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CONTENTS.

Requisitions for Material.....	339
Prospects of Terminal Electrification in Boston.....	339
A New Experiment in Cleveland.....	340
The Philadelphia Strike.....	340
Trunk-Line Electrification.....	341
The Effect of Single-Phase Development on D.-C. Line Construction..	341
Trailer Motor Cars in Philadelphia.....	342
Posting the Work of Careless Employees.....	344
The Experimental Catenary Line of the Connecticut Company.....	345
Hearing on Vestibules in New York.....	353
Operating Statistics for Street Railways in New York State.....	354
A Review of the Street Railway Rehabilitation in Chicago.....	355
Electric Welding in Repair Shops.....	356
Hearing on Service in the New York Subway.....	356
New Franchise for Cleveland Railway Approved.....	357
Strike in Philadelphia.....	358
Overhead Contact for a Cleveland Swing Bridge.....	360
Portable Transformers for Testing Armatures.....	360
Meeting of Committee on Equipment.....	361
Electric Lines Included in Amended Railroad Rate Bill.....	363
Standard Fire Hose Houses.....	364
Meeting of the Committee on Power Generation.....	365
Novel Type of Electric Locomotive.....	365
To Remove Brushes on G. E. Circuit Breaker.....	366
A Reversible Ball-Bearing Trolley Base.....	366
New Automatic Wheel Guard.....	366
News of Electric Railways.....	367
Financial and Corporate.....	369
Traffic and Transportation.....	371
Personal Mention.....	373
Construction News.....	374
Manufactures and Supplies.....	377

Requisitions for Material

The preparation of orders and requisitions in connection with rolling stock maintenance is necessarily a burdensome task, but it has a direct relation to economical operation. Apart from the connection between requisitions and the amount of stock purchased and stored, with resulting interest, insurance, taxation and rental charges, as well as depreciation, the manner in which such forms are filled out has no little influence upon the cost of clerical work in the motive power department. If orders and requisitions are obscure, time is lost in filling them, the company's telephone and inter-department mail service tends to become clogged with correcting inquiries, and as a result the cost of clerical labor is higher and the amount of material carried as a standing charge becomes greater than when material forms are filled and handled properly. If minor officials appreciated the promptness with which orders that are filled properly can be passed through department channels, there would be a more general understanding of the true obstructive effect of vague and incomplete requisitions. The need of accuracy and specific definition in orders for electric railway material is surpassed in scarcely any branch of the electrical industry except telephony, so numerous, varied and changing are the parts of equipment in their relation to progress in design and construction. It is not only natural, but right, for an executive officer to sort out orders which are plain and to hold back those which are obscure, but it is expensive to do this. Improvements in order-making may be made in two places: First, where the style of forms is decided, and second, at local points where the blanks are used. Trite as this topic seems to the busy operating man, the management of one large company recently made it the subject of an evening's discussion for car house foremen, and on other properties time similarly spent might be found profitable.

Prospects of Terminal Electrification in Boston

A noteworthy feature of the present session of the Massachusetts Legislature is the increasing public demand for electrification of the steam railroads serving the Boston Metropolitan district. A number of bills designed to effect legislation on this subject have been introduced and the remarks of President Charles S. Mellen of the New York, New Haven & Hartford Railroad before the New England Boot & Shoe Club regarding the specific problem presented in electrification at Boston, as published elsewhere in this issue, are of timely interest. Mr. Mellen recognizes that electrification for all the standard trunk lines, especially those with congested traffic, is a certain development of the future. He recommends, however, that no legislative action be taken to force the improvement at Boston, stating that his company is proceeding as rapidly as possible to determine the best methods and equipment for the service with the desire of decreasing the costs for a

given section of line as compared with the expense of the initial installation at New York.

While Mr. Mellen estimates that the fan-shaped location of the suburban lines at Boston, which branch to many diverse points, will make the total cost of electrification much greater than it has been in New York, the company is nevertheless planning to make the improvement. In view of its studies to determine the best engineering practice for both passenger and freight service, it is felt by the company that haste as a result of legislative action would lead to excessive costs for the investment, which might be overcome by the use of further time in investigation.

The recommendation of the joint commission at Boston a few weeks ago that the present Legislature pass a resolve requiring the companies entering the city of Boston to investigate and report upon the subject by next fall shows the attitude of the public on this problem. A settlement of the unsatisfactory conditions prevailing in the Boston terminal should be reached in a reasonable time. It is probable that if the public sees that the companies concerned are making definite studies designed to develop the method best adapted to their needs, radical action by legislative bodies may be forestalled. The public agitation and the evident railway recognition of the desirability of improvement certainly point to definite steps in the substitution of electricity for steam in the Boston terminal and suburban lines within a few years.

A New Experiment in Cleveland

The vote of the people of Cleveland approving the franchise for the Cleveland Railway Company assures an experiment with the low rate of 3 cents plus 1 cent for a transfer. This experiment is to last presumably through a period of eight months, but higher fares can follow if it is found that the requirements of the ordinance cannot be met with the revenues available at this rate of fare. Under the conditions created in Cleveland by the passage of the ordinance embodying the ideas of Judge Taylor for the settlement of the long standing street railway difficulties, the prescribed status of affairs is made radically different from that which exists in most large cities. The connection between the inter-related fare, dividend and service requirements is such that it is necessary first, that an experiment be made with a low rate of fare; second, that the dividend be met, and third, that, consistent with these provisions, the service, presumably, shall be satisfactory.

It is therefore necessary that the service be so adjusted as to meet the fare provisions which may be in force at the time and to assure the promised 6 per cent dividend upon the outstanding capital stock. As the trial at a low rate of fare which has been placed in effect was an inevitable result of the ordinance so the provision of this measure which enforces this experiment was in its turn an inevitable result of the agitation fostered by Mayor Johnson and continued even after the failure of the Municipal Traction Company to establish itself during its operation of the property with a low rate of fare.

A charge of 1 cent for a transfer will, of course, make the average rate of fare per revenue passenger something in excess of 3 cents during the period of experimentation, but just how much cannot be stated in the absence of statistics showing the recent extent of the transfer traffic. In the early part of the experimentation period of the Municipal Traction Company with the property the number of transfers issued aggregated

about 22 per cent of the total cash fares compared with about 39 per cent during the time just preceding when the old company controlled the property. Transfer traffic, however, fluctuates and may have varied considerably in the intervening months, particularly as the receivers who have been in charge since the failure of the Municipal Traction Company have instituted various changes in routes and in other features of the service which would tend to disturb old avenues of traffic. Whether the restricted service which will be rendered the public of Cleveland at the experimental low rate of fare will be satisfactory or whether a better service with a resultant higher rate of fare will be demanded, are questions which will now be solved without much delay.

The Philadelphia Strike

The waste and destruction of property, the loss of life, the serious interruption to business and the general defiance of law which have taken place and are still occurring in connection with the strike in Philadelphia constitute an economic and political crime.

In this twentieth century there should be other means for settling differences of opinion between employer and employee than riot and bloodshed, which are abhorrent to every right-minded person, and this feeling is emphasized when such acts occur in a city founded upon the principles of brotherly love. Any cause which requires to be bolstered up by the violence and disorder which have characterized the Philadelphia strike must receive general condemnation. The strike leaders, in public, disclaim active participation in or encouragement on their part of the lawless acts continually being committed, but their statements of the extent of the interruption to the company's service, caused in large part by these acts, show that they are giving at least their tacit approval to the assaults and destruction which are occurring in various parts of the city. Fortunately for the reputation of Philadelphia the municipal and State authorities seem alive to the necessity of preserving law and order. Already the chief imported agitator has been arrested on a charge of inciting to riot, and if protection is given to the company, we have no doubt it will have little difficulty in operating its cars on schedule.

It is unfortunate that sober councils do not more often prevail in labor organizations. There is an almost irresistible tendency among them to choose as leaders those who are reckless and irresponsible and have little at stake in any controversy which may arise. One reason for this undoubtedly is that the more sensible and conservative men among the employees do not join the organization at all. Then there is still a middle class consisting of those naturally opposed to the purposes of the union, its leaders and the means by which it accomplishes its ends, but too weak to stand out against a misguided sense of loyalty to their fellow employees and for what they themselves know is right. These men at first refuse to join, but finally become members after all the offices are filled and the reckless element is in control. Then they have little to say as to how the affairs of the organization shall be conducted, yet upon them falls the full brunt of any disaster caused by a mistake in policy. It is this condition, which seems almost inevitable in associations of this kind, which is being exemplified in Philadelphia this week. The domination there of the lawless and disorderly element among the strikers contains a moral which we trust will not be lost elsewhere.

Trunk Line Electrification

The ever-recurring subject of steam railroad electrification is once more under discussion, as we notice from an article in the *Engineering Magazine* by F. Darlington, and a paper in the current *Journal* of the American Society of Mechanical Engineers by L. R. Pomeroy. The fact that two utterances on the same subject appear simultaneously and in many respects express opposite points of view offers temptation to try to find some standpoint from which their statements can be compared.

The first paper encouragingly recounts the well-known technical advantages of electric power for transportation and refers among other benefits to its value in the collection and distribution of local freight traffic. This important field, the author states, has been consistently neglected by the steam roads, whose efforts have preferably been confined to saving a cent on their long hauls. Undoubtedly the easy subdivision of the electric train into small units suggests its application to what might be called the "retail" department of railroad freight transportation as supplementary to the "wholesale," or through type of long-haul freight business, which is so advantageous in cost per ton-mile and forms the backbone of steam-railroad earning power. Such a retail business is being conducted on a more or less limited scale now by many electric interurban railways to the benefit of both the companies and the communities which they serve. But it is a debatable question whether such roads, with their single freight cars operating at more frequent intervals than the trains on the parallel steam road really make more money in proportion to their investment in freight facilities than do the steam lines with their one local freight train each way per day in the same territory. That is, the long-train unit is still the most economical for the service which it does. Undeniably each method has its field, but unless the two can be combined, which does not seem practicable, an extension of the electric service has no immediate bearing on the broader field of trunk-line electrification.

Mr. Darlington admits that for through line service there are many cases where the greatest economy will be obtained by continuing the use of steam, but believes that the single-phase system is vastly widening the commercial possibilities of the electric agent, especially where cheap water-powers are available. Some persons may claim that certain of his figures on cost with electric operation were based upon conditions favorable to the use of electric power. But we believe a larger number will disagree with the remark of Mr. Pomeroy that "the only cases where electric operation is commercially justified is in congested local passenger situations where the conditions closely approach those of a 'moving sidewalk,' and the records show that these cases have been profitable only when a large increase in business has been realized." Later Mr. Pomeroy qualifies this statement, especially as regards mountain divisions and urban and suburban lines. But any effort to confine electrification to roads where the question of capacity is practically the only consideration would exclude such examples as the Rochester division of the Erie Railroad, where a larger patronage can be secured for single or two-car trains run at short intervals than for the longer infrequent trains which is the only service commercially practicable with steam locomotives.

Both papers emphasize the importance to the engineering world of the publication of complete operating data of the roads now electrified. We realize, of course, that the most con-

spicuous examples of this kind, while in operation for several years, are by no means completed, from causes entirely apart from their electrical equipment. For this reason, their present statistics would not exhibit as fully the differences in operating expenses and traffic with electric power and steam as in the case of the Manhattan Elevated Railway. At the same time as these conditions are known, proper allowance could be made for them, and we sincerely trust that such statistics could soon be made available, either in the form of an Institute paper or in some other way.

The Effect of Single-Phase Development on D. C. Line Construction

It was recognized at the very beginning of the single-phase railway movement that the adoption of a tenfold and even twentyfold greater trolley wire potential would require radical variations from the types of bracket and span construction then in use for direct-current railways. Nevertheless, few people foresaw that the new construction would react in revolutionary fashion on the apparently fixed standards of the older lines. The alternating-current catenary construction was evolved primarily to satisfy more onerous electrical conditions, but its mechanical advantages have become so pronounced that there is now a strong feeling that the two-wire suspension should be considered also for low-tension, direct-current roads operating in open country. The New Orleans Railway & Light Company appears to have been one of the first railways to use the catenary for 500-600-volt work since it built a suburban extension on that system as early as 1905. It is interesting to recall that on this pioneer line the poles were placed only 100 ft. apart, instead of having the 150-ft. spacing used on later lines. The hangers also were closer than has been considered needful in recent work. In the early installation of the Utica & Mohawk Valley line on the West Shore tracks, near Ilion, in the cut-off around that city and Mohawk, the poles were spaced only 80 ft. apart. Since that time the spacing of bracket poles has been increased to 150 ft., as with the three-point suspension of the Buffalo, Dunkirk & Lake Erie Traction Company's line just outside of Buffalo, and of bridges to 300 ft., as on the direct-current lines of the Syracuse, Lake Shore & Northern Railroad and the new Port Byron-Syracuse link of the Rochester, Syracuse & Eastern Railroad.

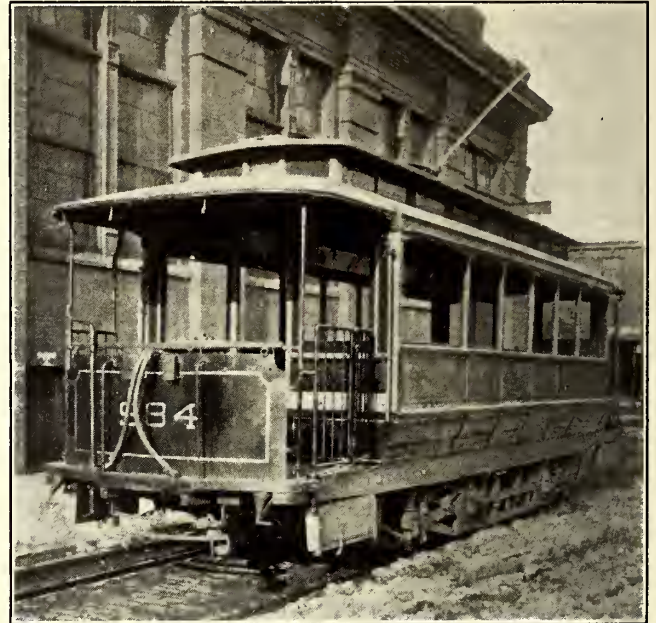
Advantageous as the catenary suspension may be, however, there is still a wide divergence of opinion as to the details of construction. Until some general standards have been fixed many railways will refuse to leave the companionable road of custom. In this connection the Connecticut Company's experimental work described in this number deserves particular notice. It was undertaken to try out six important catenary designs under practically the same conditions on successive sections of a 2-mile d.c. line near Middletown, Conn. It is hoped that the observations to be taken on this division will make it possible for the company to draw up eventually a standard form of specification which will satisfy the requirements for direct-current interurban railways operated at moderate speeds. An examination of the numerous hangers, brackets, insulators, pull-offs, steady strains and other devices submitted shows that some standards are sorely needed in these items, although it is apparent that catenary constructions are tending toward a decrease in the number of parts, especially in hangers per span.

TRAILER MOTOR CARS IN PHILADELPHIA

In the summer of 1909 the Philadelphia Rapid Transit Company equipped 50 standard semi-convertible motor cars and 50 rebuilt single-truck open trail cars for train operation. The motor cars have 28-ft. bodies and are equipped with four GE-70 motors and two K-28 controllers. The trail cars were old 18-ft., 10-bench open cars with short platforms at both ends and a center aisle. Panels were built in between the side posts up to the level of the seat backs and swinging gates were provided on the platforms. Each trail car was equipped with a trolley stand and pole, one K-2 controller and one GE-800 motor. The trailers were operated as smoking cars during the morning and evening rush hours. As they had no windows or heater equipment they were not suitable for operation in cold weather and were withdrawn from service for the winter on Dec. 1.

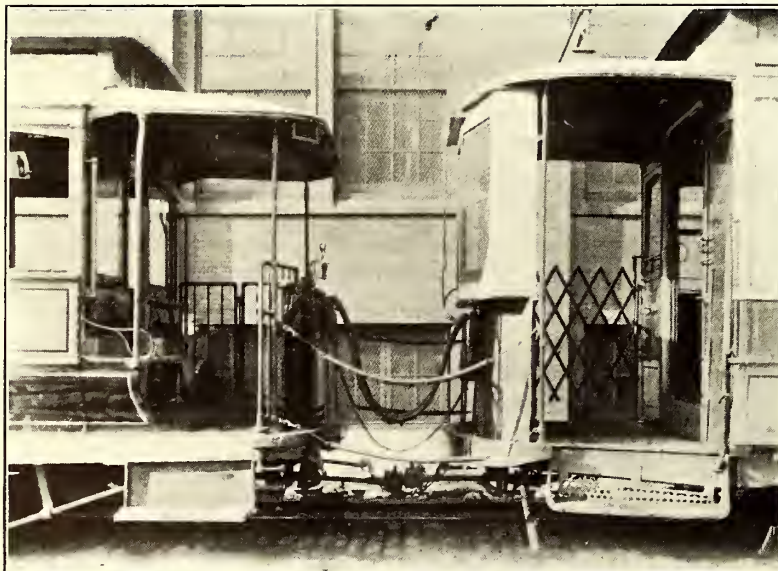
The fast schedules, steep grades and sharp curves of the lines in Philadelphia over which it was desired to operate trail cars during the rush hours made it necessary either to increase the capacity of the four 40-hp motors on the leading car or to add a fifth motor on the trailer car. The latter course was decided upon as it had a number of important advantages, the principal one being that the motor on the trailer car will give sufficient acceleration when power is applied to eliminate the jerking on the drawbar, which has always been an objection to trailer operation. The use of an air-brake cylinder on the trailer car, operated in conjunction with the brake on the motor car, reduces the momentum of the trailer car, keeps the drawbar tight and eliminates the jerk in stopping. It also keeps the slack out of the drawbar, which would cause a jerk in starting. No change was necessary in the motor equipments of the standard semi-convertible cars which could be operated singly by any motorman and cared for by any car-house force without special instruction. Four 50-hp motors would have added more weight in excess of the weight of the present equipment of four 40-hp motors than the single 25-hp motor and controller which was mounted on the trail car and this excess weight and power would have served no useful purpose when the motor cars were operated singly. The addition of

and 2. Normally No. 5 motor is fed through the trolley and front platform controller of the motor car. It should be stated here that the practice of the Philadelphia Rapid Transit Company is to feed the fields of all motors first and the accompanying diagrams have been drawn accordingly. In the series grouping motors Nos. 2, 4 and 5 are in series with Nos. 1 and 3, the tap for No. 5 being made ahead of the field of No. 4. In the



Philadelphia Trailer Cars—End View of Trailer

multiple grouping Nos. 2, 4 and 5 are fed from a tap ahead of Nos. 1 and 3, and all five motors are connected direct to ground. Motors Nos. 2, 4 and 5 have permanent grounds on the motor frames. In both the series and multiple groupings motor No. 5 takes proportionately the same amount of current for each step of the controller as Nos. 2 and 4. No trouble has



Philadelphia Trailer Cars—Views Showing Jumpers, Coupling and Safety Guards Between Motor Car and Trailer, Also End of Trailer

a trolley and operative controller on the trail car provided against a breakdown of the trolley or controllers of the motor car. Finally, the fact that the trail cars could be moved in and out of the car houses under their own power made it possible to pick them up and drop them at any convenient point with a minimum loss of time.

The connections of the fifth motor on the trail car to the circuits on the motor car are shown diagrammatically in Figs. 1

been experienced in operating together in this manner two GE-70 motors of 40 hp each and a GE-800 motor of 25 hp.

In Fig. 3 are shown the wiring connections to all motors when operating both the motor car and trailer from the front platform of the motor car. Current enters the reverser at 19 and has two paths to ground, through $A_1, AA_1, F_1, 15, A_2, AA_2, F_2$ to G and through 19, $A_3, AA_3, F_3, 15, A_4, AA_4, F_4$ to G . From AA_4 in the front platform controller a tap is run to the

junction box on the front dasher. The path of the current fed to the trailer motor is shown by the heavy line. From A_4 in the front platform controller one of the main motor cables leads to terminal AA_4 in the rear platform controller and the tap to the junction box on the rear dasher is run from AA_4 exactly the same as on the front end. A_4 of the rear controller is likewise connected to AA_4 on the front controller.

