Cottage Grove cable line work is interesting. Part of the iron had been in constant use for 10 years, including the severe World's Fair service. It was decided to pull up the rails and buy new, when Superintendent Bowen concluded to try a few lengths with cast-weld. The result was so surprisingly satisfactory that the entire division of 9 miles was so jointed and the track, which is now as smooth as a floor, bids fair to last another decade.

In Washington 3,000 joints on old track of 7-inch girder used on cable service of the Capital Traction Company for over 8 years. In St. Louis 3,500 joints on very badly worn track of the Missouri R. R.; 2,500 on old track of the St. Louis & Suburban, and 2,000 on an exceedingly bad track of the Lindell, consisting of 52-pound rail on ties spaced to 4 feet. The track as now cast-welded is in excellent condition.

In Brooklyn, 3,000 joints for the Brooklyn City & Newtown, on the DeKalb avenue line, 5-inch girder—the worst track the company had, and 5,000 for the Brooklyn Heights, 2,000 of which were on new 9-inch girder.

At Providence, the order called for 1,000 joints on the old Providence girder, but results were so good the order was increased to 6,000, and more will be laid next year. As a result of this work, the Winchester Avenue Railway, of New Haven, has put in 3,000 joints and ordered 5,000 more.

At Memphis the work was begun in January on a small contract, but one machine is still there at work, and has put in to date 6,000 joints on old and new girder and T rails.

In Milwaukee, Manager Wyman made some very severe tests which resulted in 4,000 joints, half new and half old track. He is highly pleased with the work.

The work on old rail commands special attention. As every manager knows to his sorrow, in nine cases out of ten, rail that is pronounced ready to scrap is still good except at the joints. By the welding process its life is doubled and often without lifting the iron. The method is to raise the rail ends to a proper height, by jacks or otherwise, shim the butts up, and then cast weld them. The top of the joint is then ground down, leaving a smooth unbroken surface on a level with the rest of the rail.

During the year the question of conductivity of the cast joint was raised and severe tests made, especially in Milwaukee and St. Louis. The results showed conclusively the joint by reason of its increased area furnishes greater conductivity than the rail section itself. One test was made at Milwaukee by the railway people, who took an old joint, which with the two short pieces of 58-pound Illinois Steel girder rail weighed altogether only 90 pounds. The joint was one of the first made, much inferior to the joint now cast, and had lain in a scrap heap exposed to the weather three years. This joint, 13 inches in length, was connected up one inch from each end of joint and the entire output of generator, 720 amperes, passed through it with a drop of only .05 volts. The same length of a 61-strand 1,000,000 circular mil cable was then given a similar test and showed a drop of .035 volt. Another test of equal length of a joint and rail section, both taken from same rail in track, showed decidedly in favor of the conductivity of the joint over that of the rail.

The cast weld is already attracting attention abroad, and M. Abdank, the celebrated French engineer, has ordered a complete welding outfit, which, as soon as received, will be used in Lyons, France, where there are 210 miles, which will be cast-jointed. Several other large European roads are also negotiating for the system.

The executive staff of the Falk Company is a strong one, including Herman W. Falk, the Milwaukee millionaire as president; Otto H. Falk, first vice-president; A. Hoffman, the inventor, second vice-president, and Clement C. Smith, as general superintendent. The secretary, E. A. Wurster, also performs the duties of general manager, and to his executive ability and energy, is due to a large degree, the success which has attended the introduction of this radically new and valuable improvement.

SCHEME TO FOLLOW RACES.

It is seriously proposed as a measure to lift the turf from the disrepute into which it has fallen to construct a single rail trolley track around race courses to haul a car or two at the same speed as that reached by the horses. The plan is to carry the stewards and reporters, all of whom would thus be able to keep tab upon any jockey tricks that are easily carried out with impunity when the only medium of detection is through opera glasses and distance.

A FEW NOTES ON EARLY ELECTRIC RAILWAY WORK IN PITTSBURG.

BY LEO DAFT.

One day during the summer of 1886 a bright looking young man was ushered into the writer's office, adjoining the factory, then situated at Greenville, N. J., with the remark, "This gentleman wants to get a few particulars about the maximum gradients it is possible to ascend with electric motors, and the New York office has just called us up to know if you cannot show him some experiments in that direction."

A few questions elicited the information that the young man hailed from Pittsburgh, Pa., and was bold enough to propose the construction of a street railroad, some 1½ miles long, with a total ascent of nearly 500 feet, and a maximum gradient of over 15 per cent, part of which was necessarily on a curve of short radius.

LEO DAFT.

Leo Daft, whose name is as inseparably connected with the early electric railway industry in this country as that of Van Depoele or Sprague, does not need any introduction to our readers, for it is but a few years since the company bearing his name, and playing an important pioneer part in electric road building, passed out of existence. It is hard to realize that the history he relates is that of events taking place only ten years ago, and less. The industry has grown fast, and the army of new men that have come in know little of the history of the pioneer undertakings. As Mr. Daft hints in his article, much of the "history" that is written these days is hardly worthy of the name, and it will be especially gratifying to our readers to hear from such an absolute authority as he is. Mr. Daft himself, however, is too modest to speak the whole truth about his part in early work, and we hope that some day some writer acquainted with all the facts will publish a history of Mr. Daft's connection with the electric railway industry. When that is done, it will be found that by him were first tried many devices which are accredited to others. But perhaps the most notable fact of all is the way some of his early apparatus stood the test of time and service. To the man who could design and manufacture such apparatus when working under great disadvantages, we say all credit is due. But before closing these remarks relative to the work of the author of this paper, we want to call attention to the gross injustice that has unintentionally been done him and his work by recent writers who saw only the crudity of his early apparatus as compared with that of to-day, instead of appreciating its marvelous perfection, considering the state of the art at the time it was designed. Especially is this true of the electrical work on the Manhattan elevated. The locomotives there used were far in advance of anything else put out at that time. Mr. Daft is now at Los Angeles, and is carrying on a consulting and constructing engineer's practice on the Pacific coast, and an army of friends will join in wishing him peace and prosperity after his labors in behalf of the industry that feeds and clothes us all, and which has revolutionized modern life and communication.

The average gradient for the entire line exceeded 6 per cent, and an examination of the profile of the proposed route revealed the interesting fact that there was not anywhere a sufficient stretch of track to store half a dozen cars without the brakes set, while the plan with its ten curves, three of less than 38 foot radius, on a 5-foot 2½-inch gage were salient features in the list of perplexities calculated to satisfy the most exacting seeker for trouble, and which had certainly not then anywhere confronted builders of mechanical tractors. If it has since been equaled in that respect, except by mountain railroads with special rack devices throughout, may well be doubted.

The prospect was so far from inviting that had it not been of vital importance to secure new business, our young friend's enterprise would have been "politely but firmly" declined, but an acquaintance of some three years with the kind of propositions then being offered to us and to the one other firm which was at that time commercially launched in this field, led to the conviction that only two kinds of street railway promoters were rash enough to tempt Providence by espousing the cause of electricity, namely, those having roads in a condition of financial decay, and others with plans over routes presenting topographical features of a prohibitive character.

After seeing various experiments, among which was the repeated ascension of a gradient equal to 2,900 feet per mile by a small motor car, with one passenger, from a state of rest without sprocket or other gripping devices, the bold young man departed in triumph. The outcome of this visit was a contract with the Daft Electric Company, to equip the Pittsburgh, Knoxville & St. Clair Street Railway (as soon as it should have its permanent way built) with five motor cars capable of towing a fully loaded trailer at an average speed of not less than six miles per hour up the incline, and at not less than three miles per hour on the heaviest grades; together with dynamos and all electrical station equipment. The problem was not then easy of solution and was rendered more embarrassing by the clause requiring the contractors to build a double track conduit of some 800 feet in length, near the city terminus, and change the method of supply without stopping. Why this latter clause was inserted it is difficult to imagine, since the street along which the conduit ran was so far from attractive or picturesque that the invasion of a well loaded clothes line would have occasioned little more than passing remark, but in those days the few electric railroad advocates were nearly everywhere assailed by captious councilmen or impecunious owners of abutting property, either with demands for fanciful construction on the one hand or a substantial interest on the other, before allowing a few more poles to deface the classic beauty of a semi-residential street in a crowded manufacturing city. Suffice it to say, that an attempt to

modify the objectionable clause by substituting one calling for overhead construction with iron poles and elaborately decorated finials, with severe restrictions in the matter of span wires, etc., met with a reply which practically amounted to "conduit or nothing," so without more ado the work was begun.

In a winter climate of such severity as that of Pittsburg it was evident that long gradients of from 12 to 15 per cent could not be safely operated on an ordinary track. It was therefore decided, after some little controversy, that whenever the inclines exceeded 10 per cent, a center rack rail should be employed, and a sprocket wheel mounted on the motors so as to be capable of intermittent use. This consideration alone might have been sufficient to decide the question as to the mode of traction, but there were others which finally turned the scale in favor of independent motors, and five of these were required for the proposed schedule.

Owing to the usual delays in pioneer work, the actual construction of these motors was not commenced until the spring of 1887; and proceeded very slowly, from a

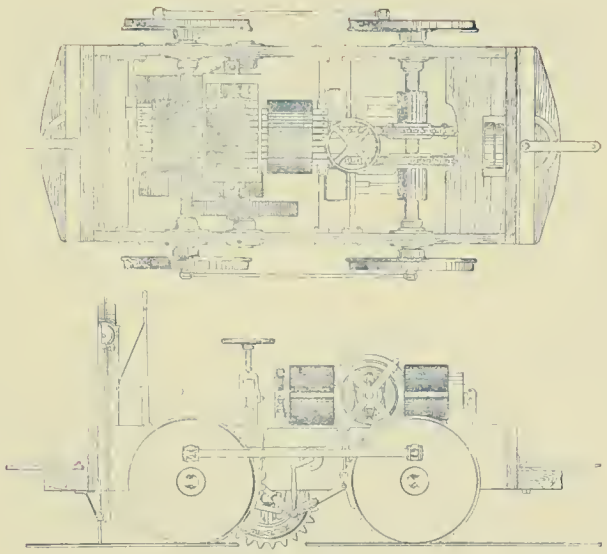


FIGURE 1.

variety of causes with which the pioneers who may read this will be all too familiar.

Referring to those tedious delays on the part of early constructors, it should be remembered that in one respect there were marked differences in the classes of pioneers, one class who merely originated special devices and depended upon established manufacturers for the greater part of the operating machinery, and another class who designed and manufactured every item of the machinery and apparatus for all the enterprises with which they were connected, thus suffering the continual embarassments due to training mechanics in unfamiliar lines, besides incurring the vexatious responsibilities which the acquisition of manufacturing facilities, however limited, had forced upon them as the very price of existence, and the support of their business associates. Of the latter class there were practically but two in this field, the Van Depoele Electric Manufacturing Company and the Daft Electric Company.

The finished weight of the independent motors was calculated to be about six tons, and the trailer, with forty passengers, added some five tons more, it was therefore

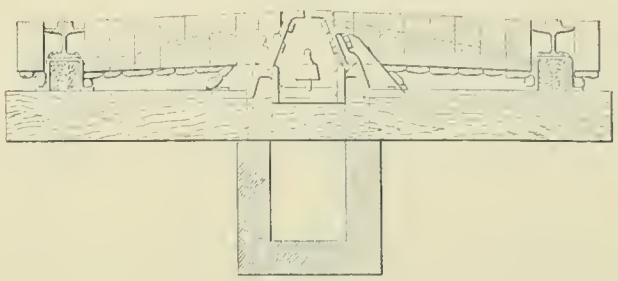


FIGURE 4.

decided to equip with motors of 30-horse-power, and accordingly five of these were built during the spring and summer of 1887.

The gearing was double reduction, the brakes toggle geared, and the 33-inch drivers were connected by side rods, quartered in the usual locomotive manner. The regulation was by means of commuted fields similar to those used on the "Ampere" at Saratoga in 1883, and at Baltimore in 1885, in neither of which cases were rheostats used at all.

Tests made before shipment at the factory, with a pressure of 260 volts, proved a development of about 32 horse-power for the unmounted motors, and when placed on dry rails the ultimate tractive effort of the complete mounted motors was found to be between 2,700 and 3,000 pounds. With the sprocket engaging the perforated rail, a pull exceeding 9,000 pounds was repeatedly registered.

The sprocket wheel shaft was connected with one driving-axle of the motor by heavy sprocket chains, and was lowered into or raised from the track by a wheel and screw on the foot board, as shown in Figure 1.

Meantime the work of track construction was slowly proceeding at Pittsburg under the Railway Company's supervision. The gage was 5 feet 2½ inches and the greater part of the rail was side bearing of 45 pounds section. Near to the city terminus was an abrupt descent of some 150 feet which was bridged by an iron trestle structure of rather imposing proportions, including gradients varying from 8 to 11 per cent; this bridge is well shown in the engravings Figures 2 and 3, as is also the perforated rail.

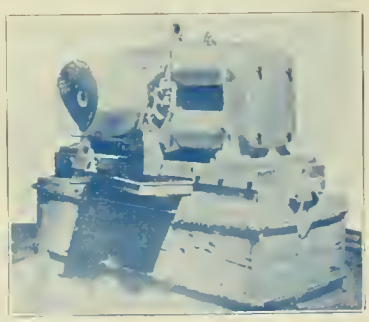


FIGURE 6.

A section of the conduit is given in Figure 4 together

with the center bearing rail used on that portion. The conduit was 800 feet long, double track with two cross-overs, and was built by the Wharton Company under contract. The conductor was of hard drawn copper 5/8-inch diameter supported on cast iron and hard rubber insulators at intervals of 4 feet, and placed directly beneath the slot, a distance of 6 or 7 inches.

The overhead system was of the bracket suspension variety, except across the trestle (see Figure 5) where two poles and a cross arm were adopted, and two number 000 wires were supported in a horizontal plane as a track for the four wheeled trolley, though both formed one side of the grounded circuit, the rails being bonded in the usual manner. The power-house, situated at the

FIGURES 2, 3, 5, 8, 9 AND 11 SHOWING THE PITTSBURG, KNOXVILLE & ST. CLAIR RAILWAY — THE FIRST ELECTRIC ROAD IN PITTSBURG — DAFT SYSTEM—OVER RUNNING TROLLEY.

upper terminus, was equipped with four 50-horse-power compound generators, supported on solid masonry foundations (Figure 6), and driven by a common slide-valve engine with double cylinders, 16 by 24, driving a flywheel 10 feet in diameter, 32-inch face, at 130 revolutions, which was belted to a jack shaft and back from four pulleys, each 6 feet in diameter, to the dynamos which were speeded to 1,050 revolutions. The latter were used in parallel series, and the pressure was from 260 to 280 volts.

Automatic magnetic circuit breakers, as shown in Figure 7, were used at the power house and head of conduit.

Owing to demands for machinery to equip other roads the first motor was not shipped from the factory until the latter part of August, 1887, but arrived in Pittsburgh long before the track was fit for operation, and from various causes it was not until the following March that the road began carrying passengers. The succeeding four or five months were full of tribulation for both operating and construction companies, as might have been expected; not a little of the difficulty being attributable to the frequent failures of insulation in the conduit and the well known peculiarities of the Pittsburgh climate, it being by no means uncommon in that region for drenching rain to fall for hours and freeze as it reaches the ground, forming a thick layer of tough ice exceedingly difficult to remove. Witness, the following quotation from engineer's report late in December, 1887, "I ran No. 5 up to the power house last Saturday and had a pretty rough experience, as the rain was pouring heavily and froze on the rails, making it necessary for us to chop the ice off ahead of the motor in order to get a rail contact. We were from 4 to 9.30 accomplishing the feat." But after heroic efforts and the most admirable skill, intelligence and self-sacrifice on the part of the engineer in charge, Robert McA. Lloyd, the road was gotten into fairly regular service and remained in operation until the winter of 1890, when the franchise and other property were purchased by the Birmingham Traction Company, which wisely abandoned the lower portion of the road, containing the heavy grades, and now operates that known as the "hill top" section only.

Illustrating the kind of track construction on this road the writer quotes from a report of the superintendent dated September 10, 1888. "The trailers were off the track twenty times yesterday, and, of course, the sprocket is all that keeps the motors on."

The engravings, 8, 9 and 10, from photographs made while the road was in operation, represent a few of the drastic doses which pioneers were wont to meekly, or even eagerly accept.

That quite heavy work was done may be gathered from the following quotations contained in informal reports of the superintendent: "Finding a core contact in No. 3 armature when she was down the road with a car, we took out No. 5 motor and pulled back a car load of people and No. 3 motor in tow. The whole train (17 tons) ascended the 12½ per cent grade with the usual speed and neither the motor or generators seemed to mind it. I'm not afraid to tackle any of the hills after that."

On one occasion a motorman neglected to let down the sprocket wheel while descending the 15.5 per cent

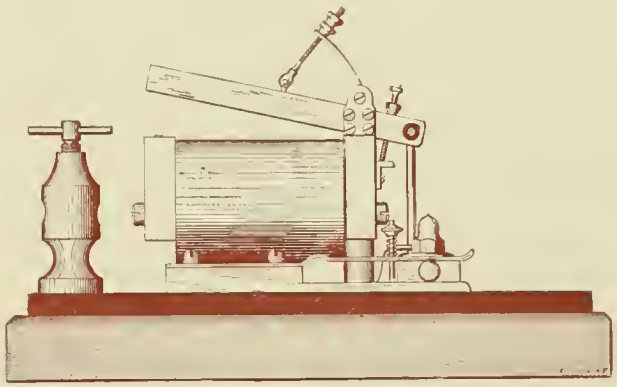


FIGURE 7.

gradient. The result is described by the superintendent as follows, under date August 15, 1888: "The motor and car, with all the wheels locked, slid to the bottom (over one-third of a mile) on a perfectly dry rail." Figure 11, showing motor and car on this grade, will give the beholder a quite vivid idea of that interesting performance.

Occasionally loads of over eighty persons were carried, when the motor would also be crowded to the great inconvenience of the long-suffering motormen, who not infrequently showed a devotion to their work and a stoical indifference to personal comfort, which one can only recall with grateful admiration, especially when it is considered for how small a pittance such work was, and is, usually done, unrelieved by the hope of extra reward which naturally stimulates the pioneer.

In the meantime Thomas A. Noble had been in negotiation with the Daft Electric Company for motors to run on a proposed suburban road of about three miles in length, beginning at the power house of the St. Clair

FIGURE 10.

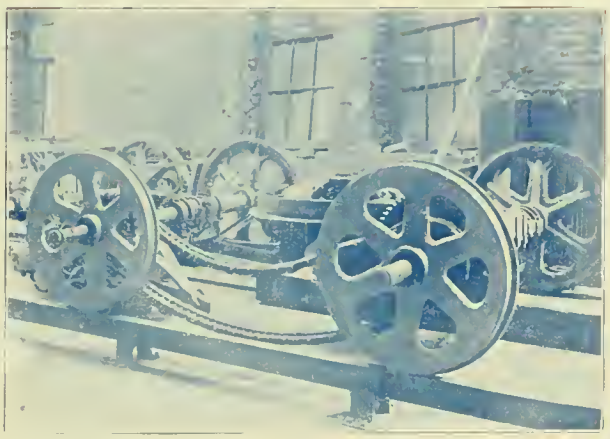


FIGURE 12.

road, and intended to develop a very pleasant residential region, besides affording transit to a large and beautiful cemetery some two miles from the terminus. Accordingly about November, 1887, an order was given for one-car motor equipment, and with truly characteristic energy and thoroughness Mr. Noble began the construction of his track, using a 45-pound T-rail and single pole bracket overhead wire line, consisting of two Number 00 hard drawn wires with rail return, as in the St. Clair road, and band copper bonding of about 130,000 circular mil section.

The first motor car was shipped in February, 1888, and was of double reduction gearing, with steel and rawhide pinions, the motor being suspended from the axles of the car by phosphor bronze bearings at the power end, and supported from the other end by an extended arm loosely fitting an under hanging link; the fore and aft wheels were connected by sprocket chain, as shown in Figure 12.

The car is represented on the track in Figure 13 from photograph made in May, 1888. This car was tested over the road with current from the Pittsburg, Knoxville & St. Clair power house, early in April, 1888, and the test was quickly followed by an order for another motor car of similar character, which was delivered during July of that year. The track of the Suburban Rapid Transit Company, by which name Mr. Noble and friends incorporated, was about three miles long, and though including among some heavy gradients one of 9 per cent, had few curves, and those of long radius. Being also of good construction, it was naturally a great relief from the rough St. Clair road, bristling with perplexities at every turn.

The contract required the motors to be of capacity to cover the lines, loaded, in ten minutes, or an average speed of 18 miles per hour, and though this could not be accomplished without dangerous coasting on the down grades, the performance of the cars was considered so satisfactory by the purchasers that they were not only accepted and promptly paid for, but more were ordered without delay. The usual trouble having been frequently experienced with the ever-exasperating sprocket chains, the writer decided to dispense with them entirely in the later cars ordered by the Suburban Company, and substitute quartered side bars. One of these 16-foot body, vestibule cars, was delivered in December, 1888, and immediately went into service. It was capable of making 18 miles per hour on a level, and 10 miles up a 6 per cent gradient. Five more of this type were ordered at short intervals within the following few months. Until July, 1891, the Suburban Company was supplied from the St. Clair power house, but in that month Mr. Noble completed his own power house, and the Daft equipments were rewound for a pressure of 400 volts, and the cars, which had previously been equipped with under contact devices, were braced for the heavier service of a contemplated extension. On the first of December, 1892, the extension of 1½ miles, into the heart of the south side, was completed ready for operation. The addition embraced one gradient of 12½ per cent and another of 6 per cent, of the extraordinary length of 5,850 feet, the total length of the grades being 6,450 feet. For over one and a half years, or until the early summer of 1894, the Daft single equipment, rated at 25-horse-power, with side rod connection, gave daily service up the 6 per cent portion of this gradient at an average speed of 10 miles per hour with a load of forty passengers. The writer simply quotes this statement from a recent report made by the president of the road, who adds in a letter dated September 11th, 1896: "Our present equipment is capable of making from 14 to 16 miles (on the 6 per cent grade.) Of course we are now equipped with two 30-horse-power motors, and we are using the Westinghouse, General Electric and the Walker." The succeeding remarks of this electric railway veteran might be of considerable interest to certain manufacturers of electric machinery, but one is not at liberty to quote further from his letter.

In December, 1894, two of the motors made by the Daft Company, which had been superseded in regular traction duty by heavier and more modern machinery, were mounted on a snow plow designed by Mr. Noble,

FIGURE 13.

the rest having been transferred to the Schenley Park and Highlands road some time previous. Again quoting from an earlier report of the managers, dated December 17, 1894, we learn that they had "built a snow plow using two of your equipments on a truck with 8-foot 6-inch wheel base and it makes a powerful snow plow. We propose to utilize the motors we take from the Schenley Park for the same purpose."

In addition to those until recently in active snow plow service there are two of the old motors still running in Pittsburgh at this date, (Oct. 1896), one is supplying power for a machine shop in the city and the other has been running a lathe in the repair department of the Suburban Rapid Transit Company for three years past. "The work is comparatively light, but it has been absolutely at no expense," says the president. It will thus be seen that the eight equipments supplied to this company in 1888 by the Daft Electric Company, remained in constant service for nearly six years, and some of them are still in harness.

It is pleasant to learn that a gentleman who was so active, intelligent and persistent an advocate of electric traction as was T. A. Noble at a time when it required no little courage and means to prove the faith that moves mountains, is now at the head of two important railway companies, and that his favorite venture, the Suburban Rapid Transit Company, has 4.5 miles of admirably constructed double track, a splendid modern equipment, and last, but by no means least, is carrying from 90,000 to 100,000 passengers per month.

Reference has so far been confined to the local work of the Daft Company, because the first contract for electrical railway work in the neighborhood of Pittsburg, was awarded to them, but in March, 1887, a contract was let by the Observatory Hill Passenger Railway Company of Allegheny City to the indefatigable pioneers, Messrs. Bently & Knight, which was the signal for a struggle as skillful and untiring as the historian of early electric railroad construction will be able to record, whenever some writer, without fear and without reproach, alike possessed of correct data and the courage to use it, shall take up the matter without the bias

FIGURE 14.

FIGURE 15.

born of affiliation with this or that "system." It would ill become the writer to reflect upon the several honest endeavors to record the early work in this direction, but that it is probably too recent for trustworthy data to be easy of access, may account for the resemblance of many historical attempts, with two honorable exceptions, to an old-time intermediate gear after encountering the ubiquitous monkey wrench on a down grade—judging from the gaps in them.

The distinguishing feature of the Bently Knight road was the ingenious metallic circuit conduit with which their names are inseparably connected, and which, in a somewhat less practical form, had been tested three years previously at Cleveland, Ohio.

The contract with Messrs. Knight & Bently required them to build several hundred feet of double track conduit. The exact data is not at hand, but the writer thinks it was something less than 1,000 feet and about three miles of single track with overhead conductor, on Perrysville avenue, Allegheny. The conduit was of the well known Bently-Knight design. The conductive system of the whole line was metallic circuit. The overhead lines were arranged about twelve inches apart, in a vertical plane, the contact being obtained by two single overrunning trolleys, similar to those used by Mr. Van Depoele. An excellent idea of this latter device may be gained from Figure 14, while Figure 15 well represents the junction of the double track conduit with the single overhead conductor section at the beginning of Perrysville avenue. The rolling stock consisted of five or six motor cars, equipped with motors built by the Thomson-Houston Company, and a substantial power house was erected containing Thomson-Houston dynamos, with high speed engines and a switchboard of quite unusual elaboration for those days.

Meanwhile the work of track and conduit construction was going on, and had so far progressed in March, 1888, as to admit of some preliminary experiments with one or two cars when, on the night of March 6, a fire

almost completely destroyed the power house and contents. The difficulties of conduit building in the severe and fluctuating winter climate of Pittsburgh, and the ever exasperating problem of insulation hitherto inseparable from the operation of them in such rigorous weather, had been sufficient to try men's souls without this added calamity, but the spartan resolution of the true pioneer was in these workers, and with a calm fortitude which compels admiration, they lost not a moment in again marshalling their forces with such good will, that after innumerable examples of the total depravity which has been the ruling characteristic of conduits on American soil, they experienced the crowning pleasure of seeing the road go into successful operation in July, 1888. But the end was not yet, for after varying success during the following winter, the conduit shared the fate of its kin in those days, by being finally abandoned after less than one year's service, and was replaced by an overhead system. After this change, and a resort to under contact devices, the road continued in successful operation for several years, and some of the motors are still in use on the Perrysville avenue branch, now in charge of the Pleasant Valley Company.

LEE SNOW PLOW.

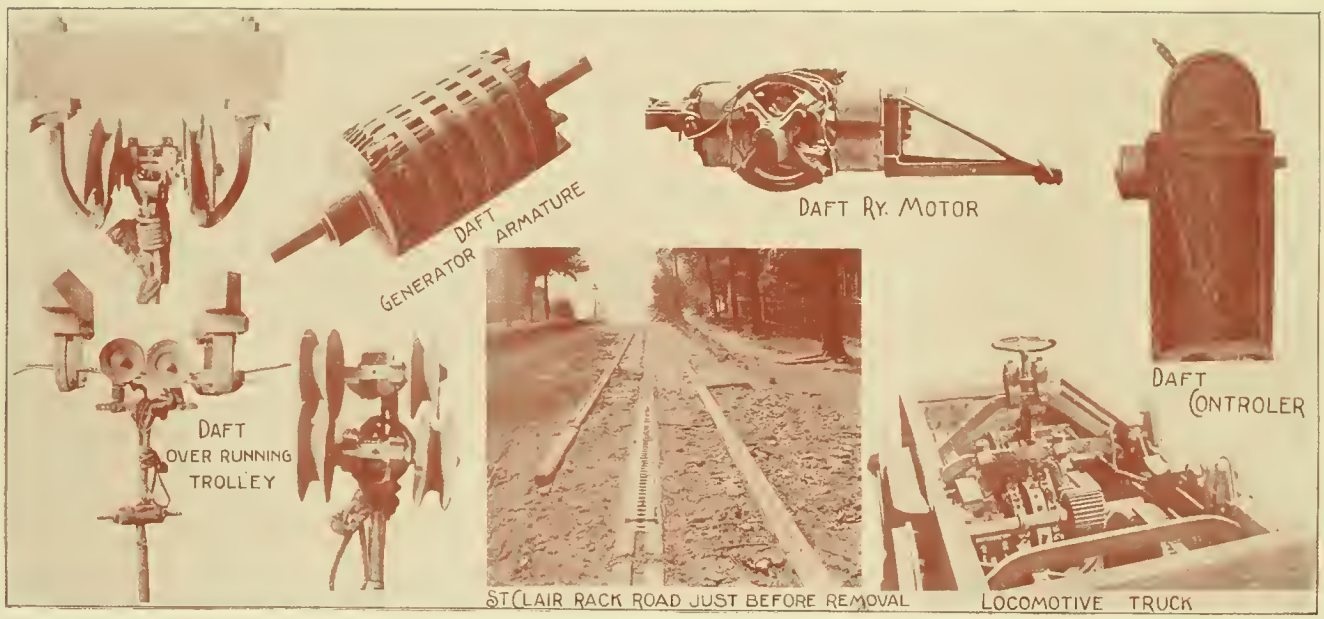
The Lee snow plow, manufactured by the W. E. Austin Manufacturing Company, Norway, Me., and of which an illustrated description was given in our issue of May, is now attracting a great many inquiries. The plow does exceptionally fine work in heavy drifts and is easily operated. It is now made in two sizes, with nose 37 or 48 inches in height. The frame is of 2½ by 5/8-inch Norway iron bolted to 4 by 8-inch rock maple. The covering is also rock maple, fastened with countersunk bolts. The cutting edge is of 5 by ½-inch steel, adjustable to take up wear.

THE KRUM DRAG.

A Traffic Inducer in Early Davenport Days.

When the first horse cars were run on tbe Brady street hill line in Davenport, many years ago, the company had difficulty in inducing people to try the car so fearful were they that the brakes would not hold it on the grade. On the day of the trial trip the whole town turned out to witness the opening, but the Davenport Democrat relates that not one of the spectators, even the stockholders, would get in the car and ride up the hill. They were afraid that the car would run away backward down the hill taking the mules with it.

Finally, as a measure of safety, adopted mainly to reassure the unduly alarmed people, a device called the Krum drag was put behind the car. This was nothing more than a big crowbar dragged along just behind the rear wheels, and was intended to check the first impulse of the fiendish car to drag the unhappy team down to destruction by the tails. It was called a Krum drag, because it dragged and because it was added to the equipment as an inducement to get Chauncey Krum, then the most active man in the crowd, and a few others, to get in and ride up the hill. The drag worked like a charm. It was not needed to stop the car, but it quieted the host of fears that were tormenting Mr. Krum, and he entered the car with some of the rest of the crowd. When part way up the hill the car was stopped, and when it was seen that the brakes alone easily held it, even some of the directors who had followed the car on foot had confidence enough to get aboard, and thus regular service was begun with the confidence of all concerned.

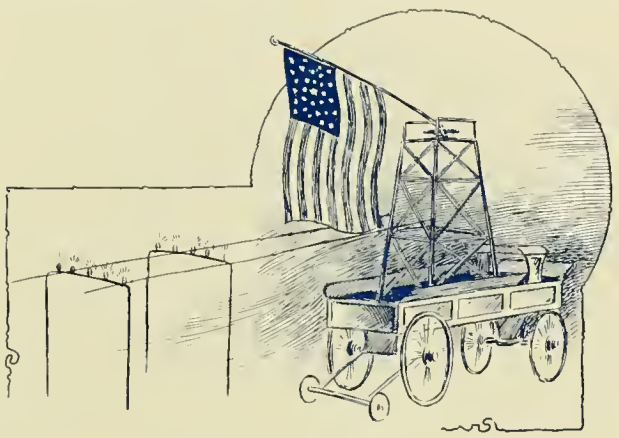


RELICS OF EARLY DAYS.

ELECTRIC TORCHLIGHT PROCESSION.

West Chicago Street Railroad Employes Discard the Oil Torch and March for McKinley Under Rows of Incandescents Current Taken From the Trolley.

The employes of the West Chicago Street Railroad have led the world in the matter of electric torchlight processions. The idea was originated and worked up



TROLLEY WAGON FOR PARADE.

by the boys at the Western avenue car house, and when first sprung on the public was an eye-opener. The first thing was to put a trolley stand on one of the company's wreck wagons. This provided for trolley connection as long as the wagon was driven along the track. To secure a sure and constant ground a two-wheeled truck was improvised and arranged to be hauled along the track behind the wreck wagon. From the wagon positive and negative wires were run back as far as required by the length of the procession. These wires were supported on cross bars carried on poles held by a pair of men. Along the cross bar, between the wires, five 100-volt lamps were put in series. The distance between cross bars is 8 feet. A shorter distance was at first used, but was not as satisfactory. The circuit is connected to the wagon by plugs which, while tight enough to hold under any ordinary strain, will pull out in case the horses should start to run. If this precaution were not taken, the results, should the wreck wagon team attempt to leave the procession, can be better imagined than described. There were 125 men in the first parade carrying electric lights, and a number of larger ones have been held since. The wreck wagon was decorated and illuminated, and a huge flag hung from the trolley pole. Besides the regular strings of five lights there were several transparencies. The idea is of course capable of endless modification in the way of colored lights and different designs. We congratulate the West Chicago boys on their enterprise, and presume that others will follow their example ere the campaign ends.

THE PROVIDENCE FENDER.

One of the few fenders that has stood the test of time and service is the Providence, made by the Consolidated Car Fender Company of Providence, R. I. Visitors to the convention will have an abundant chance to see it, as it is on all the cars of the Union Depot Railroad, which road passes the convention hall. It is strong but very elastic and for that reason is not only more valuable as a life-saving device than if rigid, but is not so likely to get smashed colliding with vehicles. Another strong and important feature of this fender is that it covers the drawbar, and all other projections which a victim would be liable to hit, with cushions of spring steel. The front edge of the cradle is cushioned with rubber rolls and the cradle, itself, is of such form that it may be dropped on any road surface without risk of breaking. It is, of course, not practicable for a projecting fender of this kind to be carried close to the ground all the time, but it is possible for the motorman to instantly drop it while his hands are free for other purposes. It folds against the dashboard so that it can be folded up when the car is run in the barn. Over three thousand of these fenders are in use and the company claims a record of saving 97 per cent of all the lives placed in its care, and of that 97 per cent 99 per cent were uninjured. In a total of 219 accidents 94½ per cent of the men, 96½ per cent of the women and 98 per cent of the children were saved, a record of which there is official proof, and one which certainly commends the Providence fender.

NIGHT PHOTOGRAPH OF THE ELECTRIC TORCH LIGHT PROCESSION.

LATEST IN AIR BRAKES.

The Standard Air Brake Company's New Automatic Controller —An Important Improvement—Be Sure and See it in Operation at Convention.

Not the least of the attractions at the Street Railway Convention will be the new Automatic Controlling apparatus which will be shown in operation by the Standard Air-Brake Company.

This unique device, while designed and built for use with the company's electric air compressor, is also applicable to a variety of uses, such as electric and other elevator work, hydraulic and other pump control, and other things which naturally suggest themselves. In air-brake practice it relieves the motorman from all responsibility. He has nothing whatever to do with throwing the current on and off for the running of the air compressor. The apparatus takes care of this and as it requires neither lubrication nor inspection it will

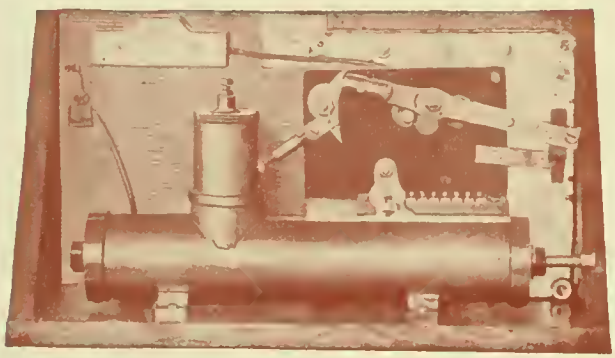


FIG. 1—AUTOMATIC CONTROLLER.

prove a boon to motormen. It is valuable in air-braking for a number of purposes, among them being the following:

Perfect, automatic action in starting and stopping.

Motor starts as easily as if operated by hand.

Resistance is automatically placed in circuit with motor when current is interrupted.

Speed of motor is never excessive.

When pressure in reservoir is released (when otherwise, ordinarily, motor would "run away") resistance is automatically placed in circuit and controls speed. Conversely, when motor-compressor is started with reservoirs empty, resistance is gradually removed from circuit as pressure increases.

When current is interrupted by opening of circuit breakers resistance is immediately introduced into motor circuit. The same action occurs if trolley flies off, or motorman removes trolley on changing from one end of car to the other.

This automatic controller has been patented both here and abroad. It is the first of its kind in the field. It has been designed to meet every contingency, in order that there may not, at any time, be anything to interfere with its rapid and reliable operation.

The apparatus is shown in Fig. 1.

The Standard Air-Brake Company's new type of electric air compressor is shown in Fig. 2. One of the most important things about this apparatus is its remarkable compactness, the 1-horse-power type occupying a space of only 12 inches high by 15 inches wide by 28 inches long. The machine is iron clad, and there is no room for dirt or water to accumulate.

The running of this motor compressor for 30 seconds will compress enough air to suffice for half a dozen

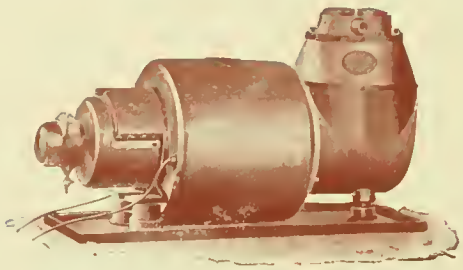


FIG. 2 GEARLESS ELECTRIC COMPRESSOR.

stops. It will be seen from this that the motor compressor is idle most of the time, thus insuring long life of the apparatus. The vibration is taken up by cushions which prevent transmission of noise to car, and the motor compressor runs very quietly, noise being scarcely perceptible. The compactness of this apparatus makes it practicable to suspend it under the floor of the car in case it should not be desirable to put it on the platform or under car seat. It can safely travel in such exposed position without suffering injury or becoming inoperative. This feature is found only in the "Standard" apparatus. Oiling is necessary only at infrequent intervals. All parts are made to gage, and replacements, should such become necessary, may be easily and economically effected. The "Standard" motor compressor differs from other types, in that it is direct coupled, thus avoiding expensive gear replacements. Its greatest advantage, however, is the entire avoidance of the noise and rattle inseparable from the use of gears in such small machines.

The Standard Air-Brake Company is now filling orders for motor-compressor air-brakes in connection with the new controller. This type makes it possible to equip any electric car, trains, or locomotive, no matter whether there is any free axle space available or not. Where, however, there is a free axle space available

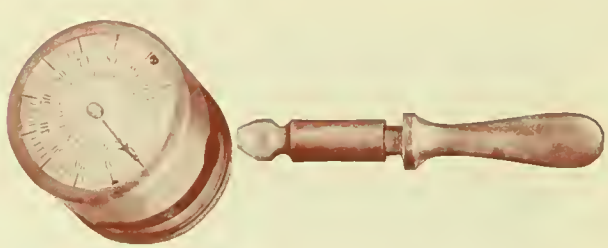


FIG. 3—INTERLOCKING HANDLE AND PRESSURE GAUGE.

alongside of motors, of from 6 inches upwards, the company furnishes its well-known types of single and double-acting compressors (driven either directly or indirectly from the car axle). Hundreds of these are in successful operation here and abroad.

A unique feature of their system is the interlocking controlling handle shown in Fig. 3. By using this handle, when motormen shift from one end of car to the other, a mistake becomes utterly impossible. The handle must be inserted in one particular place and can only be withdrawn from that place. When inserted, it makes the air-brake operative from that end of the car. When withdrawn it securely locks the controlling valve at that end, leaving the other end locked until again opened by the insertion of the handle.

It will be observed that the pressure gage is mounted on top of the controlling apparatus, where the dial must constantly be seen. It is not possible for motormen to be ignorant of the air pressure available. The pressure vane is not double-headed, but is made in such shape as to make readings absolutely certain.

The Standard Air Brake Company points with pride to the fact that it is the only concern which builds street railway air-brakes that received diploma and medal at the World's Columbian Exposition.

Since the last convention the company has, among others, made contracts as follows: Pasadena & Los Angeles Electric Railway Company, Buffalo Railway Company, New South Wales Government Tramways, Australia, Germany, Switzerland, Brooklyn, N. Y., Washington, D. C., Worcester, Mass., Akron, Ohio, Pullman's Palace Car Company, Pullman, Ill., Philadelphia, Pa., Springfield, Mass., St. Catherines, Ont., Lorain, Ohio, etc. For obvious reasons more definite particulars are withheld.

From a number of these places as many as from three to six repeat orders have come during the year.

The business had increased enough during the year to compel the company to open a storehouse in this city where a stock of air brakes and sundries is carried. The location, 254 Water street, is central and convenient for shipping. Since the company removed its factory from 11-23 South Jefferson street, Chicago, and began manufacturing air brakes within five miles from its headquarters, its business has steadily advanced.

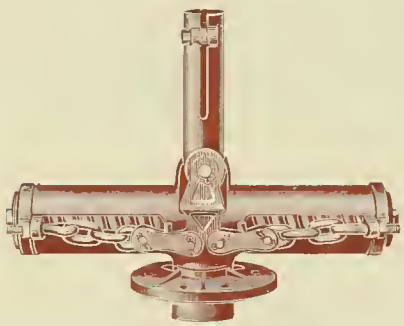
No member of the street railway fraternity has worked more energetically and successfully, in bringing to the attention of managers the merits of a radically new device, than has E. J. Wessels, general manager of the company. It has been no easy matter to introduce air brakes on street cars, but as one difficulty after another arose it was promptly met and overcome, and in this Mr. Wessels has rendered a splendid service; and not only at home, but in Europe and Australia have the Standard air brakes become known, and where known, adopted. A special convention circular has been prepared, giving full data as to air braking up to date. Be sure and read one.

Edward Saltzmen, San Jose, Cal., has brought suit against the telephone and telegraph company, and the San Jose Street Railroad Company for $51,000 damages on account of a fall from a telephone pole occasioned by contact with a live wire charged from the trolley wire.

DUNCAN TROLLEY WHEEL AND BASE.

The Duncan self-oiling trolley wheel has now reached a point where its friends consider it a success, wheels having been in service for ten months showing but few signs of wear. The wheel is made of bronze, cored out in the center to form a chamber large enough to hold oil for a run of about eight days. The bushing and pin on which the wheel runs are of hardened tool steel and the oil in the reservoir keeps the parts sufficiently lubricated so that wear is almost impossible.

The Duncan trolley base, also illustrated herewith, is now in service with good results on several railways. The materials used in its construction are of the best quality of malleable iron and wrought forgings carefully fitted. The tension is secured by a cam on the lower end of the pole socket and can be set for any desired degree of tension. The



spring is completely covered and protected from the weather. The base is 20 inches long and weighs about 60 pounds, being therefore easily handled by one man. The pole can be brought down to within 7 inches of the car roof, especially adapting it for low bridges and tunnels.

Both the devices are controlled by the Simonds Manufacturing Company, of Pittsburg.

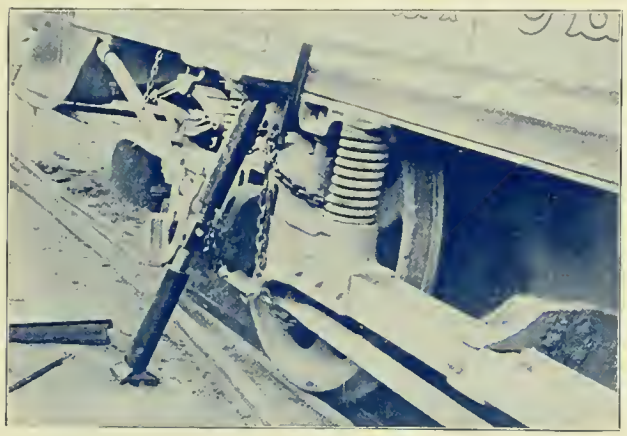
Two conductors on the Nassau Electric line, Brooklyn, have been arrested by United States officers on a charge of complicity with a gang of counterfeiters in getting spurious coin into circulation.

The Brooklyn Heights Railroad Company is looking about for a farm of two or three hundred acres for a place in which its horses may spend their vacations. There are about 200 of them used for various purposes, and it is said to be an economical move to allow them to run around barefooted occasionally.

The organization of the Winona, Minn., Railway & Light Company has been completed, and the new company has assumed control. The company is capitalized at $250,000, and the officers are C. A. Severance, president; M. D. Webber, secretary; Frank Seymour, treasurer, and S. B. Livermore, manager.

PEARSON CAR REPLACING JACK.

The National Jack Company of 7 Exchange place, Boston, Mass., has a good thing in the Pearson hub car replacing jack it is putting out. The quick results attained in replacing cars with this jack are truly remarkable. Ordinary jacks hoist straight up and do not move an object sideways. These jacks push sideways at the same time. The form of the jack is made plain in the accompanying engraving, which shows a car which was



PEARSON REPLACING JACK.

thrown off the track and put back again by this jack in 4 minutes by one man. A tool that will do such work is surely worth investigating, but it has been tried very extensively by both steam and street railway men. The jacks for street railway use are of 30 and 60 pounds weight. The 30-pound being compact and light is suitable for carrying on every car. The 60-pound is stronger and faster working and is the kind to use if it is not to be kept on the car. George F. Pearson, manager, will be at the convention showing these jacks in practical operation.

HAVE YOU SEEN HER?

The car was just comfortably filled. There was room enough for another, however, by a little squeezing. When she came in it was easy to see, by the normal expression of her face, that she was mean. At the further end of the car some ladies made room for her. She overlooked it. One of them beckoned to her to come and take the seat. She didn't even acknowledge it. She wanted the seat where she stood, and she had planted herself directly in front of a young man for that purpose. She tried to glare him out of his seat. He glanced up from his paper. The passengers breathed hard. He caught sight of the vacant seat the ladies had made for her. Then his eyes dropped and he went on reading. From that minute he was a favorite in the car. She was mad enough to eat him. The passengers chuckled. She got off at the next corner. There are others.—St. Paul Dispatch.

LOOK OUT FOR HIM.

A man representing himself as Charles C. Caldwell, formerly of Shelbyville, Ind., is circulating around the country representing himself as an electrical engineer connected with the General Electric, and drawing small sums against the company and its officials. He is not now and never has been connected with the General Electric, and this is not the first time our attention has been called to this man and his crooked methods.

AFTER THE WRECKERS.

An attempt was made to wreck a trolley car of the Everett (Wash.) Electric Railway by piling cordwood on the track. The car, carrying eight passengers, was saved by the activity of the motorman, stopping within a few feet of the obstruction. A similar attempt was made a year ago by a man who had been put off the car when drunk. He was caught, heavily fined,

$25 REWARD

The Everett Railway & Electric Co.

Will pay the above reward for information leading to the

ARREST AND CONVICTION

Of the person or persons who willfully and maliciously attempted the wrecking of their

MOTOR CAR NO. 2

Leaving the Smelter at 7:50 P. M., on Thursday evening, September 24th, 1896, by placing four large timbers, about the size of common railroad ties, across the Company's track, at a point about three hundred yards north of Twentieth Street, on Monte Cristo Avenue.

Eight passengers were on the car, and but for the timely discovery of this obstruction, an appalling accident would have resulted. This act was deliberately planned for the destruction of

LIFE AND PROPERTY

And the Everett Railway & Electric Company will prosecute the perpetrator or perpetrators to the full extent of the law, if found.

Everett, Wash., September 25th, 1896.

EVERETT RAILWAY & ELECTRIC COMPANY,

By WM. D. RAY, General Manager.

and, as a local paper puts it, "is not living on the peninsula at present." This one may also find it convenient to move, as bills, of which the accompanying is a reproduction, were scattered broadcast by Manager Ray as soon as the press could run them off.

The old story of the life of a rail being limited by the life of the joints seems to be repeated in the case of that rail against which the trolley wheel runs—the trolley wire. Only in the latter case the word supports should be substituted for the word joints. The wire between clips or hangers will last a very long time, but at the clips or hangers a pounding and sometimes an arcing takes place that wears the wire very rapidly compared with the wear taking place between clips. True there is a great difference in the merits of clips, but those used with a round wire can not from the nature of the case give the wheel a perfectly uninterrupted surface.

TERMINAL HOTEL.

The new union station at St. Louis is well known even to those whose travels have never taken them to that city. It is not so well known, however, that under the same roof, at the west end of the structure, is one of the most convenient and well appointed hotels to be found in the city. It is run upon the European plan,

ENTRANCE TERMINAL HOTEL.

and the cafe in connection bears out the promise of its kindred part. There are none of the usual disadvantages of railway station hotels for the reason that the adjoining train shed is entirely roofed in, and more especially because no locomotives enter it. All trains are uncoupled outside the station and the cars backed in.

ROTUNDA TERMINAL HOTEL.

The rooms are well-lighted and ventilated and neatly furnished and taken care of. The staff, from the manager, Mr. Abeles, to the bell-boys, is uniformly courteous and obliging.

The handsome arched entrance to the hotel and a good view of the rotunda are shown in the accompanying illustrations.

CLUBS AND THEATRES

The Mercantile, made up of leading business men, is the most influential club of the eleven in the city, and its magnificent new house is one of the prominent buildings of the city. The Commercial, as its name indicates, is a semi-business, semi-social organization, and the Office Mens' is of a similar character. The St. Louis is purely social in character, and, as have the Marquette and the University, has a beautiful home of its own. The Liederkranz is the leading German organization, ably seconded by the Concordia and the Germania. The Harmonie is a prominent Hebrew club. The Fair Grounds and Racing Association and the Pastime Athletic club have each houses of their own.

St. Louis is known to the professional as a good theatrical town, and as a collateral fact, is well supplied with good theatres. The Olympic, Grand Opera, Pope's and Hagan's are among the leading playhouses. The Standard, Havlin's and Pickwick are popular places of resort. In the summer good entertainments are afforded at several delightful summer gardens.

The first compressed air car built by the American Wheelock Engine Company, Worcester, has been delivered to the Metropolitan Traction Company.

A head-end collision between two electric trains on the street railway line at Everett, Wash., September 19, resulted in serious injuries to the two motormen and slight bruises to some of the passengers. The cause seems attributable to the dense fog prevailing at the time.

The Buffalo Railway Company has rejected the government's proposition to carry the mails. Manager Littell says the company would be obliged to build and fit up three cars which could carry no passengers, and the compensation of 12 cents per mile is not sufficient to cover the cost.

Ford Starring is auditor of the Detroit Railway and secretary of the Detroit & Saline Plank Road Company. Recently it became necessary for the two companies to do business with each other, the street car company intruding on the rights of the plank road company. Mr. Starring tided the emergency over, so the local papers say, by buying a cigar for himself as auditor and taking a drink as secretary. He now wonders what he will do when the Detroit Electric Railway starts in.

TABLE GIVING COST OF POWER PER YEAR TO RUN ELECTRIC CARS AT VARIOUS MILEAGES AND COSTS PER CAR MILE

DAILY MILEAGE	COST OF POWER PER CAR MILE																						
	$.007	$.008	$.009	$.010	$.011	$.012	$.013	$.014	$.015	$.016	$.017	$.018	$.019	$.020	$.021	$.022	$.023	$.024	$.025	$.026	$.027	$.028	$.029	$.030
70	$178	$204	$229	$255	$281	$306	$332	$357	$383	$408	$434	$459	$485	$511	$536	$562	$587	$613	$638	$664	$689	$715	$740	$766
80	$204	$233	$262	$292	$321	$350	$379	$408	$438	$467	$496	$525	$554	$584	$613	$642	$671	$700	$730	$759	$788	$817	$846	$876
90	$229	$262	$295	$328	$361	$394	$427	$459	$492	$525	$558	$591	$624	$657	$689	$722	$755	$788	$821	$854	$886	$919	$952	$985
100	$255	$292	$328	$365	$401	$438	$474	$511	$547	$584	$620	$657	$693	$730	$766	$803	$839	$876	$912	$949	$985	$1022	$1058	$1095
110	$281	$321	$361	$401	$441	$481	$521	$562	$602	$642	$682	$722	$762	$803	$843	$883	$923	$963	$1003	$1043	$1084	$1124	$1164	$1204
120	$306	$350	$394	$438	$481	$525	$569	$613	$657	$700	$744	$788	$832	$876	$919	$963	$1007	$1051	$1095	$1138	$1182	$1226	$1270	$1314
130	$332	$379	$427	$474	$521	$569	$616	$664	$711	$759	$806	$854	$901	$949	$996	$1043	$1091	$1138	$1186	$1233	$1281	$1328	$1376	$1423
140	$357	$408	$459	$511	$562	$613	$664	$715	$766	$817	$868	$919	$970	$1022	$1073	$1124	$1175	$1226	$1277	$1328	$1379	$1430	$1481	$1533
150	$383	$438	$492	$547	$602	$657	$711	$766	$821	$876	$930	$985	$1040	$1095	$1149	$1204	$1259	$1314	$1368	$1423	$1478	$1533	$1587	$1642
160	$408	$467	$525	$584	$642	$700	$759	$817	$876	$934	$992	$1051	$1109	$1168	$1226	$1284	$1343	$1401	$1460	$1518	$1576	$1635	$1693	$1752
170	$434	$496	$558	$620	$682	$744	$806	$868	$930	$992	$1054	$1116	$1178	$1241	$1303	$1365	$1427	$1489	$1551	$1613	$1675	$1737	$1799	$1861
180	$459	$525	$591	$657	$722	$788	$854	$919	$985	$1051	$1116	$1182	$1248	$1314	$1379	$1445	$1511	$1576	$1642	$1708	$1773	$1839	$1905	$1971
190	$485	$554	$624	$693	$762	$832	$901	$970	$1040	$1109	$1178	$1248	$1317	$1387	$1456	$1525	$1595	$1664	$1733	$1803	$1872	$1941	$2011	$2080
200	$511	$584	$657	$730	$803	$876	$949	$1022	$1095	$1168	$1241	$1314	$1387	$1460	$1533	$1506	$1679	$1752	$1825	$1898	$1971	$2044	$2117	$2190
210	$536	$613	$689	$766	$843	$919	$996	$1073	$1149	$1226	$1303	$1379	$1456	$1533	$1609	$1686	$1762	$1839	$1916	$1992	$2069	$2146	$2222	$2299
220	$562	$642	$722	$803	$883	$963	$1043	$1124	$1204	$1284	$1365	$1445	$1525	$1606	$1686	$1766	$1846	$1927	$2007	$2087	$2168	$2248	$2328	$2409

ELEGANT CARS FOR CHICAGO.

The first delivery of the new winter cars for the Chicago City Railway, which are being built by the Wells-French Company, of this city, to replace the equipment lost in the big fire, has been made. The cars are very attractive and comfortable, lighted with Pintsch gas, and present a strong contrast with the other City Railway rolling stock, much of which was homemade and decidedly old style. The new Wells-French cars are beauties, and the balance of the large order will be delivered on time, before the snow flies.

SHADES OF FORSYTH.

The Forsyth curtain fixture, which is standard with many of the railroads, is meeting with great success with the street car companies. The manager of their street car department reports that orders are at hand for fixtures for 140 closed cars for the Chicago City Railway Company, 12 closed cars for the South Chicago City Railway Company, 15 motor cars for the Calumet Electric Railway Company, besides large rush orders from the Jackson & Sharp Company and Barney & Smith Company.

OHIO STATE TRAMWAY ASSOCIATION MEETS.

The Ohio State Tramway Association held its usual informal yearly gathering at Mansfield, September 23. The street railway and supply men convened on the morning of that day at Hotel Vonhof, and were taken on a street car ride to points of interest around the town. After dinner the business meeting was held, at which A. A. Anderson, of Youngstown, was elected president; T. R. Catlin, of Canton, vice-president; J. B. Hanna, of Cleveland, secretary and treasurer, and W. F. Kelly, of Columbus, chairman of executive committee. The next meeting will be held at Columbus, June 15, 1897.

Chester, N. H., a town 170 years old, gave a big celebration, September 22, on the opening of an electric road.

WESTERN ELECTRIC STREET RAILWAY APPARATUS.

The Western Electric Company has placed on the market a complete line of overhead material of its own design and has besides this a full stock of general supplies in both the Chicago and New York factories. It has four designs of trolley wheel of a composition found by experiment to give the best all around results. The solid ribbed wheel weighs 2¾ pounds and has a section of wearing metal ⅞-inch deep by 13-16-inch wide. The spoked, ribbed wheel weighs 2¼ pounds and has a wearing section 9-16-inch deep by 12-16 wide. Another wheel called the competition, is solid, weighing 1¾ pounds. The W. E. sleet wheel is the result of extensive tests last winter on a large eastern road where all kinds of sleet trolleys were tried and the action of each noted. It removes the ice without hurting the wire or catching on frogs or crossings. The company publishes an interesting 12 page pamphlet on trolley wheels.

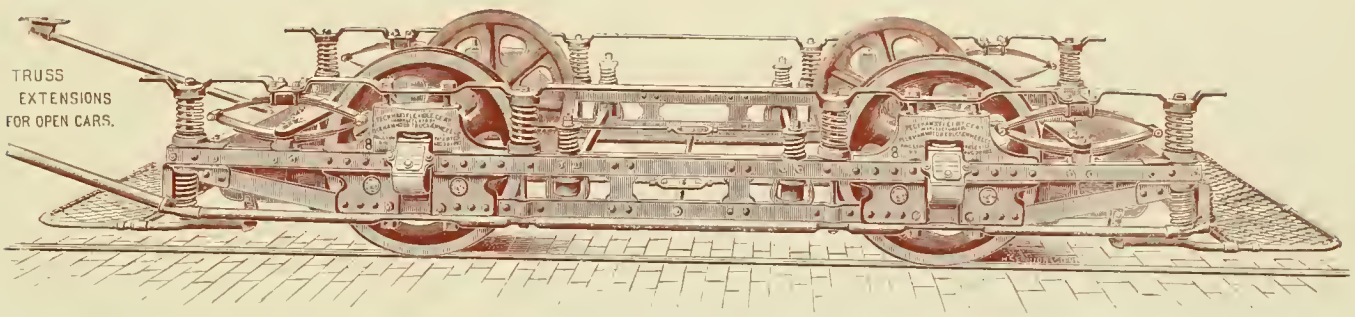
The Western Electric Company is the manufacturer of all kinds of magnet and weatherproof wire and carries a full assortment in stock.

Last but by no means least in the list of street railway apparatus come railway generators. The company has made excellent lighting machines in years past and there is no reason to think that its railway generators will be in any way inferior to the lighting dynamos. They will stand the greatest changes of load without sparking and have massive commutators on which special skill is bestowed in manufacture as it is rightly considered that the commutator is one of the most important parts of a machine. The armatures are iron clad and are without binding wires, as the teeth are shaped to hold the armature conductors in the slots. The end conductors are held apart so as to provide ventilating spaces, making it very difficult to overheat the armature. The machines are provided with adjustments in all directions, it being possible to raise or lower the yoke as desired or align the outboard bearing to the shaft at any time. The reputation of the Western Electric Company will be a sufficient guarantee for these machines.

PECKHAM'S IMPROVED EXTRA LONG TRUCKS.

The history of the Peckham Motor Truck and Wheel Company has been one unbroken chapter of improvement and advance. True, for many months past the Peckham truck had reached a point where further improvement seemed impossible, but not content with resting on his well earned laurels, President Peckham is just as alert as when he first entered the street railway field, and attended his first convention at which both he and his truck appeared as strangers. This year not a street railway man in the country but knows of Peckham's trucks while the thousands in use by roads numbered by the hundreds, testify to the recognition which has attended the manufacture and introduction of a strictly standard and reliable product, and the Peckham exhibit at St. Louis will be one of the largest, best and most interesting to be seen. The company was disappointed in securing only one-half the floor space desired, but will nevertheless, display a very extensive and attractive line. The recent improvements have been largely along the line of devising and building new designs to meet new conditions and types in car building, for there are cars operating today on four wheels, which for length and weight, would have been considered impossible only a few years ago, save when mounted on double trucks.

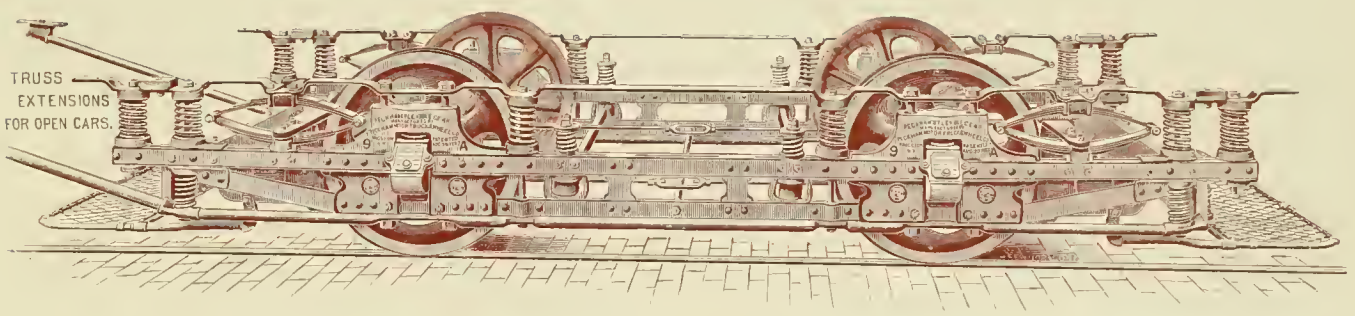
Two of these recent and specially interesting types of "Standard" and "Extra Long" trucks will be found in the exhibit, and are illustrated here. The improvement contained in these trucks consists of an improved truss for better supporting long open cars, the truss running the entire length of the truck frame and affording unusual support. The truss is so constructed that it has an increased base to correspond with the long spring base of the truck. This long base gives a more acute angle to the extended ends of the trucks, and while it not only gives a much better support to the car bodies, it prevents their oscillation and enables them to safely and comfortably run at a high rate of speed. These trucks in other respects are constructed in the same manner as the Peckham trucks heretofore built.



PECKHAM'S EXTRA LONG 8 A TRUCK.

The company guarantees this through truss to properly support car bodies from 30 to 35 feet in length with a 7-foot wheel base. Cars of such length and wheel base are already in successful use on these trucks.

Another type of Peckham truck is the swivel truck, which was brought out during the past year. The swivel truck has the double trussed, hot riveted side frames and axle boxes common to all Peckham trucks. The car body rests on half elliptic springs supported by the side frames and the jar to the side frames is in turn cushioned by the springs over the axle boxes. The truck is the result of a careful study of steam railway trucks and an adaptation of their best principles to the special service required.



PECKHAM'S EXTRA LONG 9-A TRUCK.

THE BELL THAT FAILED.

"Did you try that scheme of ringing a bell on Johnson when he was in the middle of his speech?"

"Yes, and it fizzled. Johnson was a street car driver at one time."

"Well?"

"I made the mistake of ringing twice and he took it as a compliment. Thought it was a signal for him to go ahead."

An electric boat towage scheme is proposed in connection with the Brazos river dam, at Waco, Tex.

PROGRAM OF PAPERS TO BE READ AT CONVENTION.

Six papers are announced to be read and discussed at convention. Subjects and authors are as follows:

"Track and Track Joints, Construction, Maintenance and Bonding," by M. K. Bowen, superintendent Chicago City Railway Company, Chicago.

"Trucks," by John N. Akarman, superintendent Worcester Consolidated Street Railway Company, Worcester, Mass.

"How Can the Revenue of Street Railways Be Increased, Taking Into Consideration the Collection of Fares, Method of Registry, Transfers, Use of Tickets or Cash Fare, and Attractions Along the Line of Road," by C. Densmore Wyman, general manager Milwaukee Street Railway, Milwaukee, Wis.

"The Modern Power House," by Richard McCulloch, engineer Citizens' Street Railway Company, St. Louis, Mo.

"Modern Overhead Electric Construction," by B. Willard, superintendent New Orleans City & Lake Railway Company, New Orleans, La.

"Selection and Management of Employes" (to be read at executive session), by W. F. Kelly, general manager Columbus Street Railway Company, Columbus, O.

G. E. AT CONVENTION.

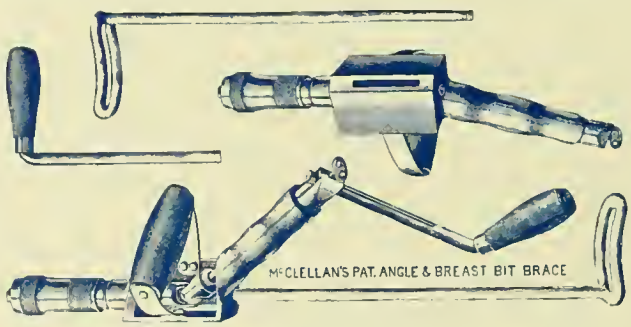
The General Electric Company will this year make a very complete exhibit at convention and the space occupied will be the most extensive allotted to any exhibitor. The display will include examples of the standard apparatus of the company's manufacture as well as the latest devices developed since the last convention, and will no doubt be of great interest.

A G. E. 1,000 motor (the new motor) will be put on a truck and shown in operation with the electric brake. One of the Brooklyn bridge trucks will be shown, equipped with G. E. 2,000 motors. The G. E. 800, 1,200 and 51 motors will also be there. The controller section will show the K10, B6 and L2 controllers, and one of those used to handle the 96-ton B. & O. locomotive. Fully equipped switchboard panels will be shown and lightning arresters will be in operation and the working of the magnetic blow out fully explained. A G. E. 1,000 armature with half of the coils in place will show to delegates the method followed by the General Electric Company in the construction of railway motor armatures. An electric brake adapted to trailer use with shoe and disk will be exhibited. In the way of general supplies there will be ten Thomson-Houston railway arc lamps in series and some samples of the new long burning lamp adapted to street railway use, assembled commutators, trolleys, overhead frogs and switches, and circuit breakers for both station and car use. The conduit system will be represented by one of the plows used on the New York and Washington conduit roads. A sample section of the third rail used on the main line of the N. Y. N. H. & H. Railroad, and a sample of the overhead work in the Baltimore tunnel will be shown. It also hoped to have a high voltage three-phase transmission plant for railway purposes set up and in operation.

The headquarters of the General Electric Company will be in the parlors opposite the dining room at the Southern hotel, where the following representatives will be found to give the visitor a warm welcome: W. J. Clark, general manager railway department; W. B. Potter, chief engineer, Schenectady; L. H. Parker, assistant engineer, Schenectady; H. C. Wirt, engineer supply department, Schenectady; A. D. Page, Harrison, N. J.; T. Beran, New York City; F. M. Kimball, Boston; George D. Rosenthal, St. Louis, and B. E. Sunny, Theo. P. Bailey, G. K. Wheeler, E. C. Noe and F. N. Boyer of the Chicago office.

ANGLE AND BREAST BIT BRACE.

An ingenious and useful tool recently placed on the market is shown in the accompanying illustration. It is known as the McClellan angle and breast bit brace and is so constructed that a hole may be bored in any position in a corner by laying the frame on one or the other



of its sides. The main part of the frame has three sides and therefore furnishes a firm support in any position. The frame and chuck are about eight inches in length, making the brace so short it can be used in all kinds of wiring work. The sweep of the handle is adjustable from four to twelve inches and the breast rest is detachable. The device is handled by Elmer P. Morris, 36 Dey street, New York.

The friends of S. Potis, Jr., chief engineer of the North and West Chicago Street Railroads, will be pained to learn of the death of his wife October 1.

Ross Mackenzie, manager of the Niagara Falls, Park & River Electric Railroad, has resigned that position to enter the service of the Canadian Pacific Railroad.

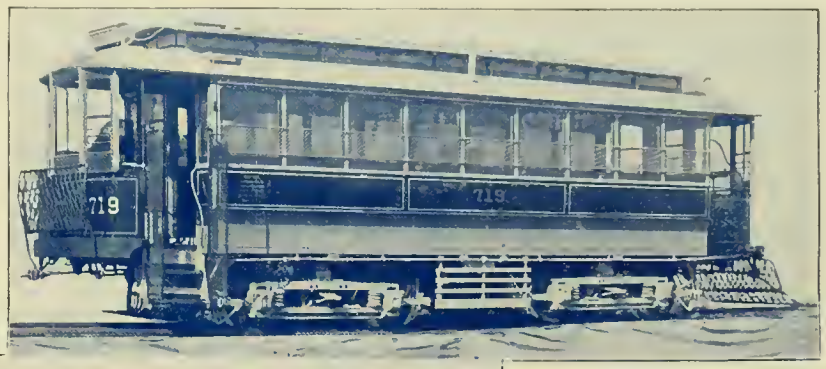
H. H. Vreeland, president of the Metropolitan Traction Company, New York, and who as an organizer and manager ranks second to none in the United States, called on the Review last week while en route home from the Pacific coast. Mr. Vreeland, accompanied by his family, made the trip, which occupied five weeks, in his private car, visiting all the larger cities west of Chicago. Notwithstanding the enormous amount of work which has prevented any vacation in the past three years until now, he is in excellent health.

BROWNELL CARS AT THE CONVENTION.

The Brownell Car Company, St. Louis, will exhibit at the Convention one of the thirty cars built for the Metropolitan Street Railway Company, of Kansas City, and shown in the accompanying engraving.

The length of body is 26 feet and of platform 4 feet. The platforms are closed on one side by continuous dash, and have the Minneapolis pattern of automatic gates on the other side, which are operated by the motorman at the front end of the car. The platforms are also provided with removable vestibules. The doors "at the step," accelerator style, at diagonal corners, are such a width, that exit and entrance can be both quick and comfortable. The interior finish is cherry, without embossing or machine carving. The seats are longitudinal and covered with the best quality Wilton carpet of a color to harmonize perfectly with the woodwork. The ceilings are birch veneer neatly decorated. Curtains of pantasote on spring rollers, with Acme fixtures, are provided for side windows.

The car is abundantly lighted by 15 incandescent lamps, 9 inside and 6 distributed between revolving signs, headlights and underside of bonnets. The car also has



BROWNELL CARS FOR KANSAS CITY.

electric call bells, and Columbia heaters, and presents the neat and tasteful appearance usual in the Brownell Car Company's work. Among the novelties on this car, are illuminated revolving signs on each bonnet, indicating four different routes. They are operated by a handle inside the vestibule, and the destination of the car can be readily seen and read from a distance.

The car is equipped with wheel guards and fenders of the Baltimore Sand Box Company's make.

General Electric equipment is used.

The Detroit Stove Works, which are the largest in the world, have made a reputation for excellent stoves and ranges, which has carried the name of Jewel stoves and ranges into every city, town and village in the land. The street railway manager, then, who wants a car heater which in appearance and efficiency must not be disappointing, need have no fears as to results when he selects and installs the excellent car heaters made by the Detroit Stove Works.

TRADE NOTES.

The New Haven registers are in use on the bridge line at St. Louis and will no doubt be seen in operation by many convention delegates.

McIntosh, Seymour & Co., Auburn, N. Y., report a lively business in engines, the works having been running night and day the whole year.

The Heine Safety Boiler Company will have on exhibition at the convention a model Heine boiler, so arranged that its various points of particular excellence can be easily pointed out. As the more recent water tube boilers, which have appeared in the market are nearly all designed to embody as nearly as may be some one or more of the several strong points peculiar to the Heine boiler, it will interest all street railway men to study in detail the latest form of this much imitated steam generator. The Heine people will be glad to welcome street railway men whether or not they are in the market for boilers.

The Michigan Electric Company, of Detroit, has been awarded the contract to equip the Ann Arbor & Ypsilanti Electric Street Railway.

The New Castle, Pa., Street Car Manufacturing Company has been awarded the contract for the erection of ten cars, to be ready December 1, by the New Castle Electric Street Railway Company.

The Electric Railway Construction & Manufacturing Company has been formed at Chicago. The capital stock is $250,000; and the incorporators are John W. Jones, William Riley and Sterling P. Bailey.

The Bradford Belting Company is having excellent success with the "Monarch" insulating paint, constantly gaining new customers and retaining old ones. The numerous

inquiries from Europe have induced the company to contemplate the establishment of agencies there in the near future.

The United States Railway Equipment & Construction Company, of Cleveland, O., has been awarded the contract to build 2½ miles of single track electric road for the Connellsville, Pa., Suburban Street Railway Company.

A. O. Schoonmaker, 158 Williams street, New York, who makes a specialty of solid mica segments, washers, bushings,

ST. LOUIS CYCLONE WRECK.

etc., built up to any required thickness, is prepared to furnish mica cut to any design or pattern upon receipt of sample.

The Commercial Construction Company has been incorporated at New York to build railways and lighting plants. The capital stock is $10,000, and the incorporators are George Hilliard, George M. Still, of New York, and Archibald J. Martin, of Brooklyn.

The New Jersey Trolley Wheel Company has been incorporated to manufacture electric railway supplies. The incorporators are William Moore, Dr. George E. Reading, E. M. H. Moore, William G. Johnson and Clementine M. Reading, all of Woodbury, N. J.

The R. Bliss Manufacturing Company, Pawtucket, R. I., has recently shipped to the St. Louis Car Company a set of elaborate brass gates for the private car of Charles H. Turner, president, St. Louis & Suburban, which is claimed to be the most elaborate private car ever built for street railway use.

The Walker Company has recently added two circulars to its lists which deal with street car equipments and generators. The Walker apparatus is giving excellent satisfaction wherever it is used, and this fact is forcibly illustrated by the words of praise bestowed upon the apparatus by its many purchasers.

The Saddler electro-automatic switch operator is hereafter to be manufactured by the Cleveland Frog & Crossing Company, Cleveland, O. The first one has been completed and put in position and is now being tested. The device is a simple and effective one, easily operated from the car platform by the motorman. It will, undoubtedly, meet a large sale when its merits are more fully understood and hasten the abolition of the shepherd's crook for throwing switch points.

The Westinghouse Electric & Manufacturing Company is promising to exhibit at the convention something decidedly new in the way of non-arcing circuit breakers. They are the design of Alexander Jay Wurts, and on account of the new principles involved it is expected that they will attract much attention.

The Westinghouse Machine Company, of Pittsburg, recently made formal announcement of the fact that it has gone into the manufacture of gas engines, by the publication of a catalog on the subject. The engines shown are free from "trappiness" and complications and promise to be as excellent in their way as the Westinghouse steam engines.

"An Experience and the Remedy" may be considered as the title of a neat little leaflet which has just appeared. The experience is detailed in the late Bill Nye's article on the steam radiator, written in his inimitable style, and the remedy is pointed out to be the equally inimitable system of steam heating furnished by Warren Webster & Co., Camden, N. J.

The Partridge Carbon Company, Sandusky, O., reports an increased business each month and that business for the month of August ran one-third over that of the corresponding month a year ago. The month of September was up to the same standard and the record is, therefore, a very satisfactory one as indicating the quality of the Partridge self-lubricating brush.

The Ball & Wood Company, New York, reports a very much increased export demand for engines, especially for the new type of vertical compound, of the kind which are meet-

ST. LOUIS CYCLONE WRECK.

ing with great success at the new Paterson station. Many new tools have been added to the equipment of the works, and not only the engines themselves, but the system on which they are built have been largely improved.

The Detroit Steel & Spring Company has in preparation what should prove a most interesting and useful catalog. It will show cuts of the various styles of street car motor trucks and full specifications of the springs used in connection with each style. It will thus place before managers in compact form the appearance of the various styles of trucks and incidentally advertise the Detroit springs.

The Ohio Brass Company, Mansfield, Ohio, has received a pleasant letter from the Hamilton, Ont., Radial Electric Railway, which line is just on the point of completion, to the effect that "the material we are receiving from you is very satisfactory, and we hope when our line is finished the overhead work will be second to none in the community. In fact, we have not seen or heard of anything equal to it."

The Ball Engine Company, Erie, Pa., has received some large orders for engines during the past week or two, both for foreign and domestic use, and the works will be kept running overtime with full force for months to come. The Southern Engine & Boiler Works, Jackson, Tenn., will erect the steam plant for the Jackson Street Railway. The power is furnished by two 200-horse-power engines built by the Ball Engine Company, one for electric lighting and the other for electric railway service.

E. F. Thompson, formerly of Thompson & Curtis, G. W. Delamater, of Pennsylvania, formerly a member of the senate of that state and republican candidate for governor in 1890, Frank Humboldt Clark, legal editor STREET RAILWAY REVIEW, and William H. Wilkins, have formed a partnership for the general practice of law, under the firm name of Thompson, Delamater & Clark, with offices at 184 Dearborn street, Chicago. The firm will give special attention to real estate, corporation and probate law.

The Ohio Brass Company, Mansfield, O., will have an exhibit at the St. Louis convention, though the name of the company does not appear in the published list of exhibitors, as the space is taken in the name of the Western Electrical Supply Company. It has recently secured a valuable acquisition to its present force in the person of M. M. Wood, who will take charge of the engineering department. Mr. Wood has been associated during the past several years with the Ansonia and Wallace Electric Companies of Chicago.

The E. T. Burrowes Company, Portland, Me., manufacturer of car curtains, has enjoyed the most prosperous year since it has been in the business, as its sales the last twelve months have largely increased and many new and influential customers have been added. It has just completed the last of the curtains with which it has been equiping 150 new cars for the West End Street Railway of Boston, and is working on 50 cars for the Cincinnati Street Railway, 50 for the Consolidated Traction Company of Pittsburg, and 50 for the Brooklyn Heights Railroad.

George P. Jones & Co., 708 North Main street, St. Louis, have manufactured oils for lubricating purposes for the last twenty years, making a specialty of oils and greases for railroad use. Their goods have been sold as far west as California, and they are now supplying a large number of electric railway plants in the west. The goods seem to give excellent satisfaction on account of the low price and the economy developed from their use. The Lindell Railway, St. Louis, one of the largest electric systems in the West, has been using their oils and greases for the past two years with good results.

The Washburn & Moen Manufacturing Company, Worcester, Mass., reports business as being very satisfactory, considering the general depression and consequent check in electric railway extension. It has, however, received large contracts for electric railway equipment, and the increased sales of crown wire for underground service has been very gratifying, showing as it does the trade's approval of a good thing. The company also reports that the favor with which the "Chicago" rail bond is received by practical railway men is undiminished, and that in many places the "Chicago" is replacing other styles of bonding.

E. F. DeWitt & Co., Lansingburg, N. Y., will have their excellent sand boxes at convention, and will exhibit in connection with the Central Electric Company, of Chicago. The demand for the "Common Sense Sand Box" continues good, especially repeat orders from roads already using them. The foreign trade is also excellent, recent shipments including Genoa, Italy; Brazil, England, Ireland and Nova Scotia. All these were triple orders. The DeWitt Company has entered suit against the J. G. Brill Company, of Philadelphia, for infringement of its patents on sand boxes, and has issued a warning circular cautioning street railway companies from purchasing cars equipped with infringing sand boxes or buying infringing boxes, under penalty of prosecution.

The McGuire Manufacturing Company, of this city, has on hand an enviable amount of orders for its trucks, sweepers and stoves, and its expectations of earlier in the season have been more than fulfilled. The present business depression has affected nearly everybody, but the McGuire Company can't believe there is any such thing as "hard times," considering the fact that it is running every night and Sundays. The recent fire which destroyed its stove department has affected it but little, as it immediately started manufacturing in one of its other buildings, and has filled many quick delivery orders the past few weeks. A special feature of the catalogue which it is just issuing, is its combination snow plow and sweeper, showing by letters from its customers the wonderful record made by its sweepers.

The Albion Construction Company, Chicago, of which C. E. Loss is the president has added one more to its already long chain of roads for which it has had the construction work. The most recent is the new line at Ironton, O., eight miles long, which will be laid with Illinois Steel Company's shanghai T on rock ballast. Mr. Loss' company will not only lay the track, but furnish and put up the overhead work, and buy the cars and all other necessary supplies to put the road in operation. Electrical equipment will be General Electric. Power will be rented for the present. The roads built by Mr. Loss, or under contract, include:—the Pullman Electric Street Railway, the Calumet Electric Street Railway, a portion of the South Chicago City Railway, the Hammond, Whiting & East Chicago Electric Railway, the Sheboygan City Railway, the Waukesha Beach Electric Railway, St. Charles Railroad of New Orleans,

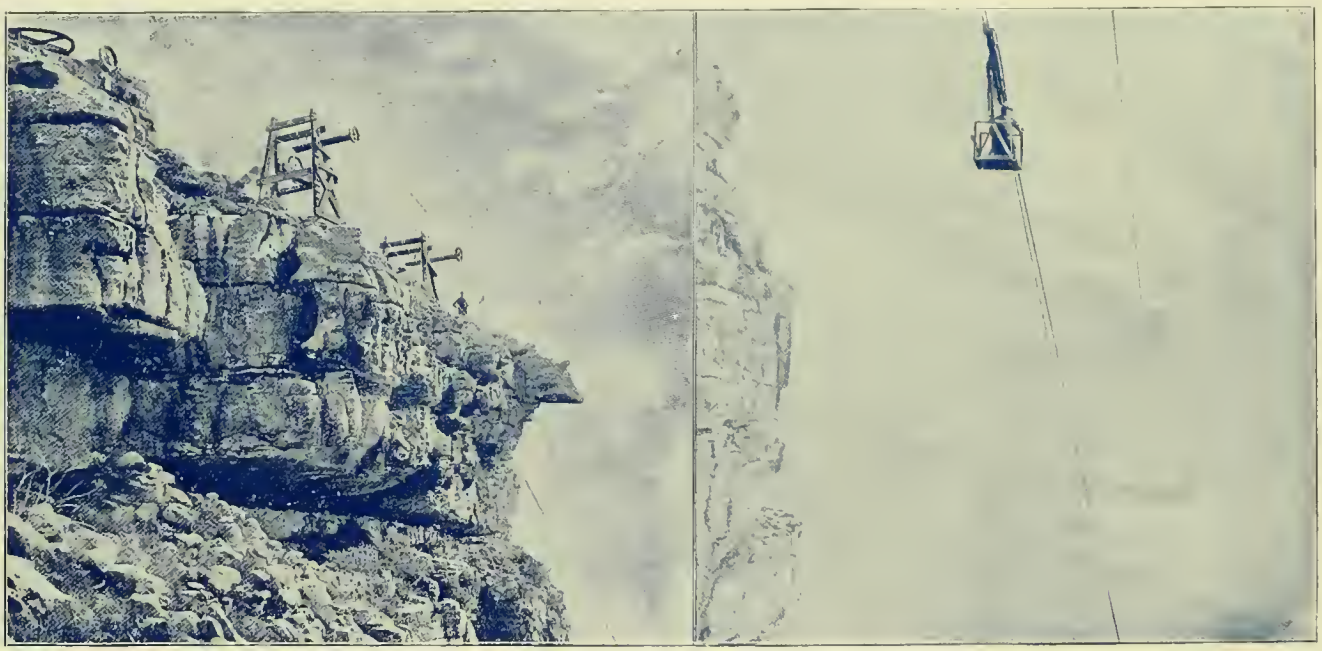
Orleans Street Railway of New Orleans, Cleveland & Chagrin Falls Electric Railway, Ironton (O.) Street Railway, Chicago & Englewood Electric Street Railway.

We are informed by the Central Electric Company that it will make a creditable and interesting display of street railway and electrical supplies at the St. Louis convention. Messrs. Garton and White, representing the Central Electric Company's railway department, will have charge and will endeavor to spread the gospel of first-class material where it will take root to the best advantage. Probably no other company in the United States carries so large a stock of miscellaneous railway appliances. These added to their well known capacity for general electrical supplies and insulated wires and cables, enables them to offer many advantages to their customers in the way of prices and prompt shipments of complete orders. That they follow up their opportunities is evidenced by the many letters received from purchasers commenting on this feature of the Central's work. A short extract from one of these letters received from Denver, Colo., will serve as an example: "Yours of the 26th, like your goods, came in on time. We greatly appreciate your promptness in filling orders, also your service in sending goods as ordered." Many of the Central Electric Company's specialties, in fact the most of them are made from patterns and designs furnished by it and under its direct supervision. All new fixtures and appliances are thoroughly tested by actual service before being approved and offered for sale. By this careful attention to important details, it has hoped to gain the confidence of electrical buyers and the results show that it has not been amiss in its calculations. They are giving considerable attention to the re-filling of commutators and re-winding of armatures and other repairs usually required on short notice. The Central Electric Company is very well satisfied with the results so far attained and feels confident that we are on the eve of a period of increased activity in all departments of the electrical trade.

WIRE ROPEWAY AT CAPE TOWN.

The city of Cape Town, South Africa, in the construction of a new reservoir at the top of Table Mountain, about 2,168 feet above the sea level, found it necessary to devise some convenient means for the conveyance of necessary material to that point. The completed arrangement is shown in the accompanying engravings, for which and the facts of the description we are indebted to London Engineering.

The tramway was installed under the direction of W. Carrington, M. Inst. C. E., and is essentially the same as that which he has placed in various places in previous years. It consists of one fixed rope stretched from end to end of the line, supported in suitable saddles at various points and anchored at the ends. On this rope a single carrier is run at a speed of eight miles per hour, being operated by an endless hauling rope attached to it and passing around pulleys at the ends. At the lower terminal are located the steam power appliances necessary for hauling, with special driving gear, brakes, etc., while at the upper end tightening gear alone is provided. The carrier, loaded, is run to the upper terminal and dumped, when, the engine being reversed, it is returned to the lower station.



WIRE ROPEWAY AT CAPE TOWN.

The difficulties in the way are partially indicated in the illustrations. The two principal spans are 1,470 feet and 1,380 feet respectively, and the total horizontal length of space covered is one mile or 5,280 feet. Some of the parts of machinery necessary to be transported weigh 1,500 pounds. Upon the opening of operations upon the site of the new water-works, the mayor and a large number of members of the corporation of Cape Town were conveyed to the top of the mountain by means of this tramway, and passengers are daily hauled over the line.

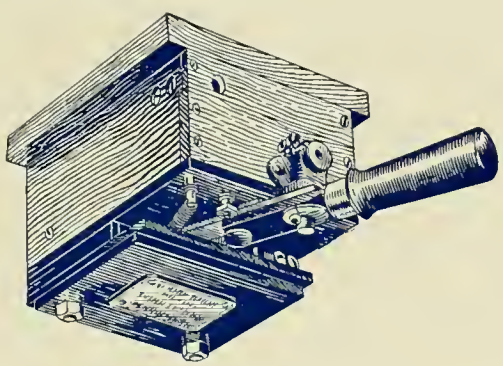
A NEW TRADE MARK.

The Ohio Brass Company has adopted the unique and original design shown by the accompanying cut as its trade mark. This symbol is made up of three pieces of trolley wire, forming the sides of a triangle, and at the spaces formed by the intersection of their ends are placed the letters "O", "B" "Co.", the initial letters of the words composing the name of the company, whose position in the electric railway field, as manufacturer of railway material, is characterized by the cuts

of the various articles of its manufacture. These appear on the inside, and the words, "Designers," "Manufacturers" and "Dealers," on the outside of the triangle. "Dirigo," is taken as a motto, and will also be used to designate insulating compounds, heretofore known as "Insulite." This insulation has been manufactured, exclusively, for several years past by the Ohio Brass Company. It is an article of the company's own invention, and is manufactured and handled by special machines, which have required considerable trouble and expense to perfect.

GENERAL ELECTRIC CIRCUIT BREAKER FOR CARS.

The General Electric Company is now offering a combination of canopy switch and car circuit breaker



for those desiring such a feature in their electrical car equipment. This is a magnetic circuit breaker with magnetic arc blow out. It is in external operation the same as the usual canopy switch and occupies the same position. It is also the same in operation as far as the motorman is concerned, except that it will open when the current exceeds a certain amount. It can be set to open automatically at any current strength desired, and is opened by hand by simply throwing the handle as on any ordinary canopy switch. If so wished it can be connected to an automatic registering device, thereby telling the inspector the number of times it has been opened, and in a measure enabling him to determine which of the motormen are in the habit of turning on current too fast. The circuit breaker is called the type "M" and will be exhibited at St. Louis.

WHERE THE WHEELS COME FROM.

The Griffin Wheel Company is at present operating four car wheel foundries, located at Chicago, capacity, 850 wheels per day; Detroit, 300 wheels per day; Denver, 200 wheels per day; St. Paul, 300 wheels per day.

This company is the largest car wheel concern in the world, its product being in use on all the leading railroads and street railway lines of this country, as well as Mexico and South America. All of its foundries have been running full capacity for the last year, and the outlook for future business is encouraging. Reports received of their special design of electric motor wheels show that they have come up to the claims made for strength, durability and large mileage.

A full set of wheels will be found under the McGuire Company's trucks at the Convention hall.

The Griffin Company is making a special design of 30-inch disc wheel for the Price brake as adopted on Chicago City Railway cars; a sample of which can also be seen at the McGuire Manufacturing Company's exhibit.

The company will be represented at the convention by F. L. Whitcomb, general sales agent, and C. K. Knickerbocker.

A recent decision in a New York case is to the effect that if a passenger riding on the platform of a car is injured through the fault of the company, the latter is responsible. The case came up on account of injuries sustained by a passenger riding on the front platform in order to smoke, though there was room inside. The car ran off the track.

M. F. Backus, receiver of the Consolidated Railway Company, Seattle, Wash., shows by his report for the six months ending June 30 that the road has been doing a much better business than during the corresponding period of last year. The surplus of earnings over operating expenses for the first six months of 1895 was $4,500, and for the period now reported $9,500, though it should be mentioned that unusually heavy operating expenses were occasioned for some days on account of the fire of June 20, 1895.

AN ELECTRIC STEAM LOCOMOTIVE.

Startling and Original Effects Produced in a Street Parade on the Terre Haute Tracks.

Not satisfied with the long list of strictly original features devised and successfully put in operation in connection with his street railway in Terre Haute, Russell B. Harrison, president of the company, has fairly outdone himself in his latest and greatest achievement. It was built in the Vandalia shops in Terre Haute, and the men who constructed it are shown in the illustration.

The steam to operate the air brakes, electric headlight, steam whistle, furnish the exhaust, and to throw smoke out of the stack, as a regular locomotive, was generated in a light boiler built on the trucks. This engine was so perfect that had it not been for the trolley pole over the cab it would have deceived every one, as the driving wheels moved and the steam escaped from the cylinders. The engineer was "Uncle Billy" Baugh, a

ELECTRIC CABOOSE.

SWITCH YARD FLOAT.

The occasion was a sound money parade of steam railroad men, some 8,000 of whom marched through the streets of Terre Haute on the afternoon and evening of September 24. When the parade was decided on Mr. Harrison promptly proposed to the railroad people a plan by which a feat never before attempted could be accomplished. It was nothing less than the construction of a full sized locomotive, mounted on street railway trucks, and propelled by street car motors. Our illustration shows how exactly the original, a standard type of Pennsylvania Railroad engine, was copied.

reckless youth of 78 years, who ran the first train into the city in 1852. We also show one of the floats which used the car tracks, and which was fitted up to illustrate a switch yard. It also was motor driven, using the trolley wire for current, as did the several floats built by the street railway company's portion of the parade, which consisted of a double-deck car with an immense searchlight upon it, high wagon decorated with lights and other features.

An interesting feature was forty-five hand cars which were pumped along on the car tracks with great eclat.

THE ELECTRIC STEAM LOCOMOTIVE.

A red caboose brought up the rear, motor driven from the trolley wire, and built to standard Pennsylvania design. A large number of steam road officials were in the parade, and Second Vice-President Brooks, of the Pennsylvania system, a life-long democrat, spoke.

ELMER P. MORRIS.

Mr. Morris, by his invariable good nature and success in various lines of electrical work, completely refutes two old time superstitions, for he was born on a Friday, and the 13th day of June, 1862. At that time his native town had not yet been recognized by the map makers. Dissatisfied with his first location, at the age of twelve months he removed to Indianapolis, taking his parents with him, and in due course of time was carving a name for himself on the benches of the public schools there. He entered the electrical field in 1879 with E. T. Gilliland, until his business was merged into the Western Electric in 1882, when Mr. Morris went to the Van Depoele Electric Light Company, of Chicago, where he remained up to 1886. While with Van Depoele, he was constructing engineer for one of the first commercial electric railways in America, at Appleton, Wis.; and going from there to do the same work in building the first roads in Michigan, at Port Huron, and New York, at Binghamton, Lima, Ohio, and Brooklyn. Then came the Ansonia road, the first in New England; next, Dayton, O. In 1888 Mr. Morris joined the Thomson-Houston, and that year did the first engineering work on the West End, of Boston; from there to Cincinnati in '89, where more pioneer work was done. He remained there until '90, having meanwhile started on the manufacture of overhead material, being the first to do so outside of the parent companies. The following year he went to Boston to develop overhead appliances for the T.-H. Company, and organize a railway supply department. In August, '94, he came to Indianapolis and embarked in the construction and supply business, which, owing to the unfavorable times, was disappointing, and in January of this year he returned east, and has since devoted his attention to promoting the Monarch Insulating Paint, of which the subject of this sketch is the father. Mr. Morris has recently opened an office at 36 Dey street, New York, as manufacturers' agent of general railway supplies, and in addition to the Monarch is representing some of the leading manufacturers of the country.

E. P. MORRIS.

THE STOW ELECTRIC DRILL.

Actions have long been reputed to speak louder than words, hence a glance at our engraving showing the Stow electric track drill in action requires no explanation. The motor is on wheels so it can easily be moved, and when in use need not block the track, while the clamp and drill can be removed in a moment when a car passes, and as quickly replaced. The flexible shaft enables the placing of the motor wherever desired. Current is taken from the trolley wire, of course. When set in motion this drill will accomplish in a minute and in a much superior manner what to do by hand would take fully a quarter of an hour. The machine will be exhibited at convention.

STOW TRACK DRILL IN OPERATION.

The Laconia Car Company, of Laconia, N. H., has applied for the appointment of a receiver. Perley Putnam, president, who is a large creditor, made the application.

The Duff Manufacturing Company, Allegheny, Pa., manufacturer of the Barrett lever jack, has placed numbers of its jacks with the Lindell, Union Depot and St. Louis Suburban lines. An order of 150 jacks has also recently been filled for the contractors engaged in reconstructing the Fifth avenue cable road, Pittsburg, into an electric. Several jacks have been shipped to Canada as a result of an exhibit at the Montreal Convention.

The Sterling Supply & Manufacturing Company, 97 Bank street, New York, report business excellent in their register and brake departments, and that the demand for rattan has never been as large. Managers who have used the rattan furnished by the Sterling Company invariably send for more when in need of renewals. The company will have a very interesting exhibit at convention, and President Carson and several assistants will be present.

The Sanitary Car Strap Company is meeting with much success in introducing its device throughout the country. The Union (Huckleberry) Railway in New York city, and the Omaha & Council Bluffs Street Railway have recently adopted it, and other roads are trying it. The exhibition car of the B. & N. Y. Railway Supply Company, at the St. Louis convention, will be fitted up with the sanitary strap, and all who are interested can see it there. The Metropolitan Electric Company, Chicago; A. S. Partridge, St. Louis; H. H. Hunt, Boston; Mayer & Englund, Philadelphia; and F. A. Lawson, San Francisco, are selling agents.

The result of a recent order of the Pleasant Valley Street Railway Company, Pittsburg, to the effect that each conductor must sweep his own car and be responsible for the broom, has been to create a broom brigade which nightly marches home along the streets in the vicinity of the barns, greatly to the wonderment of residents in the vicinity.

Street cars loaded with enthusiastic citizens, red fire, drum corps and other supplies, are a feature of the campaign in Connecticut.

The horse of a Sioux City, Ia., farmer was scared on Memorial day by a flag carried by a company of veterans riding in a street car. The farmer was injured and thereupon brought suit against the car company. The defense is that under no circumstances can the stars and stripes be considered in the light of a nuisance.

An accident which came near being serious occurred recently on the line of the Suburban Traction Company at West Orange, N. J. In going up a grade on an "S" curve the wheels slipped and the car ran down the hill and jumped the track at the bottom. One passenger was injured.

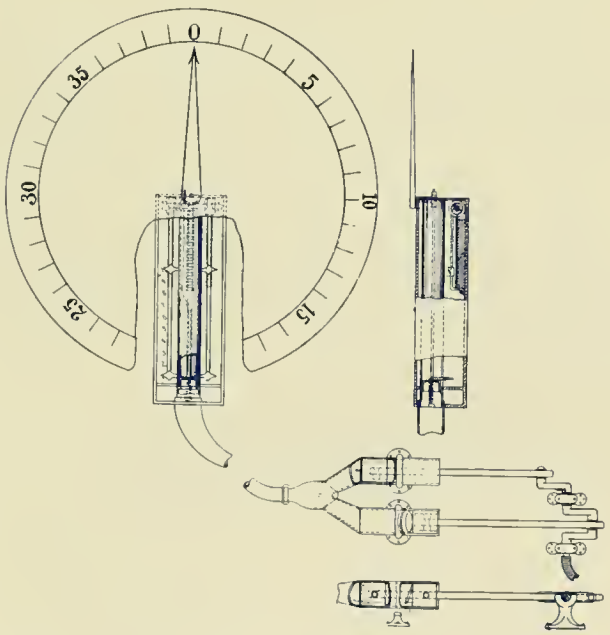
The reports of the Philadelphia street railway companies are in the hands of the secretary of internal affairs, and it is encouraging to note that each of them paid substantial dividends to the stockholders and that, considering the number of passengers carried, there were comparatively few persons killed or injured.

PNEUMATIC SPEED INDICATOR.

The accompanying illustration represents a device recently introduced for the purpose of indicating the speed at which a vehicle or shaft is moving at any given moment, and also the maximum speed attained during any specified period. It is the invention of James M. Kane and James H. McLauchlan, of New Haven, Conn.

The indicator device proper is operated pneumatically. Two air pumps have their pistons connected with a crank shaft which may, in some instances, be the shaft whose speed of revolution is to be indicated, or it may be so connected therewith that the relative speeds of revolution are constant. The cranks are set opposite so that the supply of air furnished by the two pumps is constant in the single pipe into which both discharges lead. To this pipe is connected the indicator cylinder, which has a piston whose stem carries one or more indicator pointers. The connection between the stem and the pointers is made by means of an arm passing through a narrow slot in the cylinder.

The action is as follows: The faster the revolution of the crank shaft the greater is the pressure of air in the indicator cylinder and the higher will the piston rise, carrying with it the pointers. As the pressure decreases by a slower movement of the shaft the pointers fall, and thus, by means of a graduated scale, the speed of the shaft will be indicated by the pointers at any given



moment. The downward movement of the piston and pointers is assisted by a light spring.

The maximum indication is given by means of a separate pair of pointers carried in guides in such a position as to be struck by the pointers before mentioned and raised, the backward movement being prevented by a spring pawl which engages with a ratchet. A contact strip electrically connected with a battery or other source of electric power and having in the same circuit a bell is so arranged as to be adjustable, up or down, for any desired speed. The striking of this strip by the speed pointers closes the circuit and causes the bell to sound, and it continues to sound until the speed is so reduced as to lower the pointers and break the circuit.

PULLMAN'S DOUBLE DECKER.

C. L. Pullman, of this city, has a new double deck car running—in his head and on paper—which he believes is going to revolutionize things, though he can hardly have forgotten the double-decked failure experienced by the Pullman Company in a former expensive attempt to get such a monstrosity on city lines.

The present great improvement claimed is in a center

entrance, and steel construction in place of wood. Each of the two lower compartments, as will be seen in the illustration, bears a striking resemblance to a hearse, and we can't help thinking of a ferryboat when we look at the hurricane deck of the car. We fail to see wherein the steel construction is going to reduce the elevation so the elephant can get into any ordinary car house without raising the roof of the building. It may be "English," but so was the Great Eastern.

PROGRESS ON THE BOSTON SUBWAY.

The Boston subway is a rather unique method of solving the problem of congested traffic in downtown districts. For many years it was evident to Boston people that something was needed to relieve Tremont

PUBLIC GARDEN ENTRANCE—BOSTON SUBWAY.

street of some of its traffic and the need became more and more apparent, as the electric lines extended further into the country and more cars were obliged to pass through the downtown thoroughfares. During the

busiest hours of the day four cars per minute on one street are required to handle the traffic and naturally it does not take much to cause a serious blockade on such narrow streets. After much consideration the authorities appointed by the city decided on a subway for the electric cars as the best way out of the difficulty. The work of building this subway is in charge of the Boston Rapid Transit Commission, consisting of five men with George G. Crocker as chairman. The commission has power not only to enter into the actual construction work but to fix rentals for the use of the subway by

INTERIOR BOSTON SUBWAY.

street railway companies. It is also empowered to remove the street railway tracks from the street, thereby virtually forcing the street railway to use the subway. All this work is done by the sale of bonds by the city, and it is intended to make the rentals cover the interest on bonds and other incidental expenses. There is to be about 5,600 feet of double track subway and 3,500 feet of four track. The top of the rail is ordinarly to be 17 feet below the surface of the street. From this it will be seen that the subway is immediately under the surface of the street as the height of the subway is 14

TREES RAISED TO ACCOMMODATE BOSTON SUBWAY UNDER BOSTON COMMON.

feet. The roof and side construction is that of brick arches between I beams. For a distance it passes under Boston Common parallel with Tremont street. Along here trees had to be raised or removed and part of the old grave yard had to be cleared. Stations are to be from two to three blocks apart. While the rent will, of course, be high, the West End Street Railway will be able to handle its immense crowds with much more dispatch than formerly when it gets moved into its new terminal. Our engravings of the work in progress are reproduced from the Scientific American and show how far along the first section of the work is.

Construction work on the Milwaukee, Racine & Kenosha Electric Railway is progressing nicely and already eight miles of track have been laid and the company is pushing the construction with the expectation of opening the road about the middle of November. The rail laid is a 72-pound T, standard gage, ties on rock ballast, and the overhead work is a double trolley wire of the figure 8 pattern so that cars will have no detention at turn-outs. The line will be 25 miles, reaching from Milwaukee to Kenosha and the prospects for a large business are good. Matthew Slush, of Mt. Clemens, Mich., is president of the line.

MAP OF ROUTE OF BOSTON SUBWAY.

TERRIBLE STORM AT WASHINGTON.

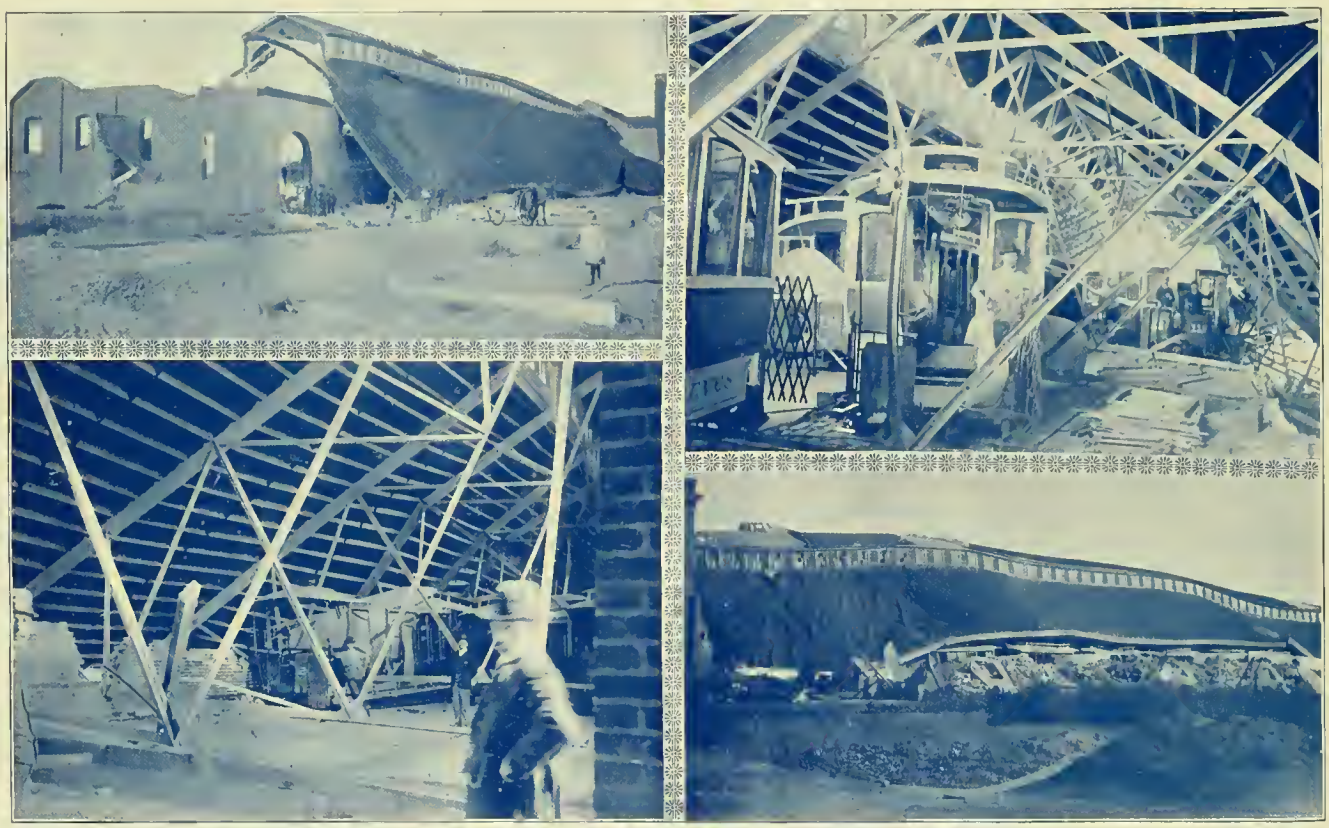
The terrible coast storm, which created such widespread disaster, left its mark of ruin with the Metropolitan Railroad, of Washington, D. C.

The company's magnificent car house, 500 feet long, presented its entire length to the storm which came from the south. The entire building was first moved bodily nearly 25 feet, and then the roof was torn off, completely wrecking the structure. There were 52 cars in the house, all of which were either damaged or wrecked. There were 19 cars on the street at the time which escaped serious damage. The wrecked cars are being repaired or replaced as fast as possible, and the management hopes to have the equipment all replaced in 40 days. The company's splendid power house fortunately escaped. Our illustrations, from photographs by F. W. Barnado, tell the story more forcibly than words.

The were many narrow escapes. One such is related by Secretary G. B. Coleman, as follows:

"The storm was simply terrific, the worst ever known here, unroofing and blowing down houses like corn stalks. There were many hairbreath escapes. While one of our cars was running up First street, a portion of one of the tall buildings that line that thoroughfare, blew off and struck the car, knocking the entire rear end of the car off, the car stopping as if it had been hit by a cannon ball. There were five ladies in the car and the conductor, who was standing with his hands on the sides of the doors looking in, was hurled forward and fell flat on the floor. Strange to say no one on the car was hurt."

Already the company has commenced rebuilding and will replace with a larger building than before. The company's loss is about $25,000.



WRECK OF 500-FOOT CAR HOUSE, METROPOLITAN RAILROAD, WASHINGTON, D. C.

The Board of Police Commissioners, of St. Louis, upon complaint of several citizens, has ordered that officers making arrests shall call a patrol wagon or walk prisoners to the station instead of using street cars for the purpose.

The Bristol & Towesdale, Pa., Trolley Railroad is nearly completed. This will form one of the most important of the suburban links entering Philadelphia. The boilers and engines for the power house are in place and the tracks laid in the car barn. This will enable a continuous ride from Bristol, Pa., or Burlington, N. J., to Philadelphia.

Work has progressed rapidly on the power house and equipment of the Eckington & Soldiers' Home, D. C., Railroad. The foundations for the engines are in and four artesian wells have been drilled to furnish a supply of water. The engine comes from the Norwalk Iron Works, Norwalk, Conn., and the motor cars are from the works of H. K. Porter & Co., Pittsburg. Compressed air is the motive power.

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ONCE more the country has been saved: its integrity and honor is again vindicated. The result of the election, and the emphatic manner in which the great mass of the American people has pronounced for National honesty, are but the first rays of the dawning prosperity which is now before us. Street railway interests and street railway employes have especial occasion to rejoice at the result. Confidence will now be restored and numerous railway enterprises will be able to reach the ear of capital and new lines and needed improvements can be made. This in all its ramifications of manufacturing the supplies, equipment and construction material; the construction work and eventual operation of the new lines, means employment at good wages to thousands of men. But no one should expect, and no honest man will hope, to see repeated the wild-cat schemes which flourished in the first few years of electric railroading. Many a road is now and must for years pay the penalty of the irresponsible promotor. Capital will weigh carefully the merit of each new bond issue, and not blindly puts its money on the throwing of a card. Those who hope to carry out successfully the effort to secure money for these new enterprises must be able to show conclusively that the scheme is legitimate and one which will stand the X ray of sound business scrutiny. Again we repeat, the era of prosperity and good times is at hand, and let every man rejoice and do his utmost to build these better days on a sounder basis, and a more enduring foundation than has ever been done before. The assertion of individual honor, assures the world of continued national honor. Repudiation has been repudiated. Now let fair dealing and honest methods in personal and business life round out the most wonderful century in the world's history, and throw its closing shadows upon the best nation of them all, made better by the past few years of business and industrial distress.

NEXT year Niagara Falls. When first announced there was a general shudder at the recollection of the old time extortion, and an intimation that everyone had better begin at once saving up sufficient funds to go. But lest any should receive a false impression, we hasten to assure all, that since the advent of the trolley at the Falls, high prices have been short-circuited, and the hotels guarantee reasonable rates and good service. There is much of interest there outside of the natural attractions, particularly the Gorge road and the big generating plant, and then Buffalo is now a suburb of the Falls, and in Buffalo is H. H. Littell and the splendid system of the Buffalo Railway Company. The location is central and will draw a large attendance. There is no suitable building now available for exhibits, but one will be erected specially for the occasion. So let everyone this early make his plans to attend the 16th annual convention at Niagara.

THE REVIEW has more than once urged a change in the time of holding the convention from October to September. There certainly was no better weather in any city north of the Ohio river during the convention week, than was furnished us in St. Louis; and yet during a large portion of each day the exhibit hall was altogether too cold for comfort, and there is seldom any means for heating so large a building as is necessary to contain the displays which have now assumed so large proportions. The experience last year was perhaps exceptional, for we met one person at St. Louis who was at Montreal and who said he had not got warm yet; but many contracted bad colds this year, and it is very hard on those who are expected to remain at their exhibits for four days. When October weather is nice it is delightful, but even Atlanta was cold, and after the middle of the month good weather is uncertain. Street railway management has changed greatly since the association was formed. Then the delegates could not leave earlier on account of unfinished construction work, but in these days there are very few who cannot just as well attend in September as October. The question of dress is a very perplexing one in October, for no one feels sure unless he go prepared for both fall and winter wear. In September there would be no uncertainty. To make the change requires a revision of the by-laws, and that involves a two-thirds vote at a regular meeting of the members, after notice of the proposed change has been made in writing, first to the executive committee, and by them with recommen-

dation to a previous meeting. A copy must also be sent each member. Five members must petition the executive committee. Hence it will appear the change cannot be made to take effect before 1899, and by that time we may have June weather in October. Nevertheless we believe the change should be made.

The appointment of a committee to prepare and present a set of standard rules for government of conductors and motormen is a desirable advance in the right direction. Their report may not be adopted, and even if it is, no company is bound to adopt the rules unless it sees fit to do so. At the same time there is very much in the government of men common to all roads, and considering the fact that a large number of leading companies are working under the same conditions of government it would be an advantage to both roads and employes. The steam roads have long since agreed on a general code, and while street railways, owing to local conditions and that absence of interchange which exists in steam railroading, may not be able to cover as extensive detail, there is much in common to them all and to standardize this is desirable.

It is more than probable there will be no more convention banquets. In the first place some one has to give a guarantee of not less than twenty-five hundred dollars, which is asking too much of the entertaining street railways upon whom the burden usually falls. Then, as in St. Louis, where there was so much feasting, it became almost a physical impossibility to do justice to the elaborate menu. Further, banquets are seldom of less than five or six hours duration, and even the most pleasing speaker is less welcome when one has sat in one spot for three hours at a stretch. The banquet feature when the association was younger was an affair of much less magnitude, but has increased each year, until now it has become somewhat of a burden, without a compensating return. The banquet, however, must not be eliminated without putting something in its place, and it is suggested by many as a substitute that a reception, with light entertainment, including music, instrumental and vocal, and possibly a recitation or two, and a few brief speeches by local and association talent, judiciously scattered through the program; with the usual reception lunch to wind up with a dance, would be quite as enjoyable and much less expensive all around. The usual large minority of ladies will be urged against the ball, but that can be remedied if more gentlemen will bring their wives and daughters; which should be supplemented by special invitation to society ladies of the city where the meeting is held. This plan has been followed for many years by the Master Car Builders' Association, which long since abandoned the banquet, for such a program as outlined above, and with great success. We modestly urge the executive committee to try it next year, and if found wanting there are more banquets in plenty where the others came from.

More companies should become members of the association. Out of the more than one thousand roads only 164 are included in the roll. A few weak roads cannot afford the expense, but there are several hundred to which this excuse cannot be honestly applied. Some roads, year after year, continue to send their officers to secure all the benefits and enjoy the bounty of the association and local entertainment, but which always get behind some weak excuse when urged to fall in line and subscribe to the very reasonable dues. It is anything but a matter to be proud of, and we hope when next year's report is made the present membership will at least be doubled, as it certainly should be.

The weather prophets all seem agreed that the coming winter will bring plenty of snow and furnish more employment for snow clearing apparatus than for several years past. The moral is to be prepared with plenty of good apparatus. A good plow will sometimes pay for itself in one bad storm, and is one of the few things a company is glad to pay interest and insurance on when not in use.

Each of the reports presented at convention was excellent, and as a whole constitute altogether the best ever offered. Several involved an immense amount of labor, and all are most valuable contributions to our technical literature. The paper by M. K. Bowen, of Chicago, represented an enormous amount of labor, the most, probably, of any paper ever read at convention.

The Iowa courts have ruled that cities cannot collect taxes on such lines of a street railway as are beyond the city limits.

SUGGEST SUBJECTS.

Secretary Pennington of the American Street Railway Association has issued the following circular:

"The Executive Committee requests that you will kindly suggest topics upon which you consider it would be desirable to have papers written and presented at the sixteenth annual meeting of the association. We should also be glad to receive any suggestions as to whom should be assigned the duty of preparing such papers.

"This matter will be considered by the executive committee at a meeting to be held in the very near future, and I should be very glad to receive your suggestions at an early date."

This is a matter upon which the success of the next convention largely depends, and all having the interest of the association at heart should promptly turn in and assist the executive committee.

Several conductors on the Omaha Street Railway have been robbed recently by three men, whose plan is to board the rear platform, pull off the trolley, and while the conductor is adjusting it he is seized and relieved of his cash.

PREARRANGED STREET CAR COLLISION.

The immense crowds which the several prearranged collisions of steam locomotives have attracted was pointed out in the REVIEW several months ago, with the suggestion that street railways might use the idea to good advantage.

The first to do so is the road at Fort Worth, Texas, in conjunction with two enterprising Texans, who paid a good price for two old motor cars and a piece of temporary track which was laid for the occasion. The battle ground was fenced in, and 5,000 people paid admission to witness the wreck. The two cars, gayly decorated with flags and bunting, were stationed half a mile apart on opposing hills, and filled with inflammable material; which was saturated with kerosene. Just before the start the cars were set on fire, and a moment later were a roaring mass of flames, which strung out in long ribbons of fire as the cars dashed down the grades and approached at a terrific rate of speed. The crowd, stationed back at a safe distance, "viewed with alarm" the motormen on the front platforms, nor was anxiety relieved when their clothes began to smoke and finally to blaze. But the men never flinched, and it was not until they were half burned up that the discovery was made that the motormen were dummies. The cars came together as though shot out of a gun, and the mass of splinters made a glorious bonfire. The affair was well planned and executed, and was pronounced a great success. The scheme is worth bearing in mind for an occasional attraction at next summer's pleasure resorts. Old bodies on worn out wheels, with old motors about ready to scrap, and all the other fixtures and trimmings removed from the cars, would represent but little money, and would be sure to draw a big crowd. A good plan would be to give the exhibition under the management of outside parties, then the road would not only get the haul both ways on the audience, but could divide on the gate receipts, where the company is running a strictly free resort.

THE COLLISION.

Electric cars have now been put in service upon the only remaining line of the Baltimore Traction Company, hitherto operated by cable. The advantages of the use of electricity are also being considered by the Baltimore City Railway, now operated by cable.

FT. WORTH.—THE COLLISION CARS BEFORE THE START.

The Montreal Street Railway earned $156,271 more last year than any year previous. The total earnings were $1,253,183. The company pays a regular 4 per cent semi-annual dividend.

A FT. WORTH LOAD.

CAPT. ROBERT McCULLOCH.

President-Elect American Street Railway Association.

In the choice of Capt. Robert McCulloch, of St. Louis, for president of the American Street Railway Association for 1896-7, the association at once honored itself and conferred the highest recognition in its power on one of the most successful and popular members of the street railway fraternity. The history of his life is that of a self-made man who has done his work well.

ROBERT M'CULLOCH.

Captain McCulloch comes of a sturdy Scotch ancestry, which, in the early colonial days, settled in Virginia —his father's family in Amherst county and his mother's in Roanoke. The male members of both families fought with honor in the revolution. The Captain is a native of Rockbridge county, Va., and received his education in the Virginia Military Institute at Lexington, Va. He went as a cadet in the confederate service in April, 1861, and followed Gen. Lee during four long years, and until his surrender in April, 1865. The only other surrender in the gallant captain's career was when, at the age of 26, he lost his own and won the heart and hand of one of Virginia's fairest daughters—Miss Paxton of his native county.

He went to St. Louis in 1869, and in 1871 entered the employ of the Bellefontaine Railway Company of that city as superintendent, was afterward made secretary, and then vice-president and general manager of the company. He continued in that service until 1889, when D. G. Hamilton and his friends purchased the Citizens', St. Louis, Cass Avenue, Northern Central and Union lines, and he was made vice-president and general manager of these roads, which position he now occupies.

His long residence there and active participation in every progressive effort which has had to do with the advance and prosperity of the city has long since enrolled his name among the best known and honored citizens of St. Louis. In all that concerns himself the captain bears an extreme modesty, at once charming and genuine. His interesting family consists of his accomplished wife, two daughters and a son, Richard McCulloch, who is civil and electrical engineer of the roads named, and a young man of unusual promise. His elder daughter, Roberta, is pursuing her studies at Vassar, and his younger daughter, Grace, is a student in the public schools of St. Louis.

ST. LOUIS CONVENTION

Best of All — Valuable Papers — Largest Attendance — Exhibits Valued at $150,000 Displayed — St. Louis Hospitality Makes a Record Which May Never Be Broken — Lunches, Excursions Receptions and Entertainments from Sunrise to Past Midnight.

Long live St. Louis!

For four days she was ours.

The few doubters who one year ago raised the question as to whether the American Street Railway Association had seen its best days are now speechless, and St. Louis has sealed their mouths. Never in the fifteen years of the Association's existence has there been anything like it.

When St. Louis extended her cordial invitation to meet there in 1896, Capt. McCulloch modestly supplemented the request with the promise that the local street railway men would "endeavor to make the visit a pleasant one;" but not even those of us who can never forget the St. Louis meeting of '85, were quite prepared for the more than royal welcome, and personal courtesies, which never for one moment waned during the four day's session. At the very first meeting the mayor hastened to turn the city over to her guests, but he was too late, for they had already been made at home by the local committees.

Arrivals were earlier than usual and prompt.

The exhibit hall was in readiness to receive the displays ten days before the meeting, and the supply men for the first time had practically completed their settings when the gavel called into existence the fifteenth annual session. For seven days previous, night and day, the boys worked like Trojans, and there were comparatively few exhibits which were not complete by noon of the first day.

The display exceeded anything ever attempted, even the World's Fair collection, and it is estimated to represent between $150,000 and $200,000 worth of products.

The attendance was very gratifying, over 1,000 being present, and a much larger number of ladies than usual graced the receptions and excursions.

The papers were every one of a most practical, progressive and timely character; prepared by some of the best men in the fraternity, and are altogether the best in years. The wisdom of placing a smaller number of reports on the program and insisting that the acceptance of an assignment meant the promise to do hard work, was amply verified. The papers were attentively listened to and ably discussed.

The various local committees were splendidly organized. Indeed, the whole convention was most carefully mapped out, and the plans executed with the exactness of a railroad time table. Everything was prearranged, and there was a very gratifying absence of that confusion and uncertainty of what was next that has marred some conventions.

In the matter of entertainment St. Louis can never be forgotten, and it may be many years before any city undertakes to equal her glorious record. Pleasure rides, elaborate lunches by day and night, a theater, music, flowers, carriages, everything the heart could wish, all were supplied with an utter disregard of expense, and tendered with that grace which unmistakably comes straight from the heart, giving equal pleasure to host and guest.

One of the most graceful features of the occasion was the untiring efforts of the local committee of ladies, who met the visiting ladies on their arrival and entertained them throughout the week. They were waiting in the parlors when their guests came from breakfast, remained with them all day, visiting points of interest in the city, and were still at their self-assumed task long after midnight to bid the last one good night. The street railway ladies of St. Louis can never be forgotten, and will ever be remembered with grateful and most pleasant memories.

The weather was pleasant, with a bright sun during all but the last day, and on that even nature wept a little at the parting of hosts and guests, so strongly and delightfully bound in the ties of friendship.

Long live St. Louis.

TUESDAY MORNING.

The fifteenth annual meeting of the American Street Railway Association was held at the Auditorium building, St. Louis, Mo., October 20-23, 1896.

President H. M. Littell, of New York city, presided, and Secretary Penington, of Chicago, sat at his right.

The meeting was opened with an invocation of Divine guidance by Rev. P. G. Robert.

President Littell—Gentlemen: I take pleasure in introducing to you Mr. Charles Nagel, acting mayor of St. Louis, who will deliver to you an address of welcome. (Applause.)

Mr. Nagel—Mr. President and gentlemen of the convention: You are thrice welcome to the city of St. Louis. You are welcome for things negative as well as for things positive. We admire your programme for what you have omitted as well as for what you have specified. You will pardon me if I, as a member of the legislative branch of the city government, express a certain relief at being assured that I am permitted to meet a body of railroad men without being called upon to assist in cracking some of those nuts which are usually submitted to us. (Laughter.) I feel a decided relief at being assured that I am not to consider the question of ultimate municipal ownership of street railroads. (Applause.) I feel decidedly rejoiced at not being called upon to serve upon a committee to determine the exact percentage which the city is to have of the income and

profits of a street railroad company. I feel relieved that I am not called upon to assist in determining whether or not a pioneer railroad that has built up a certain territory has any implied rights against a new and greedy comer. I am relieved to know that I am not to decide whether or not some of the streets in the down town districts ought to be left free to the use of lighter vehicles. I feel sure you will appreciate that I rejoice at being able to meet with you without having to consider any of these questions. You will appreciate it when I say to you, indeed, thanks for this relief, much thanks- you are welcome. But you are welcome in a higher degree—for that which you are here to do. In looking over some of your old reports I find that within twelve years you have been considering such subjects as "salt" and "glanders." Now, I must say that when I read that, I felt compelled to rub my eyes to remember what salt and glanders could ever have had to do with a street railroad system. It read to me like ancient history, and you will not be surprised, for to an untrained mind such other subjects as electric apparatus, fenders, headlights, etc., suggested themselves to me, and I could not but mark the significance of the substitution of these subjects. I could not but say to myself that this great and important change for you and for the entire community was brought about, not by the coercive force of the law, but by the native energy and force of your enterprise and genius. (Applause.) I think it is a fact that it will be well for those to bear in mind who seem disposed at the present day to rely upon government and law and protection for all the work that is to be done. (Applause.)

It is natural that we should welcome you who are here to discuss problems, the solution of which may aid the advance of your business, but the solution of which must redound to the benefit of the whole community, for your interests and ours are one. We welcome you in a broader sense. We welcome you as our guests. The city of St. Louis opens her doors to you. As a city she can do nothing to speak of. Her power and her authority are restricted; but what she is prevented from doing in her official capacity her citizens will be the more glad to do as individuals. You will find a ready welcome at the hands of all. You will find that to which you are entitled—the protection which is guaranteed to all citizens in every state, but you will find more—the hearty welcome which host extends to guest. (Applause.) We cannot do more for you than we would do for others; because we have a way of always doing our best. (Applause.) You will have to be content to receive at our hands that hospitality which we have been in the habit of extending to all of our guests wherever they come from, or whatever may have been their purpose. (Applause.)

President Littell: Mr. Mayor, in behalf of the members of the Association, I thank you for your very cordial welcome.

The president announced the next business to be the calling of the roll, which was accordingly done, and it was found that seventy-five companies were represented.

The Buffalo & Niagara Falls Railway Company and the Butte (Montana) Consolidated Railway Company acquired membership in the Association.

The next order of business being the reading of the minutes of the last meeting, on motion of Mr. Baumhoff, the minutes were approved as printed.

The address of the president being next in order, President Littell spoke as follows:

PRESIDENT'S ADDRESS.

Gentlemen of the Association:

I have to thank you for the honor you have done me in electing me your President.

For the second time, after eleven years of absence, the Convention meets in the City of St. Louis—the metropolis of the upper Mississippi—and it receives to-day the same cordial welcome, the same generous hospitality and the same courteous and marked consideration that distinguished our meeting here in 1885, and our first duty is to thank the members of our Association in this city for their active and successful efforts in providing for the entertainment of their guests.

I desire lso to thank the supply men, in the name of the Association, for the very liberal display of exhibits, more space having been taken for this purpose this year than at any convention which has hitherto been held by the Association.

The Association is to be congratulated upon the fact that during the past year no deaths have occurred in its ranks. We meet here again this year the same in numbers as at our last gathering. Papers of great value and interest will be read upon the subjects of:

Tracks and track joints, construction, maintenance and bonding.

Trucks.

The question of how the revenues of street railways can be increased, taking into consideration the collection of fares, method of registry, transfers, use of tickets or cash fare, and attractions along the line of the road.

Modern overhead electric construction.

The modern power house.

The selection and management of employes.

I will not dwell upon the statistics of street railways during the past year for the reason that these are amply supplied by the street railway press. I have, however, thought it advantageous to lay before you some general considerations on the present and future of street railway interests in the United States, the dangers and difficulties that beset them, the way in which these difficulties are to be met, and the prospect and hope of brighter conditions for the future.

Among the most serious difficulties with which we have to contend to-day is the growing disposition of the government, whether state or municipal, to increase our burden of taxation. This disposition has increased of late years, and even within the last year, to a marked degree. The extraordinary prejudice against corporations, among people otherwise intelligent, causes them to be regarded as legitimate objects of attack and spoliation. Those who have once become affected with the prejudice seem to be unable to understand that a corporation is simply a collection of persons, by means of which individual resources, which would otherwise be frittered away in individual enterprises, are brought under one direction, making possible the success of large undertakings requiring an aggregation of capital. Of all corporations those which suffer most from this prejudice are those which exercise a public franchise, and the street railway franchise seems in particular to be a favorite object of restrictive legislation. With the arbitrary limitation of the rates of fare and the obligation of conforming the roadbed to every change in the street through which it passes, on the one hand, and the imposition of direct burdens of taxation in the way of personal taxes, taxes on roadbed, license taxes, franchise taxes, taxes on gross earnings and taxes on

dividends, on the other, the financial limits within which the workings of a railroad are confined have become exceedingly narrow. Sometimes it almost seems as if the legislative agencies in our various states would not stop until they had brought the burden of taxation to a point where roads could no longer run.

For such a state of things it seems to me that the only remedy is to be found in that gradual enlightenment of the public, by which it will be induced to keep the imposition of financial burdens within reasonable bounds, and such a broad minded and conciliatory management of the roads as shall in time do away with the last vestige of popular prejudice. Any successful business corporation manages and controls forces far greater than those which are at the command of a single individual, and its very power makes it an object of jealousy and attack. But I for one do not believe that the intelligence of the American people will in the long run go astray on this question any more than any other. I believe that it is beginning to recognize, and will recognize still more clearly as time goes on, the necessity for combination and co-operation in all departments of business; and that if a proper spirit of moderation is shown—and this I consider of the first importance—by those in whose hands this extraordinary power is placed, the community at large will discover that the benefits which it derives from transportation corporations far exceed any subject of complaint which it may have against them, and will meet them upon the footing of a common interest without regard to the corporate character of the agency by which the power is exercised.

Another, and one of the severest strains to which street railway corporations are subjected, consists in the penalties imposed by courts, for the negligence of their employes. Recent years, and especially the last two years, have seen a great increase in the number of negligence suits and in the size of verdicts. There is a marked tendency at the present time, on the part of juries, to fix a higher scale in estimating damages for personal injuries. Cases where formerly verdicts of $2,500 were rendered, now often result in a judgment for $5,000, and others in like proportion. The state of New York has recently removed the limit of $5,000 in case of death, so that now a verdict of $20,000 in a death case is by no means unusual. The doctrine of contributory negligence, which in theory and as duly expounded by the courts, in charges to juries, would preclude any recovery in cases where it is shown, seems only to be considered by juries—if considered at all—as a slight makeweight against the plaintiff in determining the amount of damages. Probably no class of cases exists in which it is so difficult to meet false testimony as in these, even when its falsity is perfectly apparent.

I do not mean to suggest for a moment that street railway companies are without fault in the matter of accidental injuries, but I do say that, profoundly as we must sympathize with the suffering and unfortunate, we ought not to be compelled to pay the penalties of negligence where the negligence was due to the sufferer himself, nor should a case be sent to a jury where this fact is disclosed by the plaintiff's own statement. As was well said some time ago by the General Term of the Supreme Court of New York:

"To leave it to a jury to say that such acts under such circumstances do not constitute negligence, would be to throw away the best understood legal standing, and substitute in its place any whim which might chance to flit through the minds or run in the emotions of uninstructed and unbridled jurors."

Whatever may be the ultimate result of existing tendencies in courts and juries, we may still hope for improvement in the matter of accidents, as people become more accustomed to the high rate of speed in their streets which they now exact from street railways. No community which has had the benefit of rapid street transportation would ever be willing to go back to the old five or six miles an hour rate of horse cars. It must learn and it will learn that it cannot have this benefit without a certain element of danger, and whether it runs the risk of this danger in traveling as passengers on the cars, or in walking or driving in the roadway, it will come in time to take those precautions by which the great majority of accidents could readily be avoided.

For those accidents which no ordinary precaution on the part of the sufferer could avert, I believe there is one remedy and only one, and that lies in the hands of the management of street railways. That remedy is to be found in the discipline of the force. If discipline is slack, accidents will be frequent. If discipline is high and well maintained, accidents will be reduced to a minimum. As in every other great organization, the spirit which controls at the top penetrates through all the branches of the system, and the means by which it penetrates is the discipline maintained over the force by its head. In this one element of discipline I believe lies the secret of preventing the ruinous losses which follow from damage suits.

The last two years have seen the introduction of an unlooked for competitor in street, and especially in suburban transportation, and that is the bicycle. In some places where its use is peculiarly advantageous, it has undoubtedly cut down earnings very heavily. I do not believe, however, that in the long run the street railway business is going to suffer on that account. Anything to my mind that promotes in our American people the habit of locomotion, particularly of rapid locomotion, is beneficial to street railways. No doubt the bicycle has come to stay, and no doubt upon some suburban routes its competition has been serious, but it is still to a great extent a novelty, and when the effects of novelty have worn off, and the use of the bicycle is limited to those who will habitually make use of it all their lives, I think there will still be found quite enough people who prefer street cars as a means of locomotion, even in places where the bicycle can be used.

In spite of the disadvantages of which I have spoken, under which street railways suffer, and in spite of the financial difficulties which have prevailed for the last three years, and which have told as heavily upon street railways as upon any other interest, I believe they have before them a bright and prosperous future. In their prosperity every man, woman and child in our city communities and in many rural districts, is directly interested. They have been of enormous benefit in spreading out populations over a larger area, in relieving densely populated districts in cities, and in making possible suburban homes, where the man who pursues his business in the heart of the city can live with his family at a distance from his office, and with them enjoy the benefits of space, of sunlight, of fresh air, of trees and gardens and of rural surroundings. This is especially true of the more modern forms of rapid transportation by which the time of transit is reduced. The luxury of such a home as I have described, to those of moderate means, who hitherto have been crowded into small and unwholesome

flats or tenements, is one of the many blessings which the modern street railway has bestowed upon the community, and those who have reaped the benefits of it are not likely to forget it.

In conclusion I desire to congratulate the Association upon the large number of its members who are present here to-day, and to express the hope, in which I am sure all of you will join me, that this meeting will be the most harmonious, as well as the most interesting, that we have ever held. (Applause.)

Mr. Green, of St. Louis: I move that the address of the president be printed separately, one thousand copies, and that it be spread upon the minutes of the Association, with the thanks of the Association. Carried.

Mr. Baumhoff, of St. Louis. Mr. Chairman and Gentlemen: This meeting marks a new area in the history of the American Street Railway Association. Fourteen years ago, Mr. H. H. Littell, then general superintendent of the Louisville City Railway Company, and now vice-president and general manager of the Buffalo Railway Company, conceived the idea of the benefits which might accrue to street railway managers by the formation of an association of this character, and after a conference with a number of his friends, it was determined to call a meeting for organizing what has since developed into one of the grandest associations in this country. (Applause.) Accordingly, invitations were extended to representative street railway managers throughout the country to attend the initial meeting in the city of Boston, in the month of December, 1882. What more fitting place in our great country could have been selected than the great Hub city, for like the spokes extending from the hub of a great wheel, this association has spread throughout our great land, extending from ocean to ocean, and from the Gulf on the south to British America on the north, and has even invaded Canada, where our last meeting was held. We are in a new era, because we have eliminated the discussions of the care and feed of horses, the construction and ventilation of stables, and other sundry annoyances which at that time tended to make the life of a street railway manager anything but pleasant. It is a new era, because for the first time in the history of this association you have met for the second time in our midst, and we proudly point to the fact that we have transformed the last animal traction road to one operated electrically.

Mr. President, I have a pleasing duty to perform; the more so, because the request comes from Chicago. (Applause.) To such of you as are perhaps unfamiliar with that name, I will state that Chicago is a little hamlet over here in the state of Illinois, extending from the western boundary of Indiana on the east to the great father of waters on the west (laughter and applause) and from the great lakes on the north to Egypt on the south. Chicago, as you all know, was an applicant for this convention. In fact, it is a cold day when Chicago is not an applicant for something. (Laughter.) But as usual, St. Louis carried off the prize. (Applause.) Chicago, however, desired to have a finger in the pie, and determined to be heard, and now Mr. President, in behalf of the Chicago City Railway Company, I present to you this handsome gavel, made of the hardest and most durable wood, enclosed in this handsome box made from the sill of a car which has for many years done service on the Chicago City Railway. May this convention, as it is called to order by the rappings of this gavel pass into the annals of history as one of the most pleasant and beneficial gatherings of this character. (Applause.)

President Littell: This, gentlemen, is indeed a very agreeable surprise, and I am in hopes that it will be sufficiently large to preserve order. I thought when I was elected president of this Association that my position would be such that I would look down upon all of you; but I find upon entering this hall that you all look down upon me; the fact is, I think you have got me in a hole. (Applause.) I am pleased with the prospect that, with the assistance of my friends, it will be possible for me to preserve order with this beautiful gavel. I thank the Chicago City Railway Company on behalf of the Association. (Applause.)

Mr. Bean: Mr. President, as Mr. Baumhoff has pleasantly reminded us of the Boston meeting, in 1882, I would ask that every gentleman present who was at that meeting will rise for a moment.

Messrs. Green, of St. Louis; Smith, of Troy; H. H. Littell, of Buffalo; Rugg, of Pittsburg, and Bean, of St. Joseph, Mich., arose.

The secretary then read the minutes of the meetings of the Executive Committee held during the year, and closed with the following report on membership:

REPORT OF THE EXECUTIVE COMMITTEE.

MEMBERSHIP.

October, 1895, members		173
NEW MEMBERS.		
St. Louis & Suburban Railway Co., St. Louis, Mo.		
Omaha & Council Bluffs Railway & Bridge Co., Council Bluffs.		
Union Traction Co., Philadelphia, Pa.		
Findlay Street Railway Co., Findlay, O.		
Houston Electric Street Railway Co., Houston, Texas.		
Meriden Electric Railroad Co., New Haven, Conn.		
Schuylkill Traction Co., Girardville Pa.		
Richmond Traction Co., Richmond, Va.	8	
		181
LOSS BY CONSOLIDATION.		
People's Passenger Railway Co., Philadelphia, Pa.		
Electric Traction Co., Philadelphia, Pa.		
Brooklyn, Queens County & Suburban Railway Co., Brooklyn, N. Y.	3	
WITHDRAWN.		
Montreal Street Railway Co., Montreal.	1	
SUSPENDED FOR NON-PAYMENT OF DUES.		
Sandusky Street Railway Co., Sandusky, O.		
Hoosac Valley St. Railway Co., North Adams, Mass.		
Central Crosstown Railway Co., New York City.		
Central Railway Co., Peoria, Ill.		
Colorado Springs R. T. Co., Colorado Springs, Col.		
McKeesport & Reynoldstown Pass. Railway Co., McKeesport, Pa.		
Paterson Central Electric Ry. Co., Paterson, N. J.		
Canton Massillon Electric Ry. Co., Canton, O.		
Metropolitan Railroad Co., Washington, D. C.		
Citizens' Electric Street Ry. Co., Mansfield, O.		
Columbia Electric Street Ry. Co., Columbia, S. C.		
Atlanta Traction Co., Atlanta, Ga.		
Miami Valley Ry. Co., Piqua, O.	13	17
Present Membership		164

At the beginning of the year we found the association about $6,000 in debt. Through the generosity of the members in subscribing to cancel this, and with rigid economy in the administration of the affairs of the association during the past year, we are now virtually out of debt (a few small disputed bills remaining unpaid), and have the sum of $1,765 94 to turn over to our successors.

In this connection we take pleasure in calling the attention of the members of the association to the efficient and economical administration of the secretary's office during the year.

The committee is pleased to announce that with the amount received from the exhibit at St. Louis and the annual dues for the year 1896-97, the incoming executive committee will have at its disposal about $6,500, after paying all expenses at St. Louis. It is believed that with this amount it will be possible, without any amendment to the constitution and by-laws, for the secretary to enlarge the scope of the work of the association, and it is contemplated that a monthly bulletin shall be issued containing information of value to the members.

We have to thank the local committee at St. Louis for their hard work in relieving us of all local matters, and their splendid efforts in furnishing the association with a place of meeting and hall for exhibits, and in arranging an elaborate program for our entertainment during the meeting in their city.

Mr. Hamilton—I move that the report of the executive committee be received, approved and spread upon the minutes, and that the recommendations therein be concurred in; that this association hereby expresses its appreciation of the able manner in which the affairs of the association have been conducted during the past year, and its thanks are hereby extended to its officers for their very efficient service in its behalf.

Carried.

The secretary then presented the report of the secretary and treasurer.

REPORT OF THE SECRETARY AND TREASURER.

1895-'96.

RECEIPTS.

Deficit Fund	$4,785.00	
Dues	3,958.32	
Membership Fees	300.00	
Decisions	69.50	
Miscellaneous	705.48	
Space in Exhibit Hall, 1895	1,380.50	
Space in Exhibit Hall, 1896	846.00	
		$12,044 80

EXPENSES.

Rent	$ 180.00	
Printing and Stationery	849.42	
Salaries	1,500.00	
Convention, 1895	1,683.89	
Executive Committee, 1896	425.70	
Deficit Fund	4,698.34	
Decisions	165.75	
Miscellaneous Expenses	378.59	
Office Expenses	30.17	
Postage	183.00	
Convention, 1896	85.25	
Furniture	98.75	
Cash on Hand	1,765.04	
		$12,044.80

ASSETS.

Cash in Bank	$1,765.04

DUES UNCOLLECTED.

York Street Railway Co., York, Pa	$25.00	
Eckington & Soldiers' Home Railway Co	25.00	(Withdrawn.
Duquesne Traction Co., Pittsburg, Pa	25.00	
Lackawanna Valley R. T. Co	25.00	(Out of business.)
City Electric Ry. Co., Port Huron, Mich.	25.00	
Allegheny Traction Co., Pittsburg, Pa	25.00	
Quincy & Boston St. Ry. Co., Quincy, Mass.	25.00	
Dubuque St Ry. Co., Dubuque, Ia	25.00	
		$200.00
Office Furniture	100.00	
Space, St. Louis Convention	846.00	946.00
	$2,011.04	

LIABILITIES.

S. Jackson, Montreal	$121.80	
W. H. Watt, Montreal	50.00	
Richardson & Hook	210.00	$381.80
Net Assets		$2,530.14

MONTREAL.

Due for Space—Cannot Collect.

James Steel	$15.00
Morris, McCurdy & Smith	7.50
St. Lawrence Machine Co	15.00
A. W. Glasyone	7.50
	$45.00

In addition to the amount subscribed at Montreal the following members have paid, viz.:

Dry Dock, East Broadway & B. R. R. Co., New York	$25.00
Waterbury Traction Co., Waterbury, Conn	25.00
Vincennes Citizens' Ry. Co., Vincennes, Ind	10.00
Ft. Wayne & Belle Isle Ry. Co., Detroit, Mich	25.00
Lowell, Lawrence & Haverhill St. Ry. Co., Lawrence, Mass.	25.00
Metropolitan St. Ry. Co., Kansas City, Mo	175.00
	$285.00

The secretary desires to thank the street railway and electrical press for their courtesy in publishing all notices sent out by him, and furnishing the secretary's office with copies of their journals for the year.

T. C. PENINGTON, Sec'y.

Mr. Seely: I move that the report of the secretary and treasurer be received and filed, and spread upon the minutes. Carried.

The secretary read letters of regret at their inability to attend the meeting from Messrs. H. H. Vreeland, president Metropolitan Traction Company, New York City; John N. Akarman, general manager Worcester Consolidated Street Railway Company, Worcester, Mass. and Benjamin Willard, general superintendent of New Orleans City & Lake Railroad Company, New Orleans, La.

The President: The first paper on our list is that by Mr. M. K. Bowen, superintendent Chicago City Railway Company, on "Track and Track Joints, Construction, Maintenance and Bonding."

TRACK AND TRACK JOINTS: CONSTRUCTION, MAINTENANCE AND BONDING.

By M. K. Bowen, Superintendent Chicago City Railway.

I.

After signing a contract to tell my associates in business how to construct and maintain a street railway track, I began to cast around for data bearing upon the subject, and found that the life of a rail was measured by the wearing out of the head, and less than 12 per cent was worn away before we sold the old rail for scrap, hence the deduction that the point of contact between the wheel and the rail, in other words, the bearing and wearing part of the track, was the most important consideration. I asked a wheel manufacturer

why wheels of street railroad cars were made conical or beveled shaped instead of flat. His answer was, "To draw out of the mold, of course." Not being satisfied, I asked a steam railroad man the same question. He said it was for the purpose of compensating on curves for the further travel of the outside wheel.

If I had asked a street railroad man the same question he would have promptly and correctly answered (even if he did not know and had to guess) that the bevel on a car wheel was for the purpose of centering the car on the track, providing a means for a lagging wheel to catch up again, maintaining the axles of the car at right angles with the rail of track. The foundry man was wrong, because we all know that flat wheels can be made. The steam railroad man, when he answered, had in mind his 10 degree maximum curve, but in applying his answer to our conditions he was wrong, because on a quarter circle curve of 50 feet radius, 30 inch wheels, the outside wheel is compelled to travel 7 feet, 4¾ inches farther than the inside wheel, and the absurdity of the bevel of ¼-inch on a 2-inch tread compensating for this travel, and preventing slipping is readily apparent, as it would require a bevel of 1 11-16 inches in a 2-inch tread to compensate for the difference in travel of the wheels. The effect of the slipping of wheels on curves is clearly shown by the brightness of the rails, showing abnormal wear.

M. K. BOWEN.

The street railroad man was right, because if he stands behind any of his receding cars he notices the movement of the car from side to side with a rythmic motion which tells of an action taking place. The analysis of the action developes a coal saving, wear saving movement, always at work; a sort of a silent partner producing part of your dividend, for if this motion did not exist the wheel which once got behind, an axle which once assumed a position not at right angles with the track, would be apt to remain in its faulty position during the entire trip, requiring excess of power to haul the car, and abnormal wear of wheel and rail, resulting in sharp flange wheels and short life of rail.

II.

The action taking place is this: Suppose the car has shifted toward the rail YY', Fig. 1. This action causes the wheel (a) to bear upon its smallest diameter and the wheel (b) to bear upon its greatest diameter, with the result that (b) runs ahead of (a). This brings the axle at an angle with the rails, as shown by (a') (b'). The wheels will now tend to shift to the opposite side XX' the wheel (a) will rest upon its largest diameter, while the wheel (b) will rest upon its smallest diameter, when (a') will start and run ahead of (b'), bringing the axle into position shown by (a") (b"), and so this action keeps up continually, tending always to keep the truck in the center of the track.

If the wheels had no bevel the result would be that unless the rails were exactly on the same level the car would shift to one side,—the result you all know.

III.

Take first a conical wheel running on a rail the surface of which is level. Referring to Fig. 2 we note that the rail

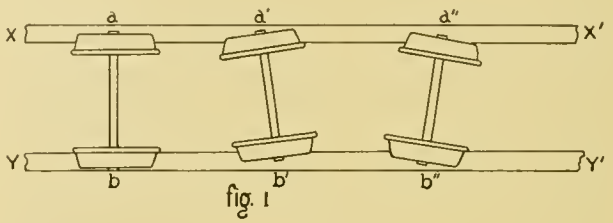


Fig. 1

and wheel make contact only at the point shown at (a). This is the state of affairs when the rail and wheel are new.

In a few months, if we again examine our wheel and rail we will not find them the same as when we first looked at them. We now observe that the wheel is badly worn next to the flange, while the inner edge of the head of the rail has flattened to a considerable extent and worn down. Both the wheel and the rail are doing their best to come to a common bearing surface, but it is at the expense of scrap wheels, of which only half of the tread has been worn through the chill. It is quite plain that the rate of wear must be enormous at first for the whole weight of the car is brought to bear upon a very small surface (a—Fig. 2), almost a point I might say. This rate of wear steadily decreases as the surface of the rails and wheels wear themselves away until the contact between the two is a line the whole width of the rail, and not merely a point. But long before the surface of the rail has conformed to the surface of the wheel tread, where the best form is attained, the head of the rail has lost a large per cent of the metal allowed for wear, and as wheels wear faster than rails it has taken in some cases thousands of quickly worn out wheels to bring the rail to its final and best form.

IV.

Figs. 3 and 4 show sections of the rail now in use on the State Street cable line, the height of the head being 1 $\frac{3}{16}$ inches. The first rail put in State street, Chicago, had a head ¾ inches high; this was increased to 1 inch, and later to 1 $\frac{3}{16}$ inches; it is beveled to conform with the bevel of the car wheel for ⅔ of its section from gauge line across head.

Many will ask, no doubt, if there is not a slipping of the wheels on the rails, due to the unequal diameter of the wheel at all points. There is, imagining the wheel divided into three parts at right angles to its axis (Fig. 3) and each piece free to move by itself and whose diameters are situated at a, b and c respectively. It is quite evident that as the portion (a) makes one revolution it will travel over a less distance than the portion (b) would, and similarly the portion (c) will travel farther than the portion (b) in one revolution, but on account of it being all one, the portion (a) travels farther than it otherwise would, thereby causing it to slip; the portion (c) would travel a less distance than it otherwise would, thereby causing it also to slip.

The above is based on the supposition that the car would move a distance equal to the circumference of the wheel at

the point (b) in one revolution of the wheel. But this waste of power due to slipping is very slight, for, considering the coefficient of friction as .15, we find that for a ton mile the energy lost by this slipping is .0104 H. P.; so small in fact that on account of other advantages it may be ignored.

The experience of the Chicago City Railway Company, who first tried this form of head, has been that it saved wear of both rails and wheels, increasing their life by about 35 per cent. Why not in building a track put in rails which are beveled to conform to that of the car wheel at the first, and not spend time and money wearing the wheel and rail down to fit each other?

Fig. 5 shows a section of a new and old car wheel which shows clearly the manner in which the tread of the wheel will wear if used on a rail with no bevel. The record of car miles of this wheel is not known, but no doubt a great amount of energy was lost before it had worn down to its most economical state.

Fig. 6 shows a rail taken from State street track after eight years' wear, during which time 8,000,000 car wheels passed over it.

Fig. 7 shows a rail when taken out after eleven years' wear. The rail should have been taken out three years previous, but owing to impossibility of getting rails at the time and the World's Fair coming at that time the track was not rebuilt. The true rate of wear cannot be found, as the flange of the wheel had begun to run on the flange of the rail long before it was taken out. The dotted lines show an interesting state of affairs. This section shows the wear due almost entirely to wagon traffic.

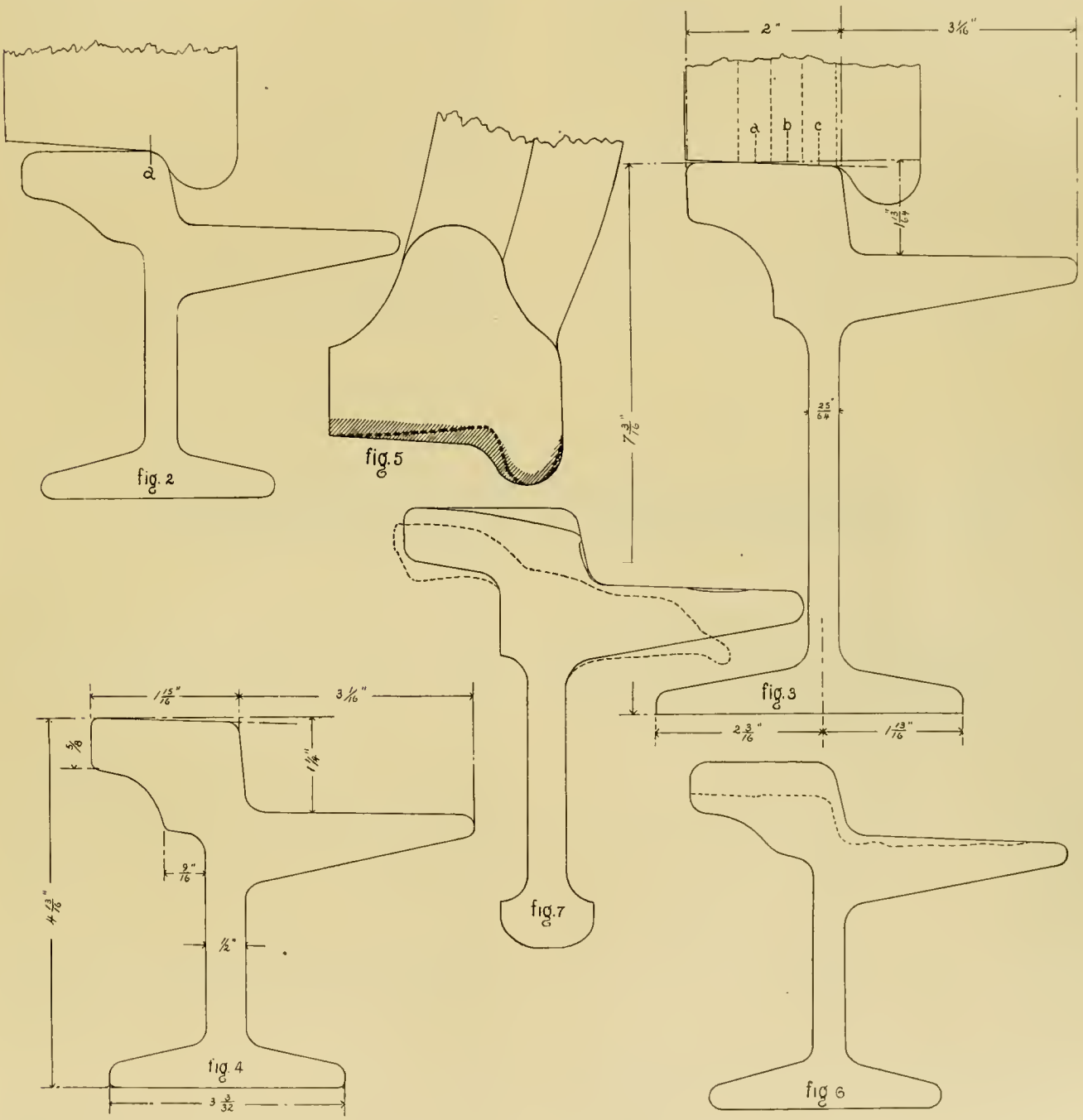
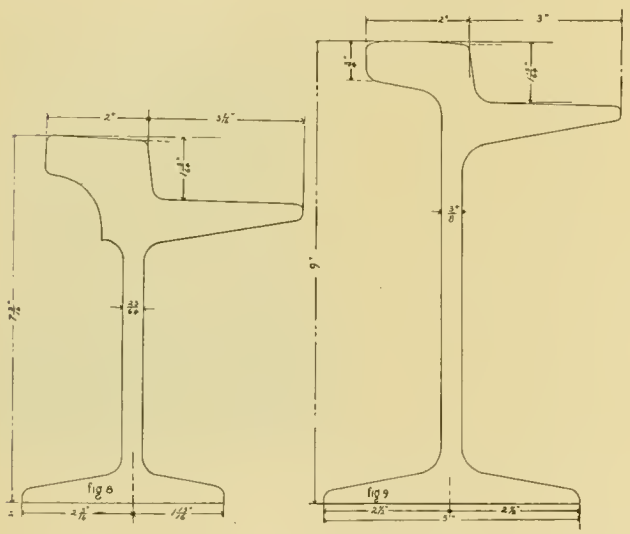


Fig. 8 shows the rail used at the present time in our 7-inch construction with chairs or tie-plates. The rail weighs 83 pounds and has a head 1 3-16 inches high, beveled as described.

Fig. 9 shows the rail used at the present time in our 9-inch electric construction without chairs or tie plates. The rail weighs 90 pounds and also has a head 1 3-16 inches high, beveled as described.

The question concerning the composition of the rails is one to be considered here also. How does the composition affect the life of the rail? The number of starts and stops made



by cars on electric railways are enormous as compared with those on a steam road. The result is, the wheels slide, sometimes spin, and this, together with the sand and dirt on the track, is a cause of great wear on both the wheels and rails. This wear, together with that due to other causes, might be greatly reduced by proper composition of metal.

I give below a table gathered from different sources showing the composition of metal advocated by experts to-day.

	A	B	C	D.
Carbon	.45-.55	.55-.60	.50	.40
Manganese	.80 1.00	.80-1.00	.75-.05	.01
Phosphorus	.06 not over	.06 not over	.09	.11
Silicon	.15-.20	.15-.20	.10	
Sulphur	.07 not over	.05 not over	.07	.06

Rail.	Carbon.	Phosphorus.	Silicon.
70-lb T	.43-.51	.085	.10
75-lb T	.45 .53	.085	.10
80-lb T	.48-.56	.085	.10
90-lb T	.55-.63	.085	.10
100-lb T	.62-.70	.085	.10

It would seem that the harder a rail becomes through its composition and the process of rolling the longer it would wear. As regards this Mr. Moxham, of the Johnson Company, says: "There are two schools—First, those who advocate a low hardened and ductile material as being of the greater wear; second, those who advocate the greatest possible hardness, regardless of brittleness. For many years, without taking positive grounds, I have leaned to the former class, but the experiments so far made have demonstrated to me that neither class is correct—that the correct solution lies between the two."

I come now to what has been heretofore the weakest part of track construction, namely, joints. Once weakened they rapidly grow worse, and not only are the rails worn at such joints, but the rate of wear of the car equipment is greatly increased. Were it only possible to get rails in continuous lengths just as one gets trolley wire, the railway manager would be happy, but as it is we must do our best to overcome the difficulty found in making rail joints solid and rigid to withstand the severe strains which come upon them. What we want is some method of keeping the rails from pulling apart at the joints, due to contraction and spreading outward at joints, and the shape, due to the outward pressure of the car wheels, and from bending down at the joints, due to the pounding and weight of the cars. The joint I have used for the past year is a cast welded joint. This has been found to give perfect satisfaction as a joint. It is strong and substantial, as has been proven by its holding under the extreme changes in temperature for which Chicago is noted. Seventeen thousand joints were put in 1895, and of these only 154 joints were lost. The joint in comparative tests has been shown to be far stronger than the rail itself, and such breakages as have occurred were due to a flaw in the metal. The metal cast around the joint has eight times the cross section area that the rail has. Hence, considering steel as four times as strong as cast iron, the joint is twice as strong as the rail. It has been found in some cases where this joint was used at crossings with other tracks, the tracks were apt to be pulled out of shape through the changes of temperature. To overcome this the joint nearest the crossing should be anchored in a substantial manner. The method of making the joint is as follows: The rails at the joint are scraped and brightened, a cast iron mold is placed around the joint, making a tight fit, into this the molten iron —25 per cent scrap, 25 per cent soft and 50 per cent hard silicon pig—is poured. The metal in contact with the mold begins to cool and forms a crust while the interior remains molten. This crust continues to cool and at the same time contracts, forcing the molten metal strongly towards the center, which makes a solid and rigid joint. The top, or bearing part of the ball of the rail, is afterward filed off perfectly level, so that it is very difficult to detect a joint by riding over it or looking for it. Upon breaking a joint that has been well cast, three spots will usually be found where amalgamation has taken place between the rail and cast portion, one on each side of the web and the other on the bottom. These spots are from 1½ inches to 2 inches in diameter. There has been some discussion as to its being a bond for carrying electric current. I cannot recommend it with certainty, as there are occasional joints which I have taken off where no amalgamation has taken place whatsoever, thus destroying the effect as a bond of all joints in that line of track. To overcome this difficulty I have adopted the plan of bonding all joints. However, future experiments and care in the casting of joints may develop their efficiency as a bond.

I give below an outline of specifications for track construction, used by the Chicago City Railway Company, knowing that it will not fill all conditions, but will serve as a suggestion for all cases; Fig. 10 shows a section of same, except as regards joints.

EXCAVATION.

Excavate to a depth of nine inches below the established grade of the street, taking out all dirt for a width of 18 feet; then excavate for each tie to a depth of 5 inches, leaving the earth between the ties in places.

TIES.

The ties, which should be of good sawed white oak, 5 inches by 8 inches by 7 feet, free from sap, are laid in their proper places, 30 inches centers, directly upon the ground, and thoroughly tamped with medium broken stone.

RAILS.

The rails to be used are 9-inch girder rails, 5-inch base, 60 feet long; the head to be beveled for two-thirds its width to conform to the bevel of the car wheel, (see Fig. 8.) These are laid on the ties and fastened with ½-inch by ½-inch by 4½-inch H. H. spikes—eight spikes to a tie. Double-nut tie rods, 1¼-inches by ⅜-inches are to be used six feet apart; the first and last to be three feet from the ends of the rail. The rails on both sides to be filled with wooden or vitrified brick filling between the paving blocks and the web.

PAVING.

The road-bed is now filled to within 8 inches of the top of the rails with medium fine limestone, thoroughly tamped. Upon this place hemlock boards 1½ inches thick, running lengthwise of the track. Upon this layer of boards a layer of clean sharp sand 1 inch deep is to be laid; upon this are to be laid the paving blocks, which should be No. 1 white cedar, 6 inches high. After being laid the joints are to be filled with good gravel or a limestone screening, tamped in place, the top of paving blocks to be even with top of rail, both inside and outside.

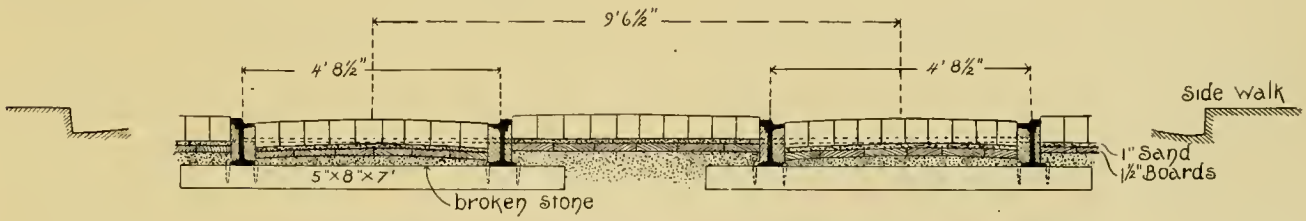
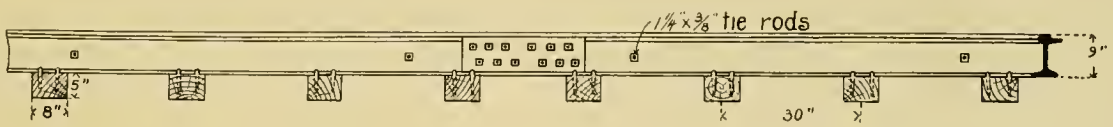


fig. 10



GAGE.

The gage must be 4 feet, 8½ inches, or ¼ inch wider than the gage kept in the shop for gaging car wheels. This is important and should be closely watched.

LEVEL.

There must not be over ⅛-inch difference in the height of two opposite rails. Any amount above this will be considered sufficient cause for rejecting such part of track and rebuilding or re-surfacing the same. The foundation should be as solid as possible to make it. The ties should be of such material that their life will be about equal to that of the rail, if anything a trifle more. The expense of taking up and replacing pavement and repairing defective ties is very great. The wood most generally used, and the one which gives the best satisfaction is good, sound white oak, free from sap. Its life is about eight to ten years under ordinary circumstances. The nature of the soil has considerable to do with the life of the tie. It is not good judgment to get the tie which will last the longest, thereby possibly paying a much higher price, for after the rails are worn out the tie will still be in a fairly sound condition and the new rails may be laid on these old ties. which are fit to last only a portion of the length of time the rails will.

Brace chairs in place of tie rods cannot be recommended for use with high rails, as they are very apt to bend over in time, but with shorter rails this will not happen.

The paving of a street upon the right-of way is generally regulated by municipal authorities. Wooden blocks are extensively used in the smaller cities, but in the larger ones they soon wear unevenly and require replacing. Granite block paving is by far the most durable, lasting under ordinary wear in cities 30 years, and should be used where the street traffic is at all heavy. The blocks should be hard, but not liable to become slippery by use, the average size being 4 by 8 by 12 inches. I advocate small blocks, even as low as 3 by 6 by 10 inches.

The cost of one mile of double track with paving for 18 feet in width of right-of-way, as above specified, based on Chicago prices, would be as follows:

283 long tons, 9-inch rails, 90-pound, at $33.00	$ 9,339 00
4,224 white oak ties, 5 by 8 inches by 7 feet, at 38 cents	1,605.00
352 cast welded joints at $3.50	1,232.00
1,760 tie rods, at 15 cents	264.00
33,792 spikes, ½ by ½ by 4½ inches; at 1 cent	338.00
42,240 feet of wood filler at ½ cent	2,112.00
Labor at $1.00 per 1 foot of D. B. T.	5,280.00
10,560 square yards cedar block, 30 cents	3,168.00
146 square yards sand at $1.25	183.00
445 cubic yards crushed stone at $1.50	668.00
10560 square yards gravel and dressing at 8 cents	845.00
10,560 square yards hemlock boards 2 inches thick at 8 cents square yard	845.00
	$25,879.00

If granite had been used instead of wood block the cost would have been $12,708.00 more.

Upon organization depends the successful maintenance of the track, and one which I find gives the greatest efficiency is that the system is divided up into sections consisting of twelve miles of double track each. Each section is put in charge of a working foreman who is to keep and maintain and repair as cheap as possible, and who is held directly responsible for the condition of the track at all times. He has under him as many laborers as are required to keep his division in repair. This foreman is held completely respon-

sible for all tools and is required to maintain at some convenient point on his section a small place for keeping his tools. All tools which need repairing are sent to the main store room where they are exchanged for others in good condition. All new tools and material required are obtained from the main store room. The method employed previous to the above was to send out a gang of men here and there at different points of the system, thus one portion of the system might be sadly in need of repairs long before the gang sent out reached that portion.

The question as to the right time to re-construct a track is one of the greatest importance as it often involves the expenditure of thousands of dollars. The question to be solved is am I losing money by not rebuilding my tracks? Should I have rebuilt them two or three years ago, or should I have waited a year or two longer? No doubt many of you have been confronted with just such a question as this and worried over it for days and nights, knowing that the decision meant the expenditure of many dollars for better or worse.

The task of solving this question was brought before me not long ago concerning the State street cable track, which had reached a deplorable condition. Taking the track master with me we rode over the line and, as street railroad men often do, guessed that it was time to rebuild the track. This involved a very large expenditure, and it would be an expensive guess unless correct, so to ease my conscience and make sure of my guess I had run over the line a car weighing 8,665 pounds, attached behind a grip car by means of a recording spring balance called a dynamometer. This test car was then run over a track newly made at the same speed as over the old line; the dynamometer showed that it took 13.75 pounds more pull per ton to haul cars over the old line than over the new. The average speed of cars on this street is 12 miles per hour. The excess horse power required to haul one ton was .44, and the excess cost of hauling one ton one hour was $.0088. The number of tons hauled one mile per year on this track was 45,147,537, and the time required to haul one ton one mile was five minutes, and 45,147,537 tons hauled at a given speed for five minutes is equal in work done to 3,762,295 tons hauled at the same speed for one hour. 3,762,295 multiplied by $.0088 equals $33,108, which is the excess cost per year for hauling cars on account of bad track. It is estimated that the new track with cast joints will last twelve years, and as there will be no low joints the draw bar pull will not increase much until the rail is worn down sufficiently to allow the wheel to run on the flange, so the annual saving will be nearly $33,108, during the life of the rail, and the total saving will be $397,276, which in twelve years will pay principal and interest on $293,444, which is the amount we could profitably expend in repairs. The actual cost of rebuilding this track was $61,670.

This caused me to think up some scheme by means of which dynamometer or power ratings could be taken and automatically traced on paper, showing the condition of the track at all points, showing faults of gage, level or joints, showing faults and excess power in consequence of faults, side by side, thus placing a value on faults, and then instead of representing faults and excess power in inches or foot pounds, make the instrument show them in dollars and cents per ton of load when capitalized, which would show, multiplied by the ton miles on any road tested the amount that could, with good management, be expended on track reconstruction or rebuilding. The apparatus devised for this purpose is what we call an indicator car. A description of the construction and method of working might be of interest to not a few, for I do not know of another in use by a street railway company, and found only one other, although very dissimilar, in existence on a steam road, after I had the plans of mine finished.

The results shown by it are high and low rails, low joints, gage, drawbar pull and the variation of the track level. Each one of these results is automatically plotted on paper 18 inches wide. The car consists of a platform 8 feet by 10 feet, mounted on a single truck —no springs being used. Midway between the two end axles is one which is fitted with wheels which record defects of joints or gage. After use and calibration of instrument it will be more valuable and the dynamometer will not be required, as any man using

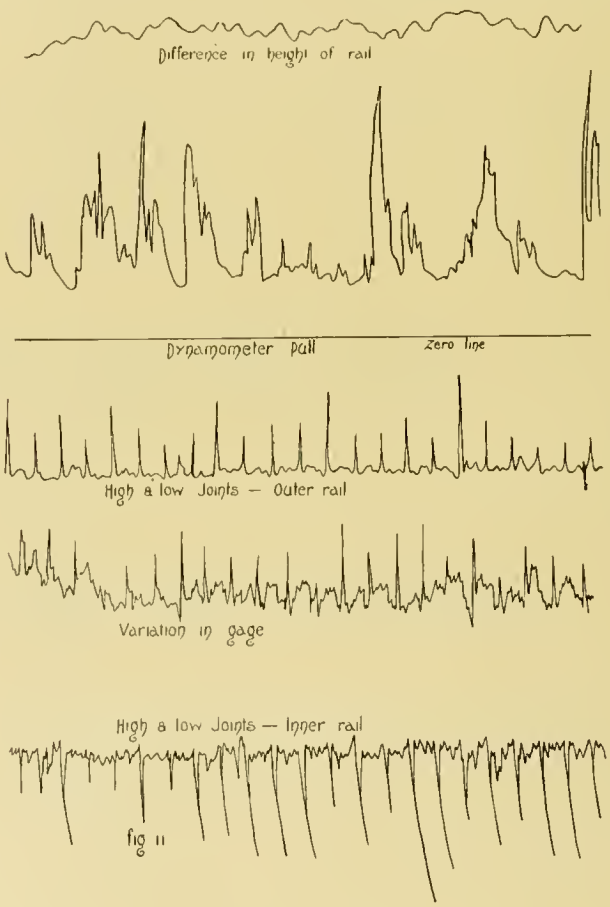


fig 11

this car constantly will become so accustomed to the value of defects that a glance at the profile will tell him the money he may, with judgment, spend for rebuilding a track or repairing it.

The dynamometer consists of two draw bars, one at each end of the car, and extending beneath the platform to within a distance of about one foot of each other. Between the two adjacent ends of the draw bars a spring is placed, and the amount of pull required to draw the car along the track in either direction is recorded by a recording arm, which is connected to the spring with a wire. The apparatus for showing the variation in the level of the tracks is mounted on the platform and consists of two cups of mercury (having a connection between them by means of a pipe) and into which dip two plungers connected to a recording arm. The paper on which the record is taken unwinds at a uniform

speed of 1 foot per 1,000 feet of track. The car weighs 3,865 pounds. The car is fastened to an ordinary car, which is drawn over the tracks by horses (or any motor car) made to go at as even a speed as possible. The results shown by a recent test trip are very interesting to compare.

Fig. 11 is from an old track. The joints are uncast, spread far apart and the rails are low at each joint. This is distinctly brought out by the record. The gage is also uneven. It would appear from the record that the rails spread at each joint. The dynamometer pull is very unsteady, showing the effect of low joints and uneven gage.

Fig. 12 is a record from a new track. Here we can observe hardly any joints or variation in gage, and the dynamometer pull is more steady. Occasionally high points

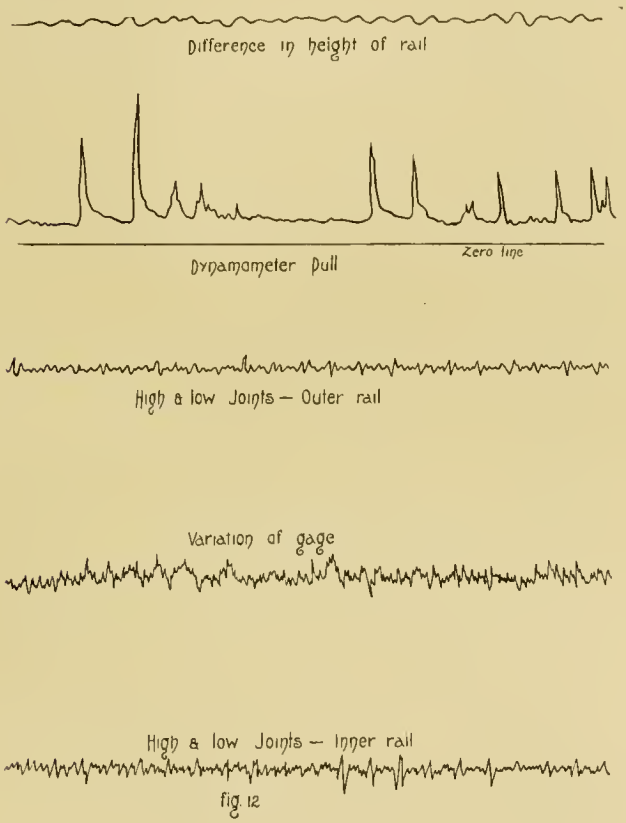


Fig. 12

are observed, but they are due more to unsteadiness of speed. A person riding on this track will not be able to detect any joints. This track has the cast welded joint. We find from the data obtained by use of this car that we could afford to expend $7,383 per mile to repair the old track. The estimated cost of repairing this track, leveling and casting new joints, is $1,740 per mile.

The track maintenance during the year 1895 for 184 miles of track cost $153,217, and represented 17.75 per cent of the total operating expenses. This excessive cost is largely due to a partial or complete rebuilding of many miles of track.

In conclusion I wish to acknowledge receipt of facts and data bearing upon the subject of this paper from Mr. Moxham, Mr. Augustine W. Wright and Mr. Mead; also to thank Mr. W. G. Price for valuable aid rendered me in designing and perfecting the details of indicator car, which can be inspected in the exhibition room during this convention.

A vote of thanks was given Mr. Bowen, and discussion of the paper called for.

DISCUSSION OF MR. BOWEN'S PAPER.

Robert McCulloch: There is one important matter in connection with Mr. Bowen's paper—I do not wish to criticise it, but merely wish to give my own experience—with regard to the carrying of the current over a welded track without bonds. We have one piece of track which is thirteen miles long and all welded together, the most of it being sixty foot rail. We have not an ounce of copper nor a bond of any kind on the entire track. We have made tests of all sorts, with delicate instruments, graded to the thousandth part of a volt, tested as long and as short lengths as possible, sometimes a mile and sometimes a single joint, and have found in most instances that the carrying capacity of the joint was greater than that of the rail at any other place. We have found no necessity for bonding; our contact is perfect at the extreme ends of the rail; and I do not believe it is necessary to bond a welded track.

Mr. Scullin: Has the gentleman found any difference in the carrying capacity of the rail, after the weld has been in use some time?

Mr. McCulloch: All the tests we have made have been on track that was laid about ten months since. The tests were made about two months ago, so that the oldest joints we tested were about six or eight months old.

T. J. Minary: Were the tracks welded by electricity or cast welding?

Mr. McCulloch: Cast welding.

Mr. Seeley: I ask Mr. Bowen whether it is necessary to own a plant for repairing purposes in case the joints are broken? How do you repair joints after the welding plant is taken down? I know that to weld a mile, or four or five miles it is not expensive to run a cupola; but it would be in the case of repairing a few joints now and then.

Mr. Bowen: For a small road it would be better to let the contractors repair the broken joints. For a large system it would probably be better to keep a cupola; you are always building more or less track and doing considerable amount of repair work. A large system is generally building new track, and you could use a machine and make it pay for itself.

Mr. Dodge, of New Haven: You spoke of something like 200 joints out of 17,000 which parted; how soon after the casting of these joints did they part; was it very soon after they were welded?

Mr. Bowen: We lost the joints on account of contraction, due to very cold weather in mid-winter. With the first cold snap, the contraction of the rails pulled 154 joints apart. The joints were then repaired, and since then they have gone through the summer the same as the other joints.

Mr. Dodge: Were they cast in the winter; were they made in the winter?

Mr. Bowen: No, sir, in mid-summer, during the night hours.

Mr. Scullin: I ask Mr. Bowen if most of the joints were examined or simply those found broken? I want to ascertain if the joints were not loosened as well as broken—some of them loosened in some way or other, which was not perceptible until they were closely examined.

Mr. Bowen: There were 154 remade. When they do part, it is for two or three inches, so that you can see them readily. If there is any oxidation between the joint and the

rail, I hardly imagine it would do any harm unless it was sufficient to loosen the cast iron from the rail proper. In that case it would come apart three inches, due to the contraction of four or five blocks of steel.

H. H. Littell: What kind of a job do you make in repairing a rail with a space of three inches?

Mr. Bowen: We saw a piece of rail and put it in and recast around the entire two joints in that case.

Mr. Connette: I ask what the average cost of the joint is?

Mr. Bowen: It is about what the contractor can get out of it. I do not know whether it is a trade secret or not. The joint requires one hundred pounds of cast iron, so that you can make your own calculations.

Mr. Wyman: As it is possible that some other gentleman here may be as interested in the answer to the question I am about to propound as I am and for that reason I ask it here instead of asking it of Mr. Bowen after the meeting - I venture to take the time of the meeting to ask it. Mr. Bowen says that he uses the bond in order to be absolutely certain of obtaining conductivity in the rail. Will he kindly tell me how he uses it. Do you use it around the weld or beneath the weld?

Mr. Bowen: We simply bond the track after we cast the joints.

Mr. Wyman: You use a long bond around the weld?

Mr. Bowen: Yes, sir.

Mr. Wyman: You said just now that when one of those welded joints pulled apart, as they do naturally, they would pull apart two or three inches.

Mr. Bowen: Yes, sir.

Mr. Wyman: Do you allow for that in your bond?

Mr. Bowen: When the joints pull apart in all probability it ruptures the bond. If it does we put in a new bond. I am not sure that the practice will obtain after the next year or two to come.

Mr. Goff: May I ask what trouble you have in the summer time? I have in mind a track which I think was bonded in the winter cast in the winter and in the summer time it seems to be out of line all the time. The car has a waving motion over the track. Do you have any trouble of this nature?

Mr. Bowen: That comes from the casting. You will find as you put your mold on to cast the joint, that the rails have contact at the ball and not at the flange at all. If you are not careful the rail will do two things it will go out and it will go up, on account of the bulk of the iron being underneath the rail. The contraction in cooling will push it up and push it out. In order to prevent that we put a clamp on the rail when casting it, and push it in a quarter of an inch and down a quarter of an inch.

Mr. Goff: Did you have this trouble before you cast the track in the manner you just mentioned?

Mr. Bowen: We cast straight joints now; we used to cast crooked ones.

Mr. Goff: What temperature do you find gives the best results? Do you take the season of the year when the temperature is cool, or can you do it equally well in the summer or late in the fall?

Mr. Bowen: I should advise that the majority of joints be cast at night, so the temperature will be cooler. I advise a medium temperature, a little cooler than the medium temperature for your climate, whatever it is. We like to cast at a temperature of between 40 and 50; somewhere about 50 degrees.

A. Langstaff Johnston: In the examination of the broken joints by contraction, did you find that the rail pulled out of the cast iron?

Mr. Bowen: Occasionally, but more often on account of our driving two pins through the last two holes of the fish-plate. We have supplemented the joint with them. We find then that it tears the casting apart.

Mr. Johnston: Then the cast metal is in the mass, but still it is not a homogeneous mass?

Mr. Bowen: It is not in spots. There is a spot on each side which shows amalgamation.

Mr. Johnston: That is something important, because if there are no spots where it is amalgamated to the steel rail, you would not have a good electrical connection.

Mr. Bowen: I have cut off many joints, and I have found some places where the amalgamation has taken place, and some where it had not.

Mr. Johnston: Have you allowed a time test as to the amalgamated metal carrying the return current through the joints?

Mr. Bowen: In welding your rails you would have to be careful to clean the rails, or you would not get a good electrical connection.

Mr. Lang: What is the lightest weight of girder rail you have used in making these cast welded joints; and have any of those rails been placed on chairs?

Mr. Bowen: The sixty-three pound rail was the lightest. We have used, 1½ inches high, on chairs. That is the lightest rail. The heaviest rail is a 7-inch, eighty-three pound rail. We have used no chairs on the 9-inch construction.

Mr. Lang: What kind of chairs did you use on the rails you speak of?

Mr. Bowen: Steel chairs. In the 9-inch construction we use in our electrical work malleable iron chairs; but this happened to be a steel chair that was used.

Mr. Littell: Do you use the single bond or double bond?

Mr. Bowen: It depends, of course, on the proximity of the power station, and how many cars are on the line.

H. H. Littell: What size wire?

Mr. Bowen: 0000.

H. H. Littell: Not cast in?

Mr. Bowen: No, sir, around the outside of the cast welded joint.

Mr. Harrington: Do you observe any particular proportion in the metal used in making up the casting?

Mr. Bowen: Yes, sir, I gave it in the paper.

Mr. Harrington: Is that proportion observed throughout?

Mr. Bowen: Yes, sir.

Mr. Bean: I would ask if Mr. Bowen has bonded any T rails?

Mr. Bowen: No, sir.

Mr. Dodge: I will say that in New Haven, Conn., there are about fifteen hundred joints there which have been cast on fifty or sixty pound T rail. Some one inquired about the cost of these joints. I understand that the man who is putting them in at New Haven on the fifty and sixty pound rail (T) is getting $3.25 a joint; the railroad company having to pay the freight to and fro on the apparatus necessary.

H. H. Littell: I ask Mr. Bowen, or any gentleman present, if they have had any trouble or experience with the pulling apart of the rail, pulling the rail in two, not at the joint whether welded joint or put together with splice bars, pulling the rail in two by the contraction.

Mr. Bowen: I think that there was one or two cases on

our road of pulling apart. Instead of the fracture being just at the joint, it was some little distance back, probably where the difference between the extreme heat and the ordidary temperature of the rail left a partial fracture; there were only one or two cases.

H. H. Littell: If the members of the convention will give me the time, I am going to tell a little story—I do not ask you to believe it—but it is a fact.

Mr. Bean: Tell the truth you mean

H. H. Littell: I always do, Mr. Bean. We have no welded joints in Buffalo. We have the ordinary track laid with nine inch rail, ninety-four pounds to the yard. Summer before last we put down some nine inch rail in hot weather, forcing the rails just as close as we could, leaving them uncovered until the morning. In the morning we drove the rail back, a lot of men with a heavy timber, and drove the rails up as close as we could, and put them together with a twelve bolt splice bar, one inch bolt. We got along very nicely for a time, but winter before last we had one of the rails pull in two, thirteen feet from the joint; a thirty-two foot rail, nine inches, weighing ninety-four pounds to the yard.

Mr. Seely: We have had some experience in that line, ninety-pound girder rails pulling in two, on an elevation grade of about 5 per cent. We have this occur every winter; The rails break right in the center. The joints are driven too close together, and the rails are bound to expand in some direction. We also find that with the high carbon rails we are using it is almost impossible to cut them with the ordidary tools; we require special devices for sawing rails in two. In sawing rails, if you have to turn them over, they will crack all the way down the center, and we are compelled to handle them with the greatest of care.

Mr. Scullin: What does the indicator car cost?

Mr. Bowen: I have no idea; it was built in our shops. The cost is a nominal sum outside of the framing of the car. It is a few wheels and strings. There is no patent on it, and I will be glad to furnish anybody with the details if they apply for them, or lend them the car.

Mr. Dodge: In the cases where you mentioned the rail as being forced up, breaking your joint, did you break that in pieces and make a new joint?

Mr. Bowen: That was not the fault of the casting, and we corrected those cases and have only a few left; pushing them down and recasting. It is faulty work.

Mr. Dodge: This foreign concern which is doing this work in New Haven, follow this plan, when it is thrown up in that way—and I saw quite a number they start back two or three feet and grind it down with an emery iron across that joint.

Mr. Bowen: We do not do that. We file down, but merely for the purpose of getting the proportions of two rails alike, and when they are of different heights or something of that sort. We won't allow a joint to be cast and leave it high now. It is necessary with every joint to smooth it off, and we are careful to smooth it off so that it has a perfect surface. You cannot tell it from any other part of the rail. We do this because a joint which once begins to pound is half worn out.

Mr. Harrington: Are you doing this work yourself?

Mr. Bowen: I am doing this work myself.

Mr. McCormack: In answer to Mr. Littell's inquiry about the experience with cast welded joints, our company in Brooklyn put in two thousand cast welded joints on the ninety-four pound rail, nine inch girder, and out of that number there was only one which pulled the rail apart; the rail broke about four inches from the end. They have given us very good satisfaction, at least we think so. We had some on our old six inch rail that broke, but we thought that was due to the kind of rail.

Mr. Heft: I would ask Mr. Dodge if he would recommend this cast welded joint from his knowledge of it in New Haven?

Mr. Dodge: I stated before, when speaking about it, that it was not done on our road, it was on another road in our city. I have had no personal experience in relation to it; I am simply telling about it.

Mr. Heft: Have you not followed the matter up?

Mr. Dodge: No, sir.

Mr. Scullin: Are you paying the Falk Company a royalty?

Mr. Bowen: Yes, we have thirty-two thousand joints in, and pay so much royalty for each joint.

H. H. Littell: On the street that this particular rail parted in two we had four curves. At the two points on this street the special work pulled apart at the curve, and in one instance the joint of the rail only separated; the rail pulled apart at the joint. On examining this joint we found that the trackmen had slighted it. They had some small bolts, so as to connect it up, and when they put in the new rail they left in some three-quarter inch bolts instead of using inch bolts. It could not be drawn up tight.

Mr. Davis: Do you have any trouble in the application of the cast joint in connecting special work with the girder?

Mr. Bowen: If we have a track switch or something of that sort, we have special molds made for those cases; but we do not make the special work with the cast welded joint. I think the Johnson Company and the Wharton Company make such work, and others, where they cast the joint in that work.

Mr. Davis: I am speaking of the union of the girder rail with the special work.

Mr. Bowen: Yes, we do that.

Mr. Heft: I ask Mr. Bowen why they use a copper bond with a cast welded joint; is it done as a precautionary measure?

Mr. Bowen: I adopted that method I did not know just what to do. We cut off probably ten or fifteen joints, just taken at random along the track, and out of that number I found several in which we failed to have any amalgamation in these little spots I have described with the rail. I will say that that was in the first part of our work, probably a year ago. Then to prevent tearing up a granite pavement afterwards to bond, which we were putting down on that line of road, I thought it was cheaper to bond, and be sure; than not to bond and be sorry. I am waiting now for the development of that matter. I think Mr. McCulloch has made some researches in that direction, and I am down here principally to hear from him on that subject.

Mr. Heft: Then you do not feel safe in the present state of the art without using the copper bond?

Mr. Bowen: That is my position.

Mr. Dodge: About that polishing up of the side of the rail, you were particular in getting the surface bright?

Mr. Bowen: Not so bright, as we were using the joint with a bond.

Mr. Dodge: The Falk Manufacturing Company, which has been doing the work in New Haven, polished the joints by an electric motor, and the motor gave out, so that they could not use it I was looking over their work and saw a

man polishing the joints with a file. I asked him if it was not necessary to have it brighter, and he said, "that is just as good."