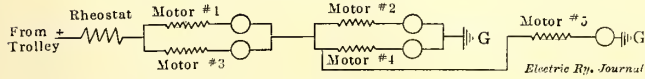


Fig. 1—Motor Circuits, Series Position

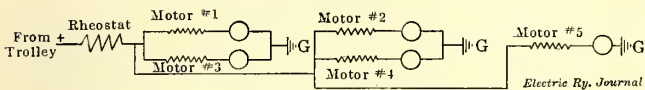


Fig. 2—Motor Circuits, Multiple Position

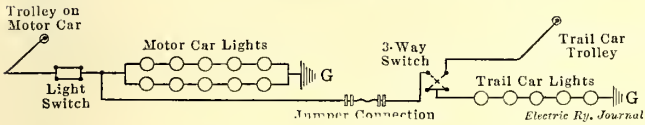


Fig. 4—Lighting Circuits

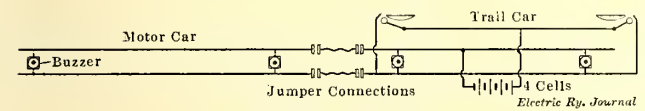


Fig. 5—Bell Circuits

The power wire jumper, which also carries the light wire, has two plugs which fit into the junction boxes on the rear dasher of the motor car and the front dasher of the trail car. The motor car plug has two terminals, one for the power wire and the other for the light wire, but the trailer car plug has four terminals, the two center ones, X and Y , being permanently connected together. From the power wire terminal in the trailer junction box current flows through the field of No. 5 motor to terminal X to Y through No. 5 armature to ground. The permanently connected twin terminals X and Y in the trailer plug permit the reverse handle of the controller on the trail car to be left in the neutral position with all contacts on the reverser open. When the plug is removed from the junction box the connections for the first five series steps in the control of No. 5 motor can be effected in the controller in the usual manner by moving the reverse handle to either the forward or back positions.

It is not possible to reverse No. 5 motor from the controller on the motor car, but when Nos. 1, 2, 3 and 4 have been reversed No. 5 is fed after the field of No. 4 and therefore receives so little current as to be practically inoperative. By disconnecting the trailer plug of the jumper, however, and putting up the trolley on the trail car, No. 5 motor can be reversed from the trailer controller and operated backward simultaneously with the four motors on the motor car. Motor No. 5 on the trailer and Nos. 2 and 4 on the motor car can be operated forward with current taken from the trolley on the trail car through the controller on that car, provided the reverser of the controller on the front platform of the motor car is set for forward running. The path of the current is then from trolley on trail car to 19 on trail car controller, to A_1 , to field of No. 5, to X , to Y , to armature of No. 5, to ground. The terminal A_1 on the trailer controller is also connected to the power wire in the jumper leading to A_4 in the motor car controller. From A_1 current flows through motor No. 4 to ground and also to No. 15 and through A_2 to motor

No. 2 to ground. Motors Nos. 1 and 3 which are also connected to 15 have no path to ground, and hence are inoperative.

The lighting circuits are shown in Fig. 4. Current for the lights may be taken from the trolley on either the motor car or trailer. Normally current is taken from the trolley on the motor car through an ordinary light switch. Between the switch and the lamps on the motor car a tap is run to a cable connecting the terminal sockets for the light wires in the junction boxes at both ends of the motor car. A single light wire in the power cable jumper connects in the trailer junction box to a cable leading to a three-way lighting switch on the trailer. This switch is connected to the trailer trolley and to the trailer lights. In one position the lights on both cars are fed from the trailer trolley, in another the trailer lights are fed from the motor car and in the third the trail car lights are cut out from both sources of supply.

An ingenious arrangement for giving signals from the trailer to the motorman and conductor on the motor car has been installed. The connections are shown diagrammatically in Fig. 5. A loud buzzer is mounted on the outside of the end bulkheads at each end of both the motor car and trailers. These buzzers are connected in multiple across a common pair of wires, carried from car to car by a separate two-wire jumper cable. The clappers of both signal bells on the trailer are connected to one terminal of a battery of four cells carried on the trailer and spring contacts are attached to the gongs so that an electrical connection is made when the gong is struck by the clapper. These spring contacts are connected on one of the common buzzer wires and the second terminal of the battery is connected to the other common wire of the buzzers. When either of the signal gongs on the trailer is struck by its clapper all four buzzers ring. The instructions to motormen are to stop on either a buzzer signal from the trailer or the usual bell signal from the conductor on the motor car and not to start until both the buzzer signal and the bell signal are given. The buzzers in the motor car do not sound except when a signal is given from the trailer.

The motor and trailer cars are coupled together with ordinary link and pin drawbars. Lying on top of each drawbar is a round iron rod fastened at the back end to the swivel pin and terminating at the outer end in an eye. Two safety chains are hooked into these eyes when the cars are coupled together as a precaution against break-in-twos. The motor and trailer cars have been regularly operated without serious trouble with the couplings around the loop at the foot of Market Street. The inner rail of this curve has a radius of only 27 ft.

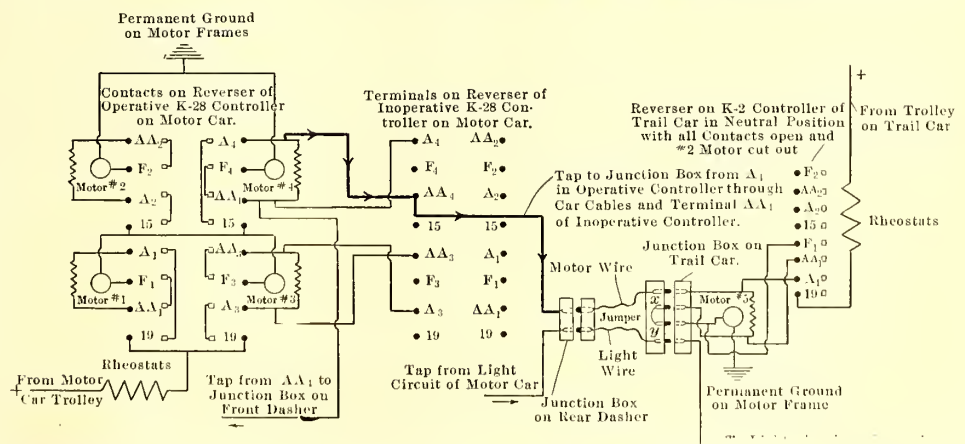


Fig. 3—Circuits and Jumper Connections on Motor and Trail Cars

The motor cars which were equipped for train operation originally had Christensen straight-air brake valves, pump governors and compressors. As this equipment has no emergency features the Westinghouse Traction Brake Company devised a modification of its SME brake equipment, which was applied in connection with the Christensen apparatus already installed on the motor cars. The SME equipment includes a brake pipe and a control pipe with hose connections

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between cars and an emergency valve on both cars. In case the cars break apart the emergency valves come into action on both cars and set the brakes with full reservoir pressure. The hose connections are attached to the brake pipe and control pipe near the top of the dasher.

POSTING THE WORK OF CARELESS EMPLOYEES

On a very large electric railway there are often differences of opinion between the mechanical and transportation departments as to the ultimate responsibility for pull-ins, and in many cases it is not easy to designate the individual responsible for the trouble. One railway has in use quite an effective photographic method which not only avoids questions of this kind, but



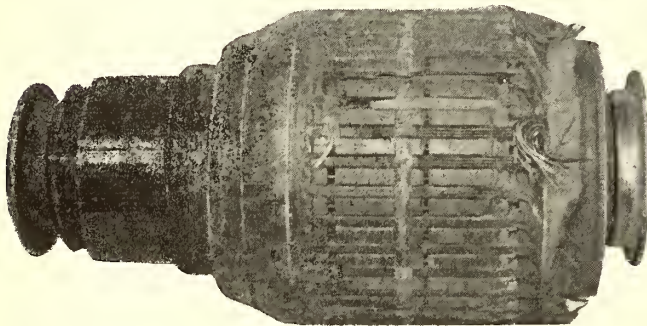
A Broken Motor Suspension Bar Which Was Responsible for An Accident

mitting the broken lugs of a motor case to strike the paving. Two other views illustrate cases where the responsibility was traced to the shopmen. Thus one armature was injured on account of a loose bearing and another through failure to lubricate. Like publicity is given to mechanical troubles, as in the example of the broken motor suspension bar illustrated.

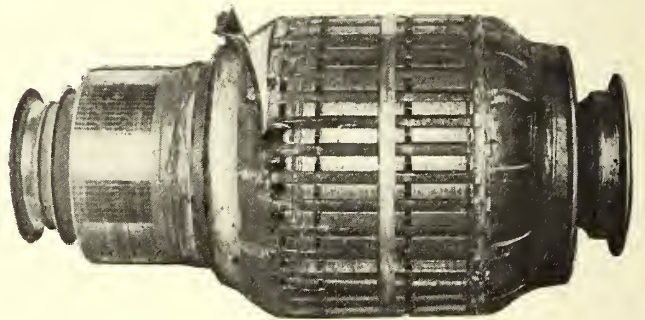
It may be added that this practice of posting illustrated



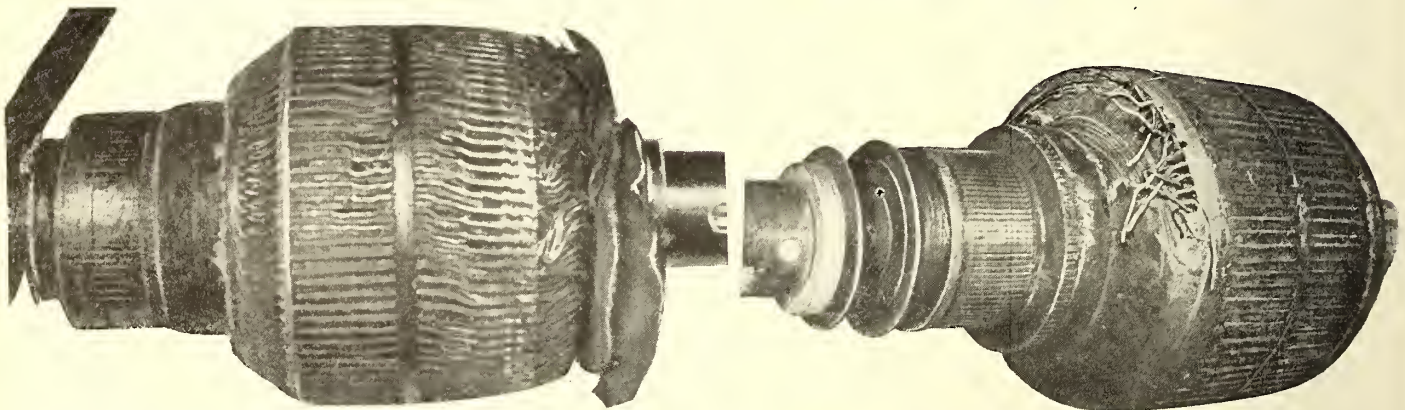
Field Coils Ruined Through Neglect in Cutting Out a Damaged Motor



Armature Injured Through Neglect of Oiler



Injury Due to a Loose Armature Bearing



Result of Motorman's Negligence in Permitting the Broken Lugs of the Lower Half of a Motor Case to Strike the Paving

Another Result of Not Cutting Out a Defective Motor

also tends to make every shopman and motorman exercise greater care in the handling of equipment.

It is the practice on this road, whenever a car is brought into the general repair shop, to take a photograph of the armature, field, controller or other apparatus which shows undue neglect. This print, together with a brief account of the trouble and the name of the negligent employee, is posted for 10 days at the division shop or car house. Some sample photographs of defective shop work, or of careless running, are reproduced in the accompanying illustrations. Two of these views illustrate the bad results to the armature and the field coils of an equipment because the motorman failed to cut out a defective motor. Another shows the battering of an armature as the result of per-

records of bad work has had a most beneficial effect, so that within the last year there have been very few examples of gross carelessness either at the car controller or in the shop.

The Public Service Commission, Second District, New York, report of the delays to passenger trains in the State during December shows 60,385 trains were run. Of these 75 per cent were on time at division terminals; the average delay for each train was 39.7 minutes; average delay for each train run 10 minutes. Principal causes of delay were: Waiting for trains on other divisions, 40.9 per cent; waiting for connections with other roads, 14.4 per cent; train work at station, 12.2 per cent; trains ahead, 8 per cent; meeting and passing trains, 4.8 per cent; engine failures, 4.3 per cent; wrecks, 3.8 per cent.

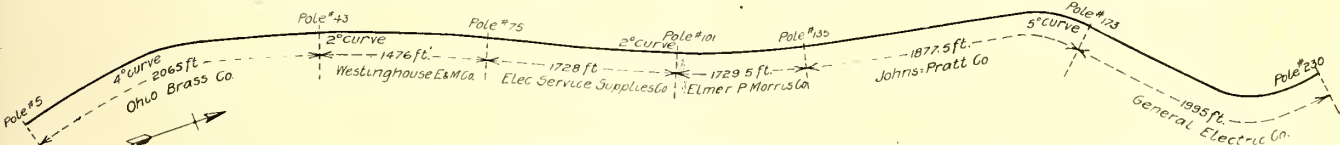
THE EXPERIMENTAL CATENARY LINE OF THE CONNECTICUT COMPANY

Since May, 1909, the Connecticut Company has been conducting an elaborate service test of catenary suspension systems on a line between Middletown and Hartford, Conn. The total trial section is about 11,000 ft. long, of which 10,050 ft. are over the Valley Branch (steam) of the New York, New Haven & Hartford Railroad, and 950 ft. over public highways.

GENERAL

The purpose of this installation is to develop the characteristics of commercial catenary line material. Six prominent manufacturers, the Ohio Brass Company, the Westinghouse Electric & Manufacturing Company, the Electric Service Supplies Company, the Electric Railway Equipment Company (through Elmer P. Morris Company), the Johns-Manville Company (through the Johns-Pratt Company) and the General Electric Company—in the order of the assignments from south to north—were each requested to erect an installation of about 1700 ft. of single catenary for wheel operation at speeds of 40 m.p.h. The messenger sag, the types and spacings of hangers and the general details of design and installation were left to the manufacturer, subject, however, to the following conditions:

The poles were to be spaced 150 ft. apart on tangents and 75 ft. apart on curves with the nearest face of the pole distant at the level of the top of the rail, 10 ft. 6 in. from the center line of the steam track and 7 ft. 6 in. from the center line of the track in the highways. Bracket construction was specified for tangents, and both span and bracket construction for curves.



Catenary Test Line—Order and Length of the Six Installations

For bracket work, the poles were to have a rake of 6 in. in 24 ft.; for span work, 12 in. in 24 ft. However, the Connecticut Company offered to install additional poles if the manufacturers desired them. All poles on the line are numbered consecutively from Middletown northward, with the odd numbers on the westerly side of the track.

With the exception of the General Electric Company's division, it was ordered that the trolley wire should be of No. 0000 grooved copper and the messenger wire of 7/16-in. extra galvanized, seven-strand Bessemer steel. For experimental purposes the General Electric Company's section was equipped with a trolley wire of No. 0000 grooved mild steel and a messenger of No. 0000 hard-copper cable made of 19 wires, each of 0.1055 in. diameter. The trolley wire clearances on the right-of-way were fixed at 22 ft. and the clearance above the rails on the highways at 18 ft. The trolley was to be continuous, each section to be anchored at the ends and elsewhere, if desired; the messenger to be independent for each section and adjacent messengers passing over a common support and dead-ending in the following section. The supports of pulling-off curves were to be designed by the manufacturers, but it was specified that the chords were to be of equal length and that no exposed composition was to be used for strains. All the feed connections were made by means of a composition ear soldered to the wire and into which the No. 0000 feed tap was soldered in turn.

The manufacturers furnished the full drawings and instructions for erection, and were invited to have representatives present at the installation. The work, however, was done by a single contractor, furnished by the Connecticut Company. As far as possible, this erection was done under written instructions and without assistance from the representatives, in order to determine the relative simplicity of the systems offered.

The work was performed under the direction of E.

H. McHenry, vice-president of engineering and construction, New York, New Haven & Hartford Railroad, and Edward Gagel, chief engineer, by Charles Rufus Harte, assistant engineer in charge, and R. E. Wade, assistant. The actual installation was made by C. W. Blakeslee & Sons, general contractors, of New Haven, Conn.

EXPERIENCE TO DATE

Up to the present time the behavior of this installation has been very satisfactory. Some time ago it was reported that certain hangers were too light and were bending. An investigation brought out the interesting fact that these bent hangers occurred on either side of the steam-railroad tell-tales. The trouble arose from the winding of the tell-tales around the trolley wire thereby throwing off the wheel, which on its return to the wire frequently struck it a severe blow. Similar trouble was caused at a point where an anchor was located in the middle of a span which was so long that the guys were almost horizontal. In this instance a little slack permitted one guy to come down alongside the trolley wire and caused the same disturbance as at the bridge tell-tales. The tell-tales were removed, the guys pulled up and the hangers straightened. As no further bending has occurred at these points, it is quite evident that the company's surmise as to the cause of the trouble was correct.

In regard to the behavior in service, it is reported that all types are standing up well. In a few cases one of the types of mechanical clamps gave some trouble due to the working-out of the short screws with which it was furnished. With these exceptions, the entire line continued to remain in first-class condition. Of course, the apparatus may still be

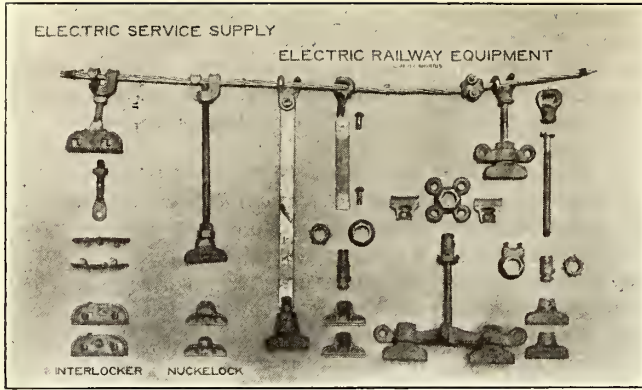
considered as brand new, but when the present winter is over there should be some definite evidence of the behavior of the material under severe weather conditions.

INSTALLATION OF THE OHIO BRASS COMPANY

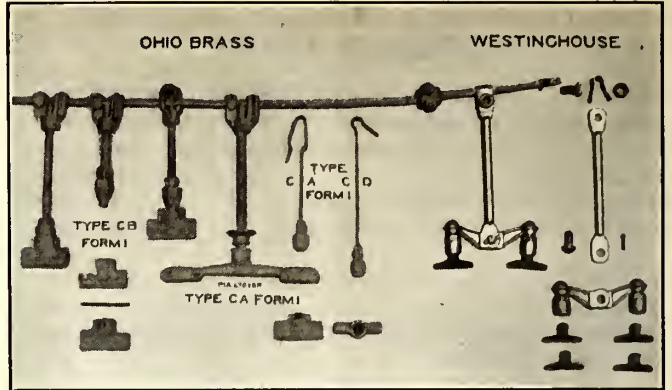
As shown on the accompanying map, the installation of the Ohio Brass Company is the first when starting from Middletown. It is 2065 ft. long. All of the construction is of the bracket type with a hanger spacing of 15 ft. The sag of the messenger wire is 4 in. for 75-ft. spans and 16 3/4 in. for 150-ft. spans. The distance from the messenger to the trolley at the messenger support is 23 in., at the center of 150-ft. spans 6 1/4 in., and at the center of 75-ft. spans 19 in. The principal apparatus of this section is described in the following paragraphs.

The pole bracket consists of a 2 1/4-in x 2 1/2-in. x 1/4-in. T-bar arm, with a 5/8-in. support rod with fittings as shown in the accompanying drawing. All of the bracket-arm castings completely surround the T-bar and the support rod and insulator-pin castings are adjustable along the arm. For convenience in erecting the bracket is so arranged that the messenger wire can be lifted over the end of the arm without having to thread it under the support rod. The messenger insulator pin is known as type C.E., form 1, and is made of black japanned malleable iron. The base of the pin completely surrounds the T-bar to make accidental disengagement impossible.