Mr. Bowen: Are they using it without a bond?

Mr. Dodge: They are using it without a bond.

Mr. Bowen: Then they will burn some coal. (Laughter.)

Mr. Dodge: It struck me that way.

On motion the meeting adjourned until nine o'clock Wednesday morning.

WEDNESDAY SESSION.

President Littell called the meeting to order, and announced the first business to be the reading of the paper on "Trucks," by Mr. John N. Akarman, superintendent of the Worcester Consolidated Street Railway Company, Worcester, Mass., who was unable to be present.

Secretary Pennington read the paper as follows:

STREET RAILWAY TRUCKS.

By John N. Akarman, Superintendent Worcester Consolidated Street Railway.

After a long and expensive experience, it has at last been generally conceded that trucks are necessary for carrying a modern street car. The term truck in this case means the separate frame work for holding the running gear of an electric car; namely, the wheels, springs, brakes, motors, etc. This being the case, the question arises as to what form or type of truck is best adapted to the purpose, and the object of this paper is to endeavor to give some hints to street railroad men which will enable them to solve this question themselves. In doing this, it will be necessary to explain the principles involved, the requirements of the service, and show where single and where double trucks are most desirable.

When motors were first placed upon street cars, it was believed that there was no necessity for special construction, or any marked departure from the prevailing horse car practice. The idea of a separate truck had not even been conceived. We found VanDepoele placing his motors upon the front platform, and using chains and sprocket wheels to carry the power to the axle. The car carried the whole weight of the motor and load, and in addition to its usual work, took all the strains of the propelling power. Sprague made a short step in advance and in the right direction by carrying his motor on links from the car body and resting one end through sleeves, on the axle. This improvement preserved the distance always the same between the motor and the axle, but the rising and falling of the body imparted a racking motion to the motors, which was destructive to the cars. Both of these systems were radically wrong, and might have been known to be so, from a study of the steam coaches of fifty years ago, and from the steam wagons of fifteen or twenty years previous. As a result hard riding cars were produced which soon wore out. It was also found that a car body was put out of service whenever there was a necessity for any repairs to the motor or machinery.

It was at this point that the idea of a separate truck was thought of. It was not, however, thought of with any favor, as months were spent in an attempt to get an electric manufacturing company to try the new system and put a separate truck under the body of a four wheeled car without success. The idea of a separate truck was first conceived about the year 1885, but it was not until the latter part of 1887 that, in its concrete form, it was put into operation.

The first truck consisted of a continuous upper chord made of bar iron in the form of a rectangle. Its purpose was to support the car body, the sills of which rested on its frame. The sides of this upper chord were re-enforced by heavy oak sub-sills to which the chord and the pedestals were both firmly bolted. This form of frame kept the body square and took many of the strains on itself; but it has been abandoned, and in abandoning and using separate bars, I think we have been drifting away from the best practice, for it had a very important advantage in preserving the squareness of the body and truck. In addition to this upper chord, there was a bar extending around the truck to which the bottom of the boxes were fastened.

In all the early trucks the frame rested directly on the journal boxes. The jar and concussion which resulted, crystallized the metal, injured the motors, and made it impossible to keep bolts and nuts tight; and was the cause of a rapid destruction of the whole truck. A remedy became an imperative necessity. So elasticity or cushioning of some sort was resorted to; and the first effort in this direction was made by placing a thick piece of rubber upon the top of the journal box between it and the axle box frame. While the principle was right, the means employed was of little value. The rubber at best had only a trifling elasticity, and was not durable and did not prevent the box from jolting.

Then a spiral spring was tried upon the top of the box. This was an improvement as it had a certain amount of motion, but the space available over the box was so small that a very stiff spring had to be used. So stiff in fact was it necessary to make the springs that they were but little better than the rubber. In many cases the springs used were so rigid that they were no better than the old uncushioned construction. It was found that springs in this position had the additional disadvantage of aggravating the rocking of the box from side to side, but by widening the box at the bottom, or adding ears so as to form spring seats, it was found possible to give each box two springs, one on each side, and of ample diameter and length so that they would carry the load with ease and have sufficient motion. Thus placed they had the advantage of carrying the box perfectly steady, preventing entirely the rocking and unsteady motion. (It should be noted here that the motors were carried on the truck and were in no way attached to the car body nor connected with its motions.)

So far as I can learn, the first car body carried on a separate four-wheeled truck was run on the Scranton & Suburban Railway in Scranton, Pa. About the same time the Boston & Revere Beach Railway Company, in Massachusetts, had a car, the body of which was mounted upon a truck; from the frame of the latter the motor was carried in the modern fashion. This car was operated under the eyes of the officials of an electric railway company, who watched it operation from day to day with the most careful attention, and it required but a few weeks of service to demonstrate that the principle was a great one, and that a very important advance had been made that was to mark an era of success in the operation of electric cars.

These first trucks, although involving nearly all the essential features of the modern trucks, were by no means perfect and the conditions of the service soon suggested modifications. The first of these was to make the removal of the wheels and axles as easy and practicable, as they had

been with the jaws and oil boxes used on the old horse cars. The form which the improvement took was the making of the jaws a part of the motor truck frame so that upon jacking up the truck, the wheels could be rolled out. This was an essential feature recognized by all truck builders, and has been embodied in every successful truck which has been constructed.

Up to this time brakes have been invariably hung from the body of the car. But it was soon found that brakes upon electrics were a very much more important feature than they had been upon horse cars. The high rates of speed and greater weight of the cars, not only made stopping more difficult, but the shortness of stops to avoid accidents was found to be important. The brakes were first suspended from the sills of the cars, and the sinking of a body under a load left the shoe so far from the wheels that in applying the brakes the slack of the chains was increased and could not be taken up without considerable delay. The remedy was simple and consisted in suspending the brake rigging from the axle box frame in such a way that it was not subject to the action of the body springs.

The change in the brake rigging from the car body to the truck frame brought about another evil which had been of slight importance heretofore. This was the longitudinal rocking or pitching of the car body, technically known as galloping, which was greatly increased under higher speed, and is also further increased by lengthening the car bodies. This motion is not only excessively unpleasant to passengers but very destructive to the trucks, motors and track. When the brakes were hung from the car body it was possible to check this oscillation by a slight application of the brake, but the change in the hanging of the brake made this impossible, and remedies became imperative. The first thing that was done as a remedy was to increase the wheel base, but this did not prove to be of much advantage. The first success as a remedy appears to have been made by extending the sides of the truck, and on the extension pieces mounting an elliptic or half elliptic spring. The latter method with the half elliptic spring has been the most successful preventative tried. The necessity for overcoming the oscillation was considered so important, and the success of this device so great, that a series of inventions were, and are being brought out for the purpose of accomplishing the same result. Numberless combinations of elliptics and spirals, and springs of various kinds were made, and also a large number of inventions involving the use of levers, cross-equalizing bars and other similar mechanical devices have been made, some of which appeared to succeed, but in most cases failed to produce a satisfactory result. Some of these devices in overcoming longitudinal oscillation very frequently caused the car to ride very stiffly and produced an undesirable effect upon the track. Others gave the car too much lateral motion, apparently, by the conversion of the longitudinal oscillation into a side or lateral movement. The so-called extended spring base which is combined with the half elliptic springs has, in my judgment, been the best solution of the problem up to the present time. It is conceded that the equalization of the wheels to carry the load according to the practice on steam roads is out of the question with a car which has only four wheels.

As time went on and experience was gained, one point was gradually made more evident, which was that a motor truck was a locomotive in every sense of the word, and for success must be governed in its construction by the same general principles that are involved in the construction of a locomotive machine. The greatest difference between the functions of a motor truck and a locomotive seems to be the fact that the motor truck carries the load instead of drawing it. It also has to preserve its propelling machinery in perfect alignment while it is moved forward by the revolutions of its axles, and is subject to combined vertical, horizontal and twisting strains of the most severe kind, and at the same time it must ride as easily as a carriage. It has been demonstrated that a composite truck frame is a failure, because of its inability to stand all the strains imposed upon it. The braces which were amply sufficient to carry the weight gave it no strength to resist twisting strains. Then, again, malleable iron parts break, bolts and nuts become loose and rattle, and it is next to impossible to prevent rivets from shearing and bars from twisting out of their place. The composite frame demonstrated its imperfections with the locomotive years ago, and has been found even less successful as a form of construction for a motor truck. This is due in a measure to the fact that on account of cost, first-class workmanship is out of the question in building a low-priced truck. The truck frame, consisting of a solid forged bar, of course gives greater strength to resist strains thrown upon it from all directions than any form of a built up truss.

Now, as a result of the best information and from large experience, I believe the ideal four-wheeled truck for electric cars at the present time is one having the fewest number of parts in its construction, in which the side pieces of the main frame are single forged bars connected across the ends by bars either bolted or welded on so as to make the frame one continuous piece. This frame is carried by springs from the journal boxes, and itself carries an upper chord, likewise a continuous rectangular piece which has suitable seats for the springs. This upper chord is recessed to take the bolts and spring seats leaving its upper surface flush. The ends are carried by the half elliptic springs, while the spirals are placed at the journal boxes. The brake should be hung by links.

Diagonal bracing on account of the motors is out of the question in the construction of a truck, but the diagonal strength is usually increased by the introduction of transoms. Such a frame carries its machinery with a certainty of its always being in alignment with the driving axle, and as it is spring carried, it is as light on the rails as any form of single truck, while the longitudinal oscillation is prevented by the peculiar effect of the half elliptic springs which do not respond readily to rythmic motion. So much for the form of construction of a good type of four wheeled trucks, but what of the disadvantages of four wheeled trucks in general. Taken at its best, the four wheeled truck is an uncomfortable carriage and a veritable track destroyer, and should only be used according to the best judgment of many of our wide awake railroad men, where cars are run at comparatively slow speed, and with moderate length of car bodies. Where it is desirable to run at higher rate of speed in suburban service, the damage to the track becomes so great that it should preclude its use. The increased length of wheel base made necessary, makes it hard on curves.

The only alternative is to use a double truck car with swivel or pivotal trucks. The advantage of this form of truck is very great and while nearly everyone is familiar with its good qualities in a general way, I hope I may be pardoned for going into details which are not so well known. They are easy on curves to a degree that would hardly be

credited by those who have only been familiar with four wheeled cars. The greater number of wheels not only reduces the weight on each wheel, but correspondingly reduces the blow when the wheels strike a joint or a low place in the track. This is still further diminished by what is known as "equalization" which practically places the car body at the central point of the truck so that each wheel in rising or falling in passing over any imperfection in track elevates the load a distance but half as great as its own rise.

Oscillation, whether longitudinal or transverse, can be completely done away with by the use of double trucks. While the trucks conform closely to all the irregularities of the line, the body can move forward with but very little influence from them. The conditions, however, are not altogether in favor of the pivotal truck. As for instance, if all the weight is used for adhesion it is twice as expensive in use as a four wheeled truck. If two motors are used, it only has fifty per cent of the propelling power. In its ordinary form, it makes a wide body necessary and hence is out of place in narrow streets or places where traffic is very heavy. It also has the disadvantage of putting the body at a greater height than is necessary with four wheels.

But it meets a great many of the requirements for fast suburban service and has been endorsed with great satisfaction; but the objection which I have just mentioned precludes its use in many cases where it would have otherwise been desirable. Now the remedy for nearly all these objections has been found in what is known as the maximum traction truck.

The maximum traction truck may be defined as a pivotal truck in which the load is eccentrically placed in relation to the four wheels, two of them receiving only a sufficient amount of weight to keep them upon the track, while the others take the remainder of the load. In practice it is found that 80 per cent of the weight may be placed on the driving wheels, while 20 per cent is used for guiding. Upon applying these trucks it was found that it was not necessary to have the wheels of equal size; that a large pair of driving wheels and a small pair of idle wheels can be used. The large pair used as driving wheels being very near the pivotal point have a comparatively small amount of swing, and can be allowed to rise within the floor timbers, while the small wheels moving through a much greater arc easily clear the sills. By this form of construction, the body can not only be brought down, but the frame can be made as narrow as in the ordinary street car body. This form of truck enables the car to be utilized for both street and suburban service. It is also found in its latest form utilized under long open cars. It carries the motors in a satisfactory manner, guides readily and answers nearly all the requirements of the service. But the question of what form of truck answers interurban service is one which every railway manager must study for himself. This becomes necessary because the conditions on different roads vary so much that there are scarcely two in the whole country upon which they are identical. The question of the amount of traffic and the headway at which it is desired to run cars involves a careful study. With heavy traffic and frequent stops, it is necessary to have low cars from which ingress and egress are easy. An extra step will increase the danger to passengers very much. On the other hand, where passengers are carried a considerable distance without stops, long cars, with more than one step are permissible.

As interurban service is almost equivalent to that of the steam roads, for this service, pivotal trucks having regular swing beams, equalizers, elliptic springs, and all the parts of the steam road truck are entirely satisfactory. They take curves easily at a high rate of speed. But for trucks which must run not only on trams, but on T-rails, some form of the maximum traction truck will give, all things considered, the best service.

In conclusion, let me call attention again to this very important question to be considered in connection with the adoption of single and double trucks, which is whether the punishment to the track by single trucks is not so great as to more than make up for the cost of putting in and running double trucks under cars of all lengths of bodies, whether short or long.

Mr. Bean moved that the paper be received and spread upon the minutes. Carried.

After announcement of the program for the afternoon, the following paper was read by its author:

THE MODERN POWER HOUSE.

By Richard McCulloch, Civil and Electrical Engineer, National Railway Lines, St. Louis.

In beginning a paper of this kind, it is usually considered proper to start with a sort of historical review, but in this case we are immediately struck with the fact, that unlike most modern institutions the eventful history of the street railway power house has been condensed into the last few years. The conditions, the general design and the greater part of the machinery itself, have been evolved during the last ten years. All of these have changed rapidly, and the manager who now deplores as antiquated, a power house built six years ago, with the best existing machinery and in the light of the most approved practice, can say with Cicero, that it was not his fault, but the fault of the times.

RICHARD M'CULLOCH.

It may readily be seen that there are two standpoints from which the design of the power house may be viewed. That of the one, who strives that the general plan, that each machine, and that every arrangement shall tend solely towards the cheapest possible production of power; and that of the other, who while appreciating the position of the former, desires also that nothing shall enter into the design which will materially affect either the simplicity or the reliability of the plant. The cost of power on a large road is about ten per cent of the total operating expenses and it is almost a self-evident fact that the use of any apparatus which might produce unreliable service and thus impair the receipts and ruin the prestige of the road in order to save a small percentage of this cost of power would be very bad business policy. The first criterion of any machine installed in a power house should be absolute reliability, and the second, economy.

LOCATION.

A great deal has lately been written concerning the proper location of power houses and formulae and graphical methods for determining this point have been derived, but we doubt very much whether any street railway power house has ever been located either by graphics or by the differential calculus. Unfortunately it usually happens, especially in cities, that the electrical center of the distribution system falls in very valuable ground, entirely unsuited for a power house location, and the final location is very often influenced by the extremely unscientific fact that the railroad company owns that particular piece of ground and cannot find a purchaser for it. In selecting a location it is very important that a large power house should be placed on a railroad track so that coal may be readily and cheaply delivered, and it is very desirable that the location should also be on some water supply in order that condensing engines may be used, unless the conditions will warrant the use of self-cooling condensers. If a location fulfilling these conditions may be found somewhere near the electrical center of distribution it is an ideal spot for a power house, but if in order to secure coal and water it must be moved from this point it should if possible be moved in the direction of future extensions of the street railroads. There are cases where power houses cannot be located on the steam railroad tracks, but the only excuse for such a location is where the interest on the cost of copper feeders running from the steam railroad tracks to the center of distribution would greatly exceed the cost of hauling of coal in wagons.

BUILDING.

The main points which should be borne in mind in the design of the building are that it should be light, airy, compact and fire-proof. The shape and size of the building will be largely governed by local conditions, but there is one general arrangement which has been adopted in a number of the most recent power houses. This will be discussed later. There is no reason why anything combustible should enter into the construction of a power house. The walls may be brick, the roof of slate, tile or iron, and the floors of concrete or iron. This method of construction not only increases security against fire, but it obviates the necessity of carrying insurance, the saving of which will in a few years pay the extra first cost. The building should be substantially constructed, but unless the location is on an important street there is no necessity of going to great expense to render the building ornamental, especially as all money which can be spared for this purpose may be far better invested in machinery to put inside the building. In erecting a building for use as a power house it is advisable to decide first on the style, size and arrangement of the machinery, so that no part of the building will interfere with the proper repairs, renewals and inspection of the apparatus. This may seem unnecessary advice, but it is a very common oversight for railroad companies first to decide on the style of building they wish, then let the contract for the erection of the power house building, and then find themselves hampered in the use of some particularly desirable form of apparatus by the shape or contracted area of their buildings.

As by far the greater number of the modern railway power stations are operated by steam power, steam alone will be considered in this article. For convenience in discussion, the apparatus in a power station may be divided into three classes: (1.) The steam generating part consisting of the boilers, piping and all their accessories, such as coal and ash conveyors, mechanical stokers, stacks, economizers, feed-water heaters, pumps, etc. (2.) The steam consuming part, consisting of the engines, steam separators, oiling devices, condensers, etc. (3.) The electric part consisting of the dynamos, cables, switchboard, electrical instruments, etc. The division between the first and second parts is more easy and more marked as it usually is accentuated in the power house itself by means of a brick wall.

STEAM GENERATING APPARATUS.

Beginning with what we have called the first part, we start with the choice of fuel. This is largely a matter of location. In a general way the proper fuel to use is that which will evaporate the greatest quantity of water per dollar's worth of fuel. It does not pay to burn too poor a quality of fuel, however, because slack containing a great quantity of ash and sulphur will cake and clinker on the grate bars, make a great deal of work for the fireman, refuse to be forced when necessary, and make much ash to be removed. On the other hand it will not do to make all arrangements for using a very expensive fuel, as a very little wasted in times when the furnaces must be rushed will make a great difference in the cost of operation. As an expensive fuel usually means one which is brought from a great distance, any furnace prepared for burning this would operate under unfavorable conditions if the supply is cut short by strikes or railroad blockades. Where the conditions are favorable for the use of oil, it makes an ideal fuel, requiring no handling, making no smoke or ashes, and allowing the fire to be regulated with the utmost nicety. Buckwheat anthracite coal is used largely by power houses in the eastern cities. It is of high calorific value, clean, making no smoke and little ash, and capable of being readily handled in coal conveyors and mechanical stokers. In the western cities soft, bituminous coal is used by force of necessity. This brings with it the troubles of ash, clinker and dirt, and in the city renders necessary some form of smoke consumer. As has been stated, it usually happens that the choice of fuel is a matter of location, but in cities where several competing grades of coal come to market, it would probably pay to have expert tests made to determine what grade of coal or what mixture is most economical for the work.

It is hardly within the limited scope of this article to discuss the numerous forms of coal and ash conveyors which have been put in use. Several large companies make a specialty of this form of machinery and special designs are developed for each power house. We may say in a general way that in power houses handling large quantities of coal, where the coal is all delivered at the same place as by rail or boat, the installation of coal and ash handling machinery will pay. Where coal is delivered in small quantities and where it is delivered in wagons and may be dumped at any part of the boiler room, the reverse may be said. The advantage of this form of apparatus is its saving in labor, and its disadvantages are its great first cost, its expensive maintenance and the fact that it is desirable for the best service that the coal should be fairly uniform in size, which is a requirement not always easily fulfilled.

In the east the use of mechanical stokers has grown to such an extent that no large power house is considered complete without them. In most of the western cities, however, and especially here in St. Louis, the mechanical stoker has not been a success. This difference in results may be attrib-

uted to the difference in the fuels used. The buckwheat coal of Brooklyn and Philadelphia feeds evenly on the stoker and and causes no trouble by cementing the grate bars together by clinkers. With the soft, fragile, bituminous coal, however, clinkers soon form on the grate bars, and very often the fire must be almost completely distroyed to remove them. No mechanical stoker will bear crowding to any great extent and any power house using them must be supplied with a greater capacity of boilers than one where hand firing is in practice. By reason of the fact that the coal is introduced gradually into the hottest part of the fire and the volatile matter slowly driven off, the mechanical stoker is a partial smoke consumer. With the exception of this there is no advantage in the use of mechanical stokers, except the labor saved, as the great efficiency which was formerly claimed for them has never been proved in actual practice.

Notwithstanding the great number of types of boilers on the market, they may be divided into two general classes, fire tube and water tube. In most of the more recent power houses, some form of water tube boiler has been adopted, as this type possesses some marked advantages over the fire tube. They are non-explosive, they may be operated at a higher pressure and consequently are more suitable for use with compound engines, they have a large heating surface and are quick to respond to calls for power. They occupy less floor space and are usually more intelligently designed than the other class. On the other hand, their first cost is greater, there is a greater number of joints to be looked after and the cleaning is more difficult, especially in those forms which use a curved tube. It has usually been considered that the efficiency of water tube boilers was much higher than the fire tube, but there is now a form of fire tube boiler being made consisting of a shell of large diameter and extra length, containing a large number of flues, which approaches the water tube boiler very closely in efficiency. The high efficiencies obtained in boiler tests are seldom reached in actual practice as they usually result not so much from excellence of design in the boiler itself as from careful and intelligent firing during the test.

It is hardly necessary in presenting a paper before this intelligent body to discuss the reasons why water should be fed into the boiler as hot as possible. Besides preventing the straining of the boiler shell from the sudden changes in temperature, there is a large quantity of fuel saved, and the percentage of this saving will be found tabulated in nearly every work on thermodynamics. The usual methods employed in heating the feed water are, first by the heat of the exhaust steam, and second by the heat of the escaping flue gases. There are numerous patented devices for utilizing the heat of exhaust steam, either by passing the exhaust through a number of pipes surrounded by the feed water, or by spraying the feed water across an opening through which the exhaust steam is admitted. Most of these devices are very simple in their construction and their efficiency depends very largely on the length of time the feed water and the exhaust steam are in contact, and in case they are in separate chambers upon the conductivity of the separating medium. Care should be taken that the opening for the exhaust steam is never contracted so that any possible back pressure on the engine is avoided.

The method of heating feed water by the heat of the escaping flue gases has been applied in apparatus under the general name of economizers. The arrangement usually employed is a coil of pipe containing the feed water placed in the flue. In order to keep the soot from settling on the pipes, most forms of economizers are supplied with a mechanism for scraping off the pipes whenever necessary. Sometimes the economizer consists of one large bank of pipes placed in the main flue, and sometimes the apparatus is divided into a number of banks each placed in a flue leading to one furnace. The choice of arrangements depends largely upon the size of the plant and the general location of the boilers. By means of a properly designed economizer, feed water may be heated to a very high temperature, even above the atmospheric boiling point of water. In the use of any device in which feed water is heated by the flue gases, care should be taken that the escaping gases will still retain sufficient heat for the maintenance of the necessary draft after part of their heat is taken from them by the feed water. In the case of power houses using natural draft, economizers should not be used, where the draft is not already sufficiently strong, or is just barely strong enough for the work to be done. There are in operation, however, many plants using natural draft, discharging flue gases at a very high temperature, much higher than is necessary to maintain the required draft. Economizers used in such cases would result in a marked gain in economy.

Whatever system of heating feed water is used, the apparatus should be made abundantly large for the work to be done; first, that the water should pass through slowly and receive the full benefit of its contact with the heated gas or steam; second, that a large store of water may be kept on hand which is of great service in case of a sudden demand on the boiler; and third, that the feed water heating apparatus may act as a water purifier. It has been found that water kept for some time at a high temperature will deposit a great portion of the carbonates and sulphates of lime and magnesia which it has in solution. This is probably due to the expulsion by the heat of the carbonic acid gas contained in the water, thus freeing from solution the lime and magnesia which it is well known are slightly soluble in water containing carbonic acid gas.

With condensing plants the waste from the condensers is never at a greater temperature than 100 degrees Fahr. and if hot feed water is desired the use of an economizer becomes almost a matter of necessity as the water from the pumps and the other non-condensing machinery would not have sufficient effect in heating the feed water of a large plant.

Several of the large power houses built during the last few years have abandoned the use of stacks for producing draft, and are operating by means of an induced draft produced by fans placed in the flue or short stack. In this case the stack is just high enough to clear the roof. This system has many advantages. First, there are no stacks to blow down or fall down, and this point is of special importance in a region subject to tornadoes. The second and most important advantage, however, is the absolute control which it affords in governing the fires, and this point will appeal especially to those power houses subject to sudden and rapidly changing loads. As an illustration of this may be cited the power house recently erected to operate the Baltimore tunnel road. A great part of the time there is no load on the power house as it is only operated when there is a freight train to be hauled through the tunnel. The manner in which the load is handled is as follows: The boiler room is supplied with blowers in place of stacks, and a slow fire is kept constantly under each boiler. When a telegram is received that a freight train is approaching, the blower is

started and on the arrival of the train, steam has been raised in sufficient quantity to supply the great demand put upon the boilers. This illustrates the extreme flexibility of the system and it would be difficult to handle this load in any other manner. Economizers are operated with great efficiency in connection with an induced draft as this system permits the flue gases to be robbed almost entirely of their heat, since it is not necessary to have a large quantity of heat in the flue gases in order to create a proper draft.

Passing from the steam generating system to the engines, we find as a connecting link, the system of piping. In regard to the general plan of the piping, opinion is very much divided; some favor a single header with leaders to the engines; others claim that a complete duplicate system is necessary, so that a failure in any part of the system need not cause a serious stoppage. The objection to a duplicate system is the greatly increased cost. In the installation of a duplicate system it is only human that the material and workmanship employed will be cheaper than if a single system were employed, because it is reasoned that if one side breaks down, there is always the other to be depended upon. The other side, however, is often never used until a case of necessity has arisen, and on account of this very lack of use, the valves and joints are apt to be found leaky and in bad condition when suddenly put in operation. A compromise system has been used in some cases in which all pipes are duplicated, each side, however, having only one-half the capacity required, necessitating the use of both sides at all times. In case of accident to one side the other half of the system may be used, at a disadvantage, of course, by increasing the steam pressure. The best plan, however, seems to be to use a single header divided at convenient intervals by valves according to the size of the plant and the number of units employed, and in laying out the system to use only the best valves, material and workmanship. The power houses having the least amount of trouble with their piping are those having a simple system, probably because it is natural to erect better, and take better care of something which is in constant use, than something which may easily be dispensed with. All steam and hot water pipes should be covered so as to prevent as much as possible loss of heat by radiation and consequent condensation of the steam. And in this connection it should be noted that there is a great difference in efficiency in the different kinds of pipe covering. Tests have shown that the magnesia plastic and sectional coverings and the asbestos fire felt covering give the best results. (Journal of the Association of Engineering Societies, January, 1895.) A water separator should be placed in the leader to each engine. It should be large in size and placed as close as possible to the engine. A number of patented separators are on the market, but very good results may be obtained by the use of a simple, large tank with the steam entering at the side and leaving at the top and supplied at the bottom with a connection to a steam trap to catch any water collecting in the separator.

STEAM CONSUMING APPARATUS.

The question of the selection of the proper engine to operate the plant is so dependent upon what dynamo is to be used, that it will be best to abandon our arbitrary classification temporarily, and take up first the question of the dynamo. During the past four years, the street railway generator has undergone a radical change. In the spring of 1893 there were installed in this city in the power house of the Cass Avenue & Fair Grounds Railway Company, then being built, the first large direct driven generators of the type which has since become so common. Soon after this the Intramural power house at the World's Fair was put in operation, containing one generator of the same size as those in St. Louis, and another of twice the capacity. Since that time there have been few large power houses built in which direct driven generators have not been installed, and some of the large railway systems have found that economy of operation required a change from the belt, countershaft and unit of small size to the large direct-driven generator. At the present time, the West End Railway Company, of Boston, which may be considered the pioneer in this country in electric traction, is changing its central power station, which had originally been equipped with a very complete and elaborate system of belting and countershafting, to a direct coupled plan.

The first cost of the direct coupled generator is about 35 per cent more than the belted generator in the 500 kilowatt size which is the largest standard size in which the belted generator is made, but when the expense of the belt, belt tightening device, and the floor space is taken into account, the direct connected generator will be found the cheaper. Besides obviating the necessity of the costly and cumbersome belt, the direct connected generator offers the following advantages; in large sizes and in connection with large engines it has a much higher efficiency than the belted unit, it requires a small floor space, it aids supervision by bringing the working parts of the engine and generator close together, it reduces danger, it is almost noiseless in operation, and it may be installed in a larger unit than the belt driven generator which is limited in size by the width of the belt and pulley which may be employed. The main objection which was urged against the direct connected generator was the fact that the shocks resulting from overloads were thrown directly on the engine and that there was none of the cushioning effect that a belt connection might supply. While this is undoubtedly true, the best argument which may be submitted against it is that none of the installations of direct driven generators can trace any trouble to this source. The large, slow speed, multipolar, direct driven generator has become perhaps the most prominent feature of the modern power house and while there may be special services which would necessitate a belted arrangement, it is difficult to imagine a power house thoroughly up to date without direct driven generators.

By varying the number of poles and the number of armature conductors in the construction of a dynamo, the machine may be designed to run at almost any reasonable speed, the slower the speed, however, the greater being the cost of the dynamo. In the matter of speed it is necessary for the dynamo maker and the engine builder to effect some sort of compromise, because it is not good practice to run such large engines at too high a speed. The speeds which are most common are 75 revolutions per minute for the 1,500-kilowatt dynamo, 80 to 120 revolutions per minute for the 800-kilowatt dynamo, and speeds running from this to 150 revolutions per minute for the smaller sizes. These speeds are what would have been considered four years ago quite out of the range of the Corliss valve gear, but the makers of this type of engine have risen to the occasion, and now there are numbers of large Corliss engines driving generators at speeds up to 100 revolutions per minute, and some have even higher speeds than this. Several other types of engines have been adapted to

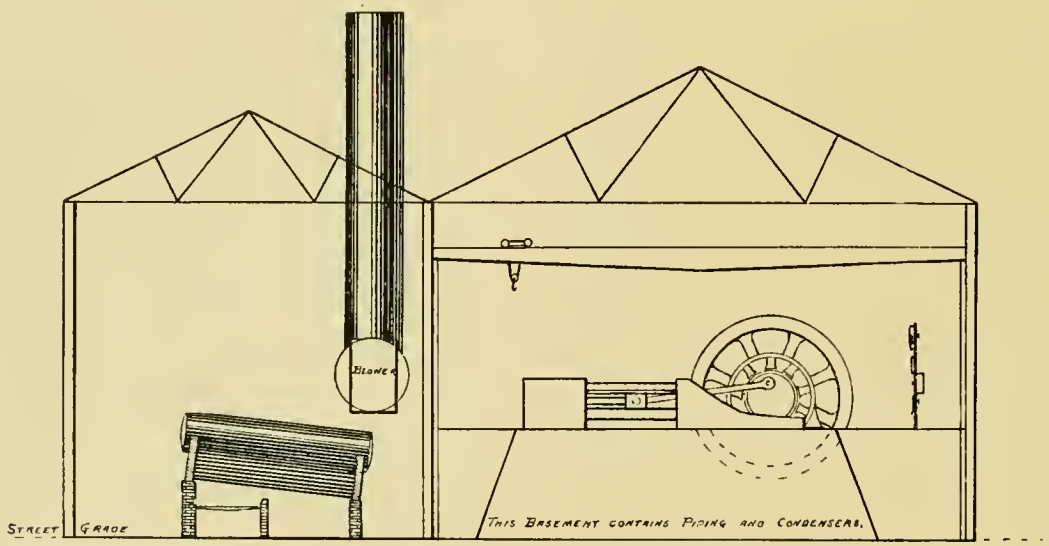
this work and are running quite successfully. Outside of the question of valve gear, most engines made for this work possess the same characteristics, the heavy bed-plate, the solidly constructed fly-wheel now being made of steel plate, the wide cross-head, the large connecting rod and the mammoth main bearings.

The choice between horizontal and upright engines is chiefly one of space. The horizontal engine is the cheaper, the simpler, the easier to inspect and the easier to repair. Outside of the advantage of requiring less space, the upright engine has the advantage of less wear on the cylinder, and a more direct strain upon the foundations.

The usual practice in the most modern power houses is to install compound engines. Most of these plants are so favorably situated that condensers may be operated in connection with the engines. This is undoubtedly good practice, but in case condensers are not used the cost of fuel must be very high for the gain in compounding to pay for the extra investment. Where power houses are favorably situated on bodies of water, condensing becomes a very simple problem, but in case the power house cannot be built on a body of water, as in this city, for instance, in order to use condensing engines, some sort of arrangement must be designed to cool a quantity of water so that it may be used over and over again for the purpose of condensing the exhaust steam. Devices of this kind have long been in use in the city of San Francisco and in Cuba, and lately several of the large manufacturing companies have put on the market complete apparatus for the purpose of cooling water after it has condensed the exhaust steam so that it may be used again for the same purpose. Besides the gain in power by using condensing engines it is claimed that by the use of this apparatus, actually less water is used than if the steam is exhausted directly into the atmosphere without condensing.

In the use of large direct connected units a great deal of the economy to be gained depends upon the selection of the proper sizes of units. The efficiency of a generator will be good when it is operated at more than 75 per cent of its capacity, but the efficiency of an engine drops off very rapidly when it is running below its rated load. In order to achieve the best economy from the use of large direct connected units, the sizes of the different generators should be so proportioned that it is always possible to operate one or more units at their rated capacity. The railway generator as at present built, will stand an overload of 50 per cent for several hours without trouble and at a maximum efficiency. This should be taken into account in the estimate of the dynamos required, but it should always be the aim to have at least one idle machine to throw on the line in case of failure of any of the others. The actual size of the unit depends upon the character of travel which the road possesses and the number of cars, and this must be determined for each road independently. In choosing machines, however, standard sizes should always be adopted, as this obviates any trouble in obtaining supplies and repair parts.

The railway generator switch board has become standardized to the extent that it consists of a panel for each generator, each panel containing the usual automatic circuit breaker, ammeter, field rheostat, field switch and main switch. It is hardly necessary to mention that there should be nothing combustible about the board, and it is not an absolute necessity for the board to contain a marble tablet inscribed with the illustrious names of the president, vice-president and secretary. It would confer equal fame, and perhaps be more economical of valuable space for their names to be handed down to posterity in some manner other than that adopted by the Carthaginian heroes on the walls of Dido's palace. Switch boards as now erected usually contain a recording wattmeter and an ammeter which shows the total output of the power house. The recording wattmeter especially is a valuable instrument, as by means of its readings exact records of the power house may be kept.



SECTIONAL ELEVATION.

The modern method of line construction is to divide the trolley wire into sections and connect each section separately to the main bus bars through feeder panels, each of which contains an automatic circuit breaker, an ammeter and a switch. This method confers the advantages that trouble on the line is always indicated on the proper section, and that in case of short circuits on the line, the main circuit breakers are protected by the section circuit breakers, and the load is not suddenly thrown off the engines by the opening of the main circuit breakers. Most of the generator and feeder boards are supplied with devices for preventing damage to the station machinery by lightning, but a very simple and

effective arrangement is to connect a large water rheostat between the positive bus bar and a good ground. This is either left in circuit continuously with a small current running through it, or is cut into circuit on the approach of a storm.

Besides those machines which are absolute necessities in a power house, there are various devices which may be added to secure convenience and regulation. An overhead crane is installed in the engine room of most of the large modern power houses, and adds greatly to the speed with which heavy repairs may be executed. An oiling system of some sort, by which the oil is either pumped or flows by gravity to the different bearings, obviates the necessity of manual labor in oiling and insures a steady feed at each bearing. A recording steam gage is found very useful in checking up the firemen. An air pressure system is beginning to be used in many of the power houses, by means of which the carbon dust may be blown out of the armature windings. With this apparatus an armature may be kept thoroughly clean, and the danger lessened of short circuits occurring on account of the collection of carbon dust between its conductors.

If readings be taken of the total output of the power house at stated intervals and then plotted, a load curve will be obtained similar to that shown in Figure 1. A study of this will show a very small load through the night from 1:30 to 5:30; a sudden rise at this point to a maximum about 7 a. m.; a lower load through the middle of the day, followed by another peak between 6 and 7 at night, after which the load again suddenly drops. In order to accommodate the machinery to the varying load, the number of dynamos in circuit must constantly be changed, and even then it is almost impossible to suit the power to all times to the load, the dynamos running much of the time either overloaded or underloaded, which of course, means a sacrifice of economy. In addition to the variation of load shown by the curve, there is a momentary fluctuation, due to the starting and stopping of cars, the violence of which decreases with the number of cars in service. It is proposed to remedy this variation and operate the dynamos under a steady load by means of a storage battery plant connected in parallel with the line, charged from the dynamos during the period of light load, and discharged into the line on the heavy call for power. The operation of the plant under these conditions is indicated in Figure 1. Installations of this sort have been placed in several of the large electric light plants, where they are operating with marked success, and there is no reason why they should not meet with the same degree of success in electric railway plants. By means of this auxiliary plant the proper number of dynamos are run throughout the entire day at their full capacity, and hence at their highest efficiency, the battery taking care of all eccentricities in the load, charging when the load is less than the capacity of the dynamos, and discharging when the load exceeds this. The steam plant may be shut down entirely during part of the night, leaving the battery to operate the road, and in case of a break down the battery may be used to take care of the entire load for a short time. The battery is discharged through a booster dynamo, which is so designed that the compounding of the dynamos and batteries are the same. This arrangement is entirely automatic, so that no hand regulation is required. The efficiency of a battery operating under conditions of this kind will be guaranteed by the manufacturers to be greater than 75 per cent and a maintenance of 6 per cent per year on the first cost of the battery will be guaranteed. The great drawback to this system of operation is the large first cost of the battery, which is about $100.00 per horse power capacity, figured on a two-hour discharge rate. A storage battery plant may also be used to increase the capacity of an existing power house, and thus save the necessity of adding more machinery. There is another use to which a storage battery plant may be put which will, perhaps, appeal more strongly to the street railroad man. This is to install it as a substation to maintain the voltage at the ends of long feeders which are subject to fluctuating loads. In this case the batteries are charged from the distant power house and discharged into the trolley wire. The feeders from the power house to the storage batteries are figured only for the average load instead of the maximum load, as would be necessary in case the line is fed directly from the power house. The economy in this installation depends very largely upon the difference in cost between the feeders in the two cases. Besides the question of economy, however, the substation will give the better service as the voltage will not fall and rise with the fluctuations of the load. A battery to be used only for the regulation of the voltage may be installed for about $50 per horse-power.

A number of power houses operating long lines are now equipped either with boosters or high voltage dynamos. Long lines usually have a booster constantly in circuit. This machine is automatic in its action and raises the voltage with every increase in the load. Some power houses operate a high voltage dynamo for use on sections which are subject to excessive loads. The feeder boards in this case are equipped with an extra bus bar so that any section may be thrown on the high voltage machine.

While each individual engineer has his own ideas concerning power house construction and while each road building a power house may purchase different apparatus, there is one general design which has been followed in many of the plants recently installed. It has been adopted by so many different engineers and in so many different places that it might almost be called the modern power house. The general features of this design are shown in Fig. 2. The

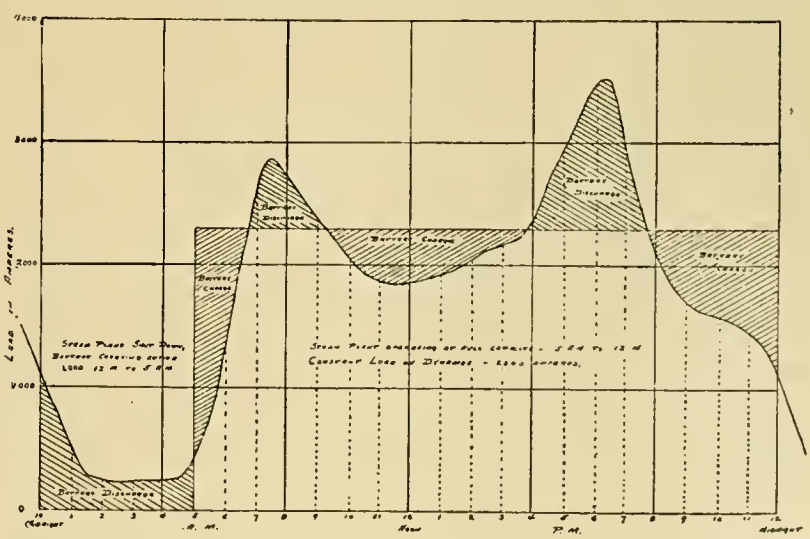
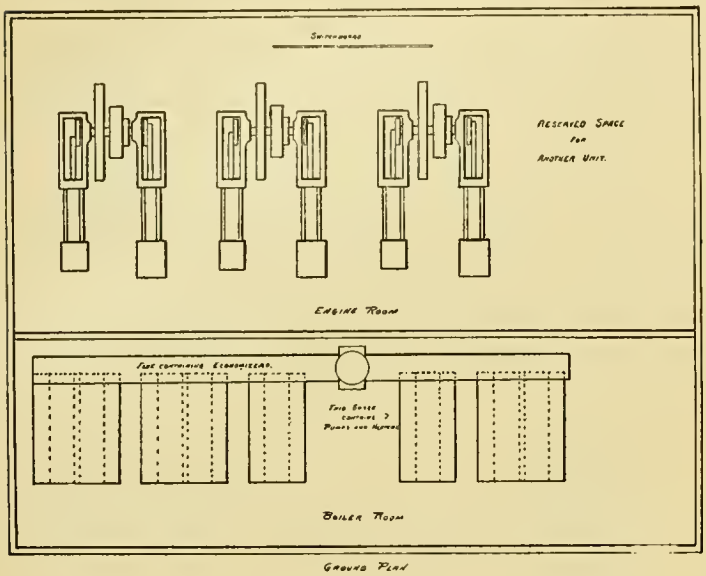


Figure 1.

engine room and boiler room are divided by a brick wall and under different roofs; both are brick buildings covered with an iron truss roof; the boiler room is set on the grade of the street and the engine room ten or twelve feet above this grade, the space below the engine room being utilized for



Ground Plan

the piping and condensers; the engines and boilers are set at right angles to the wall between them, with the engines next to the boiler room so that the piping is made as short as possible and the condensation lessened; the switch board and feeder board are set on the opposite side of the room from the boiler room, so that the length of the dynamo cables is equalized as much as possible. The general features of this design may be summed up as follows: it is compact to save real estate and buildings and to minimize the number of employes and the superintendence. Large units are used for the sake of economy and to save the number of working parts. The building is as far as possible fireproof.

The electric part of the problem has been solved, temporarily at least, by the adoption of the multipolar, direct coupled dynamo. The large, slow speed engine has followed as a necessary consequence and the general direction of improvement in power house construction seems to be toward the use of devices to prevent the waste of heat and to minimize the labor required.

There can be no more appropriate place to quote the proverb that cleanliness is next to godliness. An engine and dynamo room should be kept scrupulously clean. This is especially true in regard to the electrical devices, as a very small amount of grease and dirt in the wrong place will cause serious damage. Beyond the mere æsthetic consideration that cleanliness improves the looks of things, there is also the fact that a thorough cleaning amounts to a rigid inspection, and small leaks and defects are often discovered in this way which might otherwise pass unnoticed until they had become serious matters. It is to be regretted that this advice is not more generally followed, as there is more lost through dirty and greasy electrical devices, badly set valves, leaky steam joints, poor firing and careless supervision than ever will be gained through the use of compound, condensing engines.

As a means of comparing different kinds of machinery, figures as to cost of operation have been collected from some of the large modern power houses, and their comparison re-inforces what has just been stated, that less depends upon the refinements of the machinery, than upon the condition in which the apparatus is kept and upon the supervision to which it is subjected. Among those having the lowest cost of operation was a power house, equipped with direct coupled generators, but operating single cylinder, non-condensing engines, burning soft coal and using hand firing, while among those having the highest cost of operation are several power houses supplied with compound condensing engines, and burning anthracite coal. The lowest results are about three quarters of a cent per kilowatt hour, some records running slightly below this, while the results from some of the large stations are as high as one and a quarter cent per kilowatt hour. These figures include the cost of coal, water, supplies, repairs and all labor, but do not include anything for taxes, insurance, interest or depreciation. The cost of operation depends largely upon the cost of coal and upon the relation of the average load to the total capacity of the power house, the higher this ratio, the less being the cost of operation.

The modern electric railway power house, although it has been developed entirely within the past ten years represents the thought and the experience of many men. It has been developed carefully, detail by detail, until it is now a work both of reliability and efficiency. No one man and no one company can claim the credit for this achievement, but no class of men hold a stronger claim to recognition than the managers and owners of street railroad properties, who have ever been ready to encourage with their patronage each improvement, who have freely distributed the information gained by their experience, and who even in the most radical departures have ever acted with the courage of their convictions.

Mr. Baumhoff: I move you, sir, that the paper just read by Mr. McCulloch be received and spread upon the minutes, that a vote of thanks be extended to Mr. McCulloch, and that advance sheets of that paper and all other papers read before the Association be sent by the secretary to the various member companies. Carried.

Storage Batteries Discussed.

Mr. Rossiter: I ask if any of the members have had occasion to use the storage battery; and if so, with what success?

Mr. President: Has any gentleman here had any experience with storage batteries?

Richard McCulloch: There is one installed somewhere in Pennsylvania, and the Union Traction Company of Philadelphia, have one installed at the end of one of the long lines for the purpose of regulating the voltage at that point; but there is a storage battery in operation in parallel with the dynamos, I think, at Easton, Penn.

Mr. Bean: I see Mr. B. J. Arnold, of Chicago, is here. He is considered a competent authority on storage batteries. I would like to hear from him. He represents some road.

Mr. Arnold: I had not expected to say anything before this convention, but the subject of storage batteries has come up, and as I have had considerable experience with them, I will venture to answer the gentleman's question. Before answering the question, I beg to express my appreciation of the very exhaustive and and excellent paper we have just listened to.

I think Mr. McCulloch has gone into the questions which enter into the construction of a power house more completely than I have ever heard them entered into before, and his conclusions seem to be in almost every instance as nearly correct as we can get them with our present knowledge of power house construction. Certainly St. Louis has all of the conditions necessary for obtaining information on power house construction, and the paper shows the use of these conditions and careful preparation.

In regard to storage batteries, during the last year I have had installed in the Chicago Board of Trade plant, as the consulting engineer for that corporation, a battery auxiliary. In my opinion the work of the plant is more severe, if anything, than electric railroad work, because it operates electric elevators in conjunction with constant potential arc and incandescent lights.

The elevators take a starting current varying from 0 to 800 amperes, and back again almost instantly, corresponding in abruptness to the load on an electric railway operating three or four cars. In the Board of Trade plant the battery auxiliary acts as a equalizer and takes the surplus load delivered into the bus bars, when the demand on the line is less than the capacity of the generator, and takes three-quarters of the overload when the pull comes. The result is, that with a 75-kilowatt generator, running from 7 in the morning until 11 o'clock at night, at its absolutely normal economical load, it produces sufficient energy to operate 52,200 candle power arc lamps, 600 incandescent lamps, four 30-horse-power electric elevators, and six 10-horse-power motors, all running from this one unit, and the unit constantly loaded. That is my experience with the battery, and it is working perfectly satisfactorily, having been running nearly a year, and has cost practically nothing for repairs. We have increased the plant by putting in additional plates, because we required additional capacity, but there was no charge for repairs, and I am convinced that the battery auxiliary, when there is sufficient lead installed to do the work, is an eminent success for regulation work and economical operation of power station operating on variable loads. I do not take this stand without having gone into the matter pretty thoroughly, and I feel sure of my position. You must get lead enough into the battery to do the work, and having that you will get good results that you can rely upon and base your calculations for economical operation.

H. H. Littell: What type of battery did you use?

Mr. Arnold: A battery made by the Electric Storage Battery Company, Philadelphia—Manchester type of plate. That is another thing you gentlemen should be careful about in your investigations—the type of plate you get. It makes all the difference in the world if the plate is built for regulation or for slow discharge. This particular type is for regulation, and also performs the function of slow discharge, if necessary. The engines and generators stand idle from 11 o'clock at night until 7 o'clock in the morning, and the battery does the work through the night. That enables the engine to operate sixteen hours a day, with two shifts of labor, at its economic normal load and shut down at night until morning. That can be effected in a large number of electric plants in this country with success, as I see them. It is only a question whether the increased economy will be more than the interest on the investment of the cost of the battery. I am installing now three different stations, part railroad and part lighting, in which it is my idea to use batteries, by which I will find it necessary to put in one-third less capacity of engines and generators than would be otherwise necessary.

Mr. Hawken: What is the life of the plate under constant use?

Mr. Arnold: I cannot tell you. The plant has not been running very long; only about one year. It is guaranteed at 7½ per cent per annum. On that basis I figure out a marked economy, and feel sure that we are safe, because the company behind the battery will stand up to the guarantee. If we pay 7½ per cent to maintain the battery we will have a large economy. As a matter of fact, it has not cost 1 per cent this year. Probably it will cost something next year, and so on each year, but the battery company stands behind it.

Mr. Harrington: What is the construction of the two plates, the positive and the negative?

Mr. Arnold; The negative plate is what is known as the chloride negative. It is cast lead containing square pellets of spongy lead, originally peroxide of lead, and reduced to spongy lead. The positive plate is a lead grid containing antimony, so as to make it hard, and has round pellets, which consist of strips of corrugated lead, coiled on themselves, like a spiral, the lead being cast around it, or the spirals passed into plate and afterward converted into peroxide of lead by an electrolytic process, and the plate when thus completed is called the Manchester plate. It is porous, and you get a quick discharge on a heavy pull, and it does not buckle and fall out, as some battery plates have done in the past.

One thing I will speak of which may interest you, that is the method of charging the battery. By running the electric elevators and the battery auxiliary in parallel with the shunt winding of the generator, and by running the lights in the building on a separate set of bus bars off the compound winding of the same generator, so that the variable load on the elevators is taken care of entirely by the shunt winding and the battery, while the compound winding works constantly on the lighting load, I get the best regulation, so that the fluctuation of the voltage is not noticeable in the building. There is a slight variation of from two to eight volts under extreme conditions, which seldom occur, but it is good enough in practice, so that one unit does the work without serious fluctuation in voltage.

We use a booster in the station which consists of a motor generator to charge the batteries, if it ever becomes necessary, while the generators are running on the lines, because then the voltage must remain constant at 125 volts. Then if we wish to charge the batteries we use the auxiliary booster to charge the end or regulating cells, while the shunt winding of the generator is working in parallel with elevators and about sixty of the cells. The elevator service is such as to allow the battery to be charged and discharged in about equal proportions through the day so that it is practically fully charged at the end of the day's run, and at night if they are slightly discharged we charge them up with the booster by placing the generator end of it in series with the main generator, and at eleven o'clock shut down the engines and run the lights until morning with the batteries. In a railroad power station it would be necessary to use the booster to increase your voltage on your long feeder. If the battery was located at the end of the line you would have to use the booster to overcome the pressure at the battery, or else run a separate high voltage generator.

Mr. Harrington: I understand from the experience of a large number of railway engineers that the ordinary size plant, running from 200 to 250 horse power, where the load con-

stantly changes, that by reason of trouble on the line, the standard forms of multipolar generators flash from brush to brush, and cause a great deal of trouble in the commutators of the machine. That is a common occurrence in the Philadelphia Traction Company's plant; they suffer from that trouble there. We have had it in our plant, with both Westinghouse and General Electric machines. The storage battery would be an excellent thing to avoid that form of breakdown or delay, due to the burning of the commutator. I would like to know if any one here has had the same experience in the stations operated by the gentlemen here.

The secretary then read an invitation from the Engineers' Club, of St. Louis, to attend a meeting of the club this evening. On motion of Mr. Kelley a vote of thanks for the invitation was sent the club.

On motion of H. H. Littell the rules were suspended in favor of Seiryo Mine, electrical engineer of the Japanese government, and that gentleman extended the privileges of the floor.

The president then announced the following paper, which was read by Mr. Wyman:

HOW CAN THE REVENUES OF STREET RAILWAYS BE INCREASED, TAKING INTO CONSIDERATION THE COLLECTION OF FARES, METHODS OF REGISTRY, TRANSFERS, USE OF TICKETS OR CASH FARES, ATTRACTIONS ALONG THE LINE OF ROAD, ETC.

By C. D. Wyman, General Manager Milwaukee Electric Railway.

I have often found that it gave me a singular pleasure to read something I had long known and felt to be true, but which perhaps, I had never seen in print or in written form. I have thoroughly enjoyed listening to statements of a speaker, who perhaps but restated facts with which I was familiar, but which I had never attempted to place in form for public utterance.

I am consoled by these reflections in the presentation of this paper, for concerning the subject or subjects of which it treats I can hope to suggest little or nothing new, since the problem, "How can the receipts of my company be increased" has been the one question over which managers and directors have grown grey from the beginning of their company's operations.

C. D. WYMAN.

The text that is handed to every general manager, superintendent, and directing official of a street railroad company when selected for his position, reads "Increase your receipts; decrease your expenses," and I suspect that there are few if any untried paths leading towards the consummation to which such a text points.

Almost every company, by virtue of its location, the character of the people it serves, the specific requirements of its charter, and the general conditions surrounding its operation, is obliged in adopting any special method for increasing its revenues, or in introducing changes in the conduct of its business, to take into consideration these local conditions, and these are as various as are localities of operation.

In the general discussion of the topics assigned for this paper these local conditions must be necessarily disregarded and cannot be taken into account, thus leaving to be mentioned only such general features as we may be able to suggest, touching the operation of street roads, which we believe will be found to make for the growth of receipts. At the same time since the net revenue is produced as well by lessened outgo as by an increased income, it will be pertinent to point out if possible some methods by which possibly the coveted fares of passengers may be made the more certain of finding their way to the company's strong box without loss from light or careless fingers.

In many respects rules for the conduct of business that have been found by shrewd and successful merchants as worthy of observance in the securing and retaining of trade, and thus the upbuilding of their business will apply to our dealings as railroad managers with the public, for like the merchants, our companies have something to sell, and while a portion of our trade is derived from those who must purchase from us, much of our custom comes from those who deal at our counters from pleasure, and whose purchases are entirely voluntary.

Our regular line of customers we have always with us, and while their pleasure and comfort is to be cared for, what may be termed the transients, the occasional purchasers of our wares, are to be sought after, catered to, gathered in to increase the regular revenue. In the line of merchandizing, we have rides for sale, and all companies, I doubt not, feel at times that they are overstocked; for the disposal of this stock to attract to our counters not only those who must needs purchase but as well the wandering, uncertain shopper, is desirable.

Imitating the wise merchant, we must seek to place our wares before possible customers in the best condition. We should see to it that what we offer is not shopworn, but is made to appear alluring and enticing. Every car should be a fine looking show window, inviting not only to the regular business traveler, but to the tourist and sightseer as well, who does not know whether to buy a ride or not, and who needs an invitation.

Our salesmen are to be as dapper and obsequious as the well drilled and groomed counter-jumper of the merchant's emporium, and all the surroundings of our business should be based upon the principle that to please is the way to get custom and retain it.

Judicious advertising is, I believe, usually regarded as the coin medium of a merchant's business. What ought a railroad company do in this direction?

Some of us have doubtless felt that the presence of the cars in the streets was sufficient advertisement of the company's readiness to do business, but it seems to me in this matter we may continue our imitation of the merchant in the conduct of his business. I venture to point out two or three methods of advertising which I think may be successfully employed. First of all, what may be termed "Personal" advertisement through officials and employes.

Every person connected with the road should have it thoroughly impressed upon him when he takes a position that his first and primal business is to "talk up" his company at all times, under all circumstances and to every one with whom he comes in contact. It too often happens that a passenger riding upon a car expresses some criticicism to the conductor, motorman, or to an official, and, instead of receiving an assurance that he must be mistaken, that it is quite

impossible that an error such as that of which he complains could happen, or at best that it is surely not the fault of the company, his complaint is readily admitted as just nay, he is almost congratulated upon his cleverness in finding weak spots in the company's armor.

How often some such conversation as the following is to be heard upon the cars: Passenger—"Conductor, what's the matter this morning? The old motor rattles like a box of nails on a rocky road." Conductor—"Oh, I guess the truckman at the barn was asleep last night, and forgot to grease up the machine; those fellows up there don't pay the attention they ought to their business." The passenger alights with the feeling that there is carelessnes in the service, and proud of his critical shrewdness is inclined to gossip of what he has noticed; and thus the conductor has done injury to the company, not only in the case of the individual, but also through him with his friends. Had the conductor said, "Why, I don't notice any special trouble; everything was all right when we went out; I think it may have been some stones on the track from passing vehicles, or at any rate it is no fault of the company, for they are very particular in these matters," the passenger would have left the car feeling he was wrong, and possibly that on the whole the company was doing the best it could.

Often, even in the office and among the heads of departments, criticism is met in a cringing and apologetic form that serves to make it more positive in the critic's mind that his fault finding is well founded. However ready we may be to confess to ourselves that all is not just what we may desire, that our company is lame in some respects, and halting in others, it is certainly the poorest of policy to make such an admission a matter of public notoriety.

Within the circle of our own counsels, the severest criticism of failure to reach the standard we have set for the men or apparatus may be indulged in, but to the public no intimation of our self-condemnation should ever be permitted to go. Of course, there are times when it may be proper and necessary for the manager to admit that an employe has made a mistake, or that some portion of the system is defective in operation, but the general trend of sentiment to be exhibited to the public on the part of the entire force, from the manager down, should be of pride in the company, and a habit of talking up, praising, glorying in the institution with which they are connected, should be made a matter of cultivation on the part of the heads of departments, and insisted upon by them from all in the service.

A merchant going about with a sort of sheepish apology for the business in which he is engaged, the goods which he offers for sale, or the character of the methods which he employs in the conduct of his trade, certainly could not expect that the public would look with greater favor upon his wares and his character as a merchant than he appears to entertain regarding himself.

An individual or a company fixes its own rating often by the amount of self respect it exhibits; there is no reason why a street railroad company, conducted on modern principles, and doing its business in an honorable, progressive and straightforward manner, should not be a subject of pride and commendation on the part of those engaged in its service, and if we are all animated by such sentiments, those whom we serve will to a great extent take their cue from us, and will believe that the road of their city or the particular line upon which they are accustomed to spend their nickels, is one of which they may be proud.

Each company, in dealing with its patrons, ought constantly to impress them with the feeling that they are getting, and the company proposes to give them, the best and finest service that can be offered, and that every effort of the company and its management is enlisted to make the street railway company an ideal one, and an honor to the city it serves.

Advertising by the use of printed matter may also be employed with advantage to place before the public, the street railway company's inducements, and publications of this sort are especially of service to strangers and tourists visiting the city in which the company is located. I have found a little folder, upon one side of which a little map showing the various routes and points of interest in and about the city is printed, and with other pages descriptive of the pleasure grounds, parks, cemeteries and other places of resort, together with the time tables of the different lines of our own system, to be of great advantage. These folders placed at the different hotels, railroad depots and steamer docks, were eagerly sought for by visitors, and distributed upon the cars by the conductors, were very largely used by the patrons of the lines for reference. Our own company issued as an experiment about fifty thousand of such folders at the beginning of the past summer season and the call was so great for them that another issue was found to be justified in a very short time.

If a company's lines have some central point of intersection, from which different routes radiate, signs giving directions and places to which cars leaving these principal points go, may be of value and serve oftentimes to gather into the company's treasury nickels that, without the information so conveyed, would remain in the pocket of the undecided sight-seer. These signs are not expensive and painted upon glass and illuminated, they present a handsome appearance. They can be readily attached to trolley poles and lighted from the trolley current. They suggest progressiveness, and up-to-date policy on the part of the company.

In the endeavor to increase business many street railroads have of late become purveyors of public amusement and as proprietors of parks and outing resorts located upon their lines, have gone into the show business with more or less success.

In studying this new departure on the part of street railroad managers, we recall the Latin adage, "ne sutor ultra crepidam," and quote it as applicable to the inclination of railroad companies to embark in amusement enterprises in connection with the duties directly growing out of the operation of their respective roads.

From such statistics as we can gather, the net revenue gained by companies who have gone extensively into the show business has been in many instances inconsiderable, in some cases a loss has resulted, and but few report substantial profit. Whether to invest in matters of this sort, is however so much a matter conditioned by the local surroundings, the improvement of unfrequented lines, and the ever changing taste of the public, that no general rules for universal guidance can be formulated.

We are inclined to say to the general proposition; "Don't go into the amusement business if you can help it; subsidize those who have made that line of life their study, and give over to them the profit of the enterprise other than that gained by the transportation of visitors to their spectacle or resort; 'shoemakers, stick to your last,' for you have quite enough to do to attend to your own business."

The specially illuminated trolley car for evening excursions is a species of advertising which pays in every way. It can be made a vehicle of pleasure not only to those who pay for its use, but as well to those who delightedly watch its artistic light effects from along the line over which it passes. We believe it tends to popularize the service.

In the smaller cities, the use of the newspaper columns for items of proposed change in car house, equipment, trackage, etc., extensions and improvements ought not to be disregarded. After the wise method of an advance manager for a show, frequently the newspaper should be given news of the proposed improvement about to be entered upon by the railroad company, some new additions to its service, something that will make for comfort or convenience of passengers, or of the proposed opening of some territory hitherto unoccupied.

All this tends to the maintenance of interest in the company and the stimulation of a local pride in its doings. Daily newspapers mold public opinion and are especially influential in the smaller towns. They should, therefore, be made vehicles as often as possible of announcements concerning the growth of the railroad and they should be used to make plain the company's anxiety to please the citizens, and to promote the reputation and the growth of the city in which it is located.

We now pass to the consideration of other methods for the increasing of our revenue with the final advice: Advertise the goods of the company as the best and cheapest to be had anywhere, on all occasions and always.

In the line of making more attractive the service of a street railway company and therefore tending to increase its patronage, the establishment of a liberal transfer system is worthy of consideration. I am aware that the subject of transfers is one regarding which street railroad men differ widely, and for and against which arguments of the strongest kind are at hand.

The difficulties inherent in the wide distribution of transfers, especially upon a large system of railroad lines, are many, among which, the liability of the conductor to make of the transfers an opportunity for peculation and a cover for fraud is most prominent. While in many cities a transfer system has been made a subject of municipal enactment especially in the case of recent charters, and thus would seem to have come to stay, in some form or to some extent at least, it is for us to determine if possible, whether or not the transfer system is a profitable measure for a street railroad company, and thus where it does not involve other considerations whether or not it ought to be readily adopted.

Inquiries made of various railways touching this point lead me to the belief that this question is to be answered in the affirmative. This is especially true of roads making quick time by means of cable or electric power. When a passenger to go a few miles required two or three hours the transfer system was not specially beneficial or attractive to him, if a business man, who could not spend the time to avail himself of the privilege it gave of long distance riding. But now that six mile an hour rate has been increased to twelve, even in the crowded portions of many cities, and to a much higher rate upon suburban lines, longer distances can be traveled by passengers, visits are made possible within a reasonable length of time to widely separated portions of a city and the only impediment to greater through business between such points is often the necessity of paying two or three fares for such a visit or journey.

This impediment once removed, an increase of travel is invited, and a ride upon two or more lines of cars is provided within the same period of time that a single ride was formerly given under the system of horse-car traction.

It is of course a fact that the hazard of accident to a passenger is increased in proportion to the number of lines which he traverses on a single journey, and this with the labor attendant upon the collection and registry of his fare, and his care while on the cars would perhaps be only fairly paid for by a fare upon each line he may use, but the larger number of persons induced to ride by a very free system of transfers upon a system extending to different quarters of the city of its operation, we believe will compensate for such extra hazard and labor, even if it is assumed for a single fare.

This is especially true upon holidays and excursion lines. Almost every street railroad which controls a number of lines in a city has located somewhere upon one of them, and perhaps upon several, points for pleasuring, and to gather from all parts of the city the mass of the people and take them to these places of interest is important.

The laboring man who desires to take his wife and children of a Sunday to some outing place, if he can reach that point from his distant home by transferring for a single fare each, is likely to take the journey. If, however, he must needs pay two or more fares of five cents each to get to the point of his pleasure, he remains at home or reduces the number of persons included in his party.

Another favorable argument for the transfer system is the fact that it leads to the settlement in the suburbs of many persons who would not venture so far from their place of business were they not assured of being able to reach them by the payment of a single fare, and this getting of people from the congested parts of a city to its environs, thus assuring the railroad company of their continuous patronage, is most desirable from a railroad standpoint.

For these and other reasons which might be mentioned, we believe that it may be broadly stated that a liberal transfer system increases both the popularity and revenue of the street railway company by which it is adopted.

It is quite impossible within the limit prescribed for this paper to discuss the question as fully as its importance deserves, whether it will be found generally profitable for an urban street railroad company to sell tickets good for a fare at a reduced rate if purchasing in quantities; or whether the best interests and profits of a company are secured by adhering to a fixed cash fare of five cents at all hours and times.

When the almost universal motor for street railroad use was the horse and the mule, it was a generally accepted fact of experience, derived from the results of street railroad operation in this country, that five cents for an average ride was as cheap as a company could charge and do business at a profit, and was at the same time a most reasonable one for the users of the cars. Thus the charters of nearly all street railroads granted during the horse car period provided that the nickel should be the limit of their charge for a fare.

Is it true as some of our would-be reformers in municipal councils and legislative halls loudly announce when seeking political preferment and a reputation for being what they are pleased to call "friends of the masses," that with the change of motive power from horse to electricity or to cable, the street railroads can now afford to reduce, by the sale of commutation tickets, their fares from five to four cents or even three cents, and still have left a fair margin of profit upon their investment? The cost of transportation of a passenger

upon any individual road can be made a matter of almost exact figures, and we believe that when the items properly to be included in such a computation are carefully set down that the relative cost of transporting a passenger by horse car as compared with that of electricity or cable will be found to be such that any reduction in the fare cannot be made without positive loss to those who have put their money at risk in the enterprise. It is true that with the advent of quicker transit the gross receipts of most all companies that have changed from horse to electricity or cable cars have greatly increased. This is undoubtedly due to the fact that a longer distance can be traveled in the same length of time and the other fact that congested portions of the city have been relieved and the dwellers therein sent to the outskirts, thus creating new centers of population and business; and further that with this change of motive power has come more convenient and pleasanter facilities for transit, inviting not only more of the usual business travel, but an increase in transient, pleasure and excursion riding as well. But to an equal extent with the increase in gross receipts has the expense of installation and operation kept pace and so preserved in net the former figures. The cost of the reconstruction of a system necessitated by the change of cars and stations, tracks, and extensive machine shops, tools and new equipment are the first large items of this expense, and to these are to be added the expense necessitated by costly repairs, in maintenance. Further must be added the increase in wages of employes, engineers, mechanics, electricians, and skilled machinists whose employment is necessitated by the new regime; either because they receive more money for their labor or work fewer hours for the same wages.

A fact that must not be overlooked in this connection is that of the growing demand on the part of the public the company serves, for greater luxury and elegance in the matter of appointments of travel. Our cars must be handsomely and more expensively furnished than were those our patrons were satisfied to use a few years ago. Not only must they move faster, but they must be better lighted, better heated and generally better fitted up for the safety and convenience of passengers than were those accepted formerly. The supplying of these demands has been attended by an increasing operating and maintainance expense. Thus while an increase in the patronage of the road has been in most cases evoked by the change of motive power, we believe it can be safely asserted that little decrease in the expense per passenger carried has been made. This conclusion is brought out by the results attained in the operation of electric and cable roads in the majority of the cities of the country in the past few years, as shown by their reports.

A careful study of the published reports will make it apparent even with the depreciation accounts eliminated that the cost per passenger upon electric or cable roads is not less than that on the horse car which they succeed. As yet as far as urban roads are concerned we cannot discover that on the whole there is any more profit in a well managed electric or cable street railway than there was in a well managed horse car road; and we venture the assertion that to-day less of profit in the form of dividends derived from receipts of operation, is being distributed to shareholders in the modern electric or cable roads, proportional to the business transacted, than was given them by the old-fashioned horse car companies. From the books and statistics of the majority of companies no favorable arguments are to be drawn for the reduction of fare.

It must also be borne in mind in the consideration of this question that while it is an easy thing to reduce the fare of a road, it is by no means as easy to return to the old rate in case such a reduction results in a loss and proves, a failure. Unlike the merchant who at will may raise or lower the price of his wares and for a day may attract a crowd to a bargain counter in the hope that there may be profitable sales effected to-morrow, the loss occasioned by a reduction in street railroad fares cannot afterwards be regained by a corresponding increase above the rate originally receded from. Higher than the five-cent point we may not go, and it once lowered, even with the plainest statements of the loss it entails before the public, an attempted return to the old rate is provocative of dislike on the part of the patrons and is almost sure to set in motion legislative action designed to compel the continuance of the lower fare. Such a reduction therefore since it is likely to be made permanent and continuous, whatever may be its effect on the company, is made at the risk and in the face of the various contingencies, which surround the business of a road which must maintain an uninterrupted service through fat years and lean years, through times of depression and dullness, when competition and an uncertain labor market may make inroads on its income, and therefore is, to say the least, decidedly hazardous.

By the advocates of reduced fares it is ordinarly assumed that the cheaper rate will invite a sufficiently greater number of new riders to make good the difference in income by the lessened price to each. But we believe that a computation based on the earnings of almost all companies at the five-cent rate, to ascertain how many more passengers, say at a four cent fare, would have to be carried to make good the difference between the two rates, together with the increased cost for the more carried, including the risk assumed of accidents, will demonstrate the fallacy of such an argument.

The old adage "quick sales and small profits" will not apply in this matter. A less reduction than one cent per fare will hardly be acceptable or sufficiently attractive to induce a more liberal patronage of the cars. But the reduction of one cent in five entails a loss of a high percentage of the original price and which is much greater than the ratio of original profit.

The fallacy of such a reduction is well stated in the editorial columns of a recent issue of the Street Railway Journal. It is there remarked, "A loss of twenty per cent of their gross receipts following a reduction of fares from five cents to four would send half of our best paying roads into bankruptcy and would so cripple the others as to make improvements in service practically impossible. A further reduction of twenty per cent would make them all shut down."

For want of time we have not made mention of the serious danger to a company of loss through speculation by the conductors where the cash fares upon the road are fixed at one rate and commutation tickets are sold and received at a less rate. If the value of an article consists in the cost of its production and its exchange, we think in the light of present street railroad operation that the standard five cent fare is a just and reasonable equivalent for an average ride upon a street car, and that no reduction therefrom is advisable or expedient.

Whatever clever and ingenious scheme may be devised and adopted by the street railway manager for making more attractive the service offered by the company and thus increasing its patronage, it will fail of its ultimate purpose unless with the growth of business so stimulated he shall exercise

a like amount of skill and sagacity in the selection and training of employes upon whose honesty, faithfulness, intelligence and carefulness he can depend. Attractive resorts upon the route of a road may be opened and fostered; a general system of transfers offering great benefits to the patrons of the line may be introduced; new territory may be occupied; in many ways more travelers may be allured to the cars; still if the fares so brought to the hands of the company's collectors are not honestly handled; if its motive power and the devices for its application are unintelligently and uneconomically managed; and if that measure of discipline which secures the safety of its patrons is not enforced, the increased gain will not be found to result in an increase of the coveted net results.

To state in full the various rules and methods adopted for the securing of the desired characteristics just mentioned on the part of the employes would take too much of our space, already so nearly exhausted. We have not room to speak of the many and various excellent schemes of rewards and prizes offered to their men by not a few companies, for excellence in the matter of freedom from accidents, careful handling of the company's property and perfect reports, schemes which have proven most useful and with which it would do well for us all to become familiar.

We cannot, however, refrain in this connection from congratulating the street railroad companies upon the fact that a superior class of men have of late years sought employment at their hands. The motorman or gripman of today is the superior of his predecessor, the horse car driver. The conductor of the modern fast moving car with trolley to care for, transfers to issue and a more critical public to serve, must needs be brighter and more capable than his brother of the old style car. The chief engineer, the electrician, the master mechanic, and the superintendent are necessarily men possessed of a better education and with a far wider range of thought and information than were those whose duties were limited to the care of horses and stables, mule cars and flat rail tracks, in former days. As our business has grown in its technical and scientific requirements it is attracting a class of men for whom before there was neither call or inducement to enter its service.

These facts are to be considered in the selection of our employes. A regular mental and physical examination should precede the appointment of all trainmen, and in the mechanical departments only skilled men, exclusive perhaps of apprentices, ought to be engaged. Every effort should be made by the manager and his assistants to enlist the interest and promote the education of the employe as regards his duties and the general characteristics of the business.

While it is true that sometimes "A little knowledge is a dangerous thing," we cannot sympathize with that policy which would make of the workman merely an automaton. The rule which some roads have of requiring their motormen to spend a certain time in the repair shops before they can take their places on the cars is one worthy of imitation, and various other methods adopted along a similar line of education are to be commended. But with the desire on the part of the manager to educate the faithful men in the ranks must be a determination to prevent the retention or engagement of the dishonest, the intemperate or worthless.

We venture to make a suggestion which perhaps may aid in the line of this. Let it be a general rule of street railroad companies that all conductors, motormen or gripmen must, before entering the service, procure a bond from a reputable guaranty company. For motormen, this bond would be in the nature of protection against damage to property, in the case of the conductor, damage to property or dishonesty. The company selected for the giving of such bonds should be one having agencies in all of the principal cities and towns of the country.

The modus operandi of the bonding would be as follows: the man seeking either of the positions named, would make application in written form with a statement of names of former employers and their location, and would then be informed that such application would be sent to the guaranty company, and if accepted by them as a good risk, other conditions having been complied with, his appointment would be made. The guaranty company would then in accordance with their usual business methods make inquiry of the reference given, as to applicant's record, and aside from this, examine all records in their several offices in the various cities to ascertain whether the said applicant had ever been the cause of a loss to them upon any former railroad or other position. With this system, in whatever other city the wrongdoer might apply, his second attempt would be likely to be frustrated. The peripatetic fraud would be caught, while the knowledge on the part of those once accepted that if through carelessness or dishonesty their bonds would be forfeited and the record of such a fact placed on the books of the guaranty company would ever prevent another bonding and thus disbar them from the obtaining of another position of trust, would certainly prove a valuable deterrent to initial wrong.

If the street railway companies could but unite in this matter, a responsible guaranty company would no doubt be found who would undertake the work as outlined above, and the cost to employes for such bonds could by arrangement be made inconsiderable. The assurance that the records of applicants would be carefully searched and their subsequent actions carefully noted and recorded would certainly serve to discourage bad men from applying, and restrain others holding such position of trust, as that of train men, from yielding to temptation and going wrong.

The method of an army-like discipline to effect the discovery of offenses, and the prompt discharge of the offender, the setting about the camp of guards and pickets, beyond which no man may pass, is necessary and effective, but after the practice of many successful military commanders, who, when the battle was set, were accustomed to ride in front of the rank and file of the army, and with words of encouragement and cheer stimulate to deeds of daring and devotion, so may we not with success adopt some method of coming into personal contact with our men, not as stern judges, presiding simply at their trial, and prepared to deliver sentence, but leaders, educators and fellow workmen in the business in which we are engaged. In the case of a smaller company this might be accomplished with comparatively little trouble by the manager or superintendent making it a point to frequently meet his employes, either in a group, say at the stations, where there are several connected with the system, or en masse at some meeting held for the purpose. Thus, instead of always presenting himself as a taskmaster, he will be able freely to discuss with them the necessities of the business and the purposes of the company, with especial reference to their individual welfare, and he will have the opportunity to bring before them items of general information touching latest developments in the technique of street railroad work. In this way he and his men will be en rapport, and more cordial relations will be established between them.

Where a company operates a large number of lines, requir-

ing the employment of many men and the division of official work among a number of officers it becomes a question as to the best method to be adopted by the officers for making themselves known to the individual employe other than by the usual style of written orders, promulgated from time to time, and posted in the stations and shops. Having felt the desirability of some other and pleasanter medium of communication with his employes, the writer of this paper, about a year ago began the monthly publication of a little sheet entitled, "Milwaukee Street Railway Bulletin," and its objects were set forth in a short editorial in the first issue to the effect that the publication was issued in the hope that by it might be effected a closer relationship between the management and the employes, based on a more definite understanding on the part of the latter, of the wishes and intentions of the former. It was also announced that as from time to time changes in the method of running the cars, the use of material and the general operations on the road, in the shops and power plant, might be deemed best by the management, either to test or permanently adopt as the company desire, in order to avail itself of the experience of other companies in their work, when after due investigation such experience seemed to offer something desirable for adoption; and as the usual form of such changes as far as the employes were concerned, came to them in the shape of some new rule or regulation to be obeyed in most cases without a clear and definite idea of the cause of such ruling; it was proposed by means of the Bulletin to set forth from time to time the reasons for changes made so that the desires of the company might be thoroughly understood and unity of purpose on the part of both official and employe thus promoted.

It was further set forth that it was the intention of the management to publish from time to time facts and news concerning the business that would be interesting and educating to readers, the results of improvements made on their own and other roads, of the construction and operation of electrical roads, details of which would be usually published in a trade journal and perhaps would not always be accessible to those to whom the paper in question was to be sent.

Following the line marked out for such publication, the little paper was issued each month for more than a year and in each number suggestions, requirements, rules, time tables, etc., were set forth for the benefit of employes. Articles on the best means of handling transfers, the care of street railway motors, the treatment of passengers, and particularly the troublesome ones, statistics of the operation of the road, and electrical information in general were put in print and placed in the hands of every employe. A personal column was also introduced in which mention was made of any act showing especial skill in the avoidance of accidents, in the handling of the motor, etc., and attention was called from time to time to deeds worthy of commendation. To the columns of the Bulletin contributions were invited from the heads of the different departments, and in a column called "Reminders," short articles were introduced calling attention to any laxity on the part of the men in reference to any parparticular rule, together with suggestions how to act under any especial combination of circumstances. To its columns were welcomed contributions from the men and queries addressed to the management by employes were answered in its monthly issues.

The publication of the little sheet was in the nature of an experiment, but the fact was speedily evolved that the paper was of great utility. Its monthly issues were looked for by the employes, and its suggestions were made matters of discussions at the different stations and gathering places of the men. Hardly a conductor or motorman on the road did not carry his copy with him, and often referred to it. The four-page sheet soon changed to one of eight pages, 8x12 inches in size, and a few advertisements, judiciously selected, paid the expense of printing and distribution.

While the preparation and publication of such a paper will necessarily add to the burden of duty, already sufficiently great, in the case of most managers, its value in keeping the men of the line in close touch with their officers by disseminating information of local value in the daily operation of the road, and in stimulating to better efforts by a judicious admixture in its columns of praise and blame, and suggestions to those to whom it is addressed, will make it worth many times over the labor involved in its production. We would recommend a trial by all street railway companies of some such printed sheet for distribution among their employes.

Some companies have fostered what might be termed a benevolent protective society among their men, the officers of the company being included in the scope of such an organization, with a voice in its affairs. We regard such societies as valuable along the lines of which we are speaking, and if tact and skill is used in the official relationship of the company to such a club or association, it can be made the medium of the cultivation of pleasant relations between the employer and the employed.

Reading rooms at the different stations and shops provided with technical journals, as well as the daily papers, for the use of train men and others can be made most serviceable; and all these methods tend we believe, to the retention of good men, the cultivation of good principles on the part of the employes,and naturally the elimination of the bad, the worthless and the ignorant. Given a large proportion of honest and intelligent employes upon a road, and by a natural process of the pressure which good always exercises upon evil, the bad will find themselves out of place and will be forced to leave. The work of the detective bureau, important as it is, ought, we believe, at all times to be supplemented by the most liberal efforts on the part of the managers to impress upon their employes, either orally or in printed form the advantages of doing right, the benefits of an intelligent conception of the scientific facts with which in their daily work they are constantly dealing, and the cultivation of an enlightened public sentiment among them, to the end that the dissipated, the ignorant, the careless, and the dishonest may be made ashamed, and of their own accord seek other positions more congenial to their tastes. Light dissipates darkness.

On motion of H. H. Littell a vote of thanks was expressed for the excellent paper, and it was ordered printed in the proceedings.

Mr. Seely: I ask the author of the paper whether he found any opposition to the issuing of this pamphlet by the trade unions of the city. You were going into the advertising business when you solicited advertisements, and I believe there has been some objection to that by threatening a boycott.

Mr. Wyman: As far as advertising went we only had a very few advertisements, and they were from very strong firms that I do not presume any trades union would have any effect upon. We had, perhaps, half a dozen. The cost of

the paper was very little for the 1,500 or 1,800 copies which were issued monthly about $15 or $20, so that it amounted to little or nothing. It was, however, stated when the first issue came out, that the object of the paper was to disrupt the union. We had at that time a union, which has now passed away, and there was some talk about its being intended to disrupt the union. In one issue of the paper I suggested the formation of a benevolent society, and that caused a great disturbance among the men, but that did not make any difference to us. We went right on just the same, and after awhile, inasmuch as the paper only covered the ground intimated, simply giving information concerning the operations of the road, and perhaps mentioning some employe of the road that did something worthy of notice, all that trouble died out, and we had no trouble of that sort. At first the union looked at it somewhat askance, and I believe advised its members not to read it; but that soon passed off, and every issue of the paper was readily taken by the men.

The President: The next business is the appointment of a nominating committee to nominate officers for the ensuing year and to report upon a place for the next meeting.

Mr. Wyman: I move you, Mr. President, that such a committee be appointed, to report at this session or to-morrow morning, at whichever time the President desires; and that the scope of that committee be the presentation to the Association of the names of persons nominated to fill the official positions, including the executive committee for the ensuing year, and also to present suggestions as to the next place of meeting. Motion put and carried.

The President: I will appoint on that committee C. D. Wyman, of Milwaukee; D. G. Hamilton, of St. Louis; C. G. Goodrich, of Minneapolis; B. Van Horn, of Buffalo; E. G. Connette, of Nashville; A. E. Lang, of Toledo, and M. K. Bowen, of Chicago.

The meeting then adjourned until 10 o'clock Thursday morning.

Thursday Morning.

President Littell called the meeting to order at 10.40 a. m.

The Secretary announced that the following companies had joined the Association:

Street Railway Company of the Federal District of the City of Mexico.

Atchison Railway, Light and Power Company, Atchison, Kan.

H. H. Littell: Mr. President, I feel safe in saying that the exhibit made by the manufacturers and dealers in railway supplies at this meeting is the largest, finest and most complete that has ever been shown at any meeting of this Association. I do not know of any better way to show our appreciation and to encourage the efforts put forth by our friends in the trade, than to take a recess for the purpose of examining in a body their goods and wares. I move that before proceeding with any other business that we take a recess until 12 o'clock, to inspect the display of street railway supplies. Carried.

The meeting accordingly adjourned.

The delegates started out in twos and threes to make the rounds of the exhibit hall; starting in at some given point and going up one aisle and down the next so as not to miss any.

MODERN OVERHEAD CONSTRUCTION.

Paper Read Before the American Street Railway Association by B. Willard, General Superintendent New Orleans Traction Company.

In the equipment of electrical street railways the item of overhead construction is a very important one, and one susceptible of many ideas. There are many different methods and kinds of materials used on overhead work, all of which would go to make up practical and modern construction, but as a matter of fact there are hardly any two installations which are near alike. The reason for such a variety of construction is naturally the result of engineers' ideas, conditions and opinions relative to the merits of different manufactured parts. It is hardly possible to standardize all methods and appliances in such a way as to meet the general approval of different engineers, as the requirements vary with local conditions, and what may be found practicable in one locality may be found faulty in another.

B. WILLARD.

Difference in local condition is not alone responsible for our inability to standardize construction and make it alike, it is because we are trying to arrive at a point of perfection and have a few miles to travel before we are there. The most practical method to pursue is to profit by the successful experience of others, and when we arrive at a point which we consider will admit of improvement, then put our individual ideas into effect.

There is room for the manufacturer to investigate more carefully the outside requirements and to make many materials which would find a ready market, whereas the engineer is now dependent on his ability to devise and utilize such materials at an exorbitant cost.

My ideas relative to what is necessary for practical modern construction will undoubtedly differ in many respects from the opinions of others, and in some instances may be found not practical, but experience has proven to me many important features to be observed in modern construction, and I can only submit what in my opinion and during my experience I have found to be substantially practical.

Trolley line construction can be erected in various ways and still conform to good practice, one difference being in the kind and cost of poles to be erected. There are various requirements governing the selection and kind of poles to be used which determine an important factor in the first cost. Municipal requirements may compel you to erect steel or wood poles, or you may be allowed to make your own selection. In the first instance the price is fixed and you have only one thing to do, in the second instance you have opportunities which are left for your own discretion. The steel pole presents a neat and attractive appearance, also takes up a small amount of space, which are the chief points in its favor. The insulating qualities are not as good as with the wood pole, and although I am not prepared to say positively as to its lasting qualities, I have made some observations of deterioration on wrought iron columns that have been in the ground for several years and estimating that this deterioration would take effect in the same proportion on steel poles, I am convinced that in a moist climate a limit

of the practical life of such poles would not be over thirty years. While I am not strictly an advocate of wood poles, I am of the belief that from a practical and financial standpoint, wood poles should be used in many instances.

Through the business sections of cities steel poles are in some respects better, as they are not affected by being wilfully or accidently mutilated. In suburban or resident districts the wood poles, when properly dimensioned answer every purpose, and appear fully as well as the steel poles. A heart pine or cedar pole will, if properly selected and kept painted, last in some climates twenty years. This is a known fact from observation of poles that are now in sound condition after having been erected for that length of time.

Suppose we select New Orleans as a suitable location to build a road and base our estimates on cost of material there The cost of steel poles would be greater than in many northern cities, owing to freight rates and distance from the manufacturers of such poles. Wood poles can be furnished for less in New Orleans owing to their near production, so that I think an estimate covering cost at that point would be a fitting proposition elsewhere.

Steel poles for one mile of span wire construction, 104 poles at $15.00 each would cost $1,560, and assuming their life to be thirty years, the interest on your investment for thirty years at 5 per cent per annum would be $2,340, or a total first cost and interest of $3,900. The setting of steel poles necessitates the use of concrete, which is an expense to be figured over the cost of wood pole setting, so we must figure at least the cost of such material and labor which at $4.50 per pole, or $468 per mile, figured with interest for thirty years at 5 per cent per annum, would be $1,170, or a total for interest and first cost of material and labor of $5,070, which is to be considered against the cost of one mile of wood pole construction covering the same period.

Assuming the life of wood heart pine poles to be twelve years (instead of twenty years) I will base a comparative proposition on that basis, taking the interest on each investment and carry through to the expiration of thirty years. Wood heart pine poles for one mile of span wire construction 104 poles to the mile at $4.50 each, would cost $408, also suitable labor and material for erecting at $2.50 per pole, $260, or a total first cost of $728; to this must be be added interest for thirty years at 5 per cent per annum, $1,092, making the first investment at the end of thirty years $1,820. At the expiration of twelve years the construction must be renewed at a cost of $728, and to this must be added interest for eighteen years at 5 per cent per annum, $665.20, making the second investment at the end of thirty years cost $1,383.20.

At the expiration of twenty-four years the construction will be renewed for the third time at a cost of $728, and to this will be added the interest for six years at 5 per cent per annum, $218.40, making the third investment at the end of thirty years cost $946.40, a grand total for wood pole construction of $4,149.60.

The difference between total costs of steel and wood pole construction for a period of thirty years would be $920.40 per mile, which would be more than a liberal allowance for changing span wires and other work, but assuming it would take this amount, we would stand even at the end of thirty years and still have six years more paid for on wood pole construction. If steel span poles are used, I would recommend for the average span of 40 feet a pole weighing about 700 pounds, made in two parts. The lower section to be constructed of 6-inch extra heavy, and the upper section of 5-inch standard steel pipe swaged at the joint for a distance of 18 inches. Such a pole to be 28 feet long, 18 feet for the lower and 10 feet for the upper section, and provided with a cast iron and wood pole top for the attachment of the span wires. Such poles should be provided with a wood filling to fit the bottom of the lower half to prevent it from sinking, and should be set 6 feet in the ground with a rake of 10 inches from the perpendicular to allow for being straightened when under strain. The average size of hole to be dug would be 20 inches in diameter with a depth of little over 6 feet requiring (after the pole is inserted) a mixture of about ½ cubic yard of concrete, composed of one part of Portland cement, two parts of sharp sand, and four parts of broken rock. The cement should be given at least three days in order to set firmly before attaching the span wires. Whenever it is practicable to allow poles to bear against the curbing this should be taken advantage of, as it affords an efficient stay to assist the pole in resisting the strain. Should it not be possible to secure use of the curb (or paving) a good sized rock having a bearing surface of about one square foot would assist very much, and keep the pressure from cracking the cement.

If wood poles are used where it is necessary to make neat appearing and substantial construction, I would recommend for the average span of 40 feet a long leaf yellow pine pole, dressed and chamfered, 30 feet long, sawed square, 11 by 11 inches at the base, and 7 by 7 inches at the point, free from sap, rot or knots, and corners evenly chamfered 1½ inches, beginning at a point 14 feet from the base, and terminating in an octagonal form and roofed evenly for a space of 3 inches.

In setting wood poles where concrete is not used (and I do not consider it necessary) a great deal depends upon the soil encountered. Whereas it is necessary to use very little prepared material for filling in some localities, it will take a quantity in others, so I will mention what would be required in a soil of medium clay and character which would probably meet the average condition. Poles should be set 6 feet in the ground with a rake of 12 inches from the perpendicular to allow for being straightened when under strain, and the hole should be dug to a vertical depth of 6 feet (or more if necessary to allow the pole to stand a given height above the track) in the ground, and should be about two feet square at the top and not less than 18 inches at the bottom. Where it is practical to allow poles to bear against the curbing (or paving) this should be taken advantage of, and it will not be necessary to use other material near the surface as in iron pole construction, but it will be necessary to place a substantial bearing at the heel to prevent the pole from pressing through the earth; for this purpose a small quantity of coarse broken stone or brickbats will answer every purpose, and where this is not easily obtainable, and the earth is soft, a piece of plank 12 inches wide by 3 inches thick, 4 feet long, sharpened and driven in the earth to a depth of about 2 feet at the back and base of the pole will give good results.

Whenever it is necessary to erect poles in the absence of substantial material at the surface such as paving or curbing, I would recommend that the base of the pole be well rammed with broken rock for a distance of 18 inches, taking pains that the greater quantity is placed at the back where the pressure is greatest and leaving a small quantity in front where no pressure takes place. The space to within 20 inches of the top may be filled with earth taken from the

hole and well rammed. To prevent the pole from yielding at the surface, a breast plank of oak (or cypress) timber, 3 inches by 12 inches by 6 feet should be placed and spiked in front and at right angles to the pole, about 8 inches under the surface of the ground, which would make a suitable bearing surface, and resist the span wire strain. About 20 inches from the top of the hole and in front of the breast plank should be filled and well rammed with the same material as is used at the base of the pole. The necessary quantity of broken rock required would be about 2-10 of a cubic yard to the pole.

Poles of wood or steel which may be used for holding strains at curves should necessarily be heavier than those used for straight line construction and should also be set at greater depth in the ground. Steel poles of proper dimensions for curve construction would be made in two joints and constructed on the same principle as the straight line pole, excepting with heavier dimensions of pipe. A steel pole for curve construction should be 29 feet long, made of 6 inches and 7 inches extra heavy pipe, the larger section to be 19 feet long and the smaller section to be 10 feet long and made to weigh 1,050 pounds. Such poles should be set 7 feet in the ground, and raked 10 inches from the perpendicular in a direction radiating from central point of curve where strain is required. The filling necessary would be the same as specified for straight line iron pole construction.

Wood poles for curve construction would be made similar to those specified heretofore for straight line construction, excepting dimensions of such poles should be 31 feet long by 14 by 14 inches at the butt, 9 by 9 inches at the top, chamfered from a point 14 feet from the base to the point terminating in an octagonal form and roofed evenly for a space of 3 inches. Such poles should be set 7 feet in the ground and raked 12 inches from the perpendicular in a direction radiating from the center of curvature where strain is required. The hole should then be entirely filled with about 7-10 of a cubic yard of broken rock and well rammed.

The holes for eye bolts should be bored in wood poles before their erection and should be bored so that the bolt will incline slightly downward towards the eye to prevent the water from following in and rotting the top of the pole. The correct location for eyebolt holes would be determined by the height at which the trolley wire is to be placed; 22 feet from the base of the pole would be correct, assuming that we allow 2 feet for drop in the earbody and ear, and also dip in the span, which would make the height of trolley wire about 20 feet. To facilitate the setting of poles to a uniform height, it is a good plan to place grade stakes near the location selected for poles indicating a given height relative to the grade of the track.

Center pole construction is required in many locations and may be more adaptable than other methods, but I consider span construction better, owing to its flexibility and for being less unsightly. There are now on the market appliances for making bracket suspensions flexible, which are an improvement over the old type of rigid construction. One of the most practical which I am familiar with is an attachment to receive a short span of flexible wire and the ordinary straight line hangers.