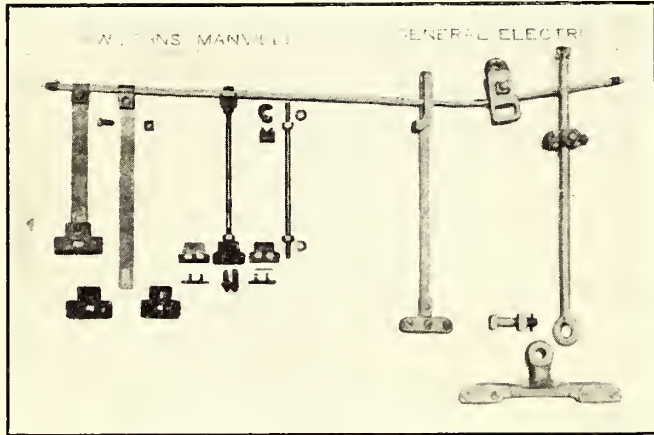
The hangers have hinged clamp ears closed by a conical wedge screwing down into conical jaws. There are three types, as follows: C.A., form 1, with a loop-top strap hanger; type C.B., form 1, with a sister-hook-top rod hanger; C.D., form 1, saddle-top strap hanger with a hinge at the ear. The pull-off hangers are of type C.A., form 1, having sister-hook-top, rod hanger, double-grip screw curve ear and a spool above the ear for the bridle. The anchor hangers, located at the brackets, are known as type C.B., form 1, and also have a sister-hook-top and rod hanger, as well as special half-cars of



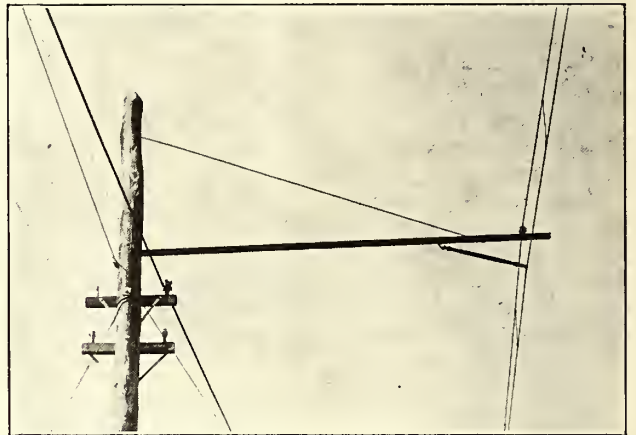
Hangers of the Electric Service Supplies Company and E. P. Morris



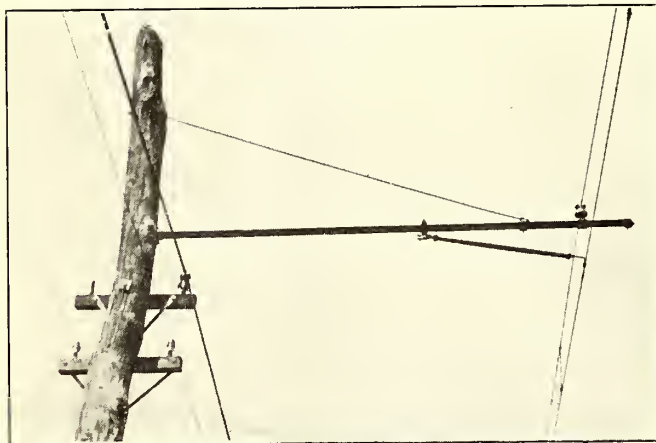
Hangers of the Ohio Brass and Westinghouse Companies



Hangers of the H. W. Johns-Manville and General Electric Companies



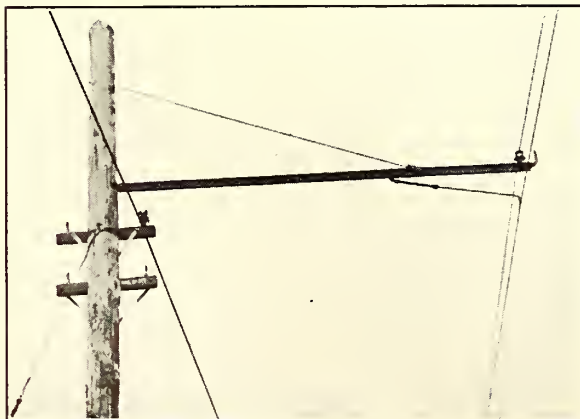
Johns-Manville Bracket and Steady Strain on Curves



Electric Service Supplies Company's Bracket



Elmer P. Morris Company's Bracket



Westinghouse Company's Bracket



Ohio Brass Company's Bracket

Catenary Test Line—Types of Hangers and Examples of Bracket Construction

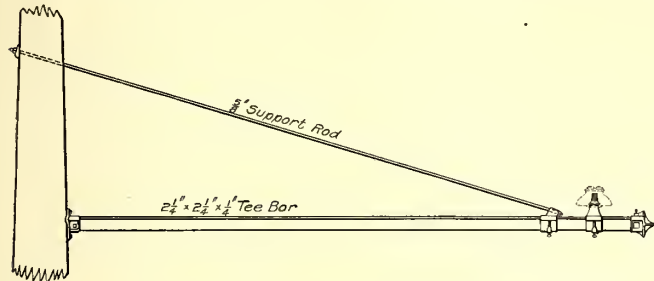
the soldered type with an eye at the butt end. From this eye a guy with a turnbuckle leads over the insulator to the anchorage on the next pole. No steady strains were used by this company. One of the final tables shows in detail the arrangement of poles, of span lengths, and the number of hangers and pull-offs installed on this division. Similar tables are presented for all the other installations.

INSTALLATION OF THE WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

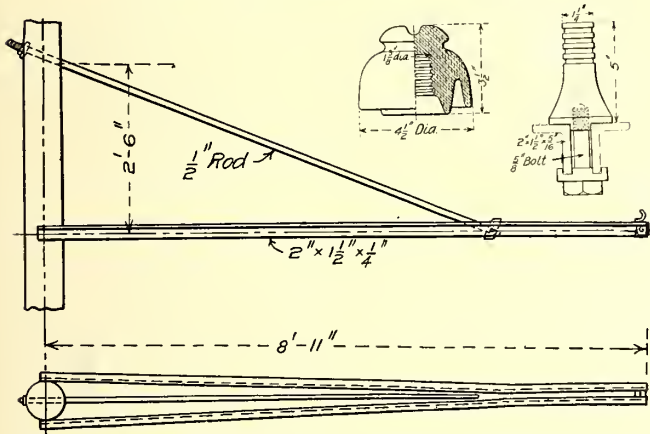
The installation of the Westinghouse Electric & Manufacturing Company is 1476 ft. long and follows that of the Ohio

companying illustration. The latter also includes details of the various fittings, such as the steady strain and its clamping ear, main line insulator, insulator clamps, etc. The weights of the several parts are as follows: Bracket arm, without main line insulator or steady strain, 64 lb.; main line insulator, 4 lb.; steady strain with clamp, 14 lb.; clamping ear for steady strain, 0.8 lb.; total weight, 82.8 lb.

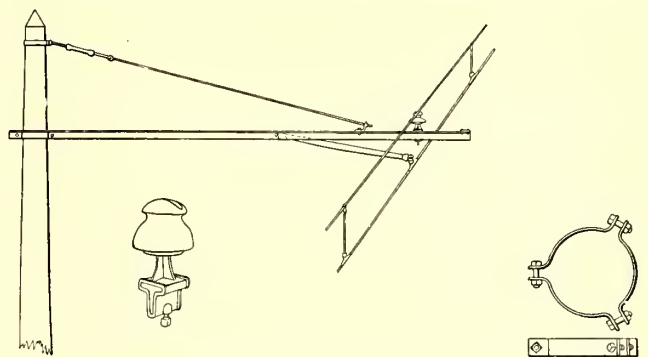
Other drawings show the anchor hanger, the anchor clamp and the new rocker type trolley hanger. The anchor hanger is provided with heavy clamp grips for the trolley wire and the messenger cable. The trolley-wire jaws have eyes for



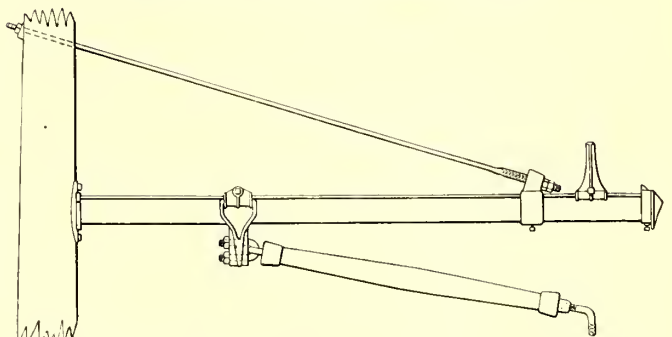
Ohio Brass Company's Standard Bracket



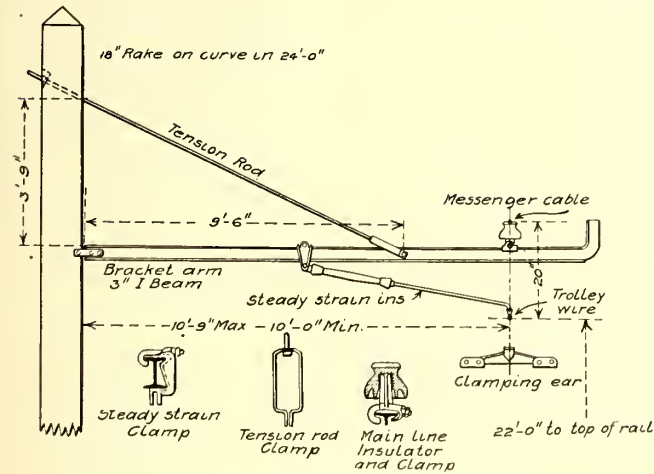
General Electric Company's Bracket, Messenger Insulator and Pin



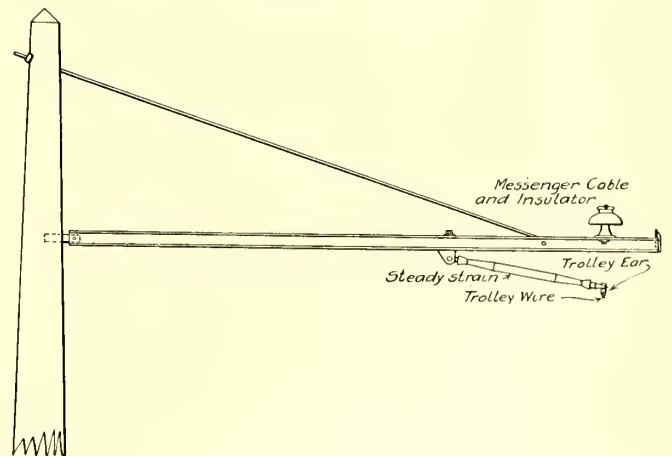
Details of Elmer P. Morris Company's Bracket



Electric Service Supplies Company's Bracket with Wood, Steady Strain and Steel Goose Neck



Westinghouse Company's Bracket and Fittings



H. W. Johns-Manville Company's Bracket Construction with Steady Strain

Catenary Test Line—Details of the Different Types of Brackets

Brass Company. All of the construction is of the bracket type with a hanger spacing of 37 ft. 6 in. on 75-ft. spans and 50 ft. on 150-ft. spans—in other words, two-point suspension is used on the short spans and three-point suspension on the long spans. The sag of the messenger wire is 3 1/2 in. on the 75-ft. spans and 16 in. on the other spans. The distance from the messenger wire to the trolley at the messenger support is 20 in.; at the center of the 50-ft. spans, 4 in.; at the center of the 75-ft. spans, 16 1/2 in.

The pole bracket is the maker's 3-in. I-beam design with upturned ends and 1/2-in. tension rod, as shown in the ac-

companying illustration. The latter also includes details of the various fittings, such as the steady strain and its clamping ear, main line insulator, insulator clamps, etc. The weights of the several parts are as follows: Bracket arm, without main line insulator or steady strain, 64 lb.; main line insulator, 4 lb.; steady strain with clamp, 14 lb.; clamping ear for steady strain, 0.8 lb.; total weight, 82.8 lb.

Other drawings show the anchor hanger, the anchor clamp and the new rocker type trolley hanger. The anchor hanger is provided with heavy clamp grips for the trolley wire and the messenger cable. The trolley-wire jaws have eyes for

INSTALLATION OF THE ELECTRIC SERVICE SUPPLIES COMPANY

The installation of the Electric Service Supplies Company is 1728 ft. long and is made up of both span and bracket con-

struction. The hangers are spaced about 15 ft. throughout. The sag of the messenger wire is 4 in. on 75-ft. spans and 16 in. on 150-ft. spans. The distance from the messenger wire to the trolley at the messenger support is 22 in.; at center of the 75-ft. spans, 18 in.; at the center of the 150-ft. spans, 6 in.

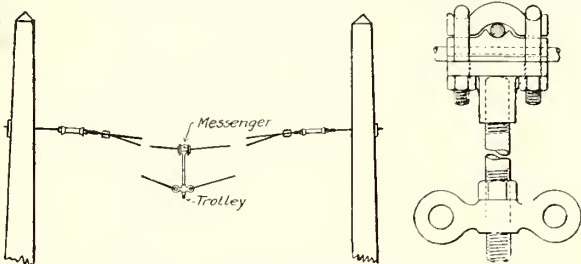
The brackets are of the maker's T-bar type with an end-piece and tension rod, as illustrated. They carry Locke No. 5-A insulators for the messenger. The weight of a standard bracket equipment is 60.76 lb., distributed as follows: T-iron, 2 1/4 in. x 2 1/4 in. x 9 ft. 6 in., 40 lb.; pole socket, with bolt, 2.13 lb.; two lag screws for pole socket, 0.22 lb. each; guy-rod clamp with set-screw, 2.63 lb.; guy rod and fittings, 8.17 lb.; cast-iron angle washer, 0.5 lb.; insulator pin and bolt, 5.36 lb.; and outer end ornament, 1.53 lb.

Two styles of hangers are used, known, respectively, as the "Interlocker" and the "Nuckelock." The first is of the rocking type, consisting of stamped-steel ear-plates with interlocking fingers, a rod hanger with flat ends, a pin-hinged bottom and a saddle top; the second is of the rigid type with jaws rocking on a ball-and-socket joint and locked by means of a lug on one of the jaws. The steady strains shown are used in curves only. An anchorage as made in the center of the span consists

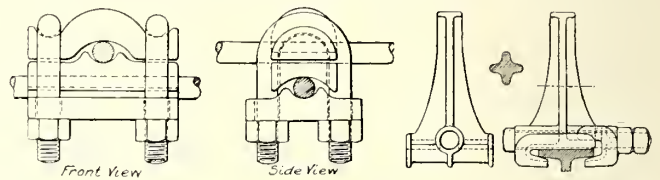
the span was made up with an eye-bolt in the pole head and porcelain goose eggs on either side of and close to the messenger; and the 10 remaining spans having wood strains instead of goose eggs.

All of the hangers embrace what the designer calls the "Sure Grip" clamp. This consists of two clamping jaws, a threaded and tapped stud and a compression cup and hexagon nut for locking all parts together and clamping the trolley wire. The locking is completed by bending down one of the small clinch points on the hexagon nut. The forcing nut acts directly on the 1-in. stud, so that no strain is imposed on the threaded end of the hanger rod. The clamp has no exposed threads nor pockets to retain moisture.

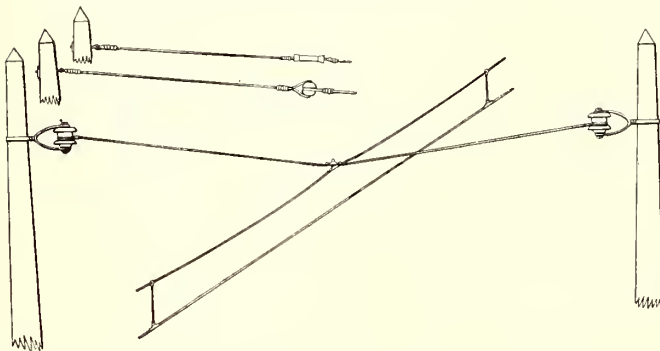
The straight-line hangers installed are of both the rod and strap types, including the clamp described and sister-hook tops. The sister-hooks are secured to the messenger wire and locked in place by two small clinching points. The latter are directly under the main holding points and when bent up in position serve to bind the messenger wire together instead of forcing it out of shape. The 1/2-in. suspension rod has a T-head which so engages the sister-hook that the rod can retain its perpendicular position by adjusting itself to the un-



Electric Service Supplies Company's Span and Steady Strain Fixture



Electric Service Supplies Company's Span Wire Clamp and Insulator Pin



Elmer P. Morris Company's Three Types of Spans



Elmer P. Morris Company's Span Work

Catenary Test Line—Specimens of Span Construction and Miscellaneous Fittings

of a single strain ear on the trolley wire either side of the center each having a guy with a turnbuckle tied to the messenger by a clamp anchor plate with four head guys from corners of the latter to adjacent poles, as illustrated. No pull-offs are used on this section.

INSTALLATION OF THE ELMER P. MORRIS COMPANY

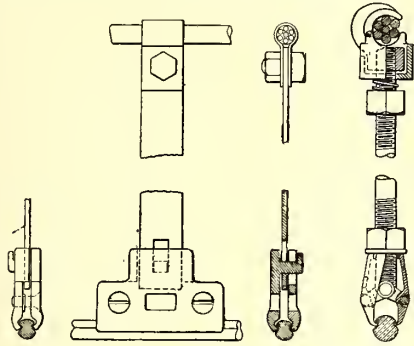
The installation of the Elmer P. Morris Company is 1729.5 ft. long and is made up of both span and bracket construction, as illustrated. The material was made by the Electric Railway Equipment Company principally in accordance with the designs of Elmer P. Morris. The hanger spacing is 19 ft. for 75-ft. spans and 30 ft. and 37.5 ft. for 150-ft. spans. The sag of the messenger wire is 4 1/2 ft. on 75-ft. spans and 17 in. on 150-ft. spans. The distance from the messenger wire to the trolley at the messenger support is 21 in.; at the center of the 75-ft. spans, 16 1/2 in.; at the center of the 150-ft. spans, 4 in. The brackets are of galvanized double angles bent to clamp the pole, with a guy rod and a special three-bolt pole clamp, as illustrated. The messenger is carried on Thomas No. 1037 insulators. The steady strains are installed only on curves. Several specimens of span construction were installed as follows: One span with spool type insulators; four cases in which

equal expansion or contraction of the messenger and trolley wire. In the case of the straight-line, strap-type hanger the sister-hook top and the trolley-wire clamp are attached to the strap by 1/4-in. rivets, the whole making a very flexible suspension. The pull-off hangers are modifications of the straight-line rod hangers in having one or two eyes on the compression cup and in substituting one or two-eye messenger clamps for the sister hooks. The curves were pulled off with equal chords, the bridge being led back to a backbone stretched from pole to pole in accordance with the standard practice of the Connecticut company.

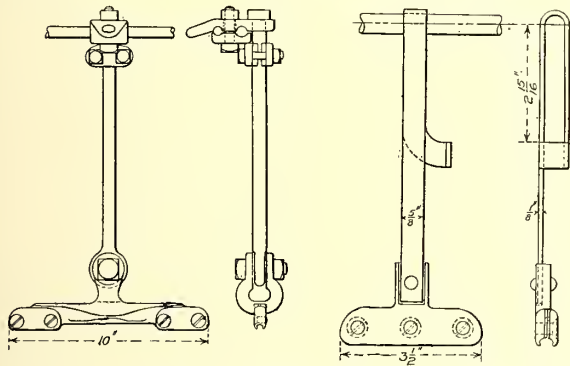
On one side of a bracket an anchorage consists of a half-strain ear on the trolley with a guy led to a turnbuckle attached to a strain plate on the bracket and a guy wire clamped to the messenger over the strain ear also leading to the same turnbuckle. On the other side of the bracket guy wires from the opposite turnbuckle lead to the top and bottom of an anchor hanger. The anchor hanger illustrated is also used on curves. An anchorage on the span section consists of a two-clamp trolley ear, with a four-eyed compression cup at the top of the hanger rod. A guy wire is led from each side of the ear to the clamps on the messenger, and from the four-eyed compression cup guys are led in four directions to adjacent poles.