Poles used for center and bracket construction should be made according to the same specifications as those used for span construction, excepting that an ornamental pole top would be required for the steel pole instead of an insulated one. Much can be spent on ornamentations on center and bracket construction, but it always occurred to me that the most practical is ornamented enough and places the cost where it will do the most good. For the bracket arm a 1½-inch pipe of the required length, attached to a malleable iron collar made in halves and encircling the pole, and supported by truss rods leading from the end and center of the arm to near the top makes excellent and neat appearing construction.

Wherever guard wires are required, it will be necessary to leave about two feet additional space on the top of the pole above where the trolley span wires are attached for the attachment of the guard wire span. It would hardly be practical to provide an insulated pole top to provide for both span wires, so the trolley span would be supported by means of a wrought iron clamp collar encircling the pole at the proper point and provided with suitable insulating fastenings. I do not especially approve of this method of construction (as I do not favor guard wires), but I would recommend it where it is compulsory to erect guard wires.

All poles should be painted with one coat before their erection, as it affords better opportunities to carefully apply the priming coat, and at less expense than after the poles are set. A paint of dark green, composed of graphite mixture, I find to wear well, and although it costs more than some other paints, it has better lasting qualities (especially in iron work). A second coat of this paint, after the poles are erected, will cover marred places made necessary in setting, and will look well and last for at least two years.

SPAN WIRES.

Span wires necessary for trolley suspension should be flexible steel, 5-16-inch in diameter, composed of 7 strands of No. 12 galvanized wire, and when under strain with conditions of pole setting, as I have stated, would have a tension of about 750 pounds when erected. Whereas I have allowed 18 inches for sag in the span, it probably would not be over 12 inches at the time the wire is first suspended, but will gradually sag more as the wire stretches and the poles spring or yield in the ground, so if a 40-foot span is attached 22 feet above the rail surface the trolley wire within the course of a year would measure approximately 20 feet above the rail.

Where wood poles are used (or wood pole tops for steel poles) the ordinary 5/8x12-inch eyed bolt, threaded about 4 inches, answers every purpose for the attachment of the span wires, and other devices more expensive, used for the same purpose are not necessary. Poles when properly set will bear a given strain on the span wires for many years without much yielding, consequently an adjustable device is rarely if ever used. Hard drawn copper trolley wire of No. 0 B. and S. gage has been found to be the most practicable dimension of wire, and is generally considered a standard for most trolley construction; therefore, overhead appliances are made of various manufacture to meet such requirements. There has been a trolley wire recently manufactured in the form of a figure "8," which is now in use on some roads and has given very good results. Where this wire is used it leaves a perfectly unobstructed surface for the trolley wheel, and gives greater current carrying capacity, but in modern construction the hanging appliances have reached such a degree of perfection that the round wire can be used with equally good results, and as the trolley wires on large systems are relied upon but little as a conductor for current capacity, I can hardly recommend anything that would be more practical than the round wire.

Span wire hangers and insulators are of various forms and compositions, and many possess equal merit, and I would recommend for straight line work those most indestructible and possessing the best insulating qualities. The best forms of such hangers are those where the insulation is concealed from the weather as much as possible and having a metallic covering to prevent them from being broken by accidental contact of the trolley pole. Brass hangers are more expensive than iron, but resist the moisture, and are maintained at much less expense. Iron hangers, if kept in good condition, should be painted at least once a year, as the oxidization if allowed to accumulate will form a conductive contact between the conductors and span wires, and in course of time will cause the escape of current by leakage. Hard rubber insulation for hangers is more expensive than many other compositions, but from my experience must say it has fine insulating qualities, and stands different conditions of climate with little or no deterioration.

Suspension ears are of as many varieties as hangers, and I have experienced the use of many such appliances and have concluded that a little modification of the old brass solder ear is the most practical and lasting of all, if properly attached. A solder ear should be 15 inches in length, tapped for 5/8-inch cap bolt, and provided with thin lips at either end, so dimensioned as to encircle but little more than half the trolley wire, and one point which should be observed very particularly is to have the ends of the ears ground to a thin tapering end, so that they will become flexible with the vibrations of the wire. If the ends are made heavy or unyielding the vibrations will have a tendency to detach the ear at the points, and when this takes place it is a question of a short time before the ear is wholly detached.

Insulators and hangers for curve construction, like straight line material, are of many designs and permit of wide selection. However primitive may seem my ideas of this particular part of construction, I can only give good results from my experience. I favor what is known as the gooseneck hanger, which is simply a 5/8-inch steel forging formed of such dimensions as to allow good clearance for the trolley wheel, and fastened to the soldered ear in a manner to permit it to swivel, also provided with an eye for the attachment of pull over wires. Such devices are strong, and do not present an obstructive object for the trolley to catch in. There is no insulation attached to such ears, and this is the only thing in their disfavor, but as there are many insulating devices to overcome this difficulty which can be attached to the hanger this could be considered a minor point.

A great deal could be said about overhead curve construction, but there are so many different conditions to meet I will simply conclude my description with a double right angle curve of 60 and 50 feet radius. The pull off ears should be placed 11 feet 8½ inches apart on the outside curve, and those on the inside curve 9 feet 10 inches apart from center to center (commencing at point of curve), so that the pull off wires between the two curves run longitudinally from the axis of the track curves. The three central pull off wires leading to the center pole would terminate in an iron ring 3 inches in diameter, fixed at a point about 20 feet from the trolley wire and attached to a single 3/8-inch cable fixed to the center pole by ending in a strain insulator. Each of the other pull off wires would lead directly to their respective poles, all ending in a strain insulator fastened to the pole top. Each of the suspension ears should be placed directly perpendicular over the track centers and each provided with a strain insulator between the trolley wire and pole.

There is a wide difference of opinion relative to the arrangement of sections and the methods of feeding such sections of the trolley wire. In many installations a practice is made of leading each individual section feeder to the station and separating the trolley into sections by sectional insulations, making it possible to cut out the various sections at the power house. This is a convenience in one respect, and that is, it makes every section of the line directly controllable from the power plant, but there are other things equally as important to consider, which may convince you that better results are obtainable through another method, and that method would be to have every feeder on the whole line doing a share of work at all times, whether the cars be assembled on one section or distributed over the entire line. This, of course, can only be done by means of connections representing the whole line as being in one general section, making short sections controllable by external switches. In the first method mentioned an accumulation of cars may be assembled on one section not estimated for carrying an abnormal load, consequently the feeder would be overtaxed on this particular section, whereas the feeders on other sections would be doing little or no work. Consequently an unevenness of potential between the the adjoining sections. If there is a bridge around each section insulator connecting each section together and connected by a feed wire so that the current will equalize itself between two sections and so the current will distribute itself from all feeders, then we have a small amount of variation of potential from section to section, and every feeder is auxiliary to each other.

I have observed in most all instances that when an accident occurs to a trolley wire the whole line is for a time disturbed in its service until the proper attention has been given to the external circuit where the trouble occurs, and those on the ground are the ones who are depended upon for relief before the forces at the power house are aware of the extent of the trouble, and the switchboard tenders are always under instructions or advice from the emergency crew. Consequently, I maintain that efficient external line appliances that are controllable by emergency forces meet the most important requirement, and the most efficient line can be built with a general feeder system leading from the switchboard and controllable as a whole for each individual line, and not separated into sections requiring separate feeders for each section leading from the station. To accomplish this method of uniting the trolley sections the line is divided into sections by means of sectional insulators, each section so proportioned as to meet the estimated feeding point where the feeder is to be attached. A switch-box is placed on the pole at a convenient height, in which is contained two switches and fuses, one for the section on either side of the sectional insulator; the feeder is then divided by connection through each switch so that the feed wire delivers current to either section through feeder span wires attached to connections on each side of the sectional insulator. When the entire line is in operation there is an equalization of current in all sections, and the trolley remains virtually as a solid conductor, but with all necessary features for disconnecting the sections.

Feed wire distribution is an important item in all installations and varies with local conditions, such as distances, amount of work to be done, and cost of producing power. As this is a mathematical problem that is made fitting to

meet each of the local conditions, I will only undertake to define a general system for erection and distribution.

The large cables are dead ended in the junction frame by use of eye bolts and strain insulators, and connections are made with the bus-bar with copper tee connections. The branch feeders are ended and connected in the same way, so that it is possible with little delay to cut out any feeder and make changes which are often necessary during progress of operation.

In most localities where a large system of feed wire distribution is required, it is necessary to erect special construction for that purpose. The most economical plan is to select centers of distribution reached by the most direct routes from the power station and establish at such points what may be called junction poles to which are attached the heavy trunk line feeders leading from the power plant, and smaller feeders for distribution to the trolley line. By this plan we may erect wires of 500,000 or 1,000,000 circular mill capacity from the plant to the junction pole, and end same to a junction frame or frames attached to the pole—which is provided with a bus-bar of sufficient carrying capacity to carry the current of the branch feeders.

Southern pine cross arms 5x3½ inches bored, to receive 1½-inch pins and doubled on each pole, will make sufficiently strong construction to receive the heaviest wires The pins should be of locust wood, bored to receive a ½-inch bolt, which should extend vertically through the center of the pin and terminate with a washer and nut on the under side of the arm.

Top groved glass insulators are desirable in all classes of heavy feed wire construction, and their adoption is to be recommended. Feed wire conductors of larger area than 0000 B. and S. gauge should be in stranded or in cable form, tripple insulated with the best waterproof covering. Care should be taken in splicing cables so that an even strain is brought on each smaller wire, and are not allowed to remain without good contact, and that all flux used in soldering is carefully removed before tapeing.

Devices have been used for connecting cables, but none are to be recommended in favor of the splice made with the cable itself.

Protection from lightning is now occupying the attention of many railway companies, and there is a wide difference of opinion relative to merits of lightning arresters and their application. I have received correspondence from many different railway companies, and in one instance there are two arresters located for 42 miles of road, whereas in another instance there were six to the mile. The general idea seems to be two to the mile, and situated at or near the junction where the feed wire is attached to the trolley wire. It is somewhat difficult for me to explain all the details of construction in a manner to be digested intelligently in the mind without referring to some illustrations covering the points in question, so I have furnished the association with some photographic illustrations which may be used in conjunction with my description.

Mr. Scullin: I move that this paper be accepted, that a vote of thanks be extended to the gentleman, and the paper be spread on the minutes of the meeting. Carried.

Election of Officers.

The president: We will now receive the report of the nominating committee.

Mr. Wyman: Mr. president and gentlemen of the Association: On behalf of the committee I wish to say that we found ourselves when assembled to confer together regarding the nominations in the position of a man embarrassed with riches. There were so many devoted laborers and adherents and assistants in this railroad association, whom it would have been the pleasure of the committee to name as nominees for official position, that it was a very difficult task to make a selection from among them. I am prepared to present to you, however, a report covering the results of our deliberations and best judgment, and we trust that the same will be found acceptable to the convention.

Mr. President and gentlemen of the American Street Railway Association: Your committee on nominations by its chairman submits the following report:

President, Robert McCulloch, vice-president and general manager, Cass Avenue & Fair Grounds Railway Company, St. Louis, Mo.

First vice-president, Charles S. Sergeant, general manager, West End Street Railway Company, Boston, Mass.

Second vice-President, D. B. Dyer, president, Augusta Railway Company, Augusta, Ga.

Third vice-president, C. F. Holmes, general manager, Metropolitan Street Railway Company, Kansas City, Mo.

For executive committee:

H. M. Littell, vice-president and general manager, Metropolitan Street Railway Company, New York City.

H. P. Bradford, general manager, Cincinnati Inclined Plane Railway Company, Cincinnati, Ohio.

Charles H. Smith, superintendent, Troy City Railway Company, Troy, N. Y.

Harry Scullin, vice-president and general manager, Union Depot Railway Company, St. Louis, Mo.

George B. Hippee, general manager, Des Moines City Railway Company, Des Moines, Iowa.

For secretary and treasurer.

Thomas C. Penington, treasurer Chicago City Railway, Co., Chicago, Ill.

Mr. Bean: I move that the report of the committee be accepted and the secretary be instructed to cast the ballot of the association for the gentlemen nominated. Carried.

The secretary duly cast the ballot.

The President: We are pleased to announce that the vote for the officers nominated is unanimous.

Calls for Mr. McCulloch.

Robert McCulloch: Mr. President and gentlemen: I cannot make a speech, and I will only say that if I had constituted the entire nominating committee, or been the returning board, or if I had carried the electoral vote in my pocket, you would have had a different standard bearer for the ensuing year, but for fear you may think I am not appreciative, I will not criticise your action. I thank you for the personal compliment you have paid me, and the courtesy you have extended to the city of St. Louis; and all I promise you is that while I sit on the executive throne of the association your banner shall not be trailed in the mire. (Applause.)

Niagara Falls Selected.

Mr. Wyman: The nominating committee also beg leave to report that after due consideration they have named as the expression of their best judgment for the next place of meeting, Niagara Falls. (Applause.)

Mr. Lang: I would like to add a word to the report,

because of criticism that I have heard since it has become known that Niagara Falls was the place recommended by the committee for the next meeting. Some of the material men have said that they thought there might be a lack of facilities for getting their heavy machinery and cars in and out, and discussing this matter this morning with Mr. Van Horne, of Niagara Falls, he assures me that it will be most convenient to get cars and machinery in and out, owing to connections they propose to make, not only with the street railways, but also with the steam railroads, so that we can assure the builders of cars and other supplies that they will have no difficulty in handling their material.

Mr. Bean: I move that the recommendation of the committee be adopted, and that Niagara Falls be the next place of meeting. Carried. (Applause.)

No Fusion With N. E. L. A.

Mr. Seely: Mr. President, I beg to offer the following resolution: Whereas, suggestions and propositions have been made looking to the consolidation in one body of the American Street Railway Association and the National Electric Light Association,

Resolved, That in the opinion of the American Street Railway Association such union is not called for. (Applause.)

The president put the question on the resolution, which was adopted.

The secretary read the following cablegram from W. J. Carruthers-Wain, of London, England:

"Much regret invitation too short to enable president and myself to attend; best wishes for overwhelming success."

Proposed Standard Rules for Government of Employes

The Secretary read the following letter:

To the American Street Railway Association:

Gentlemen: I would respectfully ask that a committee of five be appointed to consider the propriety of this association adopting a standard code of rules and regulations for the government of employes—something similar to the practice of steam roads.

I fully appreciate the objections which this will meet with, but believe it is in the line of advancement, and any road can adopt the rules in their entirety or in part. Local conditions would make it necessary for changes in a larger number of the rules than would probably be adopted, but in the main the instructions to conductors and motormen about reporting, conduct, etc., would apply to all. It would be valuable to have this class of employes educated, so that their principal duties would be the same on all roads.

Owing to the opening of a new line it is necessary for me to leave here at noon to-day, which is my reason for addressing this to the convention in writing. Respectfully yours,

Ira A. McCormick.
Gen. Supt. Brooklyn Heights R. R. Co.

H. H. Littell: I move that the suggestion of Mr. McCormick be carried out, and the committee appointed. Carried.

The President: The chair names for this committee: W. F. Kelly, Columbus, O.; M. K. Bowen, Chicago, Ill.; E. C. Foster, Lynn, Mass.; Ira A. McCormick, Brooklyn, N. Y.; H. H. Vreeland, New York City.

Adjournment was then taken until Friday morning.

In the evening the annual banquet, mentioned elsewhere was given at the Southern.

Friday—The Closing Session.

The session opened with President Littell in the chair, who called for the following paper:

THE SELECTION AND MANAGEMENT OF EMPLOYES.

By W. F. Kelly, Superintendent Columbus Street Railroad.

"It is a good divine that follows his own instructions; I can easier teach twenty what were good to be done than be one of twenty to follow mine own teaching."

The writer lays no claim to being wiser than his generation, nor to have discovered new and startling facts in human experience. He does not presume to instruct veterans in street railway management, but merely offers for your consideration some stray chapters from the book of experience. Nor is the experience necessarily personal. Much of it is gathered from observation and inspection in a dozen different cities. The suggestions which follow are not specifically what to do, but rather what not to do.

W. F. KELLY.

An intelligent consideration of a man as an operative presupposes a knowledge of the conditions and environments under which the operative exists. What these conditions are, or seem to be, depends largely on the point of view. The public view it from one point, the employes from another, the manager from a third, and the stockholders or owners from still a fourth. From these various points of view arise the complex relations of the street railway to the general public, and to its employes. The manager is doubtless familiar with the view of the stockholders, whom he directly represents, but he is too frequently unfamiliar with the view of the general public, whose patronage he seeks, or with that of the employes, whose service he receives.

To the public mind a street railway is the visible, tangible property with which they are in daily contact, and the intangible, shadowy something which they call the management.

The physical character of the property they judge of by observation. The management, they judge by the character of the employes with whom they are in daily contact. In a large system perhaps not one in ten thousand knows the general manager by sight, and not one in twenty thousand have ever seen the president. The mild-mannered, long-suffering manager, known and beloved by his friends and neighbors for his many kindly virtues, is too frequently in the public mind the embodiment of all that is selfish, cold blooded and rapacious. If the common talk of the every day world is to be believed, he delights in irritating and insulting the public, in the oppression and abuse of his employes, and is always endeavoring to rob the people or the city of their rights.

How does such an impression become current? Perhaps through the publication of his official acts and partly through the men employed on your cars; not that they willfully

malign the management, or openly condemn or criticise it, but by their conduct and bearing toward the traveling public, they unconsciously create this impression. The president, manager, and entire directory may be the most capable and eminent business men in the city, the personal character of every one above reproach, and yet collectively they are powerless before that common final tribunal, public opinion. The street is the forum and the street car the tribunal from which emanates public opinion. The employes reflect the character of the management, and whether we wish or not, the public consider the car employes with whom they are in daily contact, as representing their policy and attitude toward the public. We touch the public and have our measure taken largely through the men who man and operate our cars.

The average American enjoys a "kick" and unfortunately, the operation of a street railway system offers abundant opportunity for the exercise of this glorious privilege. The conductor or motorman affords the readiest victim, and the kicker enters up judgment on the management according to the manner in which the innocent employe receives and disposes of his kick.

The pernicious idea that anybody can run a street car has in the past, resulted in the employment of an army of careless, coarse and incompetent men, who through their ignorance, carelessness and incivility, have done more to bring street railways into public disfavor than all the official acts of its management and directory.

The manufacturer selects his salesman, not alone on account of his knowledge of his wares, but more largely on account of his ability to meet and treat courteously and kindly present and prospective customers. The merchant insists that his clerks should be courteous, diplomatic and obliging, as well as honest and faithful. We may not know either the merchant or manufacturer, but we judge them by their agents and their salesmen.

In the commercial world, the merchant, banker or manufacturer thinks it of enough importance to personally take great care in the selection of his representatives. The average street railway management is content to leave this most important matter to an overworked, underpaid subordinate, with but a limited conception of the essential qualities of a first-class employe.

The manager has time to discuss a fare register, a sand box or a truck, but he hasn't an hour to give to the choosing of his public representatives. The selection of the human machine, which is far more important, more difficult to understand, more difficult to operate, causes the most trouble and expense, and fails most frequently, is too often entrusted to a man already burdened with many details.

The manager thinks it essential to have a competent, well-paid man to purchase necessary supplies. If cars, motors or power station machinery are to be purchased he gives it careful personal attention, and calls to his aid skilled experts in order that there be no error in so important a matter.

But the employment of conductors, motormen, inspectors, foremen, etc., the working force who earn and waste your money, who make your system popular or odious with the public, who operate your cars skillfully and safely or awkwardly and dangerously, who keep your repair and accident account at a minimum, or make them a heavy burden, who collect and account for all of your earnings, or filch a portion for their personal use, this large body of men, the very life blood of your system, you leave to the selection and care of some one you wouldn't trust to buy a street car or select an office boy.

The purchase of supplies, equipment or station machinery are all important matters, and should be carefully considered, but the selection of fifty or a hundred men of the wrong kind is far more important and more expensive than a dozen blunders in the purchasing department.

Every employe of a street railway should be considered as an agent with possibilities of harm to his employer. It is not enough that he be intelligent, sober and industrious He should be of good judgment and sound thinking, and neither communistic, socialistic or anarchistic in his views; not discontented and at cross purposes with the whole social order, but of cheerful disposition and content to make the best of life as he finds it.

The physical and intellectual qualities of the applicant should both receive careful consideration. Well-bred, sound, vigorous men, with a fair common school education, can be readily secured, and the wide-awake management should be satisfied with nothing less. In order to exclude many undesirable applicants, a high standard of physical qualifications should be established and adhered to rigidly. Certain previous occupations are considered as disqualifying.

Policemen, firemen, steam railroad employes, political appointees are as a class undesirable. There may be individual exceptions but they are rare.

Friends or relatives of the directory or other company officials, relatives or political friends of city officials, brothers or near relatives of present employes are most frequently inefficient and troublesome. They are a dead weight on the neck of the active manager and no matter how excellent the reason, every dismissal involves an explanation, and frequently ill-feeling on the part of those who have been favored by having their friends appointed. Fitness should be the sole standard for securing a position. The manager should have no favorite or relatives on his force, and should be wholly untrammeled by his directory or superior officers. Either he is large enough to discharge the duties of his officers without suggestion as to details or else the property needs a new manager.

In large systems the duties of general manager are so numerous that he thinks it impossible to devote his time to the employment and discharge of conductors and motormen. Then by all means relieve him of many of these. Plenty of competent men can be found to purchase materials, jolly the council, place insurance, adjust damage claims, etc., but few men have the clear judgment and broad mindedness to select the best class of men for their service and to deal fairly, firmly and kindly with their faults and failures.

No class of public service is more exacting than that of the street car employe. In no other business do the public get so much for their money and grumble so much because they don't get more. In no other business is the employe so much the personal representative of his employer as in this. What do we expect and require of him? That he be always prompt in reporting for duty; always quick and accurate in the various details of his business; honest, sober, intelligent, trustworthy, clean, courteous, smiling, patient, good natured, never weary, always ready to help everybody, always obedient to several dozen or hundred rules; in fact, a model of all the virtues for $2 a day. Desiring all these, there are some managers who require yet more. I have in mind one prominent city road in which nearly all of the employes are of one religious belief, and others find it diffi-

cult to secure employment. Another in which all the employes are opposed to this belief, and yet another in which they are almost wholly of foreign birth or parentage. In the first two cases this condition arises largely from the personal prejudice of the manager, and in the other through a mistaken notion of economy. It is fair to assume that neither of these managers are of that broad gage type which places high character and efficient service above political or religious creed.

Granting that there has been careful and intelligent selection, it is equally important that there be wise and considerate management. Rules applicable to individual conduct are not necessarily applicable to men as a class. The class is above the individual and the rule must be adjusted to meet the average requirements. Many of the rules in existence today are the heritage of the old days when the street car employe was "Something better than his dog, a little dearer than his horse." Rules were then made to meet the exigencies of the case and in accord with the duty and character of the employe. Frequently the only rule was the whim of the foreman or "Barn Boss." In time various miscellaneous practices crystallized into custom, and finally became a well settled practice.

The electric motor and the cable ushered in the new era of city surface transportation. New blood and new capital entered the field, but many of the old customs and old employes remained. The change from animal to mechanical traction has been swift and startling. In many places the horse car is but a memory, and the mule driver is an extinct species. Track, cars and power station up to date, but the method and management of the men who operate the cars are that of the past decade.

It is conceded that a different type of men is necessary, and on various systems there has been a noticeable change since the horse car days. True to natural law, the fittest have survived and a superior class of men now operate the cars. There has not been on the part of the managers in all cases so marked an improvement in the modification and amelioration of various harsh practices. It is urged that the more intelligent superior type of man is deserving of better treatment than the mule whacker of ten or twenty years ago. Frequent and severe punishment for petty offenses should be abolished, and a code of rules established worthy of the men and the business they represent. The almost universal practice in punishing minor offenses is to "lay off" the employe from one to ten days without pay, which is in effect a fine of from $2 to $20. The man is soured, his family suffers from the loss of earnings, and if the man happens to be a conductor it is not surprising if he tries to get even by nipping fares. The practice is still adhered to by many railway companies, and the offenses which the punishment is supposed to correct still continue. Such a practice would not be countenanced in a manufactory, a store or in commercial affairs. Why should it be on street railways? If the man is valuable enough to be retained in service, why should his family suffer the loss of his wages? If the man were permitted to continue at his work and one-half the amount he would lose by laying off were assessed as a cash fine, the practice would be condemned in unmeasured terms both by the press and an indignant public. If employes are not amenable to reprimand administered in a proper way, then they have not your welfare at heart, and should be dispensed with altogether. An entry, together with date, should be kept of all occurrences connected with every employe. It should show his absence from duty, whether from sickness or other cause, his various little lapses from duty, disobedience or neglect of orders, etc. This record should be frequently examined by the manager, and when it is evident that the man is making no improvement replace him at once without waiting for "something to happen."

All foremen and sub-foremen should be impressed with the idea that all men under their charge should be treated in a gentlemanly manner and with the utmost fairness; that there should be no favoritism in recommending men for promotion or in shielding them from punishment. Much depends on the integrity and good judgment of the division foreman. It is, therefore highly essential that there be no mistake in selecting men for these positions. If they are not active, loyal and interested in their work, discipline will be lax and unsatisfactory service the result.

Employes should not be censured for light or trivial causes or on ex parte testimony. Reprimand should be kind but pointed and manly, and never in public or in the presence of his fellows. Deal fairly and justly with every man and teach the men to feel that each case will receive careful unbiased consideration, and that for similar offenses the same and certain punishment will follow in all cases.

Drinking on duty, drunkenness, frequenting saloons or gambling rooms, or association with loose women are all inimical to good service, and merit dismissal.

Revise your rule book and eliminate all useless and harsh rules and insist on a strict observance of the remainder. Study it and see if many old customs should be not be abolished and new ones inaugurated. Put yourself in the employes place and see how many of them you think are necessary in order to secure efficient service.

A number of large railway companies have in recent years furnished comfortable and attractive waiting rooms for their men, with reading room, lavatory, etc. This is neither charity or generosity. It is a plain business proposition that the company will obtain better and more satisfactory service if the men have cosy and attractive quarters about the car houses. The manager too frequently thinks that when he has done all this, his men have no cause for complaint and that they are ungrateful and unappreciative Let him look beneath the surface and discover the cause of the irritation. He will probably discover that somebody is not receiving fair play. That their is some discrimination in promotion, punishment, hours of labor, etc. The grievance may be only imaginary but until it is considered and adjusted it creates grumbling and discontent as surely as a real one. To obtain the best service there must be a feeling that the manager has a personal interest in the welfare and success of his men. Prizes for good conduct and satisfactory service, beneficial organizations, reading and recreation rooms are all helpful and in the right direction; but courteous and manly treatment, and a kind word now and than smooth away the irritations of an exacting service more than all else. The man must feel that you respect his manhood, integrity and fidelity; that aside from his service as an employe you have a human interest in his success as a man. He has a right to feel that years of right living and faithful service entitle him to your confidence and that his good character should shield him from evil report.

Improved conditions, shorter hours of labor and better wages have all contributed to make street railway service more desirable and attractive to a high class of labor. Formerly it was considered that street railway men were

necessarily a shifting, thriftless class whose term of service was of brief duration. Street railway managers seemed to think it a part of the daily program to discharge somebody or employ somebody—anybody—in his place. Men looked upon it as a makeshift job—a chance to pick up a few dollars while waiting for something better to turn up. The result was a miscellaneous aggregation of men with no higher interest in the welfare of their employer beyond receiving their wages. Happily this condition is fast passing away and the best street railway systems today are those which have given most care and attention to the selection and treatment of their men.

We may never reach that ideal condition where every man is capable, honest and trustworthy. It is none the less worth striving for, and the manager who most nearly approaches it has within his grasp the highest elements of success. With the whole body of employes loyal, faithful, intelligent and devoted to their duty, gross earnings would be increased and operating expenses diminished, personal injury claims be reduced to a minimum, secret service agents no longer necessary, the occupation of the labor agitator gone, the kicker silenced, and that peace of mind of which the general manager now only dreams, will become a reality.

The writer was given a vote of thanks, the paper ordered on the records, and the secretary ordered to furnish copies to the press of the city.

Discussion of Mr. Kelly's Paper.

Mr. Scullin: I would say that in connection with that part of the paper which relates to the furnishing of reading rooms, lavatories, and sort of reception room for the men, our road took that step about a year ago when we were building a new shed. Some of the men suggested it, and I thought it was a good idea. We formerly had no waiting room for the men, except a little cubby hole in which the men were crowded in the morning, and the result was that instead of their remaining at the depot they would hang around saloons. We put in a nice waiting room for them, with a library containing a few standard works, and subscribed for some of the magazines. We also put in a gymnasium for them, not an expensive one, but provided with a punching bag, lifting machine, etc. In this way we can always find the men. When we want an extra man, he is on hand, as there are always a number of them reading or exercising in the waiting room. We also provided a bath room with a shower bath, and in every shed we are now putting in these rooms. It is a splendid move, and the men appreciate it; but as Mr. Kelly says, it is not an act of charity—it is a duty we owe to our men. The street railway men will never regret having taken this matter up.

In relation to taking a man off, and making him lose a great deal of time; while I am rather a young man, at the same time I have given considerable thought to this subject. I find that if you take a man off, and let him lose two, four or six days, or whatever the case may be that man is not a millionaire, is not making a great deal of money and has got a family to support, and the chances are that he can just make both ends meet. If you take the men off you take part of his livelihood away from him, and he is going to get it, if he can. A better practice is to reprimand a man, not take him off, reprimand him once or twice—show him that you mean what you say—and the second or third time let him go, if he does not believe you or take notice of what you said to him, but do not keep his wages away from him, whether he is a conductor or motorman; if you do, they will try to make it up.

Robert McCulloch: We have three or four different gathering places for our men, and we have three rooms at each of three different places, which we have equipped very nicely for the comfort and convenience of the men; one of them in particular is eighty feet square, it is heated by steam and lighted by electricity. The men have built a very nice stage, and have organized amongst themselves, among other things, a Thespian corps, and they give remarkably good performances of a theatrical character from talent among themselves. They have a piano and a dancing master who comes there, and they have dancing classes, and bring their wives and daughters to them, and our hall is much in demand for the giving of entertainments by church organizations in the neighborhood. We give it to them free. The hall has done a great deal of good to keep the men out of the saloons, and to furnish them a place where they may have any kind kind of gatherings which they may desire. We exercise a control over their organization by having some of our officials as members of it, and prohibit any discussions relating to the affairs of the company or the relations of the men to the company. They may debate any questions they choose of a general nature. We allow no liquor to be served there in connection with their entertainments or with those that are given by others. We have kept the character of the place respectable and it has been running now about six years, and it has done a great deal of good. A great many of our men do not appreciate these things, but we don't feel that we have wasted any money.

Mr. Mahoney: I would like to get the views of some of the gentlemen present as to the custom of charging the employes with trival accidents, breaking wagons, etc., whether they are to blame in the matter or not. I would like to hear an expression of opinion as to whether it is good policy to charge the employes with the trivial accidents. With our company we have not been doing it. If you charge a man with the breaking of a vehicle, and he has not money enough due him to meet these demands, he may be on the eve of quitting and may do much mischief.

H. H. Littell: I do not think that two cities of any size can be governed alike in these matters in all respects. The question of making a motorman pay for damages to a vehicle, etc., is probably a very serious one. On our system in Buffalo, we sometimes make them pay a portion of the cost when we are convinced that it was the carelessness of the motorman that caused the accident; but in a great many cases, if after investigation we find that he is not to blame, we pass it over. I think if they are careless and break a vehicle, or injure the car, and you charge them with it, it is not so liable to occur again; but if a man continues to have accidents of that nature, it is a good thing to dispense with him before something serious happens. When we discharge a motorman for breaking a wagon, or causing an injury to the car, we do not deduct anything from his pay.

In regard to rooms, I think that all well regulated street railway companies should have closets for their motormen and conductors, some place where they can hang up their rubber coats and put in their overshoes and heavy gloves, where they can change their clothing, if they desire; and these closets, or wardrobes, should be thoroughly ventilated. We have ours with a wire screen in front, and then there is an opening between them, leaving an inch space between

the different little wardrobes. It enables air to circulate, and if anything is damp or moist, it will dry out. I think it is positively necessary to have a good place where the men can congregate and read, play a game of cards (so long as they do not play for money), smoke, and have chess and checkers, and any amusement that will keep them at the proper reporting place. We have nine such places; we have lavatories at all of our buildings, and all the necessary conveniences.

Mr. Musser: I ask Mr. McCulloch if they pass their employes free to and from this place of amusement at all times?

Mr. McCulloch: Our employes ride free on their badges, at all times.

Mr. Bendure: I find it a good plan to retain some of the wages of the employes to cover these minor accidents. Before I did that there was trouble all the time with the men getting too near buggy wheels. I made it a rule to retain $15 from each motorman, and $10 from each conductor to cover damages to the property of the railway, or the public, if they were to blame, and damages to trolleys and overhead switches. I have had the rule in practice now for ten months, and I have not had to deduct a dollar for these damages. They have almost entirely ceased. We run six cars, and in my brief experience I find it a good thing to do.

Mr. Lang: I do not know that I can add much to what has been said with respect to the government of employes. I will say, however, that we make it a practice to require the men to meet the expenses of accidents occasioned by their gross carelessness; if there is any douht in the matter, we decide it in favor of the employes. I think if this system is carried out with discrimination, the results will be very good. With respect to the furnishing of reading rooms and conveniences for the men, we do it as far as we possibly can. It is our intention to enlarge upon this plan, and it is very interesting to know from those who have entered upon that experiment that it is beneficial to the company and the men alike. I certainly think we must get nearer to our men, and while the experience with these matters is sometimes very discouraging, owing to the fact that some men do not appreciate these things, yet if we can reach eighty per cent of our men in that way, we have done ourselves good and also the men.

Mr. McCulloch: The question of fining a man or making him pay for damages is a very serious thing. We have not done that. If I think a man ought to pay for a damage or deserves punishment, I discharge him. We have, in many instances offered a gripman or motorman the alternative of paying for a damage or giving up his place. That would be where men had several small accidents, and in some instances they have declined to pay and have given up their places; in others they have accepted the condition, paid the damage and retained their places, and we have very seldom had another accident from that same man. We have never both discharged a man and made him pay for the damage.

Mr. Scullin: I would like to hear some of the gentlemen present say something as to the methods of laying men off or reprimanding them. I believe it is an important subject, and I would like to hear some of the gentlemen give their views as to how they handle them; whether they reprimand them and discharge them, or lay them off and fine them.

Mr. Jones: In that same connection I would like the gentlemen to say what they do with reference to bulletining men when these damages are charged to them, when they are discharged, and things of that sort; whether they put up a bulletin and notify the employes that such and such a thing has been done.

H. M. Littell: I will say in the company I am connected with, all reports regarding accidents, dismissals and suspensions are put on the blackboard. When a man has been reported four or five times he is then warned. We have a book in which we make the entry of the date of a man's employment, and any record in regard to his references is kept in another book. Every time a report comes in against him it is entered in this book; it does not make any difference what it is. When there are eight or ten reports against him the book is then handed to the superintendent, who calls the man, reprimands him and enters in red ink "warned," with the date. Another eight or ten will come along, and he is warned again. Probably that man's page will be filled up before he is warned three or four times, and then he is discharged. When he is discharged we never re-engage him.

As to accidents on our cable and electric roads, when a man has an accident he reports it at the end of the trip. He walks into the station and dictates a report to the stenographer. When he gets back on the next trip the report is written out and he signs it. He does not lose any time. This port is then sent to our claim department, and if the claim agent thinks it necessary to talk with this man he sends for him; he is called to the office. When he leaves the station the foreman gives him a card, for instance, John Smith left the station at 9:10 a. m. He goes to our claim department, recites his case, and the claim agent then endorses on this card, retained until 3:10 p. m., or whatever time he was kept at the office. This goes back to the division superintendent and he O. K's. it. If the man has been five hours away, he is paid for it. If he loses one hour he is paid for it. If he loses a day he is paid for it. In that way we believe we get our men to report all accidents, even the most trivial incidents.

It is the small accidents which give us the most trouble—accidents which in the mind of the conductor, or gripman, or motorman, he would think well, that is not worth reporting, and he says nothing about it; but the railroad company may hear of it in a month or two, or possibly a year or two, and these are the most difficult cases we have to defend, because we have no report and no witnesses. The conductor has gone or the gripman has disappeared. We talk to our men and try to impress upon them the importance of reporting everything. It does not make any difference if a man stubs his toe on the car we want a report of it, if the conductor knows about it. If a man falls off a bicycle alongside the track, and there is a car approaching, we want a report. If a man stubs his toe on the street crossing, and falls while a car is passing, we want a report of that. As I said before, we try to get reports of accidents of every kind and nature which occur on our cars or adjacent thereto.

With regard to rules, we have rules; but we believe we can do more with our men by getting them together and talking to them. Our gripmen and conductors have a club, called the Metropolitan Club, with such a large membership now that we are compelled to increase the size of their quarters. We finished a few days before I left home, a room 120 feet long by 80 feet wide. They have a stage and piano, and the room is well lighted. We have in this room controllers, grips, and other appliances; we have miniature cars, and tracks with the conduits exposed; we have broken grips. If a man should have an accident with the cable, or the cable broke, we bring

in the piece and show it to the men, and tell them how to avoid it. We believe we can do more by talking to them than by trying to reach them through a book. They have their toilet rooms, etc. We do not put them together. We have a conductor's room, a driver's room, a gripman's room, and a motorman's room. They do not associate together at all. You will rarely see a conductor in the motorman's room, or a motorman in the conductor's room. They have their own lockers in the separate rooms, and have checker boards, tables, chairs, and all that kind of thing.

About discharging men, I have a report come to the office every week, giving the number of men discharged on each division, and if I find that the division superintendents are discharging too many men, I send to the stations and get the records of the men and find out the reasons. I am quite positive that there have been a great many men discharged unjustly, for no good reason. Our foremen are as liable to make errors as the men are to make them. If a man is discharged we require that his complete record be sent to the main office—sometimes it takes a sheet of paper typewritten, a yard long. It makes our foremen careful, and they are not going to discharge a man for some trivial offense. We do not like to change our men. If a man does something which is not exactly right, we talk to him, and we try to make it pleasant for him and keep him in our employ. The men are paid more wages the second year than they are the first. We believe that is some inducement for the men to stay with us.

H. H. Littell: Our road is not as large as the one represented by the President, but we make a record of every complaint that comes in against either a conductor or motorman, but we do not wait until there are four or five complaints against him—we call him down on every complaint, either by sending for him when he is off duty, so that he shall not lose any time, or sending a man to him to call his attention to what he is reported as doing, which is in violation of our rules, or which, in our opinion, is a violation of good judgment. I think it is due to the man that he should be told, if it is possible to do so, every time that he is reported. We punish our men a little differently, I think, from the methods pursued on most roads. I find if you have a man who has been on the road for some months, and he gets a little careless, it is a very excellent punishment to put him for one or two days on some other route, with some old motorman or conductor, as the case may be, and let him practice "sub it" as we call it. It is the most effective punishment we have yet introduced. We apply this remedy for slight offences, such as omitting to announce streets, failing to keep the platforms clear when it can be done, etc.

There was some further discussion on the subject of transfers, children's fares, and methods of checking conductors' collection of fares; but being in executive session, the matter was not issued for publication.

Mr. Goff: I move that a heartfelt vote of thanks be extended to the people of St. Louis, especially the ladies of the Entertainment Committee, for the very kind, courteous and hospitable manner in which they have entertained us, and for their labors in our behalf. I think they set their aim high, and you will all agree with me that they have overtopped the mark. This is one of the best meetings of the Association we have ever had, and in leaving you, I leave you with the toast, "Here's to your good health and your family's; may you live long and prosper."

The President put the motion, which was unanimously adopted by a rising vote.

Mr. Seely: I move that we thank the Local Committee; these gentlemen have worked night and day, and we are under great obligations to the Local Committee.

Mr. Goff: I move that the Secretary be instructed to send to the St. Louis Local Committee a letter conveying our assurances of esteem and appreciation. Carried.

Mr. Scullin: I move that a vote of thanks be also tendered to the supply men for the magnificent exhibition they have given us in St. Louis—one of the grandest ever gotten up of street railway supplies of all kinds. They have worked hard and spent a great deal of money. I do not know whether they are going to get just returns or not; I hope that they will. They have helped us greatly and show that they are with us body and soul; and I think we should thank them heartily. I move that we tender them our thanks.

H. H. Littell: I take great pleasure in seconding that motion. When you take into consideration the disturbed financial conditions of the country, the display they have here is perfectly wonderful; I heartily second the motion.

Unanimously carried.

Mr. Bean: I move that a vote of thanks be tendered to the president, vice-presidents and members of the executive committee for the efficient discharge of their duties and the able manner in which they have conducted the affairs of the Association during the past year. Carried.

New President Installed.

The President: I will appoint Mr. Lang and Mr. Bean a committee of two to escort the newly elected president to the chair.

Mr. Lang: Gentlemen of the Convention, it is hardly necessary for me to say a word in introducing our new president, Mr. Robert McCulloch. His name is as well known to you as his face; and I bespeak for the coming year a very successful and pleasant era in the history of the Association, and hope that we will all meet together again at Niagara Falls. (Applause.)

President Littell: Captain McCulloch, I am delighted to have the pleasure of turning over to you the president's gavel; and I trust that in occupying this position you will find it as pleasant a duty as I have found it. (Applause.)

President McCulloch: Gentlemen, all that I can say is that if you will give the new executive administration the same support as you have in the past, we will prosper as we have in the past. I hope our relations will all be pleasant, and that we shall have as successful a meeting at Niagara Falls, and our intercourse be as pleasant as it has been in St. Louis. (Applause.)

H. H. Littell: Before we close I want to say that the next meeting will be held at Niagara Falls. Buffalo is twenty miles away, and I expect to be in Buffalo up to that time and probably a little longer. Our office is at the disposal of any of you gentlemen, and if there is anything I can do for you in relation to the next convention, I should be glad to have you write me, and I will look after your affairs as well as I can, and certainly will reply to any inquiries you may make. When you are in Buffalo I want you to make our office your headquarters; come and see us and stay with us.

President McCulloch: We held a meeting of the executive committee last night, and the committee desires that the members shall write to the secretary, making suggestions for titles of papers for the next meeting, and if desired the persons to prepare them. We cannot promise to adopt all the suggestions which may be made, but we will do what we can in that direction.

Mr. Seely: I move that a vote of thanks be extended to the steam railroad managers and the steam railroad associations, both of the eastern and western sections, for their courtesy in enabling us to return to our homes for a one-third fare. Carried.

Mr. Davis offered the following:

Resolved: That the secretary be instructed to obtain from the members of the association information and copies of municipal legislation relating to the imposition by their cities or municipalities of taxes or license fees upon the companies property, franchises or receipts.

The foregoing was referred to the executive committee.

Mr. Goff moved that the meeting adjourn to convene at Niagara Falls the third Tuesday in October, 1897. Carried.

Social Features.

The arrangements for the entertainment and social functions have never been equalled at any former convention. Especially was this true as regards the attention paid the visiting ladies, and the contrast between the utter absence of any such courtesies last year, was very marked. The St. Louis ladies spared neither themselves or opportunity to make their guests welcome, and had the entertainment been in their own homes it is hard to conceive what more could have been done. They were waiting in the parlors each morning, and remained until the last visiting lady had retired. And the reception was in that royal, thoughtful, whole-souled spirit for which the south is famous. The appointed committee of ladies includes the following, but was constantly assisted by many more St. Louis ladies:

LADIES ENTERTAINMENT COMMITTEE.

Mrs. Robert McCulloch.
Miss Susie Cayce.
Mrs. J. M. Brady.
Mrs. E. Strassberger.
Mrs. J. B. Padfield, Jr.
Mrs. Oscar Enders.
Miss Ella Hudson.
Mrs. J. S. Minary.
Mrs. Arthur Partridge.
Mrs. F. B. Brownell, assisted by Miss Brownell.
Mrs. G. D. Rosenthal.
Mrs. Harrison.
Mrs. F. R. Henry.
Mrs. Claude Kilpatrick.
Mrs. Q. Ebanues.
Mrs. C. N. Duffy.
Mrs. J. W. Blow.
Mrs. Robert Lehmann.

The local organization for the entertainment of the association was:

Robert McCulloch, Chairman.
P. C. Maffitt, Ways and Means.
Harry Scullin, Entertainments.
Geo. W. Baumhoff, Exhibits.
Jos. S. Minary, Hotels, Halls and Depots.
Robert Lehmann, Information.
John Mahony.

Excursion to Forest Park.

At 2:00 p. m., Tuesday, the first day, a trolley ride was taken to the beautiful Forest Park, with the ladies entertainment committee in charge. The ride was a pleasant one. On arrival an elaborate lunch was served while a fine orchestra rendered popular music. A novel feature was the singing and performance of a band of colored singers and musicians, which gave a real glimpse of southern darkey music. Souvenirs were distributed and at four o'clock the return was made by a different route in tally-hos and carriages, passing through West Moreland, and some of the finest residence streets in the city. The local ladies were so distributed that one occupied each carriage and pointed out prominent residdences and other interesting features. The air was just cool enough to make the ride enjoyable, and a bright October sun poured a flood of light upon the many tinted foliage. The occasion was one of the most enjoyable of the whole convention.

Tuesday Evening Reception.

The evening reception was likewise a great success. At 8:30 the delegates and supplymen, with their ladies assembled in the parlors and parlor corridors of the Southern, and a most pleasant evening was enjoyed. The rooms and walls were lavishly decorated with trailing vines, palms and potted plants, and a large orchestra furnished the choicest music. The work of the entertainment committee was such that there was an entire absence of formality, while old friends exchanged reminisences of former meetings or made pleasant new acquaintances. At 11 o'clock the dining room was opened and the "lunch" found to include a most elaborate repast served in courses, being the third lunch of the day, which, with the regular hotel menu made six times the visitors were dined. It is needless to remark that none went hungry to bed. The ball room was opened at midnight and not until after 2 o'clock did the entertainment committee find their first day's work completed.

Excursion Wednesday Afternoon.

Promptly at 2 o'clock fifteen of the elegant double truck white cars of the Citizens' Railway left the Southern, conveying the guests to the Fair Grounds where the association was the honored guest of the jockey club. The procession of cars, all as neat as wax, was headed by the superb private car Ariel, occupied by the officers and executive committee, and was observed by large crowds which lined the streets along which the procession passed. On arrival at the grounds a most delightful and elaborate lunch was served, after which the visitors watched the races from the galleries of the club house, or strolled about the grounds. A fine group photograph of the party was taken by Straus, the St. Louis artist, which proved unusually fine even for so large a group. Returning by a different route a stop was made at the Cass avenue and Fair Grounds power house which had been made as neat as a parlor, and which was generously praised. It was not until after five that the last returning car reached the hotel, after an afternoon of keenest enjoyment, to which the genial warmth of a bright October sun lent special delight. The party included a large number of ladies, whose bright costumes and brighter faces added largely to the charm of the outing. On reaching the hotel the ladies hastened to their rooms to dress for the theatre party in the evening, while the gentlemen filled the easy chairs of the large parlors, or gathered in groups in the corridors, smoking, chatting and telling stories.

The Theatre Party.

Not by halves, but on a broad scale, were all the entertainments given her guests by the street railway fraternity of St. Louis, and hence when the theatre party was given Wednesday evening, nothing less than the entire first floor of the house seemed to satisfy the generous hosts. The play, In Gay New York, was very enjoyable, and was given in the handsome new play house, the Century, which was opened only three weeks previous. The local committee took pains in issuing the tickets that friends and acquaintances were seated together, and the intermissions gave opportunity for pleasant chats. The new house is of good size and decorated in extremely good taste, and is one of which any city may well be proud.

Thursday's Excursion.

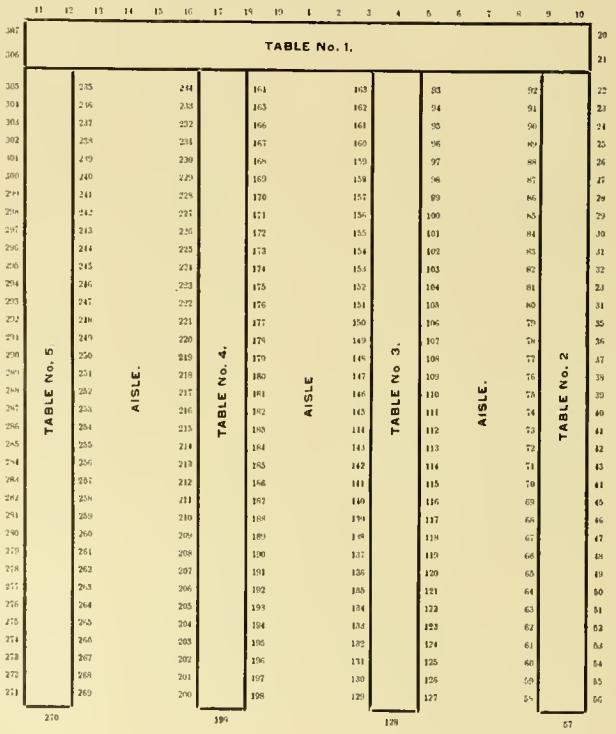
Among its other big things St. Louis boasts the largest brewery in the world, and at 2 p. m., the visitors took cars for a ride to inspect the immense plant of the Anheuser-Busch brewery. The ride was largely through the cyclone district, and while repairs had removed much of the disaster, there were abundant evidences remaining which were of intense interest. On arrival at destination a visit was paid the costly private stables, and a stroll taken through the plant, where the various processes by which hops become beer, even to the packing room, were seen. Then a group photograph was taken and a return to the hotel for dinner and preparations for the banquet.

The Banquet.

The spacious dining room of the Southern certainly was never more attractive, or seated a finer company at table, than assembled Friday evening for the annual dinner. The four walls were fairly hid with a wreath of smilax, and the long tables were long drawn out dreams of floral color. The dinner was excellent, finely served, and the wines delightful. A large number of ladies were present. An appreciated arrangement was the numbered plates, corresponding with the tickets, and a diagram handed each guest which enabled him to find his place without any confusion or annoyance. The music was excellent and the toasts well received. Subjects and speakers were:

City of St. Louis, Hon. Charles Nagel.
Welcome to Our Guests, F. N. Judson.
The Street Railway in the Courts, Smith P. Galt.
The Street Railway as a Social Factor, F. W. Lehmann.
The Press, W. M. Reedy.
The Technical Press, E. E. Higgins.
J. H. Stedman acted as toastmaster.

Diagram of Banquet Room, The American Street Railway Association, Southern Hotel, St. Louis, October 22d, 1896.



ELECTRIC TRACTION APPLIED TO STEAM ROAD PROBLEMS.

Discussion at Chicago.

A general discussion of the above subject was held at Armour Institute, Chicago, Wednesday evening, October 28, under the auspices of the western branch of the American Institute of Electrical Engineers. No prepared paper was read, but an informal discussion was taken part in by a number of those present.

H. N. Brinkerhoff, electrical engineer of the Metropolitan Elevated opened the subject. He said the only forms of electric traction which had been demonstrated by actual practice to be applicable to a service similar to that on steam roads were some kind of overhead trolley or contact, and the third rail. We had an example of an overhead contact arrangement in the Baltimore & Ohio tunnel at Baltimore. This was of course necessarily very heavy, as it was for handling large locomotives in freight service. As an example of the overhead trolley in steam road service there was the Nantasket Beach branch of the New York, New Haven & Hartford Railroad which employs a figure 8 trolley wire. This had been successful except that the difficulties of the trolley leaving the wire at high speeds were such that the company was now experimenting with a third rail laid in the center of the track. The main objection to the third rail was the danger to employes in the yards and to passengers at crossings. One of the chief objections to overhead work he had heard from railroad men was the presence of poles between the tracks, which introduced an element of danger to switchmen in the yards. All the employes had a horror of the third rail when first they began to work where it was, but they soon outgrew this. To what extent they do this might be judged from the fact that on the Metropolitan Elevated not only was all the switching at terminals done by men in yards where the third rail was unprotected (and during the morning and evening rush this switching required quick work), but all repairs were done in yards and shops where the third rail was present. In his opinion there would be no difficulty about insulating the third rail on surface steam roads if it was kept away from banks of melting snow. Dry snow would do no harm. At grade crossings there would have to be a break in the third rail, but any interruption of the current supply to the motors could be overcome in most cases by putting contact shoes on all the cars in the train and running a motor supply wire to them the length of the train. Experiments were in progress on the Manhattan elevated in New York with a locomotive supplied from a third rail and equipped with a storage battery as an auxiliary to steady the station load and hold up the voltages at congested or distant points. It was hard for him to see where the great advantages of this added complication would come in.

Maurice Coster expressed the belief that electric traction would not be seen in trunk line service in our generation. There was another line in which he expected great development however, and that was in the use of multiphase alternating current railway motors. He believed the multiphase motor to be the coming motor, especially for such places on steam roads as will be equipped electrically. Not only this but he believed it would be a matter of but three or four years until it drove out the direct current motor for street railway work.

W. D. Ball agreed with Mr. Coster in both the positions he took. He was informed that last spring the General Electric Company was almost on the point of offering a single phase railway motor and complete equipment, but he believed some difficulties were met with. An impression once got out that multiphase motors were not suited to railway work on account of low starting torque, but it had now been conclusively shown that they can be designed to give as good or better results than any direct current motor. On account of the danger of the third rail it would be better to stick to an overhead trolley.

J. R. Cravath alluded to steam suburban service as being the only place where much immediate application of electricity to steam roads could be expected. Entrance to this field had already begun. Present steam road methods of crowding all suburban traffic into a few long trains per day would not be good practice with electric motive power, and indeed one of the most powerful inducements to any road to adopt electricity for suburban service would be the fact that more frequent service could economically be given to compete with other lines.

The Illinois Central suburban service at Chicago, was probably one of the most promising openings. Electrical engineers were apt to think steam roads rather too conservative, but from conversation with steam road engineers he was inclined to think that they were awake to the desirability of electricity for suburban traffic, but were very sensibly waiting until it became more apparent what form of conducting system and what type of motors were best adapted to their conditions. There could be no doubt they were justified in going slow and waiting for these things to develop before entering into a change on a large scale. It was only a question of time. He would like to ask Mr. Brinkerhoff which he considered most desirable for a surface steam road, a third rail in the center of the track, as on the Liverpool elevated and on the Nantasket beach road, or the rail at the side, as used by the Chicago elevated roads.

Mr. Brinkerhoff said that the position of the third rail had naturally been considered very fully before the equipment of the Metropolitan elevated. It was found that in order to have a safe clearance between the motors and a third rail in the middle of the track, it would be necessary to place the third rail very low. It was considered better to put it at one side where it could be placed high enough to give a chance for good insulation. The complications of a center rail at switches and special work were also something fearful; it was bad enough with the rail at one side. Of course the problem was

somewhat different on a surface road as the high third rail at the side would there be more in the way of employes in the yards.

A communication was read regarding the Nantasket Beach road which told of some of the drawbacks of the third rail there, chief of which was the short circuiting by a brake beam hanging too low or an engine pilot below standard. The momentary going out of lights at grade crossings where the rail was omitted was an unpleasant feature. Some trespassers had received shocks but the company was not legally liable for such accidents.

Mr. Brown believed that in spite of its dangers and complications the third rail would come into use. Employes could be educated to it. The Illinois Central suburban service seemed to him to be a good field for the overhead trolley.

Mr. Drake spoke of the tendency of all steam road practice to bunch cars into as few and as long trains as possible in the interests of economy. While this practice could with profit be abolished in the case of passenger trains for the sake of more frequent service, economy in freight hauling demanded long trains, and long trains are unfavorable to economical electric work. In view of the subdivision of passenger trains that would take place if electricity was adopted he considered that the overhead trolley might be found heavy enough to answer the requirements.

Mr. Rugg explained that the idea of the storage battery on the Manhattan elevated locomotive was not only to steady the power plant load but to save investment in feed wire. The alternating current motor had been given a bad character in the past, but it would live it down.

In answer to a question Mr. Brinkerhoff stated that the highest recorded speed made on the Metropolitan Elevated was during a test of a four car train (the motor car having four G. E. 2,000 motors) loaded with the equivalent of 90 passengers to each car. With this train a Boyer speed recorder showed 38½ miles an hour (and speed still increasing) just before being obliged to slack speed at the end of the longest tangent on the road.

Mr. Coster called attention to the high efficiency of multiphase motors on low loads. At half load they reach nearly their full load efficiency. Their simplicity of construction and regulation were strongly in their favor for railway use.

Professor W. M. Stine did not wish to be considered as the champion of the storage battery, or as saying anything in favor of it in its present form, but had some rather interesting figures on storage battery weights. Some time ago he had occasion to investigate a battery which could be constructed so as to give an electrical horsepower hour to 12 pounds weight. This battery had never been constructed commercially, but he considered it quite possible that it might some day be put in commercial form. He gave figures to show that with such a battery an electric locomotive could be constructed which would weigh no more than a steam locomotive for doing the same work, and which would be capable of hauling a train over one ordinary division of a railroad (100 to 140 miles) with one charge. These figures he considered of interest only as showing what might possibly be accomplished in the future and not as anything of practical value at present.

STORM IN SOUTHERN CITIES.

The storm which wrecked the car house of the Metropolitan Railroad at Washington, D. C. (illustrated in the October Review), also wrought havoc among many other southern and eastern cities.

At Savannah the car houses of both the electric lines were destroyed and a number of cars damaged.

The Pennsylvania Traction Company at Lancaster was tied up by the falling of wires and wreck on the track.

CALUMET BUILDS AN IRON FOUNDRY.

The Calumet Electric Street railway of Chicago has recently started up an iron foundry of its own, being we believe, among the first roads to do this. The cupola erected will melt 800 pounds of iron at a heat, though, of course, it can be run continuously if desired. The fan is driven by an electric motor. The company will cast its own brake shoes and stoves, and some small parts.

STORAGE CARS START IN CHICAGO.

The Englewood & Chicago Electric Railway, which is building an extensive system to be operated by storage batteries, began running it first cars during the past month. The equipment and power plant are far from completion, however, and the two cars that have been started are simply for the purpose of holding franchises. Temporary machinery has been put in for charging the batteries and the two cars are the ones which were run on Madison avenue, New York.

ERB ON THE WAR PATH.

A peculiar state of affairs exists at Leavenworth, Kan., and no one seems to know the cause of it. Frequently of late cars of the Leavenworth Street Railway have been fired on by unknown parties with shotguns, revolvers and stones, and it has become necessary for General Manager Erb to arm his conductors and motormen as well as to watch with a posse at suspected points. Fortunately no one has as yet been hit, though some windows have been smashed.

The Union Traction Company, of Philadelphia, has a rule to the effect that no passenger shall be allowed to carry free any large article in a car, and certain articles are specially designated as prohibited. The conductor must use his judgment as to the size of an article which calls for an extra fare.

CONVENTION EXHIBITS

FINEST AND LARGEST EVER MADE—VALUE ESTIMATED AT NEARLY TWO HUNDRED THOUSAND DOLLARS—THE IMMENSE AUDITORIUM FILLED—SIXTY THOUSAND DOLLARS SPENT IN MAKING THE DISPLAY.

The convention exhibit was stupendous, and at once was an honor to the association, a credit to the supplymen and a compliment to St. Louis. There never was anything like it, far eclipsing the World's Fair exhibit of railway appliances. Even the great auditorium, with its 30,000 square feet, was far too small for the applications made, and at least 15,000 additional square feet of floor space could have been sold if available. Many exhibitors, even, were sadly crippled for room, and where 1,000 or 1,200 feet were asked for, had to content themselves with half that amount, and either crowd their display, or, as in some cases, bring only a part of it. This, however, was no fault of the St. Louis people, and Chairman of Exhibits, Baumhoff, whose task was a big one, handled the matter in a satisfactory manner.

The building, being an amphitheater, presented an inspiring picture, and one which thrilled alike the hearts of delegates and exhibitors as they realized, as never before, the magnitude of the business in which both are engaged.

The comparison with the little handful of fare boxes and harness devices shown in St. Louis in 1885, was a whole volume of the history of the wonderful advance in the science of street railroading. The entire floor was fairly packed, while the terraces rising on four sides, banked with booths, all decorated in flags and bunting, made a picture which must be seen to be appreciated.

It is estimated that the exhibits were valued at between $150,000 and $200,000, and a conservative estimate by a large exhibitor, who has attended many of these gatherings, places the expense incurred by the supplymen in making the display at upward of $60,000. One company alone is said to have appropriated $6,000 for the purpose. In view of these facts the supplymen certainly have a right to expect of the delegates a careful and thorough examination of the displays prepared for their especial benefit.

The classifying of exhibits, the edict against hanging banners so as to hide other displays, and the removal of the noise producing exhibits far away from the room in which the sessions were held, all were wise and desirable. The fine brass band of thirty pieces furnished by the local roads was an excellent one and furnished good music.

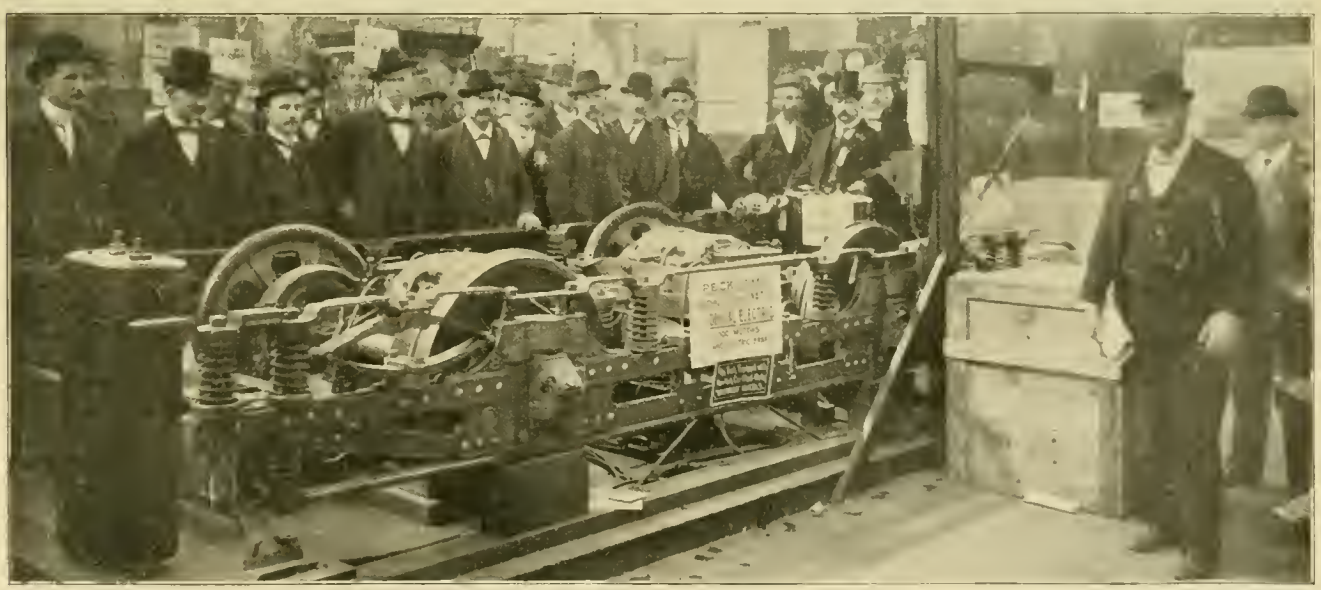
The lighting arrangements were excellent, the aisles well laid out and the entrance arrangement and registration good.

Exhibitors evidently profited by the lesson of former years, for never were the installations so prompt, and very few were caught with unpacked freight after the first day. There was also a gratifying absence of those impracticable devices of some former years, which are best described as "mechanical fakes."

Altogether the display was a grand success, and the only regret is, that every street railway official in the country could not have seen it.

J. M. Atkinson & Company, Chicago, exhibited their well-known horseshoe rail bond and represented its merits to many visitors. The bond has recently been fully described and illustrated in the REVIEW. It is reported that several good orders have recently been obtained. Represented by J. M. Atkinson and Sears B. Condit.

Elmer P. Morris, the well known manufacturer's agent, 36 Dey street, New York, was omnipresent at the convention. He was representing the Electric Railway Equipment Company, Cincinnati; the Simplex Interior Telephone Company, Cincinnati; the Automatic Circuit Breaker, Newaygo, Mich., and "Monarch" insulating paint. Mr. Morris' presence was better than a whole quarter section of exhibits without him.



GENERAL ELECTRIC 1,000 MOTOR AND ELECTRIC BRAKE ON PECKHAM TRUCK.

The Crane Company, Chicago, presented an attractive exhibit of valves of all sizes and kinds, especially metallic disk globe and angle valves. There was shown what is said to be the largest high pressure steam valve ever made, the gate being 24 inches in diameter, the whole weighing 6,500 pounds. The gate is of the wedge pattern. The valve has been tested to work at 200 pounds steam pressure. Represented by G. A. Hurd, of Chicago.

The Leschen-Macomber-Whyte Company, Chicago, exhibited specimens of hard drawn copper trolley wire, galvanized span wire and other electric railway specialties.

The Electric Mutual Casualty Association, the plan and scope of whose work has been previously described in the REVIEW, distributed pamphlets, and its representative explained fully the line of business pursued.

Berry Brothers, Detroit, Mich., displayed a variety of samples of varnishes for car work. The exhibit was in charge of L. M. Combs, resident manager.

D. C. Sweet, Springfield, Mass., showed two samples of his wheel grinding machine which has recently been fully illustrated and described in the REVIEW. It will be remembered that this machine is driven by the car motor and grinds the wheels without removing them from the car. The machine was shown with wheels in position for grinding.

The R. D. Nuttall Company, Allegheny, Pa., had a variety of gears and pinions, trolley wheels, etc. The most striking feature was a handsomely-finished trolley pole and base erected in front of the exhibit. The Nuttall sleet wheel came in for a considerable share of attention, and it is claimed that this wheel is a complete protection against the trouble it is designed to meet. Represented by Arthur S.

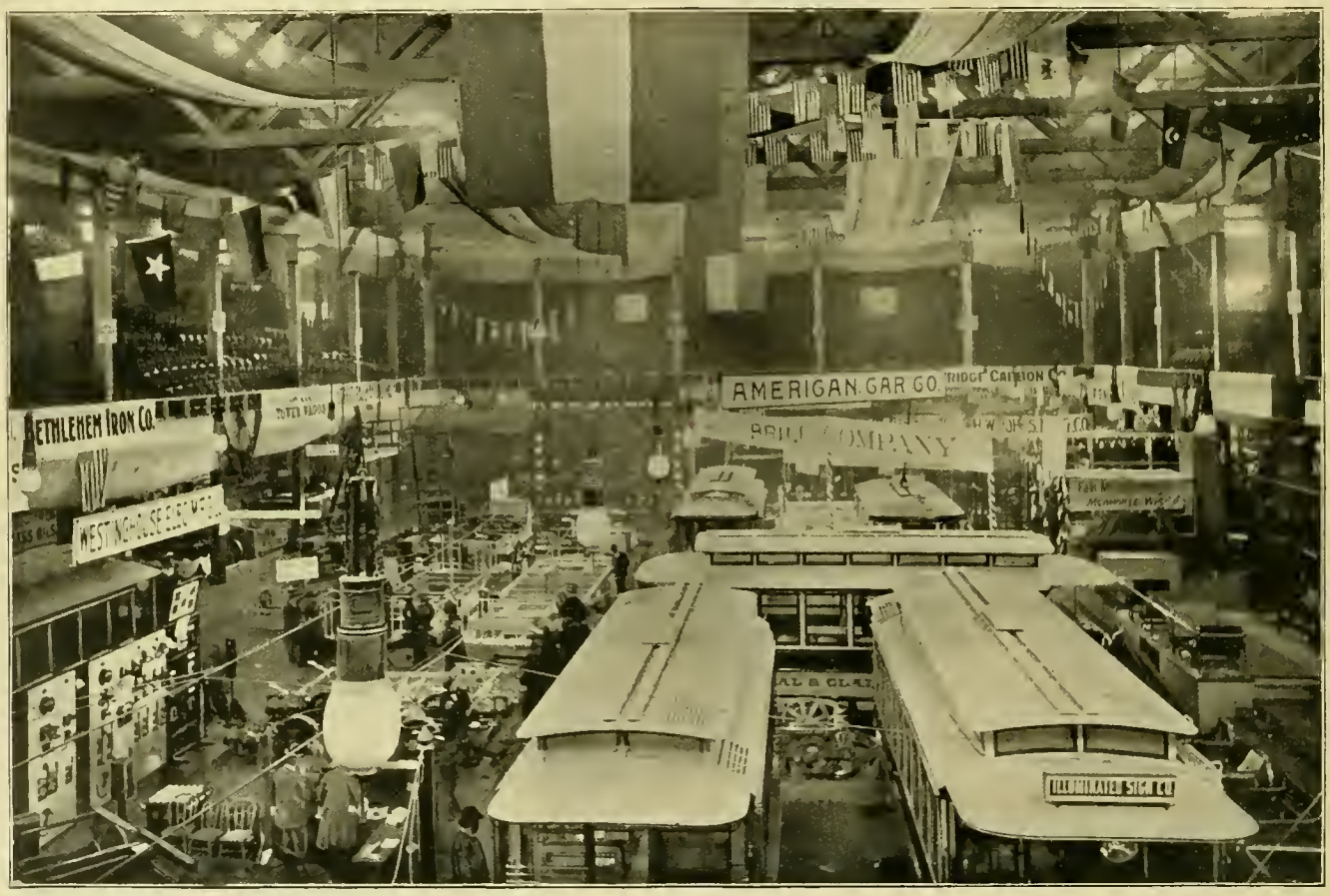


EXHIBIT HALL—LOOKING WEST.

M. M. Buck, St. Louis, had a very comprehensive display of car lamps and trimmings, Joyce car and track jacks, headlights, tools, oilers, waste, oil tanks and a variety of miscellaneous hardware.

Robert A. Schleges & Bro., St. Louis, made a handsome display of plain, ornamental and colored glass and mirrors of every shape for use or ornamentation in street car work.

E. M. Davis had a working model of an automatic switch thrower, which attracted considerable attention.

The Ready Rock Asphalt Roofing Company, St. Louis, exhibited samples of its roofing material, which consists of layers of rosin-sized paper, Trinidad asphalt and screened gravel in several alternate layers.

The H. W. Johns Manufacturing Company displayed a large line of electrical material, including insulators, mica, sockets, controller parts, vulcabeston, heaters, bushings, etc.

Partridge, St. Louis agent. President Estep was also present; also Garson Myers, Chicago agent; and A. H. Englund, Philadelphia agent.

The Illuminated Sign Company had one of its beautiful and effective signs on one of the cars in the American Car Company's exhibit. This sign is something radically new, and permits of a very large number of changes which can be made in an instant. The sign is equally plain by day or night.

The Diamond Truck & Car Gear Company, Kingston, N. Y., had two trucks, one for short and the other for long cars. The latter was equipped with Hyatt roller bearings and electric brake and was seen in daily operation in connection with the exhibit of the General Electric Company. The exhibit was most attractively displayed, that part of the gallery being decorated with palms and draperies and the truck arranged to show against a white background. The general manager, W. H. Wilkinson and W. H. TenBroeck were the representatives of the company present.

The Solar Carbon Manufacturing Company, Pittsburg, had an exhibit with the Central Union Brass Company, of St. Louis, and A. T. Webb was present as representative.

The Forest City Electric Company, of Cleveland, had several boards of samples of roll drop and drop forged commutator bars and protected rail bonds. John C. Dolph and W. B. Cleveland were in attendance.

The White-Crosby Company was represented by Mr. Harrison, of its New York office. It had on exhibition a sample pole top fitted with cross arms and insulators as used on the Niagara Falls-Buffalo transmission line over which power is to be transmitted to the Buffalo Railway. It was an exhibit meriting much interest.

The Steel Motor Company occupied a prominent place in the central part of the hall, and was represented by George W. Henry, Chicago, sales agent, and E. C. Parham, electrician, Johnstown, Pa. A Dupont truck was equipped with two C 3½ steel motors and C 3 controllers. This motor is the latest tested and tried production of this pioneer builder of motors made of steel, and always convinces street railway men of its staying powers and durability. The C 3 controller is of the series-parallel type, and has besides the usual interlocking device, the unique feature that the motor cut-outs are incorporated with the reverse lever, so that it is unnecessary to open the controller to cut out one motor.

The Central Union Brass Company, of St. Louis, which is a representative of a large number of manufacturing companies, had an attractive display.

The Lombard hydraulic brake was in operation on the Dupont truck, equipped with steel motors, and always attracted a crowd. Homer M. Daggett, Jr., of 29 Temple place, Boston, was exhibiting it.

The Partridge Carbon Company, of Sandusky, O., had its secretary, J. L. Speer, in charge of an extensive array of all kinds of carbon brushes. Besides new brushes some were shown that had "been through the mill" so that delegates might see the brushes "before and after taking" current.

The Commercial Electric Supply Company, of St. Louis, had a very extensive and varied exhibit. This company represents a great number of manufacturing concerns, including the Western Electric Company and Standard Paint Company. Two St. Louis products shown were the St. Louis car heater and Shelton rheostat. The city telephone in their booth was the only one in the building.

The Morrell Electrical Works, of St. Louis, exhibited some of its commutators, and A. W. Morrell, from whom the company is named shook hands with many of his former brothers in the field of actual street railway operation.

EXHIBIT HALL—LOOKING EAST.

The Standard Underground Cable Company had its usual fine exhibit of samples and was represented by J. R. Wiley, western manager, of Chicago, and F. C. Crosby.

The Doty-MacKnight automatic electric track switch was a prominent device in operation in the center of the hall. W. W. Doty, Armitage building, New York, explained it to all comers. It is thrown from an insulated section of track by simply turning on and off the controller.

The Creaghead Engineering Company, of Cincinnati, as usual, gave prominence to its flexible bracket constructions, and in addition showed a full line of overhead material, including a steel cross arm adapted for wood poles giving great strength and durability. The Manhattan 100 hour arc lamp for railway circuits was also an important feature. George B. Scrugham was in charge.

Carbons in every form and for every purpose in connection with street railway and general electrical work were tastefully displayed on the south gallery by the National Carbon Company.

Bowers Brothers, mica goods manufacturers, of 117 Lake street, Chicago, exhibited a full line in connection with the Central Union Brass Company, of St. Louis, and were represented by E. S. Bowers, of the firm.

The Kilgour patent emergency pavement brake, 250 of which are in use on the Cincinnati Street Railway, was shown in model in the Peckham parlor at the Southern, and also on one of the Peckham trucks in the exhibit hall.

The Interior Conduit & Insulation Company of New York had an exhibit of underground and interior conduit in the booth of the Central Electric Company of Chicago. It was represented by E. B. Kittle, general sales agent and also had an exhibit in the parlors of the Southern hotel, where all the friends of the company were welcomed.

The Michigan Stove Company, Detroit, exhibited three "Gem" car heaters of the kind in use on the Broadway and Laclede avenue lines in St. Louis, and which have given good satisfaction on the Lindell and Suburban lines. The Garland stoves and ranges in other kinds of service are so well known that it is unnecessary to say that the car heaters are well designed, ornamental and fulfill all requirements.

The Kinzer & Jones' Manufacturing Company, Pittsburg, had a line of samples of its brake shoe and the several kinds of heads used to adapt it to service on the various types of trucks in use. The shoe is made up of a shell containing a special composition which is pressed in at a tremendous pressure. The reports given of the shoes in actual service have confirmed the claims of the manufacturers, the braking power of the shoes being increased and the wear upon the wheels diminished by the spring connection controlled by the company. Represented by William Weierback.

The American Steel Foundry Company, St. Louis, had an interesting display of parts of trucks and car attachments made of basic steel, including bolsters, combined column and spring seat, cast steel truck frames and some specimens of castings drawn out under the hammer to show the tenacity of the metal. There were also two models of trucks made wholly of steel.

Under the title "The Story of a Dead Duck" (Duct), the representative of the H. B. Camp Company, Aultman, O., was telling about Camp's vitrified clay conduit and recommending that the duck be spitted on wires and buried.

The Munson Electric Conduit Company, Chicago, showed a large working model of the Munson underground conduit, in the operation of which it is claimed that there is no possibility of danger, leakage, short circuiting or arcing.

The New Process Rawhide Company, Syracuse, N. Y., appeared in the person of A. C. Vosburgh, secretary and treasurer. The company required no other representation, except, perhaps, a reference to the number of pinions in use on roads in various parts of the country. But Mr. Vosburgh was "the whole thing."

A unique method of exhibiting fare registers was that employed by the Sterling Supply & Manufacturing Company, New York. A handsomely turned and decorated post was erected in the center of the alloted space and upon each of the four sides of the top of the post were placed samples of the well known Sterling register. The styles include trip and totalizing alarm registers, with either the numeral disc indicator or the hand or clock face. Operating rods were also shown. Represented by J. J. Kennelly, superintendent.

The American Electric Heating Corporation, Boston, was represented by F. P. Luther, the Chicago agent. There was, unfortunately, no exhibit, though space had been taken, owing to the illness of the St. Louis representative, in whose hands the whole matter had been placed. The company recently secured a large order from the West End road of Boston.

The "Ham Sandwich" did not, at the convention, mean the usual eating house variety, but a sand box completely controlling the output of sand, having no opening or valve in the bottom. Briefly stated, the sand is simply dipped out. It was represented by R. H. Ham, of the Trojan Button Fastener Company, Troy, N. Y., who also exhibited the Windsor emergency brake.

The Shultz Belting Company, St. Louis, showed a monster belt, seventy-two inches in width, of the well known sable rawhide, which, it will be remembered, is leather tanned only on the outside, leaving the interior rawhide. Samples of the regular belts manufactured by the company and its patented woven leather link belt completed the exhibit. J. A. J. Shultz and J. A. Ferguson represented the company.

The Chapman Valve Manufacturing Company, Indian Orchard, Mass., displayed a variety of valves, each having as a distinctive feature a tell-tale dial, showing at a glance whether the valve was open or closed.

The Devlin Car Brake Company, Memphis, Tenn., showed a working model of the brake which was recently illustrated and described in the REVIEW. It will be remembered that this brake is so constructed that in emergency a flat face upon the brake head may be brought down to the rail, thus forming a track brake in addition to the regular wheel brake.

The International Register Company, Chicago, exhibited a line of its well-known registers, and also a new form of double register for registering either fares and transfers or five and ten cent fares. This has previously been described in the REVIEW. A feature of the totalizing or permanent register is that it cannot be set back even when taken out of the machine. In the exhibit was one of the totalizers taken out, and accompanied by an offer of a silk hat to anyone who would set it back. Represented by A. W. Woodward, manager.

J. A. McGrath had a working model of a car brake recently patented. It was shown as applied to a maximum traction truck, and in the model form stopped the car successfully on an incline.

The Pearson car-replacing jack exhibit, in charge of George F. Pearson, attracted numerous interested visitors. This device was illustrated and described in our September issue. It is handled by the National Jack Company, Boston.

The Consolidated Electric Purifier Company, Chicago, exhibited one of its feed water purifiers, "a scale preventer that prevents." The apparatus is small but does the work. Represented by Charles E. Whitmore, president.

The R. Bliss Manufacturing Company, Providence, R. I., showed one of Woods's gates for all classes of cars. This gate is attached to the end of the car near the side and is thrown by the operation of a short thumb lever. The gate is locked in either open or closed position by a spring catch which is operated by the lever. The gate is in extensive use upon both street and railroad cars and is giving excellent satisfaction. Represented by C. Kinne.


AMERICAN CAR Co.
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STREET RAILWAY REVIEW
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BROWNELL CAR Co.
JOHNSON Co.
JACKSON & SHARP Co.
HUNT AIR BRAKE
CRANE CO. N.Y.
SHIELD'S AUTOMATIC FENDER.
Standard Underground Cable Co.
WALKER COMPANY
TAYLOR ELECTRIC TRUCK Co. TROY, N.Y.
TAYLOR ELECTRIC TRUCK Co. TROY, N.Y.
Consolidated Car Fender Co.

One of the most attractive exhibits on the south gallery was that of the Consolidated Car Heating Company, New York. A large space was fitted up with car seats each provided with electric heaters under the seats, and upon one side of the space were arranged several side seat heaters. These were connected up in circuit with the switches which allow of regulating the heat from one to five intensities. This is done by cutting out some of the heaters and throwing the remainder into series, the heat varying according to the number of heaters in use. When the greatest degree of heat is required all heaters are in multiple series. Represented by W. P. Cosper.

The Western Telephone Construction Company, Chicago, showed several styles of receivers and transmitters and a section of an exchange.

The Safford & Moore Railway Jack Company, Chicago, exhibited samples of its quick trip and adjustable handle railway jacks which were described and illustrated in the September issue of the REVIEW. These jacks possess several novel and meritorious features worthy of investigation. Represented by Mr. Moore.

The exhibit of the Duff Manufacturing Company, Allegheny, Pa. consisted of samples of different sizes of the Barrett lever jack. This jack is in use by several St. Louis roads and an order for 150 has just been placed with the contractors who are reconstructing the Fifth Avenue cable road at Pittsburg. Represented by George A. Urling, secretary and treasurer.

The Broderick & Bascom Rope Company, St. Louis, had outside the hall an immense spool of wire cable. The weight of the spool was 175,000 pounds and of the truck on which it was carried 14,000 pounds. Friends were presented with a souvenir in the shape of a paper weight made of a short section of cable nickel plated and finished with pedestal and cap. Represented by J. J. Broderick and E. W. Sherman.

The Q. & C. Company, Chicago, made a special working exhibit of the Bryant portable rail saw, two men being at all times ready to show the rate at which a rail could be cut, either straight across or at any angle. There was shown a section of tie from the Calumet & Blue Island road carrying a short section of rail with tie plate, showing the completeness with which the tie is protected. Other features of the exhibit were the Q. & C. oil filter, Servis tie plates, specimens of ties used with and without tie plates, etc., etc. Represented by Edward W. Hodgkins.

K. McLennan & Company, Chicago, exhibited and took orders for Gale's commutator compound, warranted to prevent sparking or gumming of brushes and keep the commutator in good condition. The company perpetrated a unique circular in the shape of a warrant of arrest. It was served on a great number of persons.

The Bethlehem Iron Company, Bethlehem, Pa., exhibited an immense hollow shaft weighing 15 tons, one of twelve furnished to the street railways of Chicago. Four of these went to the Northwestern Elevated, four to the Union Loop, and four to the Chicago City Railway. As a specimen of hollow forging it has probably never been equalled, and it is doubtful if it could be equalled at any other plant in the country.

The Columbia Machine Works, Brooklyn, N. Y., exhibited a few specimens of drop forged commutator bars, nickel and brass castings for controller handles, etc. Represented by J. G. Buehler.

The Heine Safety Boiler Company, St. Louis, had a full-size boiler handsomely bronzed, and also a model of a boiler enclosed. Photographs of various plants using the Heine boiler completed the exhibit. The display was one of the largest in the building.

The St. Louis Car Wheel Company showed a number of wheels and axles of various sizes and patterns, some broken to show depth of chill and quality of metal. There were also included an endless variety of broken pieces of charcoal iron chilled, showing a remarkable fineness of grain and a good depth of chill. There was also shown the contracting chill in which the wheels were cast.

D. P. Shields exhibited a recently patented form of automatic fender, a distinguishing feature of which consisted of a rubber covered chain held out by two arms at about six inches from the front of the fender proper.

The Gold Car Heating Company, New York and Chicago, displayed samples of its electric and hot water systems of car heating. The electric heaters were connected up with the proper switches for regulating the intensity of the heat. The system of hot water heating was illustrated by a complete outfit for a single car with the necessary heater and piping. The exhibit was tastefully arranged on the south gallery, and E. H. Gold explained its operation.

The Partridge Carbon Company, Sandusky, O., exhibited a variety of samples of self-lubricating brushes, ranging in size and form from those adapted to the smallest dynamo to those for the largest generator.

The National Lead Company made an attractive exhibit of babbitt metal, solder and special car and carriage leads. The enterprise of the company is shown by the fact that its exhibit was the first in place. The goods are well known in all parts of the country.

The New Haven Register Company, New Haven, Conn., had on exhibition its new double and triple registers for recording fares and transfers. The register is in use on more than 300 roads and is endorsed by some of the best in the country. The company is now making quite a specialty of rods and rod fixtures. Registers were shown in nickel, bronze and antique copper finish. A new and interesting feature is the new iron base containing the spring from which the body of the register can be disconnected without difficulty, making it necessary to have only half as many registers. Represented by Pres. Anthony, F. C. Bond, vice-president and general manager, and A. N. Loper.

C. B. Bray exhibited a model of the De Staebler automatic fender the workings of which were illustrated with a rubber doll.

John T. McRoy, Chicago, attracted interested attention by his array of terra cotta conduit in six foot lengths. This has been fully described in the REVIEW.

The Phoenix Carbon Manufacturing Company, St. Louis, exhibited a large line of carbon specialties, including brushes, electric light carbons, etc., etc. The representative of the company in charge of the exhibit, S. G. Booker, superintendent of the works, gave out as souvenirs, paper weights giving a representation of the Phoenix carbon brush and a carbon medal showing the fineness of the material employed and the treatment of which it is susceptible under heavy pressure.

The Stever Rail Joint Company, Cleveland, O., exhibited a sample of the Stever rail joint for steam, electric or cable railways, and also showed its use as applied to the yoke of cable roads. The joint is made in either iron or cast steel, and it is claimed to give much greater strength than the angle bar, and that the joint is stronger than the balance of the rail.

An exhibit in which delegates spent more time than any other perhaps, was that of Harold P. Brown, of 68 Broad street, New York, who was kept constantly busy explaining the various forms of plastic rail bond, the joint invention of Thomas A. Edison and himself. There are four types; the standard original fish plate bond; the plastic socket bond, the plastic plug and the plastic cup. A large show case was filled with bonds showing "what not to do." Complete records were also on file of outside tests made by reliable parties showing the inefficiency of other bonds as compared with the plastic. In each case it was shown that fully three-fourths the drop in voltage was due to poor contact between the steel and the copper even where made in the best mechanical way. Mr. Brown had these tests made and printed to enable any doubter to satisfy himself. A set of specially delicate measuring instruments, with certificate of calibration by Weston, was on hand, and at the service of any desiring corroberative tests. The tests exhibited by Mr. Brown showed the drop of the best forms of plastic bond to be about 1-50 that of the ordinary form of copper bond.

The exhibit of the Security Bank Note Company, Philadelphia, suggested a room in the Bureau of Engraving and Printing, but a closer inspection revealed that it was a collection of street car tickets printed from steel plates. T. A. Bradley is the engraver and he recently secured a contract for the printing of fifty million tickets for the Brooklyn Bridge line, some of which were on exhibition.

The Safety Car Heating & Lighting Company, New York, made its customary handsome display of the Pintsch system of lighting, with the various styles of globes and fixtures. The lamps were in operation, but by reason of the fact that the building was not provided with city gas it was impossible for the exhibitor to make a comparison of the illuminating qualities of the two gases, which invariably shows that the illuminating power of the Pintch is several times greater. The exhibit was in charge of Clarence H. Howard, secretary of the company, Geo. N. Terry, Wm. St. John and Wm. H Hooper.

Geo. P. Jones & Company, St. Louis, had specimens of railway oils and greases, including cylinder, engine, dynamo and car box oils, railway motor grease, etc. The company is also an extensive manufacturer of boiler compound and guttapercha roofing, both of which were included in the display.

The Charter Oak Stove & Range Company, St. Louis, had a number of "Charter Oak" stoves of various styles and encased in cast boxes. These are lined with asbestos and the claim is made that while the stove is red hot the casing remains cool enough to handle and so as not to scorch the most delicate fabric.

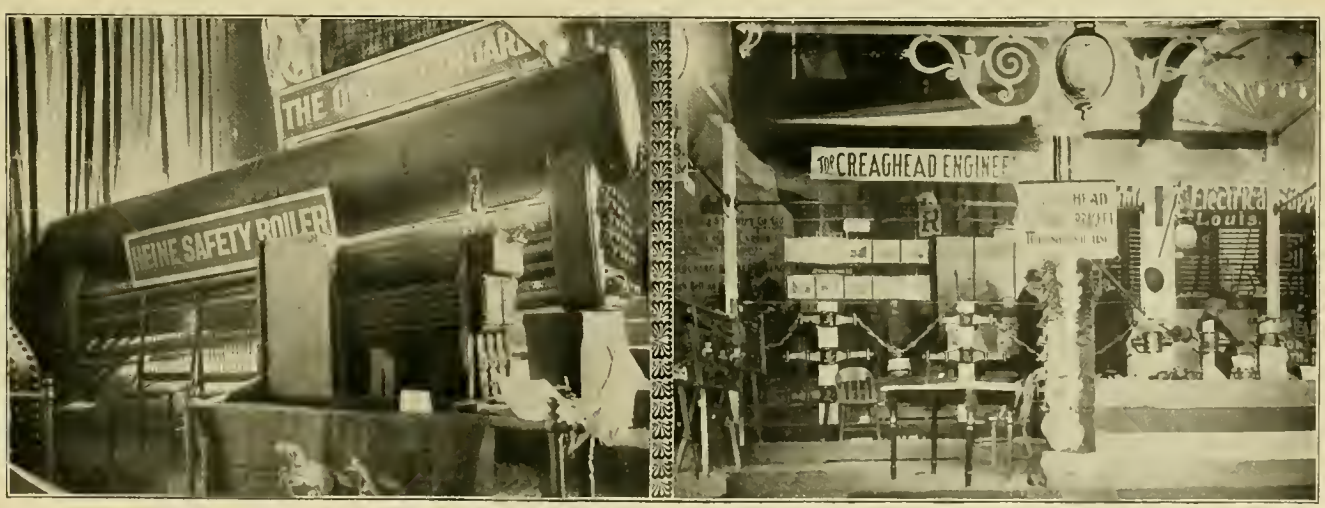
The New York Car Wheel Company, Buffalo, N. Y., exhibited several of its machined car wheels, both spoke and plate with broken sections showing depth of chill and quality of metal. Axles were also included in the exhibit.

The Murphy Varnish Company, Newark, Boston, Cleveland, St. Louis and Chicago, exhibited a great variety of varnishes and colors for special purposes. An interesting feature was the specimens of Sierra Leone and Kauri, New Zealand, copal in its natural state, weighing 100 pounds and supposed to be the largest specimen in the United States. Represented by W. H. Sterns and Charles G. Ettinger.

Specimens of wire glass for a variety of purposes were shown by the Mississippi Glass Company, St. Louis.

The W. H. Coe Manufacturing Company exhibited and took orders for Coe's gilding wheel for striping and decorating.

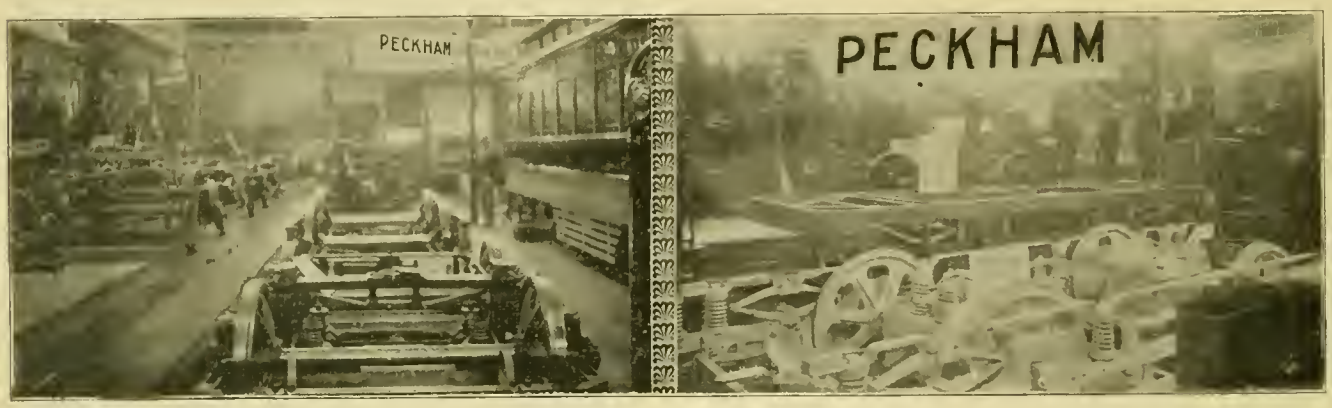
A variety of fire brick manufactures, terra cotta, sewer pipe and paving brick formed the display of Evens & Howard, St. Louis.



The Detroit Stove Works made a display of "Jewel" street car heaters and station heaters. The exhibit was a notable instance of the attractiveness with which even such utilitarian devices as stoves can be arranged. Especial claims are made for the "Jewell" street car heater that it has no sheet iron parts to wear or rust out, will outlast the life of the car and in appearance is an ornament to the car rather than an adjunct that is merely tolerated because it is necessary. The company claims to have the largest stove works in the world.

The Peckham Motor Truck and Wheel Company, Kingston, N. Y., made a very extensive showing, including No. 7-C Excelsior truck, one of 175 now building for the Cincinnati Street Railway, fitted with Kilgour emergency brake and G. E. 1000 motors; extra long truck with Westinghouse 38-B motors; standard 8-A truck with new type extension trusses; and No. 4 double cushioned swivel truck. Extra long trucks were also shown in connection with the exhibits of the Walker Company, Westinghouse Electric & Manufacturing Company, General Electric Company with electric brake in operation, and under the closed car of the Brooklyn & New York Railway Supply Company. Peckham double trucks were in operation under Jackson & Sharpe 35-foot combination car having Hunt air brake. The representatives were E. Peckham, president, W. E. Cooke, general manager, J. A. Hanna, Chicago, and A. W. Field, Boston.

The Eugene Munsell & Co., of New York and Chicago, exhibit consisted of India and amber mica in a variety of forms—large clear sheets untrimmed as they come from the mines, mica segments for all standard motor commutators, mica washers, etc. The company is also selling agent for the drop forged commutator segments which were exhibited. Henry C. Onick, of the Chicago house, was representative.



The Mica Insulator Company, of New York, Chicago and London, had of course, an extensive exhibit of its famous insulator "Micanite" in the shape of commutator rings and segments for all the standard railway motors and generators, field spools, slot troughs, plates, washers and tubes. Henry C. Onick, of the Chicago house presided.

Clarence Whitman & Co., New York, had a booth filled with a good line of samples of Pantasote. The canopy form in which part of the material was arranged added greatly to the effectiveness of the display. A car seat covered with pantasote was shown, and it was stated that it had been in use two years, though it showed few signs of wear. In charge of H. M. Greer, H. E. Twining and John High.

The Brussels Tapestry Company, Depew, N. Y., displayed a great variety of shades and shade material. The made-up shades were arranged in working order in a handsome paneled frame, by which they were shown to the best advantage. This material is well known as of standard quality. The shade fixture has been described in a previous issue of the REVIEW. W. S. Calhoun was the representative of the company.

Smith, of New York, made a splendid showing of all sorts of lamps, lamp shades, lanterns, headlights, oilers, bell cord, etc. The line of lamps was remarkably complete, and was so arranged as make the display one of the most attractive in the hall. Thomas C. Millen answered all questions and made the most of the exhibit.

The Kraushaar Lamp & Reflector Company, St. Louis, had a most attractive display made up of brass car fixtures of every description, arranged in the form of crescents, anchors, stars, hearts, rosettes, etc. There was also a large variety of lamps, reflectors, headlights, brake handles, etc. Represented by Al. Mynders.

J. L. Black, St. Louis, had a model of an automatic fulcrum brake. The feature of this was a six-inch arm on the end of the staff to which the chain was attached to take up the slack. The connection at the other end was to a floating lever by which great leverage was obtained at the finish.

The Hale & Kilburn Manufacturing Company, Philadelphia, showed four walk-over seats, two with cane covering and two in plush, also one seat with side arms. The exhibit was attractively arranged in a nicely carpeted space. H. T. Bigelow, Chicago, and C. E. Barrett, St. Louis, were the representatives present.

The St. Louis Register Company had a conspicuous space at the east end of the hall, and displayed a great variety of registers and operating rods. Some had the Baumhoff attachment. "Watch the little red joker and you will catch the thief" called attention to the styles of registers having a red hand which jumped to "cash" or "transfer" according to the direction in which the rod was turned. A new numeral register just out has a perfectly white face with the exception of three openings, one for showing the numbers in big figures, one for the out or in sign, and one for the totalizer. These and others of the standard and well known forms were arranged in operative position upon the wall. E. F. Wickham, J. A. Stephenson and Giles S. Allison, were present at the convention.

The Taylor Electric Company, represented by President Taylor showed two double trucks and one single. The single truck was provided with double elliptic springs at the ends of the frame, which have been shown effectual in saving track, motors and car body. All trucks were equipped with 33 inch wheels. Mr. Taylor experienced considerable difficulty in getting his display in shape since for some unknown reason the wheels were removed on the road and came several days later.

The General Electric exhibit was the most comprehensive display made and fully up to its usual high standard. It included almost every device used on electric roads, except generators. The McGuire truck with two G. E. 50-horse-power motors, for use on Brooklyn bridge, and the controller, attracted special attention. On a Peckham truck were two G. E. 1,000 motors with electric brake, controlled by a B. 3 series parallel controller which was constantly in operation watched by a large crowd. Many favorable comments were made on the sudden and effective operation of this brake, which was one of the new features. Prominence was also given to one of the Nan-


THE STEEL MOTOR CO.
JOHNSTOWN PA.
STEEL CASTING
"EW HAVEN
Car Register
Always on
THE
WEBER RAILWAY JOINT
MANUFACTURING CO.
Solid Cast Steel
ELLIOT FROG & SWITCH CO.
EAST ST. LOUIS ILL.
Frogs, Curves, Switches Turnouts,
Crossings and Special Work
FOR STREET RAILWAYS.
CENTRAL
ELECTRIC Co.
CHICAGO
WASHBURN & MOEN MAF'G CO
OVER HALF A CENTURY
STREET RAILWAY SUPPLIES
STERLING
SUPPLY MF'G CO.
PHILADELPHIA, PA.
TAYLOR ELECTRIC TRUCK
Diamond Truck
No 5.

tasket Beach air brake compressor equipments, motor, pump, tank and automatic switch. To this was fitted one of the chime whistles used on that important innovation in steam railroad practice, and the shrill musical note, served as a means of attracting very large crowds. A model switchboard, complete, was shown. In the motor display were handsomely finished specimens of the G. E. 800, 1,000, 1,200 and 2,000 types. The line of overhead line supplies was very complete, including the U. S. standard trolley for low bridge work. Photographs illustrated various phases of the Baltimore tunnel system, and a sample length of the overhead conduit and contact shoe used were shown.

A length of the third rail over which regular trains are now being operated between East Weymouth and Nantasket Junction, on the main line of the Old Colony Division of the N. Y., N. H. & H. R. R. served to illustrate another electrical system for steam railroad work.

The space was handsomely illuminated by a large script sign, and by the famous G. E. monogram in many-colored miniature incandescents. Around the space, and under the gallery, were a series of ten Thomson arc lamps for use on railway circuits. The new apparatus shown outside of the brake, comprised the M automatic circuit breaker for

car and other work; a modified form of the K automatic circuit breaker for station and work of that character, railway and arc lightning arresters and other minor devices.

A full supply of G. E. literature was spread upon the table where set a handsome bust of Edison. The interests of the General Electric Company were well taken care of by the following gentlemen: Messrs William J. Clark, B. E. Sunny, F. M. Kimball, T. Beran, Ralph Beach, C. C. Pierce, H. J. Crowley, F. H. Striely, F. M. Boyer, Theo. P. Bailey, G. K. Wheeler, H. C. Wirt, L. H. Parker, E. M. Hulett, George D. Rosenthal, W. B. Potter and John McGhie.

A. S. Dexter, manager of the Chicago branch of the Binghamton Oil Refining Company, represented that concern.

The John Stephenson Company, New York, was, as for many years past, represented by D. W. Pugh, of whom it may be said no man in the convention has more or better friends. He once more supplied everybody with one of those neat vest-pocket note books, bound in russia leather, and which have become the standard souvenir of the Stephenson Company. John Pugh, general sales agent, was also present and welcomed by his large circle of acquaintances.

Another of the veterans in the supply business, who has grown gray in the service, but whose heart is as young as ever, and his energy undiminished, is Edward Beadle, of the Railway Register Company, New York. He was one of the first supply men to make exhibits at conventions, and has missed but one or two. His fare-registering devices are as well known as himself.

The Falk Manufacturing Company, Milwaukee, had a display which attracted probably as much interested attention as any in the hall, on account of the vigorous discussion upon the subject of cast-welded joints, which went on in convention session. There were a number of sawed sections of joints, showing the relation of the rail and joint metal, and other joints whole, showing the outside appearance. There were also a number of sections taken from the Missouri Railroad, showing where the rail had broken sooner than the weld. E. A. Wurster, secretary, and C. C. Smith, general superintendent, were present.

The Mark Railway Equipment Company, Chicago, was well represented by a display of cable track, joints, joint bridges, rail chairs, brace chairs, double brace plates, single brace plates, tie plates, pole arms, etc. Many samples and sections of each were included in the exhibit, and C. E. Mark explained everything.

Dilworth, Porter & Co., Pittsburg, showed a lot of axles made of Glendon indestructible soft steel. There were five samples, showing axles in the rough, cold drawn and turned at journals only, cold drawn, no lathe finish, and one bent, showing result of tests. Goldie tie plates and section of tie showing the action of the Goldie spikes, made up the balance of the exhibit.

The E. T. Burrowes Company, Portland, Me., had shades and shade material in revolving cases. The varieties included the regular pinch handle curtain for closed cars, the cable curtain for open cars, and a new style of pinch handle curtain, fitted with anti-friction tip, which admits of its being operated with or without the use of the handle. Twenty samples of water-proof material and ten styles of bottom finish were displayed. W. H. Russell and Mr. Potter represented the company.

The Ohio Brass Company was represented by C. K. King, secretary, and Arthur L. Wilkinson, who expounded the merits of the company's manufactures in the neighborhood of a pyramid of samples. A great variety of hangers and clips were shown. This company offers its customers a wide choice in this respect. Figure 8 wire line material has been furnished for over 150 miles of track the past season, showing that this company has done the greater part of such business. Besides a more than complete line of overhead material, bell metal bearings, bonding caps, track brush holders and track brushes were shown in the collection of supplies. Dirigo insulating material is used on all overhead work, and has given satisfaction from the first.

The St. Louis Car Company showed a car body frame on maximum traction trucks. The platform is low, so that only one step is necessary to enter the car. Another attractive feature was the frame in natural wood finish, showing quality of material. This was mounted on a solid steel four-wheel truck, and was equipped with Verstraete's brake, which was shown in operation. The handsomest part of the company's work was the car "Kinloch," built for President G. H. Turner, and in operation on the St. Louis and Suburban road. In the exhibit was also a Verstrate electric brake in constant operation on one of its trucks in the hall, and it attracted much attention. This is a solenoid brake acting to draw up the ordinary brakes in the same manner as the cylinder of an air brake. The controller was also shown open. Representatives of the company were George J. Kobusch, president; P. M. Kling, vice-president and secretary, and J. M. Denniston, sales agent at Chicago.

The McGuire Manufacturing Company, Chicago, had an extensive display, including a No. 26 pivotal motor truck for double truck cars, one of the 250 A1 suspension trucks for the Consolidated Traction Company of Pittsburg, and two Columbia magazine street car heat-

ers. The latter were set up on dummy seats in proper position and encased. The casing and stoves were also shown separately. A number of photographs used for the adornment of the section gave a good idea of the work which the company turns out. The truck for elevated roads, of which the company has built a considerable number, was shown in the General Electric Company's exhibit. W. J. Cooke, M. G. Hubbard and George T. Collins were the representatives present.

John T. Duff, St. Louis, had a display of uniform coats and caps for motormen and conductors.

W. H. Carter, St. Louis, had a model of a car brake which was examined by many street railway men.

The Leonhardt Wagon Manufacturing Company, Baltimore, had a handsome display of three electric emergency wagons, with folding and revolving tower and extension platform. The number of specimens made it possible to show the tower in three positions.

The American Street Car Sprinkler Company, Worcester, Mass., had a sprinkler in operation on the lines of the Union Depot Railroad,

The Brownell Car Company, of St. Louis, had on exhibition one of the large order of cars built for the Metropolitan Street Railway, of Kansas City. These cars are handsomely finished in cherry, and have large enclosed platforms, with gates of the Minneapolis pattern. They were fully described in our last issue. There were also shown seats of the latest pattern which can be folded up like a school desk. A reversible seat in which the back and seat are exactly alike, the back becoming the seat when reversed, attracted much attention. The Brownell standard single 3 E truck completed the exhibit. F. B. Brownell, president, W. B. Allen, salesman, and F. A. Baier, superintendent, did the honors for the company in a pleasing manner.

near convention hall. The apparatus will sprinkle any width of street and can be filled in two or three minutes. The car was driven by its own motors and the platforms were constantly filled with interested delegates. Frank D. Perry, general superintendent, explained its merits.

The Washburn & Moen Manufacturing Company, Worcester, Mass., exhibited feeder wires and cables, hard drawn copper trolley wire and insulated wires and cables. The Chicago rail bond, which has proven so satisfactory as to be very extensively in use, attracted interested attention.

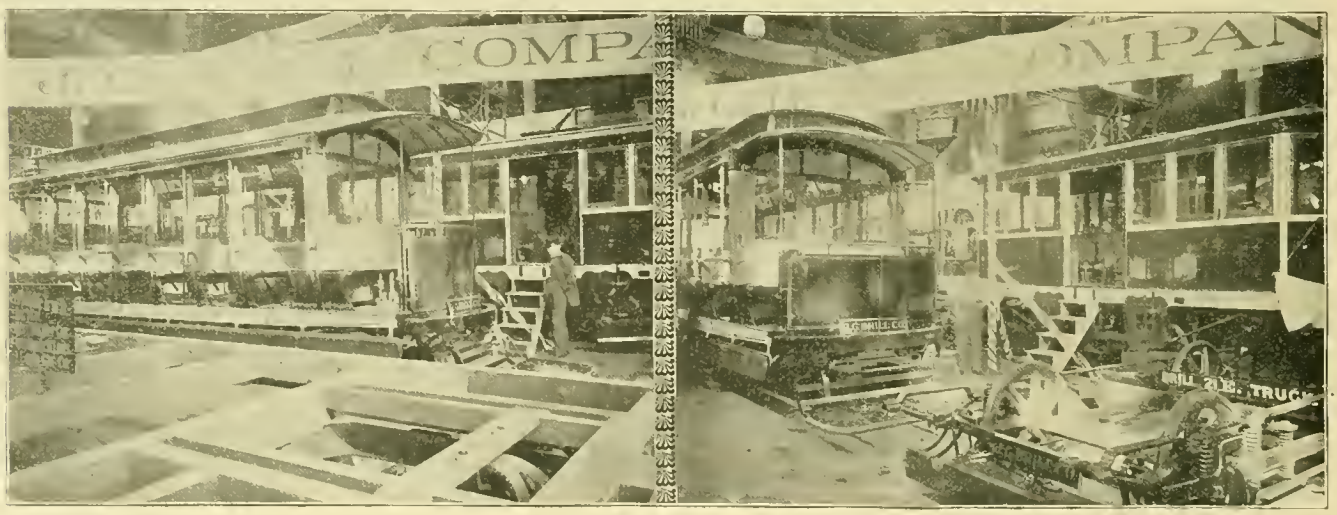
The Walker Company exhibit was in charge of J. Holt Gates of the Chicago office. One of the things that attracted most interest was the new Walker non-infringing roller bearing trolley, shown together with some of the overhead work used with it. One of the heaviest exhibits in the hall was an armature built for the new Chicago City Railway plant. Four sizes of railway motors were on the floor, together with some motor armatures and resistances. Electricians and master mechanics were also much interested in the street car and elevated controllers making use of the double cylinder multiple brake feature. Besides Mr. Gates the company had in attendance W. J. Davidson, engineer, Chicago; M. D. Barr, of Cleveland; C. E. Flynn and S. T. Dodd. W. H. Bone, general manager, Cleveland, also spent two days at Convention.

Fitzgerald & Van Dorn displayed the workings of the Van Dorn automatic coupler which is in successful use upon a large number of roads and is practically the only automatic street car coupler in use. Represented by W. T. Van Dorn.

The Hunt Air Brake Company, Jackson & Sharp Car Company and Peckham Motor Truck and Wheel Company made a very happy combination in the shape of an outside exhibit running on the streets of St. Louis for the special accommodation of visitors. It was a long combination vestibuled double truck car built for the Springfield, O., Railway, mounted on Peckham swivel trucks. George Pratt, manager of the Hunt Air Brake Company and formerly of the Jackson & Sharp Car Company put the car at the service of delegates desiring it. The car was a beauty. It was a combination, the air compressor running with a small motor being placed in the baggage compartment. On the platform was the usual controller at the left and the lever working the air at the right. A pressure gauge just over and in front of the motorman showed the air in reservoir. The compressor worked automatically, and the car was in constant operation and worked perfectly under all kinds of stops, regular, slow and emergency. Both car and brake received many compliments.

The Brooklyn & New York Railway Supply Co., made its shipment of a very handsome car two weeks before convention, but by some misfortune it was lost en route, and after 13 days showed up just at the last minute. Frank Morrell, the company's general sales agent made the best of things, however, and had his car loaded on a big wagon and placed in the street just in front of the main entrance. A large box containing specialties was smashed, but in the car were the new registers one at each end for registering cash and transfer fares respectively. A sliding board with "cash" and "transfer" at opposite ends moves so as to indicate on both registers which fare is being recorded.

The DeWitt Common Sense Sand Box was on exhibition in the space of the Central Electric, of Chicago, which is western agent. Mr. DeWitt was present and was kept standing on one foot the greater part of three days, in order to demonstrate with the other the simple working of his box which was constantly watched by an interested crowd.



The American Car Company, St. Louis, displayed one of the closed cars built for the Canal & Claiborne Traction Company, New Orleans—one closed car with 25-foot body mounted on the company's No. 2 motor truck and equipped with the National air brake; a new high-speed double truck with 33-inch wheels and 4-inch axles. These trucks weigh 385 pounds apiece and have steel frames. They are center bearing and it is claimed are capable of running at any speed. There was also a handsome open car with center aisle and cross seats. The company was represented by Wm. Sutton, president; W. B. Krueger, superintendent, and E. J. Lawless.

The Scarritt Furniture Company, St. Louis, occupied a large, neatly carpeted and enclosed space with a number of seats of several varieties, but constructed on the well known Scarritt plan. These were both the short and long cross seats for center aisle and open cars respectively. The exhibit also included some handsome and comfortable looking station settees. General Manager Scarritt, Mr. Parker and Mr. Howard, all of the St. Louis office, were present.

McCardell, West & Co., Trenton, N. J., showed the Trenton trolley wagon, and gave frequent exhibitions of its simple and effective working. J. R. McCardell was in charge.

The Shickle, Harrison & Howard Iron Company, St. Louis, had a large display of steel motor gears, truck frames, step irons, platform brackets and almost every part of a street car susceptible of being made of steel. The company is comparatively new in the street railway supply field, but its gears are especially worthy of investigation. Represented by J. M. Harrison, J. Daniel, William Burow and J. A. Janney.

The Consolidated Car Fender Company, Providence, R. I., was represented by Col. A. C. Woodworth and G. H. Hale. The fender is too well known to require much explanation, and its features and work have been so often shown in the street railway press that the work of the representatives at the convention was comparatively light.

The Missouri Car & Foundry Company, St. Louis, had on view samples of wheels of various sizes and patterns, with rims broken away to show quality of material and depth of chill. The representative of the company, Scott H. Blewett, explained the interesting features to professional and layman alike.

The Missouri Malleable Iron Company, East St. Louis, Ill., exhibited truck frames, brake handles, boxes, parts of trucks and a lot of miscellaneous castings for car work.

William Wharton, Jr., & Co.'s exhibit included many specimens of manganese steel work. These were a tongue switch, mate and frog, tongue switch and mate, unbroken main line construction, tongue switch mate and frog for T-rail with manganese centers, etc. Not the least novel and attractive feature was the firm name done in rail sections of the various manufactures. The representatives were F. P. Howe, vice-president, and A. W. Slee.

The Paige Iron Works, Chicago, occupied considerable space with a great variety of forms of special work suited to all ordinary requirements and adapted to rails of varying weight and section. The exhibit included different forms of switches and crossings. This company manufactures so large an amount of these classes of work to meet special conditions that it is an impossibility in any one exhibit to convey an adequate idea of its resources. The exhibit, however, attracted interested attention from many of the railway men present. President Paige and E. S. Nethercut, engineer, were present.

The Pennsylvania Steel Company, Steelton, Pa., showed a solid cast steel switch with hard steel wearing plates cast solid with the body casting; also samples of rail braces.

The Elliott Frog and Switch Company, East St. Louis, Ill., had on exhibition samples of its steel clamp frogs, tongue switch, mate and frog, the Doddridge clamp rail joint, a handsome nickel-plated model and 3-throw split switch and stand. Represented by Col. H. Elliott, W. H. Elliott and H. Elliott, Jr.

One of the most tasteful arrangements of exhibits was that of the Standard Air Brake Company, New York, whose display was surrounded by a unique railing consisting of trailer hose connections. The articles shown included the motor compressor and automatic controlling device as leading features. The compressor was shown

in operation and attracted great interest among motormen, as it relieves them of all responsibility, they having nothing to do with cutting in or out of the motor. The automatic current controller responded instantly to demands made upon the compressor. Without having compressor in operation twenty service or ten emergency stops were made. By means of the interlocking handle the most delicate stops were made as readily as emergency. There was shown also the type of compressor made for the Akron, Bedford & Cleveland: and the single compressor, of which 50 have just been ordered from Germany, making 279 to one road. A chime of air whistles for interurban work made merry music. E. J. Wessels, general manager, was in charge, assisted by his superintendent.

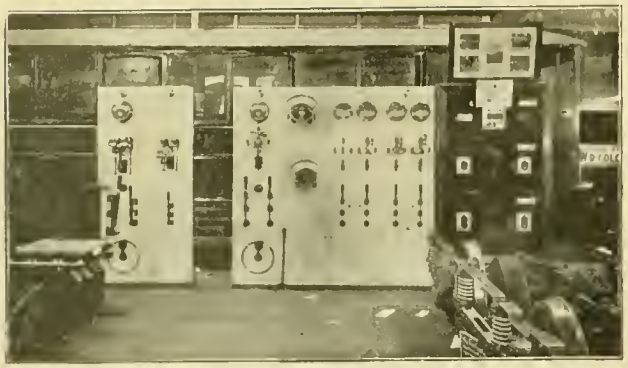
The Johnson Company, Lorain, O., had a large floor space covered with special work, switches, crossings, and an immense variety of samples of rail sections in both girder and T forms, guard rails, etc. The Company makes probably a greater variety of sections than any similar concern in the country, and the exhibit conveyed as well as could be done in so small a space some idea of the magnitude of its business. Major Evans of the New York office; A. S. Littlefield, and O. W. Meysenburg, Chicago; and Mr. Evans of the Philadelphia office, were present.

J. G. Brill & Company, Philadelphia, had as usual an interesting display, including an open car with fenders; No. 27 trucks; a maximum traction truck; an electric sweeper with motor in the middle, and a 21 E single truck. Outside the building on the east side were the Brill snow plow and sprinkler. The Dunning drawbar also formed a part of this exhibit. President John Brill was assisted by a large force from the home office.

The Weber Railway Joint Manufacturing Company, New York, exhibited several specimens of the Weber joint for both girder and T rails. The characteristic of this joint is the wood filler between the channel and shoe angle, affording elasticity and deadening noise. Represented by Mr. Weber and D. O. Ward.

The Sargent Company, Chicago, displayed a line of the brake shoes manufactured by it which are of especial interest to street railway men. Most of these patterns have been in extensive use, and are so favorably known as to require but brief notice.

The Chicago Truck Company displayed a single Curtis truck similar to those in use upon the recent large orders for cars furnished by the Wells & French Company to the Chicago City Railway Company and others. The representatives were E. F. Carry, Jr., and E. A. Curtis.



PART OF THE WESTINGHOUSE EXHIBIT.

The Westinghouse Electric & Manufacturing Company was found in a very central location where this well known concern had a display of motors and switch board apparatus. The particular novelty of this exhibit and from an electrical standpoint one of the most interesting of the entire exhibition was the display of switches and circuit breakers recently designed by that company's eminent engineer, A. J. Wurts. These devices make contact through jaws of laminated copper so arranged, that the ends of the laminations form the contact surface. By this design a great current carrying capacity is obtained in a very small switch and the opening and closing is made vastly easier than with the ordinary type switch of the same capacity. The circuit breakers and switches are made up to three thousand amperes capacity. The circuit breakers have copper and carbon shunts to prevent all liability of burning the main contact points. There is no solenoid, but the passing of the current through the breaker creates a sufficient field to operate the tripping device. The company was represented by G. H. Lewars, Albert Schmidt, W. F. Timmerman, C. E. Bragg, A. J. Wurts, H. P. Davis, A. Hartwell, J. A. Rutherford, C. E. Skinner, T. A. Cleland, H. C. Ebert, M. Coster, W. R. Brown, A. F. Gordon, W. W. Stover and E. H. Heinrichs.

J. M. Jones, president of the J. M. Jones' Sons Car Company, West Troy, represented his company, and was kept busy meeting old friends.

G. C. Kuhlman, president of the Kuhlman Car Company, Cleveland, was present, accompanied by his wife.

The Morris Tasker Company, Philadelphia, had no exhibit, but its interests were well cared for by Charles Yerkes Flanders, of the Philadelphia office.

Hooven, Owens & Rentschler, Hamilton, O., makers of the well-known Hamilton corliss, were represented by J. C. Hooven, president; Geo. H. Halbey, superintendent; J. A. Vail, St. Louis agent, and J. J. Sullivan, Chicago agent.

G. H. Quinn, Chicago, general western agent of the Detroit Steel & Spring Company, represented his people in a pleasing manner.

The Cutter Electric & Manufacturing Company, Philadelphia, was represented by W. E. Harrington.

Geo. C. Ewing, secretary of the Neal Electric Headlight Company, Boston, represented his company.

J. V. E. Titus, general manager of the Garton-Daniels' Electric Company, Keokuk, Ia., was present and made headquarters with the Central Electric, of Chicago.

The Hyatt Roller Bearing Company, Newark, N. J., had an interesting exhibit of the Hyatt flexible steel bearing which is well known as consisting of a strip of steel bent into tubular form and arranged in yokes or caps to form roller bearing for various purposes. The rollers were shown in a variety of sizes. One of the Diamond trucks upon the floor of the hall was equipped with this bearing. Represented by F. V. M. Hudson.

The Bradford Belting Company, Cincinnati, was well and thoroughly represented by O. M. Hubbard and Elmer P. Morris. The principal thing exploited was "Monarch" insulating paint, and it is safe to say that that effective article lost nothing of the esteem in which it is held by reason of their statements.

Holmes, Booth & Haydens, N. Y., had a small display in connection with that of the Commercial Electric Supply Company. J. O. Crane was the representative.

The Standard Paint Company, New York, was ably represented by its western manager, J. C. Shainwald, and a supply of samples included in the display of the Commercial Electric Supply Company.

The Western Electric Company, of Chicago and New York, had no exhibit, but A. S. Tucker, manager of the supply department, and Thomas G. Grier in charge of street railway supplies, were present making friends for the company.

E. P. Sharp, of Buffalo, dealer in all kinds of second-hand electrical machinery, was present talking business.

The Taunton Locomotive Works were represented by Wendell & McDuff, of New York.

The Griffin Wheel Company presented a handsome leather card case as a reminder of the extensiveness of its wheel manufacturing plants at Chicago, Detroit, Denver and St. Paul. C. K. Knickerbocker was the representative.

The Jewell Belting Company had a handsome exhibit of samples of the company's product, and was well represented by Chas. E. Newton, W. G. Wheeler and A. E. Silk.

The Central Electric Company of Chicago had a handsome display of Garton lightning arresters, Billings & Spencer overhead material with colophite insulation, mica products, changeable electric headlights, Central Electric headlights, Bound Brook trolley wheel bushings, Nelson crossovers, Kelsey brake handles and figure 8 overhead material. W. R. Garton, manager railway department, was in charge, assisted by C. B. White and C. W. Cobb The Southern Electric Supply Company is the Central's southern branch house and had some of its force in attendance also.

The Contra-Twist Door Opener Company, Wilmington, Del., had its double door opening device in successful use upon the car constituting the exhibit of the Jackson & Sharpe Company.

The Meeker Register Company, North Chicago, had a large and desirable space and a fine exhibit of its improved fare registers, both stationary and portable, which attracted much attention. There were also several samples of the overhead specialties made by this company, including trolley wire hangers and a new type of insulator President J. W. Meaker was present, assisted by G. L. Meaker.

Francis E. Donohoe, Chicago agent of the American Electrical Works, Providence, R. I., did the honors for his company.

The John A. Roebling's Sons Company made an exhibit of only one of its numerous products, the Columbia rail bond. The sample was designed to show the ordinary bond attaching to the rail beyond the fish plate, and also the method sometimes preferred of bonding inside the fish plate. In the latter case the attaching holes are staggered, and it is thought that by this method there is not enough metal removed to seriously weaken the plate. George Bailey, manager of the Chicago agency, was present; exhibit was in charge of Wm. L. Doyle.

Ezra H. Linley, St. Louis, represented a number of firms, and had on exhibition a sample of the product of each. The list included Cambria Iron Company rails and wire; Wm. Jessop & Sons, English cast tool and rock drill steel; Nathan Manufacturing Company, locomotive injectors and oil cups; Midvale Steel Company, tires, steel forgings, etc.; Morris, Tasker & Company, boiler tubes; Detroit Steel & Spring Company, car and locomotive springs, track tools, etc. The exhibit was carefully arranged and displayed to the best advantage for each firm represented..

Fletcher & Stone, of Terminal Hotel building, St. Louis, occupied a space in exhibit hall where the two members of the firm explained the Fletcher automatic trolly cut out which leaves all trolley wires dead as soon as they fall, and also a new flexible suspension trolley hanger which is radically different from those heretofore on the market. The display was very interesting and Mr. Fletcher received a good many orders for his flexible hanger.

J. S. Everett, Mt. Ayr, Ia., showed and explained the working of a model of a track brake for both steam and street cars.

PERSONAL.

C. H. Cochran, superintendent of the Hagerstown & Potomac Electric Railway, has resigned.

Jacob Hays has been elected president of the Eighth Avenue Railroad of New York, in place of George Law, deceased.

J. F. Barry, general manager of the Columbus (O.) Central Railway, has resigned, and will be succeeded by Marion Crabtree.

F. O. Rusling, superintendent of the Rochester Railway, recently suffered the loss of his father, Joseph Fowler Rusling, of Lawrence, Pa.

Prince Michael Hilkoff, imperial minister of ways and commerce, of Russia, was in this country, last month studying steam and electric roads.

J. C. Bowerman has resigned as secretary of the Baltimore Traction Company, and H. C. McJilton, formerly auditor, has been elected in his place.

J. C. French, president of the Sioux City Traction Company, has resigned, and M. L. Kohler, of Philadelphia, was recently elected to take his place.

The marriage of J. F. Prince, Jr., general superintendent of the Corning & Painted Post Street Railway, to Miss Kate Hoare took place at Corning, N. Y., last month.

John E. Witbeck has been elected president of the Chicago General Railway, to fill the vacancy caused by the resignation of L. E. McGann, who still remains on the board.

George J. Hurd, superintendent of the Knoxville (Tenn.) Light & Power Company, and who was one of the early ones in electric railroading, becomes general manager of the Miami Valley Railroad.

W. Phillips has been appointed acting manager of the Niagara Falls Park & River Railway Company, with headquarters at Niagara Falls, Ont., in place of Ross Mackenzie, resigned.

John Young, general manager, and William Clark, chief engineer of the Glasgow municipal tramways, have been making a trip through the United States investigating street railway systems and apparatus.

E. D. Albaugh, one of the division superintendents of the Union Traction Company, of Philadelphia, was slightly injured recently by jumping off the front end of a car to avoid collision, due to a blinding rain and a track greased with leaves.

Rodney Denis Allen, the junior member of Smethurst & Allen, the electric railway contractors of Philadelphia, was married in that city, October 21, to Miss Charlotte Gilpin, an accomplished and beautiful young belle, who is prominent n Quaker City society.

W. C. Camp has recently become interested in the Metropolitan Electric Company of Chicago, and has been elected treasurer. Mr. Camp has, until recently, been manager of the great music house of Estey & Camp, and will bring with him a valuable business experience.

A. Hoffman, inventor of the cast-welded joint, has sailed for Europe, accompanied by his wife. Mr. Hoffman will visit all the leading cities in England and on the continent, where great interest is expressed in the new process. He will also instruct a crew at Lyons, where an outfit has already been sent.

Charles L. Harry used to be the superintendent of the Bay Cities Consolidated Street Railway Company, and upon his departure to assume a similar position with the Citizens' Light & Power Company, at Kokomo, Ind., he was presented with an elegant chain and charm by his former employes. The present was of less value to Mr. Harry than the expression of good feeling which accompanied the gift.

On the election of Col. D. B. Dyer as second vice-president of the A. S. R. A., the Augusta, Ga., News, says: "In honoring Col. Dyer the American Street Railway Association has honored Augusta. Col. Dyer has attracted and has invested more than a million of dollars in Georgia, and has just started on his good work, and there is no telling what wonderful and beneficial accomplishments he will succeed in doing before he finishes."

Among the most recent acquisitions to the street railway electric field, is Maurice Coster, who is manager of the Chicago agency of the Westinghouse Electric & Manufacturing Company. Mr. Coster is an electrical and mechanical engineer of large experience and ability. He has been located in Chicago about one year, and his attention during that time has been given almost entirely to lighting and power work, and now that he has entered the electric railway field, his many friends have every reason to expect the same marked success which has characterized his work in the other departments.

CONVENTION NOTES.

The Chicago City Railway was represented by eleven officers and heads of departments, this being the largest delegation sent by any company.

The grouping of exhibits in classes was an excellent feature, and the removal to points farthest from the "Meetin' House" of such as were the most noise producing was a good scheme.

A large party of delegates went down over the Wabash in special cars, leaving Chicago Monday night. City Ticket Agent Keenan, who accompanied the special Wabash train last year to Montreal, went along and made the journey very pleasant for his many friends.

It was a great disappointment that C. S. Sergeant, general manager of the West End, Boston, was not present. Mr. Sergeant arrived in St. Louis Sunday morning only to find a telegram announcing the death of his wife's mother, and he took the first train home.

A certain exuberant hilarity which has marred a few conventions, and arising not from looking upon red wine but in getting too much of it out of sight, was absent this year, and while no one went either hungry or thirsty, it was in all respects a "gentleman's association."

The massing of all the exhibits at one place, instead of having many at the headquarter's hotel as heretofore, was a desirable innovation. The parlors were thus left for social purposes, and when one had thoroughly "done" the exhibit hall, inside and out, he could be sure he had missed none.

The rule of the exhibit hall that banners and signs should not be allowed to hang in such a way as to hide other exhibits proved a good one. The walls were plentifully covered, and some of the banners were not as conspicuous as the owners would have liked, but the general effect was excellent, and we hope the rule will prevail hereafter.

The hotel accommodations have never been better. Both the Southern and the Planter's were full, but the table service, which at some conventions, has fallen down under the unusual numbers, was maintained, and individually no one would have known there was any convention. The other hotels also received their share, quite a large number stopping at the Terminal and reporting excellent accommodations.

"Yes, that's a big shaft," remarked a street railway officer to some of his friends that were standing around as the Bethlehem Iron Works exhibit was being moved in, "but you just ought to see the ones they are making for our new power house; that shaft is a needle beside 'em." Just then the attendant appeared with a card which was put on the exhibited shaft, stating that it was one of those built for said officer's road. The account was promptly squared in the usual way.

Nothing like a convention to wake people up and stimulate to better and more energetic effort. This rubbing up against others engaged in the same work at once suggests many new ideas, and not infrequently shatters many a pet scheme which the author supposed was new and good, but which he sadly learns has been tried and found wanting. There is no investment involving an equal amount of money which brings such large returns, as the money a company invests, or ought to, in sending its men to the street railway convention.

Among the visitors were a large number of Shriners, and on Wednesday evening they assisted the local brothers and initiated Capt. McCulloch into the order. The captain says he never imagined the humps on a camel could be so big and hard, and that even during the heated term last summer there was nothing in St. Louis to approach the temperature to which the boys parched the desert sand. However, he reached an oasis in safety and was presented with a magnificent emblem set with diamonds from his friends. W. J. Clark, of the General Electric, made the presentation speech.

Probably one of the most thoroughly and genuinely interested visitors at convention was Seiryo Mine a leading Japanese electric railway engineer who has been visiting in this country for several months. He is commissioned by the Japanese government to look up the questions of electrolysis of gas and water pipes by the return current and the long distance high tension transmission of power. Like most of his countrymen Mr. Mine is very quick to grasp new ideas and will no doubt carry back with him a mine of information on American practice. He installed the electric road at Kiota which has been described in our columns.

There were divers rumors afloat the evening of the last day as to the magnitude of the hotel bills of some of the visitors. One unassuming street railway delegate, who it is safe to assume did not have any "extras" while there, was turned to stone when the cashier handed him a bill evidently intended for some "entertaining" supply man, but managed to collect his senses enough to raise a protest so the confusion was discovered. Another delegate with commendable desire to economize for his road, registered for a room at the Southern and took his meals elsewhere, with the idea that he was going on the European plan. When he came to pay his bill his mind was violently relieved of all such fallacies.

Another improvement was the greatly decreased use of circulars, pamphlets, and the like, and a corresponding increase in comfort. What printed matter was used was brief and to the point, and of such size that a man could carry it without a valet or a wagon, as in former years. Unless a manager is sufficiently interested in supply literature to ask for it, the chances are he will not read it, much less burden himself to carry it home. We repeatedly noticed managers who could not very well refuse matter which was forced upon them, carry it a few yards and when they thought themselves unobserved, drop it on the floor or lay it one side. At the same time there was less waste than at any former convention.

The buttons worn by delegates and supply men were of solid silver and of a most tasteful and pleasing design. Each suspended a neat number printed on celluloid. The buttons for the ladies were solid silver with heavy gold plate, and mounted on a pin. The wearers of these badges could not find a conductor on any car in the city during the entire week who would accept any fare money, and in this connection it is a pleasure to compliment the St. Louis street rail-

way employes on their gentlemanly bearing and uniform courtesy to the visitors. Information was readily and pleasantly given and cars stopped to let off or pick up the guests with an utter disregard of crossing rules: all of which was much appreciated.

The arrangements as made by our St. Louis friends were as nearly perfect as it is possible for any set of men to make them, and any one who has a word to say against the work of the local committee must verily be an unreasonable and unreasoning kicker, but the fact remains that there was a certain amount of discomfort and even sickness because of the coldness of the convention and exhibit hall. The street railway men who attended the sessions and the supply men who staid by their exhibits can testify to this. Now it was out of the question to warm a hall of such a size and nature. It was also practically necessary to have the convention hall in the exhibit hall, because of the complaints of supply men in years past as to the out of the way place the exhibitors were given in reference to the places frequented by delegates. The trouble was not with the arrangements, but with the season. In view of the fact that the exhibit has grown to such proportions as to preclude the use of small halls, and of the growing sentiment that the convention hall should be entered through the exhibit hall, and that the exhibits should be kept together at one place, it seems very desirable to change the date of convention to one month earlier. Even in our most northern cities September is such a mild month that there need be no fear of discomfort, whatever the quarters in which the convention is housed. There is now no good reason why the convention should not be one month earlier, except that of precedent, and in consideration of the fact that the conditions have changed in the past ten years, and the four walls of a hotel cannot contain our gatherings, as formerly, precedent no longer holds.

Some exhibitors expressed the belief that the delegates did not all give as much time and attention to examining the displays as they should have done. There may not be as good grounds for this as supposed. A manager can hardly be expected to spend much time looking over a supply which he is either using or knows all about. Then, too, we noticed not a few whose buttons were covered by the overcoat, who in a very quiet manner were making the rounds, some several times, and pausing here and there to hear the explanation which was being made to some one else. One morning session was adjourned for the express purpose of visiting the exhibits, though it is a fact a person could easily spend several days if he made a real thorough study of them all.

RECEPTION PARLORS.

Nearly all the parlors at the Southern were occupied as headquarters of various concerns.

The main parlor was taken by the General Electric, where an informal reception was held each evening. Here, at about 10 o'clock at night, were gathered everybody of prominence in the street railway field present in St. Louis, together with their wives; and for almost four hours the feast of reason and flow of soul ran evenly on its course. Mr. Clark is to be congratulated upon the success which met his efforts to uphold the reputation of the General Electric Company in every particular, at this convention. The smaller parlor adjoining was also used, and the material welcome there extended, proved a constant attraction.

The J. G. Brill Car Co., occupied two spacious rooms with easy chairs.

The Westinghouse Electric Manufacturing Company had a pleasant room, with cigars for the gentlemen and flowers for the ladies.

The Peckham Motor Truck & Wheel Company, had in its rooms two very handsome models of its trucks, and comfortable chairs where the weary delegate could rest himself.

The Brownell, LaClede, American, and St. Louis Car companies, and the Missouri Car & Foundry Company, jointly occupied three parlors with an attendant constantly in charge to serve frappe and lunch.

The STREET RAILWAY REVIEW and Street Railway Journal also had a parlor each.

The decorations were pleasing and all the rooms were attractive though not as much frequented as usual owing to the multiplicity of attractions elsewhere.

CONVENTION SOUVENIRS.

Souvenirs have become an interesting feature, and the collecting of these trophies quite a fad, especially with the ladies. In some cases the supply was not exhausted and our readers can secure a sample by addressing the concern at its home office. Among the souvenirs may be mentioned: Gold medal and a desk easel by the St. Louis Car Company; a small bottle of standard contents by the Monarch Paint Company; a handsome collection of cyclone views by the St. Louis Register Company; the Rochester Car Wheel Company gave away a neat pocket knife; the Diamond Truck Company, a memorandum book; Jewell Belting Company, leather pocket case for bills; Griffin Car Wheel Company, russia leather card case; New Haven Register Company, pin with fac-simile of its register; Van Dorn Coupler Company, one of Van Dorn's patent bread toasters; Hunt Air Brake, aluminium tea ball; Garson Myers, unique calendar for desk or table; Creaghead Engineering Company, small flask of Kentucky essence; A. S. Partridge, neat vest pocket memorandum book, with name of recipient printed in gold on cover; Ohio Brass Company, paper weight; Heine Boiler, aluminium medallion; E. T. Burrowes Co., dictionary; Partridge Carbon Company, paper weight and carbon coin; the STREET RAILWAY REVIEW, 10,000 pieces of chewing gum made specially to order and inclosed in its own wrappers.

In an action for $3,000 damages against the Urbana & Champaign, Ill., Street Railway Company for an alleged assault by a motorman, the jury, after eight hours' deliberation, awarded plaintiff 85 cents, being the cost of a 50-cent prescription and 35 cents worth of liniment.

An action involving the right of a street railway company to construct its lines across the tracks of a steam railroad where there was no highway crossing and without the consent of the latter, has been decided under the law of Pennsylvania adversely to the street railway. The case was that of the Northern Central against the Harrisburg & Mechanicsburg Electric Railway Company.

NEW AIR BRAKE SYSTEM.

By N. A. Christensen.

As heavier cars and higher rates of speed are introduced in street railway practice the crying necessity for a braking device which shall be simple, durable and efficient, becomes more and more apparent, and the amount of attention which has been devoted to the subject during the past few years, as evidenced by the great number of new devices which have been brought forward for the purpose, shows that it has attracted the notice of a large number of those interested in street railway matters. It will be strange if all this attention should not have resulted in the production of any method more suitable than the old and primitive one in vogue during the early stages of the industry when motive power was confined to horses.

In railroad practice for many years the inventor and promoter of a device which would prove more efficient than the old wheel and ratchet had the incentive of enormous fortunes as the prize to be won by the producer of such an appliance. Notwithstanding that the best mechanical minds of the country had the matter continually before them with such incentive to urge them on, it was not until the application of compressed air to this service was successfully made that any improvement suggested possessed merit enough to replace the wheel and ratchet, and to this day, with the exception of the compressed air device, the old wheel and ratchet is the only survivor on railroad cars.

The same grounds that have recently been gone over by seekers for improvements in mechanical brakes for street cars were thoroughly prospected, and found barren during the stages of railroad operations previous to the introduction of air brakes.

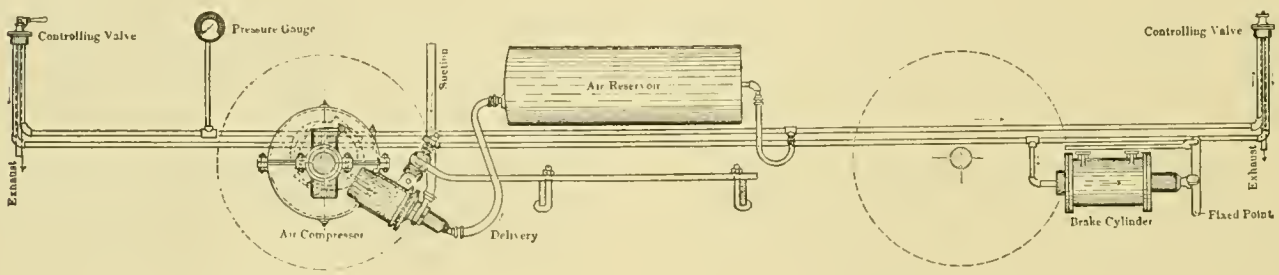
It is, therefore, hardly reasonable to suppose that the same question for street cars will be solved in any different manner from what it has with steam cars. The lack of success to date in the application of air as a means for furnishing power for braking street cars may be attributed to the fact that heretofore no pumping and regulating device has been supplied possessing the features of durability and efficiency which would guarantee at all times a sufficient supply of compressed air for the purpose.

The Seamless Structural Company, of Milwaukee, having re-inforced their first impressions of the perfection of the system herein illustrated by a practical test extending over a period of more than a year, now feel warranted in stating to the street railway fraternity that they have to offer in the Christensen Improved System of Air Brakes a device which will be to the street railway equipment of the country what the automatic air brake is to the steam railroad equipment.

The general method of the application of compressed air to the service of braking cars has been heretofore so thoroughly ventilated, and the means adopted in the Christensen system to obtain the results desired, are so simple, that a cursory examination of the cuts herewith displayed will render unnecessary a verbal description of the details of the working parts.

The reservoirs supplied with these brakes are manufactured by the Seamless Structural Company, and consist of seamless cold drawn steel shells, tested to 600 pounds per square inch, and fully guaranteed against leakage. The absence of rivets and joints in the construction of these cylinders does away to such an extent with the possibilities of leaks occurring, that the manufacturers are fully warranted in making the strongest guarantees.

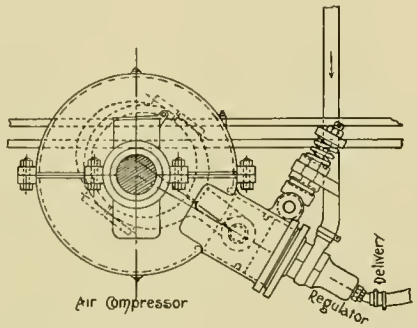
The controlling valve is of the simplest construction; the brake cylinder is identical with those which have demonstrated, through years of service, their suitability for the purpose. It may, therefore, be confidently stated that these appliances are suitable for, and if supplied with the necessary quantity of air under pressure, will perform the functions for which they are intended with certainty and without depreciation in use and we may, therefore, in passing upon the merits of this system, consider these features as satisfactory. It only then remains to assure ourselves of the efficiency and durability of the pumping and regulating device.



It may be safely said that the two most important features to insure efficiency and durability in any description of pump mounted upon the car axle are, first, protection from dust and grit, and second, perfect alignment between the axle and the pump cylinder. It is safe to say that any device in which perfection in these two features is not secured will, in practice, be found unsuitable for the service.

Upon the axle is keyed an eccentric, fitted with sleeves on either side, the length of which is only limited by expediency or the space available on the axles. Upon these sleeves is hung the casing and cylinder, which forms a part thereof, the piston within this cylinder being operated, of course, by the rod connecting it with the eccentric. The width of the eccentric strap, as well as that of the bearings of the casing upon the sleeve, is such as to reduce the square inch pressure upon the bearings to a point which insures great durability. To the back head of this cylinder is attached the governor, the office of which is to shut off communication with the reservoir when ever the pressure therein reaches the desired point, and at the same time opening connection between the discharge valve and suction hose, so as to permit the air to flow back and forth without compression. This controlling valve contains but three moving parts, all of which are strong and durable, and their action

is such as not to cause undue wear. The casing is partially filled with oil, thus insuring perfect lubrication of all working parts in the casing, pump cylinder and regulator. The elastic suspension not only protects the pump and casing from the effects of sudden jars, but also permits universal play of the pump cylinder, sufficient to insure at all times perfect alignment between the axle and the piston, thus securing one of the features above spoken of as absolutely essential. The other feature, viz, the protection from dust and grit, it will also be observed, has been positively accomplished, as there is no opening through which dust can enter the outer casing, nor is there any moving rod which is pass-



ing back and forth from the dusty exterior to the chambers containing the moving parts. Careful consideration of the features above mentioned should convince investigators that this device is efficient and durable to a remarkable degree, but practice has also demonstrated that the theories are correct. As these pumps now have a record of having run fourteen months and are still running, without failure or repairs, the confidence displayed by the company would seem to be warranted.

While the tests so far made have not been upon a sufficient number of brakes to determine the exact saving in percentage in car wheels and brake shoes that can be made by the use of this air brake, yet it has been demonstrated that such saving is quite material. The saving of life and property which can be made by the prevention of accidents through the use of these air brakes cannot be stated, yet when proper estimate is made of the difference in time required to stop a car by this method over the usual means, it is safe to predict that at least 75 per cent of the accidents from collision will be avoided, as it is seldom that a collision occurs without the motorman's being able to foresee it and take some measures for avoiding same; if then, he is able to stop his car in one-half the distance that he otherwise would, he will be able, in most instances, to avoid all damage. That the car can be stopped in much less than one-half the space by the use of an air-brake than it can by the use of a manual brake, has been demonstrated and is easily proven.

ENGINE SMASHES TROLLEY CAR.

A terrible accident occurred at Hazleton, Pa., October 14, when an engine of the Delaware, Susquehanna & Schuylkill Railroad backed into a trolley car at a crossing, killing three persons and seriously injuring about twenty others. The night was dark and cloudy. The conductor had turned the safety switch, not noticing the engine, and the car was partially over the track. The car was thrown around and overturned. It is said that there was no headlight on the tender.

THE "JEWELL" STREET CAR HEATER.

The accompanying illustration gives a good idea of the "Jewell" street car heater, manufactured by the Detroit Stove Works, and for which several claims of superiority are made. The handsome appearance of both the stove and the casing create a favorable first impression which seems to have been well supported by its behavior in service. It

is made entirely of cast iron with nickel trimmings, is adapted for burning either coal or coke and is said to operate perfectly under ordinary conditions. The fact that the company manufacturing it is one of the largest stove plants in the world is a good indication that details of construction have been so looked after as to fully secure the best results in heating.

THE VAN DORN SOUVENIR.

The souvenir which most interested the ladies at convention was the toaster, the invention of W. T. Van Dorn, also inventor of the Van Dorn automatic draw bar. The large supply he had was very soon exhausted, but we believe any manager who did not receive one, or who was not present, would be very likely to receive one if he

A NOVEL SOUVENIR.

should write Mr. Van Dorn, whose office is in the Monadnock building, this city. The toaster will work on any kind of a fire in any kind of a stove with any kind of bread, just as the Van Dorn draw bar will work on any kind of a car on any road.

A. S. R. A. at Jockey Club, photographed and copyrighted by J. C. Strauss, St. Louis, from whom original photographs 16x20 inches can be obtained. In the photo from which this engraving is made every face is easily recognized. It is the finest large group of the Association ever taken.

The Standard Underground Cable Company, has established a St. Louis office with F. C. Crosby in charge.

The fender invented by R. Dietrich, of Cleveland, has been tested with success on the Columbus Street Railroad.

A. O. Schoonmaker, 158 William street, New York, carries a large stock of India and amber mica, and is thus able to furnish anything in mica promptly.

The Ansonia Brass & Copper Company, 19-21 Cliff street, New York, announces that Frank X. Cicott has been appointed its representative in its electrical and metal departments.

The R. D. Nuttall Company has removed its Boston office from 180 Summer street to 31 State street. Charles N. Wood, who has had charge of the company's New England business, will continue in charge at the new location.

The Schultz Belting Company, of St. Louis, has recently shipped several 28-inch belts to the Southwest Missouri Electric Railway, of Webb City, Mo., this being one of the largest electric railway orders filled recently by them.

The Ranken & Fritsch Foundry and Machine Company, St. Louis, has just issued a neat and comprehensive catalog of corliss engines, both standard and heavy duty, with illustrations of plants installed and details of construction.

The "Heavy Duty" St. Louis corliss engine, manufactured by the St. Louis Iron & Machine Works, is making for itself and its manufacturers an enviable record, seventy engines, aggregating over 14,000-horse-power, having been placed in St. Louis alone.

The Crane Company, Chicago, has recently secured the contract for all the piping, valves, and headers, required by the Akron, O., Street Railway & Illuminating Company. This work is all made up in the shop and only requires to be put up on arrival at destination.

While at convention, General Manager Wessels, of the Standard Air Brake, received notice of an order for fifty equipments of air brakes to go to Germany. They are for a road on which the Standard has already been in use on several cars, and emphatically indicates the good impression the equipment is making abroad.

An order which the Westinghouse Machine Company recently received through its Paris branch for a 1,200-horse-engine, similar to those exhibited by that company at the World's Fair, would seem to indicate that some features of the great exposition made substantial and lasting impressions on our foreign visitors. The engine is to be used in an electric lighting station in France.

Contracts for the 7½ miles of road of the Springfield Electric Railway between Springfield, Vt., and Charlestown, N. H., have been awarded as follows; the General Electric Company, motors and generators; the Jackson & Sharp Company, Wilmington, Del., cars; W. H. H. Slack, Springfield, Vt., power plant, and Fred T. Ley & Co., Springfield, Mass., track and overhead construction.

C. S. Hart, of Oconto, Wis., has large contracts for cedar poles for the city of Lansing, Mich., and Martinsville, Ind.; also to electric light companies in Brazil, Ind.; Indianapolis, Ind.; New Albany, Ind., and Kansas City, Mo., and a large number of smaller contracts. His motto is "best quality and quick shipments." Mr. Hart has been in this business for twenty years, and his extensive experience makes him well qualified to judge of the best grade of poles, and his trade in all parts of the country is the best indication that his judgment is appreciated by all those who want a high grade of white cedar poles.

The Borden & Selleck Company, 48 and 50 Lake street, Chicago, reports fairly active business in its coal and ash handling machinery for power houses. The following recent contracts have been put in operation: Ash and soft coal handling conveyors for power house of the Chicago Electric Transit Company, Roscoe boulevard and California avenue; also power house of the North Shore road at Edgewater; soft coal conveyors, steel storage tanks, etc., for carrying coal from a side track through a tunnel under streets and factory, delivering same into battery of boilers for James S. Kirk & Co., soap makers, North Water, near Rush street, this city. Contract has just been closed with the Chicago Library Company for anthracite coal and ash handling machinery for the new library building. Recent orders have been filled as follows: Tennessee Coal, Iron & Railway Company, Pratt City, Tenn.; Howard Harrison Coal Company, Bessemer, Ala.; Choctaw Coal Company, Alderson, Ind. Ty.; Schloss Iron & Steel Company, Birmingham, Ala.; Toledo Traction Company, Toledo, Ohio; Elmwood Coal Company, Elmwood, Ills.; Dora Coal & Mining Company, Horse Creek, Ala.; Pablo Gamiz, Havana, Cuba.

It is rumored that three street railroads of Michigan may consolidate; the Consolidated of Bay City, the Union of Saginaw, and the Interurban connecting them.

We will be under obligations to anyone who will send us the address of Monroe B. Smith, formerly connected with the Brigantine Beach road.

Hon. I. C. Libby, of Waterville, Me., who is officially identified with several of the most important street railroads in that state, was recently interviewed by the representative of a local paper upon the prospects of new roads and extensions for next season. He considers that such work is largely dependent upon the action of the next legislature, as the railroad commission can prevent the construction of any line upon the ground that it is not a public necessity. Lines under contemplation are from Bangor to Charlestown, Bangor to Winterport, the extension of the Brunswick and Topsham line to Lewiston and Bath, Turner to Auburn and Sabattus, extension of the Waterville and Fairfield from Shawmut to Oakland, and additional lines in Waterville and Skowhegan. Under favorable financial conditions many of these plans will be consummated.

The Union Traction Company, Philadelphia, has reduced the number of its general divisions from four to two, thus dispensing with two general superintendents.

Julius Mannow, who with Joseph Windrath, murdered in cold blood Cash Receiver Birch, of the West Chicago Street Railroad, was executed in this city October 30. Windrath was hanged several weeks ago.

The application of George H. Worthington, receiver of the Columbus Central Street Railway, for leave to issue $20,000 of receivers certificates for the purpose of meeting the running expenses of the line has been granted by the court. These will constitute a lien superior to the mortgage given to secure the bond holders, since the condition of the road is such that the action is necessary to protect that mortgage.

A. S. Macraedie has been promoted to the Superintendency of the Portland & Cape Elizabeth Electric Railroad.

H. R. McLeod, formerly superintendent of the Portland & Cape Elizabeth Electric Railroad, has been made general manager.

J. C. Liggett, of Detroit, succeeds George Volker as superintendent of the White Line Street Railway Company, Dayton, O.

S. Roy Wright, of Denver, spent several days in Chicago, where he came to meet his family, who were returning from Boston.

H. E. Collins, senior member of the firm of H. E. Collins & Co., Pittsburg, died on October 14, at his residence in East End, Pittsburg.

H. J. Waite, formerly of the Portland (Me.) Street Railway Company, has been appointed superintendent of the Waterville & Fairfield line.

Thomas C. Millen, representing "Smith of New York; established over half a century," made the REVIEW a pleasant call when homeward bound from convention.

John J. Fitzpatrick, son of Inspector Fitzpatrick of the Chicago police department, was married October 22 to Miss Kate Mulvaney, of this city. Mr. Fitzpatrick is a bright young attorney connected with the legal department of the Chicago City Railway, and has hosts of friends.

E. S. BOWERS SUICIDES.

Elbren S. Bowers, of Bowers Bros., of 117-119 Lake street, this city, dealing in mica, drop forgings and other street railway specialties, committed suicide by jumping into Lake Michigan, at his home in Evanston, Sunday evening, October 25. The body was recovered November 2. Mr. Bowers was in attendance at the street railway convention in St. Louis, where he had an exhibit, and appeared in usual good spirits. He returned home Saturday, and Sunday evening proposed a walk with his mother. Before she was ready he disappeared, and with the exception of a brief stop at a drug store, where he bought a cigar, was never seen alive again. He evidently was temporarily demented, probably the result of an attack of grippe a few years ago, as his business was in excellent condition. The body was taken to Acworth, N. H., for burial.

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COMMENCING with January, 1897, the STREET RAILWAY REVIEW will issue a special FOREIGN EDITION, which in size and quality of matter, illustrations and general attractiveness will be fully equal to our present home edition. As usual, the REVIEW will be the pioneer in this new departure, but no expense or effort will be spared to make it deserve the same recognition abroad which it has earned at home.

Mechanical motive power is now the one absorbing topic among the managers and directors of the street railways abroad. The electric lines already in successful operation in Great Britain, France, Germany, Italy, Egypt, South African Republic, India, Japan, Australia, Brazil and elsewhere, are emphasizing the advantages of the new and the disadvantages of the old systems as never before. The tramways throughout the world are just about to enter upon the same great period of transformation from animal to electric power, which has just ended in the United States. The great majority of foreign roads have been watching developments here, and in their conservative way waiting until the weak features of electric traction had been worked out and perfected. The same public prejudice that was encountered here has had its day there, and is now rapidly on the wane; hence, during the next two or three years the trolley system will be installed and welcomed in several hundred foreign cities. The time is now most opportune; the field ripe, for manufacturers of all kinds of street railway supplies to enter this broad and inviting field. We have the advantage of devices now tried and perfected, with abundant records of good service in actual use.

Our FOREIGN EDITION, which will at first be issued quarterly, will contain descriptions and illustrations of the newest tramway plants outside the United States; portraits of the leading tramway men in Europe and elsewhere, and a full resume of the best and latest appliances and ideas which have been brought out in this country during the three months preceding each quarterly issue. Like our home edition, it will be printed on the finest of paper, made especially for our use, and the engravings, and in fact everything which enters into the mechanical and editorial departments of the paper, will be without regard to expense. Letters received from leading tramway men abroad commend the plan most highly, and assure us it is just what they want and greatly need. The REVIEW will now reach every street railway in the world. What that means as an advertising medium requires no comment.

LAST month we called attention to the great desirability of a change in time of holding the street railway convention, suggesting that it be held one month earlier. The proposal has met with the approval of a large number, and we are pleased to learn that the necessary petition of five members will be presented at the next meeting of the executive committee. It will then be in its power to recommend the change in constitution at the October, '97, meeting, and in '98 the association can accept or reject the proposed change. But it is a change which by all means should be made.

THE very interesting description, and no less interesting illustration of a "trolley man-of-war," found elsewhere in this issue, is full of suggestions of possibilities. For local celebrations and parades the idea could be worked out to almost any extent, and when one remembers the amount of territory covered by car tracks in every city, and the possibilities of illumination of floats operating on car tracks, with electric power, the full scope of the scheme is better appreciated. The Veiled Prophets at St. Louis, or Rex at New Orleans, could ride in equal state and much greater comfort on motor-driven floats, and could, in addition, pass over miles of streets where they now cover blocks, in the same length of time. This would reduce the congestion of unwieldly crowds at a few points, and enable thousands to witness the display who have not been able to do so heretofore. Who will be the first to inaugurate the scheme on a large scale? The Fourth of July would be a good date for some one to try.

THE presentation elsewhere in this issue of the question of exhibitions of appliances at future street railway conventions will appeal not only to the supply men them-

selves, but merits, in all fairness to these gentlemen, the attention of the executive committee and officers of the American Street Railway Association and all its members. Some of our readers who may have slighted the exhibits this year, under the impression that all the others were doing them thoroughly, may be surprised to find how many others there were who have been equally unthinking of the courtesy, at least, of expressing by their presence, appreciation of the very commendable efforts of the manufacturers to produce a display really creditable to the association. Surely there was not a visiting delegate at St. Louis but took genuine pride in being connected with a business which could produce such an exposition. If exhibits are to be continued on any such scale as this year, the association will have to arrange to set apart more time to inspection work, and the supplymen will want to secure better organization and system of handling and installing their wares than has thus far prevailed. We believe both reforms will commend themselves to members and supplymen alike.

The matter of contact losses in electric circuits is something that needs a thorough ventilation. For some time two or three electrical engineers of this country have been "crying in the wilderness," as it were, about the contact losses where electrical conductors of any kind are joined, especially in rail bonds and contacts around power stations. As some of these men had personal interests at stake in the matter the attention was not given their remarks that was deserved. The paper read by G. W. Knox, electrical engineer of the Chicago City Railway, before the Chicago Electrical Association will prove an eye opener to many who have imagined that it is in this present day and generation an easy matter to get a good contact between an iron rail and a copper bond. As coming from a perfectly unbiased electrician, engaged in the operation of a large system, where the opportunities for observation are plenty, Mr. Knox's statements bear much weight and will set many a street railway man to thinking. There are difficulties much greater than have been formerly supposed in the way of making good electrical contact between two metallic surfaces. The majority of contacts are made only in spots and it is seldom that two contact surfaces actually make firm contact over their entire area. This matter of contact losses is worth study by every railway electrician. While the loss in any one contact is small it amounts to considerable in the number of contacts that are necessary in any working circuit. The method of making joints in heavy copper conductors deserves more attention than it usually receives. Solder can not play as important a part in perfecting the conductivity of a joint in large wires and cables as in small, and there is entirely too much tendency to rely on solder to furnish the conductivity of such joints.

The effort to build a trolley line connecting Hartford and New Britain, nine miles apart, has been again defeated, this time in the Superior court. The ruling of the court was doubtless in accordance with existing state laws; laws which were enacted in the interest of the steam roads; laws which are executed at the expense and convenience of the people; laws which will some day be wiped out. In the meantime the construction of interurban roads in Connecticut is made extremely difficult, and what progress is made has to be fought out inch by inch.

Probably few interurban franchises are now asked in which the freight and express privilege is not included. Certainly none should be accepted unless the clause permitting this department of transportation is inserted. At Cortland, N. Y., recently, the county commissioners were favorable to a passenger line, but at first declined to include the freight service. The parties who were seeking the franchise abundantly proved how difficult, if not impossible, it would be to market their securities unless allowed to do a freight business in addition to the passenger, and won their point. One of the greatest advantages to residents along and at termini of interurban roads is the ability to enjoy the cheap and quick express service with more frequent mails and delivery of merchandise.

There are now operating in this country many thousand railway motors which are provided with a field shunt for the purpose of enabling the motors to be run economically at a greater variety of speeds than would otherwise be possible. Now, a field shunt is all right when used as it should be, but we wish to call attention to its abuses, for when not used properly it would be hard to find its equal as a destroyer of armatures and power consumer. In the first place the field shunt is intended only to give higher speeds when on a level. Its effect is to weaken the motor fields and the result of its use when on a grade is to very much reduce the horizontal effort for a given current, and to cause a very heavy flow of current through the armature in proportion to the work being done. The results are the same as if the motor were overloaded. This is ruinous to armatures and wasteful of power. Another abuse of the shunt is that of making it of too low resistance with a desire to get higher speed. No company can afford to do this unless it has money to burn. Better wind the armatures for higher speed in the first place rather than force them to make better time by cutting down the field shunt resistance and being continually obliged to rewind them because of burn-outs caused by the shunt. The tendency of the average motorman is to do the very things he should not do with the shunt. That is he will use it on grades and to pull heavy loads. This is perfectly natural, because it gives him greater speed, but it is disastrous in effect and pains should be taken to educate him in this regard.

After a most desperate struggle lasting several years, the Chicago City Railway has won out, and is now stringing its trolley wires on Indiana avenue.

NOTES ON THE ELECTRIC RAILWAY RETURN.

Paper Read Before the Chicago Electrical Association, December 4, 1896 by G. W. Knox, Electrical Engineer Chicago City Railway.

In the good old primitive days of electric railway work we dropped into the nearest hardware store, picked up some boiler or stove rivets and a bundle of No. 6 or No. 8 iron wire, which was in stock for the farmers' fence, handed the material over to a "roustabout" laborer, with instructions to cut the wire in about two-foot lengths, twist it around under the head of the rivet, and then, after dipping the ends of these so-called bonds in solder (this latter performance was often considered a kind of a luxury), to go out and bond the joints of the rails. We then gave our attention to the only problems (as we thought) of the installation—those of equipping the station and cars and the very important matter of running out ample overhead feeders, leaving Pat to enjoy his pipe and to carry out instructions as he saw fit. It, of course, became necessary to further inform Pat that he must drill holes in the rail at the end of the fish plates, put the rivets in the holes and rivet them up. This he did in his own "elegant style" with the aid of an outfit usually consisting of an "old man" braced up with paving blocks, a ratchet drill with a bit of any convenient size—just so the hole bored did not allow the head of the rivet to fall through—a hammer and a billet of iron to back the rivet during the riveting process. This was the artisan's outfit. The rivets often proved much too small to fill the holes drilled, but the faithful son of Erin was ever equal to the emergency. There was at all times a convenient longer rivet which could be dubbed back and with a little more hammering be made to fill the hole.

While Pat was always enjoying his pipe he was not easy concerning his work. Certain perplexities had come to him which he was unable to unravel. I overheard one day the following dialogue pass between him and his co-laborer: "And sure, Moike, what does yese think they be putting the loikes of these wires in these rails for?" Mike's answer was: "Bedad, I don't know, and divil a bit do I care so long as I get me money." In the first place, though unmindful of its true importance, Pat asked a very sensible question: What were we putting "the likes of those wires" in the rails for? Had the question been asked me, and had I given it serious enough thought to have answered it correctly and honestly, my answer would then have been similar to Mike's: "I do not know nor do I care so long as the contractor for whom I am working gets his money." The bonding contract in those times was a bonanza for the dishonest contractor. He received a big price for the contract and was able to completely cover up his fraudulent work, get his money for it and get out of town long before the resultant bad effects were discovered.

The description of the early bonding just spoken of may seem overdrawn, but it is not. Very nearly all of the first equipped street railways of this country had work of this character, and the bad effects resulting from such bonding have created a prejudice among city municipalities and other enemies of the electric street railway system which it will take many years to eradicate, no matter how well the work is now accomplished.

At the outset there was little importance attached to the return system. For this the pioneers in the profession should not be blamed; they knew no better, and had to learn that knowledge of the business which was obtained only by practical experience. But for those who after having the correct methods clearly demonstrated, still persist in ignoring the advanced ideas in doing the work, censure cannot be too severe, as they not only do injury to their own interest, but to all others in the line of business. Street railway work in most of the European countries is today being held back on account of the influence of the bad effects of the poor return of some of the electric street railways of America. As the question of the return circuit is now understood and with the facilities at our command, there is no more necessity of having disastrous effects from electrolysis with the return circuit than there is of disaster from leaks on the overhead feed system. It may be argued that to put in a perfectly safe return feed system will involve so great an expense as to make it wholly impracticable. If former methods of return feed installations are taken as a basis for such an assertion I will admit that estimate to be correct, but when we take into account all the power wasted daily in overcoming paths of high resistance in the return circuit, to say nothing of damage to extraneous conductors, like pipes and lead cables (which, I wish to say here, I believe to be considerably exaggerated) the amount of money saved figures up in a few months' time to much more than will pay the interest on investment, no matter what the size of the system and its requirements may be.

In determining what is required for the return system we have a very easy problem. Having experimented to the fullest extent on the value of the earth as a conductor for currents of the volume employed in street railway work, and finding it totally valueless, there is but one thing left to do and that is to have an absolute metallic return conductor, and right here is where our trouble begins.

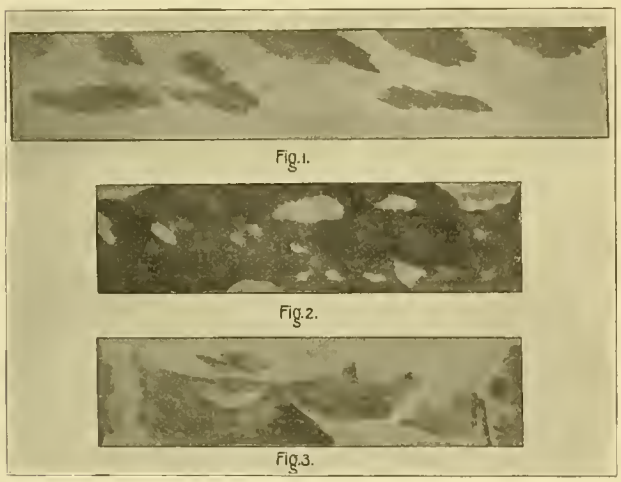
There are, I may say, three plans which may be adopted in securing the desired absolute return, substantially as follows: Having a complete copper return; having a metallic return made up by heavily bonding the rails and using a supplementary wire in connection therewith; or joining the rails in such a manner as to secure the full value of their current conducting capacity.

The first plan is, perhaps, the only really perfect one (bond supply men will, of course, take exception to this.) But on a heavy traffic road calling for heavy current supply it means a tremendously large outlay of money for copper and does not seem warrantable when, as a matter of fact, we have any amount (in most cases as much, perhaps, as is needed for the system) of return conductor in the shape of rails, providing there is a sure method of electrically joining the rails at the joints. In this proposition there is centered the whole problem of the return system as it is employed today, for it is the aim, universally, to bond the rails to their full conductive capacity, or as nearly so as is practicable.

Discarding the idea of having a complete copper return on account of the excessive cost we will consider only the other two plans mentioned.

Taking rail bond connections all in all, as we find them today, I would strongly advocate the use not only of return feed wires, but of supplementary wires, for the reason that we have not a bond which insures us, beyond a doubt, of the

perfect contact of bond terminal with the rail. Let us look at sample bonds as made up and submitted, no matter what their style may be, and what have we? Surely most excellent looking affairs. Examine a cross section of rail and bond; it would be impossible to know that there existed a seam between the two articles, were it not for the difference in the color of the metals. Twist, strain and pound at this made-up sample, and it is with great difficulty that it is finally loosened, or made to show any defects; take the bond terminal out of the rail; it looks bright and clean, and one cannot be blamed for saying, "What a splendid connection there is between the terminal and walls of the hole in rail." But if we examine a little closer the defects show themselves, even to the naked eye, in a very striking manner! All over the surface of the terminal will be found portions of the copper which did not come in contact with the rail. Figure 1 illustrates the contact surface of a sample terminal I examined, as it would appear if spread out on a



CONTACT AREAS OF BONDS.

plane. This had been placed in the rail, and the rail sawed, split and removed from around the terminal. The dark spots are the portions of terminal which did not come in contact with the rail. The reason for this may be explained in two ways. In fastening the bond in place there was not, perhaps, enough care taken in doing the work. A few more blows with the hammer would, undoubtedy, have left the bond fastened in in a better manner. Or it might have been caused by one portion of the terminal being of a different temper than the other, for in that case the softer metal swells out in contact with the rail, the harder portions on the surface forming arches, as it were, which resist the "swelling-out" process. This latter-mentioned difficulty is sure to exist with any form of bond used, of course, to either a greater or less degree than the sketch shows.

But a still more striking example of poor contact between bond terminal and rail is brought to light upon taking out bonds which have been in the rail for some time. Examining some bonds recently taken out, which had been in service for about two years, I found them badly coated with oxides of copper and iron. These bonds, I know, were put in the rail with the greatest care and attention, yet in taking the terminals out, some of them did not show one-third of their surface to be bright and to have been in good contact with the rail.

Figure 2 is a sketch of about the worst specimen found and Figure 3 the average.

The light-colored areas show portions of the bond which were in good contact with the rail, while the dark spots are the portions having poor contact with rail. It does not necessarily follow that the dark portions shown are not capable of carrying current, but it does follow that they offer enough resistance to the current, so that, through the chemical action of the different salts and gases existing in the earth surrounding the bond and rail, and the electrolytic action of the current, when meeting these paths of resistance (all acting upon the terminal of bond and the walls of hole in rail for bond), there is a deterioration started which increases in proportion to time, nature of earth elements surrounding the bonds and the volume of current.

We would not have to be greatly alarmed over the conditions just mentioned were there only a few joints and were they where we could get at them easily and test them out satisfactorily, but where they are likely to exist at almost any 30 foot (or 60 foot at most,) point of the rail length, covered and thus out of sight, such liabilities to bad condition increase in mammoth proportions.

A plan of alleviating to a great extent these troubles may, in my opinion, be brought about by adopting a scheme which I am now experimenting with, and watching with much interest.

First dip the terminal of bond in solder. Have the solder very hot so there will not be a heavy coating of it on the terminal, thereby making an unnecessary increase in resistance. Next, apply in a thorough manner a coating of metallic composition known as plastic alloy to the walls of the hole in the rail; apply the bond in the best possible manner, follow up by coating with a preparation consisting of two-thirds tar and one-third pitch all around the bond terminal on each side of the rail web, and pack sand ballast tightly about the joint thus made This plastic alloy is comparatively new to the trade. I have made some tests with it, applying it to iron and afterwards immersing the iron thus treated in salt water, and the parts coated with the alloy do not show a particle of rust. Just how it compares with copper as a conductor I am unable to say, but believe from tests made that it is a fair conductor. There is a possibility of the tin and plastic alloy thus interposed between the copper of the bond and the iron of the rail acting, to a degree, as resistance, but this never can equal the extent of the difficulties which we now encounter by the corroding of the bond terminal, as well as the walls of hole in rail.

This manner of treating the bond terminal and hole in rail cannot, I think, be regarded as expensive when we take into consideration the cost of the bond and the cost of labor in applying the bond, as well as the probable increase in the life and effectiveness of the bond thus treated.

In further considering bond terminals, their style of construction and the manner of fastening them in the rail, there is one principle now employed regarding which I can not agree with some as to its efficacy, and that is the riveting or mauling process in fastening a terminal in the rail. We place a rivet terminal in a hole which is larger than the terminal, and then commence to maul or rivet the terminal until the hole is filled and the terminal tight. From the first blow of the hammer to the finish we start the disarranging and breaking down of the natural state of tenacity of every fibre of the copper. Before mauling on the copper, when it is in its natural state right from the furnace, every fibre is alive

and of a spring-like nature, but as soon as the mauling is commenced the breaking and bending of fibres begin. One fibre is folded back upon another, not to unite, for copper will not weld when cold. After mauling upon the terminal until it is tight in the rail, what have we? A piece of copper with the spring-life of its fibres gone, and the metal in a partially pulverized state, so that when the jars and blows, (to which the article in its place is subject) are brought to bear upon it, there is no bouyancy or activity in the fibres of metal to resist the shocks. Consequently we find particles of the mass which are in a cramped or strained condition shifting or adjusting themselves, one granule after another dropping into a cavity made while the mauling process was going on, until each, now granulated like fibre, has, aided by the shocks, finally adjusted itself; all resulting in the terminal getting smaller and loose in the hole. If this theory is not correct, why is it that we find the terminals of bonds gradually working loose in the holes? They were, at the time of putting them in, perfectly tight in their place. What must be guarded against in wedging copper in the hole in a rail for current contact purposes, is this mauling process which breaks down and destroys the tenacity of the fibres of the metal. Should the rivet-principle terminal, or, in fact, any other kind of terminal, be employed, hammer upon the terminal as little as possible—rather compress it, working from the center outward until the metal fills the hole in rail. The metal of terminal should be tempered reasonably hard, for as before stated, fibres of the metal should possess a spring-like nature to meet and resist the shocks brought upon them.

Desirable as it is to have a bond connection that will practically equal the conductive capacity of the rail, there has been little effort in the direction of a bond wire to do this, and poor success attending such effort. Two years ago I experimented with a bond which equalled about two-fifths of the capacity of a 63-pound rail, but on account of the lack of space for the bond at the joint I did not consider the idea worth following up. The bond consisted of two heavy terminal castings, each having four lugs which went into holes staggered in rail and fastened with drift pins. The terminal castings were united with each other by a number of copper strips riveted and soldered in such terminals. This bond, when made up, was about twelve inches long and went under the fish plate. It was a very difficult bond to apply, and we had nothing that we felt sure of after it was applied.

It is possible that we may in the future obtain the best results for the full value of the rail as a conductor, in the use of the cast-welded joint, although I do not believe that the joint as it is now made can be counted on with any degree of certainty as having, in all cases, the same capacity in the joint as in the rail, for this reason: Most of the joints are applied to rails which have been in the ground for a term of years. The rails are badly corroded and the best that has been done so far to remove the rust was to file and rub with sand paper. This only took off the outer coating of rust, leaving the worst part of corrosion, which had eaten deeply into the metal. This rust prevents a perfect amalgamation between rail and joint metal taking place, and upon close examination of a cross section of one of the cast joints a seam will be found between the rail and metal of joint. Looking into this seam with a glass, small particles of rust and burnt iron scales will be noticed. Where the metal of joint does come in contact with the rail it is in an irregular or saw tooth fashion. This latter is probably caused by the metal cooling upon striking the rail, which is comparatively cold when the cast is made. It is easy to understand how these saw tooth tissues may be destroyed as a conductor for current by the rail constantly working upon and breaking them down while expansion and contraction of rail is taking place, and by the jar or hammer-blow effect of car wheels and the burning up of these tissues upon the passage of heavy currents across them.

The rail will work backward and forward in these joints where amalgamation has not taken place, and I have noticed joints which, when pulled in two, (from contraction) were but a shell, being completely honeycombed with blow holes, through the casting process. This, I believe, will happen with but a few joints in a thousand, yet if we have no way of testing them out for a certainty, such joints as described are gaps offering resistance in the circuit. The number of seams and honeycombed joints mentioned may be increased or diminished according to the honesty of the workman in cleaning the rust off the rail and pouring the metal in making joints.

I am informed that the promotors of the cast joint idea are now getting out a machine which will prepare the rail for the welding by perfectly cleaning off all rust and scales found on new rails formed at time of rolling. When this is done, I believe that it is possible there will be, with care in having the right mixture and temper of metal and in pouring a perfect amalgamation between joint metal and rail, and when this is finally accomplished we may be able to have the full value of the metal of the rails as a conductor for the return circuit, and may almost completely solve the heretofore complex problem of how to have a perfect return.

I wish to say before leaving the subject of the cast weld joint, that with all the joints which I have tested I have found no appreciable drop across their parts, but where the tests were made, there was a comparatively light volume of current flowing, and I believe should a very heavy volume of current be sent through joints which were not properly prepared, by having all rust cleaned off of the rail and the joint carefully poured, they would gradually be broken down as conductors, for reasons heretofore set forth.

In general we will be able to consider bond wires as successful in supplying the wants for which they are designed, i. e., carrying the return current from rail to rail to the full rated current capacity of the bond wire, providing that the bond is applied in a proper manner, and that it is possible to fully protect the terminal and walls of hole in rail from the effects of corrosion. Regarding the latter, which is today our greatest difficulty connected with bonding work, I believe there is a remedy on the lines mentioned, and with the former, it lies mostly with the person who is directly in charge of the work. If he be honest and painstaking, and if he thoroughly understands the purport of the bonds and what it means to have them perfect, (not alone as regards the matter of dollar and cents, but as to their successful working, or to the contrary), if he further comprehends all parts of the machinery connected, and if he doesn't slight in the least any part of his work, I may say half the battle is won. It matters not in what business a man may be employed I believe there is no position in which honesty is at a greater premium than the one in which men are entrusted with the putting in of the return circuit of the electric surface railway of today. As it is they who are directly responsible for all time to come for the utility of a whole system costing an

enormous amount of money, therefore, I would emphasize the fact that too much care and attention cannot be given by the engineer in charge to selecting the best men for the positions of trust.

There are several more all-important points connected with this subject which should be brought out in detail, but

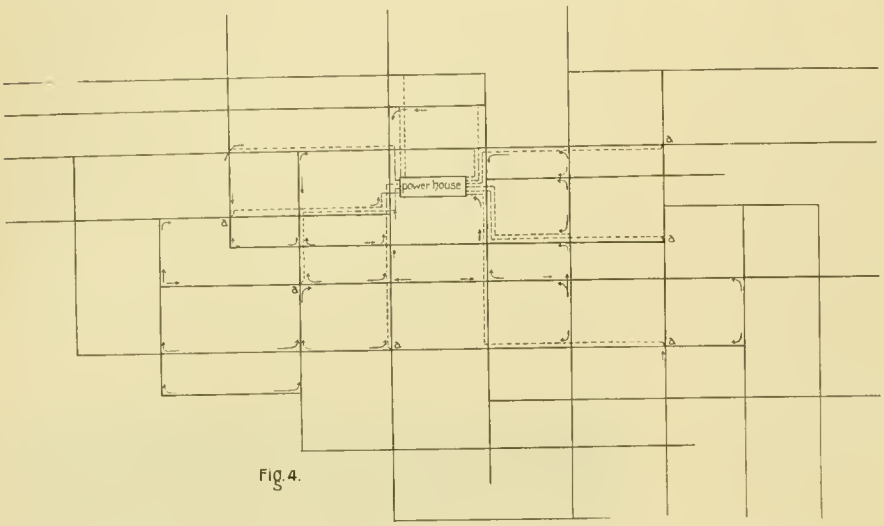


Fig. 4.

as it would make much too lengthy an argument for our paper, I will, in closing, refer to them but briefly.

I have so far but merely mentioned the supplementary and return feeder wires. As to the amount of these run in connection with the bonding, it, of course, depends upon conditions entirely. I would not recommend using either for a supplementary or return feeder, any smaller than a 500,000 circular mil wire, except in cases of leading by frogs in switches and turnouts, as I believe, should the path for the return current be within the limits of the 500,000 circular mil wire requirements it will be easy to bond the rails so

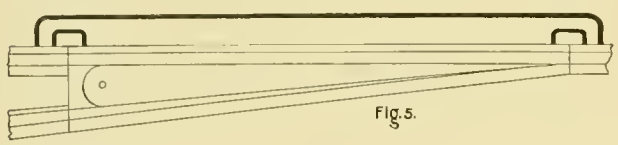


Fig. 5.

as to take care of whatever the flow of the current may be. Any copper in the shape of a wire, very much smaller than the size mentioned, especially if some distance from the power station and where the flow of return current is but normal, will be found to have so high a resistance as compared with the four bonded rails running parallel, that it will pick up and transmit but little of the current on its way to the power station except in cases of bridging a poorly bonded joint.

I do not believe it necessary to carry return feeder wires overhead on poles save in cases where the earth is of a damp, mucky or alkaline nature. In a sandy soil the copper will suffer but little from deterioration from electrolytic effects sand being of high resistance.

Figure 4 gives a general idea of the arrangements for return feeds on a road on which the traffic is ordinarly heavy, the dotted lines representing say 500,000 circular mil units. Return feeds should be run out and tap junctions of tracks as shown at a in Figure 4.

All importance should be attached to tying together in a thorough manner the tracks at all intersections, thus giving the return current as many paths on its way back to power station as is possible. The arrows on Figure 4 represent imaginary, but probable, direction of flow of return current on its way back to the power station.

Figures 5 and 6 represent plans of running wires in addition to bonds at special track work, like switches, crossovers and at all track intersections. The wires which are run should equal or exceed the capacity of the bond wires on either side of such special work, and, as in all other cases where supplementary return feeders are tapped into the rails, the taps should in capacity exceed by at least a third the capacity of the feeders tapping the rails; this to insure against any losses by having poor contacts.

I believe it is necessary to thus carry additional conductors through the special work on account of the probability at all times that the special work, being in so many pieces, may get loose, thus causing the bond wires also to work loose and introduce gaps in the return circuit.

To describe the requirements for a system of track testing is a whole paper by itself. Suffice it to say, that while it is, perhaps, prohibitorily expensive to recommend a potential wire to parallel all the tracks for testing purposes, I believe that the use of this wire in connection with a telephone service, which will always be in demand in street car work, will make it possible to recommend the installation of a potential wire (knowing how great is its value as an adjunct in keeping up the return system), and also to demonstrate fully its office as a helper in the way of dividend earning.

To illustrate and make mention even of a comparatively few of the many kinds of bonding devices which have been sprung upon the market, I have deemed unnecessary. I have taken three which are the bonds mostly used (as nearly as I am able to ascertain) by the leading large roads of this country, and which serve to illustrate the points of the requirements in a bond wire.

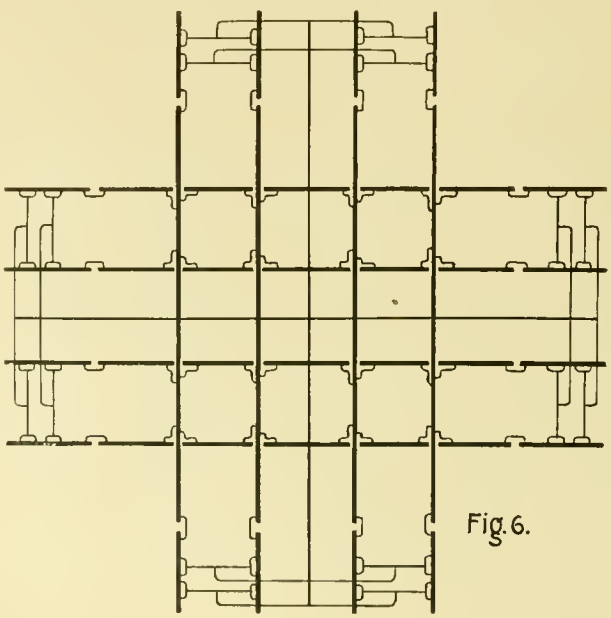


Fig. 6.

DESCRIPTION OF BONDS.

Figure 7 illustrates the "Chicago" rail bond, which is the pioneer in the way of a large and substantial bond. To the inventor of this bond is due the credit of being the first one to realize the necessity of having a large capacity bond with a terminal having a surface contact with the rail seven or more times that of the sectional area of the bond wire, thus making up for the difference in the conductive ratio of copper and iron.

It is a strictly one-piece bond, made up by having an enlarged terminal drawn on each end of wire with a hole in the terminal allowing for a drift pin about $\frac{1}{16}$ larger. The enlarged ends or terminals of wire are inserted in the holes of rail and the ends expanded with a drift punch to hold it in position while the drift pins are driven home, expanding the terminals of bond until thorough contact is made with the walls of the hole in rail. The drift pin should be driven into the terminal until the front end of drift pin is about $\frac{1}{8}$ inch through the web of rail. This process expands the terminal on both sides of the rail, making it impossible to have the bond work either way out of the rail. The bond is very easily and quickly applied.

Figure 8 shows a diagram of the Columbia bond. This bond is a comparatively new arrival in the field. As the diagram shows, a truncated cone head terminal, with a fillet at the base, is formed on each end of the wire. These terminals fit into a thimble which is made exactly to the taper of the terminals. The outside of these thimbles is tapered slightly in an opposite manner to allow them to go into the holes in rail readily.

The manner of applying the bond is this: First the thimble is inserted in the holes of rail from one side, and the conical shaped terminal inserted in the thimble from the

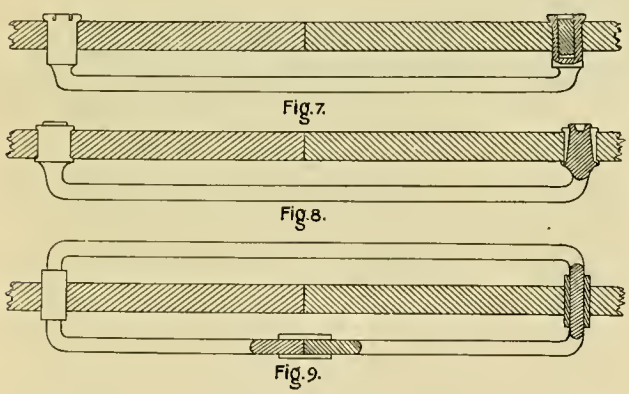


Fig.7.

Fig.8.

Fig.9.

other side, then forced into and expanding the thimble until perfect contact is made with the walls of the hole in the rail. The end of terminal is then expanded with a center punch while the pressure is still on the terminal, locking it firmly in position. The construction of this bond is such that it allows for the terminal being forced into the holes in rail until a perfectly tight fit is secured; should the hole be a trifle too large or too small it will adjust itself, and this is not accomplished by the mauling of metal process, before spoken of, as it is a compression strain on metal at the time of fastening of the terminal. With the greater number of bonds offered, the manner of applying them tends to weaken them, for mechanical strains, just where they should be strong, that is, at the terminal just outside of the web of rail, for in forcing the metal out in contact with the walls of hole in rail it is liable to nick and weaken the terminal. With this bond, nicking will take place only on the thimble, which does not necessarily have to stand any of the strain brought upon the bond wire through expansion and contraction of rails. This bond may be taken out and used over again.

Figure 9 illustrates the Brown bond designed for the West End road of Boston. It consists of a wire having a soft steel thimble sweated on where it passes through the web of rail. The thimbles are slightly tapered and driven into the web of rail with a sledge and follower. This style of bond is often used in double form, that is, the ends pass through the web, are brought together, and connected with a sleeve. The thimble is about 1½ inches long, thus, it is claimed, making the required extra amount of surface contact between the copper of bond wire and the metal of rail. The use of steel to steel, as mechanically employed with this bond, is very commendable, as it is possible to force the terminal in place in a very firm manner, and there is but little danger of injuring the softer metal, the copper wire.

NEW CAR STOVE.

H. M. Sloan, general manager of the Calumet, Chicago, has designed a new form of car stove which is being put on that road this winter. Mr. Sloan reasoned that the principal radiating surface of a car stove as usually constructed is inside the non-conducting case, and furthermore that much of the heat generated in a car stove goes directly up the chimney. To increase the radiating surface and get as much

CALUMET STOVE.

good as possible from the coal burned, four stove pipes were substituted for the one commonly used. These four are extended nearly to the roof where they join and pass through a damper to the open air. The damper is provided with notches and a spring holds it in the notches so that it can not rattle out of adjustment. An attempt will also be made to improve the ventilation and heat distribution by running cold air supply pipes under the seats to the bottom of the stove casing from points under the seat near the door.

THE TROLLEY OF THE SEA.

Most Novel Electric Railway in the World—The Brighton and Rottingdean Electric Railway.

(From Our Own Correspondent.)

The principal features of a novel seashore railway which was under construction at Brighton, England, were noted some time ago in the STREET RAILWAY REVIEW. The line has now been completed, and by the time this article appears in print it will have been formally opened for public running. Although the system is very far removed from ordinary railway practice, and has indeed little bearing on the subject, there are many novel features in the design that are interesting.

The line commences at Brighton, probably the most fashionable watering place on the south coast, and extends to the village of Rottingdean, some three or four miles distant. The line passes over the foreshore, a short distance away from the coast, and at high tide is completely immersed. Indeed, at an ordinary full tide there is fifteen feet of water above the rails, while at low water the track is not more than three or four feet higher. It was, however, arranged by means of a specially constructed car, that the condition of the tide at ordinary weather would not interfere with the running. The accompanying illustrations show the car passing through a somewhat heavy swell, as well as through comparatively smooth water. The reasons that led the promoter of the railway to adopt such a curious construction were twofold. In the first place it was desired to carry an electric line on to Rottingdean, which would practically have been an extension of a small electric line that has been in existence at Brighton for some years. To do this, however, it would have been necessary to pass over the cliff, and such a scheme would have involved many engineering difficulties. Running the line along the foreshore, and using a car of special construction, however, enabled the owners of the line to give passengers all the benefits of a short sea trip with perfectly steady movement. It should be explained that the line is intended purely for pleasure purposes, and the cars are intended to run at a speed not exceeding seven miles an hour.