INSTALLATION OF THE H. W. JOHNS-MANVILLE COMPANY

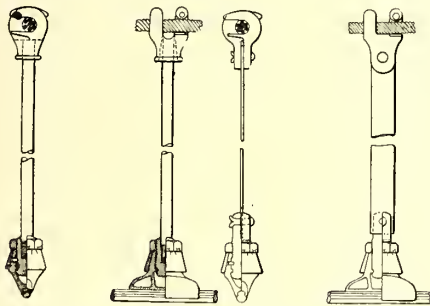
The installation of the H. W. Johns-Manville Company, which was furnished by the Johns-Pratt branch, is 1877.5 ft. long and is made up of bracket construction throughout. Both flexible and rigid material were furnished as specified hereinafter. The hanger spacing is 10 ft., 12 ft. or 15 ft. for spans ranging in



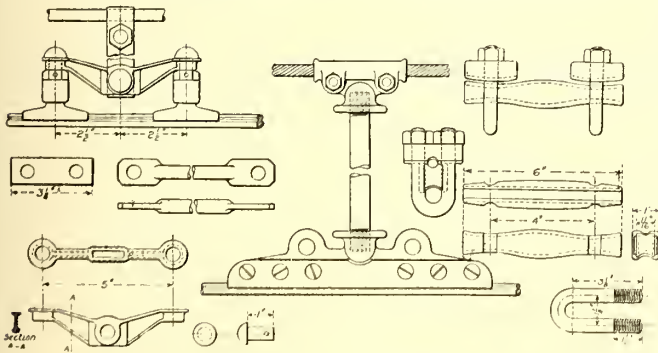
H. W. Johns-Manville Company's Flexible and Rigid Hangers



General Electric Company's Curve Pull-off Ear and Form CF Catenary Hanger

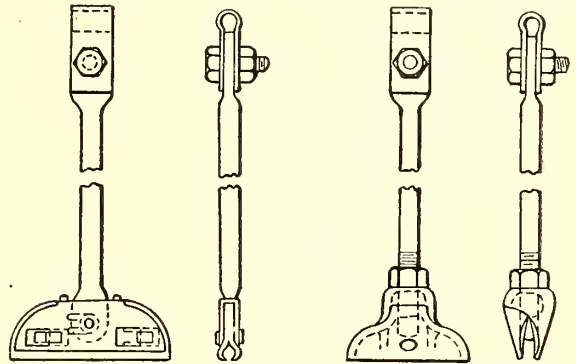


Elmer P. Morris Company's Straight Line Rod and Strap Hangers

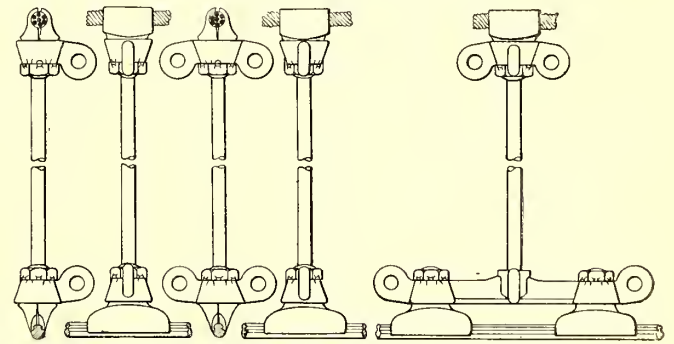


Westinghouse Company's Trolley Hanger, Pull-off and Anchor Clamp

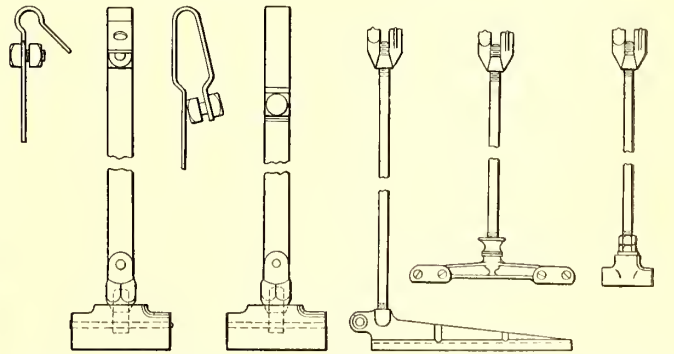
gent sections, respectively. The curve bracket is provided with a steady strain, as illustrated. It is 14 ft. long, and is composed of two rolled-steel channels 2 in. deep and 1 in. wide and weighing 2.6 lb. per foot. These channels are riveted together with spacing blocks between to increase the strength of the bracket as a strut. The blocks offer excellent means for fastening the various fittings by passing bolts between the channels and holding them in place with a washer, lock washer and nut. The tension rod is made of 1/2-in. hot-rolled steel, having a head on one end and being threaded at the other. This rod passes up through a casting riveted between the channels, the head engaging the lower side of the casting. The tangent bracket differs from the curve bracket in being made of two steel channels 3 in. deep and 1 in. wide pressed from 1/8-in. sheet stock. The tension rod is fastened to the bracket by a bolt passing through the two webs of the channels and an eye at the end of the rod. The messenger insulator is of the ordinary petticoat porcelain type with a malleable-iron pin cemented into the porcelain. The pin is held to the bracket



Electric Service Supplies Company's Interlocker and Nuckelock Hangers



Elmer P. Morris Company's Single and Double Strain Hanger and Curve or Anchor Hanger



Ohio Brass Company's Form 1, Hangers, Type CD, Type CA, Type CB (anchor), Type CA (curve pull-off), Type CB

Catenary Test Line—Different Types of Hangers and Fittings

length from 75 ft. to 150 ft. The sag of the messenger wire is 5 in. on the 75-ft. spans and 16 in. on 150-ft. spans. The distance from the messenger wire to the trolley at the messenger supports is 20 in.; at the center of the 75-ft. span, 15 in.; at the center of the 150-ft. span, 5 in.

Two types of brackets are installed for the curved and tan-

by means of a bolt passing up between the channels and screwing into the bottom of the malleable-iron pin.

Both flexible and rigid hangers have been provided, the former being of the bottom slide strap type with a two-screw ear and the latter of the rod type with a toggle clamp ear. The flexible hanger is made up as follows: The strap is stamped

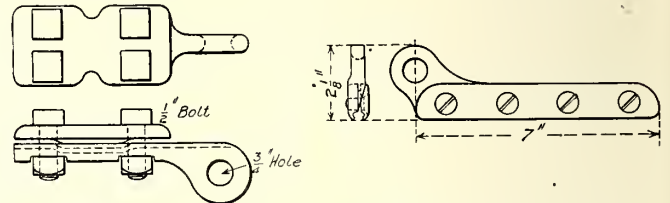
from steel stock 1 in. x 1/8 in. in section, a thickness which has been found stiff enough to prevent buckling from the blows of trolley wheels. Flexibility is obtained by a finger passing from one of the clamping plates through a rectangular slot at the lower end of the strap and through a rectangular hole in the other plate, the two plates being held together by flat-head machine screws. The strap is fastened to the messenger cable by a loop of flat stock, a bolt passing through the two loops and the upper end of the strap. In the rigid hanger the holding power of the trolley-wire clamp is secured by a pair of toggles. It will be noted from the accompanying drawing that the weight of the trolley wire comes directly on the first point of the toggle arms so that the clamping effect on the wire increases automatically with the load. The nut and lock washers above the jaws prevent the opening of the latter with the upward pressure of the wheel. The messenger clamp consists of a malleable-iron hook screwed to the end of the hanger rod and having a grooved, hollow casting forced upward by a nut to hold the messenger firmly and to prevent its slipping from the hook.

Both flexible and rigid pull-offs are used, corresponding to the sections with flexible and rigid hangers. The flexible pull-off construction illustrated is used to avoid hard spots at pull-off points. Its messenger clamp consists of two interlocking plates clamping the messenger cable between them, the pull-off cable passing around grooves at the middle of the plates and holding them together on the messenger cable. The trolley wire is held by means of an ordinary single-curve yoke and curve

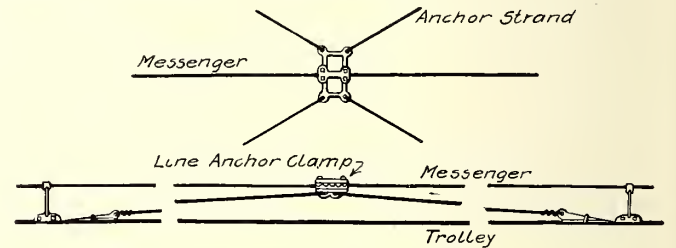
insulator bolt. This plate is then anchored to the adjoining poles. The eye for attaching the anchor cable is placed far enough from the strain clevises to avoid the formation of a pocket to catch the trolley wheel. A spreader is placed between the cables attached to the messenger cable and trolley wire to avoid cupping the latter when the strain is applied. This construction also permits the use of a flexible hanger at this point to prevent hard spots.

INSTALLATION OF THE GENERAL ELECTRIC COMPANY

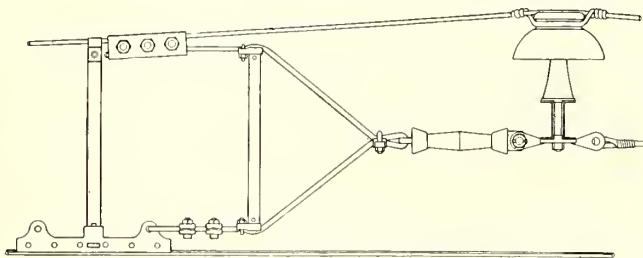
The installation of the General Electric Company is 1995 ft. long, and is made up of both span and bracket construction, the latter being used over the steam tracks and the former on the highway portion, where the ordinary overhead construction is terminated. The hanger spacing varies from 17 ft. to 50 ft. The sag of the messenger wire is 6 in. for 75-



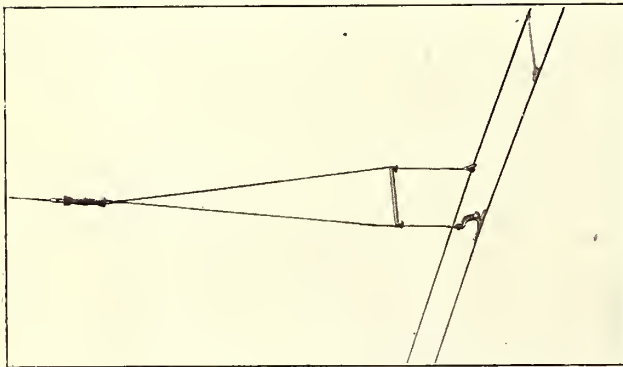
General Electric Company's Messenger Clamp and Strain Clamping Ear



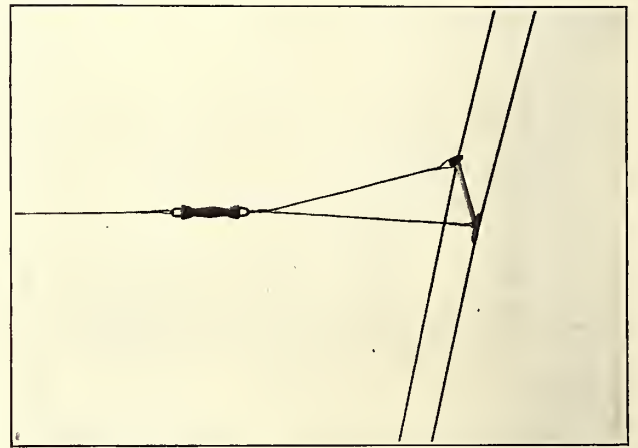
Electric Service Supplies Company's Trolley and Messenger Anchor



H. W. Johns-Manville Company's Anchor Scheme



H. W. Johns-Manville Company's Flexible Pull-Off



H. W. Johns-Manville Company's Rigid Pull-Off

Catenary Test Line—Pull-offs, Anchors, Etc.

clamp ear. A spacing bar is placed between the pull-off cables at a distance of about 15 in. from the line, beyond which they converge and fasten to a wood strain.

The rigid pull-off illustrated is made up of a steel tube with a clamp at the upper end similar to the messenger clamp of the flexible pull-off. The lower end of the steel tube is provided with a four-screw clamp ear. The pull-off cable loops around a shoulder at the lower clamp and loops over the two plates at the messenger cable. The steel tube is fastened to the messenger and trolley clamps by necks extending into the ends of the tube and being riveted to it. The two pull-off cables converge to a wood strain.

Two of the accompanying drawings illustrate the anchorage scheme. The messenger cable and trolley wire are anchored to a plate held against the bottom of the bracket by the messen-

ft. spans and 24 in. for 150-ft. spans. The distance from the messenger wire to the trolley at the messenger support is 30 in.; at the center of the 75-ft. spans, 24 in.; at the center of the 150-ft. spans, 6 in. Steady braces were not used on this section. In this installation the trolley wire is of No. 0000 grooved mild steel, and the messenger of No. 0000 hard copper cable, made of 19 wires, each of 0.1055 in. diameter.

The brackets consist of two pieces of 2-in. x 1 1/2-in. x 1/4-in. angle irons, 11 ft. 6 in. long, joined at the extreme end by a space block and rivet, and by a second space block 2 ft. nearer the pole. The 1/2-in. steel guy rod which supports the bracket from the pole top passes through this second space block, the weight resting on the large button head on the end of the rod. The inner ends were sprung apart to span the pole and fastened with lag screws. The slot formed between the angle irons

by the space blocks is used for attaching a malleable-iron insulator pin to the bracket. The base of the pin is shaped to engage the slot and secured by a bolt passing up between the angles, thus providing means for transverse adjustment of the messenger with respect to the track. A standard single-piece, one-petticoat porcelain insulator, 4½ in. in diameter by 3½ in. high, was cemented to the pin for supporting the messenger cable. A piece of No. 8 iron wire was used for tying in. The end space block is provided with a lug which prevents the messenger cable from dropping off the end of the bracket in case the porcelain insulator is broken. It is also valuable during construction while pulling up the wires.

The span construction is located on the village highway, as mentioned. The messenger support consists of two malleable-iron castings, one of which is sprung on the span wire similar to a round-top hanger, the other casting having sister hooks for gripping the messenger cable is adjustable so as to accommodate the varying angles of the cross-spans. On curves this support was not located over the center of the tracks, but directly over the trolley wire, the alignment of the trolley and messenger being made by the adjacent pull-offs. A wood strain insulator was inserted in the span wire 2½ ft. to 3 ft. either side of the messenger support.

The straight line hangers are of the flexible type and consist of a 3½-in. three-screw clamping ear, similar to the well-known screw clamp grooved-wire ear, and a ½-in. cold-rolled steel strap ⅝ in. wide. The supporting strap is bent so as to form an open loop 2½ in. long at the upper end, and is shaped to prevent the hanger from becoming unhooked, no bolts or clamps being used. The extreme lightness of these hangers, the heaviest weighing 8 oz., and the long loop allow maximum flexibility.

The pull-off hangers are of the semi-flexible type, consisting of a 10-in. curve screw-clamp ear, a ⅝-in. stem and clamps for gripping the messenger wire and for adjusting the hanger lengths. The stem is provided with an eye at one end and a "T" at the other, the eye being bolted to a clevis on the trolley clamp to allow movement parallel to the trolley wire, and the "T" end is passed through the messenger clamp and limits the travel of the stem after a wheel has passed under the hanger. On curves of large radius appreciable flexibility is obtainable, and on small radius curves the adjusting clamp is used to maintain the proper distances between messenger and trolley. The loop hangers and the jointed pull-offs permit taking out the slack in the messenger and trolley wires independently.

The anchor scheme shown is designed to give maximum flexibility by avoiding hard spots in the line, and at the same time providing for the independent adjustment of both the trolley and the messenger wires. A special malleable-iron two-piece clamp, with eye, was used for anchoring the messenger wire, and a single and soldered strain ear was employed for anchoring the trolley wire. A turnbuckle was used in each anchor wire, these, in turn, being attached to the bracket. The strain plate is fastened to the bracket by the insulator pin bolt. A separate plate is bolted to the bracket, from which the guys are run to adjacent poles. A space of 5 in. was left between the plates to avoid a pocket for the trolley wheel.

A special condition was encountered on this division and was overcome as shown in one of the accompanying drawings. The height of the trolley wire over the steam tracks was 22 ft., and after turning on the highway the wire descended while passing over a level section of 400 ft. to a height of 18 ft. above the rail. At this point ascending grades of 1 per cent for a short distance and 5 per cent for several hundred feet were encountered. It was desired to keep the height of the trolley wire 18 ft. above the track through this low section and up the grades. The whole structure tended to lift 12 in. to 18 in. Hence a pull-down was installed, located at the base of the 5 per cent grade, consisting of a standard pull-off hanger guyed on either side to the poles supporting the span wires and pulling the wires down to the desired height above the rail. The weight of the structure was sufficient after the

pull-down was attached to give the desired height above the rail at the base of the 1 per cent grade. A hard spot is formed in the line by this method, but recent inspection shows no excessive wear upon the wire.

TABLES

The following tables give the details of the span numbers, pole numbers, span length, hangers, anchors, etc., as installed on each of the six sections:

OHIO BRASS COMPANY.		
Span No.	Pole No.	Span length in ft.
1	5-7	97
2	7-9	143
3	9-11	74
4	11-13	99
5-13	13-31	73-77
14	31-33	74
15	33-35	151.5
16	35-37	150
17	37-39	154
18	39-Bridge	70
19-20	Bridge-41	135 & 90
21	41-43	151

Alignment, curve right, 1433-ft. radius, spans Nos. 3 to 12.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY.		
Span No.	Pole No.	Span length in ft.
22	43-45	75
23-32	45-65	73 to 77
33	65-67	75
34-36	67-73	123-152
37	73-75	150

Alignment, curve right, 2865-ft. radius, spans Nos. 22 to 33.

ELECTRIC SERVICE SUPPLIES COMPANY.		
Span No.	Pole No.	Span length in ft.
38	75-77	150
39-40	77-81	150 & 151
41-47	81-95	149 & 151
48-50	95-101	73 & 76

Alignment, curve left, 2865-ft. radius, spans Nos. 48 to 50.

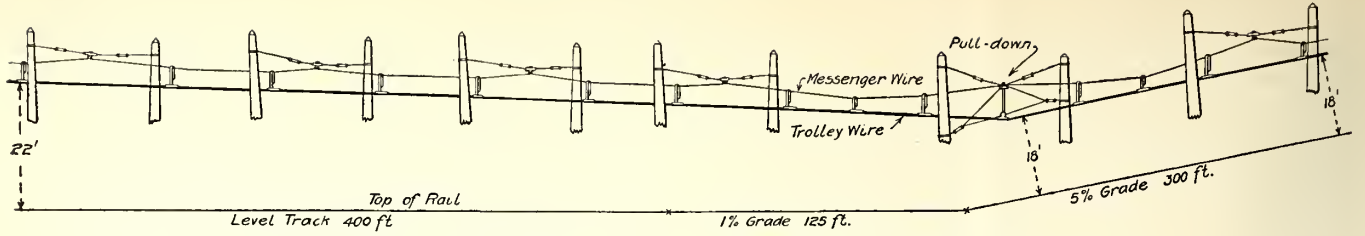
ELMER P. MORRIS COMPANY.		
ELECTRIC RAILWAY EQUIPMENT COMPANY.		
Span No.	Pole No.	Span length in ft.
51	101-103	75
52-54	103-109	76
55	109-111	74
56-59	111-119	75 to 77
60	119-121	69
61	121-123	80

6 type CB form 1 rigid hangers, one type CB form 1 one-way anchor.
 10 type CB form 1 rigid hangers; feed tap at pole No. 7.
 4 type CB form 1 rigid hangers, one type CA form 1 curve pull-off.
 5 type CB form 1 rigid hangers, two type CA form 1 curve pull-off.
 3 type CB form 1 rigid hangers, two type CA form 1 curve pull-off.
 5 type CB form 1 rigid hangers.
 10 type CA form 1 loop-top flexible hangers.
 10 type CD form 1 hinged-bottom rigid hangers; feed tap at pole No. 35.
 6 type CB form 1 rigid hangers.
 5 type CB form 1 rigid hangers.
 6 type CB form 1 rigid hangers.
 9 type CB form 1 rigid hangers, one type CB form 1 one-way anchor.