The special form of track which is employed on this railway was shown in the previous article. The line consists of four rails which are laid in the form of two tracks of narrow gauge, and on all four of these rails the car travels. The effective gauge from the outer rails is 18 feet, which furnishes an idea of the size of the structure which is to move over it. An idea of the difficulty of laying the track may be gathered from the fact that it was only at low water that work could be carried on, and very often a heavy increasing tide would undo all that had been done. In order to securely hold the rails, concrete blocks have been driven right through the sand into the solid chalk, and on these blocks the rails are secured by steel clips and bolts. There is a plentiful use of tie rods even on the straight, while they are doubled on curves.

The car itself is constructed on four strong tubular legs, about 23 feet in length and 11 inches in diameter. At the lower end of each leg is placed a bogie truck provided with

VIEWS ON BRIGHTON-ROTTINGDEAN SEASHORE ROAD.

four wheels which run on the narrow gauge lines, there being 16 wheels, each of three feet diameter, on each car. It will be noticed that the bogies taper off at each end for the purpose of facilitating a passage through the water. The four bogies are held together by hollow steel struts, the wheel base being 28 feet. On the top of the main legs lattice girder work is built, which carries the whole structure. Naturally the aim of the builders has been to secure the greatest possible strength, while presenting as little surface as possible to the water. The platform, or main deck of the car has been fitted very much after the manner of a steam yacht, even to the carrying of a boat and life buoy. There is a saloon in the middle, which will accommodate about 40 passengers, while on the top of the saloon is a second deck capable of seating some 30 people. Altogether the carrying capacity of the car is between 150 and 200 people. The total height of the vehicle from the rails is a little over 30 feet, and its total weight is 40 tons.

The propulsion of the car is, perhaps, one of the most interesting features of the system. It will be observed from the illustrations that the overhead wire method is employed, the collection of current being performed by means of two trolleys, which working on a swiveling device, give a considerable amount of side play. The rest of the equipment is almost identical with that of an ordinary tram car. There are two 30-horse-power G. E. 800 motors, each of which is placed over one of the main legs. The armature of the motor is geared through a pinion on to the main shaft which passes down the inside of the leg and at the bottom is connected through a bevel wheel and single reduction gearing on to the axle of the driving wheels. The brakes are worked by rods passing down the remaining two legs. The

CAR AT STATION.

controlling of the car is effected by means of G. E. type K controllers arranged at each end of the car.

The electric energy is generated at the Rottingdean end of the line and is sent direct into the overhead wire. The posts which carry the overhead wire, at the Brighton end of the line are of steel, but outside the towns wooden posts are employed. It is an interesting fact that the cost of a steel post, including its erection, was practically £20, the chief cost arising from the difficulties in placing it in position. The generating plant is placed on a specially constructed iron pier which serves also as a landing stage. The appearance of the station very much resembles the stoke hold of a ship. At the present time a marine boiler has been erected which is capable of furnishing steam to a 100-horse-power high speed double acting engine by Sissons & Co. The engine is direct coupled to a G. E. four-pole generator which supplies current to the line at a voltage of 500. An automatic

THE TROLLEY LINE.

circuit breaker and the usual switching devices are provided here.

The return circuit at low tide is through the rails, but when the track is covered by water the sea assists. Although it is not definitely known what energy is necessary to propel the car at full load it has been found that with a moderate load the consumption of current was 40 amperes at 500 volts when going through a fairly heavy sea. It may be taken as a fairly accurate figure that about 40-horse-power will be necessary to keep the car at a steady speed during high tide.

The line is, of course, attracting considerable attention and there is very little doubt that as a pleasure railway it will prove to be an unqualified success.

Since the above was put in type, cable press dispatches report a very severe gale on the night of December 4, which washed away the track. The opening ceremonies had been held early in the week. Old Neptune evidently is jealous of his new rival.

MACHINE FOR ADDRESSING ENVELOPES.

The Addressograph Company, 356 Dearborn street, Chicago, is introducing a machine for making out electric light bills, telephone bills, addressing envelopes, pay envelopes, time tickets, etc. The machine is not an expensive one. It is simply constructed, and can be operated by any boy or girl. It prints complete addresses, direct on the bill or envelope, fac-simile of the type-writer, at the rate of 2,000 per hour, all addresses neat and business-like, absolutely accurate, without errors, omissions or duplicates. It has been adopted by several departments of the government, the New York Life Insurance Company, Armour & Co., and a great many manufacturing firms, for their pay rolls and mailing lists. The STREET RAILWAY REVIEW was one of the first users of this device, and has a complete equipment in its mailing department, where it is giving excellent service.

EXHIBITS AT FUTURE CONVENTIONS.

What of exhibits at future conventions? is a question nearly every exhibitor has asked himself, when, after all the rush and excitement of the St. Louis meeting was over, his bookkeeper handed him a statement of the expense. That it was a most magnificent display, the finest and largest ever made, there is no question. That the St. Louis people exerted themselves to the utmost in behalf of the supplymen is conceeded. And yet almost every exhibitor has again put the question to himself, as for several years past. Does it pay?

It has been estimated by competent judges, that this year's exhibit did not cost the supplymen less than $60,000, while others place the figure much higher. Not all this money was, perhaps, spent in freights, cartage, space, traveling and hotel bills for extra men in charge, but the bulk of it was. Somebody has got to sell a lot of stuff to earn that $60,000, and yet with no exhibits a convention would be a very tame affair. The association undoubtedly could exist without them, for there were good conventions years ago when the writer remembers all the exhibits were held in one small room, but that the association cannot well afford to do without them is equally certain.

We wish to emphazize, first of all, that what is to follow, either editorially or as quoted from leading exhibitors is not stated in any spirit of complaint or even criticism. It is simply the discussion of a business problem, in the endeavor to work out a betterment of the case.

First of all, it would seem, now that the exhibit has assumed such gigantic proportions, that the old methods which have been in practice until now, have not kept pace with the necessities of the case, and are now in very many respects sadly inadequate to its needs. The arrangements at St. Louis were quite as good as any heretofore; in some respects better. But the magnitude this year has emphasized what has been the experience of former years, and the Review and many of the largest exhibitors believe the time has come when an improvement can be made to the mutual advantage of visitors, local committees and by no means least, the exhibitors who pay the bills. We firmly believe the latter should receive more for their money, or pay less for what they receive, and we believe they can do both.

As several times stated in these columns, we believe the exclusive handling of exhibits by a local committee is all wrong, for the inevitable result is that no matter how earnestly that local committee may work to anticipate everything needful, it has to grapple with new work, and each year a new committee, which has had absolutely no experience in its work, has it all to learn anew, and largely at the expense of the exhibitor. For instance, a committee composed of experienced exhibitors would not only have had the exhibit hall open several days in advance, which was done, but would have had it lighted several nights in advance of the first day, which was not done, so exhibitors could unpack. True, there was some early light, but it was in the General Electric quarters, on its own wires and lamps, and paid for by it. The same is true in leaving, when the building was again in darkness the last night of the convention, when nearly every exhibitor wanted to box and get away, but who were, in several cases, obliged to remain one more day than otherwise necessary. Again, an experienced exhibitor would have laid temporary tracks, with transfer tables connecting the street with all quarters of the hall. None but exhibitors realize the extra and needless expense thus incurred by many. We have in mind one case, where twelve men and a foreman worked all day Sunday, on extra time, to move one piece, which with a track and transfer table could have been easily handled in probably one hour or less, including taking from the table.

Still another feature, and by no means a small item either, was that of cartage, the bills for which ran all the way from a few dollars, to $100 or more for the larger ones. True, the local committee had nothing to do with this; they never have had at any convention; at the same time an exhibitor's committee, which would know in advance just what was coming, could have contracted for the whole cartage, pro-rating to each one hauled, and saved a lot of money. As it is now, an exhibitor arrives and at once becomes a bidder against all the rest in his anxiety to get moved promptly. It is undeniably a good thing for the teaming companies, but the exhibitor has to pay for it. Once more; there has always been more or less trouble in getting shipments out of the freight houses; this year especially, as much of the stuff was put off at East St. Louis, and had to be hunted up and teamed across the bridge. We know of exhibits which were even delivered by mistake to local concerns, and when the company's agent arrived he had a delightful time in chasing it up. This took time; cost money; and was besides a strain on his good nature. We know of another, who, after paying his freight and turning his goods over to a teaming company "to come right up," waited all day Saturday and all Sunday at the hall, with nothing to eat from morning to night, and then his exhibit did not put in an appearance until Monday morning.

Now it is all very well to say that in any of these railroad and teaming cases the local committee was in no way to blame, for most assuredly they were not, but because no one was to blame does not help the situation. Obviously the thing to do is to prevent the repetition of these annoyances, which can and should be done. Now, how can it be done?

As will be remembered, an effort was made at Cleveland, in 1892, to organize a Supplymen's Association. The scheme fell through, partly because it was not sufficiently worked up and understood, and partly on account of jealousies among the supplymen who did not then know, as now, what a really good fellow the other man is. In Montreal some of the association members tried to enlist the supply men as associate members, on a basis of taxation without representation, as it were. This did not go, nor in our opinion should it; for if supplymen are to have an organization they most certainly are abundantly competent to conduct one of their own. From the views of exhibitors printed below it will be seen some favor an organization; some do not; but nearly all favor reform.

Let us see what others have done. Take the Master Car Builders Association. The supplymen have long had a separate organization working in utmost harmony with the car builders. This organization has its members, its own officers, its annual election, its dues, and standing committees for its several branches of work, such as entertainment, invitation, hotels, floor space, etc., etc. It is a splendid success, not only for its members, but for the association which it serves. We are not prepared to say this is what the street railway supplymen want; but it does seem as if some arrangement could be effected which would at once relieve the local committees of a heavy and usually thankless burden, and put the details in the hands of experienced men, who from long attendance at these conventions and abundant

experience in handling exhibits would, out of past tribulations, know how to avoid the rocks.

For instance, an exhibitor's committee of say three, might take entire charge of the exhibit department. Such men as Randall of the Brill Company, Hanna of the Peckham, Clark of the General Electric, Wm. Silver, A. S. Littlefield, W. J. Cooke of the McGuire, Estep of the Nuttall, and a lot of others, all have had experience and would know just what to do. Let these employ one good and experienced man for a month, who would have an office at the exhibit hall, where he could be found when wanted. Let him be the general superintendent. Let him arrange and provide all the details necessary. Let him contract for all teaming. Have all exhibits shipped in his care, as was done so successfully at the World's Fair to the various departments. His business would be on notification by shipper of what had been sent, to receive it on arrival, haul it, place it in the allotted space, and when the exhibitor came on, it would only be necessary to unbox or expose his exhibit. Being experienced he would not carry car wheels on pillows and drop a box of registers into a wagon with a view to smashing all the glass. When repacked for return he and his force would haul and ship, and the exhibitor could go home. He would know days in advance, on information from exhibitors, what would be needed in the way of platforms, booths, etc., and he would have this ready; also a force of carpenters under contract at regular prices, to do what was wanted at the last, and this labor and material furnished at a reasonable price which has never been the case. The Review paid $4 for some boards which at the yard would not sell for more that $1.20, and $6 for carpenter work, which at regular prices would not have been over $2.50. While in our own particular case these figures are not worth mentioning, for others who required work of consequence the difference amounted to something.

In all this, teaming, unloading, setting in place, etc., one man could contract and effect the saving of several thousand dollars on such an exhibit as at St. Louis, to say nothing of the convenience, for the freight houses of a strange city are sometimes very delusive institutions and hard for strangers to find.

Of course each exhibitor would be pro-rated for the service rendered, according to what he received, but many a wagon has hauled a small box when it could as well have carried a dozen other exhibits in the same load, and at the price charged for one.

We believe the association, local railway men, everybody, would be benefitted by some such arrangement. There is nothing in this plan to prevent the payment to the association, as heretofore, of the money received for space, which usually costs the association nothing. We do feel, however, that if the supplymen are to make this contribution, which this year amounted to about $2,500, that they should receive more time and better attention. Exhibitors who go to all this expense to put up a display, which is the great feature of each convention, have justly a right to expect and receive far better attention from visiting street railway men than was accorded them this year. As suggested by one, a whole day at least, should be set aside to them, unbroken by counter attractions in the way of local excursions and entertainments. The effort and expense put forth by the supply men this year was not realized or appreciated as it deserved.

Our columns are open for the formulation of any plan which will bring about a betterment. Here is what several exhibitors say:

McGuire Manufacturing Company.

In reply to your letter in regard to handling of the exhibits at our street railway conventions, I beg to say that the matter is a very important one and one which we fully appreciate, having made exhibits at the Master Car Builders and Master Mechanics Associations referred to in your letter. It is almost impossible for local parties to appreciate the amount of labor necessary to the placing of exhibits, and I believe it would be for the advantage of all concerned, that a thoroughly capable person have charge of the installation of exhibits. A great deal of time and money could be saved and exhibits placed to the very best advantage. We believe we could spend this additional amount of money to better advantage and we trust your agitation of this matter will result in some action being taken by the supply concerns to remedy this lack, thereby relieving the local people of a great deal of worry and at the same time be an advantage to the Street Railway Association.

W. J. Cooke, Vice Pres.

Peckham Motor Truck and Wheel Company.

I am in receipt of your letter, and in reply beg to say that as far as our company is concerned we are not at all satisfied with the ways and methods and the expense incurred in making or attempting to make a satisfactory exhibit at street railway conventions, and we have concluded that unless different arrangements are made in future to better protect the supply men in the way of room, freight and other expenses, we shall not attempt to make an exhibit of any consequence. When you take into consideration the large expense incurred by the supply men in trying to show their goods for the benefit of street railway men, I think they are entitled to more consideration than they have received in the past, and for one, we would be in favor of joining an association of the supply men if such an association was organized, and unless this can be done we shall take other methods of bringing our goods to the attention of the street railway trade, rather than by exhibiting them at the annual convention.

E. Peckham, President.

Q. & C. Company.

My only suggestion would be that all arrangements for exhibits should be in the hands of a joint committee, made up of members chosen both from the Association and from among the leading supply men. It would seem as if in the hands of such a committee the interests of all would be provided for.

C. F. Quincy, Treas.

St. Louis Register Company.

We agree with you that the supply men form a considerable addition to the railway convention, and that their interests should therefore be looked after, but as far as we are concerned, believe that the most advisable way to get at the result would be to refer the matter to Mr. Penington, the secretary of the association, and request him to take it up with the committee at its next meeting, or at some time that he may deem it advisable. We are perfectly willing to leave our interest in the matter in his hands, and believe that he would be in better position, having full cognizance of all the circumstances to formulate some plan which would bear equally upon all interested without antagonizing any one.

J. A. Stephenson, Secretary.

Central Electric Company.

We are in accord with the view that an organization such as the Master Car Builders have for their exhibitions at conventions, is needed for the exhibition of street railway supplies at conventions. This could be brought about, we believe, by a separate organization for the special purpose of arrangement of exhibits.

Geo. A. McKinlock, President.

Name Withheld by Request.

We think your idea is an excellent one, and it should have been carried out long ago. While we do not wish to particularize on the various grievances that we have felt at various times, yet there are unquestionably many things which have arisen at former conventions in connection with our exhibits, that we would have desired to have had different if our feelings had been consulted, and which

arose purely and simply, as we believe, through an insufficient organization of the department that had these matters in charge.

We trust that you will be able to bring the scheme which you propose to a successful issue, and if there is anything which we can do to be of assistance to you in the matter, you may rely upon us.

Walker Company.

We are glad that you are taking the matter up with a view of bettering the facilities for exhibitors at the Annual Convention of the Street Railway Association. You have our fullest sympathy in this matter, and if we can be of any assistance to you, we shall be glad to do what we can in this direction.

S. H. Short, 2nd Vice-President.

Crane Company.

Your favor of the 25th inst. is at hand. We can see no possible objection to an organization of the supply interests with a view to obtain better facilities at street railway conventions.

Such an organization, if it was accorded proper recognition by the A. S. R. A., would probably be beneficial to all concerned; to the dealers by enabling them to install their exhibits more cheaply and expeditiously than heretofore, and to the association by relieving the local committee of a great deal of thankless detail.

If the location of the exhibits, cartage and handling charges were under the control of a committee from the supply dealers, who were financially interested in the matter, we think a great saving could be effected.

Jno. B. Berryman, Mgr. Engineering Dept.

Brownell Car Company.

In reply to yours as to "Whether the time has not arrived when the supply interests require some different system regulating the exhibits at future meetings of the Street Railway Association," I would say, yes, provided the railway association desires exhibitions that will be of interest and real value to it, in bringing together, annually, for inspection and comparison, all that is new and good, developed during the year, in appliances adapted to the successful operation of street railroads.

These exhibitions could be made of inestimable value to street railroad managers, if the latter could but be brought to realize the fact, and would show their appreciation of efforts of the supply men, by giving the exhibits more attention, even at the expense of omitting to visit places of purely local renown, that oftentimes are of questionable value and interest.

If the conventions are to be made occasions of a frolic, with business as an incidental, it is one thing; but if they are to be educational and beneficial to the highest degree, the efforts of the supply men to make them so should be encouraged.

And if this is done, I am sure future meetings would not be less interesting as a recreation, for the supply men understand fully the value of such features and will not fail to exert themselves to the limit, to the end that the delegates will return to their homes wiser even if their wisdom is not tinged with sadness.

In conclusion, I would suggest:

1st. The exhibition of appliances to be managed by an organization of supply men.

2nd. That the entire day, succeeding the opening of the convention, should be devoted to the exhibition of supplies, and no session of convention or diversions on part of local committee, be permitted to interfere.

3rd. That the association, in selecting places for future conventions, be requested to consider the necessities and conveniences of the supply men, to the end that their exhibition may be the best possible, rather than the desires of localities, usually actuated by selfish motives, for while in both cases there is an element of self interest, in the first, the railway association is the beneficiary to a greater extent than in the last.

4th. That the railway association be requested to adopt such other means as it thinks wise and proper to stimulate men to make future supply exhibitions attractive and worthy of the time to be devoted to them.

5th. That the exhibitions of appliances, hereafter to be made, be recognized by the association as one of the leading features of the annual conventions.

F. B. Brownell, President.

Name Withheld by Request.

The point raised in your letter is pertinent and timely, and doubtless has received the consideration of every large exhibitor in some of the past conventions.

Unquestionably, the exhibitors who have made expensive displays year after year at these conventions, are more experienced and better prepared to manage them or advise the local committee, than the new men who assume this task each year.

An exhibitor's committee, composed of three men to be chosen by the supply men among themselves, to advise and co-operate with the A. S. R. A. committee on all matters relating to this subject, would result in the saving of thousands of dollars, much annoyance, and the more prompt location of material.

The regular A. S. R. A. committee could provide the exhibition hall, light and heat it, and collect rental for space, but the exhibitors committee should make contracts for the transportation of all material from the railroad to the exhibition hall, receive and locate it in its allotted space and attend to the reshipment after the convention.

Let every exhibitor at the St. Louis convention write to the Review, naming his choice of three supply men, or companies, to represent him on this committee, the three obtaining most votes to be considered elected, and communicate with each other and the association committee at once.

A more satisfactory allotment of space can be made in future by compelling each exhibitor to submit with his application, a list showing the approximate weight and size of the articles to be displayed. Then the committee will be able to locate all material with regard to convenience and economy in placing, as well as harmony in appearance.

It will be urged by some that jealousy among competing exhibitors will make co-operation impossible, but I believe there are many supplymen who have had experience with these exhibitions, and who are broad enough to act fairly toward all and for the general good of the convention.

Charles Scott Spring Company.

Replying to your favor, with reference to the somewhat heavy expense incident to the making of exhibits at street railway conventions. We are glad that you have taken this matter up, as we believe good will be accomplished thereby, both to the Street Railway Association and the supply men. These exhibitions necessarily entailed great labor upon the committee of the association having them in charge. In the past they have done this work in an exceedingly able manner. We think, however, that an improvement can be effected and relief given the association by having the exhibition placed in the hands of a committee of supply men. This would necessitate a permanent organization of the representatives of supply houses, which in our judgment is advisable. This has been found very advantageous in various associations of steam roads. A standing committee is appointed at one convention to look after the interests of the supply men at the next, also, they arrange for the place of exhibition, the supply of power, if wanted, and aid as far as possible in the installation of exhibits. In addition they secure reduced rates at hotels for all supply men and formulate plans for the entertainment of members of the association. We believe that such a scheme will prove of benefit to the American Street Railway Association.

Charles Scott, Jr.

St. Louis Car Company.

We have no complaint to make whatever, in having been put to unnecessary expense in placing our exhibit, and, considering the location of the building, as well as the architecture of the same, we feel that all the exhibitors had has many conveniences as could possibly be expected.

It should be remembered that the parties who had charge of the affair are not solely responsible to see that each exhibitor is properly placed; this he should see to himself.

Geo. J. Kobush.

Smith of New York.

I am in receipt of your favor in regard to my views upon making exhibits at the annual convention of the American Street Railway Association. In reply to which I would say I regret very much that it will be impossible for me to make exhibits in the future. I have done so for the past five or six years, and in every case have come out away behind. This year it cost me $335, and there were but

eleven members of the association who condescended to spare a moment to inspect our goods.

Should they at any future time offer more encouragement than they have in the past, I will be glad to again exhibit my goods. Our representative, Mr. Millen, sold something like $60 worth of goods while at the convention, and this you will readily see does not nearly pay for the trouble. I can easily see that there might be some future benefit derived, if the railroad people would condescend to inspect the exhibits.

CHARLES G. SMITH.

This exhibit was a large and very attractive one.—EDITOR.

Paige Iron Works.

We have your letter and in the main we think you are perfectly correct in your ideas in regard to handling the exhibits at the street railway conventions. We think that some way could be devised to handle the exhibits at less cost and inconvenince to supply men but whether it is best to put the allotment of space and the control of the exhibits in the hands of the supply men is a question that we are not at the moment ready to express an opinion on. We ourselves do not consider that we have suffered great inconvenience or much unnecessary expense in connection with our exhibits and have always received absolutely fair treatment at the hands of the association but we can see wherein experience would be a valuable thing in locating the exhibits, improvements could doubtless be made and we should agree to almost any plan that would facilitate the placing of the exhibits at the various conventions.

ALONZO W. PAIGE, President.

Harold P. Brown.

Your favor of the 25th inst. has had a careful reading, and I feel as you evidently do, that the management of the A. S. R. A. exhibitions by a local committee, which necessarily varies from year to year, occasions a great deal of unnecessary trouble and expense to many of the exhibitors. On the other hand, it is a great deal to ask of the local committee, since there is a very large amount of work in a line entirely new to most of the members, and an absolute certainty that some of the exhibitors will make complaints in spite of everything.

It is clearly impossible for every concern to have the best space, and many of the exhibitors who are crowded out through their own neglect are apt to be very free with their criticism of the management.

It seems to me that the most satisfactory solution of the question is to put the management of the exhibitions into the hands of a paid expert in that line, and to publish several months ahead a diagram of the building to be used and the rules governing allotment of space.

These rules should be so formed as to give each applicant for space an equal chance with all other applicants for the same amount of space and a better chance than applicants for a less amount.

In this way the companies who pay the largest sums would have the choice of space. This seems to me to be fair and just. There should be some method, either by order of receipt of application or by lot, of awarding locations between applicants for the same amounts of space, so that each person might feel that there was absolute impartiality shown in the distribution. A man cannot be blamed for complaining when he finds that his exhibit is in an obscure corner, while his competitor, who has the same amount of space, is close to main entrance.

Were this decided by drawing lots, there would be less basis for complaint. And an expert in this line would know the easiest and cheapest method of handling and placing heavy exhibits.

J. G. Brill Company.

We are in receipt of your letter of the 25th inst., and have carefully noted the contents. The case in point does not appear to us to the greatest interest, for the reason that we have not experienced many of the difficulties contained in your letter. Of course we do not want to stand in the way of any method which will cheapen the exhibits of the supply men at the convention, but think in view of the past experiences in connection with the separate organization that it is hardly policy for the case to be brought up again. The local committee has undoubtedly always done everything it could to lessen the expense, and its shortcomings, we think, have been few and far between. However, we shall be pleased to hear from you as to the general impression prevailing, which will undoubtedly be ascertained when you receive answers to the various letters to which you refer.

General Electric Company.

Replying to your esteemed favor of the 25th instant relative to the advisability of inaugurating some different policy as regards exhibits at the street railway conventions, I desire to say that, so far as this company is concerned, the present arrangement has worked exceedingly satisfactorily, with the possible exception of at one convention. At St. Louis, we were exceedingly well pleased with all the arrangements that were made by the local committee, and have nothing but words of praise for the manner in which all the matters were managed. I am, of course, aware that the arrangement which exists between supply men and the Master Car Builders and Master Mechanics Associations of the steam roads has always worked admirably; and should such an arrangement be acceptable to the members of the American Street Railway Association, it would be entirely satisfactory to us.

As we view the relationship between the Street Railway Association and the supply men, it is practically this, that while the latter do undoubtedly contribute much to the success of the conventions, they are there simply through the courtesy of the members of the association, and, consequently, we should leave the determination of the best plan to follow, as regards exhibits and the position of the supply men entirely to the wisdom of the association. Some years since we were inclined to the opinion that an auxilliary association of supply men, to work in full harmony with the Street Railway Association, would be a most excellent move, and personally, with some of our friends, we undertook the organization of such auxilliary association, but the project did not seem to meet with favor, either from the supply men themselves or from many members of the older organization, consequently we have since adhered to the opinion expressed above, that the supply men should permit the Street Railway Association to handle these matters without suggestions from us gentlemen of trade, and feel that at all times we may rest assured of the best of treatment.

WM. J. CLARK, General Manager Railway Department.

Standard Paint Company.

Owing to the nature of our business as well as the inconvenience, trouble and expense of getting goods for exhibition in place, we have in the past few years almost entirely abandoned exhibiting at the street railway conventions, although we attend them regularly. We have been members of the Master Car Builders Association for many years. The M. C. B. convention is carried on almost exclusively by the supply men, who not alone look after the interests of themselves and their exhibits, but see to it that all active members of the association are carefully looked after and have an enjoyable time, and there are various committees appointed, such as finance, printing, entertainment, etc., and everything is done in a thoroughly business-like way, so that there is no confusion or friction, and if there is any trouble, one knows just whom to go to, the names of the various committees all being printed, so that every one knows who they are. We would emphatically approve of some similar system being adopted by the American Street Railway Association, as we believe a better feeling would exist, not alone among the supply men, but the active members of the association. We believe that a separate organization for supply men should be encouraged, not alone by the manufacturers, etc., but by active members of the association as well.

FRANK S. DE RONDE, General Sales Agent.

ADAMS CASE LOST.

The celebrated suit of Wellington Adams, of St. Louis, against the Lindell Railway, but really against the General Electric, has again been turned down; this time in the United States Circuit Court of Appeals. The evidence fills 3,800 pages of printed matter. Adams claimed prior patent on street railway motors.

Steam heating from central electric station is to be tried at Greenville, Pa.

VESTIBULES UP TO DATE.

The street car vestibule is comparatively a new product, as it is only within the last three winters that it has come into use to any extent. Its use has been compelled by law in some states, but there is undoubtedly a growing sentiment in favor of it on the part of managers, even where its use is not compulsory. In view of the infancy of the street car vestibule it will be of interest to compare notes and see what have been found to be good forms of construction by those roads that have used vestibules.

COMPLETELY CLOSED VESTIBULES ON THE CALUMET.

H. M. Sloan, general manager of the Calumet Electric Street Railway of Chicago, believes that a vestibule can hardly be called a success as a device to keep motormen warm unless it is entirely closed in. If a vestibule is not entirely closed the eddy currents of air are apt to make it nearly as uncomfortable for a man as if there were no vestibule whatever. Mr. Sloan has had considerable experience with cold weather, and believes in fully protecting the

CALUMET VESTIBULE ON NEW CARS—FOLDING DOOR SWINGS FORWARD.

men. With the assistance of W. A. Harding, master mechanic, he has equipped all the closed cars of that line with vestibules, which are fully closed with wood when occupied by the motorman. Some new cars bought this fall have also been fitted with the same type of vestibule. The old cars which have been equipped with vestibules have double doors, one of which swings in on hinges against the car body and the other swings back against the vestibule front. One of our engravings shows the doors slightly ajar on this type of vestibule. To fill the space over the step between the bottom of the doors and the edge of the platform a strip of wood is provided which the motorman carries from one end of the car to the other. On the new cars there is but one door, which is hinged in the middle and swings back against the controller. It can be held back by a hook. In this case the space over the step is covered by a trap door hinged at one end which swings up behind the door in the corner of the vestibule when the door is open. The doors on both styles are kept shut by a catch at the top and by the trap door at the bottom. A motorman in one of these vestibules is entirely shut in from cold blasts and is as comfortable as is possible. There is no leaky canvas to deal with, and the ingress of passengers is not in the least interfered with when the vestibule is in the rear and open.

KALAMAZOO, MICH.

E. E. Downs, manager of the Citizens' Street Railway of Kalamazoo and also of the Battle Creek and Lansing roads, makes some interesting and to the point observations on the vestibule question as follows:—

"We have given the vestibule matter some consideration. The law went into effect with us in Michigan, January 1, 1896, and it found quite a number of the smaller roads throughout the state unprepared, as it were, having allowed the question to run along until quite late in the fall, and then at the last moment, hurriedly devising something that would comply with the law, inexpensive, useful and ornamental, a combination which is quite difficult to arrive at, especially when the limited productive power of some of the small roads is considered; for instance, Lansing, Michigan, where business is done mostly for the healthful effects that it has on its managers, and where the vestibule builder, when most needed, is usually out somewhere replacing a rail or a pole, or mending a break in the trolley wire, or struggling with some other of the many numerous positions which he is obliged to fill on some of the above mentioned small roads. The vestibuling of our cars was a matter, as I stated above, of some consideration, as the cars in use on the three different roads which we are operating, required to some extent, a different design. The vestibules are made almost wholly of glass, with light frame work to hold the same, running straight up from the front dash to the hood, the bottom of the vestibule being fastened to the top of the dash, having first set the brake and controlling mechanism inside of the dash board. One side of each end of the car is enclosed with matched lumber and made in the form of a shutter, with a large window, the entire vestibule being painted to match the car, and fitting closely when put into position. A vestibule so arranged can be taken off or put on in comparatively short order, and without disfiguring the car. These vestibules are inexpensive in comparison with any we could buy. It should be understood that one side of the vestibule is open at all times, but this does not entail any discomfort, as it were, to the motorman, as there

CALUMET VESTIBULE ON OLD CARS—DOORS SWING BOTH WAYS.

DULUTH VESTIBULE.

is no draft, and no objections can be raised, and in case of an emergency, it is quite necessary that one side be open.

As to vestibules in general, while there are disadvantages, there are advantages. The initial cost, for instance, is what worried some of us; the increased liability to accidents, as we saw it, is what worried all of us. On the other hand, the vestibules are certainly a great protection for the men. On stormy, ugly mornings, they report for duty the same as on pleasant days, and our stormy day sick list has decreased perceptibly, and it is certainly pleasing to realize on such days that the men are not working in misery, as they have to do without any protection. Furthermore, we find a great saving in heating our cars, the consumption of coal being reduced one-third."

THE DULUTH STREET RAILWAY.

uses an all closed vestibule, plans of which are shown herewith. This vestibule is somewhat similar to that being put on the Calumet, of Chicago. Herbert Warren, general manager, says that it is well suited to cars that must change ends every trip, as do those in Duluth. The inside panels and doors, are bass wood, stained to imitate cherry. The hood ceilings are basswood left natural color. The platform sills and floors are of white oak. All the other frame work is white ash. The outside wainscoating is Tennessee poplar. Sashes are cherry.

YOUNGSTOWN STREET RAILWAY.

A. A. Anderson, general manager, gives his experience as follows: "We have not planned anything new in the line of vestibules for front platforms. The vestibules on our 16-foot cars are not put permanently on the cars, but are taken off each spring and put on again the next fall. They are made of canvas, wood and glass, and project beyond the bumpers. They are a continual source of expense and annoyance to us, and I hope it will not be necessary for us to use them another winter. In all probability we will do some rebuilding on the 16-foot cars during next summer, taking off the present style of double platforms with closed gates on one side and putting on both ends of each car a permanent vestibuled platform open on one side only.

I consider vestibules on the car in the winter time an absolute necessity to the comfort of the motorman, which is in reality necessary to safe operation. I do not believe in taking them off, even in the summer time, as the motorman needs protection from rain as well as from cold.

I do not consider that vestibules have any disadvantages whatever if they are built properly. That is, if the enclosure is large enough to admit of the convenient handling of passengers, packages, etc."

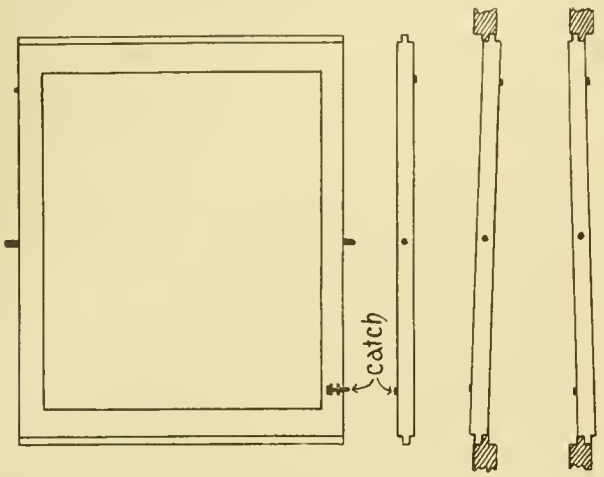
DETROIT CITIZENS' STREET RAILWAY.

A. B. Dupont, general manager, says: "We have not worked any improvement out on the one we used a year ago. Our vestibule is enclosed on three sides only, using as little wood-work as possible, and as much glass above the line of controller handle. All of the sash of vestibule can be lowered. I do not think that a vestibule is in the least a nuisance, as long as only three sides are enclosed; but on the other hand is quite a protection to your motormen. It would be a great hardship on our company, if we were forced to put a door on the vestibule, as in that event, we could not use our front platform for passengers to get on and off the car. We have one improvement over vestibules used elsewhere; and that is, the curtain in rear of the motorman is attached on a spring roller to the side of the car near the door, and the other end of the curtain is attached by a button to the door so that when you open the door in the rear of the motorman, the curtain is opened at the same time."

A SUGGESTION.

There has always been some trouble about keeping vestibule windows clean in snow and sleet storms. The REVIEW has a suggestion to offer that some readers may think worth putting in practical form. It consists in having the window

or windows at the front hinged either vertically or horizontally in the middle so that when one side gets covered, the motorman can, in a second, swing it around and scrape off the covered side. Of course the joints can not be as tight around the window as they would otherwise be, but that is



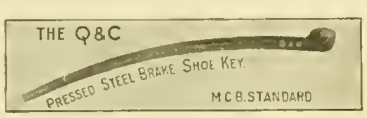
not a matter of great importance. With many vestibules now the only way for the motorman to thoroughly clean the windows is to stop the car and go outside. The result in practice is that a motorman has to keep the front window open when it storms.

McEWEN COMPANY ALL RIGHT.

General Manager Robinson, of the McEwen Manufacturing Company, New York, advises us: "The announcement that all liabilities will be met in full and the company placed on a perfectly sound financial basis within the next week, we trust will prevent our friends and prospective customers from even considering we are in any way out of the field. Our factories are running full on pressing orders and we shipped this week the fourth 200-kilowatt unit direct connected to one of our 350-horse-power tandem compound condensing engines, to the Holmesburgh and Tacony Street Railway Company, Philadelphia, and we shall ship this coming week two 100-kilowatt direct connected units with engines to your city. The assignment was made purely to protect the interests of the creditors as a whole from a threatened run by one or two. The business of the company will be extended considerably this coming year and close attention will be paid to the larger sizes of street railway power generator and engines."

Q. & C. BRAKE SHOE KEY.

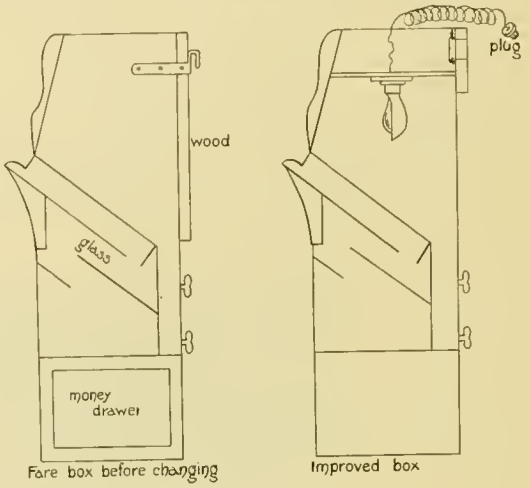
The Q. & C. Company, 700 Western Union building, Chicago, is putting on the market a pressed steel brake shoe key which is much lighter than a forged key, made of the



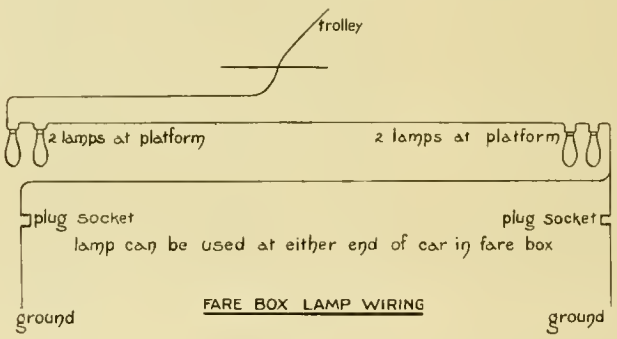
best material of uniform strength throughout, and cheaper than forgings. A large stock is carried, and as they are manufactured in large quantities, the price is low.

FARE BOX IMPROVEMENTS.

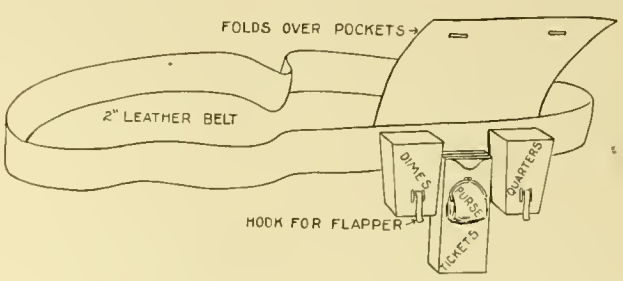
Among the numerous roads operating in whole or in part without conductors, is the Norway & Paris Street Railroad, of Norway, Me., and F. B. Lee, superintendent, has devised some improvements in the fare boxes used there heretofore.



Our engravings show the fare box as it was before and after the improvements. The principal changes consisted in putting an incandescent lamp inside the box, and having a glass back so that the money can be seen when it enters the box.



The fare box is changed from one end of the car to the other, and to accommodate the lamp in it, a flexible cord and plug socket are provided. By wiring the car as shown the



MONEY BELT.

plug can be put in at either end without interfering with the other lights on the car.

A money belt is now furnished the motormen for use in making change, to save them the trouble of getting at inside pockets when they are dressed as they must be for winter duty. This also is shown in one of the illustrations.

NIAGARA POWER FOR THE BUFFALO RAILWAY.

Street railway men are especially interested in the Niagara-Buffalo transmission line because the first power to be sent over it is to be used by the Buffalo Railway Company in the operation of its cars. The sample pole exhibited at the St. Louis convention and the article in our August issue gave some idea of the line construction, but the pictures accompanying this article better portray the construction of the line at various points along the route between the Falls and Buffalo, while they also show the conduit and the manner in which the tile ducts were laid. This transmission line is being built by the Niagara Falls Power Company, and it is its property. The poles were furnished by Thomas Barnard, of Lockport, whose men cut about 1,500 of them on the Indian peninsula, Georgian Bay, in the neighborhood of Pine Tree harbor, and the remainder came from points along the Canadian Pacific. The double petticoated porcelain insulators shown in one of the pictures came from the Imperial Porcelain Works, Trenton, N. J. The electrical equipment of the line will be furnished by the General Electric Company of Schenectady, N. Y. The cable to be used on the pole line was furnished by the American Electrical Works, of Providence, R. I., and the cable to be used in the conduit was supplied by the Safety Insulated Wire Company of New York. The H. B. Camp Company of Aultman, Ohio, made the vitrified tile laid in the conduit.

SAMPLES OF LINE CONSTRUCTION—NIAGARA FALLS-BUFFALO TRANSMISSION.

William A. Brackenridge, M. Am. Soc. C. E., chief engineer of the Cataract Construction Company, is in charge of the work of the transmission line on the part of the Niagara Falls Power Company. Its voltage will be 10,000, the highest at which power in such large units has ever been transmitted.

In length the transmission line is about 26 miles, and for about 18 miles of this distance it runs through private property and for about 5 miles it is built along the bank of the Erie canal. The White-Crosby Company, of Baltimore, Md., had the contract for the construction, and it commenced work on August 14, John A. Wilson being superintendent of the work. The Niagara Falls end of the line will be at the transformer house across the inlet canal from the central power station of the Niagara Falls Power Company.

The canal bank is reached near the foot of Hinds street in the village of Tonawanda, and the line then follows the canal to Buffalo. The pole line meets the conduit at a point about 300 feet north of Brace street, and from this point to the power station of the Buffalo Railway Company the cables will be laid underground, the distance being about 4,200 feet. In its course the transmission line passes through the city of Niagara Falls, the town of Niagara, the town of Wheatfield, the village of North Tonawanda, the village of Tonawanda and the city of Buffalo, in which last named place two and one-half or three miles are built. The places named are located in the counties of Niagara and Erie, and these counties will receive the benefits of the transmission of Niagara power. However, as the rights along the canal bank are obtained through the franchise granted by the state to the Cataract General Electric Company there is no telling to what extent the transmission is likely to be continued. As the right of way will not have to be purchased, power can naturally be delivered at a lower price to places along the canal.

The poles used in the construction of this greatest power line in the world are from 35 to 65 feet in height, of white cedar and nicely shaved. They are set at a depth of from six to eight feet, and where the soil was soft the base was set in concrete. The larger number of them, however, are set right in the hard clay and well tamped about their butts. All the poles of the present line have been set to the east side of the center of the 30-foot strip, the outside line being one foot beyond the outside end of the large cross arms. This method was adopted so that another line of similar capacity may be built on the west side of the right of

way when the demand for power warrants it. The distance between the poles is from 60 to 75 feet, which is varied in order to overcome any possible vibration of the spans. The poles will all be painted with two coats of pure white lead and boiled linseed oil. Complete transposition is effected every five miles along the line. At each of these five points two poles, which are five feet higher than the poles adjoining, are set. Where the line turns sharp corners or angles six poles instead of three are used, and these are fitted with double crossarms in order to distribute the strain of the cable on six instead of three pins. All poles set at angles are guyed with a three-quarter wire strand. All poles have three crossarms. The two upper crossarms will carry the power cables, and are of the same size, 12 feet long by 4¾ by 5¾ inches, and are made of yellow pine. They are supported by solid braces made of 2x2 inch angle iron. The lower crossarms are designed for telephone purposes, and are 6 feet long by 3¼ by 4¼ inches, supported by 1½ by 1¼ angle iron braces. All the crossarms are staggered, the gains being painted before they are set. All double crossarms used at corners and other angles are fastened by ¾ by 10 inch lags and a ¾-bolt through all parts. On the upper crossarms iron pins will be placed to carry galvanized barbed fence wire as a protection against lightning. This will be strung at a height of 18 inches, and will be grounded at frequent intervals along the line. The pin holes in the crossarms are four inches in depth and all have drainage holes. The pins are all boiled in linseed oil, and their butts painted before they are placed in position.

The cable over which the electric current will be transmitted is a bare copper cable about three-quarters of an inch in diameter, and was shipped to the work on reels carrying about a half a mile in length. These reels were loaded onto a wagon, and in this way the cable was strung on the poles. Power is to be transmitted over it at a voltage of 10,000 on the three phase system.

The conduit through which the transmission cables will run for the last 4,200 feet of the distance is made of 12 vitrified tile ducts, each having a diameter of three inches in the clear. These are laid in concrete with four inches as the minimum protection on all sides. Only three of these 12 ducts will be used for the first installation. A terminal house will be built at the point where the pole line and the conduit meet in Buffalo. This terminal house will be equipped with lightning protectors, and here the bare copper cable will be connected with the lead covered insulated cable that will be run through the conduit. The transformer house at the Buffalo end of the line will be located in the rear of the power house of the Buffalo Railway Company, and will be built almost entirely under ground. It is in this transformer house that the voltage of the current will be reduced. The current as it will come from the generators in the power house at Niagara Falls will be at 2,200 voltage, and it will be passed through transformers in the Niagara Falls transformer house and its voltage raised to 10,000 volts, plus the loss sustained in transmission.

In the construction of the transmission line the Niagara Falls Power Company has gone to great expense. For 18 miles of the distance it has purchased a strip of land 30 feet wide for a right of way. It was found impossible to secure this in a straight line, but the line as erected is not very indirect in its general route. In many cases farmers were indisposed to part with a strip of the desired width through the center of their farms, and so the fence lines had to be adhered to in these instances. Railroads built and projected had to be crossed and avoided, but all this has been done, and soon Niagara's force will be speeding across country to the Tonawandas and Buffalo. The Niagara-Buffalo transmission line will be the greatest of its kind in the world, just the same as the Niagara power development stands unrivalled and unequaled for immensity. The successful transmission of power to Buffalo will be placed among the most notable accomplishment of electrical science during the present century. Current was first turned on the transmission line early on the morning of November 16. The construction has been a remarkably rapid piece of work. Much of the credit for the way this matter has been pushed through is due to H. H. Littell, general manager of the Buffalo Railway. Had he not contracted for the first power and urged quick work, it would have been many months before Niagara turned a wheel in Buffalo. The running of the entire Buffalo Railway plant by Niagara power is now probably only a question of a short time. The price paid is $36 per year per horse-power.

NO CAUSE OF ACTION.

The jury in the case of Thompson vs. The Citizens' Street Railway Company, Kalamazoo, Mich., for $25,000 damages on account of the death of Samuel Thompson, June, 1895, brought in a verdict of no cause of action. The facts appear to be that Thompson attempted to board from the wrong side a moving train of motor and two trailers, when he was struck by a center pole and thrown in front of the rear trailer. He was instantly killed, but the jury concluded that it was a plain case of negligence.

REGULAR PARLOR CAR SERVICE.

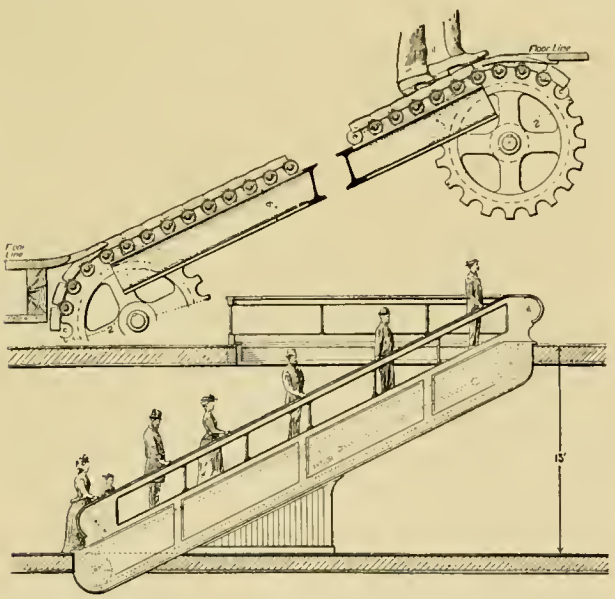
The enterprising general passenger agent of the Brooklyn Heights Railroad Company, H. Milton Kennedy, informs us that his road has recently inaugurated a regular parlor car service between Brooklyn and Flushing. The parlor cars we have previously illustrated run on schedule time, and tickets are sold in advance from a diagram. This the conductor uses and upon it notes the time of passing schedule points, the state of the weather and any incidents of the trip. If the experiment is successful the service will be largely increased.

ELECTRIC CARS FOR HAULING FIRE ENGINES.

In our issue of August, 1894, we described a plan, which was investigated by the city council of Lynn, to haul fire engines to fires in suburban districts over electric roads. The scheme, although apparently a good one, was not at the time adopted, but the fire commissioners of Springfield, Mass., are now considering the same thing. The idea is to have special cars on which the fire engine and other fire apparatus can be placed and hauled as near as possible to the fire. Horses can then take it the balance of the way. The plan is intended only for suburban use where the run over the country road with horses would be slow or where hills would prevent fast time being made. If the Springfield fire commissioners, can make satisfactory arrangements with the electric railway the Holyoke board will adopt the same plan. Eastern Massachusetts is specially adapted to a plan of this kind as nearly all its towns are connected by electric railways.

THE RENO INCLINED ELEVATOR SYSTEM.

What appears to be a very valuable system for handling large crowds at elevated and underground stations and other places where many people per hour must go from one level to another, is one being introduced by the Reno Inclined Elevator Company, of New York. Its principle is simply that of the treadmill reversed. Our engravings show the working of the apparatus. The passenger steps on the moving incline at the bottom and is conveyed to the top. The hand rail is also made to move at the same rate as the incline. The first objection that the average person raises to the arrangement is the



PLANS OF RENO INCLINED ELEVATOR.

danger of catching feet or clothing at the top when the change from the incline to the stationary floor is made. This has, however, been amply provided for. The surface of the incline consists of a series of shallow rubber covered ridges which, at the top, pass between the prongs of the comb shaped landing, as shown in one of the engravings. In this way a passenger is slid upon the

RENO INCLINED ELEVATOR AT CONEY ISLAND.

landing without a chance of injury or catching of clothing, even though entirely unfamiliar with the device. The ends of the prongs are bent down slightly, as shown, so that even cotton waste when thrown on the incline will not catch.

A narrow incline of this kind has been given a practical test at the old iron pier, Coney Island, this fall, with the idea of demonstrating its practicability to the trustees of the Brooklyn bridge, the officers of the elevated roads and the Boston subway. The capacity of a single file elevator is 3,000 people per hour, and by increasing the width the capacity can be correspondingly increased. The system is manifestly superior to vertical elevators for many places because people are handled by it continuously and without delay and no attendant is required.

TWO WASHINGTON ROADS WANT COMPRESSED AIR.

W. Kesley Schoepf, receiver of the Eckington & Soldiers' Home and Belt Railways of Washington, D. C., has asked authority to enter into a contract with H. K. Porter & Co., of Pittsburg to test compressed air motors on the company's lines, and if the test is satisfactory to purchase ten cars for each road. He sets forth in his reports that up to the time of the enforced removal of the trolley poles and wires, in accordance with an act of congress, the Eckington road paid a surplus of $10 to $25 a day over expenses, but when the road was forced to go back to horse-power the earnings fell off and there was a deficiency of $40 to $50 a day, which was made still worse when the Metropolitan Railroad's parallel line changed to electricity. He believes the only salvation of the property to be some method of rapid transit and as the expense of the electric conduit system puts it out of the question he favors the trial of compressed air.

MAMMOTH CORLISS FOR MONTREAL.

What will, when installed, be the largest engine employed in electric work on this continent, if not in the world, is building in Montreal, for the Montreal Street Railway. It is a cross-compound-corliss condensing, and is expected to work up to 4,000-horse-power. The engine and fly-wheel will weigh 350 tons, and be ready to use at an early date. Some of the dimension figures are interesting; the main shaft is 26 inches diameter and weighs 21 tons; main shaft journals 24 by 28 inches; fly wheel 24 feet diameter, weight 100 tons. The engine will work under 160 pounds steam pressure.

The parts of the machine are so massive, a special track is being built from the works to power plant and special cars built for the purpose will haul the loads, electricity being the motive power. The generator will of course be direct connected.

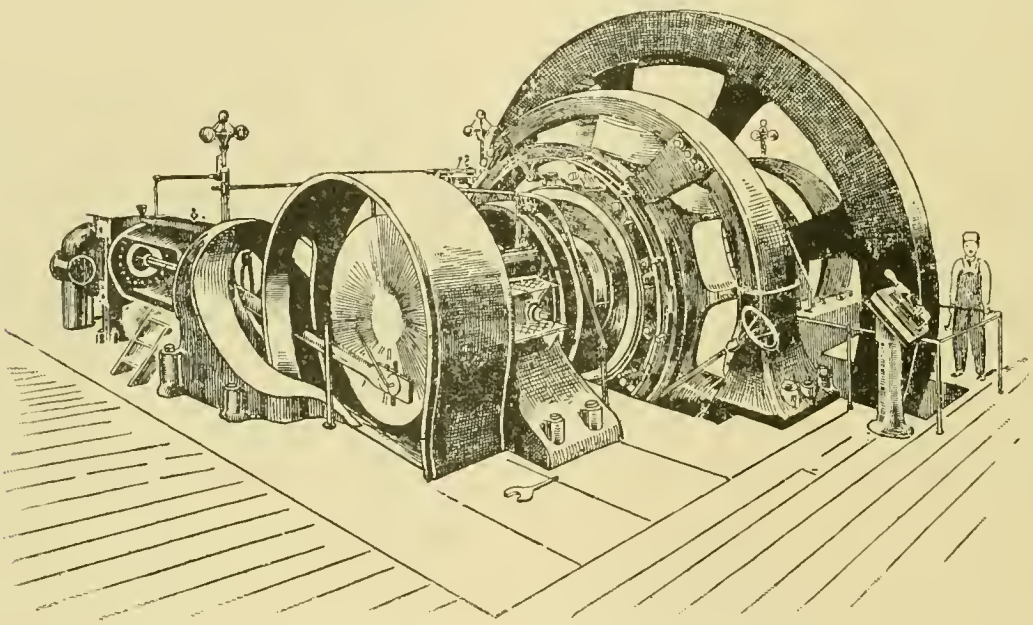
RAILWAY ELECTRICIAN A BALLOONIST.

W. E. Tate, the electrician of the Piedmont & Mountain View, Cal., electric railway, has added to his previous title of E. E. that of B. P. J., which, in the language of the profession, stands for Baloonist and Parachute Jumper. He is 32 years of age, married and greatly fascinated with the new work. How he came to take it up is told in his own words, as follows:

"The professional who was making the ascensions for the company injured himself one Sunday in some manner and expressed his feelings in very profane words. Mrs. Bishop was present and heard him. Mr. Bishop later told him that his services would not be needed any longer. About two weeks later I remarked to the superintendent that it was about time we had another balloon ascension. He told me about Mr. Bishop's action, and I then offered to make the trip if they would pay me the money they had paid him.

"We talked the matter over, and he and I decided to go into the scheme. We went to San Francisco and ordered a new balloon and parachute made. It is 60 feet high when inflated and 40 feet wide, has an 18-foot mouth and weighs 226 pounds. The parachute when open is 26 feet across and weighs 49 pounds. They cost us $225 and are made of the very best canvas sheeting and cotton ropes.

"When it was ready we took it to Blair Park and inflated it before a Sunday crowd and I went up. It was a great success. My feelings were like being out in the ocean rolled about on the waves. It was very close and oppressive, but I stood it nicely. The next trip I found it cold, and the third time I went through fog banks and clouds. After coming out of the latter I



MONTREAL STREET RAILWAY'S BIG CORLISS.

MORE POWER FOR B. & O. TUNNEL.

The power house supplying the Baltimore & Ohio Railroad locomotives in the belt line tunnel at Baltimore is being enlarged and improved. Two 250-horse-power Babcock & Wilcox boilers are being added, also a 600-horse-power Green corliss engine direct connected to a General Electric railway generator, besides some lighting machinery. Hunt coal and ash conveying apparatus is being put in with a coal storage tank of 500 tons capacity and automatic weighing apparatus. Automatic oiling pipes are also being run all over the station. When all these improvements are completed the services of quite a number of men can be dispensed with. A small 10-ton locomotive has been put at work in place of the horses that formerly drew cars off the the barge ferry at Fell's Point.

was blinded with the glare of the sun. It was as if it was shining on snow banks.

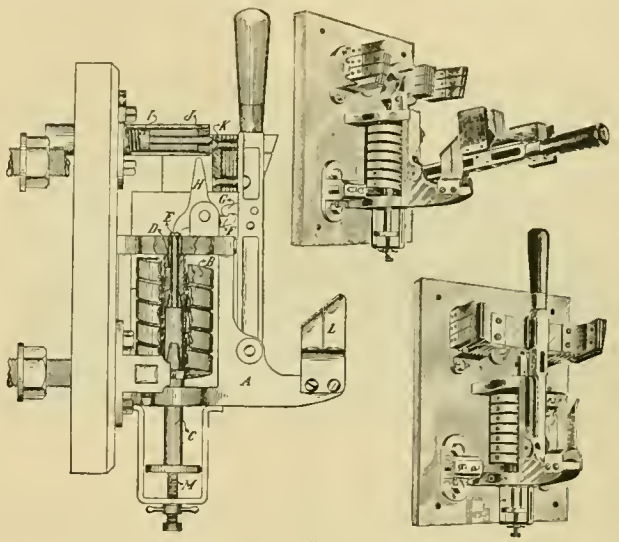
"On cutting loose from the balloon for the descent one drops quite a distance before the parachute opens, and when it does you are brought up with a jerk that causes you to rebound like a rubber ball. If you cut loose while ascending you will drop from 300 to 500 feet before the parachute gets in its work, but if you cut away when descending or about at a stand still, you will only drop from 200 to 300 feet. You come down very gently until within about fifty feet of the earth, when the air seems to fail to support you and you come to the ground so quick that it will throw you off your feet, but not hard enough to injure you.

"I must say that I rather enjoy the work, as it is a change from my everyday work at the power house where I am foreman. There is a feeling that you have very little support when you are coming down, as you have only the small line in your hand attached to the parachute."

The arrangement which Mr. Tate uses to carry himself up is rather novel. The parachute is attached to the mouth of the balloon. From the lower edges of the parachute extend twenty-four cotton lines the size of a lead pencil. These are gathered into groups of six each, and a snap attached to each group. These, in turn, are made fast to an iron ring to which two ropes are made fast, and to the other end a bar on which he sits. From the mouth of the balloon through the parachute down to his hand hangs the rope with which he cuts himself loose when ready to descend.

THE I. T. E. CIRCUIT BREAKER.

The magnetic circuit breaker for cars, a device comparatively unknown a few years ago has been brought into prominence very largely through the efforts and advertising of the Cutter Electrical & Manufacturing Company of Philadelphia, which also makes magnetic cut outs for all purposes. The advantage of a magnetic cut out over a fuse for quickness of action is now well understood. The Cutter circuit breaker, better known as the "I. T. E.," is designed on original lines and involves features peculiar to this device. The electromagnet is designed to develop more energy than is required simply to trip the retaining catch,—this additional energy being employed to aid in opening the main switch. The great advantage of this secondary action consists in quicker and more positive opening of the protected circuit when it approaches a short circuited condition. The "inverse time element" from which this circuit breaker takes its name "I. T. E." is perhaps one of the most important features. It means that the time of opening the circuit becomes less and less as the conditions approach nearer to a short circuit. Springs as a means of adjustment have been entirely avoided in this device because of their unreliability. This company also makes a breaker that will open on an underload as well as an overload. This is for stationary motor circuits where the current may be shut off the circuit by the opening of the power house circuit breaker or from some other cause. In such case all the motors on the circuit will stop, and unless the current is shut off at each motor serious damage may be done if the current is turned on



THE CUTTER "I. T. E." CIRCUIT BREAKER.

at the power house again without warning. This breaker which opens both on overload and no load, obviates all this danger. Our engravings represent the I. T. E. circuit breaker of the standard switchboard type, both open and closed together with a detailed section.

STOP AND LOOK.

A point recently decided in a Detroit court should be interesting to street car companies and drivers of other kinds of vehicles. The plaintiff in an action against the Citizens' Company admitted that he had time to get off the tracks, but claimed the motorman had time to stop if he had seen fit to do so. The judge told the jury that it was the duty of a person crossing to stop and look both ways; that it was not the duty of the motorman to stop until he was aware the horse was not being driven off, and that the party delaying to drive off was guilty of contributory negligence. But the jury brought in a verdict for the plaintiff.

The Detroit Citizen's Street Railway Company is building a theater car, which, in matter of decoration and appointments, is expected to surpass anything of the kind hitherto attempted.

An order of the Boston police board provides that but two policemen shall ride free at one time upon the same street car, and then only unless standing upon the front platform of a closed car or the rear platform of an open car. If occupying a seat he must pay fare. This is the result of an agreement between the board and the officials of the West End Street Railway Company.

SANTA BARBARA, CAL., ELECTRIC OPENING.

The Santa Barbara (Cal.) Consolidated Electric Company made the change from mules to electricity October 1. The opening was the occasion of a general holiday and the entire population of the town and vicinity turned

out to take part in the rejoicing. A procession of four motor cars was run on the trial trip. The first of these contained the officers and stockholders of the road and their families. This car had as motorman Miss Hattie Miller, daughter of President and manager C. W. Miller. She has the honor we believe of being the first woman to operate a car on an occasion of this kind, and truly an honor it may be called, for it is a position that

requires much more skill and courage than the proverbial "pressing of the button" at the beginning of great enterprises.

The electrical equipment is General Electric with Dorner & Dutton trucks. Pear shaped trolley wire is used.

The officers are C. W. D. Miller, president, H. S. Luster, secretary and manager, and A. P. Miller, assistant manager.

Following the motor car in the procession was a flat car carrying two mules wearing wreaths of flowers. One of these, "Phoenix Quaint" had seen car service for twenty years. He passed through a barn fire, was given up for dead and $15 insurance was paid on him. He is now pensioned for life.

The fuel used is crude oil, from a well only 8 miles distant, and at a cost of $2 per day of 18 hours per car. The consolidation includes the Citizens and the Santa Barbara, and further change to electricity will be made at once.

ELECTIONS.

At the election held recently by the Seashore Electric Railway Company, Asbury Park, N. J., General Manager Hammond, Howard Schaffer, the electrician, and F. A. Norton, Superintendent, were all retired. S. G. Hazelrigg, of New York, is the new superintendent.

The Exeter, N. H., Street Railway Company has elected the following officers: Directors, Eben Folsom, W. H. C. Follansby, George F. Haines, John Templeton, A. S. Wetherell, J. Warren Towle, Edwin G. Eastman. Mr. Eastman was chosen president of the organization; John Templeton, clerk, and William H. Folsom, treasurer.

The Fall River, Mass., Street Railway Company has elected the following named officers for the ensuing year; President, Wendell E. Turner; clerk, James E. Osborn; treasurer, John T. Robertson; superintendent, William Ring; directors, W. E. Turner, J. E. Osborn J. T. Robertson, W. Frank Shove, Herbert Field, David Beattie, Alex Casey.

At the annual meeting of the Tri-City Railway Company, Davenport, Ia., D. H. Louderback, of Chicago, retired from the presidency; and E. E. Cook was elected to fill the vacancy. The Secretary-Treasurer is J. F. Lardner. E. E. Cook, Clarence Buckingham, D. H. Louderback, J. C. Shaffer and J. J. Mitchell constitute the board of directors.

The following have been elected directors of the Elgin, Ills., City Railway Company: William Grote, D. B. Sherrwood, E. D. Waldron. J. B. Lane, R. P. Jackman, G. M. Peck and A. B. Church. At a directors' meeting following, William Grote was chosen president; J. B. Lane, vice-president and manager; A. B. Church, secretary, and E. D. Waldron, treasurer.

At the annual meeting of the stockholders of the Jamestown, N. Y., Street Railway Company, the following officers were elected: A. N. Broadhead, president; L. B. Warner, vice president; S. B. Broadhead, treasurer; W. S. Cameron, secretary; with O. E. Jones, F. E. Gifford, R. N. Marvin and Wm. Broadhead, directors. The office of superintendent holds over, G. E. Maltby continuing to occupy that position.

The stockholders of the Nashua, N. H., Street Railway at a recent meeting elected the following directors: John D. Chandler, John A, Fisher, Nashua; E. M. Tuck, Percy Parker, Auguste Fells, E. A. Smith, Miles F. Brennan, Lowell. John P. Goggin was elected clerk and Percy Parker treasurer. The board of directors organized as follows: President, John D. Chandler; Vice President, Auguste Fells; Secretary, M. F. Brennan; Finance Committe, J. D. Chandler, Percy Parker and J. A. Fisher.

The New Haven Street Railway Co. at its annual meeting, elected these directors: T. S. Rutz of New York, Thomas M. Waller of New London, S. Harrison Wagner, David Corey, W. J. Atwater, Eli Whitney, J. J. Lawton, Charles A. Warren and G. A. W. Dodge of New Haven. The directors selected the following officers: President, David Corey; Vice President, Charles A. Warren; Secretary, Treasurer and General Manager, G. A. W. Dodge; Superintendent, E. H. Mather. The preliminary report of the road was read, but not made public.

ELECTRIC RAILWAYS IN ENGLAND.

The Practical Engineer, published at Manchester, England, comments on American railway practice and explains why progress has been so slow there, as follows:

Everybody knows that we in the United Kingdom have been very slow in taking to electricity as a motive power for tramcar propulsion. Up to a certain point this is not to be regretted. Ten or fifteen years ago, in the United States, millions of dollars were spent upon electric lines, experimental and otherwise, and many of these had hardly got to work when they were abandoned as bad or commercially impracticable, the valuable plant and machinery therefore being thrown on the scrap heap and sold as old iron. No sooner was a new system, upon which an enormous amount of brain power and money had been expended, completed, than it was rendered out of date by something new and better. While this was going on in the States our electrical engineers were sitting quietly at home developing electric lighting, watching the course of American events, and taking advantage of the dearly-bought experience of our transatlantic confreres in the matter of electric tramways, which we for various reasons delayed until we had pushed electric lighting business. A few quiet workers were jogging along with plans at home, but nothing particular was done here at the time.

In the States, systems are nearing perfection, and in this country, now that the move has commenced, we are able to lay down our electric systems with more confidence, for we have the benefit of experience dearly purchased in the United States, and can take advantage of the good points, avoiding the bad ones, revealed by means of that costly experience.

At the present time there are in the United Kingdom about 1,000 miles of tramways, these representing a capital expenditure of something like £15,000,000. But of these there are as yet only a few miles—less than fifty—worked electrically. There is, however, every reason to believe that many more lines will be operated by electricity shortly. No one—not even the contractor, or the most sanguine enthusiast—expects these 1,000 miles to change from horse, steam, and cable haulage to electricity immediately. All understand that the progress must be gradual. But it is clear that the companies owning horse tramways are coming round to the opinion that electricity is the motive power for the tramway of the near future. It is important to note that nearly every company that applies for a bill to extend its system reserves to itself power to propel the cars by electricity. Companies that have already equipped sections of their lines electrically are expressing the greatest possible satisfaction. Particularly is this the case at Bristol, where the company contemplates considerable extension of the use of electrical power, although it has only had twelve months' experience, and that with the trolley system.

While great hopes are entertained of the substitution of electricity for horses upon a large number of our existing lines, just as happened in the United States a few years ago, it is expected that much will be done in the way of extensions and complete new systems; for it is generally thought that our English Tramway system will bear considerable expansion, and the efforts of promoters and municipal bodies will doubtless forward the work by equipping these new lines electrically now that there are several successful ones within easy reach for their inspection.

For many months, corporations and their specially-appointed committees in different parts of the country, have been going thoroughly into this question of a suitable and economical mechanical power for their tramways. In several cases visits have been paid to a number of English and continental towns where systems were running, to collect facts and figures to aid them in coming to a right conclusion. The result of these inquiries—particularly at Glasgow, Belfast and Plymouth—have been decidedly in favor of the use of the overhead trolley electric system in preference to all others.

Some statistics recently compiled in the United States are interesting in that they show that there are now in operation there over 10,000 miles of electrical track, the other lines, including horse, cable and miscellaneous, only amounting to about 3,000 miles in all. This contrasts greatly with the 50 miles of electric track and 950 miles of other kinds in this country. It is also noteworthy that both France and Germany are ahead of us in this matter of electric traction. Statistics recently drawn up regarding the three countries show that France has 50 per cent more and Germany four times as many electric tramways when compared with this country. The tramways in England equipped electrically previous to the year 1895 were few indeed; but 1895 and 1896 have brought about the inauguration of several trolley lines, which are estimated to lead to many others.

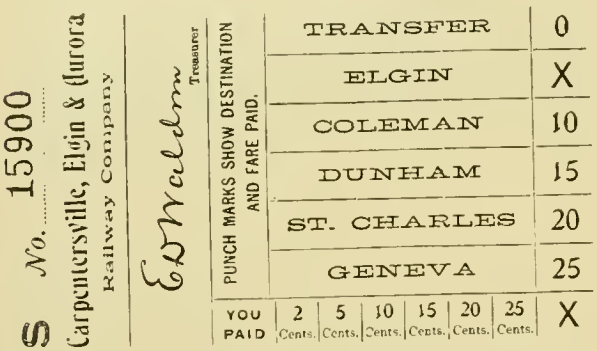
What has hindered the progress of this work in the United Kingdom? The causes have been many and various. Our legislation has not given, and does not yet give, such facilities to promoters as are desirable for schemes to be taken in hand. The necessary permission of parliament and the local governing bodies affected is only secured after long rigmaroles of legislative requirements have been compiled with and considerable expenditure incurred. The difficulties are far greater than they should be. Then, financiers, on this side of the Atlantic have been, until recenily, very reluctant to sink money in what were considered hazardous schemes. Our preference for old and tried machinery, instead of new and uncertain systems, has helped to keep us back. But last, and not least, there is the vigorous opposition which has been raised by local bodies and the general public to the overhead trolley system. Electric traction has been very materially hindered here by the æsthetic objections of many people who have never seen a trolley system in operation, but who formed rough and very erroneous ideas of what it would be like. Their objections are proved on the continent and in the few systems we have of this kind (Bristol, Coventry, Hartlepool, etc.) to be more imaginary than real. Happily, the old idea is now being gradually cleared away, and the points for and against are taken more seriously into consideration, with the result that the overhead wire is likely to be laid in ten or more towns to every one that will have a conduit or other system of conducting the electrical energy.

The great initial cost of conduit lines (according to existing systems) inclines promoters to the cheaper system—that is, the trolley. It is worth mentioning that in Germany all the electric trams, with one or two solitary exceptions, are stated to be worked on the overhead trolley system.

The Dublin United Tramways Company expects to complete the electric equipment of the Clontarf line by the close of the present year.

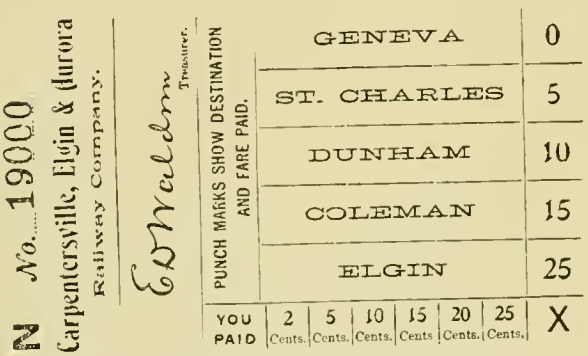
CARPENTERSVILLE, ELGIN & AURORA CONDUCTORS' RECEIPTS.

The Carpentersville, Elgin & Aurora Railway, operating along the Fox river valley from Elgin to Geneva, Ill., had a rather complicated problem in cash fare handling to take care of when it began carrying passengers. It had to provide for passengers inside of Elgin transferred from the lines of the Elgin City Railway. It had also to provide for the payment of six rates of fare. Two forms of tickets are used. Those issued on the north bound trip are marked N and are of a different color from those issued going south which are marked S. The ticket is really simply a duplicate receipt for cash


S No. 15900
Carpentersville, Elgin & Aurora Railway Company
E D Waldron Treasurer
PUNCH MARKS SHOW DESTINATION AND FARE PAID.

TRANSFER	0
ELGIN	X
COLEMAN	10
DUNHAM	15
ST. CHARLES	20
GENEVA	25

YOU PAID	2 Cents.	5 Cents.	10 Cents.	15 Cents.	20 Cents.	25 Cents.
						X


N No. 19000
Carpentersville, Elgin & Aurora Railway Company.
E D Waldron Treasurer.
PUNCH MARKS SHOW DESTINATION AND FARE PAID.

GENEVA	0
ST. CHARLES	5
DUNHAM	10
COLEMAN	15
ELGIN	25

YOU PAID	2 Cents.	5 Cents.	10 Cents.	15 Cents	20 Cents.	25 Cents.
						X

fare. The conductor is provided with a book, each leaf of which consists of stub and passenger's receipt, so folded that the conductor punches both stub and passenger's receipt at the same time. Stub and receipt are exact duplicates of each other, and each pair bears a number. We reproduce herewith the face of both north and south bound receipts. In issuing one the conductor punches the space opposite the starting point and the space opposite the destination. The amount paid is punched at the bottom. The 2-cent space is for childrens' half fare. In starting from Elgin if a passenger has a transfer from the Elgin City Railway it is good for 5 cents worth on the interurban cars, so that if a passenger turns in a transfer the beginning of the trip is designated by a punch opposite "Transfer."

The Toronto Street Railway Company is gainer to the extent of from $12,000 to $15,000 by the recent decision of the privy council of England allowing it a remission of duties paid on imported steel rails.

NOVEL SCHEME TO PREVENT HITCHING ON.

The Sioux City, Ia., Traction Company devised a novel plan to prevent boys hitching onto an advertising car which was run around the streets with a crew of one man. A gas pipe hand hold running around the lower part of the car just high enough for the youngsters to grasp, was connected with the electric circuit so as to give a slight tingling sensation to the hands. It was a success until one boy grasped the rail and at the same time put his bare foot upon the rail of a crossing line just after the street had been sprinkled. He received about 300 volts and fell partially in front of the wheels and only prompt action on the part of the motorman saved him. Though not sufficiently hurt to prevent his running up the street with a yell like a Comanche before his name could be learned, the company has felt obliged to abandon the scheme.

MAIL CARS DISPLACE WAGONS.

President Kilgour, of the Cincinnati Street Railway Company, has succeeded in making such arrangements with the superintendent of the railway mail service that his mail cars will now be able to perform much of the service heretofore rendered by wagons. The company has secured the right of way over several streets, making its crosstown loop complete, and covering all suburban stations. Switches will also be placed so that the cars can run directly to the various railroad stations. This service will do away with twelve of the seventeen mail wagons now in use, and assure an early morning delivery of mail.

LANSING ROAD WINS PAVING CASE.

The history of this interesting case, in brief, is that when the city paved certain streets it fixed a date on which the company must pave between its outside rails with brick. When the time came, recently, the company was unable to sell bonds, owing to the money market, and was barely making operating expenses, so no funds were available from that source. The company, backed by the best citizens and local papers petitioned the council to extend the time. Council refused and secured a mandamus from the supreme court compelling paving on penalty of having franchise annulled. The company then shut down its road. The people finally asserted themselves, and by public pressure forced the council to recede from its position, and service was resumed after two weeks discontinuance. Now the Lansing people are waiting to elect a new council in the spring. Manager Downs is now up, and is to be congratulated on his victory.

The New London, Conn., Street Railway Company is making arrangements to supply several manufacturing plants with electric power.

BROOKLYN NOW STOPS AT FAR CORNER.

By a vote of 17 to 5 the city council of Brooklyn decreed that hereafter cars shall stop to receive and discharge passengers at the far corner. The reasons were the same as experienced in all other cities which have returned to the far corner stop after trying the near. Wading through mud and interference with motorman in leaving by the front door of the car were the two choice disadvantages.

MET IN A FOG.

At Everett, Washington, recently, during a fog which was so thick as to prevent seeing more than a few feet, two cars on one of the outside lines tried the old experiment of endeavoring to pass on a single track. When the fog and wreck was cleared up a photographer secured the results as illustrated. That the wreck was so slight, and that none of the passengers were injured, speaks well for the motormen, both of whom remained at their posts, and by the instant use of their brakes prevented what would otherwise have been a very serious accident.

MET IN A FOG.

PHILADELPHIA ROADS WIN PAVING SUITS.

Decisions in five important cases of interest to street railway companies were recently handed down by the supreme court of Pennsylvania. They define the obligation of the companies in the matter of paving and are the conclusions of actions brought by the city of Philadelphia to recover about $132,000, which the city expended five or six years ago in laying improved pavement in streets occupied by five roads. The decisions practically turn upon the question whether repaving was such a repair as the companies were bound to make under the terms of their charters, though other points were incidentally raised. The decision in each of the five cases is in favor of the road, and the city cannot recover.

ENTERED THROUGH THE WINDOW.

A man from the woods signaled a Bangor, Orono & Oldtown electric car recently and indicated his desire that the car should stop by standing in the middle of the track and waving both arms. It was an open car and he took a seat in the rear with the conductor. Presently he expressed a desire to go inside and inquired how it was done. He was dressed in a heavy fur coat and mittens, and was by no means slender, either; so the conductor said, "Through the window," which was open.

Through the window he went, but his size and the fur coat were too much. He stuck half way, and it was only by a vigorous push from the conductor's foot that he was enabled to land on all fours in the car, 'lowing that he would learn more about street cars before he took another ride in them.

PRIZE AWARDS ON SAN FRANCISCO & SAN MATEO.

The San Francisco & San Mateo Electric Railway has made its first set of prize awards to conductors and motormen for excellence of service for six months. The cash prizes were $40, $25 and $10 for motormen and $12.50, $7.50 and $5 for conductors. The conditions of these awards were the best observance during six months of the rules of the company and the avoidance of accidents. The plan has worked to the great satisfaction of Superintendent S. B. McLenegan, as no accidents have occurred and the rules have been better observed than before.

Burglars entered the office of the Des Moines City Railway a short time since and stole a bucketful of fare envelopes turned in by conductors, and which it was the custom to place between the inner and outer doors of the vault. The fact that the outer door of the vault was not defaced leads to the belief that the work was done by some one familiar with the premises and with the custom of disposing of the envelopes over night. The amount was about $300.

THE NEAL ELECTRIC HEADLIGHT COMPANY.

The record of more than 10,000 headlights placed within the last year on the electric lines of the United States and Canada, is one of which the Neal Headlight Company of Boston, may well "point with pride."

It has been the aim of this company to produce a headlight to withstand the severest service to which it may be put, and one which may give the greatest possible light. These features are combined in their latest type No. 5 electric headlight, which is made of malleable iron casing containing a spun brass, heavily nickel plated, parabolic reflector and adjustable lamp socket. The adjustable lamp socket allows for perfect focusing of the lamp regardless of any irregularity in the size of different makes of incandescent bulbs. The glass holder is of bronze and is so made that all danger of the trolley cord catching upon the lamp is removed.

F. E. HUNTRESS.

The officers of the company are F. E. Huntress, president and treasurer; Geo. N. Towle, vice-president, and Geo. C. Ewing, secretary.

Mr. Huntress is a young man well known among the street railway companies of the east. He is also merchant in iron and steel, and was for two years selling agent of the Laconia Car Company, resigning that position to accept the eastern agency of the Walker Company, of Cleveland. In his business enterprises he has been uniformly successful and is bringing to the front the Neal Electric Headlight Company by his untiring energy and efforts.

George N. Towle, vice-president, is the junior member of the well known banking house of Leland, Towle & Company. This house has handled the financial end of some of the largest and most successful enterprises in the east. Mr. Towle has only recently entered the street railway field, but bringing to it as he does the business methods and the influence of his firm there is no doubt but he will be given a cordial welcome.

Geo. C. Ewing, secretary, was formerly for several years connected with the General Electric Company, and has a large and varied experience in street railway work. He resigned from this company to go into the general supply business on his own account. It is needless to say to those who known him that he has met with great success.

The company has protected its headlights by strong patents, both in this country and abroad.

ELECTRIC BUS LINE FOR LONDON.

An electric bus line is to be started this month in London if the plans of the Electric Omnibus Company are carried out. The storage battery will, of course, be used. The busses will be provided with pneumatic tires. Radcliffe Ward, chief engineer of the company, is authority for the statement that 200 will be put in operation at first. The batteries are to be changed each trip. The busses are to be elegantly fitted up and somewhat more roomy than the present horse vehicles.

VEST POCKET MAP BROOKLYN HEIGHTS RAILROAD.

The Brooklyn Heights Railroad has issued a vest pocket folder map giving a bird's eye view of Brooklyn and surroundings and showing the lines of the company. It is printed in colors and when folded is 3½ by 2 inches. It gives a much better idea than a simple map as it shows the topography of the country. It is the work of H. Milton Kennedy, general passenger agent and is made to pay for itself by the advertising that is on it. The most numerous advertisers are the real estate men and proprietors of pleasure resorts. The first edition was one of 500,000, but this will be followed by one of several million another year. It is an idea that other roads might copy to advantage.

NEW TRANSFER AT CINCINNATI.

Secretary James A. Collins, of the Cincinnati Street Railway, sends us a transfer recently put in use by his company, which is thought to be an improvement on the transfer checks heretofore in use. It is shown herewith. Two punch holes indicate the hour and minute of the morning or afternoon as well as the line upon which it shall be used and the direction on the said line in which it shall be good. In the accompany sample the punch marks indicate that it is good at 7:20 p. m. going east on the cross town line. The time punch on the dark table means that it was afternoon and the other punch through the letter "E," and opposite the word cross town indicates the direction and line upon which it is good. Each conductor has his own separate number printed on the transfer at the right and the serial number for each conductor's transfers is put at the left. A different color is used for each day.

FROM OUR DENVER CORRESPONDENT.

Colorado Springs.—The Rapid Transit Railway Company is overhauling its rolling stock, laying double track and planning a new car house. For its twenty-seven motor cars the company has purchased 30 A1 suspension trucks of the McGuire Manufacturing Company, Chicago. Eighteen of the cars have been equipped with the Steel Motor Company's apparatus, including type D controllers. The remaining nine will probably be equipped with G. E. 800 motors. All the cars have been fitted with fare registers furnished by the Meaker Manufacturing Company. After repairing and repainting the company finds itself the fortunate possessor of forty-three cars, looking as bright and clean as when they came from the builders' shop. The prospects for future traffic are such that the company contemplates building eighteen cars of the combination open and closed type.

Steam railroad competition had to be overcome by the Manitou line. The steam road ran trains every hour. The car line inaugurated a 15-minute service. The steam road cut fares from 25 to 10 cents. The street railway ran its cars faster, and now beats the steam cars by four minutes. Another advantage of the car company is that it deposits its passengers just where they wish to go. The steam road appears to have given up the contest, as it now runs only five trains per day.

Manitou.—The cars operated over the Manitou Street Railway are owned by the Colorado Springs Rapid Transit Railway Company. Its two miles of road runs from the Rio Grande railway station to the Pike's Peak Cog Wheel depot, and is very popular with tourists. A new line up Ute Pass to reach the Grand Caverns and Williams Canon, 1½ miles distant, is proposed.

Pueblo.—The Pueblo Electric Street Railway Company, which has changed hands, will build three new lines and add to its power house and car equipment. A car house is being erected, and the track is being relaid with heavier rails upon new hardwood ties. Since the line changed hands four additional cars have been placed in service and the old ones have been repainted.

Boulder.—H. K. Kendricks, A. C. Jakesel and others are interested in an electric line which will operate over four or five of the main streets. If the line prove profitable it will be extended as an interurban to Marshall and Denver.

Cripple Creek.—Cripple's 10,000 citizens are tired of hill-climbing and are longing for a street railway. A company has been formed to build electric, cable or compressed air lines in Victor, Altman and Cripple Creek. It is known as the Cripple Creek Traction Railway Company. Thirty old Denver horse cars have been obtained for the new line.

Grand Junction.—An electric line fourteen miles in length is to be running by summer. Twelve cars will be purchased, and probably equipped with G. E. 800 motors, as the management favors the General Electric system.

Durango.—"Fruit" day was a red letter one in the history of Durango's railway. The four electric and three horse cars carried full loads.

Denver.—The Denver Tramway Company is rebuilding its old cable cars as trailers and motor cars. It now has 254 cars in splendid condition and the number is being increased. A number of convertible cars have been made into trailers.

The Denver, Lakewood & Golden Railway Company has fitted up an extensive repair shop. A number of 14-seat open cars have been purchased to be rebuilt and equipped for electricity. The company runs every day except Sunday five freight trains, made up, as shown in the sketch, of a motor, a flat and box car.

The Denver City Cable Railway Company has been succeeded by the Denver City Railroad Company, which proposes to repair the cable tracks and build new electric lines.

All lines in the city carried immense crowds during the festival of "Mountain and Plain." One car and trailer of the Tramway in going two miles collected 247 fares.

Woeber Bros. Car Company has sold out its old horse cars, 106 in all. Some have been converted into restaurants at Cripple Creek, some are children's playhouses, some carpentry shops, coal sheds, stalls, etc. They went like hot cakes at prices from $2 to $16.

A CABLE SPLICE.

An unusual entertainment was afforded the passengers on a cable car of the Metropolitan Street Railway of Kansas City recently. Two couples accompanied by a clerical-looking gentleman boarded the car, and one of the party hesitatingly inquired of the conductor if there was any objection to a marriage ceremony being performed there. There was none. And so they were married. They took a wedding tour to the end of the line while the gripman rang the marriage bells.

HOW TO SELL AMERICAN GOODS IN GERMANY.

Our department of state, in a recent consular report, publishes a report from the United States commercial agent at Furth, in which he says:

If the United States manufacturer or merchant would make the same effort to introduce his goods into Germany that the German does to put his goods upon the United States market, there would be far more American products sold in this country than there are to-day. The American seems to think that the merit which his goods possess ought to be sufficient to guarantee for them a market and that it is, therefore, quite unnecessary for him to stir himself at all to find the same.

During the three years which I have had the honor to represent the United States at this post, I have not had a single representative of any American industry to darken the door of my office asking for information that would aid him in his efforts to introduce his goods or in any way to get a foothold here.

I am, however, in almost daily receipt of letters, circulars, or something of the kind from American manufacturers or dealers requesting lists of names and other assistance to enable them to get their goods into this market, and to these I always reply promptly, furnishing all the information at my command, but there the matter seems to end, as I never hear of anything else being done and never see any of these manufacturers here exhibiting their goods or making any personal efforts to introduce the same.

To suppose that consular officers can enter into an active canvass for the introduction and sale of American products, is a very great mistake. They can introduce the manufacturer or his representative, and are willing to do so, but they can hardly act as agent for the introduction of his goods.

Catalogues, circulars, and all the other advertising matter sent here are a clear waste of money. The Germans will not buy without first seeing the goods themselves.

In this district, the leading manufacturing interest is that of looking glass plates, and over $1,000,000 worth of this article is annually exported to the United States; but the sales are effected, not through the instrumentality of letters, circulars, etc., but by the personal efforts of the manufacturers themselves, who go often to the United States and ride the country over, from New York to San Francisco and from St. Paul to New Orleans. Without this personal and persistent effort on the part of the manufacturers here, a considerably less quantity of Bavarian glass would find its way into the American market.

A VALUABLE DREAM.

Last month a street railway was sued for several thousand dollars on a case it had already settled and paid for. The slight difficulty under which the company labored was that the most careful search failed to produce the release. The secretary who had the filing of the releases went home in anything but a joyful frame of mind the night before the trial. At a late hour sleep came to him, but even then the missing release would not down. Toward morning he dreamed he was searching for it, and accidentally came upon the paper misplaced in a bundle of old accounts of little value. At early dawn he hustled down to his office and soon found the package, and sure enough, there was the release—and the country was saved.

The electric mail service recently put into operation at Rochester, N. Y., includes the collection from twenty-four boxes as well as sub-stations, and collectors will deposit mail from other boxes at such points without returning to the main office.

FIVE CENTS DAMAGES ON A TRANSFER SUIT.

In an action for $5,000 brought against the Baltimore City Passenger Railway Company for ejectment from a car for non-payment of fare, it was shown that the plaintiff suffered damages to the amount of five cents. He took a transfer and, according to his testimony, boarded the next car that passed on that line, but the conductor refused to accept the transfer in lieu of fare. It was shown that the plaintiff might have avoided all trouble by paying fare and taking a receipt therefor, and then stating the circumstances at the office of the company.

UNION LOOP WINS.

A recent decision of the Supreme Court of Illinois removes the last of the obstacles in the way of the completion of the Union Elevated Loop in Chicago. The court affirmed the finding of the Appellate Court in the cases in which it was sought by injunction to stop the construction of the loop on the ground that the statutory provisions had not been complied with by filing a petition specifying that the consent of a majority of the property holders affected had been obtained. It is held that the remedy lies in an action for damages.

It is thought that the line may be in operation by February 1.

MOTOR CARS VS. SHIP CANAL.

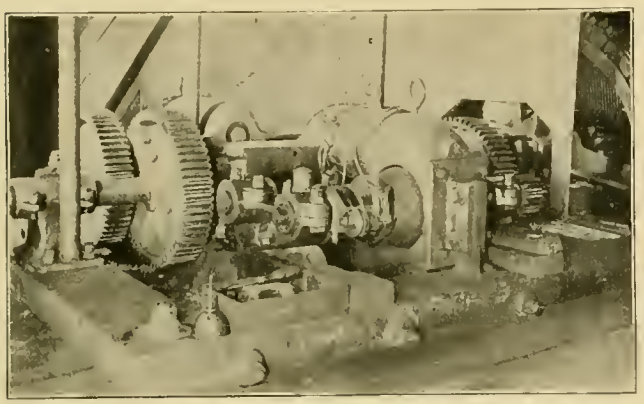
A scheme is being promoted to build an electric road to parallel the Manchester, Eng., ship canal. When the Manchester ship canal was completed and Manchester given an outlet to the sea it was expected that it would take away some business from Liverpool. The plan of the electric road is to unload the ships at Liverpool and haul the freight to Manchester at a rate which will undercut both the ship canal and the railway companies. The ordinary highways are to be used for the right of way. The plan does not appear to have any very wonderful financial possibilities.

INTERURBAN LINES AND CITY TAXES.

The lines outside of a city belonging to a city company cannot be taxed as city property, according to the decision of a recent Iowa case. Although common sense would seem to teach this, it took a law suit before the city of Cedar Rapids found it out. The Cedar Rapids & Marion City Railway operates the city street railway system of Cedar Rapids and also the interurban line to Marion, which runs outside the city. The city took the grounds that the property of the company outside of the city was a part of the city equipment, and attempted to tax it as city property. The courts decided otherwise, however, and the city authorities very sensibly concluded not to carry the fight further.

OLD MOTORS, BUT NOT RETIRED.

In the article by Leo Daft on early electric railway work in Pittsburg, in our October issue, mention was made of the early Bentley-Knight conduit experiments. After the failure of the road some of the old T.-H. motors used there were put into stationary service. Two of them have been in street railway service and regularly



BENTLEY-KNIGHT MOTORS OPERATING MURREY HILL INCLINE AT PITTSBURG.

hauling cars though they have enjoyed more comfortable quarters than most street railway motors have. Their occupation has been the operation of the Murrey Hill incline. This incline is 1,100 feet long. A 1⅛-inch cable is used, and the grade is about 26 per cent. The time of ascent is two minutes and forty seconds. This incline was originally operated by steam, but the change to electricity was made in '93.

DOES WEST END FAVOR THE L?

The directorate and stockholders of the West End road, Boston, are said to be divided as to the policy of the road toward the proposed elevated; and that the board is not a unit on the question. Some hold that the road should co-operate, believing that the surface lines will be the gainer in the long run and get rid of a large amount of long haul travel which will be eventually replaced by short riders. Others feel that the surface system is not only adequate now but for a long time to come, both in service and speed.

TWENTY THOUSAND FOR A LEG.

The Atlantic Avenue Railroad of Brooklyn is loser in an action for damages to the extent of $20,000 for cutting off a boy's leg a year ago. The case was first decided against the company on the day when Governor Morton signed the bill prohibiting appeals from the unanimous decision of the appellate branch of the court, but the company appealed on the ground that the verdict was given a few minutes previous to the signing of the bill. The court of appeals held that the law recognizes no fractional parts of a day and that the case in question was governed by the law.

FAST RUN ON THE A. B. & C.

A special car on the Akron, Bedford & Cleveland recently made a good long distance run from Akron to Cleveland. The time for the 36 miles was 1 hour and 35 minutes, including a stop of 5 minutes at Cuyahoga Falls and 2 minutes at Newburgh, besides the necessarily slow speed inside of Cleveland. But the remarkable part of the run was the 26 miles between Cuyahoga Falls and Newburgh which was made in 40 minutes, or at the rate of 39 miles an hour. As far as we know this is the best long distance run made on an electric interurban road. Who can report one better? This run was made in the night when the voltage was high and the track clear.

HEALTHY GROWTH AT BINGHAMTON.