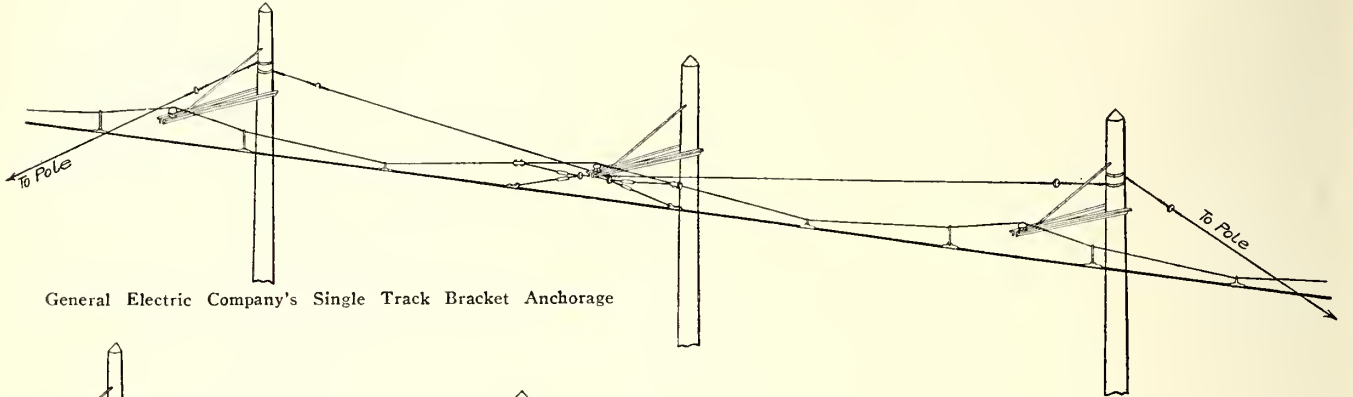
2 Cat. No. S 48612 anchor hangers; two-way anchor in center of span; messenger dead ends on pole No. 42.
 2 sketch No. 18915 rocker hangers; 1 Cat. No. S 119658 steady brace on each pole.
 2 sketch No. 18915 rocker hangers.
 3 sketch No. 18915 rocker hangers; feed tap at pole No. 69.
 2 sketch No. 18915 rocker hangers; 2 Cat. No. S 48612 anchor hangers; two-way anchor in center of span; messenger dead ends on pole No. 76.

8 Interlocker rocking hangers; two-way anchor in center of span; messenger dead ends on pole No. 73; bracket construction.
 9 Interlocker rocking hangers; steady brace on pole No. 77; bracket construction.
 9 Nuclelock rigid hangers; steady brace on poles Nos. 85 and 93; feed tap at pole No. 83.
 4 Nuclelock rigid hangers; span construction; steady strain fixture consisting of messenger clamp, hanger rod, double strain eye and 12-in. two-clamp curve ear at each span; two-way anchor in center of span No. 49; messenger dead ends on pole No. 104.

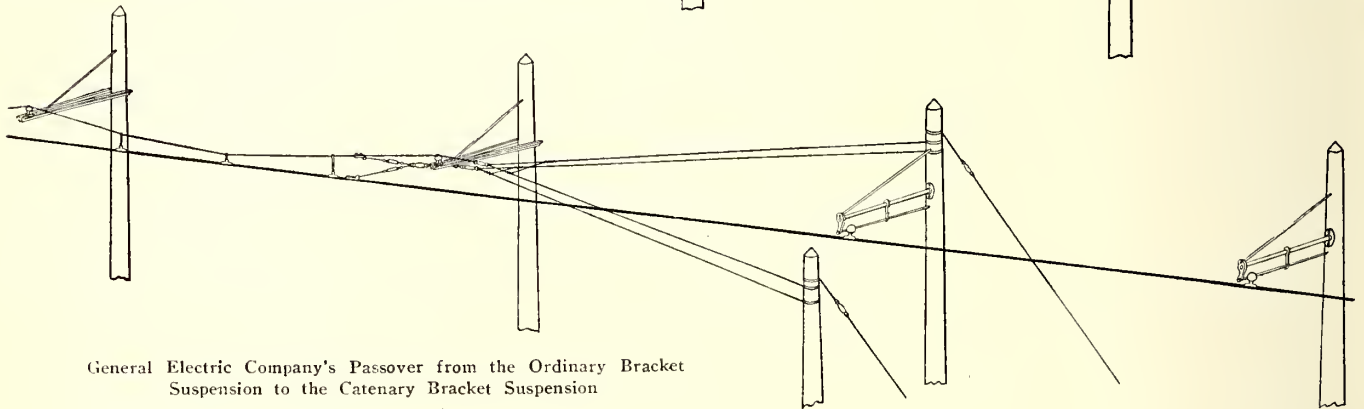
4 top-and-bottom-hinged, strap type "Sure Grip" hangers, three being regular form and one pull-off form; span construction, with pole clamp having Thomas No. 7023 spool type strain insulator on poles Nos. 103 and 104; no trolley anchor; messenger dead-ended on pole No. 99.
 4 top-and-bottom-hinged, strap type "Sure Grip" hangers, two being regular form and two pull-off; span construction, with Thomas No. 362 goose egg type strain insulators.
 4 top hinge T-rod type "Sure Grip" hangers, two regular form and two pull-off form; span construction, with 9½-in. wood strain insulators.
 4 top hinge T-rod type "Sure Grip" hangers, two regular form and two pull-off form; span construction, with 9½-in. wood strain insulators.
 4 top-and-bottom-hinged, strap type "Sure Grip" hangers, regular form; span construction, with 9½-in. wood strain insulators; two-way anchor in center of main span.



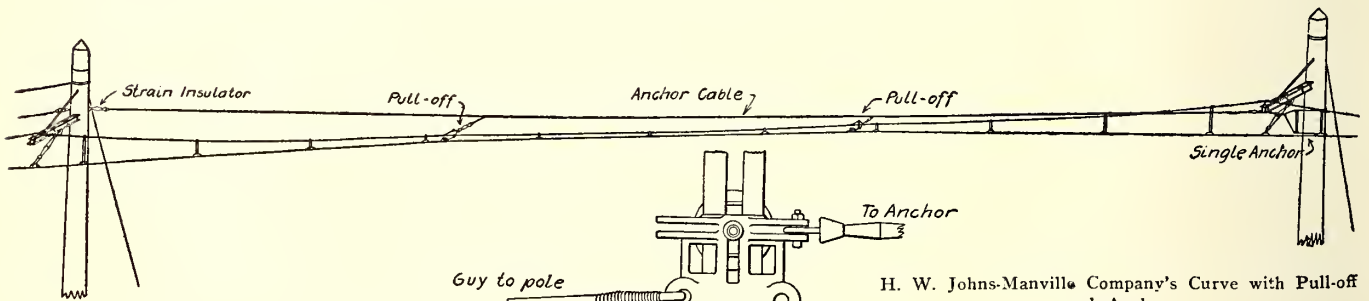
General Electric Company's Special Pull-down Scheme to Allow for a Change in Trolley Clearance



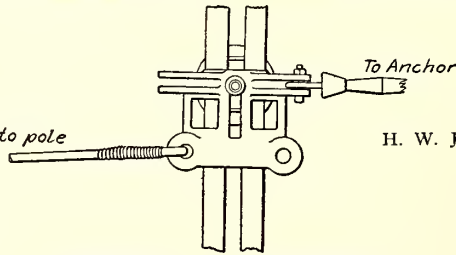
General Electric Company's Single Track Bracket Anchorage



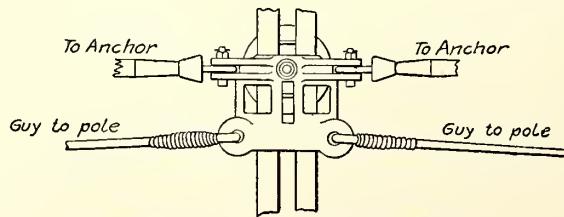
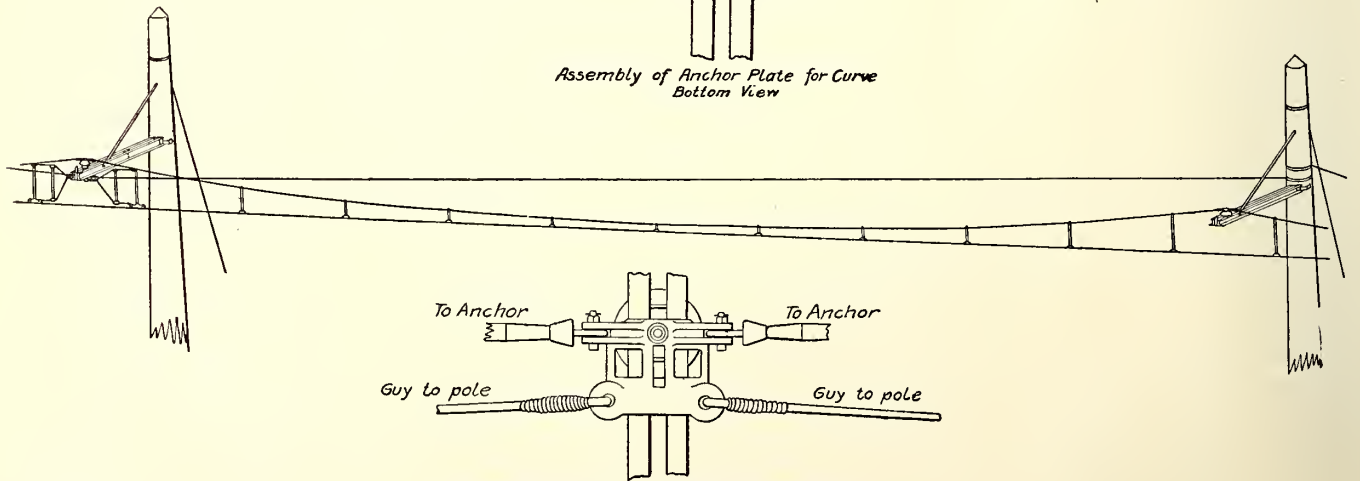
General Electric Company's Passover from the Ordinary Bracket Suspension to the Catenary Bracket Suspension



H. W. Johns-Manville Company's Curve with Pull-off and Anchor



Assembly of Anchor Plate for Curve Bottom View



Assembly of Anchor Plate for Straight Line Bottom View

H. W. Johns-Manville Company's Straight Line Anchor

Catenary Test Line—Details of Anchorage and Other Adjustment Methods

Span No.	Pole No.	Span length in ft.	
62-65	123-131	148 to 154	5 regular form "Sure Grip" hangers, three being top hinge T-rod type, the other two top-and-bottom-hinged, strap type; span construction, with 9½-in. wood strain insulators between poles Nos. 123-124; bracket construction otherwise; feed tap on pole No. 125.
66	131-133	150	4 regular form "Sure Grip" hangers, three being top hinge T-rod type, the other top-and-bottom-hinged, strap type; bracket construction; two-way anchor at pole No. 133.
67	133-135	150	4 regular form "Sure Grip" hangers, three being top hinge T-rod type, the other top-and-bottom-hinged, strap type; bracket construction; messenger dead ends on pole No. 136.

Alignment, curve left, 2865-ft. radius, spans Nos. 51 to 61.

H. W. JOHNS-MANVILLE COMPANY.

Span No.	Pole No.	Span length in ft.	
68	135-137	150	10 rigid toggle-clamp rod type hangers; messenger dead-ends on pole No. 133.
69	137-139	152	10 flexible bottom-slide strap type hangers; steady brace and two-way anchor on pole No. 137; feed tap at pole No. 139.
70-72	139-145	150 to 152	11 flexible bottom-slide strap type hangers.
73	145-147	148	10 flexible bottom-slide strap type hangers.
74	147-149	74	6 flexible bottom-slide strap type hangers; one flexible pull-off; one-way anchor at pole No. 147.
75-82	149-165	73 to 77	6 flexible bottom-slide strap type hangers; two flexible pull-offs; feed tap at pole No. 150.
83-84	165-169	74 & 76	5 rigid toggle-clamp rod type hangers; one rigid pull-off; steady braces on poles Nos. 165, 167, 169.
85	169-171	77	4 rigid toggle-clamp rod type hangers; one rigid pull-off; two-way anchor and steady brace on pole No. 171.
86	171-173	74	5 rigid toggle-clamp rod type hangers; messenger dead-ends on pole No. 175.

Alignment, curve right, 1146-ft. radius, spans Nos. 74 to 86.

GENERAL ELECTRIC COMPANY.

Span No.	Pole No.	Span length in ft.	
87	173-175	152	3 flexible loop-top, strap type hangers; bracket construction; one-way anchor on pole No. 172.
88-89	175-179	151 & 152	3 flexible loop-top, strap type hangers; bracket construction.
90	179 & 184	82	3 flexible loop-top, strap type hangers, bracket construction, changing from west side to east side.
91	184 & 202	65	3 flexible loop-top, strap type hangers; bracket construction; two-way anchor at pole No. 202.
92	202 & 204	151	3 flexible loop-top, strap type hangers; feed tap on pole No. 204; bracket construction.
93	204-206	150	2 flexible loop-top, strap type hangers and two flexible sliding-top rocker-base rod type hangers, pull-off form; bracket construction.
94	206 & 212	166.5	4 flexible sliding-top, rocker-base rod type hangers, pull-off form; pole No. 206 has bracket; span between poles Nos. 209 and 212.
95-96	212-218	52 & 69.5	3 flexible sliding-top rocker-base rod type hangers, pull-off form; span construction.
97	218-220	65	2 flexible loop-top strap type hangers; span construction.
98-100	220-224	71 & 86	1 flexible loop-top strap type hanger and one flexible sliding-top rocker-base rod type hanger, pull-off form; span construction.
101	224-226	80	2 flexible loop-top strap type hangers and one flexible sliding-top rocker-base rod type hanger, pull-off form; pull-down device at poles Nos. 223 and 224; bracket on pole No. 226.
102-104	226-230	100 & 116	3 flexible loop-top strap type hangers; one-way anchor at pole No. 230; bracket construction.

Alignment, curve left, 231-ft. radius, span No. 94; curve left, 1433-ft. radius, spans Nos. 96-100.

HEARING ON FULL VESTIBULES IN NEW YORK

The hearing by the Public Service Commission of the First District of New York to determine why an order should not be entered against the companies operating surface railway in Kings County and Queens County to require them to vestibule their cars completely was continued before Edward M. Bassett, of the commission, on Feb. 10, 1910. G. H. Backus acted as counsel for the commission. A. M. Williams represented the Brooklyn Rapid Transit Company in a similar capacity; J. J. Kuhn, the Coney Island & Brooklyn Railroad; Arthur

G. Peacock, the New York & Queens County Railway, and the New York & Long Island Traction Company, and Joseph R. Mansion the complainant.

William C. Wiston, assistant electrical engineer of the commission, testified that during the storm on Jan. 1, 1910, he rode on the front platform of a car of the Brooklyn Rapid Transit Company equipped with one-third vestibule from the Borough Hall, Brooklyn, to the car house of the company near Bergen Beach, in the outlying section of Brooklyn. He was clothed for walking and wore a derby hat. The outside temperature was about 32 deg. and the temperature of the car about 49 deg. The run took about an hour. He felt no back draught, and it would be difficult to say what his feelings would have been had he been properly clothed. Conditions on the day he made his trip were not what could be considered average. He suffered no ill effects from the trip. The motor-man of the car had the flaps of his cap turned down over his ears and a wide coat collar turned up about his throat. He evidently experienced no difficulty from the cold in operating the car, and his clothing did not appear to interfere with the performance of his duties.

Clifton W. Wilder, acting electrical engineer of the commission, who took part in the work of making an appraisal of the property of the Brooklyn Rapid Transit Company, said that, in his opinion, the cars of the company could not be equipped with full vestibules for the amount of money mentioned in an estimate furnished by W. H. Marsh & Company.

The specifications that were furnished with this bid did not conform to the standard practice of the Brooklyn Rapid Transit Company. The company would naturally follow its standard specifications in making this installation. That would increase the cost considerably. On the convertible cars it would be necessary to install trap doors on the platforms to fill in the space between the doors that would be put on and the edge of the platform. On the semi-convertible cars, of which there were more than 1000, the doors were set on the edge of the platform, and it would be necessary to fill in the space between the edge of the hood and the door. This would require extra material and extra labor over and above the estimate made. There were a number of other small items which he did not recall.

The specifications for painting called for work that would be suitable only for the inside. The Brooklyn Rapid Transit Company had standardized its entire equipment whereby it used practically the same article for the same service on all cars, and had adopted hardware made chiefly of brass or bronze. Wrought iron with an oxidized finish was called for according to the estimate furnished by Marsh & Company. This finish would wear off in time and expose the iron to the weather.

Mr. Wilder did not doubt that the estimate of \$28 for the specifications submitted by Marsh & Company was accurate, but said that they were incomplete. He had examined estimates made by the Brooklyn Rapid Transit Company for materials and labor for a vestibule for its cars, such as would meet the requirements of the case, which placed the cost of materials at about \$85 and the cost of labor at about \$90 a car. He considered this estimate to be approximately correct. The cars of all the other companies were very similar in construction to the cars of the Brooklyn Rapid Transit Company. It would cost more to equip the 50 steel cars of the New York & Queens County Railway, however, than the wood cars.

The Brooklyn Rapid Transit had approximately 1050 semi-convertible cars and 450 convertible cars to be equipped with vestibules and the Coney Island & Brooklyn Railroad about 200 cars. Mr. Wilder would not advise that the companies depart from what had come to be their standard practice, especially as in this case it would entail the lowering of standards.

A motion made by Mr. Williams to dismiss the case was taken under advisement. The hearing was then closed.

Negotiations are in progress for the construction of an electric railway in Jutland, Denmark, from Aarhus to Randers. The estimated cost is \$1,000,000.