President G. T. Rogers, of the Binghamton, N. Y., Railroad Company, has compiled a comparative statement of the earnings and operating expenses of his road for the five years ending September 30, which indicates a healthy development of business. The receipts for the last year were nearly 2½ times as great as in 1892, and the percentage of operating expenses to receipts has been reduced from 60 to 56 per cent. The gain in receipts over operating expenses for the quarter ending September 30, 1896, was $3,699.16 over the corresponding period of 1895, and the company now has on hand a surplus of $63,040.37. The statement is exceedingly gratifying to both the stockholders and friends and reflects great credit on the management.

NEW PRESIDENT FOR NEW ORLEANS TRACTION.

James H. Maury, president of the Traction Company, New Orleans, has resigned, and R. M. Walmsley, president of the Louisiana National Bank, has been elected in his place. The New Orleans papers, however, say the resignation of Mr. Maury was in response to a pointed suggestion from the board of directors, that if he did not resign they would do it for him. The current report in New Orleans is that Maury got his company in hot water with the city council and other interests, and that his management had reached a point where a change could no longer be deferred.

When the directors met to wield the ax Mr. Maury was at the Waldorf, in New York, and was so overcome by the news that he proceeded to get himself in such a state of exuberance that it became wearisome to the landlord, who had him arrested. The next morning he was brought up in the police court, where the judge suspended his fine.

Mr. Walmsley, the new president, has been at the head of the Crescent City lines, where his administration was successful. The company will now proceed at once to erect its own power house. Current has until now been purchased from the lighting company.

HALF FARES

Interesting Bits of Information from all Parts of the Country, Boiled Down for Busy Readers.

A compressed air motor, the invention of B. L. Ryder, of San Francisco, is to be tried at Berkeley, Cal.

The value of a dog, killed by a St. Paul street car, is the issue in a case on trial in the municipal court of that city. A justice court awarded $75 on a suit for $100, and the railway company appealed.

The Beaver Valley Traction Company, Beaver Falls, Pa., has acquired control of the College & Grandview Electric Company. The line is about two miles long, and is said to have been paying well.

The Midland Electric Railroad Company of Staten Island, N. Y., is fitting up a party car which will carry 900 colored lamps. The dashboards will have stars and a representation of the American flag in colored lamps.

The Scranton, Pa., Traction Company is putting in a new 700-horse-power engine at its power house, in addition to the 1,200-horse-power of engines now in use. The increase in power is demanded by the increased traffic.

Margaret Canevin was awarded a verdict of $9,000 against the Chicago City Railway for injuries received in alighting from an electric car. The claim was for $50,000 on the ground that the car started before she had time to alight and the fall produced partial paralysis.

The Derby & New Haven Electric Railway Company has applied to the superior court of the state of Connecticut for permission to construct an electric road from New Haven to Derby. This is another case arising under the "parallel road" clause of the electric railroad law.

It is stated that the borax king, F. M. Smith, president of the Oakland, Cal., Consolidated Street Railway Company is negotiating for the purchase of the Highland Park & Fruitvale Railway Company. Proceedings to foreclose a mortgage of $200,000 on the road are now pending.

A train on the Pennsylvania railroad at Alexandria, Va., October 8, struck and knocked from the track an electric car, causing the front truck of the engine to become derailed. The conductor and brakeman were injured slightly. The gates at the crossing were not closed and there was no flagman.

A curious thing is reported as happening in the underground railway of Budapest occasioned by the insufficiency of ventilating apertures in the tunnels. Trains rushing through them compress the air to such an extent that it is said that cars have been lifted almost off the track and passengers nearly suffocated.

The assignee of Jacob Rich, San Jose, Cal., whose affairs are inextricably mixed up with the First Street Railroad, has filed a petition for an order to sell the estate of the insolvent. The road is in the hands of receivers. The petition to oust the receivers and put Riche's assignee in charge of the road has been denied.

A New York man, by name William Fletcher, nearly lost his hand by catching it in the mail slot of a Third avenue mail car. He was attempting to post a letter while the car was in motion and was obliged to run alongside for a block before the car stopped. One finger was crushed so badly that amputation was necessary.

During the progress of a damage suit a Philadelphia lawyer was trying to floor Superintendent MacFayden, of the Chester Traction Company. After a number of specially mean insinuations the attorney asked Mr. MacFayden why he had not attempted to buy him. The reply was instant and silenced the lawyer for a time; "I did not know you were for sale."

In view of the volumes that have been written about the cost of power from Niagara Falls it is interesting to note that the contract of the power company with the Buffalo Railway Company calls for the delivery in Buffalo of the first 1,000-horse-power at the rate of $40 per horse-power per annum and $36 per horse-power for whatever additional amount may be used.

The report of the receiver of the Norfolk & Ocean View Railroad Company, Va., for the six months ending August 31, 1896, gives a detailed account of the receipts and expenditures for the preceding six months, and shows that notwithstanding the hard times, the company has had increased earnings of about 50 per cent over that of the corresponding period of previous years.

Motormen should take care that when running over a dog it does not belong to a lawyer. A hairless animal, belonging to G. W. Howe, a divorce attorney, of Alameda, Cal., was run over and killed, and the owner wants $5,000. The motorman was arrested for cruelty to animals, but he protested that there was no cruelty about it, as the canine was transferred to the after abode of dogs with neatness and dispatch.

The Electrical Engineer, (London) pays something of a compliment to the American street railroad systems in republishing a notice to the effect that the Glasgow Herald has sent a correspondent to this country to describe the chief systems of mechanical traction in use here, accompanied by the statement that the reports of this representative may have a good deal of influence upon the action of the common council of Glasgow.

STREET RAILWAY LAW.

EDITED BY FRANK HUMBOLDT CLARK, ATTORNEY AT LAW, CHICAGO.

Municipality Granting Exclusive Rights to Street Railway:

Municipal corporations have no power to grant exclusive rights to street railway, gas or water companies, except on authority from the legislature, given explicitly and clearly expressed, and in construing charters and statutes conferring upon a municipality the right to provide for these conveniences the authority to grant exclusive privileges will not be implied from the use of general language.

Montgomery, J.—The bill in this case was filed to restrain the defendant, the Detroit Railway, from constructing and operating a street railway in certain streets in the city of Detroit, the complainants claiming to have prior right to construct and operate a street railway in such streets under, and by virtue of, an ordinance of the city. The complainant is the successor to the Detroit City Railway. By an ordinance approved November 24, 1892, the Detroit City Railway was "exclusively authorized to construct and operate railways as herein provided, in and through" (certain named streets) and "through such other streets and avenues in said city as may from time to time be fixed and determined by a vote of the common council of said city of Detroit and assented to in writing by said corporation, * * and provided the corporation does not assent in writing within thirty days after the passage of said resolution of the council ordering the formation of new routes, then the common council may give the privilege to any other company to build such route, and such other company shall have the right to cross any track of rails already laid at their own cost and expense."

By an ordinance passed in November, 1879, the rights conferred and the obligations imposed by the ordinance of 1862 were continued until November 14, 1909.

Complainant's predecessor, the Detroit City Railway, was organized under the train railway act and at the date of the adoption of the first ordinance in 1862, section 34 of that act provided that "all companies or corporations formed for such purposes shall have the exclusive right to use and operate any street railways constructed, owned or held by them, provided that no such company or corporation shall be authorized to construct a railway under this act through the streets of any town or city without the consent of the municipal authorities of such town or city and terms and conditions as said authorities may from time to time prescribe." In 1867 this section was amended by adding another proviso, which reads as follows: "Provided further, that after such consent shall have been given and accepted by the company or corporation to which the same is granted, such authorities shall make no regulations or conditions whereby the rights or franchises so granted shall be destroyed or unreasonably impaired, or such company or corporation be deprived of the right of constructing, maintaining and operating such railway in the street in such consent or grant name, pursuant to the terms thereof."

The question first in importance is whether the common council of the city had the inherent power or derived the power under this statute, to grant the privilege not only to build such lines as were specifically designated in the ordinance of 1862, but to couple with this grant the grant of the first right to build any other lines which the city authorities might in the future elect to have constructed, on the same terms as were provided with reference to the lines specifically provided for in the ordinance of 1862.

It is apparent from the reading of the statute that there was no express, and direct authority conferred in terms upon the common council to grant an exclusive privilege to occupy the streets of the city for street railway purposes. An attempt has been made to distinguish the right of election sought to be conferred by the ordinance, from a grant of an exclusive privilege, on the ground that the municipality reserves to itself the right to grant the privilege to other companies to construct street railways in case the first company shall elect not to build in designated streets. But while the ordinance does not in terms purport to be a direct grant of an exclusive use in all the streets of the city, it is a grant of an exclusive privilege which the company is given the option to avail itself of or not at its pleasure. * * * *

It is, however, strenuously urged upon us that in view of the general policy of self-government, which is evidenced by the provisions of the constitution quoted and the decisions of this court, the grant to the municipality by the legislature should receive a construction more liberal than if it were a delegation of power which the legislature could itself exercise, it being urged in the same connection that the legislature could not grant an easement or right to use a particular street for street railway purposes. Without affirming or denying the latter proposition, we do not think the precedent contention would be solved by a determination of that question. It is clear that whatever power the local authorities have to grant an easement in the street for street railway purposes is derived from the legislature, whether the streets of a city be directly controlled by the legislature in such sense that a direct grant may be made or whether the trust be one which may be executed through certain local authorities only; the reasons for construing a grant of authority with strictness are equally forcible. Whether such a franchise be the subject of a grant by the state direct or by the local authorities, the power over the streets is a trust, and the authority to grant an exclusive right ought not to be implied any more because the legislature has not reserved to itself or does not originally possess the power to grant an easement in a particular street.

The question whether such power is reserved to the legislature seems not to have been allowed to control the rule that the power to grant an exclusive franchise or right will not be inferred. In Parkhurst v. Salem, 32 Pac. Rep. 304, the Court states the question as follows: "The precise question then is, had the city of Salem, under grant of an exclusive power to permit, allow and regulate the laying down of tracks for street cars upon such terms and conditions as it may prescribe, the power to grant, for a term of years, the exclusive right to occupy its streets with street railways." The Court said: "It is true this power, so far as granted, is by the charter made exclusive; that is, the city alone has the power to permit, allow and regulate the use of its streets for the purposes indicated; to this extent it is endowed with complete legislative sovereignty. That sovereignty has no limit so long as the city keeps within the power granted." Yet notwithstanding this, it was held that as the power to grant an exclusive privilege was not expressly conferred, it was not to be implied.

Indeed the argument in favor of the necessity that the power to grant exclusive privileges be lodged somewhere

would apply with substantially the same force in case of a delegation of power which the legislature may exercise directly, as in a case where the power is conferred upon the local authorities as the only means of gaining an easement. Certainly the difference is only in degree, as during the recess of the legislature the power would in the former case as in the latter be in the local authorities.

One very solid ground upon which the cases which hold that authority of a municipality to grant an exclusive privilege is not to be inferred in the absence of an express grant rests, is that a franchise of that nature is in restraint of free competition. It does not detract from the force of these authorities that in some of the cases there has been stated a further reason that the legislature will not be presumed to have delegated its own authority except to the extent that such delegation of power is clearly expressed. In State v. Gas Light Co., 18 O. St. 262, it was said:

"We have referred to these authorities as our justification for saying that when a franchise so far in restraint of trade, and so pregnant with public mischief and private hardship, is drawn in question, and is claimed to be derived through a municipal ordinance or contract, the power of the authorities to pass the ordinance or enter into the conaract, must be free from doubt. It must be found on the statute book, in express terms, or arise from the terms of the statue by implication so direct and necessary as to render it equally clear."

(Supreme Court of Michigan, Detroit, Citizens' Street Railway Company vs. Detroit Railway. 28 Chicago Legal News, 817.)

Granting Franchise to Street Railway Company—Car License.

A city is not limited to a simple denial or granting of a franchise to a street railroad company; but can prescribe the terms upon which such privilege shall be conditioned, if conferred; and a street railway accepting an ordinance conferring such franchise is bound by the terms thereof so long as it enjoys the privileges conferred therein.

Exacting a license fee is lawful and proper by a city from a street car company for running cars in the streets, and where the company accepts and exercises a franchise from the city under an ordinance providing for a license fee for each car run, such acceptance constitutes a valid contract to pay the license fees as imposed.

(Appellate Court of Illinois Byrne vs. Chicago General Railway Company and the City of Chicago, 1 Chicago Law Journal Weekly 533.)

Paving and Repairing Street Charter Obligation—When Duty Arises—Changing Pavement.

1. Under a provision in the charter of a street railway company requiring the company to "keep said tracks, and for the space of two feet beyond the outer rail thereof, and also the space between the tracks, at all times well paved and in good order," the duty of paving and keeping in repair arises only when the rails are laid and tracks constructed on some appreciable part of its line of road.

2. Merely laying cross-ties and sleepers in streets along which it is proposed subsequently to construct its tracks, the work being done with the consent of the municipal authorities while the latter are engaged in paving the street, the company not being ready to construct its tracks and having under its charter considerable time in which to do so, is not sufficient to charge the company with the cost of the work.

3. Where, however, the municipal authorities, who are clothed by law with entire control of the streets and avenues, determine to change the character of the pavement in certain streets in which the company has constructed its tracks and is operating its road, the obligation imposed by the charter will arise; and upon the failure of the company, on being notified, to do the work itself, the municipal authorities may cause the work to be done and charge the cost thereof to the company.

4. And the fact that the substituted pavement is unfit for the purposes of the company and has to be removed and replaced by the company with a pavement similar to the former pavement at its own expense, will not relieve the company from the obligation to pay for the work done on its behalf by the municipal authorities.

5. The operations of the Board of Public Works, so far as they could be the source of resultant right or liability, have been so frequently recognized by Congress that they must be held to have been validated to the same extent as if they had been authorized in the first instance, although in fact unauthorized.

(Court of Appeals, District of Columbia. The District of Columbia vs. the Metropolitan Railroad Co. Washington Law Reporter, Sept. 3, 1896.)

Riding on Platform of Car—Injury by Sudden Jerk—Duty of Company.

Plaintiff, a passenger on an electric car, went out upon the platform before the car reached his destination, so as to be in readiness to alight. On reaching a point midway between the two crossings the car gave a sudden jerk and threw him from the platform. In an action brought to recover for injuries received.

Held, that while plaintiff was not guilty of negligence in taking the position he did, he could not, by so doing, impose upon the company the obligation of instantly stopping the car, or not accelerating its motion.

(Supreme Court of Michigan. Etson vs. Fort Wayne & Belle Isle Railway Co. 29 Chicago Legal News 9.)

[NOTE. In a similar case it is held that for a passenger upon a street car to signal for the car to stop, then to walk to the position on the car from which he expects to alight and to stand there waiting for the car to stop, is so common that such conduct cannot be said to be a lack of ordinary care. Whether the passenger thus standing is negligent in failing to hold to something to prevent his falling is a question of fact for the jury. North Chicago Street Railroad Co. vs. Southwick, 1 Chicago Law Journal Weekly 436. Ed.]

Property of Street Railway Entitled to Protection—Laying Tracks in Streets—Tracks of Two Companies in Same Street.

Property in a street railway is entitled to protection against wrong doing to the same extent as other property.

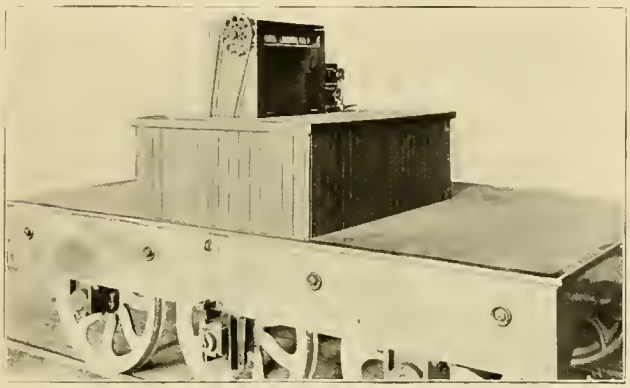
Street railways do not merely for their own accomodation have any right to lay tracks in the public streets, as this is a privilege extended to them for the accommodation and benefit of the public and their undertaking to serve it.

Where two companies have been given the right to lay tracks and operate cars thereon in the same street, each is bound in the exercise of such right, not to interfere with the paramount right of the public to the use of such street, and neither company can be allowed to interfere with the right of the other.

(Appellate Court of Illinois. Chicago General Railway Company vs. West Chicago Street Railway Company, 1 Chicago Law Journal Weekly 518.)

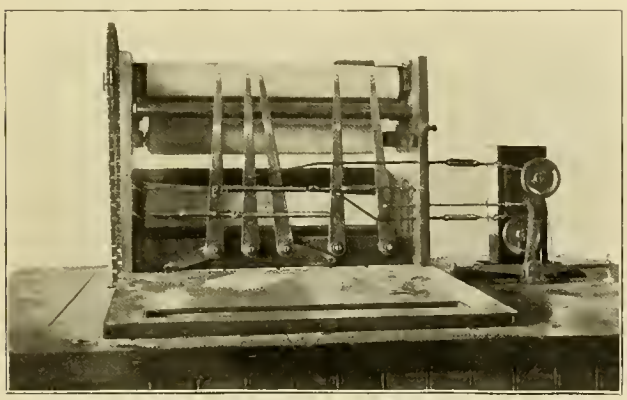
DYNAMOMETER CAR.

The dynamometer car which M. K. Bowen, superintendent of the Chicago City Railway described in his paper at the St. Louis convention, was on exhibition in convention hall, but for the benefit of many who were not there and others who failed to notice it when there, we reproduce two photo-



CHICAGO CITY RAILWAY DYNAMOMETER CAR.

graphs of it. It is the design of W. G. Price, of the City Railway. The weight of the car is carried rigidly on four wheels. The middle pair furnish the records. The latter are allowed a free up and down motion, and this up and down motion is transmitted to recording pointers by a wire cord from the box of each wheel. For the purpose of recording the gage the middle pair of wheels are not mounted on the same axle, but each wheel is held out against the track so as to record variations in gage. This is



RECORDING POINTERS ON DYNAMOMETER CAR.

done by the second pointer from the left end. The dynamometer pull is recorded by the pointer second from the right end. A fixed pointer traces the zero line for the dynamometer record. The other records do not need zero lines. The pointer at the right end is for variation in height of rails. It is connected to the balance show on the right. This balance has instead of weights at the end two plungers dipping into two mercury cups. These cups are of course connected by a pipe so that the mercury in the two will remain level. The revolving drum which carries the paper is geared to one of the truck axles by a light bicycle sprocket chain.

PECULIARITIES OF WHEEL WEAR.

Although wheel wear is not as much of a mystery as it was several years ago and while much has been written about it there are still some unexplained results in practice. Before dealing with a few peculiarities which have come under the observation of one of the REVIEW staff in his travels among master mechanics we will sum up in a few words some of the facts that have been established in the last few years regarding the cause of sharp flanges due to one flange crowding the rail.

One of the first reasons assigned as the cause of sharp flanges was that of trucks being out of square. While this was found to be the cause in some cases it would not account for the majority of such troubles, and master mechanics had to look further.

This led up to the discovery of what is probably the most prolific cause of sharp flanges, namely, wheels not mated, or in other words, of unequal circumference. When this was discovered it was a great step in advance and it is now a a well established practice to measure the circumference of wheels with a steel tape before putting onto the axles and to put only those of practically the same diameter on the same axle. Contrary to theory the wheels as they came from the foundry vary considerably in size and among a small lot of wheels it is sometimes difficult to find two of even approximately the same diameter. Notwithstanding the fact that on steam roads (and on most large electric roads) the importance of mating wheels by their circumference measurements has been fully established, many small roads do not seem to realize the necessity of this. Some substitute diameter for circumference measurements but this latter practice has been shown to be unreliable.

Another cause of sharp flanges not very common but very puzzling when it does occur is that due to the gage centers of the wheels not corresponding to the centers of the axles. In such case the error is usually due to a miscalculation as to the proper distance between the wheel and the end of the axle. One wheel will be pressed on at a wrong distance from the end and as the other wheel will be pressed to gage with reference to it and no attention paid to how far it is from its end of the axle the error slips by unnoticed.

Several months ago on the Calumet road of Chicago it was observed that all the equipments turned in for worn out wheels showed sharp flanges on the wheel next to the gear. This seemed to be something new and since learning of it we have made inquiries among a number of roads to find if there was not some hitherto undiscovered cause of sharp flanges. The inquiry so far has given mainly negative results.

On the Missouri Railroad of St. Louis it is found that nearly all sharp flanges are on the wheel next to the gear but this is not invariably the case.

On the Union Depot Railroad of St. Louis the majority wear sharp on the gear side but not all.

On the West Chicago Street Railroad sharp flanges are found on both ends indiscriminately. The same is true on the Chicago City Railway, the West End Street Railway of Boston and the Milwaukee Electric Railway. Thus the evidence is abundant that the sharp flange is not always on the gear side but the frequency of this phenomenon on some roads is not accounted for.

On the South Covington & Cincinnati Street Railway it is found that there is no rule as to the side of the motor the

sharp flange is on but that the wheels on lines where the cars change ends every trip wear evenly without sharp flanges. Where cars are always run the same direction without changing ends the wheels on one side wear sharp. This is thought to be caused by the condition of the track due to the fact that the rails nearest the curb settle more than the inside ones. On such lines too, it is found that the rear wheels wear faster than the front, because of the tendency of passengers to crowd the rear end.

RECENT STEEL MOTOR APPARATUS.

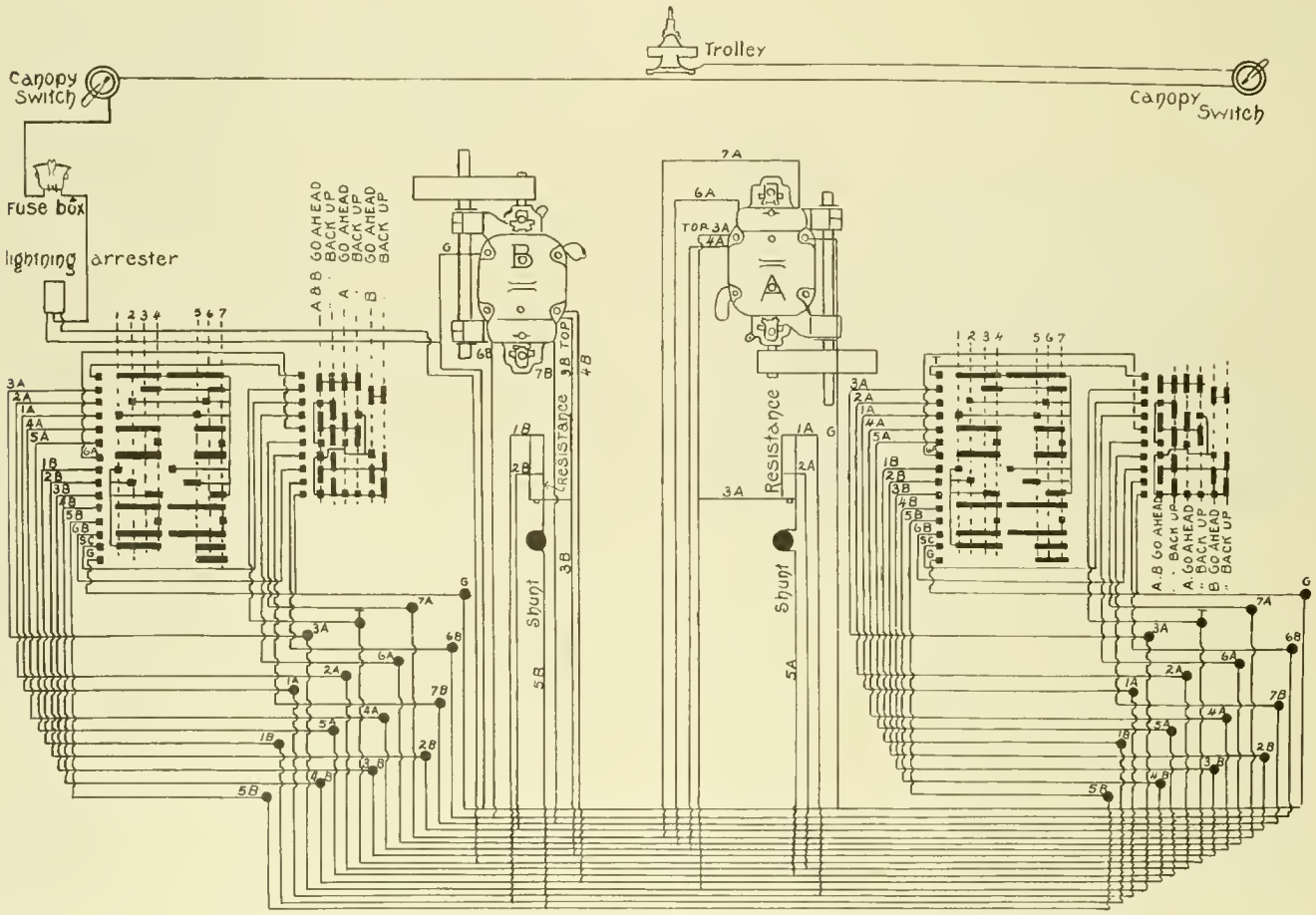
The Steel Motor Company, of Johnstown, Pa., has been kept so busy filling orders for the past few months that it will be of interest to inquire into the construction of apparatus that creates such a demand.

The most novel piece of equipment recently brought out by this company is a controller in which the cut outs for disconnecting a disabled motor are incorporated in the reverse switch, thereby doing away with the necessity of opening the controller to cut out one motor. The reverse switch consequently has six points, two for both motors and two for each individual motor. Two principal types of controller are made. The type "C3" is made for ordinary street car motors. It can be operated as a series multiple or as a multiple controller. It takes a space 15 inches wide, 9 inches deep and 38 inches high. The main cylinder has 15 contacts and the reverse cylinder 10. Guards of vulcabeston prevent an arc forming between the contacts. The finger contact board is placed at the side of the controller. When in position the fingers are separated from each other by arc guards. Both fingers and arc guards are readily thrown back when inspecting or repairing. The reverse switch is made interlocking in the ordinary manner, so that motors can not be reversed without first turning off the controller and the reverse handle can not be taken off without turning off and locking the controller. Besides these features a movement of the controller to a point shown on the index changes the controller to a plain multiple controller and prevents its operation beyond the fourth notch. Fuse boxes (one for each motor) are contained in the controller.

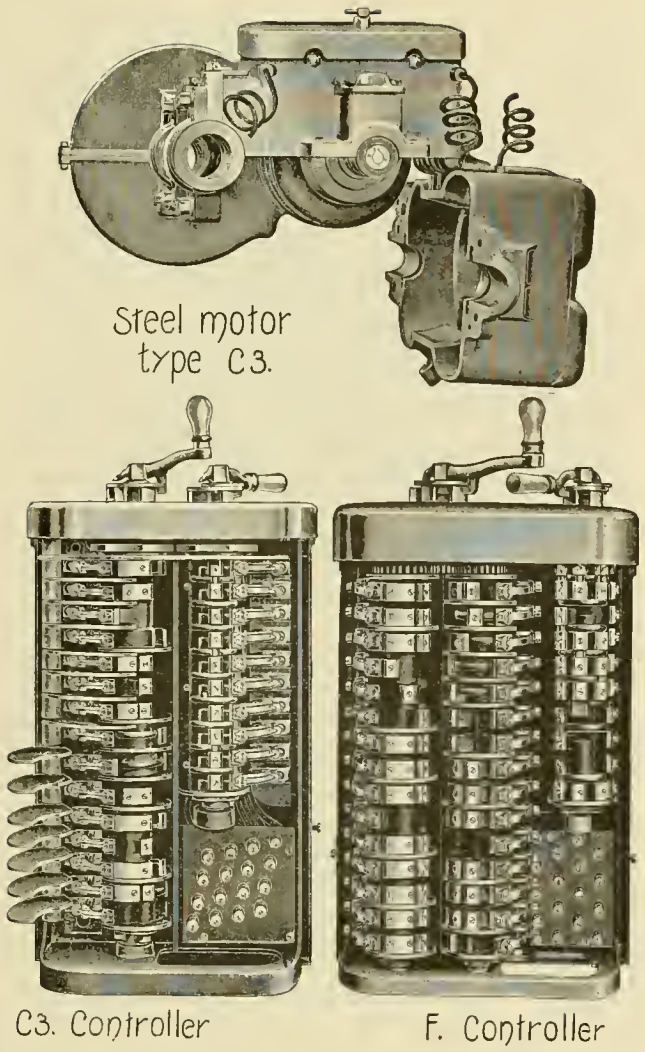
The "F" controller is of series-multiple type designed for use with very heavy motors, and with four motors to the car. Two controlling cylinders moved simultaneously by means of pinions and gears are employed, so connected that one pair of motors is operated by each cylinder. These cylinders are practically the same design as the type "C3," but with contacts of greater area and carrying capacity. The combined reverse and cut out switch is the same as on the "C3" with the exception of being heavier and of greater capacity.

The wiring of the "C3" controller is shown herewith.

The "C3" motor is rated at 30 horse-power and will exert a draw bar pull of 1,000 pounds continually, without heating or sparking at the brushes. The frame or body of the motor is of low carbon cast steel. The axle and armature bearings are contained in the same casting. The frame is parted through the center and suspended so as to remove the armature from below. Openings are provided between armature bearings and motor frame through which all surplus grease



CAR WIRING WITH STEEL MOTOR COMPANY'S C_3 CONTROLLER.



falls to the ground. A malleable iron door of ample dimensions affords access to the commutator and brushes. Drum armatures are used on 3⅞-inch hammered steel shafts. The shaft is tapered for both armature and pinion and the bearings are of good length. Flanges are keyed to the shaft and run in open spaces between motor frame and bearings. These prevent end motion and are an extra safeguard to prevent oil and moisture from entering the motor frame. The windings are laid in slots well below the surface.

The balance of the slot is filled with a hardwood strip. The heads of the armature are covered with canvass, thoroughly varnished, and a brass ventilated shield is placed on the head opposite the commutator. The motor is four pole, but only two field coils are used (top and bottom) and the other poles are consequent.

This company manufactures 25, 30, 35, 40, 50 and 60 horse-power motors, suited to all classes of electric railway service.

NEW PROJECTS IN ENGLAND.

During 1896 fifteen applications were made to the English Board of Trade for permission to do new construction work, of which eleven were successful, and nearly all of these had clauses in their orders permitting electric traction to be used if thought desirable. It will be noticed that many of these are municipal enterprises. Heretofore municipalities were not allowed to operate their own lines but were required to lease them. This year they were freed from this restriction and they can now operate their own lines. This is considered a great step in advance, and much greater activity in the introduction of mechanical traction is now expected. Fifteen applications representing an investment of $2,500,000 were made. Of these the eleven successful projects were as follows:

Aberdeen District.
City of Blackpool.
Blyth and Cowpen.
Bristol.
City of Dover.
City of Hull.
City of Manchester.
Oldham, Ashton-under-Lyne, Hyde and District Electric.
City of Plymouth.
Potteries Extension.
Swansea (Constitution Hill).

ENGINEERS INSPECT THE NEW ROCK ISLAND BRIDGE.

The Western Society of Engineers, of Chicago, to the number of 250, including the ladies, inspected the fine new steel bridge over the Mississippi at Rock Island, on November 7 and 8. The Rock Island road tendered a special train and entertainment, and the return trip was a record breaker, the 181 miles being covered in three and a half hours, including five stops to let off passengers. The bridge is, 850 feet long, built by the Phœnix Bridge Company, designed and superintended by Ralph Modjeski, of Chicago. The draw is swung by electric motors installed by Geo. P. Nichols &

THE NEW ROCK ISLAND BRIDGE LOOKING WEST.

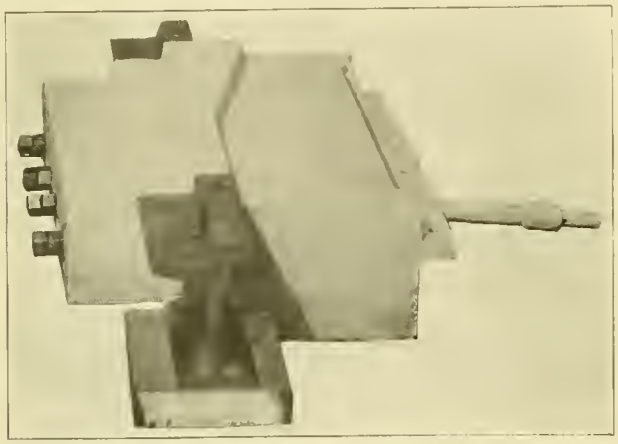
Bro., of Chicago, and is one of the finest electric installations in the world. The society also visited the Arsenal and inspected the new water power development. A dinner was given by C. E. Schauffler, Chicago manager of the Empire Cement Company, whose cement is used in the extensive government work on the Island.

The new bridge is double decked, the Rock Island tracks occupying the upper, and the roadway and street railway the lower deck. The superstructure weighs over 5,000 tons and cost $6,800,000.

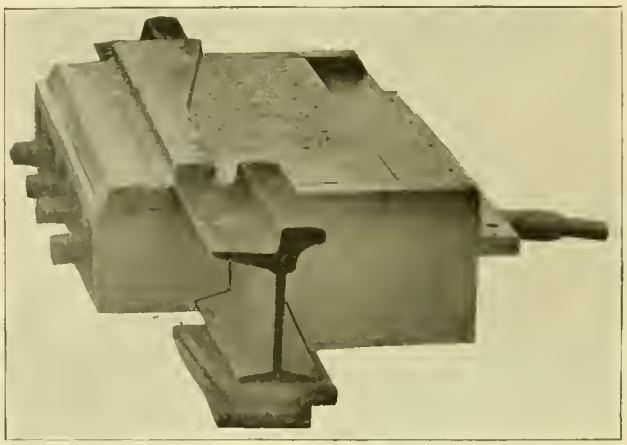
Lady passengers persist in using the smoking cars which are run at intervals on the Union Traction lines in Philadelphia, in winter, even though informed by conductors when boarding the cars.

NEW GIBBS DERAILING SWITCH.

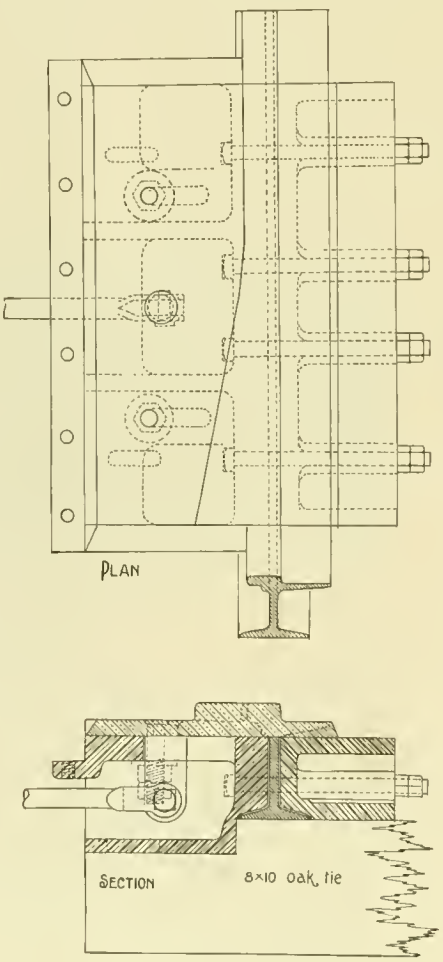
George Gibbs, mechanical engineer of the Chicago, Milwaukee & St. Paul Railway, who invented the interlocking apparatus now in use for the protection of many electric railway grade crossings with steam roads, has devised a derailing switch to be used in place of the skotch block heretofore employed for preventing cars from running onto a crossing when signals are set against them. The skotch block is liable to badly smash a car, and a derailing switch of many of the ordinary forms introduces a piece of special work which weakens the track so as to make rough riding, and is liable, furthermore, to clog with dirt, ice and snow. In the new switch of Mr. Gibbs' design only the head of the rail is removed to make place for the switch, leaving intact the base and web, and consequently there is practically no weakening at that point, and the presence of the switch is not noticeable from the riding of the cars. It consists of two cast iron boxes, 26 inches long, bolted to each side of the rail, on top of which slides the derail switch. When the switch is closed it offers an uninterrupted rail head to the passage of the car wheels. The sliding plate has beveled edges, so that it does not catch dirt in its operation. Another advantage is that it extends very little below the bottom of the rail, and consequently does not require any foundation, nor does it form a pocket for collecting water. It can, of course, also be used at drawbridge approaches, and made interlocking with the draw; in fact, Mr. Gibbs has worked out the details of such an arrangement, which is to be thoroughly commended.



GIBBS DERAILING SWITCH CLOSED.



GIBBS DERAILING SWITCH OPEN.



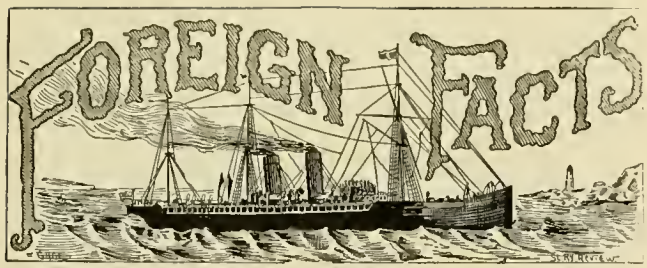
GIBBS DERAILING SWITCH.

HARD LINES VS. MUNICIPAL DICTATION.

Franchise grabbers who are willing to promise anything, and others who fail to stand out for what may mean defeat or victory in days to come can learn a lesson from Seattle. The Third street and Suburban Railway operates 8 miles connecting the city hall and Ravenna park. It was built in three sections each under a different franchise. One provision called for cars at 20 minutes headway. Owing to poor business the schedule has been lengthened to 30 minutes on a part of the line, and the public insist on their pound of flesh, and want the shorter schedule over the entire system. The receiver opens his books and shows that to grant the request means an additional loss to the road of $450 per month, and he is now before his city council seeking relief. It will seldom be found absolutely necessary and is never desirable to bind a proposed line to a given headway. The rate of fare is all right, and the hours for first and last cars are not so bad; but to accept a fixed schedule should never be done except as a last resort in most desperate cases. A similar experience occurred a few weeks ago on a Michigan road, whose franchise called for a 10-minute schedule, and which was forced to ask city council to let it down to 20 minutes for a year or two.

AN IOWA PAVING CASE.

In a case of the Oskaloosa Street Railway & Land Company, appellant, vs. the City of Oskaloosa, Iowa, the Supreme court of that state held that under the recent acts of the general assembly cities of the first class and those organized under special charters have no right to assess street railway companies for paving between the rails on streets which have been paved before their occupancy by the company, but the right to assess applies only to streets to be paved.



Electricity is proposed as a substitute for steam on the railways connecting Turin with Gassino and Moncalieri, Italy.

Dover, England, proposes to employ automobile vehicles for street scavenging in place of the present horse-drawn carts.

Vienna engineers have been granted a franchise to construct an electric railway between Arnau and Koniginhof, Austria.

Johannesburg, South Africa, has granted a concession for a complete electric railway system with branches to populous suburbs.

Storage battery traction is undergoing trial at the Hague. The cells are of the "Eclair" type, made by a Belgian company.

Ostend and Middlekerke, Belgium, will be connected by electric railway, the executors of the late Col. North having determined to carry out his plans.

Glasgow's street railway committee has voted to send the manager and engineer-in-chief of the city lines to the United States to learn the latest and best electric railway practice.

Manchester local authorities have been asked to permit the construction of electric railways. The promoters are represented by Andrews & Butterworth, surveyors, and Joseph Sampson, solicitor.

Electric locomotives will be tried on the lines running from St. Petersburg to Moscow and Warsaw, Russia. The experiment is said to be in charge of the Ministry of Ways and Communications.

Gas traction has been reported on by a committee of the Plymouth, Eng., borough council. It was resolved that the use of gas engines as motive power on the cars of the corporation was undesirable.

The Blackburn, Eng., Tramways Company has voted to equip with electricity those portions of its lines now operated with horses. The city has offered to build the plant and furnish current at 6 cents per car mile.

Portsmouth, Eng., proposes to purchase its street car lines for $300,000 and equip with electricity at a cost of $450,000. The municipality will continue to own the system, leasing it to an operating company at a profit.

Workmen's cars, with 2 cents fare for 4 miles ride, have been running over the Kingswood line of the Bristol Tramway Company. Where two cars sufficed at the beginning, seven are now in use. Electricity, with its low operating expense, has made it possible to place a ride within the means of a great many men who formerly walked.

November 15 was the day on which self-propelling vehicles were given the freedom of the streets by the law recently enacted by Parliament. Inventors are prepared with all manner of conveyances, electric, petroleum, steam and gas motor driven.

A curious burglary took place recently at Douglas, Isle of Man. The office of the Douglas Southern Electric Tramway Company was broken into and the safe, weighing about 350 pounds, removed and thrown over the cliff. It fell about 30 feet upon a ledge and was broken in the fall. The contents taken amounted to about $200. The safe was then pushed along the cliff and landed at last in nine feet of water.

The cable system was used on the new Isle of Man railway because the severe grades made electric wheel traction out of the question. The Isle of Man Tramways & Electric Power Company is quite satisfied with the electric lines previously constructed. The Douglas Cable Railway is double track, of 3 feet gage, and 1½ miles in legth. A very fine steel cable 3½ inches in circumference was supplied by George Cradock & Co., Wakefield.

To construct two tunnels between Earl's Court and the Mansion House, London, the sum of $4,866,000 will be advanced to the Metropolitan District Railway by the shareholders of that company. The interest on this loan is 4 per cent, but none is to be paid until a dividend of 5 per cent is first declared on the existing $7,000,000 of preferred stock. After the existing $11,000,000 of common stock has received a dividend of 5 per cent, the subscribers to the loan are to receive a bonus of one-half the profits.

The City of Birmingham Tramways Company has acquired the plant of the Birmingham Central Tramways Company, at a cost of $2,500,000, with a view to its extension and equipment with the cable, or electric systems. The new company is a strong one financially, and is directed by James Ross, manager of the Montreal Street Railway, and W. McKenzie, president of the Toronto Railway Company. Local interests are fairly represented on the directory by the chairman of the Birmingham Electric Supply and the Birmingham Central Tramways Companies.

RAPID TRANSIT SCHEME REVIVED.

The rapid transit scheme for underground transportation in New York has been revived by plans presented the commission by Chief Engineer Barclay, who has shaded the expense down to $30,000,000—on paper. The estimate is divided as follows: Construction, $20,048,000; real estate, $3,000,000; contingencies, $4,900,000; interest, $1,200,000. The down-town portion calls for a 4-track road; with east and west branches at Forty-second street. A schedule of 21 minutes is promised between city hall and 135th street.

With the heavy losses from the elevated to the surface lines ever since the cable was installed, and with the disappointing results of underground operation in London, the plan is far from being an assured success from a financial standpoint; especially as the estimate is probably too low.

THE "CAST-WELD" JOINT AS A CONDUCTOR.

By Harold P. Brown.

About two years ago a "cast-weld" joint was brought to the Edison laboratory for a test of its electrical conductivity.

The makers had claimed that the joint was a better conductor than the rail itself and that a bond was therefore entirely unnecessary.

Unfortunately the rail had been cut off close to one end of the joint so that the working resistance of the rail could not be determined. A cut through both rail and joint had been made near the other end, evidently with a reciprocating saw, since the metal of the rail was broomed into the cast iron, making what appeared to be a very perfect mechanical contact. This was made evident when a small bit of the iron was cut away near the edge of rail since a perceptible outward burr was found on the steel. Careful examination showed that the cast iron was not welded to the steel, as iron

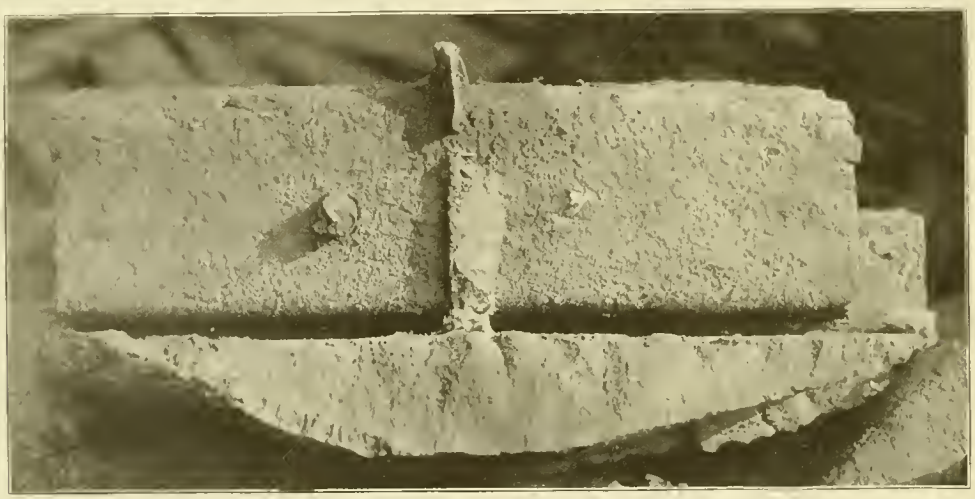


FIGURE 1—BROKEN "CAST-WELD JOINT" AS REMOVED FROM TRACK.

chips were easily removed from contact with the rail. It was evident, however, that the outer surface of the cast iron had chilled while the interior was soft, thus insuring a most excellent mechanical joint which would be difficult to break. As one end of the joint was missing it was decided to measure the drop from end of projecting rail to the iron of the joint. This would represent, of course, but one-half of the total drop of the joint.

The end of the rail was filed bright and a heavy lug bolted on.

On the other end two holes were drilled and tapped in the cast iron to which the other terminal was fastened. Small holes were drilled in both rail and iron for the voltmeter terminals. All of the contacts were amalgamated, and the wire connecting the rotary transformer, the rail, the joint and the shunt of the Weston ammeter had a section of 1,500,000 circular mils. The current was varied from 100 to 1,500 amperes, and the drop in pressure measured with a Weston instrument reading to 0.01 of a volt. Tabulation of the readings showed that the total drop of the entire joint would be practically the same as that of a very good bond of No. 0000 copper. The joint was then buried for about two months when the measurements were repeated. It was very evident that a thin film of iron oxide had been deposited between the contact surfaces of rail and joint as the resistance had doubled. Since that time I have watched with great interest the behavior of several miles of these joints on old track of 60-pound girder rails in Newark, N. J., where the copper bonds were left in place. The mechanical performance of the joints has been excellent. It is hard to find the joints and the track is in fine condition. It is evident, however, that there is sufficient clearance between rail and cast iron to allow for expansion and contraction, for very few of the joints have broken in winter, while during the heat of last summer when the electric welded rail in Brooklyn was crooked and badly distorted, these rails showed no signs of twisting. The reason for this is plain. When the molten iron is poured around the steel the latter expands; as it is in the center it is the last to cool, and therefore remains expanded until the cast iron has set. When it resumes its former size there is a minute clearance left, through which water soon finds its way, leaving a high resistance coating of iron oxide which grows thicker as time passes. After about a year's use the drop on these joints at Newark was taken with a Weston instrument reading to 0.0001 of a volt. The average of several hundred measurements, excluding broken joints, showed that the resistance of a foot of rail in each joint, *which was also bonded with copper*, was fully five times the resistance of a foot of the same rail between the joints.

And the current carried by these rails was very much less than it should have been had the rails been continuous. After making these tests I saw a report of a test in Milwaukee of a few joints whose resistance was said to be lower than the rail. I therefore had my Weston instruments recalibrated and took them to St. Louis to see what I could learn there. On Monday, October 19th., I measured over 50 joints on two lines of double track in the vicinity of one of the power houses.

One of the 8 rails was dead; the others were carrying respectively 40, 90, 40, 40, 90, 180, 120 amperes. The station ammeters showed a very much greater load than the sum of these amounts. Though the rails were quite wet at the time of these tests and the conductivity of the joints was thus greatly increased, the drop of one foot of rail at the joint

FIGURE 2—SECTION OF OLD "CAST-WELD" JOINT SHOWING CLEARANCE BETWEEN IRON AND RAIL.

was from 4 to 6 times the drop of one foot of rail between joints.

The following is the average of over 50 measurements, not counting open joints, on cast-weld joints upon 85-pound rails in use about one year, with very wet track.

40 amperes	.012 volts drop.
80 amperes	.03 volts drop.
90 amperes	.042 volts drop.
100 amperes	.050 volts drop.
150 amperes	.060 volts drop.
180 amperes	.064 volts drop.
200 amperes	.096 volts drop.

The joints were magnificent mechanically, making the smoothest riding track I have ever seen. In looking about the city during the convention, I found several broken joints that were being removed from the track and was unable to find any traces of "welding." I also examined two large scrap heaps of these joints in different parts of the city and made a number of photographs which show clearly that a cast-weld joint should be carefully bonded. One of these photographs, Figure 1, shows the prints of both rails.

A. C. Thompson, electrical engineer of the Missouri Railroad Company had loaned two joints belonging to his road, which were given a prominent place in the "cast weld" exhibit at the St. Louis convention.

At the close of the session Mr. Thompson sent these to the power house of his road and they were carefully tested with the following results:

New joint of 63-pound rail belonging to the Missouri Railroad Company, and taken from the exhibit of the "cast-weld" joint at the St. Louis convention. Never been in use nor exposed to weather. Tested at power house of the Missouri Railroad Company, in presence of A. C. Thompson, E. E., on Oct. 23, 1896.

100 amperes	0.005 volts drop.
200 amperes	.010 volts drop.
300 amperes	.012 volts drop.
400 amperes	.016 volts drop.
500 amperes	.019 volts drop.
600 amperes	.022 volts drop.
700 amperes	.024 volts drop.
800 amperes	.029 volts drop.

Joint of 78-pound rail taken from track of Missouri Railroad Company, after one and one half days use on account of breakage of rail through contraction. This joint was also used in the exhibit of the "cast-weld" joint. Tested Oct. 23 as above:

100 amperes	0.006 volts drop.
200 amperes	.012 volts drop.
300 amperes	.014 volts drop.
400 amperes	.016 volts drop.
500 amperes	.020 volts drop.
600 amperes	.024 volts drop.
700 amperes	.028 volts drop.

To show how far from perfection this result was, a hole 7/8 of an inch in diameter and 3/4 of an inch deep was bored at junction of rails so that half of the hole was in each rail with the cast iron of the joint forming the bottom. The hole was bored diagonally downwards from angle of the tread and the tram of the rail; it was quickly amalgamated by the Edison process and a plug of the plastic alloy slipped in. The current could then pass from one rail to the next through the plastic alloy. In service the hole would penetrate 1/8 of an inch deeper and be sealed on top by a soft iron plug held in place by slightly burring the metal of rail around the edge of hole.

The result of this inexpensive bonding is shown below:

100 amperes	0.001 volts drop.
200 amperes	.002 volts drop.
300 amperes	.004 volts drop.
400 amperes	.006 volts drop.
500 amperes	.008 volts drop.
600 amperes	.010 volts drop.
700 amperes	.012 volts drop.
800 amperes	.014 volts drop.
900 amperes	.016 volts drop.

The drop of one foot of the rail at the joint was then made practically the same up to 300 amperes as the drop of one foot of rail outside of the joint.

Weston instruments used; shunt ammeter reading to 1,500 amperes; volt meter reading 0.01 per degee and special milli-voltmeter reading 0.0001 per degree; calibrated Oct. 16, 1896, by the Weston Company.

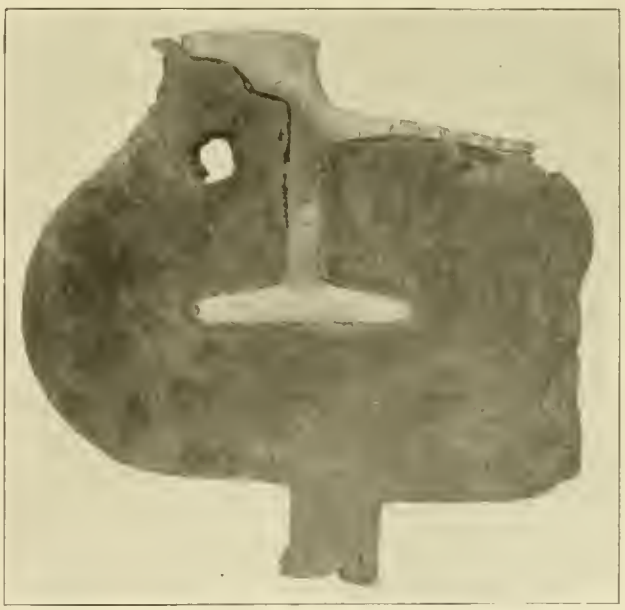


FIGURE 3—ANOTHER SECTION OF JOINT SHOWN IN FIGURE 2.

These tests showed that a new cast-weld joint, which had never been exposed to water, was about equal in conductivity to two No. 0000 copper bonds; that at the end of a year's use the conductivity even when rail and earth were wet, had dropped to about one-tenth what it was at the start, not counting open joints; and that a little plug of Mr. Edison's plastic material applied from surface of the road at very slight expense, would cut the loss down to one-sixth at the start, or to one-fiftieth after a year's use. On my way home from the convention, I stopped at another city where thousands of these joints are used and are giving magnificent results, mechanically. But it is found absolutely necessary to use a liberal amount of copper bonding in order to operate the road. Here I found a number of sections of the joint similar to the ones shown in Figure 2, and Figure 3, in which the line of demarcation and corrosion between steel and iron is very clearly shown. On one side the chilled edge of the iron is seen to be about one inch in depth, though this not clearly shown in the cuts.

TROLLEY CANNOT YET PARALLEL STEAM IN CONNECTICUT.

The Superior Court of Connecticut has decided against the proposed trolley line between Hartford and New Britain, and a permanent injunction under penalty of $10,000 entered.

This is one of the most interesting cases in a long time, and so far as electric lines in that state are concerned, the most important. Two years ago the Central Railway & Electric Company, of New Britain, undertook the promotion of an interurban to Hartford. The first-named city has 22,000, and the latter over 60,000, while between are vilages and densely settled country. The road was to carry passengers, express and freight. The N. Y., N. H. & H., which had long controlled the legislature, had previously secured the enactment of a law under which public necessity arising from absence of service was necessary to the granting of rights to construct new lines.

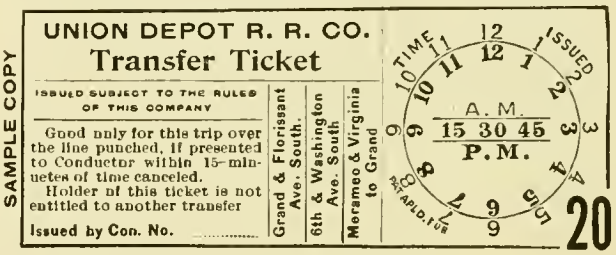
As the proposed new road closely paralleled two steam roads, the project was defeated in the lower courts in April, 1895. But another effort was made, in which the Hartford Street Railway, the Newington Tramway, and the Central, of New Britain, undertook to fill gaps and connect the three systems over a purchased right of way, each company to extend its tracks toward the other, thus effecting a continuous track. On November 10, Judge Wheeler handed down his decision that the three electric companies would exceed their chartered rights in making the proposed extensions; and that the operation of the through line would cause a loss in passenger and freight traffic to the New England steam road, and the decree was thereupon entered.

There would seem little hope in trying to carry the case any higher in the courts, and as shown in these columns two years ago, the only relief to the people seems to be in new legislation. With a steam railroad legislature this is impossible, and until the present incumbents can be unseated and their places filled with others, matters must be expected to continue as before.

Connecticut should be one of the best states for interurban roads, and yet there are but 128 miles. While the day of electric interurbans may be deferred, it cannot be defeated, for it is sure to come. As previously pointed out by the REVIEW, the dog in the manager policy which has been the policy of the consolidated steam lines will be their Waterloo. In the very near future they must either furnish this electric service themselves, or wake up some day to the new competition. Frequent service at low rates is bound to come, and when it does it will be in a trolley car.

WOLF TRANSFER TICKET.

Our illustration is a sufficient explanation of the above named transfer slip, which is reproduced in actual size. The tickets are bound in books and torn out as issued. The figure in the lower right-hand corner is the day of the month, and by using a different colored paper stock for succeeding months, use of old tickets is guarded against.



WOLF TRANSFER TICKET.

CABLE RELICS EXCAVATED.

Recent excavations on Springfield avenue, in Newark, N. J., unearthed a vault 40 feet long, 18 feet wide and 8 feet high, in which were massive cast iron wheels and shafting weighing many tons. The presence of these curiosities had been long since forgotten, and proved to be a part of the Rasmussen cable system which was first tried on West Lake street, Chicago, and afterward on a larger scale in Newark, where a quarter of a million dollars were sunk in the dismal failure. The Rasmussen scheme was in using a very small conduit only a few inches square, and a cable on which were placed at intervals of 18 inches, buttons made of malleable iron. A fork depended from the car through the slot and straddled the button taking the car along when the fork "caught on." The driving drums, curve and terminal sheaves had sprocket holes for the reception of the buttons, but as the cable stretched the result was very few of the buttons were found to engage the holes. The vault found the other day was a terminal vault. Rasmussen lost both his fortune and his mind in his endeavors to make the scheme a success, which was promoted at the time when the cable system seemed the coming power, and the Rasmussen conduit cost only about one-tenth that of the approved cable conduits which have stood the test of time.

Conductors of the Pleasant Valley Traction Co., Pittsburg, who do not wear beards, are required to shave twice each week; also to wear white shirts, collars and black neckties when on duty.

So many delays have occurred to street car operation in Pittsburg, from steam shovels and other heavy objects, the city has restricted the removal of such to the hours between midnight and 5 a. m.

THE MIS-USE OF SAND

By H. S. Cooper, Superintendent Schenectady Street Railway.

It might sound better to say the "use of sand" but this is not a minority report and the vast majority of misusers would feel aggrieved at the preference so shown in the title.

The proper method of using sand is a burning question—as may be inferred from the remarks of any street railway superintendent when a "flatted" wheel comes in—and the question needs ventilation instead of extinguishment—a rather paradoxical thing by the way.

It is necessary that we have sand both on our rails when slippery and in our dealings with sand-box salesmen, and the only question is "how shall we apply it in the case of the rails?" Under the usual conditions of these rails in a paved street in icy, showery, misty, foggy, slushy or snowy weather, we bless the frictional qualities of sand; but the next day when it is fine and the cars go "bangety-bang, bangety-bang, bangety-bang" down the street, we revoke all the blessings, forgetting that it has not been the use, but the mis-use of our gritty coadjutor that has caused the trouble.

Should sand be used from sand-boxes on the car and under control of the motorman, gripman or driver?

Should it be used from a sand-car running regularly over the tracks?

Should it be used by a man—or men—regularly patrolling the tracks and sanding the necessary places by hand?

These are the points of dispute, and taken from the single standpoint of wheel, and track wear, the last named method is for reasons to be shown undoubtedly the best. But unluckily for the wheels and track there are other points in operating, and such slight things as passengers and schedules and accidents have to be taken into consideration. It is for the benefit of these that the car sand-box was invented, is still being invented and will probably keep on being invented as long as there is enough sand left on earth to fill a "working model!" And to this much invented and indispensable article is due nearly all the blame for the mis-use of sand, for its capabilities in this respect are infinite. It has—to inventors—many endearing defects; it never carries enough sand for one "bad-rail" trip, although on every other trip in the same day it has been slopping over with sand; it is always mysteriously empty when its non-contents are most needed; it will, according to the inventor and salesman, swallow and disgorge bricks, paving-stones, cordwood or bar-iron, and yet it invariably chokes up on a hair, a straw, or a large grain of sand; it absorbs all the moisture in the vicinity and transforms its contents into a block of concrete; its discharge pipe is extraordinarily sensitive to temperature, is the first thing in town to freeze up and has a wonderful attraction for mud and slush, which rush from all directions into its open mouth and choke it up; it will not put sand on the tread of the rail, especially at curves and turnouts, but takes insane delight in filling up the guard-groove or the switch points or emptying itself on the pavement outside of the rails, or between them, or all over the corporate limits; it is liable to become "possessed of a devil" at critical times, especially when a director is on board, or the superintendent is showing a visiting superintendent the road; it delights in levers, chains, rods, springs and straps which get out of order just when needed and stay so until they, or it, are not needed and then suddenly repair themselves, bringing discredit on reputable motormen and grey hairs on the inspector; it never fits; never did fit and never will fit, in any car that ever was built, but always demands that a car be fitted to it; it is "the devil and the deep-sea" combined in one, and yet we must have it or an equivalent, and it (and its inventors and makers) knows that fact! We cannot do without it—but we can limit its diabolism by having our tracks sanded by a sand-car or a sand-man and by making it a law, of the "Mede-and-Persian" type, "that sand from the car sand-box must never be used to stop a car except to avoid an accident." Where the modern type of electric motor is used, a corrollary should be added "that it should not be used even then to retard the car by skidding the wheels, but to enable the wheels to obtain greater traction, or good traction, when the motor is reversed as it should instantly be."

The sand-car is an expensive article when everything is taken into consideration, and while it has some advantages over the car sand-box, it has the serious disadvantage of not being "on the spot" when its contents are needed. Five minutes' heavy traffic will obliterate its work and nullify its effect, and it may be miles or minutes away, while a car devoid of sand-box is running amuck among vehicles, the general public and the quarterly dividends. Hand sanding on all dangerous track is much safer and surer, and when to the duty of sander on bad days is added the duties of track-greaser, switch and curve-cleaner, or salter, and general patroller on fine days, the cost per car mile is made very small. Added to the above is the fact that with present apparatus, hand-sanding is the only way by which the right amount of sand (a very little) can be put in the right place (on the tread of the rail). Add also to the above, the fact that by thus placing the right quantity in the right place, the waste of sand is reduced to a minimum, as is the wear, the normal wear, of the wheel flanges and tread and the rail and fittings.

But even the sand-man cannot be everywhere at once; omniscience, in the use of sand, may be obtained for a dollar to a dollar and a half per day, but omnipresence has not yet come down to that rate, and in consequence there will be slippery oases in the desert of sandy track where a car must be stopped, and stopped at once, and our box-on-the-car friend is the only thing that is left, unless it gets to cutting up some of its "didoes," and then the company is!

Seriously speaking, the car sand-box, while even in its

present most improved form a very imperfect thing, is a very necessary adjunct on a car, its value being mainly its "being there." We may object to flat wheels, but we object still more to accidents and to the damages accruing therefrom. While it may be a feather in the managerial cap to say at the end of the year, "No flat wheels and a few accidents," it is much better to be able to say, "No accidents from lack of sand, but a few flat wheels!" The experience and observation of the writer, on all sorts and conditions of tracks, has been that the best method to enable a manager to make the latter remark is to supplement a hand-sanded track with (1) good sand-boxes, (2) well taken care of and (3) properly used. "Ah!" some manager will say, "we can train our motormen, gripmen or drivers to give us the third item, we can trust our inspectors to give us the second, but where, oh where shall we get the first."

My dear manager, don't even dream the last part of that speech, or you will wake up in the morning to find your front yard in a worse fix than Major McKinley's, for in it will be an army of sand-box salesmen and inventors, each with a "working model" and a box of sand. Don't run, don't hide, don't get your gun. Sit down and write out the follwing: "On deposit of one thousand dollars, to be forfeited on failure to fulfill in one year's working test, any one of the following conditions (myself to be the only and absolute judge), I will allow any person to place on one of my company's cars (at the placer's own expense), a full set of four sand boxes; another one thousand dollars, to be deposited in cash, to cover the inevitable damage, delay and nuisance incidental to the placing. Conditions as follows:

"1. Box must be of size and shape to fit under present seats of car without injury to or rebuilding of same, and must still be able to hold one-half bushel of sand.

"2. The delivery machinery must be of such shape and size as not to interfere with any of the machinery at present under the car, nor must its introduction or attachment necessitate the cutting or weakening of any timbers, braces or supports; nor the making of any opening in the floor of over six inches in diameter, or of greater number than one such opening to each box.

"3. The arrangements for the delivery must be controlled absolutely and freely by one foot of the motorman, gripman or driver, and must be so arranged that he can sand either rail or both rails with same motion of foot. The foot attachment must make no machinery on or above the floor of the platform, beyond a button or two buttons similar to a footgong button, and which must be similarly removable at will from the platform.

"4. It must feed positively, fine, coarse, pebbly, damp or lumpy sand, or mixed salt and sand.

"5. It must feed positively on the 'ball' or 'tread' of the rail on both straight or curved track or on turnouts, and must feed close up to the front of the wheels.

"6. The delivery tube or spout must never choke up with anything that is fed to it from the box, nor must it be possible for its mouth or delivery opening to become frozen or choked up with mud, slush, snow, or ice.

"7. It must be free from all complications of springs, chains, straps, or anything that will be liable to warp, rot or 'give out' if exposed to oil, dirt or dampness, or that if it breaks or gives out, will become entangled in any of the other machinery of the car.

"8. It must be made of good and substantial materials, must be easily 'got at', with ordinary tools, and must be repairable with tools, labor, appliances and material usually kept in a car barn repair shop.

"9. It must indicate at all times the quantity of sand in it, and must be so arranged that it will sound an alarm whenever the quantity of sand in it reaches a certain minimum.

"10. It must be free of patent suits, and must not cost over forty dollars per set of four boxes, complete and installed.

"(Signed) NOAH A. GOODTHING.
"General Manager."

Send the hired girl out to post this on the outside of the front door, eat your breakfast with an easy mind, and you can then go to your office unmolested, for the front yard will be full of silence, trampled grass and little piles of nice, fine, clean, dry sand.

SENATOR E. S. GOODRICH.

Street railway men are in great demand these days to fill public offices; certainly no other calling furnishes a better business training for the duty of conducting the business of public affairs. Among the several managers honored at the last election, is E. S. Goodrich, for many years president of the Hartford Street Railway, who will now take his seat in the senate of Connecticut, to which he was elected by a big majority. Senator Goodrich was serenaded by 300 of his men, the address of congratulation being made by J. A. Crilly, one of the employes. Mr. Goodrich has been a successful manager for many years, and his friends in the American Street Railway Association will be pleased to learn of his political success.

E. S. GOODRICH.

THE LAUSANNE TRAMWAY.

The road at Lausanne, Switzerland, has several novelties that will interest American readers. Switzerland, has in fact, been distinguishing itself in electric railway matters recently, as it has the honor of having the only alternating current electric railway in the world, at Lugano. The most novel thing about the Lausanne tramways is the fact that direct connected gas engines are used to drive the generators at the power station. Each of the two engines is of 130-horse-power and runs 160 revolutions per minute. The engine fly-wheel weighs six tons. The dynamos are Thury six pole. These machines can be run either as shunt or compound dynamos and have starting resistances in the main circuit so that they can be run as motors off the storage batteries for starting the gas engines. The battery, which is used as a station auxiliary, is designed to give 350 amperes, but can for a few minutes give as much as 400.

The road is very hilly and has one grade of 11.3 per cent, 900 feet long. A safety brake is provided, consisting of a piece of toothed iron which is pressed down by powerful springs against a wooden rack rail laid next to the tram rail.

The Glasgow, Scotland, municipality has purchased the car lines of Govan, a suburb.

KEEPING CAR MILEAGE RECORDS.

One of the changes that electric traction has brought is the necessity for keeping accurate account of car mileage. True, a road can easily be operated without any account of mileage whatever, but there are few managers so slovenly and careless in their stewardship that they fail to keep records as guides to economy. The accuracy with which these mileage records are kept varies on different roads, but the tendency undoubtedly is toward more accurate records, as it is becoming more and more realized that if records are worth keeping at all they are worth keeping well. There was a time when simply a record of the total mileage run per day on the entire road was as much as a progressive manager thought of keeping. This was often kept in a very rough way, and was useful only in figuring the expenses per car mile at the end of the month or year. Then came the necessity of keeping track of the mileage of the various parts of an equipment, such as wheels, gears, pinions, armatures and trolley wheels. This required the mileage of each individual car in detail. The methods in use are well illustrated by the practice of the following roads.

AURORA STREET RAILWAY.

D. A. Belden, general manager has both conductors and motormen turn in reports as to number of trips. The car mileage is usually figured from the latter. Individual car mileage is kept for the purpose of recording the life in miles of wheels, gears, armatures, etc. Statements of operating expenses, earnings, etc., are based on car mileage, and for this reason care is taken to keep the records very accurate.

MADISON, (WIS.) CITY RAILWAY.

George H. Shaw, superintendent, takes great care with mileage records, and first had the entire line measured with steel tape to get the exact distance. The regular cars all make the same number of trips each day. The mileage is taken from motormen's reports. In cases of extra and relief cars the reports state the number of full trips and parts of trips; and the distances from the car house and different turning points on the road being known, it is easy to get at the exact mileage. Time lost for any reason, by any or all of the cars, is kept track of in figuring mileage. The car mileage is used for estimating the rental of power, and also for keeping track of the wear of the wheels.

THE ROCHESTER RAILWAY.

F. O. Rusling, in the course of a discussion at the New York State Street Railway Association, stated that on his road the mileage record is kept from motormen's cards. Every line in the city is figured closely as to its length, and each trip is known, as it is reported on the motorman's card as he turns it in at night. The motormen that are taking cars from the different barns to the repair shop make a note of that on a special card for that purpose. This makes a complete and very nearly perfect system.

CHAMPAIGN, ILL.

B. F. Harris, Jr., general manager, has adopted a blank which conductors fill every day, stating the number of each car he has had during the day, the hour at which he took and left it, the condition it was in and the number of trips or half trips he made. This is all charged up against each car, so that the exact total and individual mileage is known. In putting in new wheels, axles, armatures, etc., they are marked and the car barn foreman keeps a written report of the service obtained from them.

LACROSSE CITY RAILWAY.

Peter Valier, superintendent, reports a system somewhat different from other roads; due to peculiar local conditions. All cars in the system meet at one point, at which is a transfer office and a transfer clerk. This clerk puts down the number of trips and time schedule maintained by each car every day. At the end of the month it is necessary only to foot up the daily records of each car as shown in the mileage book.

THE SCHUYLKILL TRACTION COMPANY,

of which E. W. Ash is superintendent, employs for the purpose a conductor's trip sheet, in which the conductor not only gives full details of financial transactions for each trip, but the starting and arriving time, the point each trip started and ended, and the mileage made by the car each trip. From this report entries are made on a book at the office, which among other things shows the daily, monthly and yearly record of each car on one page.

EVERETT, (WASH.)

W. D. Ray, general manager of the Everett Railway & Lighting Company, recommends the use of a mileage chart or table for saving time in figuring the car mileage on each division. The chart used on his road contained all the divisions of the road and showed the exact distance traversed by a car in making one to fifty trips for each division and also the distance between all principal points. Such a table can be used very rapidly and is by all means to be recommended not only as a labor saving device, but as an aid to accuracy.

FOOLED THE CONDUCTOR.

A recent dodge for beating, not the company, but the conductor, was worked by a well dressed woman, as follows: When asked for her fare she tendered a ten dollar bill, saying it was the smallest she had, which the conductor could not change and handed back to her. He skirmished around and got the requisite change from other passengers, and returning handed it to the woman, who handed him a bill folded, which the conductor thrust into his pocket without looking at it. The woman soon left the car. When the bill was unfolded and examined it proved to be one dollar, and the fare collector was just nine dollars out.

BRISTOL MAY SUPPLY POWER FOR THE TRAMWAY.

Current for the two lines now operated electrically by the Bristol Tramway Company is generated by the company's own plant. In view of the probable conversion of the remaining lines to electricity, the municipality is taking steps to preserve its monopoly of electric power supply, more especially as the economy of operation of the city's lighting plant would be subserved by a day load. It is proposed to install four 500-horse-power generators.

Judge Campbell, of San Francisco, has decided that it is a misdemeanor for a passenger to give a transfer ticket away.

FIGURE 1—STEP UP TRANSFORMERS AT NIAGARA.

TRANSFORMERS FOR THE NIAGARA FALLS-BUFFALO TRANSMISSION.

We publish elsewhere in this issue a description of the transmission from Niagara Falls to Buffalo for the Buffalo Railway. The accompanying engravings show the transformers, both rotary and static, used at each end of the line. These are all the work of the General Electric Company. Figure 1 shows the two 1,250-horse-power step up transformers at Niagara. These are located in a transformer house across the canal from the power house, and are placed over an air-tight chamber. Each has a capacity of 935 kilowatts and stands 94 inches high on a base 64 by 56 inches. The weight of each is 25,000 pounds. They are cooled by driving a blast of cold air up through the core and coils. The blast is furnished by a large blower driven by a 5-horse-power motor. In these transformers the two phase current generated by the dynamos in the power house at 2,200 volts is changed to a three phase current of 11,000 volts pressure. This high pressure current is led to three switches on a marble board, each switch being separated by a marble barrier about 1 inch thick to prevent arcing from switch to switch

FIGURE 2—STATIC TRANSFORMERS AT BUFFALO.

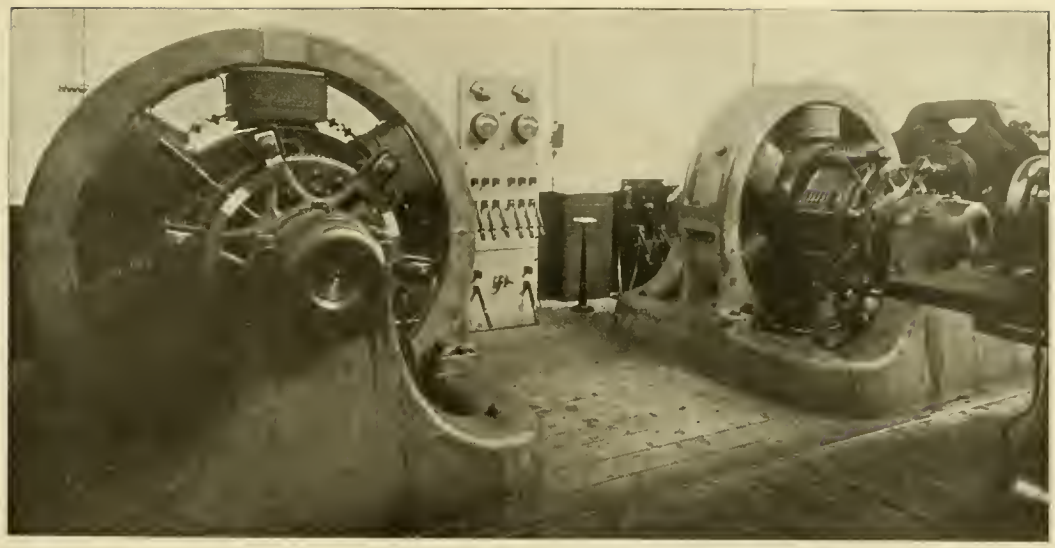


FIGURE 3—ROTARY TRANSFORMERS AT BUFFALO.

at the high pressure used. At the Buffalo transformer house in the rear of the Buffalo Railway power house there are three transformers (see Figure 2), two of which are in use and the third in reserve. Each weighs 7,000 pounds and is 82 inches high with a base measurement of 47 by 36 inches. In the step down transformers the pressure is reduced from 10,700 to 370 volts. They are cooled by an air blast as at Niagara. From the Buffalo transformer house the 370-volt three phase current is fed to two 500-horse-power rotary transformers (shown in Figure 3), which feed into the railway bus bars at 500 volts. These converters may be started either by the alternating current from Niagara or the direct current from the railway bus bars.

The lightning arresters are of the Wirt non-arcing cylinder type. They consist of strips of marble on which are mounted eleven cylinders, giving an air gap space of $\frac{1}{32}$ inch for each 1,000 volts, with allowance for 25 per cent rise in potential. In the action of the arrester the large metal cylinders serve to chill the arc so that on the reversal of the alternating current the arc is extinguished. In order to limit the current on short circuit a solid graphite rod is used to give a non-inductive resistance. The arresters are similar to those used in the Big Cottonwood transmission at Salt Lake City, where they have proved effective in protecting the machinery.

CALCUTTA WANTS TROLLEYS.

Calcutta is waking up and wants her 19 miles of tracks, with 1,000 horses and 186 cars, converted to the trolley. That the change will be of incalculable benefit and convenience there can be no doubt. The present system is known as the Calcutta Tramways Company, and was incorporated in 1880, under a concession of 21 years, at the expiration of which the city may purchase the road. As the present charter runs out so soon, 1901, it is proposed to form a new corporation, to be called the Indian Electric Company, and which shall do both a railway and lighting business. The new company would have 21 years to run, but would lease the present road until 1901. It is proposed that the city shall assist the enterprise by a concession of 15,000 rupees; rental shall be remitted for a term of 13 years.

Indian Engineering opposes this grant and objects to the combination of light and railway. The objection, does not, however, appear to be at all well taken, for the lighting and railway plants can all be under one roof, with one corps of men instead of two, and great economies thus effected; and as the present tramway uses up 91.86 per cent of its earnings in operating its lines, the proposed concession would not be at all unreasonable. The city could even well afford to double the grant, if by so doing, it could speedily secure the change from horses to trolley.

Another feature, which, under the new company should receive large patronage, would be the use of small electric motors to work the punkas, and for operating light machinery of all kinds. The combination of the light and tramway work in Calcutta should be a very desirable one. Calcutta has now about 800,000 population, while its present tramway service is greatly inferior to any town of 50,000 in the United States. With electricity great improvements can be made. Charles Akers, of Calcutta, is the secretary and resident manager of the present company.

WANTED: BICYCLE HOLDER ON STREET CARS.

Quite a number of managers are looking for, or experimenting on their own account, with a view to adopting some convenient device for carrying wheels on the outside of cars. This seems to be especially desired in those cities where there are long, steep hills with the riding territory at the top or bottom. We illustrated some months since the scheme of hooks on outside of the cars at Butte, Montana. There the city is away up on the top of the mountain and the good wheel roads down in the valley. In San Francisco the order is reversed, with the choice riding streets on the high plateau, to reach which the wheelman has to push his vehicle up long steep hills. General manager Vining is looking for a good, simple device to take care of the bicycles. Here's a chance for some ambitious inventor.

Stewart Speddy, of Southport, Eng., has planned an electric railway to connect the town with Lytham.

In the Power House

This department is devoted to the construction and operation of electric railway power houses. Correspondence from practical men is specially invited. Both the users and makers of power house appliances, are expected to give their views and experiences on subjects within the range of the department.

The Stockton (Cal.) Electric Railroad is being operated by a gas engine of the Otto type, supplied with natural gas. California is one of the most promising fields for the gas engine; at least that part of the state where natural gas can be obtained.

* * *

The cable plant at Mason and Washington streets, San Francisco, was recently shut down several hours by the bursting of a steam pipe. Accidents of this nature seem to be the most frequent cause of breakdowns in power plants of late.

* * *

The gas engine installed in the power house of the Lancaster (O.) Street Railway has been operating the road satisfactorily for some time now, according to W. F. Kelly, of Columbus, who has charge of the road. It has stood the test of some unusually heavy traffic and the regulation is reported to be fully equal to that of the best steam engines.

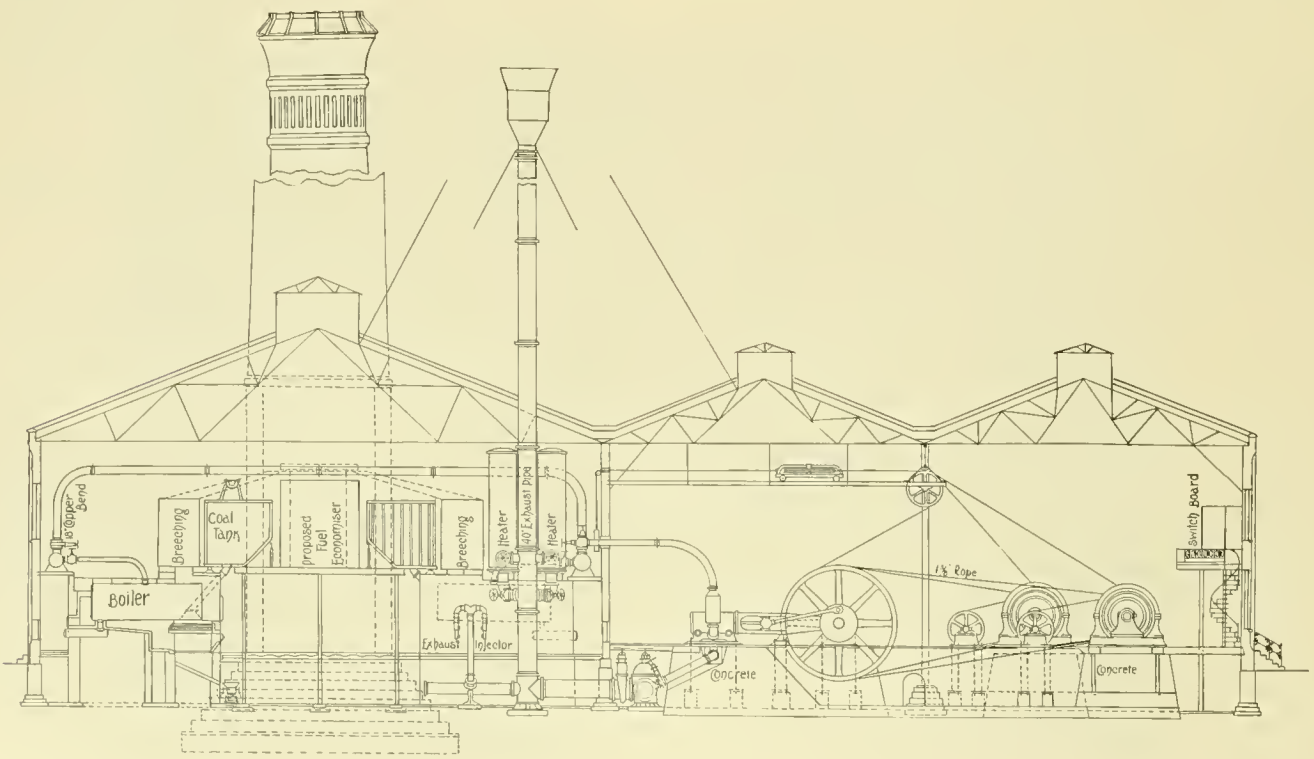
* * *

An English steam engineer who has noticed that with a certain water, gage glasses waste away where they enter the top fitting and are surrounded by steam, hung some in a boiler for six weeks and noted the loss in weight. Plain glass hung in water lost 2.7 per cent and a plain glass hung in the steam space lost 2 per cent. This seems strange considering the fact that it is the upper end of the gage that is eaten away.

* * *

Chicago City Railway New Power House.

In our issue of last July we made brief mention of the plans of the Chicago City Railway for its new power house at Forty-ninth street and Oakley avenue, and we are now able to present further details of this immense undertaking, which is being carried out under the supervision of Robert J. Hill, chief engineer. It is the largest railway power house building in the world and in horse-power capacity is equal to any yet planned—having a rated output at the switchboard of 11,528 horse-power. The great size of building, however, is due partly to the fact that rope drive is used in place of the now usual practice of direct connection. The building is 209 by 266½ feet. The boiler room is 99 by 266 and the engine room 110 by 266. The walls rise 40 feet above the ground and the roof is of the type and arrangement indicated in the plans. On account of the size and height of the building it was made a steel frame structure similar to modern office buildings. As the general arrange-

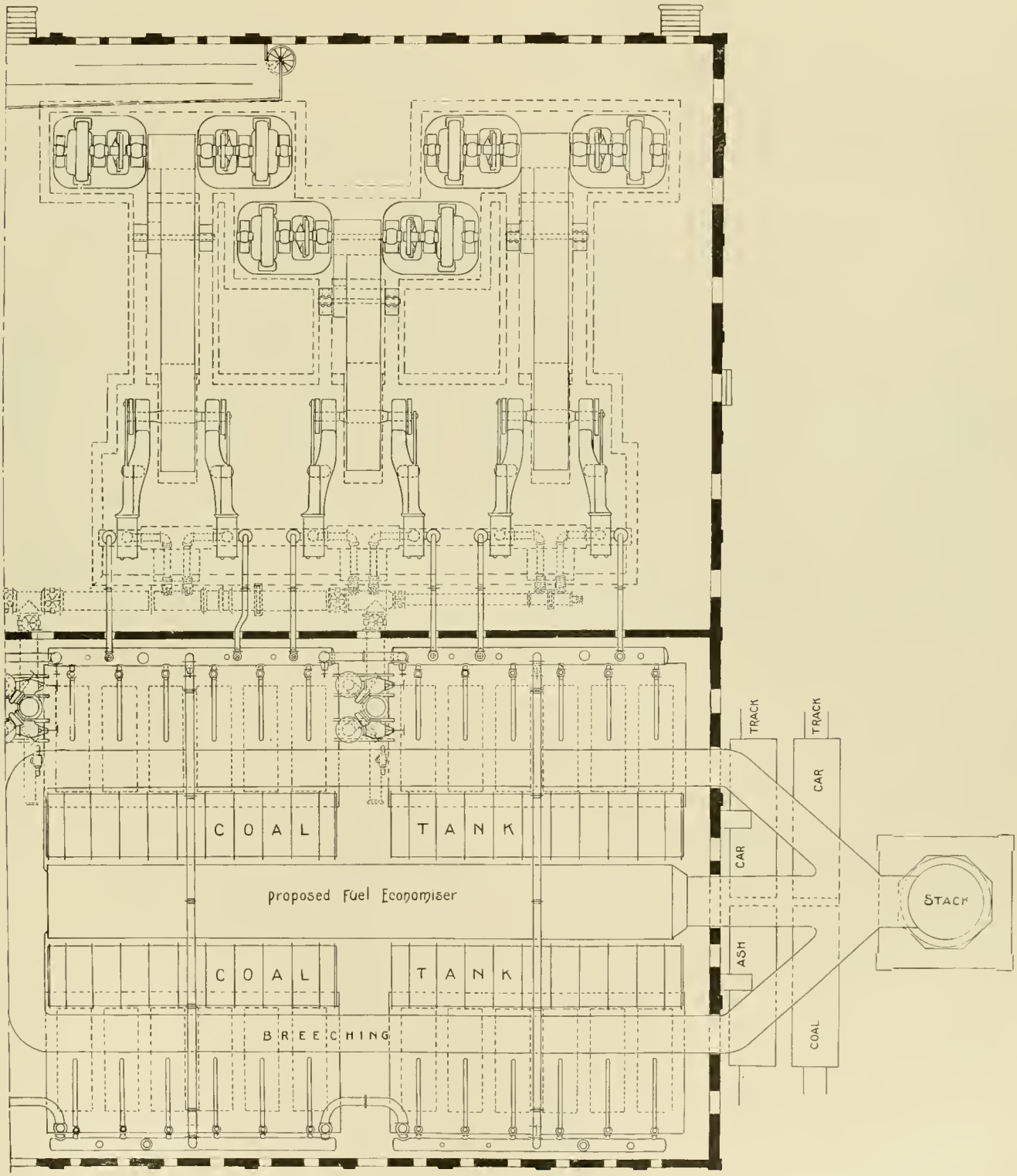


ELEVATION—CHICAGO CITY RAILWAY'S NEW POWER HOUSE.

ment of apparatus inside the station is nearly the same as that at the company's Fifty-second street station, which we have fully described, it will not be necessary to go into great detail.

One-half of the ultimate capacity of the power house is being installed at present, but we will describe the station as it will be when completely finished.

The boiler room is to contain 48 horizontal return flue boilers 6½ by 20 feet. Half of these boilers will deliver their smoke to a stack at one end of the building, and the remainder to a stack at the other end. Each of these stacks is to be 200 feet high with a 14-foot flue. The base is 25 feet square. The coal siding of the steam road on which the plant is located passes between one of the stacks and the boiler room. There are two tracks one for removal of ashes, the other for the coal supply. The coal is to be carried by a John T. Mead & Co. conveyer, and distributed to the coal tanks running the length of the boiler room. The tanks are directly over the boiler front, and from them the coal is

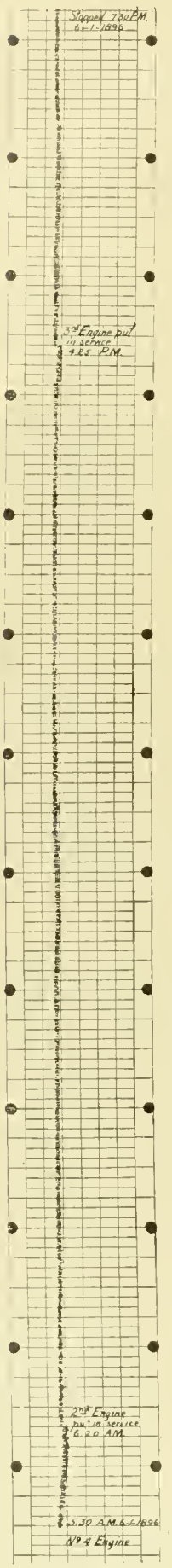


PLAN OF ONE-HALF CHICAGO CITY RAILWAY'S NEW POWER HOUSE—THE OTHER HALF IS AN EXACT DUPLICATE OF THIS.

piped down to the Murphy smokeless furnaces. Under the furnaces run the tracks of the ash-conveying apparatus, which is a part of the same system as the coal conveyor. With reference to piping, the boilers are divided into eight banks of six each. Each bank feeds into a header and each header is joined to the others by curved copper connections. Each division is separated by valves, so that the station is protected against breakdowns of any portion. The main header from which the engines draw their supply is 3½ feet in diameter. The exhaust piping is all under the floor in the engine room, and will rise in the boiler room through three 4-foot exhaust pipes each 130 feet high. Three Baragwanath exhaust heaters of 2,000-horse-power are used. Exhaust feed water injectors are employed, as in all Mr. Hill's plants. In the engine room there are to be six simple double engines running 77 revolutions per minute, with two cylinders, each 36 by 60 inches. Each pair of cylinders drives a 20-foot fly wheel. This fly wheel drives by a Hoadley rope drive a short jack shaft. On each end of each jack shaft is a clutch which connects with an 800 kilowatt Walker generator. When the station is finished there will be six pairs of generators and six double engines. The engines are fitted with a valve gear designed by Mr. Hill, and used with success in the company's other electric plant. They have Sweet separators. The switchboard is to be elevated on a gallery running parallel with the row of generators. The generator panels will occupy the center and the feeder panels the extreme ends. The plans are made for 112 feeder panels. Walker switchboard panels are being put in, this being the first large Walker railway switchboard to be installed, as the Walker Company now has facilities for making such goods at its New Haven plant. The foundations for this immense work were put in by Clift Wise, contractor, of Chicago.

* * *

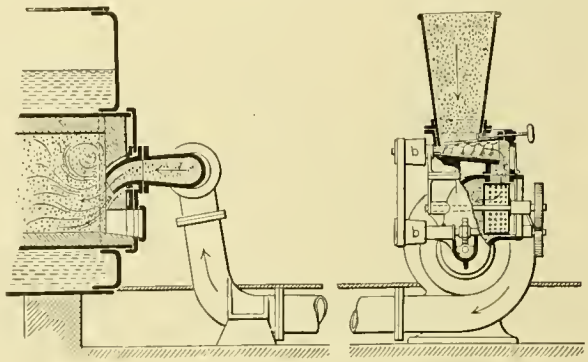
The E. P. Allis Company is naturally rather proud of the speed regulation performance of one of its twin tandem compound direct coupled Allis engines in the Green street power house of the Philadelphia Traction Company, as shown by the Moscrop speed recorder diagram reproduced herewith. It shows a 13-hour run of engine number 4 in that plant. The normal speed is 65 revolutions per minute. The vertical lines represent a variation of 5 per cent. The actual variation as recorded by the pointer is so slight that it leaves nothing to be desired in the way of regulation.



MOSCROP SPEED RECORD.

* * *

F. De Camp, of Berlin, Germany, has invented and put in operation in that city a coal dust stoker which works somewhat on the principle of an oil burner. The dust is blown into the furnace by air blast after being ground in a mill. The amount of dust and air can both be regulated. It is claimed to combine the advantages of a forced draft and



COAL DUST STOKER.

mechanical stokers. It has no machinery exposed to the fire and therefore is not so expensive to maintain as a mechanical stoker. In its operation the boiler flues are cleaned twice a day. The plan of this furnace shown herewith is reproduced from the Engineering News.

CONNECTICUT ASSOCIATION MEETS.

The Connecticut Street Railway Association met at New Haven, the morning of November 18, at the offices of the Fair Haven & Westville Railroad. The session was given principally to an informal discussion. About twenty were present, nearly all the leading roads being represented, except those at Meriden and Stamford, controlled by the New York, New Haven & Hartford Railroad. The election of officers resulted in the selection of H. Holton Wood, Derby, president; H. S. Parmalee, New Haven, vice-president; E. S. Goodrich, Hartford, treasurer; E. S. Breed, New Britain, secretary. The executive committee consists of A. M. Young, Waterbury; I. A. Kelsey, West Haven; G. A. W. Dodge, New Haven; H. Holton Wood, Derby; H. S. Parmalee, New Haven; E. S. Goodrich, Hartford, and E. S. Breed, New Britain. After looking over the New Haven street railways a banquet was held at the New Haven House, at 2:30 p. m.

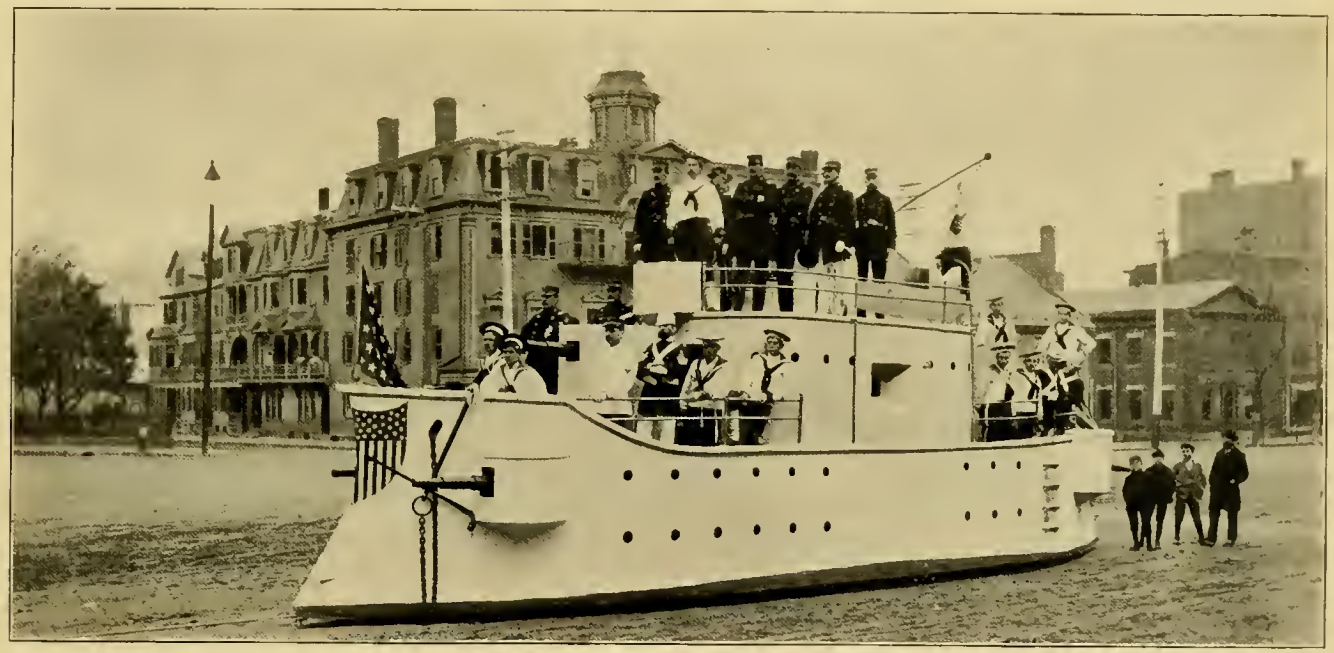
FENDERS FOR MERIDAN, CONN.

The railroad commissioners have ordered fenders on the cars of the Meridan (Conn.), lines, to be installed within three months. Col. Heft favors the Phelps fender.

The Baltimore Traction Company, which, late the past season permitted bicyclers to carry their disabled wheels on the suburban lines free, found it was being imposed upon, and that the punctured tires would hold air, and loose handle bars were easily tightened. Conductors now examine wheels before accepting them.

A TROLLEY MAN OF WAR.

While the comic papers have been cartooning military engagements of the future as between portable forts operating on trolley lines, it has remained for the enterprising superintendent, W. W. Sargent, of the Fitchburg & Leominster, Mass., Street Railway to actually build, what to all appearances was a very formidable fighter. Like the steam locomotive copy built at Terre Haute, this new idea is suggestive of endless possibilities for future occasions of celebrations, parades, and novel special cars. The cruiser was operated through the principal streets of Fitchburg and surrounding towns during the late presidential campaign, and was in every way a success, serving as a novel feature in many parades and making all its trips without a breakdown or accident of any kind. At one time it carried one hundred and four



TROLLEY MAN OF WAR AT FITCHBURG, MASS.

men this being the entire crew of officers and men. The car was designed to run slowly through the street during a procession with its crew marching in front, on both sides and in the rear, while many of the officers would ride; then during a long jump from town to town, officers and men would ride together. The boat, which is 37 feet long, was built on a construction car 26 feet long with 6-foot 6-inch wheel base, equipped with two 12-A, 30-horse-power Westinghouse motors. It was constructed of sheathing and timber, the whole being covered with canvas painted and varnished. The hull was painted white, superstructure cream, iron work bronze, guns, and anchor chain black, sponsors, life boats and turrets white. It was lighted with twenty-five incandescent lamps. Red fire was used on many occasions in the smokestack which gave it a decided martial appearance. After celebrating the victory, special parties were given an opportunity to enjoy the novelty of a ride on the cruiser. A few days ago she was dismantled and will be erected on a raft at the pleasure park of the company (Fitchburg & Leominster Street Railway) in early spring. The boat was designed by naval architect W. W. Lapointe and was constructed at the car house of the Fitchburg & Leominster Street Railway Company under the direct supervision of its superintendent, W. W. Sargent.

WYMAN TO NEW ORLEANS.

The New Orleans Traction Company and the citizens of that city are to be heartily congratulated on the prize they secured in C. Densmore Wyman, who has accepted the position of general manager. No man in the fraternity is more respected or popular than he, while to his genial personality he adds a long experience and that close application to the study of details which is the secret of his success.

Mr. Wyman is a native of Racine, Wis., where he was born in 1850, being educated at the old Chicago University, the Rochester University and the Albany Law School. For many years he was general manager of the Central Park, North & East River lines in New York, and took a similar position at Milwaukee about three years ago. His splendid work in both is well known to street railway men. The Milwaukee road was extremely sorry to lose his services, but as the New Orleans salary is written with five figures it won the day. The best wishes of the REVIEW and his hundreds of railway friends go with Mr. Wyman in his new home.

OBITUARY.

W. G. Ellis, president of the Ellis Car Company, Amesbury, Mass., died November 3, at the age of 64 years. He was born in Elgin, Scotland; went into the Australian gold diggings when a young man, and afterward came to this country, where he amassed a large fortune. His car works were burned in 1893 and never rebuilt. A widow and five sons, Arthur, Robert, George, James and David survive him.

We regret to announce the death of F. G. Pratt, the head of the catalog department of the General Electric Company. He belonged to the Harvard class of '84, and was later with the Boston & Albany Railroad and the Southern Railroad, following which he was for some time with the Union Switch & Signal Company. In 1892 he entered the employ of the General Electric Company, and shortly after took entire charge of the catalog department, where the breadth of his technical knowledge adapted him well to his duties.

PERSONAL

Robert A. Dyer has been appointed superintendent of the Auburn, N. Y., City Railway.

Richard C. Reamer, superintendent of the Greensburg & Hempfield Street Railway, was obliged to have a diseased foot amputated last month.

J. R. Beetem, general manager of the Union Traction Company, Philadelphia, has resigned. He will take a needed rest before making any new connection.

Walter C. Smith, mechanical engineer of the Milwaukee Electric Railway and C. L. Jones of the same company were welcome visitors at the REVIEW office this month.

John T. Prince, Jr., has resigned as superintendent of the Corning & Painted Post Street Railway, of Corning, N. Y. He is succeeded by John A. Wilcox of Norwich, Conn.

W. R. Hill, treasurer of the Holyoke Street Railway, and his wife, were pleasantly surprised and remembered by friends on the occasion of the fifteenth anniversary of their marriage.

G. B. Coleman, secretary of the Metropolitan Railroad, Washington, D. C., has been honored by having added to his title that of general manager, at a recent meeting of the board of directors.

Charles Bayliss, general manager of the Mount Clemens, (Mich.), & Lakeside Traction Company, committed suicide by shooting on December 2. It is thought that the deed was occasioned by family troubles.

H. N. Hurt, superintendent of the Atlanta Consolidated Street Railway, was struck by a bicycle last month and when picked up was unconscious. His injuries were not serious but confined him for a few days.

E. W. Courtney, assistant electrician of the Washington, Alexandria & Mt. Vernon Electric Railroad, has resigned to accept the position of general superintendent of the Frederick & Middletown Railway, Frederick, Md.

J. Percy Clifton has been selected superintendent of the People's Electric Railway at Sandusky, O. This is a position formerly filled by Thomas Wood together with his supervision of the Sandusky, Milan & Norwalk.

E. Kessler, formerly electrical superintendent, has been promoted to superintendent and mechanical engineer of the Richmond (Ind.) Traction Company, with C. Snider as assistant and F. Roth, chief engineer of power station.

Henry E. Chamberlin, superintendent of the Concord, N. H., Street Railway was elected representative by a nice majority on the republican ticket. It was a case of the office seeking the man, and this time it secured a good one.

A. Langstaff Johnson was tendered a banquet by President John Skelton Williams and other officials of the Richmond Traction Company on the occasion of his leaving the company's service as chief engineer to take up similar work in Philadelphia.

Charles Hathaway, Cleveland, still holds the palm as the champion fisher and hunter. Recently, while hunting in the Georgian Bay country, he celebrated his seventy-seventh birthday by shooting a magnificent buck, which was the largest killed in that district in a long time.

John C. Bridgeman, secretary of the Hazard Manufacturing Company, Wilkes-Barre, Pa., spent several days in Chicago, last week, looking after the interests of his company. The Hazard cables are fully maintaining their long time and well earned reputation for excellence and good service.

Thomas L. Roberts, a division superintendent of the Denver Tramway Company, has disappeared, and his place has been filled by the appointment of Charles Tedford. Roberts leaves a wife and three children, and is thought to have gone to South Africa, where he was offered a position to which his wife objected.

H. H. Lynch, superintendent of construction of the Market Street Railway, San Francisco, accompanied by H. S. Manning, of the land department of the Southern Pacific, is making an extended tour of inspection of the leading street railway systems east of the Rocky mountains. They may extend their trip to Europe.

Invitations are out for the marriage of Charles Kelley King, the genial secretary of the Ohio Brass Company, to Edith May Crawford, both of Mansfield, Ohio. The wedding occurs on Wednesday evening, December 23, and Mr. and Mrs. King will be at home at 48 Park Avenue West, after February 1. Our congratulations in advance.

T. O. Troy has resigned the presidency of the Charlottesville, Va., City & Suburban Railway, and the Jefferson Park Companies, and has been succeeded by Walter Dinwiddie. W. A. Melhorn was elected superintendent. Mr. Troy remains a member of the board of directors and will continue as president of the Piedmont Traction Company, which will probably engage in in enterprises elsewhere.

John T. Bramhall, Chicago, advertising agent of the passenger department of the Monon route, contributes a most interesting and suggestive article to Leslie's Weekly, on the "Utilization of Natural Forces." The spirit of his predictions is revealed in a single sentence, which we quote: "The glaciers of the giant peaks of Oregon and Washington hold sufficient power in their icy grasp to turn every factory wheel and light and warm every building in those states for a century to come, while the thousand mountain streams along the rocky barrier from Montana to New Mexico will perform the double duty of supplying power to the millions who will people those states, (mills, mines, railroads, etc.), and irrigating the soil to provide for their sustenance."

The appellate division of the Supreme Court in Brooklyn, has sustained the finding of the lower court, which denied $10,000 damages claimed by a woman, for personal injuries sustained in being thrown from her seat while a Broadway car was rounding a curve at 14th street. Court ruled the curve and speed were both essential to the successful operation of the road.

THE VILTER MANUFACTURING COMPANY.

The Vilter Manufacturing Company, of Milwaukee, has achieved an enviable reputation for the superiority of its steam engines, refrigerating and ice-making machinery. The business was established in 1867 by P. Weisel. In 1879 the firm of Weisel & Vilter was formed, and in 1886 the Weisel & Vilter Manufacturing Company was organized. In 1893 Messrs. Theodore O. and William O. Vilter reorganized the company under the present title, and removed to Bay View, where a modern plant of large size has been erected.

Of recent years a specialty has been made of compound, cross-compound and tandem corliss engines, designed to give good economy under peculiar conditions. In building engines for electric light and power plants, where high speed and the best regulation are requisites, this company has been quite successful. The large engine in process of erection, in the view of the interior of the machine shop is a 32 and 48 by 48-inch corliss cross compound condensing "Vilter" engine, built for the Minneapolis General Electric Company, of Minneapolis, Minn.

The refrigerating and ice-making machinery of this company is found in all the principal breweries of the United States, some of its machines being of 400 tons capacity. Among the refrigerating plants recently installed is that of the Buffalo Packing & Cold Storage Company, of Minneapolis. In this plant two of the standard Vilter horizontal double acting ammonia compressors, each driven by a corliss engine, are used and successfully maintain a temperature of — 35 degrees Fahrenheit.

WORKS OF THE VILTER MANUFACTURING COMPANY, MILWAUKEE.

A general view of the new plant and the interior of the machine shop are shown in the engravings. The buildings comprise a two-story machine shop 85 by 305 feet, storehouse and pattern shop three stories in height 60 by 60 feet, pipe shop 60 by 160 feet, blacksmith shop 40 by 60 feet, engine and boiler room 45 by 40 feet.

The steam engines built by this company are noted for the good quality of the materials used in their construction; for the strength and rigidity secured in the frame; for the precision of working and the close regulation under varying loads; and for the economy obtained. That they are satisfactory to the users of power is evidenced by the large numbers in use throughout this country and Mexico.

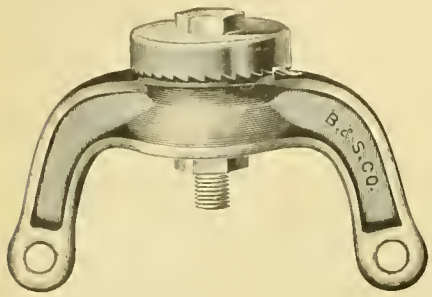
Theodore O. Vilter personally superintends all departments of the shops, and the office is in charge of William O. Vilter, the secretary and treasurer. From this time special attention will be given to the building of engines for electric railway service.

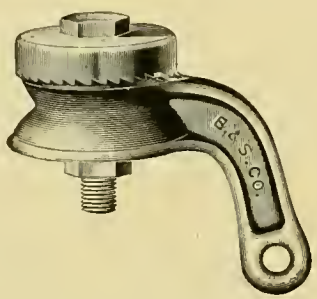
Since election, Treasurer Duffy, of the Citizens road, St. Louis, has resumed the use of gold in pay rolls. During the the campaign he was unable to get it from the banks, but resumption of specie payments began the first pay day after election. His experience has been errors are less likely in using gold than paper. The fractional parts of five dollars, are of course, in silver.

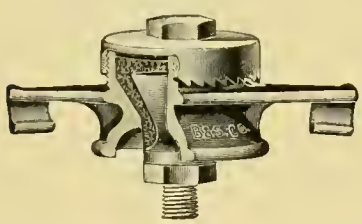
The Scranton Traction Company, of Scranton, Pa., reports $32,214 gross earnings for October, an increase of $5,798 over October, 1895. Net earnings increased $3,215, to $16,193.

NEW TYPE B. & S. HANGERS.

The Central Electric Company is offering to the trade a new type of Billings & Spencer straight line hanger; also single and double curve pull-offs. These are shown in the illustrations on this page. It will be seen that they possess some features which are considered as a radical improvement over other forms of hangers, in compactness, and greater tensile strength. Another admirable feature is that they are self locking, so that when once placed in position, and the cap screwed down tightly upon the insulated stud, they can not work loose. This positively obviates one of the most troublesome features of another form of hanger. It will also be noticed that the shape of the insulated stud in this new type of hanger is unlike any other. We refer to the conical form of the head; the interior of the forging is also conical, therefore adding greatly to the crushing strength of the stud. To demonstrate the increased strength of this form, the following break-down tests were made. First the stud was put in a bracket provided with a conical pocket; metal loops were arranged in such a manner as to screw directly on the threaded part of the stud. In this first test the metal loops broke at 9,925 pounds, the stud remaining intact. The metal parts were then strengthened, and the pressure again put on; this time the metal loops opened at 11,700 pounds. In the third test the metal parts broke at 15,700 pounds. In the fourth test the metal parts broke at 40,200 pounds. During the entire series of tests the insulation of the stud and the stud as a whole, remained in perfect condition. It has been conclusively proven by tests that this insulator is sufficiently strong, were a stress brought to bear upon it, when connected to ordinary metal poles used by street railways, to bend or break them. The hangers of this new design are made in bronze or galvanized malleable iron.







The large stock carried in all lines of its goods has enabled the Central Electric Company to fill orders fully and promptly. It is prepared to furnish at short notice, and in a great per cent of cases from stock, cables of odd size and special insulation, adapted for all departments of electrical railway work.

Work is progressing rapidly on the Van Buren Street section of the Union loop, this city, and it will be in operation by March.

CHARLIE GIVES US THE MARBLE HEART.

CHICAGO, ILL., 1896.

To the Editor of the STREET RAILWAY REVIEW,

Dear Sir:

A very caustic, unfair, indeed malignant little article appeared in your "Souvenir Number" of October 15th, attacking the "C. L. Pullman Doubledecked Center Vestibule Car," and although containing only sixteen lines of the half page, it had condensed into that small space enough vituperation and hard names to season a whole number of even your publication: for instance, it says the car was "in his head and on paper;" it was a "monstrosity," "resembled a hearse," a "ferryboat," and an "elephant," the "Great Eastern," etc.

Your article has so much the appearance of being spiteful and malicious, and it goes so far beyond the legitimate criticism looked for in a technical publication, that many of your readers and clientage are asking what can be the motive of such an attack. If personal, then you are abusing your position as a publisher of a trade paper, and if not personal, that you are ignorantly making many mis-statements with a viciousness very unbecoming, and giving the business interests using your paper very grave reason for losing faith in your statements and opinions. We will answer your incorrect statements seriatim, and will request you, for your own sake, as well as ours, as a matter of fair play and justice to publish this reply to what was meant to be a very hurtful and uncalled for attack.

1. You say "C. L. Pullman has a new doubledecked car running in his head and on paper." This was evidently meant for a slur, but only succeeded in being a gross mis-statement of facts. Instead of being "in his head and on paper," a number of these cars are already in use and giving the greatest satisfaction. For instance, there are five in constant use at Saratoga‡, and a number of our citizens who have been visitors there during the past summer have spoken enthusiastically of the pleasure and comfort they had in using them, bear testimony to their popularity, and say that people waited for these cars in preference to using the ordinary ones, and quite a number in other places, which we can refer to when necessary.

Trial trips have also been made in Boston*, Washington† and Philadelphia§, at all of which, the cars had the warmest approval, not only of the public who rode in them, but of some of the leading street car owners and managers in the country. We will here quote some extracts from the Washington Post, apropos of your little denunciation of their form and appearance.

"The car left Georgetown shortly after 6 o'clock, attracting no end of attention by its rich colors and graceful lines as it rode up the hill, Is is thirty-four feet long, just about the space occupied by a horse car, and will seat eighty passengers." Again. "The car was a trim and handsome craft. Its makers think, apparently with good reason, an improvement on any car which glides or clatters over the street. From the track to the awning above the upper deck, the car is fourteen feet high. It is finished with bright brass trimmings, and the woodwork is painted a dark maroon."

These facts should be a sufficient answer to your impudent statement that the double decked car was running "in his head and on paper."

2. You call it a "Monstrosity." How is it that your opinion on this point is so diametrically opposite to that of the best street car men in the country, who, like the Washington Post, praise its graceful lines, its symmetry and handsome proportions, and who have quite recently backed up their opinions by large orders for these cars, which are now being built, to be placed in some of our largest cities. They have ordered this "Monstrosity," not only for its symmetrical proportions, its graceful lines and handsome appearance, but because it is the best vehicle yet made, by which the congestion of the tracks in a crowded city can be relieved. Carrying double the

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‡The Saratoga road has two double deckers, but is operated purely as a summer line, and has been closed down several weeks.

*There are no double-deck cars now in use in Boston.

†Our Washington Correspondent, under December 5, 1896, writes as follows: "There are 10 double-decked cars in the district, but they were built by the J. G. Brill Company, of Philadelphia, and in the possession of the Eckington & Soldiers' Home Railway. *They have not been used for over two years.* I think they were only trail cars.

There was one double-decked car on the Georgetown & Tennallytown Railroad *about three years ago*, but it was only used a few times and returned. It might possibly have been built by the Pullman Company."

§There are not now in use, and never have been any double-deckers in regular operation in Philadelphia.—EDITOR.

number of passengers in the same length of track; it is the acme of comfort and safety, and its earnings are larger than the ordinary cars of the same length. Truly it is "Monstrous Good."

3rd. You say, "each of the two lower compartments bears a striking resemblance to a hearse." Well, if all the vehicles run on high wheels, (high as compared with street car wheels) a fine hearse is perhaps the most shapely and symmetrical, but aside from that, your remark shows you to be just as ignorant of a hearse as you are of this new and successful "double decked car."

Where have you seen a "hearse" carried on four wheel trucks? or with floors less than two feet from the track, reached by low steps leading into the center of the vehicle? or with windows framed like those of steam cars. If you have not seen these, where is your fancied resemblance? If you mean that any vehicle with sides, windows and roof, on wheels, bears a striking resemblance to a hearse, you may be right, for all common street vehicles have these common characteristics, but your remark shows gross ignorance both of street cars and of hearses. You will have to use one of the latter some time, and then you will perhaps know just as much about them as you appear to know now. It must have been with green and envious eyes you looked upon these cars, to cause you to make such a false and foolish comparison.

The friends of Mr. C. L. Pullman, who may be called "legion," for they are many, as well as every fair-minded man knowing anything about this car, who reads your little diatribe, cannot fail to be both indignant and disgusted at such an attempt to mislead, and to misrepresent facts.

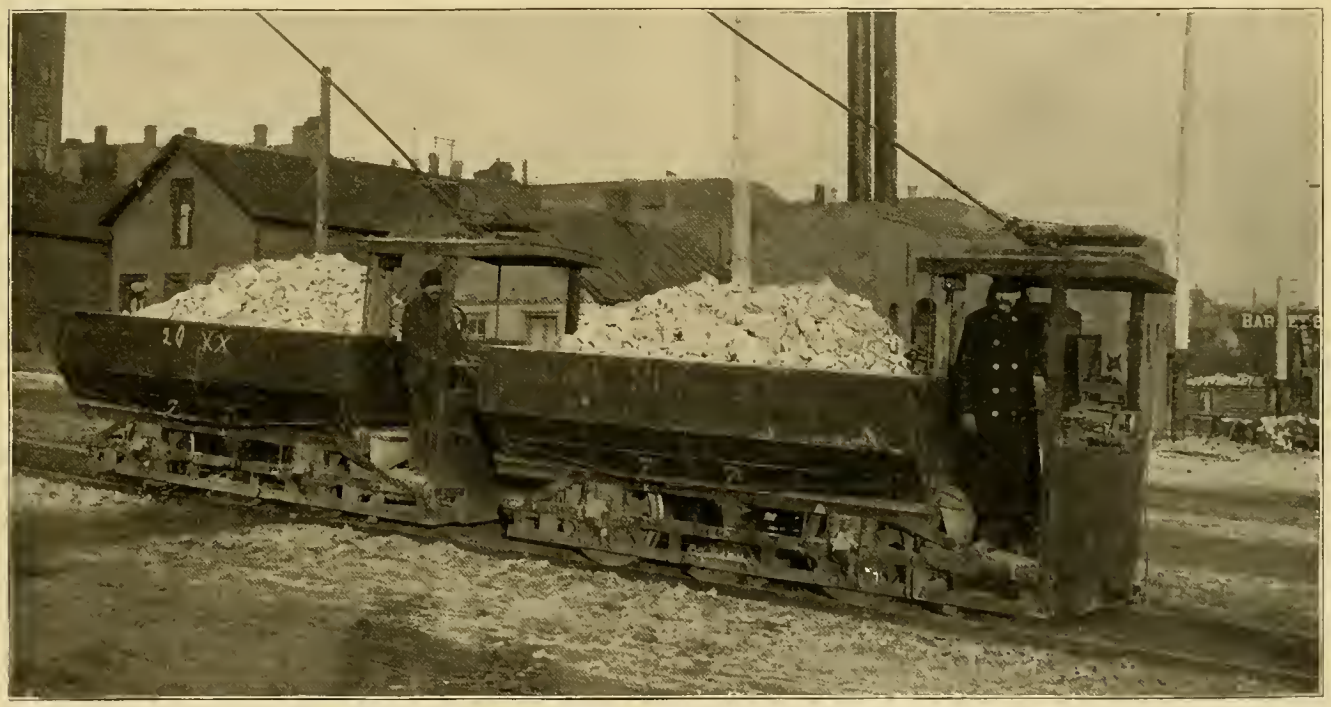
Yours respectfully,

C. L. PULLMAN, Center Vestibule Car Company,

1121 Monadnock block.

TROLLEY ORE CARS.

The engraving, from a photograph, illustrates two of the ore cars in use on the Butte Consolidated Railway, at Butte, Montana. The freight line has been in successful operation since November 10. The cars have a capacity of ten tons, and are used for transporting the ore from the mine to the smelter, a distance of three miles down a grade exceeding 10 per cent. During the recent blizzard no serious trouble was experienced in running, although the temperature was 44° below zero and the snow drifting badly.



TROLLEY ORE CARS—BUTTE CONSOLIDATED RAILWAY COMPANY, BUTTE, MONT.

4. Your "ferry-boat "simile, if you understood it, is a compliment, rather than the reverse, which you intended, for the best points of this commodious "water vehicle" are embodied in the new car, viz., smoothness of motion, good accommodation for passengers, absence of those "monstrosities" at each end, called platforms, a clear and unobstructed view through the windows at both ends, protection from drafts blowing through, etc., etc.

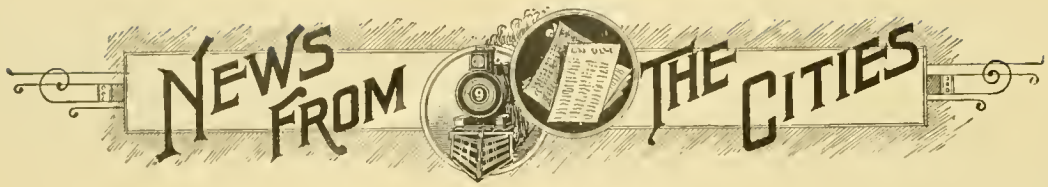
5. You say, "you fail to see wherein the steel construction is going to reduce the elevation. so the 'elephant' can get into an ordinary car house, etc." After reading your article, no one can wonder that you fail to see it, but car builders, or car experts, those who understand anything about street cars, can readily see how a steel framing can be made lower than a timber framing. Our first cars with timber framing were, as stated in the "Washington Post," fourteen feet in height, the cars of steel construction now being built are 12 feet, 9 inches in height.

6. This car is an American car, invented by an American, built in America, and used here. It is thirty-three to thirty-four feet long. Now, wherein is the honesty or common sense of your saying of it, "It may be English. But so was the Great Eastern."

The car bodies were made by the Ramapo Iron Company, of Hilburn, N. Y., the trucks by the Peckham Motor Truck & Wheel Company, and the brakes by the Weston Iron Company, of Butte. We are indebted to Manager J. R. Wharton, whose idea these cars are, for the photograph.

Net earnings of the Dayton Traction Company, during its first three months of operation, July, August and September, 1896, were $11,438, or nearly sufficient to pay the interest on the bonded indebtedness of $250,000. Gross receipts were $16,620, and operating expenses, $5,182. The company operates 12½ miles of road between Dayton and Miamisburg, O.

Paterson Railway earnings for ten months ending October, increased $21,834 in gross and $5,687 in net, compared with same months of 1895.



Alabama.

SHEFFIELD, ALA. The cars and rails of the Sheffield Street Railway are advertised to be sold by auction.

Arkansas.

FAYETTEVILLE, ARK. It is said the recently organized Fayetteville Electric Street Car Company will soon let contracts. J. A. Griffin is president and J. W. Lipsey, secretary and treasurer.

FAYETTVILLE, ARK.—The Fayetteville Electric Street Car Company has been organized by John A. Griffin, president; O. M. Wallace, vice-president; J. W. Lipsey, secretary and treasurer, and F. T. Crommett, of Boston.

California.

SAN DIEGO, CAL.—The Citizens Traction Company will extend its line several miles and establish a pleasure resort.

FRESNO, CAL.—J. S. Eastwood, of the San Joaquin Valley Electric Light & Power Company, is interested in the proposed railway.

SANTA ROSA, CAL.—The Santa Rosa & Sonoma County Electric Railway Company has been incorporated to build 70 miles of road.

NAPA, CAL.—The Napa & Clear Lake Traction Company's petition for a franchise between Vallejo and Napa was heard December 7.

LOS ANGELES, CAL.—The Pasadena & Pacific Electric Railway Company is pushing the work of electrically equipping the Colorado street line.

WEAVERVILLE, CAL.—Tehama County is asked to grant a franchise to the Northern California Electric Railroad & Improvement Company, which is represented by Frederick Eden.

RED BLUFF, CAL.—The Northern California Electric Railway & Improvement Company, represented by Frederick Eden, has petitioned for right of way over the county road from Red Bluff.

LOS ANGELES, CAL.—The Pasadena & Pacific Railway Company has been incorporated to build 35 miles of double track electric road between Santa Monica and Altadena. Capital stock, $500,000; beginning with $35,000; incorporators, E. P. Clark, W. D. Larabee, M. H. Sherman, M. E. Hammond and T. C. Paxton, all of Los Angeles.

OAKLAND, CAL.—The syndicate has just obtained control of the Highland Park & Fruit Vale Railroad, and will now carry out its plans for extensive changes. The other companies controlled are, the Oakland Consolidated, the Central Avenue, the East Oakland Street Railway, and the Alameda, Oakland & Piedmont Electric Railway.

SAN FRANCISCO, CAL.—Col. Charles F. Crocker, president of the Market Street Railway, says the company may improve some of the existing lines by converting them into electric roads. Among those that will be changed to electric power are the Montgomery, Post, Leavenworth, Howard, Sacramento, Clay, Jackson and Powell street lines. And it is the intention of the company to change the cable power-house on Washington and Mason streets to an electric station. But none of this work will be commenced until after the holidays.

Chicago.

CHICAGO.—A franchise is asked by the Chicago Metropolitan Railway & Traction Company, of which nothing is known.

CHICAGO. The South Chicago City Railway Company has increased its capital stock from $1,500,000 to $2,000,000.

CHICAGO.—Having obtained consents the Chicago City Railway Company will soon lay 4 miles of track in Indiana avenue.

CHICAGO.—The Metropolitan Traction Company, of which little is known, has applied for franchises to cover Cook county with a network of lines.

CHICAGO.—The Chicago & Desplaines Valley Street Railway Company has been incorporated to construct and operate a street railway Capital stock, $100,000; incorporators, Frank Lehmann, Otto Gorke and Robert E. Williams.

CHICAGO.—The Chicago Electric Transit Company has been granted right of way in Irving boulevard. D. H. Louderback is president of the road, which is intended as a feeder for the Northwestern Elevated Railway.

Colorado.

CANON CITY, COLO.—Dr. Bartlett, proprietor of the zinc-lead pigment works, has agreed to supply power for the the proposed electric railroad from Canon City to Cripple Creek, of which J. B. Crosby is promoter.

Connecticut.

NEW HAVEN, CONN.—The New Haven Street Railway Company will petition for an extension to Cosy Beach.

ROCKVILLE, CONN.—Favorable action has been taken on the Rockville & Ellington Street Railway Company's petition to lay track.

HARTFORD, CONN.—Right to extend its electric road from Talcottville has been granted the Hartford, Manchester & Rockville Tramway Company.

WILLIMANTIC, CONN.—C. D. West and G. D. Morse, representing Worcester, Mass., capital, are negotiating the purchase of the property, rights and franchises of the Willimantic Street Railway Company. Extensions are contemplated.

WINSTED, CONN.—Citizens want an electric road to Torrington. Among those interested are William L. Camp, Joseph P. Glynn, N. B. Stevens, Judge Fenn, S. Landon Alvord, L. C. Strong, Henry Gay, Harvey L. Roberts, L. W. Tiffany, S. D. Horne and H. B. Morse, all of Winsted, and O. R. Fyler, F. W. Fuessenich and James Alldis, of Torrington.

ENFIELD, CONN. The Enfield & Longmeadow Street Railway Company has placed its new line in operation, connecting at Thompsonville with the Springfield, Mass., Street Railway, which is supplying power until the Enfield Company's electric station shall be completed. Of the ten miles of road 8 have been finished, the remainder will be completed in January, when the power house is expected to be in operation.

Delaware.

WILMINGTON, DEL.—William B. Carswell asks the appointment of a receiver for the Chester & Wilmington Electric Railway Company. Mr. Carswell is a civil engineer. He alleges the company owes him $384 for surveying the road, none of which has yet been constructed.

District of Columbia.

WASHINGTON, D. C.—Receiver W. Kesley Schoepf, of the Maryland & Washington Railway, has been authorized to issue $75,000 of certificates for the completion of the company's electric road.

Illinois.

NEWMAN, ILL. John Smith, of Oakland, petitions for a railway and lighting franchise.

GALESBURG, ILL.—Vestibules will be tried by the Galesburg Electric Motor & Power Company.

STREATOR, ILL.—Upon application of the Farmers Loan & Trust Company, Carey Barr has been appointed receiver for the Streator Railway.

EAST ST. LOUIS, ILL.—The veto by Mayor Bader of the Belleville Electric Railway franchise does not end the project. Another ordinance will be prepared more likely to meet his approval.

LA SALLE, ILL.—Jarvis R. Burrows has been appointed receiver of the City Electric Railway Company, of La Salle and Peru, on application of President L. B. Merrifield, of Ottawa, who also requests that the property be sold to satisfy judgments aggregating $19,429. The road has never paid expenses.

Indiana.

MARION, IND.—John Pierson, Edward Caldwell and Ansel Smith have obtained an extension of Clodfelter's electric railway franchise.

RICHMOND, IND.—The Richmond Traction Company will build 4½ miles of extensions the coming spring and put 4 more cars in operation.

LAFAYETTE, IND.—The Yawger Construction Company has brought suit against the Lafayette Street Railway Company for a balance alleged to be due for the construction of the Soldiers' Home extension.

Iowa.

MASON CITY, IA.—The Mason City & Clear Lake Traction Company has let the contract for grading 8¼ miles to Cullin & Co., of Cedar Rapids.

Kansas.

PITTSBURG, KAN.—The Pittsburg, Weir & Columbus Railway Company has been incorporated to do a general freight and passenger business in Crawford and Cherokee counties. Capital stock, $200,000; incorporators, Robert Simons, of West Chester, Pa.; S. A. Nuttman, J. M. Leepman, John Randolph and Sam Barratt, of Pittsburg, Kan. The backers of the new electric road are the owners of the Pittsburg, Frontenac & Suburban Electric Railway. Surveyors will soon be placed in the field.

Kentucky.

FRANKFORT, KY.—The Capital City Electric Railway Company has suspended operation. It is said the receiver will sell the road.

Maine.

NORWAY, ME.—Amos F. Gerald, the electric railway man of Fairfield, has been looking over the proposed line from Norway to North Waterford.

Maryland.

HAGERSTOWN, MD.—The Hagerstown Railway Company will extend its electric road through Corbett's Addition.

BALTIMORE, MD.—The City Passenger Railway has asked the mayor for a permit to begin the change of the Blue line from cable to electric.

BALTIMORE, MD.—The Lake Roland Extension Railway asks right to build a bridge at its present terminus with a view to constructing a 2-mile extension.

BALTIMORE, MD.—The City Passenger Railway Company has sold $500,000 of bonds to cover the cost of recent extensions and provide for contemplated improvements.

BALTIMORE, MD.—Col. Charles B. McClean, engineer of the Baltimore & Gunpowder Railway, says the company is ready to build under the permit granted in 1895. The plans submitted by Col. McClean were recently approved by the county commissioners.

Massachusetts.

WESTFIELD, MASS.—The Woronoco Street Railway Company is surveying a trolley line to connect with the Springfield road.

SHREWSBURY, MASS.—The Worcester & Clinton Railway Company has been granted the right to lay tracks in Shrewsbury.

WICKFORD, MASS.—Work is soon to begin on the Seaview Railway, which is to run from Wickford to Hamilton and Narragansett Pier.

WALPOLE, MASS.—The franchise of the Norfolk Central Street Railway is said to have lapsed on account of failure to begin operation before October.

BOSTON, MASS.—Phineas W. Sprague, of Boston, has been appointed temporary receiver of the Blackstone Valley Street Railway on petition of Adam Manchester, of Newport, R. I.

NEWTON, MASS.—Since the election the Newton & Boston Street Railway Company has decided to renew its application for a franchise to extend its road to Great Plain avenue, Needham. The company proposed to put in a line a year ago, but retired in favor of a local company which, however, has done nothing beyond forfeiting its franchise and $1,000 bond.

Michigan.

FENTON, MICH.—John E. Nolan has had his franchise for an electric road to Flint extended until November 18, 1897.

MUSKEGON, MICH.—The Muskegon Railway, which has been in the hands of a receiver 2 years, will be sold January 5 by auction.

MONROE, MICH.—William C. Johnson and P. N. Jacobson represent a new company which is asking a franchise to build an electric railway in Monroe.

MARINE CITY, MICH.—A bond for $2,000 has been given by the Union Trust Company, of Philadelphia, to guarantee the construction of John B. Dyar's electric road.

BAY CITY, MICH.—A third rail electric railway company has been formed in New York to build from Bay City east to Fairgrove, with branches to Sebewaing, Unionville and Caro.

DETROIT, MICH.—John B. Dyar, of Detroit, and F. S. Parker, have been granted an electric railway franchise in Marine City. This is part of a proposed line connecting Detroit and Port Huron.

DECATUR, MICH.—Vice-President Deam, of the Benton Harbor & Eastern Electric Railway, says the grading of the line between Benton Harbor and Decatur will begin at once. From Decatur the road will be continued to Allegan, by way of Paw Paw.

Mississippi.

MISSISSIPPI CITY, MISS.—At its first annual meeting, November 7, the Mississippi City Street Railway & Transfer Company considered an extension of the road to Handsboro and Gulfport. Directors were elected as follows: Henry J. Haller, Biloxi, Miss., president; Ed J. A. Domedion, New Orleans, vice-president; Hon. J. D. M. Loescher, Biloxi, Miss., secretary and treasurer; Geo. W. Pierce, Jr., Mississippi City, Miss., general manager and superintendent.

Missouri.

ST. LOUIS, MO.—The North St. Louis Improvement Association contemplates building an electric street railway.

NEVADA, MO.—H. C. Moore's electric car franchise has been extended 6 months, work to begin within 30 days.

ST. LOUIS, MO.—The Shaw Avenue Electric Railway Company, not yet organized, has petitioned for a franchise for a double track road to use the trolley, conduit or battery.

KANSAS CITY, MO.—Charles A. Braley, attorney of the West Side Street Railway, says the company will, before December 31, deposit $18,000 in acceptance of its franchise.

KANSAS CITY, MO.—The Northeast Electric Railway Company has been incorporated to operate the Northeast line recently sold under foreclosure. Capital stock, $250,000; incorporators, Edmund G. Vaughan, trustee, Kansas City; Samuel M. Jarvis, New York; Roland R. Conklin, New York; Baylis Steele, Milton Moore, William M. Reid and Harold G. Blakesley, all of Kansas City.

New Jersey.

NEWARK, N. J.—Car sheds will be erected at Elizabeth by the Consolidated Traction Company.

MONTCLAIR, N. J.—It is said the North Jersey Traction Company contemplates extensions to Pine Brook, Parsippany and Morristown.

RUTHERFORD, N. J.—The Union Traction Company has about completed its power house at East Rutherford, and will soon have the Carlstadt line in operation.

NEWARK, N. J.—A franchise for a double track trolley road in Central avenue, East Orange, between the Newark and Orange city lines, is asked by the Consolidated Traction Company.

CAMDEN, N. J.—The Camden & Suburban Railroad Company is about to place in operation its cross-town line, an arrangement for crossings having been made with the Pennsylvania Railroad Company.

New York.

NEW YORK, N. Y.—The People's Traction Company has been awarded the franchise in the Annexed District.

TARRYTOWN, N. Y.—The trustees have granted a franchise to the New York, White Plains & Elmsford Electric Railway Company.

SYRACUSE N. Y.—Skaneateles and Syracuse are to be connected by electric railway. The enterprise is said to be promoted by a Syracuse man.

OSWEGO, N. Y.—The Oswego Street Railway has been sold for $800 unpaid taxes. S. M. Coon, representing bondholders, bought the property.

BROOKLYN, N. Y.—President Baldwin, of the Long Island Railroad, believes that the company will have electric cars in operation by next summer.

PORT CHESTER, N. Y.—The Port Chester Street Railway Company has been granted its franchise for a trolley line. A bond of $10,000 must be deposited.

PATCHOGUE, N. Y.—Although denied a franchise, the promoters of the Patchogue & Port Jefferson Traction Company will make another effort to obtain consents.

LARCHMONT, N. Y.—It is said Charles Singer, principal owner of the Larchmont Horse Railway, will adopt electricity. Power will be supplied by the local lighting company.

ALBANY, N. Y.—The Albany, Helderberg & Schoharie Electric Railway Company has increased its capital from $300,000 to $500,000. New York bankers are going over the route to value the bonds.

NEW YORK, N. Y.—The Metropolitan Street Railway Company next spring will begin work on two new lines to relieve the traffic on Broadway and Lexington avenue. Rumors anent discarding cable power on Broadway cannot be confirmed.

LYONS, N. Y.—The Wayne County Traction Company, which was incorporated in July, is reviving. Among those who are now becoming interested are O. F. Thomas, William Van Camp and C. R. Sherwood, Lyons, and Charles Perkins, Newark.

CATSKILL, N. Y.—The state railroad commission has refused permission to the Catskill, Cairo & Windham Electric Railway Company, to build its line, on the ground that it is not a public necessity. For its entire length the road would parallel the present line of the Catskill Mountain Railway.

CHITTENANGO, N. Y.—Work has begun on the Chittenango & White Sulphur Springs Electric Railway. One and one-half miles have been graded. The charter is being amended to permit an extension to Cazenovia. W. H. Young, of the Lincklaen House, is general manager, and W. H. Stewart, of Chittenango, vice-president. George Walrath and Charles F. Pennock, of Chittenango, will superintend construction of the first six miles.

Ohio.

LIMA, O.—The Lima Electric Street Railway will equip with double motors and electric heaters.

IRONTON, O.—The Ironton & Petersburg Street Railway Company has been granted additional right of way.

CINCINNATI, O.—The Main Street Line is to be extended to Reading. Citizens are subscribing $3,750 bonus.

PIQUA, O.—Stockholders in the Piqua, Sidney & St. Mary's Electric Railway have been assessed to pay for a survey.

HAMILTON, O.—The Cincinnati & Miami Valley Traction Company has increased its capital stock from $10,000 to $650,000.

YOUNGSTOWN, O.—The Mahoning Valley Electric Railway Company has increased its capital stock from $150,000 to $1,500,000.

YOUNGSTOWN, O.—Manager A. A. Anderson, of the Youngstown Street Railroad, is visiting different cities to investigate fenders.

MIDDLETOWN, O.—Application for a franchise in Middletown has been made by the Cincinnati & Miami Valley Traction Company.

CLEVELAND, O.—Contractors on the Cleveland & Lorain Electric Railway will begin tracklaying at once instead of waiting until spring.

ZANESVILLE, O.—The Zanesville Electric & Street Railway Company has given a mortgage for $500,000, to the International Trust Company, Boston.

CINCINNATI, O.—General Manager H. P. Bradford, of the Cincinnati Inclined Plane Railway, says cars will soon be running on the proposed Lockland extension.

LIMA, O.—E. W. Moore, of Cleveland, has taken possession of his recent purchase, the Lima Electric Railway, and appointed as superintendent, James Currie, of London, Ont.

DAYTON, O. The Dayton & Eaton Electric Railway project is backed by the Cincinnati & Miami Valley Traction Company. A power house will be erected at Johnsville.

AKRON, O.—The Cleveland & Southeastern Electric Railway Company has given the county a bond of $2,500, to guarantee the completion of the proposed road within 18 months.

LIMA, O.—The Lima Electric Street Railway Company has been incorporated. Capital stock, $200,000; incorporators, E. W. Moore, N. A. Gilbert, W. L. Corry, Adam T. Hill and Edward H. Tracy.

COLUMBUS, O.—The franchise of the Columbus & Buckeye Lake Street Railway Company has been extended to October 1, 1897. The company was formed 2 years ago but has done no construction.

CINCINNATI, O. The Cincinnati, Hamilton & Dayton Railway Company has obtained control of the street railway of Middletown, O., with a view to the immediate equipment of its steam tracks for an electric suburban service.

AKRON, O.—The Cleveland & Southern Electric Railway Company has been granted the franchise forfeited by the Cleveland & Akron Company. Work must be begun within six months, and the line be in operation within eighteen months.

CINCINNATI, O.—The Cincinnati & Miami Valley Traction Company will let contracts after January 1 for 25 cars. Hon. Peter Schwab, of Hamilton, is interested, as are also Stern & Silverman, the railway builders of Philadelphia.

LIMA, O.—The new owners of the street railway have elected E. W. Moore, of Cleveland, president; Edwin Stone, of Bedford, Me., vice-president; C. Currie, of Lima, general manager. Other directors are M. A. Gilbert and L. C. Catlin.

CINCINNATI, O.—Butler County has granted a franchise to the Cincinnati & Miami Valley Traction Company for the portion of the proposed Cincinnati & Dayton line lying within its limits. Construction must begin July 1, 1897, and be completed within one year.

NORWALK, O.—W. W. Graham, of Norwalk, and Clark Rude, of Sandusky, have been granted a franchise by the Huron county commissioners for the electric road they have been promoting for over a year. They will build 30 miles of road from Sandusky to Norwalk, with a branch from North Monroeville to Bellevue. Mr. Rude visited New York recently and succeeded in interesting eastern capital.

Pennsylvania.

PHILADELPHIA, PA.—A permit has been granted the Union Traction Company to lay track on Fifteenth street.

LANCASTER, PA.—William B. Givin, of Columbia, has been appointed receiver of the Pennsylvania Traction Company.

BRADDOCK, PA.—The right of way of the Braddock Electric Railway has been declared forfeited for not operating its Talbot avenue lines the past 16 months.

BRISTOL, PA.—The Bristol & Langhorne Electric Railway has been placed in operation. Current is supplied by the Langhorne Electric Light Company.

SCRANTON, PA.—The People's Street Railway Company has petitioned for a change of name to "Scranton Railway Company." The company is extending its lines.

TOWANDA, PA.—The Bradford County Railway Company's franchise has been extended, the date for the completion of the road being advanced to June 1, 1897.

QUAKERTOWN, PA.—President C. Taylor Leland, of the Quakertown Traction Company, has purchased some of the material required for the new line to Richlandtown.

PITTSBURG, PA.—The Ohio River Electric Street Railway Company has been incorporated to build in the borough of Bellevue Capital stock, $36,000; incorporators, J. N. Davidson, A. M. O'Brien and Frank Oliver.

PHILADELPHIA, PA.—The Grand Boulevard Street Railway Company has been granted a permit to lay track on Mill street, Germantown. The company proposes to build a line from Bristol turnpike and Germantown avenue to Branchtown.

PITTSBURG, PA.—The Sewickley Valley Electric Street Railway has been incorporated to build an electric railway in Glenfield Borough. Capital stock, $30,000; incorporators, J. N. Davidson, Frank Oliver, Allegheny; A. M. O'Brien, Pittsburg.

QUAKERTOWN, PA.—The Quakertown Traction Company has been incorporated to build the road between Richlandtown, Quakertown and Truhbaursville, already noted in the BULLETIN. Capital stock, $100,000; president, C. Taylor Leland, Newtown; directors, H. M. Seiple, Charles F. Cronin and George H. Toadvine, Philadelphia.

South Carolina.

CHARLESTON, S. C.—Now that the Charleston Railway has begun work, the City Railway and the Enterprise Company both are eager to convert their horse lines to electricity.

GREENVILLE, S. C.—The Paris Mountain Land Company has been incorporated to build a horse, steam or electric railway from Greenville to Paris Mountain. Capital stock, $10,000; incorporators, S. F. Trowbridge, of Piedmont; Samuel M. Grist, of Yorkville; W. J. and W. F. Thackston, H. C. Markley, O. B. Cagle, J. F. Richardson, A. G. Furman, A. G. Gower, H. J. Haynsworth and Frank Hammond, all of Greenville.

Tennessee.

CLARKSVILLE, TENN.—An electric road to New Providence is contemplated by Clarksville men.

CHATTANOOGA, TENN.—Sam W. Divine asks a franchise over William Street, for his proposed electric road to the Chickamauga National Military Park.

Texas.

FT. WORTH, TEX.—J. T. Voss, and Woodford Brooks, the enterprising proprietors of the Glenwood & Polytechnic College Street Railway, have purchased the Samuels avenue line of the City Railway with a view to placing it in thorough repair and operating in connection with their present lines.

Vermont.

MONTPELIER, VT.—The Montpelier & Mad River Electric Railroad has been incorporated.

BRATTLEBORO, VT.—The Brattleboro Street Railroad Company has petitioned for an amendment to its charter permitting various extensions.

BELLOWS FALLS, VT.—The Bellows Falls & Saxton's River Street Railway Company has asked that its charter be amended to permit a change of route.

BENNINGTON, VT.—Work on the Bennington Electric Railroad will probably be resumed next spring. About $6,000 has already been expended in grading the road, which is to be nine miles long.

NEWPORT, VT.—The Clyde River Electric Railway Company has been organized to build through Newport, Derby, Charleston and Brighton. Capital stock, $150,000; incorporators, C. S. Magoon, P. J. Farrel, G. H. Prouty, J. E. Farrel, Seymour Lane, C. C. Davis and C. A. Prouty.

RUTLAND, VT.—The Western Vermont Street Railway Company will be incorporated to operate in Middletown Springs, Poultney, Fair Haven, West Haven, Benson, Castleton, Ira and West Rutland. Capital stock, $100,000; incorporators, Leonidas Gray, A. Y. Gray, A. A. Greene, A. H. Varney, J. B. Beaman, E. H. Phelps and Jerome B. Bromley.

RICHFORD, VT.—The Richford & Montgomery Electric Railway Company has been incorporated to build to Montgomery. Capital stock, $75,000; incorporators, Silas P. Carpenter, L. C. Leavens, W. S. Foster, A. K. Brown, F. W. Mitchell and J. N. Powell, of Richford, and J. M. Cobb, H. J. Rublee, O. N. Kelton, C. T. Hall, J. C. Hutchins and H. O. Rowley, of Montgomery.

Virginia.

NORFOLK, VA.—F. Heismenger, a director, and Mr. Talbot, engineer, have been going over the lines and proposed extension of the Portsmouth Street Railroad. Mr. Whitman and others, of Philadelphia, are investing in the road.

Washington.

SEATTLE, WASH.—The Seattle Consolidated Street Railway has been sold under foreclosure for $139,601, representing the claims of the first mortgage bondholders.

Wisconsin.

MILWAUKEE, WIS. A. B. Meyers and James Petley, of the Milwaukee & Waukesha Electric Railway were in Waukesha recently negotiating the purchase of the Waukesha Beach Electric Railway.

EAU CLAIRE, WIS. E. A. Noyes, of Portland, Me., representing bondholders, on November 17 purchased the rights and property of the Eau Claire Street Railway, Light & Power Company, for $20,000, at auction sale.

OSHKOSH, WIS.—Local men are organizing the Citizens' Traction Company, to carry out the project of the defunct Central Wisconsin Company. M. H. Eaton, ex-Mayor Stevens and ex-City Attorney Weed are interested.

OSHKOSH, WIS.—The Central Wisconsin Electric Railway Company's property has been sold by the sheriff. The company was organized three years ago and built a few miles of road which was never operated. W. H. Clark, of Chicago, purchased the franchises; W. F. Gruenwold, of Oshkosh, the ties and poles, and Charles Barber, of the Oshkosh Street Railway, the iron.

Canada

SARNIA, ONT. Point Edward and Sarnia people are agitating for an electric railway.

GALT, ONT.—An electric road is proposed to connect Brantford, Port Dover and Galt.

KINGSTON, ONT.—Right has been granted the Kingston, Portsmouth & Cataraqui Electric Railway to extend its tracks.

TORONTO, ONT.—The Metropolitan Street Railway will probably be extended to Lake Simcoe, in which case a power house will be erected.

SHERBROOKE, QUE.—Preparations are being made for the construction of the Sherbrooke Street Railway. Tracklaying will begin in the spring.

DANVILLE, QUE.—The Asbestors & Danville Railway Company is applying for power to build and operate an electric railway from Danville to Asbestors.

QUEBEC, QUE.—Mr. Badger, manager of the Electric Power Company, is in the United States buying material for the new trolley line, of which he is now the head.

BRANTFORD, ONT.—The project to build an electric railway from Brantford to Galt and Port Dover has been received by Mayor Elliott and Dr. Secord, of Brantford, and Henry Stroud, of Paris.

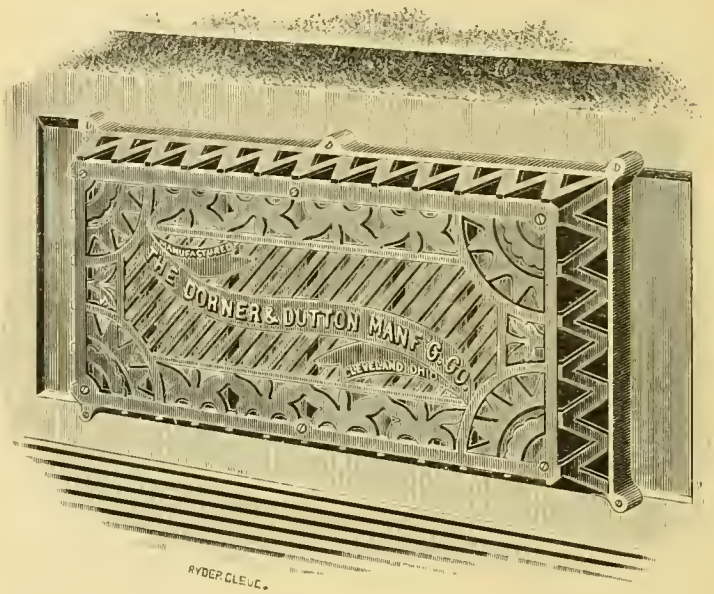
ST. JEROME, QUE.—The Northern Electric Railway Company has applied to the provincial legislature for power to construct an electric railway from Montreal to St. Jerome and through the northern townships.

ELECTRIC MUTUAL FIRE ASSOCIATION.

This is the name of a mutual fire association which has been organized by street railway men at Scranton, Pa. It is along the lines of what managers have wished for and talked of for years. It has been organized by practically the same men who so successfully started the Electric Mutual Casualty, and is really an outgrowth of that association, though of course, a fire and casualty business could not be conducted by one corporation. The fire company proposes to take street railway risks exclusively. Newton Jackson, who did such good work in organizing the Casualty, has resigned his position as secretary to become secretary of the Fire company, and will devote his time to pushing it. Wm. W. Wharton succeeds him as secretary of the Casualty.

THE DORNER & DUTTON ELECTRIC HEATERS.

The Dorner & Dutton Manufacturing Company of Cleveland has put on the market an electric heater using carbon in place of iron wire for the conducting medium. Each heater contains twelve feet of 1 ½ inch porcelain tubing filled with a carbon compound. Four amperes passing through this compound keeps the outside of the tube at about 310 degrees. The tubing is encased in neat open work which allows the free circulation of air. The tubes have a greater surface exposed than wires and cannot burn or rust out like wires. These heaters are wired two in series and four are placed on a car. Switches are furnished so that two or one-half amperes can be used when four amperes are not required. The carbon compound is guaranteed not to consume and the heaters guaranteed to last the life time of a car. Two styles are manufactured for cross and side seats. This company seems to have secured a very durable and simple form of heater that ought to find a ready sale.



DORNER & DUTTON ELECTRIC HEATER.

The Consumers Electric Light & Street Railway Company, Tampa, Fla., has thrown open to the public its line to its new power house, making nearly forty miles of road in service. At the new station, 1,500 horsepower, is obtained by steam, and a similar amount will be taken from the Hillsboro river. This is in addition to two plants already in operation.

F. H. Tidman has been appointed receiver for the Lake Ontario & Riverside Electric Street Railroad of Oswego, N. Y., at the instance of C. Sidney Shepard, a judgment creditor. The motors of most of the cars have been removed by the sheriff to satisfy claims of the Walker Company, of Cleveland, and others. The employes have received no pay in two months.

ELECTRIC RAILWAY PROGRESS 1896

In the way of new construction the past year has been disappointing. New projects started in well in the spring, but in June came the election scare, and nearly all work was stopped until the outcome of the free silver movement was settled. True, some unfinished work was completed after June, and one or two projects were put through in spite of the difficulty of finding money for investment, but, taken altogether, this past year has seen the least amount of new work of any year since electric traction was first introduced. Aside from absence of new work, the general progress of the electric railway industry has been fully as gratifying as in previous years.

One of the most important and significant tendencies of the year has been the decline of the 3-cent fare agitation, taken up last year by the newspapers in many cities, and reaching a climax early in 1896. This agitation had been persisted in until it was a serious menace to many of the street railway investments of the country. For several months nothing seemed to effectually stem the tide of 3-cent fare sentiment. Then came the Massachusetts railroad commissioner's report, which showed conclusively that no road could carry for 3 cents and live. This was the beginning of the exposure of this fallacy, and when later in the year the Detroit Railway, which had been heralded over the country as an example, announced its inability to come out even on a 3-cent fare, there was nothing left for the 3-cent fare advocates to stand on. In this connection the REVIEW takes some pride in being the only technical paper to take an active part in fighting this movement, which threatened for a time to cause great financial ruin. The agitation has now practically ceased, and like many other daily newspaper crazes, will probably not soon appear again.

There has, during the year, been a gradual improvement in the methods used on various roads over the country for testing and repairing motors, and scientific methods now prevail in many shops where guesswork and cut-and-try methods before prevailed.

Our knowledge of track bonding and of the behaviour of return circuits is also being added to month by month, and methods of testing return circuits are being improved and new ones evolved.

One more elevated road—the Lake Street Elevated of Chicago—has come into the electrical fold and the Manhattan Elevated of New York will probably follow, as it is experimenting with an electric locomotive at the present time.

Another interesting but not exactly new development was the use of a third rail on part of the electrically equipped line of the New York, New Haven & Hartford Railroad.

A third rail electric system has also come into use on the Brooklyn bridge for switching and night traffic.

From a purely electrical standpoint the opening of the road at Lugano, Switzerland, on the three phase system, was probably the most important event of the year although attracting comparatively little attention on this side of the water. It is probably the forerunner of many others.

Of considerable local electrical importance also is the furnishing of Niagara power to the Buffalo Railway. Although this is not the first long distance transmission of electric railway power it is interesting because of the size of the undertaking and the high voltage used on the transmission line.

During the year a street railway system of considerable size has been installed in Chicago (though not yet completed) which is to give the storage battery a thorough test for traction purposes. Every provision is being made to give the battery a fair show and determine what merit there is in it.

The largest electric railway engine (4,000-horse-power) and generator yet built are the product of this year's labors in two Canadian factories,—the recipient of this big unit being the Montreal Street Railway.

Gas engines have come into use in two small electric railway power stations in this country, viz., Stockton, Cal., and Lancaster, O.

There is a noticeable tendency to the use of artificial means for cooling condensing water for power stations not on a water supply.

The convertible car has found increasing favor and use as has also the double truck car.

Increasing attention is being given to the composition of steel for electric railway rails and their wearing qualities thereby increased.

Electric railway building in foreign countries has progressed steadily and is on the increase. The progress has been most gratifying on the European continent, where as complete a transformation from horses to electricity is taking place as has been effected in the United States. The trolley has also invaded Cairo, Egypt, and Cape Town, South Africa. Foreign trade is coming to be an important factor in the business of American street railway supply manufacturers, with still more promising prospects in the near future.

PROGRESS ON CHICAGO'S STORAGE BATTERY ROAD.

Although work is going steadily forward on the Englewood & Chicago Street Railway (the big system to be run by storage batteries) it will be a long time yet before the road is in regular operation. Some rather misleading articles have been published recently in the technical press, giving the impression that the road is in full operation. As a fact, however, only two or three second-hand cars are being run, and those for the purpose of holding down franchises. None of the permanent engines are installed yet in the power plant, and the new cars are just beginning to be equipped. There are some gaps in the track to be filled in, and, taken altogether, it will be several months until the road can really be called in regular operation.

Troy City conductors are required to report on trip sheet the name and star number of all policemen riding free.

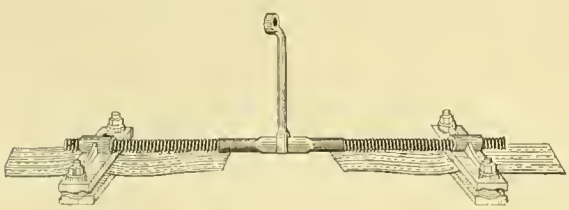
NEW WHITE SNOW PLOW.

The accompanying engraving shows the latest type of snow plow manufactured by the White Manufacturing Company of New York City. It has a shear board extending outside of the wheels and has a wing on each end of the shear board that can be raised or lowered in a very short time. Inside the car is a hand wheel about the size of a brake wheel by which the shear board can instantly be lifted or lowered. The board is kept horizontal, as it is raised, so that one end is not lifted higher than the other. The ice diggers or track cleaners are in front of each set of wheels and are controlled by the motorman by a large lever. One special feature about this plow is that any part that might break can be replaced as the car stands on the track. Another new and important feature is that the controlling handles are all placed at the extreme ends, so that by a few minutes work the shears can be taken off and the car can be used for a freight, express or tool car. The motors are on the axles, leaving the car body clear. The brakes are simple and strong, and work between the wheels. The plows are being made with full closed bodies or with platforms, as desired. In addition to a very good trade in snow plows this company is filling many orders for transfer tables.

WHITE SNOW PLOW.

BELT STRETCHER.

For lacing belts not more than six or eight inches wide the device here shown is much more convenient than one with a screw at each side. Equal tension is put upon the two edges of the belt if the right and left hand screw be properly adjusted so as to come over the line of the center of the width of the belt. The clamps have corrugations running lengthwise, which prevents the belt slipping.



BELT STRETCHER.

STREET RAILWAY NOTES FROM PARIS.

(From Our Own Correspondent.)

Electric railways operated by the overhead wire have been introduced with much success at Versailles. We shall give some notes upon this in a succeeding issue. Following closely upon this inroad into the set prejudice prevailing here against trolley lines, comes an authorization to admit them under restrictive conditions into Paris. A mixed commission of the municipal council has quite recently resolved to grant a franchise to the Southern Street Railway Company (Compagnie des Tramways du Sud.)

All the other tramway companies systematically oppose all the efforts of the city council to secure the substitution of mechanical traction for animal power by demanding in return lengthened concessions. The Southern Company offers to install, entirely at its own cost and risk, an electric line in Paris between the Bastille and Charenton, on the south side of the city, leaving to the authorities the power to definitely cancel the provisional grant if they shall deem the line unsatisfactory in operation. At all street intersections, squares and other open places to be designated by the city the wires are to be placed underground, but with the option of using surface contacts on the road. The fares are to be reduced below those now prevailing in Paris, and are to be for first-class four cents, and for second class two cents. Outside the fortifications the fares are to be two cents and one cent, leaving the other half to be paid on passing the limit mentioned.

The insufficiency of the means of transportation in Paris is ever the cause of complaint, and the Prefect of the Seine has compiled a list of the lines most pressingly required, and submitted it to the general council of the city for approval. There are at least thirty lines so recommended, some of them four and six miles long, and all are to be operated by mechanical traction.

The unwillingness of the Paris street railway companies to lay new lines is the subject of many stormy debates with the municipal authorities. Even Parisans are exasperated at the great difficulty in securing any extension of the lines. It is amusing to hear the members of the council speak of using "coercion" or "prosecution" against the offending Compagnie Generale des Omnibus. Disputes as to the itinerary of a proposed line arise and matters progress but slowly in

consequence. The public is weary of the published discussions and of the unavailing threats of the municipality against the great street car company which for fifteen years to come will monopolize the right to transport the inhabitants of Paris.

In addition to the new lines referred to, there are some twenty or thirty others proposed. There can not be less than 240 miles of lines projected, which really require to be built. Only mechanical power is possible or permissible in operating such an extent of road, and French engineers are closely watching the best systems prevailing in America.

As substitutes for the trolley the underneath wire electric line (surface contacts in road) from Paris to Romainville, the Serpollet steam, and the Mekarski air cars on other lines appear to serve well. The passenger cars containing motors oscillate so much as to produce a feeling of fatigue not noticeable with electric trail or horse cars.

A new line to be worked by underground electric current, is to connect the Western Station (Gare St. Lazare) with the Place du Temple on the east side. A narrow gage line (Decanville system) is proposed to connect the Villette Abattoirs with the quays of the different canals running southward towards the Seine.

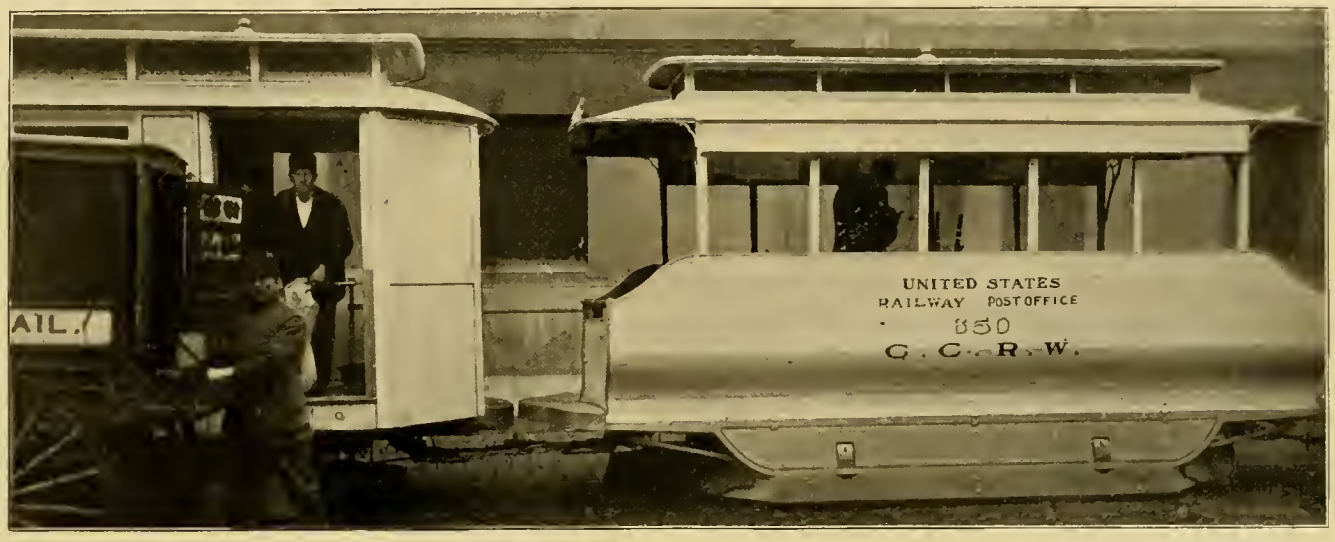
Track laying is proceeding with great activity in many parts of Paris. In view of the lines which will be blocked at the Trocadero (American quarter of Paris) during the 1900 exposition, other tracks are being laid so maintaining the communication with Passy, the Anglo American suburb, by a detour.

UNION LOOP POWER HOUSE, CHICAGO.

The power for the Union down town loop of the elevated roads of Chicago, is to be supplied by a new power house, 300 feet south of Van Buren street on Market street. The location is directly on the river. The present plan is to have a two-story station, with the boilers on the second floor, as sufficient land could not be obtained to put everything on one floor. The dimensions will be about 157 by 141 feet. Plans are made to accommodate four 2,000-horse-power Siemens & Halske generators direct connected to Providence corliss engines. Three of these units will be put in at first.

WILL RUN SPECIAL MAIL TRAINS.

The Chicago City Railway has re-built a couple of grip cars for the exclusive purpose of hauling postal cars. These grip cars are fixed so as to be inaccessible to passengers. The idea is to do away with the delay and interference to mail cars by passenger traffic as when hauled in passenger trains.



MAIL TRAIN WITH SPECIAL GRIP—CHICAGO CITY RAILWAY.

NEW PUBLICATIONS.

"Hartshorn's Roller" is the title of a 16-page monthly setting forth the merits of that most excellent curtain supporter.

The catalog for the University of Wisconsin, has made its yearly appearance and shows that institution to be one of the foremost in engineering lines.

"Always In Line" is the title of an attractive little pamphlet full of facts, figures and illustrations of the cast-welding work of the Falk Manufacturing Company, Milwaukee. It should be studied by every manager and track foreman in the country.

We are in receipt of the 1896 announcements of Lehigh University. The shorter course in mining now offered differs from the longer, in offering electrical instead of metallurgical and chemical subjects, and will prove attractive to students in electrical engineering.

The latest publication of Warren Webster & Company, Camden, N. J., is one of the most neatly executed trade pamphlets that has come to our notice. It contains a very complete illustrated description of the Webster system of steam heating, a list of a hundred or more users of the latest improved system, and a great number of handsome illustrations of prominent buildings in which the system has been installed. The widespread distribution of the users and the character of the plants wherein it is used are the best possible arguments in favor of the efficiency of the system.

The Consolidated Traction Company, of Newark, N. J., has absorbed the Passaic & Newark Electric Railway.

Echoes from the Trade

The Brooklyn & New York Railway Supply Company has furnished an electric snow sweeper to the Troy City Railway Company.

Charles N. Wood, manager of the R. D. Nuttall Company's Boston office, has opened another branch at 80 Broadway, New York.

The McGuire Manufacturing Company has issued a handsome colored folder on its Columbia magazine street car heater, setting forth its advantages.

Elmer P. Morris, 36 Dey street, New York, becomes eastern selling agent of the McGuire Manufacturing Company, succeeding H. P. Hirsch, who returns to Chicago.

The American Engine Company, of Bound Brook, N. J., is about to ship one of its new American-Ball engines to the Chinese government, to be used in driving machinery for the coinage of silver.

The Berlin Iron Bridge Company, of East Berlin, Conn., has under construction the frame work, and roof of corrugated iron, for the electric railway car house at Port au Prince, Hayti, West Indies.

The Taunton Locomotive Works, Taunton, Mass., have shipped a snow plow to the Portland (Me.) & Cape Elizabeth Electric Railway that will, doubtless, do good work in annihilating the big drifts with which that road is troubled.

The Edison-Brown plastic rail bond is finding its way abroad, having been specified in the past few weeks for a number of important European roads. An order of 9,000 joints is also being sent to the La Capital Company, Buenos Ayres.

A. H. Woodward, general manager of the International Register Company, Chicago, returned last week from an extended and very successful eastern trip. He reports business as improving, with even better prospects for the near future.

The Ironton & Petersburg, O., Electric Railway Company has placed one-half its line in operation. Track was laid by the Albion Construction Company, Chicago; and overhead work erected by the Creaghead Engineering Company, Cincinnati.

The National Association of Manufacturers meets at Philadelphia, January 26, 27 and 28. The president will report very gratifying progress in the association's first year of work. A policy will be mapped out for the ensuing year, which is one full of promise.

The Central Electric Company, of Chicago, has issued a catalogue of X-ray apparatus, in which are listed induction coils, transformers, batteries, Crooke's tubes, fluoroscopes, etc. The catalog is particularly interesting because of the sciagraphs therein reproduced.

The Card Electric Motor & Dynamo Company of Cincinnati, manufacturing multipolar generators and slow speed motors is now represented by A. Shillinglaw, with an office at 625 Western Union building, Chicago. With him is associated E. F. Norton, formerly with C. G. Armstrong.

N. R. McLeod becomes manager of the insulating department of the Chicago office of Washburn & Moen Manufacturing Company, which now will be given special attention. Mr. McLeod is energetic, experienced and popular, and under his care this new department should become a strong one.

The Garton-Daniels Electric Company, Keokuk, Iowa, closes the year with altogether the biggest record since the organization of the concern. Every arrester sent out helps to sell another and a large share of the orders were for additional equipment of new cars on lines where the arresters were already in service.

The Crane Company, Chicago, has lately closed contracts for high pressure valves, fittings and pipes for the Chicago City Railway, Western Wheel Works, Chicago; McCormick Harvesting Machine Company, Chicago; an electric power station at Yokohama, Japan, and five gold mines at Johannesburg, South African Republic.

During the unsettled time preceding the election, the R. D. Nuttall Company reports its works ran full time. It rightly construes this as a high compliment to its workmanship, goods and business methods. As it has always been the pioneer in its lines it is anxious now to lead in supplying the demand it anticipates will follow the revival of business.

G. L. Foote, H. G. Pierson and Charles Freeman, long associated with E. S. Greeley & Company, 5 and 7 Dey street, New York, have purchased the manufacturing department of that company, and removed to 82 and 84 Fulton street, where they will continue the manufacture of electrical instruments and supplies under the style of Foote, Pierson & Co.

On December 3, McCurdy & Smith, Indianapolis, perfected a settlement with the creditors, and the assignees turned over to them the business of the company, which will be continued at the same place and under the old name. Their many friends will hope to see the success attend their efforts which the excellent quality of their insulating paint deserves.

The Graphite Lubricating Company, Bound Brook, N. J., is meeting with continued success with its many applications of graphite and bronze bearings, bushings and washers. In street railway work it has been especially successful and the good records made speak volumes in its favor. For trolley wheels and motor bearings the graphite claims unequaled merits.

The New Haven Car Register Company, of New Haven, Conn., is negotiating some large contracts for its double register, which is rapidly pushing its way to the front. The New Haven double register has just been adopted by the Syracuse Rapid Transit Railway Company, the Richmond Traction Company and the Market Street Railway Company, of San Francisco.

The report of the supervisor of signals on a leading trunk line shows most satisfactory results obtained with a waterproof graphite grease manufactured by the Joseph Dixon

Crucible Company, Jersey City, N. J. The grease is easily applied and stays where it is put. Being a good lubricant and unaffected by water it is well adapted for all exposed bearings in railway signal plants.

Geo. C. Ewing, 620 Atlantic avenue, Boston, is rapidly building up a good trade in second hand electric railway machinery, cars, etc. It frequently happens that larger companies in order to standardize discard apparatus which is too small for their use but still serviceable on smaller roads, and it is to make a sort of clearing house between the large and small roads that this agency was opened.

The Glen Oaks and Prospect Heights is a new electric extending from the city limits of Peoria out to a manufacturing point, which now has no suitable connection with the city. Line is three miles of single track. Overhead and track work will be done by Louis Myers; J. Holt Gates sold the Walker generators and motors; McGuire the trucks and the St. Louis Car Company, the 5 cars.

Owing to the widespread interest in McRoy vitrified terra cotta conduit, John T. McRoy, of 915 Chamber of Commerce building, Chicago, has been obliged to issue another very neat little booklet on the subject, which gives in detail the many good points embodied in this valuable article. The McRoy conduit has so many distinct advantages for underground work that it is bound to find wide use.

A well known and successful Ohio manager, who operates a fine pleasure resort in connection with his road, informs us he found the merry-go-round which he installed last spring the best attraction in his park. The park season lasted 100 days, on 50 of which rain fell, but in spite of this the machine earned nearly enough to pay for itself. It was made by the Armitage, Herschell Company, North Tonawanda, N. Y.

The Simond's Manufacturing Company of Pittsburg has closed arrangements with Elmer P. Morris to act as representative and handle its gears and pinions in the east, with an office at 36 Dey street, New York. The company has also arranged with J. C. Carry to represent its interests in Chicago. Mr. Carry is located at 1301 Fisher building, and will be glad to see all railway men when they are in the city.

The Davenport Consolidated Gas, Electric Light & Steam Heating Company, of Davenport, Iowa, commenced the supply of exhaust steam for heating on October 18, 1896. The underground steam plant was constructed by the American District Steam Company, of Lockport, N. Y. It comprises about one and one-fourth miles of pipe. The company already has a large patronage, and its income from exhaust steam will make a handsome addition to its net revenue.

The Brussels Tapestry Company reports a very large inquiry for its waterproof car curtain material, 'Brusselette.' It makes 'Brusselette' with silk, wool or cotton, all in a great variety of patterns and styles. It guarantees 'Brusselette' superior to any similar goods on the market. The 'Perfect' self-adjustable curtain fixture, manufactured by this company, is meeting with a large demand, for both open and closed cars, and as far as we can learn, giving entire satisfaction.

Pintsch light has been thoroughly investigated by the management of the Manhattan Elevated Railroad, of New York. President George J. Gould is convinced that the Pintsch system is the best, and has just signed a contract with the Safety Car Heating & Lighting Company for the equipment of all the elevated cars with this splendid illuminant. The brilliantly lighted cars of the Broadway cable road have been attracting many former patrons of the elevated railroad. By adopting the same light the managers of the latter hope to regain a portion of the lost traffic.

The St. Louis Electric & Construction Company has been incorporated at St. Louis, Mo., to install electric plants and construct railways. The capital stock is $600,000, fully paid; and the incorporators are George J. Kobush, Otto Von Schrader, Adolphus Busch, Ellis Wainwright, Charles H. Turner, Philip Stock, L. B. Pierce, Rolla Wells, Breckinridge Jones, Julius J. Walsh, C. K. D. Walsh, William T. Haarstich, C. Marquard Foster, Henry Nicolaus, August Gehner, Hopkins H. Crawford, William C. Orthwein, William F. Walker, H. S. Priest and James H. Parish.

A very interesting addition to existing data on insulating materials has been made by the Mica Insulator Company, of New York, Chicago and London, in the form of a collection of samples of the various insulating materials which it manufactures, bound up in book form, and accompanied with the results of actual tests on each material. The voltage required to break down a given thickness and the specific insulation resistance are given. The figures are the averages of a large number of tests made by Herrick & Burke, New York. The samples consist of insulation suited to very many different uses.

Cahall-Babcock & Wilcox boilers, manufactured by the Aultman & Taylor Machinery Company, of Mansfield, Ohio, have recently been sold to the following customers: Nekoosa Paper Company, Nekoosa, Wis., 500-horse-power; Abbeville Mills, Abbeville, S. C., 300-horse-power; Steere Worsted Mills, Providence, R. I., 500-horse-power; Block Plant Electric Light Company, Boston, Mass., 175-horse-power; Willimantic Linen Company, Willimantic, Conn., 750-horse-power; Crystal Ice Company, Allegheny, Pa., 750-horse-power, and Pittsburg Wire Company, Braddock, Pa., 500-horse-power.

A visit to the works of C. & G. Cooper & Co., Mount Vernon, Ohio, found them very busy. President F. L. Fairchild reports the past year as the best in the history of the company, the increased work requiring the addition of another large building, which has just been finished. Recent orders include a 1,600-horse-power engine for a large cotton mill at Spartansburg, South Carolina; an 800 for Whitney, South Carolina; a 150 for Durham, North Carolina; a 1,200 for Centerville, R. I.; a 1,200 for Webster, Mass., and a 750-horse-power for the street railway at Painesville, O., being a third order from this road.

D. C. Sweet, Springfield, Mass., is meeting with phenominal success with his wheel grinding machines for turning down wheels without removal from the car. One manager who has recently installed one of these machines, states it formerly cost them $1.50 to take out and replace a wheel,

and 25 cents to grind it, not to count anything for loss of time on car when out of service. With a Sweet machine he has cut the time and expense right in two. Mr. Sweet estimates the cost of grinding a wheel by his method at from 50 cents to $1, which includes labor, power, wear of the emery wheels, and interest on cost of grinding machine. He says almost any car house with 12 to 20 cars, or more, can install a machine to advantage.

The Ohio Brass Company, Mansfield, Ohio, is receiving an unusual number of orders for adjustable track brush holders and steel wire track brooms. The adjustable track brush holder has been given a thorough trial under the most severe conditions by a large number of roads, and its utility has been completely demonstrated. A neat descriptive circular and price list of holders and brooms has recently been distributed. As a result of the increasing popularity of the Walker trolley ear several companies have placed on the market a mechanical ear patterned after it, and said to give equally good results. The Ohio Brass Company states for the benefit of the trade that the salient features of the Walker ear are fully covered by letters patent No. 526,422. This company has the sole right to manufacture this article, and requests that its rights be respected.

The trade will be interested to know that the Western Electric Company of Chicago, has been given the agency for the products of the Interior Conduit & Insulation Company, of New York. All brass armored and iron armored conduits, elbows, couplings, fittings, etc., will be carried in stock in Chicago, and unusual facilities will be given to jobbers and contractors for obtaining this material at the lowest prices. The Interior Conduit Company has just brought out special conduit which is much superior to anything before placed upon the market, and it has not only increased the excellence of this material, but has materially decreased the price. The Western Electric Company is prepared to furnish new prices upon application. Coupled with this agency the Western Electric Company has also secured the agency for a fine line of standard, iron armored, slate lined, panel, distributing, fuse, main and feeder terminals; also branch junction boxes. These boxes are specially designed and each box can be used on either two or three wire systems. Catalogs and special quotations on application.

The McGuire Manufacturing Company, of this city, reports the past two months' business as the largest this year, which is saying a great deal, especially at election time, when it is generally very dull. The sales for October included 281 A1 suspension trucks, 38 L. trucks, 486 "Columbia" heaters, and 18 sweepers. The sweeper and stove departments are very busy, and enough orders are on hand to keep them running for some time. The Consolidated Traction Company, of Pittsburg, has just placed an order for seven combination snow plows and sweepers, this being the third order for sweepers from this company. It has also just received orders for sweepers from the Chicago City Railway and the Burlington Traction Company, of Burlington, Vt., both being duplicate orders. The McGuire Company is quite conservative in regard to predicting the outlook for next year, but the fact that it has plans out for a seven story addition to its Morgan street factory, suggests that it is encouraging. It reports exceptionally good business in ratchet handles and steam specialties.

Cahall vertical boilers, manufactured by the Aultman & Taylor Machinery Company, of Mansfield, O., have recently been sold the following firms: Briar Hill Iron Company, Youngstown, O., 500-horse-power; United Coke & Gas Company, McKeesport, Pa., 600-horse-power; Phœnix Horseshoe Company, Poughkeepsie, N.Y., 125-horse-power; Brown & Co., Wayne Iron Works, Pittsburg, Pa., 450-horse-power; F. C. Hood, Watertown, Mass., 400-horse-power; American Net & Twine Company, Anniston, Ala., 320-horse-power; Lowell & Suburban Railway Company, Lowell, Mass., 1,250-horse-power; Chicago Horseshoe Company, Chicago, Ill., 250-horse-power; Buffalo Furnace Company, Buffalo, N. Y., 200-horse-power; Woodland Fire Brick Company, Woodland, Pa., 100-horse-power; Apollo Iron & Steel Company, Apollo, Pa. (fifth order), 250-horse-power; National Tube Works Company, McKeesport, Pa. (second order), 400-horse-power; Merrimack Manufacturing Company, Lowell, Mass., 250-horse-power; George Westinghouse, Jr., Pittsburg, 100-horse-power; Sicilian Asphalt Paving Company, New York City, 300-horse-power; Elmira Knitting Mills, Elmira, N. Y., 200-horse-power. The Carnegie Steel Company is just finishing up the installation of 6,000-horse-power of these boilers in the Edgar-Thomson Steel Works, Braddock, Pa.

The American Engine Company, Bound Brook, N. J., has begun the shipment of its new engines, known to the trade as American Ball engines. The first of these engines of 100-horse-power capacity has gone to the Detroit Evening News, and the second, a 50-horse-power engine, to the Savannah News. Since the addition of this line of work, the business of the company has so increased that the works are now running double time. In the electrical department, among recent shipments are the following: Cliff Paper Company, Niagara Falls, N. Y., two 150-horse-power motors; Detroit Evening News, Detroit, Mich., two 25-kilowatt dynamos; Albany Morning Express, Albany, N. Y., one 18-kilowatt dynamo; Oakland Tribune, Oakland, Cal., one 25-horse-power motor; A. N. Kellogg Newspaper Company, Chicago, Ill., one 25-horse-power and four 15-horse-power motors; Topeka Capital, Topeka, Kan., one 5-horse-power motor; Boston Traveler, Boston, Mass., one 12-horse-power and one 5-horse-power motor; Worcester Post, Worcester Mass., one 9-killowatt dynamo; Cincinnati Post, one 35-horse-power motor; Philadelphia News, one 25-horse-power and one 3-horse-power motor; American Newspaper Publishing Company, one 25-horse-power motor; Carrington Publishing Company, one 12-horse-power motor; J. B. Cranfill, Waco, Tex., one 25-horse-power motor; Fall River Publishing Company, Fall River, Mass., one 25-horse-power and one 3-horse-power motor; Saginaw Evening News, Saginaw, Mich., one 12-horse-power motor; B. A. Meade Co., Augusta, Me., one 3-horse-power motor; Chicago Journal, one 15-horse-power motor; Grand Rapids Democrat, Grand Rapids, Mich., one 15-horse-power and one 3-horse-power motor; St. Paul Pioneer Press, St. Paul, Minn., one 5-horse-power motor; Wallace Publishing Company, Des Moines, Ia., one 12-horse-power motor; New York Tribune, two 15-horse-power motors; Rubber Tire Wheel Company, New York, one 12-horse-power motor.

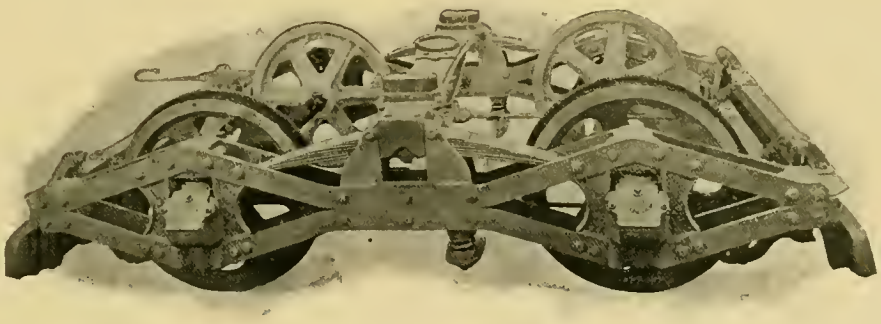
NEW DIAMOND SWIVEL TRUCK.

One of the latest and most improved swivel trucks today on the market, is that manufactured by the Diamond Truck & Car Gear Company, at Kingston, N. Y.

The design of this new double truck is an entirely new departure from existing forms of double truck construction, and combined in it are many new mechanical features suggested by experience and the criticisms of prominent street railway officials who have used double equipments for many years.

The unique design of the side frame members is similar to that of the single truck manufactured by this company, and is equally mechanical and up-to-date in every detail. The main bars of the side frame, instead of crossing each other at the center of the truck, only meet at the angles of the diamonds, and run parallel with each other horizontally between these points.

By this parallel-center construction of the side-frame members an opportunity is secured of locating advantageously the side steady guides for the bolster, which are firmly riveted to each member. This accomplishes two results, that of firmly bracing the truck frame members and that of providing a guide and draught-plate for the bolster. Situated between these two guides and resting on a shelf, on the inner surface of the plates, are spring pockets, which support the motor suspension bars.



The bolster is of heavy channel steel, with an under truss support or reinforcing girder of heavy flat steel bar, which is firmly riveted at each end of the bolster channel bar. This tie is also augmented by a steel casting which is bolted to these members and also acts as a vertical guide for the bolster in the jaw of the side steady plates.

Immediately at the center of the truck and within the area of the steel channel bolster and truss, the maximum width of which is midway between its ends, is located a separating casting, through which the king bolt passes. This casting, with its two fellow members, forms a truss, from which each end of the bolster is tensioned, or sprung together and riveted.

Surmounting the channel bolster, and vertical with the king bolt casting, is riveted the female center of swivel plate, through the center of which, the main swivel or king bolt passes.

The load of the car body is received and carried by two extra long elliptic springs, one on either side of the truck and located between the steady plates and the side frame members. These springs are seated at either end upon steel wearing pieces, which rest upon the solid shelves which are a part of the pedestal, and located nearly over the journal bearings. On account of the extreme length of these springs, it is claimed, a very easy riding and resilient service is secured by their use.

At either end of the steel channel bolster, and surmounting it, are the improved spring friction bearings, which receive the side movements of the car body first, thus assisting the main half elliptics, and modifying the thrust of the car load upon them. These side yielding bearings impart also a very easy riding quality to the truck. The brake equipment is of a unique swinging design and in its application is very powerful.

The track side frame members are securely held together at their ends by steel angle bars, which are firmly bolted to the end piece of each frame. These angle braces are also augmented by heavy life guards, which are also firmly bolted below the angle bars to the frames.

The first impression upon looking over the truck is one of exceptional strength combined with easy riding qualities. Upon a thorough examination of construction, it is found that the manufacturers have spared neither pains nor expense in their endeavor to place upon the market a swivel truck, within which are combined the essential features and improvements suggested by experience.

POWER HOUSE BURNED.

On December 12 the power house of the Lookout Mountain & Lulu Lake Incline Company, on top of Lookout mountain, was totally destroyed by fire. No one was injured.

MORE CONDUIT FOR NEW YORK.

As we go to press confirmation of the news comes that the Metropolitan Traction Company, of New York, will construct the Fourth, Sixth and Eighth Avenue roads with a conduit system similar to that used on Lenox Avenue.

Secretary Penington, of the American Street Railway Association, has broken all records and had the official report of the St. Louis convention in the mails in just one month after the meeting adjourned. The report is unusually well edited and arranged, and contains a fine steel engraving of Ex-president H. M. Littell.

The Third Avenue Railroad, of New York, during the year ended October 31, 1896, received $3,000,904, and paid $1,407,417 as operating expenses and $367,463 as fixed charges, leaving a balance of $1,226,023, of which $890,000 was disbursed as dividends and $336,023 applied to surplus. At the recent annual meeting Albert J. Elias was re-elected president and Henry Hart, vice-president.

The Standard Air Brake Company, in addition to receiving the large foreign order recently reported in our columns, has just secured a further order from abroad, and is now in treaty for its air brakes with a large system. It is very evident that General Manager Wessels keeps his weather eye open. His acquisition of Col. Fairchild, shows he is surrounding himself with the best available talent.

The Hoppes Manufacturing Company reports a large increase in orders during the past few weeks for its live steam feed-water purifiers and exhaust steam feed-water heaters. We note the following:

John Morrill & Co., Ltd., repeat order for 500-horse-power purifier; also 350-horse-power exhaust steam feed-water heater, Ottumwa, Iowa; St. Augustine (Fla.) Gas and Electric Light Company, 60-horse-power purifier; Louisville (Ky.) Railway Company, repeat order for 1,250-horse-power purifier; Liggett & Myers Tobacco Co., St. Louis, Mo., 3 purifiers, 2,250-horse-power; Northern Grain Company, Manitowoc, Wis., 200-horse-power purifier; Brooklyn (N. Y.) Hygenic Ice Company, 500-horse-power purifier; S. D. Hospital for the Insane, Yankton, S. D., 80-horse-power purifier; also 200-horse-power exhaust heater; Dayton Malleable Iron Company, Dayton, O., 200-horse-power purifier; Chattanooga, (Tenn.), Light & Power Company, 500-horse-power purifier; Indianapolis, (Ind.,) Hospital, 250-horse-power heater; Milwaukee Sander Manufacturing Company, Green Bay, Wis., 75-horse-power heater; Rowland Hazard, Mine LaMotte, Mo., 100-horse-power heater; Kupferle Bros. Manufacturing Company, St. Louis, Mo., 200-horse-power heater; Village of Clayton, Ill., 75-horse-power heater; Chas. G. Stifel, St. Louis, Mo., 150-horse-power heater; St. Louis (Mo.,) Iron & Machine Company, 150-horse-power heater; Rochester (Minn.,) State Hospital, 400-horse-power heater; P. H. & F. M. Root Company, Connersville, Ind., 100-horse-power heater; H. Guenther & Bros., Owensboro, Ky., 100-horse-power heater; Acme White Lead Works, Detroit, Mich., 200-horse-power heater; California (Mo.,) Electric Light Company, 100-horse-power heater; Springfield, (O.,) Silver Plate Company, 100-horse-power heater; Alex. Balfour, Pencoyd, Pa., repeat order, 300-horse-power heater.

The Seattle Consolidated Street Railway has been sold to representatives of the reorganization committee of the bondholders for $121,000. Property owned by the company brought $18,601 additional.

In the case of E. W. Skerry vs. the Sioux City Rapid Transit Company District Judge Gaynor decided that supply claims against an Iowa corporation are to be considered inferior to its bonded indebtedness.

The Albany Railway, Albany, N. Y., for the quarter ended September 30, 1896, reports gross earnings of $149,650, against $143,147 in 1895; operating expenses, $92,722, against $78,952; net earnings, $56,927, against $64,194.