OPERATING STATISTICS FOR STREET RAILWAY COMPANIES IN NEW YORK STATE

The table below gives a summary of the financial and operating statistics of the electric railway companies in New

York State for the year ended Sept. 30, 1909. These figures are taken from the reports filed by the railway companies with the Public Service Commission of the Second District and will appear with the other detailed figures in the forthcoming reports of the commission:

Name of Company.	Total miles operated.	Railway Revenues.	Street-Operating Expenses.	Operating ratio.	Car-seat miles, 6 mos. only.*	Total car-hours.	Total car-miles.
United Traction Company, Albany.....	93.5	\$2,003,178	\$1,184,119	58.61	....	1,003,632	8,164,786 Pass.
Auburn & Syracuse Electric Railroad.....	56.8	387,707	233,030	60.1	....	157,907	1,521,968
Auburn & Northern Electric Railroad Company...	11	43,352	25,404	58.64	....	10,422	131,472
(a) Babylon Railroad Company.....	7.5	1,390	1,260	90.6	(b) 32,400	....	1,080
Eastern New York Railroad, Ballston Spa.....	15	31,058	23,087	74.34	....	3,872	59,110
Binghamton Railway Company.....	46.98	331,777	195,518	58.84	* 278,054,574	206,778	1,659,751
International Railway Company, Buffalo.....	....	....	....	....	....	803,833	16,370,814
Buffalo Southern Railway Company.....	23.6	63,662	55,662	87.43	....	42,893	416,925
Buffalo & Depew Railway Company.....	13.59	14,489	21,382	147.5	....	....	193,124
Buffalo & Lake Erie Traction Company.....	168	667,674	450,679	67.6	....	357,099	3,558,606
Catskill Electric Railway Company.....	5.5	18,280	19,352	105.87	* 1,539,915	....	121,732
Cohoes Railway Company.....	2.6	77,810	53,707	69.02	....	53,523	400,153
Corning & Painted Post Street Railway Company..	5.9	49,753	34,711	69.53	* 2,903,360	26,938	218,909
Cortland County Traction Company.....	17	75,192	54,411	72.36	....	37,058	303,349
Elmira Water, Light & Railroad Company.....	27.24	239,708	68,967	71.2	....	103,860	1,302,641
Elmira & Seneca Lake Traction Company.....	16.41	64,037	48,011	74.9	....	22,311	316,201
Fishkill Electric Railway Company.....	7.23	49,778	33,365	67.1	....	26,892	208,255
(c) Geneva & Auburn Railway Company.....	17.75	94,631	50,132	52.98	....	43,882	422,706
Glen Cove Railroad Company.....	3.45	20,585	14,807	71.93	....	18,240	98,501
Hudson Valley Railway Company, Glens Falls....	138.25	580,541	471,776	81.26	....	187,966	1,879,197
(d) Fonda, Johnstown & Gloversville Railroad Company.....	117	773,849	378,033	48.24	....	....	1,653,945
The Adirondacks Lakes Traction Company.....	5	6,949	7,112	102.34	(e) 366,274	4,767	31,166
Lima-Honeoye Electric Light & Railroad Company.	5.26	....	....	....	....	....	....
Bennington & North Adams Street Railway Company	28.87	73,059	66,618	91.18	....	34,186	469,454
The Hornellsville Electric Railway Company.....	5.06	21,020	18,296	87	* 2,108,712	18,780	161,952
The Hornellsville & Canisteo Railway Company....	4.33	27,846	13,247	54.76	* 1,678,000	10,414	82,512
(f) Albany Southern Railroad Company.....	47.6	236,325	192,646	81.5	....	27,722	688,283
Huntington Railroad Company.....	18.7	23,452	13,979	59.68	....	15,075	76,232
Ithaca Street Railway Company.....	10.5	125,502	83,200	66.29	* 5,512,437	66,876	387,722
The Jamestown Street Railway Company.....	24.64	186,511	108,715	58.29	* 13,038,833	154,815	794,668 Pass.
Chautauqua Traction Company.....	33.4	153,093	86,180	56.55	* 12,965,348	57,649	506,458 Pass.
Warren & Jamestown Street Railway Company...	22	84,417	42,067	49.83	40,774,509	22,828	296,802
Keeseville, Ausable Chasm & Lake Champlain Railroad Company.....	5.64	....	....	....	....	....	....
Kingston Consolidated Railroad Company.....	9.1	141,245	80,533	57.02	* 9,139,147	68,864	573,083
Marcellus & Otisco Lake Railway Company.....	....	32,173	25,389	78.9	....	....	....
The Walkill Transit Company, Middletown.....	12.84	60,275	55,052	92.3	* 29,984,508	33,313	305,387
New York & North Shore Traction Company, Mineola.....	10	37,084	34,578	94.1	* 4,926,048	18,976	201,001
Newark & Marion Railway Company.....	9.15	14,357	13,708	95.4	....	....	....
Orange County Traction Company.....	18.95	163,485	104,468	63.9	....	76,384	556,194
New Paltz, Highland & Poughkeepsie Traction Company.....	9.27	27,885	17,813	63.8	....	....	....
Westchester Electric Railroad Company, New York	50.3	388,497	406,811	104.7	....	267,888	2,169,517
Niagara Gorge Railroad Company.....	25.43	163,193	87,740	53.76	....	37,076	305,023
The Electric City Railway Company, Niagara Falls.....	3.87	18,825	13,593	72.20	....	11,137	93,146
Northport Traction Company.....	2.74	10,755	9,304	86.56	....	....	42,627
Ogdensburg Street Railway Company.....	63.71	37,993	24,207	63.71	* 15,139,430	73,407	312,287
Western New York & Pennsylvania Traction Company, Olean.....	98	346,842	145,294	42.12	....	145,068	1,503,534
Oneida Railway Company.....	114.2	352,280	210,770	59.24	....	57,953	1,241,225
(g) Otsego & Herkimer Railroad Company, Oneonta.....	76.62	185,508	179,163	96.61	* 10,123,724	61,720	646,423
Hudson River & Eastern Traction Company, Ossining.....	11	21,221	24,813	112.2	* 2,914,993	....	138,583
Oswego Traction Company.....	11.5	61,947	45,058	73.74	....	55,728	397,491
Peebleskill Lighting & Railroad Company.....	10.36	67,052	41,247	60.02	* 5,252,908	44,583	340,745
Putnam & Westchester Traction Company.....	4	8,484	7,474	88.09	* 1,071,738	6,655	61,304
Penn Yan, Keuka Park & Branchport Railway....	9.32	30,002	17,255	57.5	....	8,518	85,708 Pass.
Plattsburg Traction Company.....	7.7	27,234	10,062	58.98	* 1,903,934	13,822	134,993
New York & Stamford Railway Company, Port Chester.....	23	250,853	169,780	67.45	....	95,342	879,232
Port Jervis Electric Light, Power, Gas & Railroad Company.....	4.4	14,501	14,820	102.19	* 1,122,562	17,278	98,269
Poughkeepsie City & Wappingers Falls Electric Railway Company.....	17.05	135,755	100,323	73.95	* 8,923,191	64,372	545,495
(h) New York State Railways, Rochester.....	230.96	834,516	544,589	65.22	(h) 123,680,424	324,990	2,944,772
(i) Rochester Railway Company.....	165.3	1,948,187	1,277,708	65.58	....	802,075	7,112,764
(i) Rochester & Eastern Rapid Railway Company..	53	202,534	142,773	89.734	....	....	556,475
Rochester & Suburban Railway Company.....	23.4	58,308	38,250	65.60	* 2,637,355	9,625	148,740
(j) Rochester & Manitou Railroad Company.....	7.75	10,763	13,708	120.95	....	....	....
Rochester, Syracuse & Eastern Railroad Company.	115	382,037	199,106	52.12	....	67,243	1,333,662
Buffalo, Lockport & Rochester Railway Company..	60.3	167,047	144,946	86.78	205,375,894	31,286	582,288
The Nassau County Railway Company, Sea Cliff..	1.6	14,422	13,879	96.23	....	10,215	44,776
Schenectady Railway Company.....	133.71	904,038	602,599	66.65	* 63,668,850	338,822	3,223,769
Syracuse Rapid Transit Railway Company.....	88.4	1,350,558	967,574	71.64	* 97,714,888	54,542,560(?)	5,454,256
Syracuse & Suburban Railroad Company.....	18.08	118,234	77,387	65.53	....	51,231	500,470
Syracuse, Lake Shore & Northern Railroad Company.....	53.14	208,500	136,620	65.68	....	50,883	720,008
Syracuse & South Bay Electric Railroad Company.	21	39,105	35,098	89.75	....	12,463	166,810
Troy & New England Railway Company.....	10	33,918	22,623	67.45	....	9,183	151,963
Utica & Mohawk Valley Railway Company.....	127	1,149,890	710,410	61.78	* 84,236,144	439,647	4,440,509
Black River Traction Company, Watertown.....	10.47	73,071	73,095	100.00	* 642,550,000(?)	....	365,000
St. Lawrence International Electric Railroad & Land Company, Watertown.....	7.69	14,271	14,049	98.4	....	....	19,785
Waverly, Sayre & Athens Traction Company.....	9.28	77,392	59,533	76.92	....	54,612	478,076
Elmira, Corning & Waverly Railway Company....	10	7,177	7,345	102.34	....	....	76,179
Tarrytown, White Plains & Mamaroneck Railway Company.....	24	144,929	186,486	128.82	....	101,456	875,329
Buffalo & Williamsville Electric Railway Company	11	38,703	27,293	70.51	....	....	....

Seventy-eight companies on this list, but three with no report. (a) Operated during summer months only. (b) For one month only. (c) Successor to Geneva, Waterloo, Seneca Falls & Cayuga Lake Traction Co. (d) Includes 32 miles operated by steam. (e) For two months only. (f) Successor to Albany & Hudson Railroad Company. (g) Successor to Onconta & Mohawk Valley Railroad Company. (h) Operation from March 23 to June 30, 1909. (i) Operation from July 1, 1908, to March 23, 1909. (j) Operation from Aug. 20, 1908, to June 30, 1909.

A REVIEW OF THE STREET RAILWAY REHABILITATION IN CHICAGO

Speaking on the subject, "What Has Been Accomplished in the Rehabilitation Work of the Chicago Traction Companies," B. J. Arnold, chairman and chief engineer of the Board of Supervising Engineers, Chicago Traction, addressed the Electric Club of Chicago on Feb. 16. He reviewed the "settlement ordinances" passed by the City Council, Chicago, in February, 1907, which went into effect when accepted by the street railway companies. This date, in the case of the Chicago City Railway Company, was April 15, 1907. The ordinances were adopted as the result of a 10 years' struggle over street railway franchises and street railway service in Chicago. They provided for the organization of a board of supervising engineers composed of a representative from each of the companies, a representative of the city and Mr. Arnold as chairman of the board. The representative of the Chicago City Railway Company from the first was H. B. Fleming. The first representative of the city of Chicago was Charles V. Weston, later succeeded by George Weston, the present representative of the city. John Z. Murphy is the representative of the Chicago Railways Company, which did not formally accept its ordinance until Jan. 28, 1908.

At the present time, the work of the Chicago City Railway Company, which operates on the South Side, is almost completed and there is little doubt that the entire rehabilitation of this company will be accomplished within the three-year limit set by the ordinance, which, in the case of this company, will expire April 15, 1910. The work accomplished has been of a high grade and credit is due, said Mr. Arnold, to the engineering force of the company for carrying it on rapidly and efficiently. No doubt the Chicago Railways Company will complete its work also within the time limit set.

The work of rehabilitation has been an undertaking of magnitude, requiring the reconstruction of many miles of electric railway, the building of substations, car houses, etc. Financially considered, the ordinances provide that the operating expenses of the railway companies shall first be paid out of the gross earnings. From the remainder 5 per cent is deducted for interest on the investment. Of the net profits 55 per cent goes to the city and 45 per cent to the companies. Thus the companies and the city are jointly interested in the operation, success and profits of the street railways of Chicago.

Since the ordinances went into effect the companies have paid into the city treasury about \$4,250,000 under the arrangement just mentioned. This money is available for any purpose to which the city sees fit to devote it, although it has been generally considered that it is to be used only for traction purposes. Having in charge the financial aspect of the rehabilitation, with its other duties, the Board of Supervising Engineers has supervision over the accounts of the rehabilitation work, as well as the engineering and construction. It files monthly certificates with the city comptroller showing the amount expended for betterments. Before the ordinances were adopted it was agreed that the valuation of the properties of the companies should be fixed at \$50,000,000. Additions to this original investment are shown by the board's monthly certificates. One provision of the ordinances is that the city may purchase the properties at certain fixed times if it elects. The amount which must be paid is exactly determined at any time by adding the total expenditure shown by the monthly certificates to the original valuation. However, only the city has the right to purchase the properties at this valuation. If any third party desires to purchase the properties it is provided that 20 per cent shall be added to the actual investment determined in the manner mentioned. This is a wise provision in the ordinance, in Mr. Arnold's judgment, for it makes the companies feel secure in their investments.

Mr. Arnold gave some interesting figures showing the extent of the rehabilitation work. The mileage of track reconstructed so far is 302, and there are 305.5 miles of trolley wire and 465 miles of underground cable feeders. The trolley wires and the

feeder cables represent 7,017,418 lb. of copper. For the feeders there have been constructed 888,139 ft. of conduit, representing 5,524,200 duct-feet. The number of manholes provided for these conduits is 2412. The total cost of this overhead and underground construction so far has been \$4,468,767.

Some attention was paid by the speaker to the method adopted for the treatment of ties by impregnating the wood with chloride of zinc. This permits the use of cheaper timber and makes the first cost less. The ties are completely embedded in concrete. Three types of track are used. One consists of steel ties spaced 4 ft. apart. A second consists of treated wooden ties spaced 3 ft. apart, and a third of treated wooden ties spaced 2 ft. apart. In every case the ties are embedded in concrete, but in the third method they are laid on a foundation of crushed stone. This last type is used in the central business portion of the city and is constructed with the idea that it may be disturbed at the building of the passenger traffic subways. The construction is such that by removing the crushed-stone foundation the ties may be easily supported on temporary foundations while excavation is going on for the subways. The total cost of the rehabilitation of 302 miles of track has been about \$15,000,000. Seventy-five per cent of this mileage is laid on treated ties.

In relation to buildings the rehabilitation has resulted in the construction of seven new substations, while two of the old cable-railway power houses have been remodeled into substations. Nine fireproof car houses have been built, as well as three paint and carpenter shops, one office building, one storage-battery building and four new storehouses. The total cost of these new buildings has been \$4,620,000. An idea of the volume of building work performed may be had if one considers that the brick used would build a 13-in. wall 10 ft. high and 18 miles long. The new power-plant equipment consists of 78,400 kw in rotary converters and also 2240 kw in storage batteries. The total cost of this equipment has been \$1,617,437. Electrical energy is purchased to a large extent.

Of new "pay-as-you-enter" cars 1350 have been purchased during the rehabilitation. Of these 50 are of the all-steel type. In addition, 828 modern cars have been remodeled to conform to the "pay-as-you-enter" standard car. The total number of these new or rebuilt cars in operation is 2178, and the cost of them to date has been \$8,136,114. A standard fender which is believed to be the best yet evolved has been adopted and during 1909 the saving of four lives is directly ascribed to the use of this fender.

The total cost of the rehabilitation work to Dec. 1, 1909, was practically \$37,000,000. To this should be added the certificates of investment cost during December and January, and also nearly \$6,000,000 which has been expended for the smaller systems of the Calumet & South Chicago Railway Company and the Southern Street Railway Company. This brings the total investment to date up to about \$95,000,000, and this amount will exceed \$100,000,000 by the time the rehabilitation is completed. Thus the original valuation of \$50,000,000 will have been doubled as the result of the extensive system of betterment and reconstruction carried out under the direction of the Board of Supervising Engineers. On the \$100,000,000 the railway companies will receive 5 per cent on their actual investment as well as 45 per cent of the net profits and they appear to be satisfied with their returns under this arrangement.

Referring briefly to the tunnels under the Chicago River, Mr. Arnold spoke of the Washington Street and La Salle Street tunnels as under construction. In relation to the latter tunnel the shield method of construction is used on the land approaches in order not to disturb existing buildings. For the river section a double-section steel tube will be floated into the proper position across the river and then filled with water and sunk into the place excavated for it in the bed of the river. The tubes will then be pumped out and connected with the tunnels previously driven through the land approaches. In the case of the Washington Street tunnel a part of the old tunnel in the river section is to be utilized in an ingenious manner in the river section of the new tunnel. This portion is the new

roof of the old tunnel, consisting of a thickness of about 5 ft. of concrete reinforced by steel I-beams. The old footings under this roof will be cut out in places and still enough left to support it. In these cut-out portions the new side walls will be built down to the deeper level made necessary by the new construction and afterward the remaining portions of the old footings will be taken out in like manner. This accomplishment under a river bed is quite a complicated piece of engineering, and Mr. Arnold paid a compliment to George W. Jackson for originating it. The new Van Buren Street tunnel under the river is practically completed.

Mr. Arnold further said that the through-routing of the surface street railways in Chicago has been delayed largely by the necessity of building these three new river tunnels at a much lower level (in order to comply with the navigation requirements of the War Department) than the old tunnels. Furthermore, through-routing has been delayed by the necessity of rearranging some of the columns supporting the Loop elevated-railway structure in the central business district, so that the long new surface cars may go around curves which were not originally planned for their use. These obstructions will probably be removed, however, by a concerted action of all the surface and elevated railway interests, resulting from a movement now under way, so that it is probable that during the summer of this year the through-routing of the street railway lines of Chicago will be an accomplished fact. "After that," said Mr. Arnold in conclusion, "the problem of building the passenger traffic subways for Chicago will press for a settlement which can no longer be delayed."

ELECTRIC WELDING IN REPAIR SHOPS

The Philadelphia Rapid Transit Company after experimenting for a long time in a small way has perfected a number of interesting welding processes with an electric arc at its Kensington Avenue shops. Two welding outfits have been installed and the work of the forge shop is now confined almost entirely to upsetting and forming. All grades of wrought iron and steel are successfully welded with the electric arc and even malleable iron gear cases have been repaired with this process. Current at from 14 to 20 volts is used to form the arc. The carbon pencil is secured in a wooden handle and is connected to the positive lead of the water rheostat which regulates the voltage. The piece to be repaired is mounted on a bench and is connected to the negative side of the rheostat. By playing the point of the carbon pencil over the surface to be welded the metal is brought up quickly to a full welding heat, which is localized at the break. The weld is finished on an anvil by hammering until cold in the usual manner. A special flux is necessary to secure satisfactory welds with steel. The composition of this flux was determined by Harry Branson, superintendent of rolling stock and equipment of the Philadelphia Rapid Transit Company after many trials and experiments, and is secret.

Among the many uses to which electric welding is put in these shops may be mentioned butt welding of motor armature shafts and building up shafts which have worn down in the bearings. A worn shaft can be built up with metal welded on to a thickness of $\frac{1}{4}$ in. or $\frac{3}{8}$ in. at a total cost for welding and machining to correct diameter of not to exceed \$2. To tear down an armature and insert a new shaft would cost from \$35 to \$50. In building up a shaft small pieces of $\frac{1}{2}$ -in. round steel bars containing 0.20 per cent carbon are melted down on the shaft by the electric arc. The completed weld is not hammered, but it is claimed that the metal welded on in this manner is as homogeneous as the shaft itself and has quite as good wearing qualities. Another application is plugging worn and elongated holes in brake levers and rods which are afterward drilled out.

In a recent paper before the Engineers' Society of Western Pennsylvania, J. C. Roberts, assistant chief engineer of the Technologic Branch, Geological Survey, stated that 200,000,000 tons of coal are wasted annually by being thrown on the culm banks, or left in the mine in pillars and otherwise.

HEARING ON SERVICE IN THE NEW YORK SUBWAY

At the continuation of the hearing before William R. Willcox and John E. Eustis of the Public Service Commission of the First District of New York on Feb. 16, 1910, regarding service on the subway lines of the Interborough Rapid Transit Company, B. G. Lewis of the statistical department of the commission said that he had compiled from the reports of the company for 1905, 1906, 1907, 1908 and 1909 a statement of the number of cars in operation, the miles of track operated, and the revenue passengers. Mr. Lewis' figures follow:

	CARS OWNED.				
	1905.	1906.	1907.	1908.	1909.
Subway	796	794	794	837	823
Elevated	1552	1524	1503	1591	1591
	MILES OF TRACK OPERATED.				
	1906.	1907.	1908.	1909.	
Subway	71.4	72.48	79.25	81.94	
Elevated	118.05	118.05	118.05	118.05	

	REVENUE PASSENGERS CARRIED.			
	1906.	1907.	1908.	1909.
Subway	137,919,632	166,363,611	200,439,776	238,430,146
Elevated	257,796,754	282,924,273	282,845,864	276,250,196

PERCENTAGE OF INCREASE ON SUBWAY ALONE FROM 1906 TO 1909.				
Number of cars	.....3 to 4 per cent			
Miles of track	.....14 per cent			
Revenue passengers carried	.....73 per cent			

James L. Quackenbush of counsel for the company said that the commission would be notified if any discrepancies were found in these figures.

Frank Hedley, vice-president and general manager of the company, said that it was not surprising that there had been no increase in the number of cars between 1907 and 1909, during which the traffic had increased from about 166,000,000 passengers to 238,000,000 passengers, because all the cars were being operated that could be used expeditiously. He presented the following memorandum showing the percentage of passenger increase and the percentage of increase in subway cars run from 1906 to 1909:

	Per cent.
1906 over 1905—Increase in passengers	28.88
1906 over 1905—Increase in cars run	17.65
1907 over 1906—Increase in passengers	21.88
1907 over 1906—Increase in cars run	15.63
1908 over 1907—Increase in passengers	21.05
1908 over 1907—Increase in cars run	29.01
1909 over 1908—Increase in passengers	16.19
1909 over 1908—Increase in cars run	.97

The hearing was then closed.

As a result of the hearings on this subject the commission on Feb. 18, 1910, adopted the following order:

"Ordered: 1. That the Interborough Rapid Transit Company provide service daily on all subway express and local tracks, by operating subway trains in each direction past every station so as to furnish during each half hour period, beginning at the even hour and half hour, either:

"(a) A number of seats at least equal to the number of passengers, or:

"(b) The maximum number of trains and cars that can be operated with the subway cars now and hereafter owned and equipped.

"2. That the interval of time between all subway trains operated both on express and on local tracks southbound past Ninety-sixth Street shall, daily except on Sundays and holidays, be as follows:

"(a) Not more than a two-minute interval between trains from 6.11 a. m. to 8.30 p. m.

"(b) Not more than a three-minute interval between trains from 8.30 p. m. to 12.39 a. m.

"Further Ordered, that this order shall take effect on Feb. 25, 1910, and remain in force until modified or revoked.

"Further Ordered, that within five days after service upon it of a copy of this order said Interborough Rapid Transit Company notify the Public Service Commission for the First District whether the terms of said order are accepted and will be obeyed."

The commission has adopted an order for a general investigation of the service on the elevated lines of the Interborough Rapid Transit Company, to be conducted by Chairman Willcox and J. E. Eustis of the commission. The first hearing was set for Feb. 24, 1910, at 2:30 p. m.

NEW FRANCHISE FOR CLEVELAND RAILWAY APPROVED

On Feb. 17 the people of Cleveland approved the Tayler form of franchise for the Cleveland Railway Company by a vote of 27,307 to 19,197, or a majority of 8,110. The small vote was the result of the very disagreeable weather that prevailed. The city was harassed with a blizzard so severe that traffic was demoralized. Under the circumstances, the friends of the grant feel that the vote was very complimentary to the ordinance and they are well satisfied. Had the day been pleasant, it is believed that the majority would have been very large. As it is, the number is larger than that given any other public measure in Cleveland for years.

Aside from the statements issued by Judge Tayler and former Mayor Johnson, nothing in the way of public campaigning regarding the grant was done. It is said that former Mayor Johnson's friends did some quiet work against the ordinance, but this evidently did not have much effect.

The cardinal points in the new grant are that there shall be a sliding fare so regulated that the profits shall be only sufficient to pay a dividend of 6 per cent to the stockholders and interest on the bonds; the initial fare for the first eight months shall be 3 cents, with a maximum fare of 4 cents cash or seven tickets for 25 cents and a penny for a transfer in either case; city council to have control over routing cars and conditions of service; a street railway commissioner to represent the city with a salary of \$12,000 a year and expenses for assistance, all to be paid by the company, whose books shall be open to him at all times; charges for operating expenses limited and expenses for capital account to be approved by the city council; all lines to be equipped with pay-as-you-enter cars by a certain date; city given the right to purchase the property at the end of the grant and to purchase or name a purchaser at the end of eight years at \$110 per share. The ordinance is for 25 years and if not extended for another 25 years at the end of every 10-year period, the company has a right to put in force the maximum rate of fare.

It is recognized that an experiment is to be tried in limiting the fare to such a low figure and placing the operation in complete control of the city council, as well as in putting a limitation upon the dividends to be paid upon stock. Judge Tayler realized that the elimination of the element of possible increase in dividends will to a certain extent tend toward loss of interest on the part of those in control, but he believes that there are other features which will counterbalance this, and that the result will be gratifying in every way. The stockholders, however, are guaranteed dividends of 6 per cent and, should the maximum fare not prove sufficient to give a good service, maintain the property in good shape and pay these dividends and the interest, it will be up to the city to take such action as will make this possible. It is believed that the people of Cleveland will not be satisfied with anything less than was furnished by the old company before the fight commenced. They have had to stand what the receiver has been able to furnish, but now that the city has achieved its purpose, the people will look to the city to carry out its contract with the company and at the same time furnish a service second to none in the country.

Judge Tayler and Receiver Bicknell had made arrangements so that little time would be required to put the new fare into effect if it was found that the grant had been approved. Accordingly, when the unofficial count showed that it had been carried by a decisive vote, the announcement was made that it would become effective on the morning of Feb. 19. It was understood beforehand that there should be no such demonstration as took place when the Municipal Traction Company acquired the system and presented the people with a "municipal day," with free rides.

The little metal disks went into general use on Feb. 19 and were sold five for 15 cents. They are put upon the little wire fixtures with which the Municipal Traction Company ex-

perimented at a cost of several thousand dollars. Fares were also collected in cash, but if even change was not proffered the conductors retained 5 cents. The old tickets were also accepted, but if the holders preferred, they could exchange them at the general offices for the 3-cent disks. It is understood that the company will use paper tickets when the formal change of control of the property takes place.

Judge Tayler has set March 1 as the date when the receivership will be ended. He believes that all the necessary formalities can be completed by that time. Funds will probably be placed in the hands of Secretary Henry J. Davies, as trustee, to pay the dividends to the stockholders of the old Cleveland Electric Railway and the holders of so-called guaranteed stock, as fixed by the court.

The new rate of fare applies on all lines within the city limits only and the people of the suburbs will be compelled to pay whatever their contracts with the old company provide. Collinwood and Corlett have been annexed to the city and the order putting the ordinance into operation includes them, although it was thought some time ago that a legal decision regarding the territory included in Collinwood would have to be secured, as it has been annexed since the ordinance was passed by the city council. East Cleveland has the same fare and the same conditions as prevail in the city, because of its contract with the old company to that effect. Lakewood people pay 5 cents and have the benefit of free transfers, as they have had in the past. Several other suburbs have the same conditions. In effect, the grant makes a zone system, so far as these villages are concerned.

As soon as the result of the vote was made known President Horace E. Andrews, then in New York, called a meeting of the board of directors for Feb. 21, in order to make preparations for receiving the property on March 1 and also for financing the improvements that will have to be made. Under the requirements of the ordinance, it is estimated that about \$3,000,000 will be required at once, although as much more will probably be necessary later. About \$1,000,000 will be used for relaying tracks, \$1,000,000 for power plant improvements, \$600,000 for new cars and half that amount for converting cars now in use into pay-as-you-enter cars. Considerable talk is heard of purchasing power from the Cleveland Electric Illuminating Company, but if this is done the old power plants will be preserved and improved and the only power purchased will be the surplus needed above what the company's plants will produce. If the Illuminating company can furnish current at a desirable figure, it may be possible that such an arrangement will be made, especially for the outlying districts.

A problem is presented to the officers of the company in arranging for financing the improvements. President Andrews, it is stated, would prefer to sell stock for this purpose and it is possible that this may be done if the market price exceeds par value at an early date. If not, then a bond issue may be decided upon. In talking of the matter, Judge Tayler spoke of the 6 per cent dividends on stock and the probable 5 per cent interest on bonds, but seemed to be willing to leave the question of financing with stock or bonds with the officers of the company. Opinions in Cleveland differ as to the probable difficulty in financing the company on either plan with the initial fare at 3 cents.

The regular dividend of 6 per cent on the stock of the Cleveland Railway Company, to be paid in quarterly installments, will be begun on April 1. Unsecured claims against the company, amounting to about \$40,000, will probably be paid by the receiver on order of the court, before the property is turned over to the company. A few other claims have not yet been passed upon and they will also be settled, in all probability.

On the Cleveland stock exchange the stock of the company has varied between 95 and 96 since the result of the vote was known. A little stock came into the market at the higher figure and had the effect of pushing down the price somewhat.

John J. Stanley, vice-president of the Cleveland Railway Company, will again assume the duties of general manager of the system on March 1. Mr. Stanley, it is expected, will put into

effect the agreement made with the men to increase their wages.

It is said that the first new track building that will be done is the construction of a cross-town line on West Sixty-fifth Street. Another extension discussed is a short strip of tracks to connect the Superior Avenue line with the Euclid line in East Cleveland or the extension of the Superior line east to connect with the tracks at another point, so that the interurban cars will be able to use the Superior route.

The immediate announcement of the appointment of Gerhard M. Dahl as street railway commissioner by Mayor Baehr caused some surprise among the people. Mr. Dahl is well known as a young attorney and political speaker, but he had not been mentioned publicly in this connection before. It is rumored that Receiver Warren Bicknell will be the street railway expert in the office of the commissioner.

STRIKE IN PHILADELPHIA

The dismissal of 173 motormen and conductors of the Philadelphia (Pa.) Rapid Transit Company on Feb. 18, 1910, following their conviction of breaking the rules of the company, was made the excuse for a strike of the motormen and conductors of the company, called at 1 p. m. on Feb. 19, 1910. Of the 6700 trainmen employed by the company about 4000 heeded the order of the union and turned in their cars.

It was claimed by the union, in order to enlist the sympathy of the public, that the discharge of the men was in the nature of a lock-out. As a matter of fact the cases against some of the men discharged had been pending for some time, and the dismissal of so many men from the service at one time is accounted for by the accumulation of cases. Some 600 men were recommended for dismissal by the car house superintendents, but only 173 men were dismissed. The extreme action of the union is shown by the fact that the grievance committee of the men with which the company has dealt was to meet on the evening of Feb. 21, 1910, to consider matters affecting the welfare of the men and the company.

In explanation of the discharge of employees for breaking the rules of the company, a statement was issued by the company in part as follows:

"The assertion that the company locked out the men evidently represents an attempt to create a fictitious grievance, and is in line with the remark made frequently during the past month that the faction represented by Mr. Pratt, of the union, must bend all its energies to the creation of public sympathy. Hence, the claim that the company has ruthlessly discharged 600 or 700 employees without adequate cause.

"During the negotiations begun by the men on their own initiative, and without any suggestion from the company, for a new agreement, the company has scrupulously avoided any action that would in the slightest degree embitter the situation. For this reason few, if any, discharges have been made. The accumulation of cases of intoxication and neglect to register fares and miscellaneous breaches of discipline was disposed of on Feb. 18. This resulted in the discharge of 173 men. Twenty-nine of these were discharges for neglect to register fares; others for intoxication, others for breaches of discipline and for the good of the service. In the latter classification are men who have defied the company's rules and orders and stood in the way of efficiency and good service.

"These are the facts of the matter. The strike is in line with the action taken a month ago, when a strike vote was carried for the purpose of frightening the company into a new agreement to take the place of the contract which expires at the end of June, and with which the men have become dissatisfied. The company made every effort to arrive at an agreement, although it was under no obligation whatever to do so. It found, however, that the only thing that would satisfy the union element was a closed-shop agreement. The company was willing to go to any length short of surrendering the control of its property to the men who repeatedly succeed each other in the domination of the local union."

In June, 1909, the company entered into an agreement with its employees imposing conditions of service to be in force for a year, as published in the *ELECTRIC RAILWAY JOURNAL* of June 12, 1909, page 1087. According to this agreement the company was to treat with a committee from the men whose members were to be selected by the employees at the different barns. The first clause of the agreement between the company and the men covered this subject. It reads as follows:

"The company agrees, through its accredited representatives, to meet with the accredited representatives of its employees to adjust any differences or grievances which may arise."

This agreement was dated on June 5, 1909, and was signed for the party of the first part by the Philadelphia Rapid Transit Company and for the party of the second part by 19 car house representatives.

Some of the employees construed this agreement to mean that the company should not deal with any but representatives of the union which had been organized among the men, but which included in its membership less than a majority of the total number of trainmen. As a result the company found it difficult to maintain proper discipline among the men, especially those affiliated with the union, and was compelled from time to time to call the attention of the men to the necessity for exercising greater diligence in performing their duties.

Following a conference with a committee of the men on Feb. 17, 1910, to discuss a new agreement to replace the present one at its expiration C. O. Kruger, president of the company, issued a statement in which he said:

"The company must and will maintain the position that its employees shall be free to join or not to join any organization and may present their grievances to the company individually, or, if members of any organization of employees, by a committee or the representatives thereof, and there shall be no intimidation or discrimination against any employees so doing by any officers of the company or their subordinates."

The meeting on Feb. 17, 1910, to discuss a new agreement between the company and its employees lasted from 10:30 until 12:10. The men reiterated their demand for 25 cents an hour immediately, 26 cents an hour in 1911 and 27 cents an hour in 1912. On Jan. 1, 1910, the company announced a plan to provide insurance and pensions for its employees and fixed a new scale of wages effective on July 1, 1910, as follows:

"Motormen and conductors now in the employ of the company, and who remain continuously therein, will receive an increase of 1 cent an hour on July 1, 1910; another cent an hour on July 1, 1912, and another cent an hour on July 1, 1914, making a maximum rate at that date of 25 cents per hour.

"Motormen and conductors entering the service after Jan. 1, 1910, will receive the present rate of wages, namely, 22 cents an hour, until they have served the company continuously for two years, and if they remain in the service of the company they will then receive the increase of 1 cent an hour each two years thereafter, until the maximum of 25 cents an hour is reached.

"Motormen and conductors in the elevated service will likewise receive an increase of 1 cent an hour on July 1, 1910, and further increases of 1 cent an hour at the end of each two-year period, until the maximums of 28 cents an hour for motormen and 25 cents an hour for conductors are reached.

"New men entering the elevated service will be likewise increased after each two years of continuous service.

"Station and train men now in the elevated service will receive 19 cents an hour after July 1, 1910, with a further increase to 20 cents at the expiration of two years.

"New employees entering this branch of the service will receive 18½ cents an hour until they complete two years of service, when they will be paid 19 cents, and after two years' further service, 20 cents."

Mr. Kruger repeated on Feb. 17 that the wage scale approved by the directors of the company on Dec. 31, 1909, could not be changed except to concede a half-cent increase between the 23-cent rate effective on July 1, 1910, and the 24-cent rate to go into effect July 1, 1912. He stated, however, that he would

recommend to the directors that the time new men had to work at 22 cents before being entitled to increases be reduced from two years to one year. This was not satisfactory to the committee, the chairman of which stated that it was opposed to a sliding scale in any form, and wanted the same wages for a new man as for an old employee. It also demanded increases in proportion to the 25-26-27-cent scale for other employees that motormen and conductors received.

Incidental to the discussion of the proposed agreement, Mr. Kruger defined to the committee the company's position with regard to the presentation of grievances. He said that any employee had the right to present any grievance, but that the decision of the officials of the company must necessarily be final in all matters involving the discharge or discipline of employees. Mr. Kruger further stated that among the causes that would be considered sufficient reason for absolute discharge was the creation among the employees of a feeling of hatred, dissension and distrust, and that any man who engendered this feeling by word or act would be summarily discharged and not re-employed.

All of the men who did not turn in their cars on Saturday were continued on their runs and a limited service was given by the company with the men at its disposal. Almost immediately after the union men had abandoned their cars, however, violence was resorted to by the strikers and their sympathizers. It soon became necessary to abandon service entirely on some of the Kensington lines, including the Frankford line, and service had not been given on them up to Tuesday night. In many instances the company had the men necessary to man the cars ready in the car houses to take out the cars, but the police protection was inadequate and no attempt was made to operate cars over lines running from these car houses. Up to the evening of Feb. 22 the company discontinued service on all surface lines after 6 p. m., but maintained service on its elevated and subway line all day and until after 1 a. m. The subway and elevated lines were well protected by the police and the company's own employees, and in addition more than 450 Pinkerton detectives were detailed to duty on these lines.

On Feb. 20 the company had 700 surface cars in operation out of a total of more than 1100 called for in the regular schedule. On Feb. 21 it had 777 cars in operation. On Feb. 22 it had 600 cars in operation at 9 a. m. and increased the number steadily until about 3 o'clock in the afternoon, when cars had to be withdrawn from some lines on account of violence.

As Feb. 22 was enjoyed generally as a holiday and many offices and stores were closed, down-town Philadelphia took on the aspect of a city enjoying a celebration. The streets were thronged with people who watched the cars, and while they were for the most part orderly there was constantly present a very large element which made for inherent disorder. At the general office the company, at Eighth and Dauphin Streets, there was a special detail of mounted men augmented on Feb. 22 by a battalion of State Fencibles. Telephone communication kept these men informed of disorder and a portion of the mounted men was dispatched from the offices whenever it became apparent that the services of the men were needed to reinforce the regular police guard of two men to each car. The emergency crews were kept constantly in readiness, and whenever the services of a crew were needed two mounted men were dispatched to accompany each wagon.

The company feels that most of the men are satisfied with the conditions of service which obtained before the strike, and it has not advertised for men. Feb. 22 was the regular pay day of the company, and all men who deserted their cars and applied for their pay were promptly paid provided they turned in their badges, thus formally terminating their term of service with the company. Very few men took their pay under the conditions imposed. This indicates that the men who are on strike realize the ability of the company to dispense with their services. It is generally agreed that the action of the men was ill-advised, and there is very little tendency on the part of the business interests to support the men. It has even become apparent to the casual user of the company's lines that the

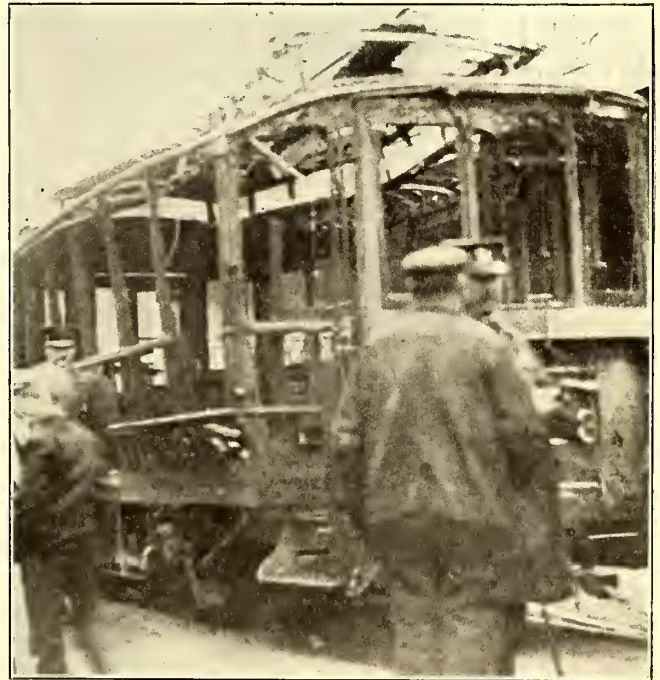
men have been negligent since the last strike and have failed in many instances even to extend to passengers courtesies that would be called for under ordinary circumstances.

On Feb. 21 C. O. Pratt, national organizer of the union, was arrested after a meeting of the strikers, charged with inciting riot, and was committed to jail and kept in confinement all night. It was alleged that his speech was of an incendiary character. When arraigned before Magistrate Beaton at the City Hall Police Court on Feb. 22 Mr. Pratt was released on \$3,000 bail.

Following the disorder of Saturday and Sunday the company issued a statement in which it said:

"Last June the company stated that it had resisted the domination of the union because it believed that the public and the company would be better served by men who placed loyalty to their employers above any other allegiance. The public has had ample opportunity during the past seven months, and from the events of Saturday and Sunday, to judge whether or not the company was right then and now. We think it has been amply proved that neither peace nor good service can be expected from the forces directing the strike riots of to-day.

"Denial will, of course, be made that these riots are sanc-



Strike in Philadelphia—Car Destroyed by Fire

tioned by the union, but there can be no doubt that it has directed and expects to benefit by violence."

George H. Earle, president of the Real Estate Trust Company and a representative of the city on the board of directors of the company, in an interview on Feb. 22, said:

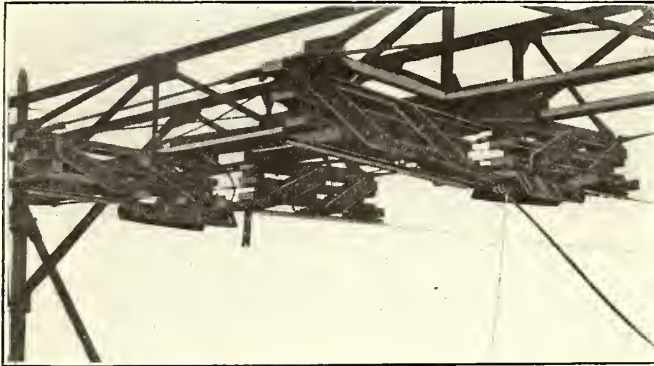
"The sword has been wrested from the State and the State must get it back. Laws and authority are usurped, suspended by flying mobs. It is really pitiful. Under the circumstances it is no use talking of arbitration.

"You cannot arbitrate when the Government ordained by the people is to govern or that ordained by Pratt, of Detroit, is to govern. You cannot arbitrate anarchy. I warned Pratt that if he ordered a strike he would be sending many a poor fellow to his death, and look at the blood that has been shed.

"I believe in organized labor, but nothing discredits it so much as leadership which places the power of organization ahead of the happiness of men. The sentiment grows all the time that if the organization of street railway men is to mean constant disorganization of business and the transportation and comfort of 1,500,000 of people, the fight had better be fought to an end once for all."

OVERHEAD CONTACT FOR A CLEVELAND SWING BRIDGE

John W. Sheehan, superintendent of overhead construction of the Municipal Traction Company, Cleveland, Ohio, has made an interesting improvement in the overhead wiring connections on the Superior Viaduct in that city, which has done away with much of the trouble formerly given by this bridge, and has resulted in a material reduction of the maintenance cost. As this viaduct is opened and closed frequently through the sea-



Draw Bridge Runway in Place

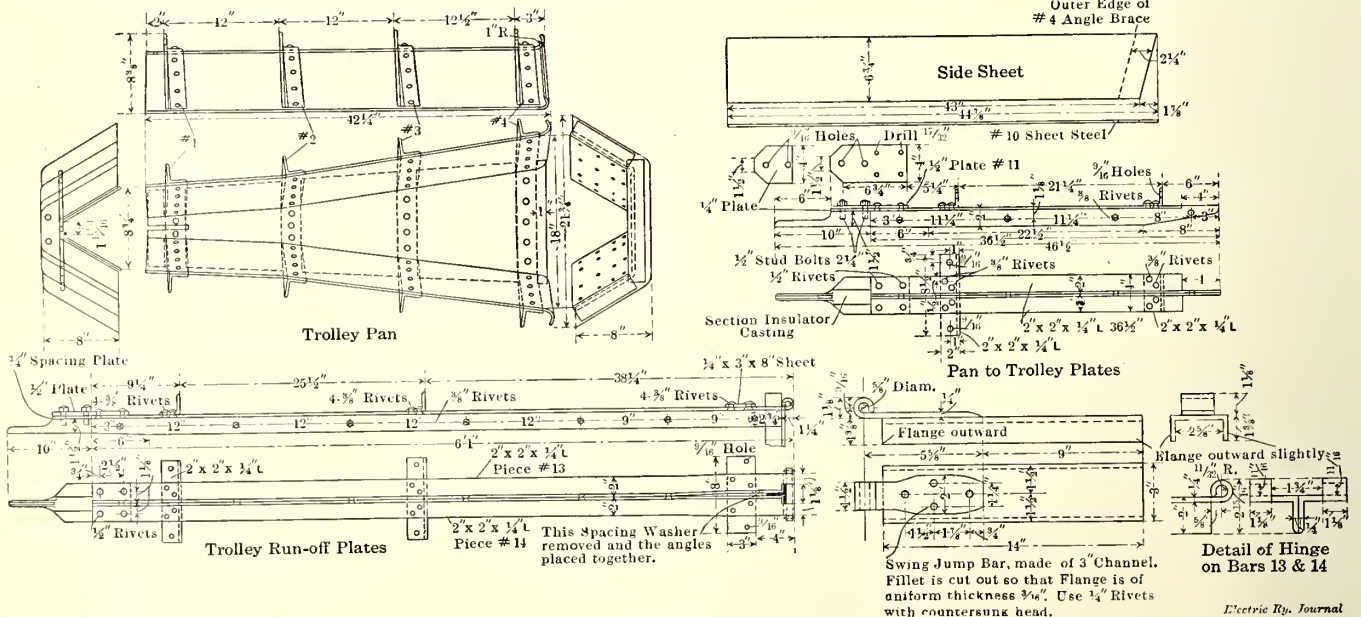
son of lake navigation some form of connection was necessary to permit the flow of current the instant the bridge returned to its normal position. When the iron structure from which the trolley wires are carried was built, it was required to clear the rail 20 ft. On account of the settling of the west end of this viaduct some years ago, the iron structure was bent, and some of the poles had to be renewed. At another time, when the city widened the roadway, the structure had to be widened also. As a result of these changes the draw in swinging would be over 8 in. off center on one end and, with other irregularities, caused about one-third of the trolley wheels to jump when passing under the pans. Three blocks, 3 in. x 3 in., and 3-in. plank were employed for insulating the trolley runways when using the old clearance of 20 ft. The company also had much trouble in wet weather on account of the short-

suggested that the company provide an improved runway of his design, to be built at the company's Lake View shops.

The new runway has lowered the trolley wire 15 in. without affecting the bridge truss, and allows better tension on the trolley pole. The frame from which the runway is carried consists of three 2-in. x 8-in. planks and three sets of 4-in. x 4-in. x 8-in. block spacers, all made of hard maple. These pieces were staggered in bolting to secure the best insulation possible. The flopper or swing jump bar is made of 3-in. channel iron weighing 4 lb. per foot and is 15 ft. long. The tongue of the hinge is riveted in the back of this bar, passing into the mortise of the hinge made by turning up the ends of the double 2-in. angle iron on the top used for the trolley runway. The bolt passing through this hinge has to be renewed with each new jump bar, the latter itself being replaced every three months on account of wear. The pan is 36 in. long, widening from the place where the double angle iron is attached to the receiving end, which is 12 in. on the top and flares at the sides to 18 in. across the bottom. The pan is 6 in. deep. The pans are made of case-hardened steel, and after 16 months' use show little wear, although about 3000 cars cross this viaduct daily. This is equivalent to 1500 cars to each track or 75 car per hour for a 20-hour day. The conductor no longer is obliged to hold the trolley rope when crossing the draw, as the wheel does not leave the wire.

PORTABLE TRANSFORMER FOR TESTING ARMATURES

At the Homewood shops of the Pittsburgh Railways Company a convenient mounting has been designed and built for an alternating-current magnet coil testing set, used to detect short-circuited armature coils. The curved pole-piece and coil are bolted to the top cross-piece of an ordinary two-wheeled warehouse truck. The iron shoe on the bottom of the truck is bent backward so that the frame of the truck will stand vertically when tipped up. Armatures under repair are mounted on wooden horses, which are of such a height that when the transformer truck is tipped up the center of the pole-piece is exactly opposite the center line of the armature shaft. The armature shop is wired for 60-cycle alternating-current in-



Details of Ironwork of Draw Bridge Runway

circuiting of the iron bolts which held this plank to the structure and from the breakage of adjoining wires. As the draw was close to the center of the city it was impossible for the conductor to collect all his fares by the time he reached the draw. With the pay-as-you-enter system in use he would have to get off the car to replace the trolley, thereby permitting people to board without paying fare. Mr. Sheehan therefore

candescant drop lamps over each armature horse and by connecting the testing coil to one of the lamp sockets suitable current is instantly available.

Transformers of this kind are frequently mounted on a frame equipped with casters, but the attachment of the transformer to an ordinary warehouse truck makes it a very convenient testing outfit for transportation around the shop.

MEETING OF COMMITTEE ON EQUIPMENT

The committee on equipment of the American Street & Interurban Railway Engineering Association met at Pittsburgh, Pa., on Feb. 21 and 22. Plans were made for the work of the year as assigned by the executive committee, and a number of the subjects were discussed. There were present: John Lindall, chairman, superintendent of rolling stock and shops, Boston Elevated Railway Company, Boston, Mass.; M. V. Ayres, electrical engineer, Boston & Worcester Street Railway Company, South Framingham, Mass.; R. C. Taylor, superintendent of motive power, Indiana Union Traction Company, Anderson, Ind.; A. T. Clark, superintendent of shops, United Railways & Electric Company, Baltimore, Md.; J. L. Davis and M. B. Lambert, of the Westinghouse Electric & Manufacturing Company, and representatives of the technical press. A telegram from Terrance Scullin, Cleveland, Ohio, member of the committee, was read expressing regret that he could not be present.

GAGES FOR WHEEL WORK

The advisability of recommending gages for use in wheel mounting and inspection was first discussed. It was recalled that the gage for mounting wheels as described before the Denver meeting was not accepted as recommended practice because it was thought not suitable for universal use. That gage used the dimension between the backs of the wheels and if designed for steel wheels would not fit iron wheels which had the same tread and flange contour, but might not have the same flange thickness. It was agreed that a wheel mounting gage should be designed and recommended by the committee. Mr. Taylor thought that such a gage should use the gage line on the flanges as a basis, and not the backs of the flanges.

A discussion followed as to the advisability of recommending the marking of the center of each axle before finishing and using this center mark as a basis for all wheel mounting measurements. The committee agreed that such a recommendation would be advisable. That would be better practice than to measure from the center of the journals. In Boston, wheels were set according to the gage line and not the backs of the flanges. The allowance of 1/16 in. either way from correct gage was allowed. This practice was satisfactory.

Mr. Clark spoke of the need for a limit of wear gage and the committee agreed that it would be very desirable to design a gage which the inspectors could use to tell when to turn tires. This would reduce the variable element of personal judgment and would assure that the turning would be done at the time when the least metal would be wasted. It would be better to restore the contour frequently and thus gain wheel life.

One road had experienced derailment troubles because the wheel makers had thickened the wheel flanges to make them stronger. A proper gage to use in checking the contour of new wheel treads and flanges was thought desirable. A general discussion followed in which the tendency for wear of flanges and the best methods of restoring the flanges were considered.

The committee decided to consider the design of gages for checking the contour of new wheels, and limiting flange wear and a gage bar for mounting wheels.

TAPER OF PINIONS

The taper and design of pinions were discussed rather thoroughly. The taper used by the Westinghouse Company was 1.219 in. per foot and by the General Electric Company 1.25 in. per foot. Mr. Davis thought it would not be difficult to agree on a taper of 1.25 as standard for the pinions made by both companies if it really was advantageous to standardize the taper of pinions. The Westinghouse No. 312 and the GE-86 motors have interchangeable pinions now. Mr. Davis thought a standard taper would not be of great value unless other features, such as gears and pinions, were standardized. A standard taper would not make the pinion interchangeable, but it would probably facilitate the work of ordering pinions from different manufacturers. The two tapers now used by the manufacturing companies have practically no difference as to mechanical qualities. The armature shaft taper was not related to the size of

the shaft and one standard taper would do for all capacities of motor.

The committee agreed to consider favorably the recommendation of a standard taper of 1.25 in. per foot for pinions.

MOUNTING PINIONS

Interesting practices of pinion mounting were then described. Indiana Union Traction shopmen pressed on pinions for 75-hp motors at 40 tons pressure by using a wheel press. They were taken off with a screw clamp or with wedges. At Boston about 90 per cent of the pinions were put on at the car houses, where it was necessary to put them on by driving. The Chicago Railways used a hydraulic press for removing pinions, pushing the shaft out as in wheel practice. The Baltimore United practice was to counterbore the pinion and fasten with a nut and lock washer.

Attention was called to the small part which keys played in holding pinions in place. If the fit of a pinion did not hold it securely, then the key would soon be destroyed. To emphasize this the Interborough Company had mounted a large number of pinions without keys more than a year ago. These ran satisfactorily in regular daily service. The practice of the Westinghouse Company in mounting pinions was to shrink them on. Formerly they were heated with a gas flame, but extreme care was necessary in this work to make certain that the pinions did not become heated above a temperature of 150 deg. C., otherwise dangerous stresses might occur. With specially hardened steels the process required even additional care or they would break in the keyways. Now the gas flame was no longer used, but the pinions were heated by immersion in boiling water. This did not anneal the steel as the careless use of the flame might do. It was a safe way for mounting large pinions. The shrinking fit was much better than a drive fit, because the arrangement of the grain of the metal was not disturbed.

GEAR AND PINION MATERIAL

An interesting discussion followed on the characteristics of pinions made of various kinds of steel. One member spoke of a tool steel pinion that had been so hard that it had stripped the teeth off a gear without any injury to the pinion teeth. It had been the experience of one committeeman that the combination of a hard pinion with a softer gear increased the life. The gears stayed in proper mesh longer, and because of the small wear of the hard pinion there was less abrasive metal to accelerate the wear.

A representative of the Westinghouse company called particular attention to the injurious effects which loose gears and bearings had upon the motor and armature coils. After a careful study interesting data had developed showing that an element which had much to do with the mechanical breaking down of armatures, brushes, gears and similar parts of the motor equipment was the loose axle bearing. Any play in the axle bearing permitted the gear and pinion to get out of mesh and thus severely jar the motor. The necessity for maintaining the gears accurately in mesh was most important. In many instances it would be advisable to scrap the gears and pinions sooner and thus save the motor equipment from the injury which severe vibration would bring about.

In developing characteristics of material for gears and pinions it was the practice of the Westinghouse company to make very severe endurance tests by driving a load with a 200-hp motor through gearing designed for motors of 50 or 60 hp only. In these tests it was plainly seen that if the gearing was not in accurate mesh the life of the teeth was very greatly shortened. Some experiments had shown that a great life will be had when both pinion and gear were made of treated or specially hard steel. The Westinghouse engineers had concluded that excellent results are obtainable by using treated steel of a high grade and ductile carbon steel. This was put through a heat treatment and the resulting pinion was neither too hard nor too brittle and was tough enough to give good wearing qualities. The experience of the Interborough Rapid Transit Company had shown that proper gear material was to

be obtained by treatment. The Westinghouse company was prepared to treat cast-steel gears. Old style gears, which had an elastic limit of from 20,000 to 25,000 lb., when treated had double that elastic limit.

The American Gas Appliance Company had case-hardened some pinions for small motors used on the Boston system.

Mr. Taylor suggested that gears might be made according to the process used in rolling steel wheels, that is they would be in one piece of homogeneous metal, as no operating man desired any part of his apparatus subdivided if he could get that part made of the same material in one piece. When rims were shrunk on there was an opportunity for fits which would distort the rim or stress it unduly. Mr. Davis stated that the Westinghouse company uses altogether for heavy equipments gears which are made from rolled tire steel.

One member called attention to the apparent inconsistency in the wear of gears on two and four-motor equipments. Although the two gears of a two-motor equipment handle practically the same load as the four on the other equipment, there was very little difference in the rate of wear. It was noted that there was more wear on the No. 2 and No. 4 motors. This probably was because the torque on these motors acted opposite to the blow made by irregularities in the track. The No. 3 motor gave the most trouble, so far as axle bearings were concerned.

One engineer suggested the advisability of standardizing the length of the axle bearing fit. With non-standard axle bearing lengths as now used it was not convenient to use motors of different makes but of similar capacities on the same axle. If the first motor used had an 8-in. axle bearing the shaft would be worn for that length, and if it were desired to install a larger motor on the same shaft it would be found necessary to smooth the shaft before the 10-in. bearing of the larger motor could be used.

The committee as a result of the foregoing discussion thought that it might be advisable to include in its report the following subjects: (1) Gear material, (2) better material, such as rolled instead of cast, (3) limit of wear of gears and pinions.

WHEELS AND TIRES

The question of wheel design was touched upon briefly at the first session of the committee. Mr. Lindall called attention to the necessity for careful judgment in choosing a wheel design suitable for the type of equipment under which it was to operate. On the Boston Elevated, with its large cars and wheels, there had been practically no loose tires in 10 years, while on the surface lines, with tires of smaller section, considerable trouble had been experienced. It was very desirable to have a proper limit of wear established for steel tires and wheels.

Mr. Taylor told of the practice of using steel tires on the large interurban cars of the Indiana Union Traction Company until they had worn down to a thickness of $1\frac{3}{8}$ in., when they were transferred to a city car with a 20-ft. body and worn until they were but $\frac{1}{4}$ in. thick.

A peculiar wheel failure was mentioned during the discussion. On a road where severe braking was necessary, a wheel became very hot and when a pool of water was passed at the bottom of a grade the change in temperature cracked a large piece out of the tire and web. At first the reason for this fracture was not understood, but the explanation came when the same conditions were reproduced at the time of grinding another wheel. It broke in the same way because it had been overheated and then cooled with water.

It was the sense of the committee that profitable study could be made of the design of wheels with regard to the amount of metal used. One interurban road used wheels that weighed 725 lb., and these were too heavy. The cost of carrying the extra metal around was a dead loss.

REDUCING CAR WEIGHTS

The problem of reducing car weights brought forth an interesting discussion. It was thought very desirable to determine upon a unit of comparison for the more important parts of equipment. For example, should cars be compared on the passenger-seat basis or on the square foot of floor surface

basis? Would it be advisable to rate trucks with a unit of tons of center plate load, and the electrical equipment according to horse-power? Mr. Ayres called particular attention to the necessity for better engineering design of car bodies. If a part broke it should not be assumed that the breakage occurred on account of lack of material in the part, but rather on account of wrong design or use of material.

Mr. Taylor felt that any units for comparing car bodies and trucks should include some function of the car speed. It would be desirable to find a unit better than the weight per seated passengers now so generally used. For that reason he suggested the unit of weight per square foot of car floor, including platforms, in relation to the speed. Stronger car bodies were needed for high speeds than those which would satisfactorily serve for low speed.

Following out this thought Mr. Lindall remarked that the service in cities where tracks were rough from special work and rail corrugations might possibly be as severe on a car body at slow speed as smoother track on an interurban at higher speeds. Mr. Ayres had noticed that an undue proportion of the axle and loose bolt trouble on his cars occurred while they were on the tracks of a large city company. This confirmed what Mr. Lindall had said. The members expressed various views on the conditions imposed by corrugated rails and agreed that roughness of track from this cause worked a severe hardship on car bodies.

One member said that there was such a variance in the designs of different car builders supplying equipment for like service that much work could profitably be given the problem of getting a unit of car-body comparison that would take all conditions into account; this would make the comparison of cars of different roads more accurate and useful. One member speaking of the effect of rough track related how one of his division foremen had told him that if all the cars were run on boulevards where the track was smooth, rather than over the special work in the center of the city, the equipment could be maintained with not one-third the work now required for the upkeep of the cars on the rougher lines. Mr. Taylor cited a peculiar condition brought out on the 18-mile division of the Indiana Union Traction Company, between Alexandria and Tipton. There were three railroad crossings in this section. The cars made a large mileage. It was found that the lighter type of car stood this severe service best and the body racked less than a heavier would. Mr. Ayres spoke of weight as a disadvantage unless the material were needed for strength. This was particularly true at high speeds. The blows were nearly in proportion to the square of the speed and also in proportion to the weight. So long as the blows could not be obviated it was very desirable to lessen their effect by judicious reduction in weight.

Mr. Davis called attention to the spring quill method of supporting electric locomotive motor armatures used on the freight locomotives and motor cars of the New Haven Railroad. This kind of support reduced the hammer blow very greatly, although it was an expensive design. The motors of this type were also heavier, but the pounding effect, nevertheless, was reduced considerably. Mr. Ayres spoke of an ideal design of truck which would have one spring-supported motor connected to both axles, thus permitting a reduction in maintenance, weight and some of the usual troubles.

Mr. Davis told of experiments which the Westinghouse Company was making with spring gears and asked for opinions of how a flexible gear would reduce maintenance troubles. The gear as designed had eight springs inside the rim which allowed it to absorb vibration without moving laterally on the axle. The reduction in vibration in the gear in turn reduced the injurious vibration in the motor and reduced the maximum stress in the gear teeth. The problem of lubricating the sliding surfaces of such a flexible gear might be difficult of solution. The company was not yet fully prepared to indorse this design, but the experiments were of considerable interest.

Several members placed emphasis on the desirability for re-

ducing tire weights and thus bringing about a reduction in track and motor maintenance cost. The single-phase high voltage railways were economical because from 20 to 25 per cent of the power was saved even though it was necessary to handle heavier cars. This saving, Mr. Davis said, more than balanced the additional cost of maintaining the single-phase equipment.

The allowable wear of axle and armature bearings was discussed. Many roads run their gears too long and a damage to the rest of the equipment results. This was false economy. F. R. Phillips, superintendent of equipment of the Pittsburg Railways Company, had used one-half the air gap dimension as the maximum limit of wear for armature bearings. He spoke of the false economy in trying to get too long a life out of motor bearings. Some roads did not take into account the injurious effects which loose bearings brought upon the rest of the equipment. He favored the use of bronze and said that it was cheaper than babbitt. When in charge of the equipment at Cleveland he had changed 55 per cent of the axle bearings from babbitt to bronze, and thereby reduced the bearing and gear case trouble 75 per cent. In using bronze extreme care was necessary to assure a uniformly pure mixture. The metal in each lot of 100 bearings was analyzed and thus the composition kept uniform. The mixture was in the proportion of 80:10:10, copper, tin and lead. No scrap was used and the base was pure lake copper. Scrap copper, such as magnet wire, contained phosphorus, iron and other impurities. The life of bearings of this mixture could be increased by adding $\frac{1}{2}$ lb. of nickel to each 100 lb. of the mixture. The proportions as used were those which had been found so satisfactory in steam railroad service. Mr. Phillips did not think it economical for a railway company to operate its own brass foundry.

The bronze bearings were molded on a plate and after molding it was necessary only to bore and to face the collar, thus the bronze bearing required no more machine work than the babbitt bearing.

It had been the experience in Boston with babbitt bearings that the malleable shell required scraping after relining two or three times, because of the disfiguration and wear of the outside. The renewal of bronze bearings meant a full new shape with each bearing.

GEAR RATIOS

The subject of gear ratios was discussed in connection with the low voltage existing on the lines of many interurban roads. As much as 20 per cent reduction in power was frequently obtained where the line voltage was low by using a gear ratio which was less than that which would be suitable if the full voltage were had. The speeds obtainable would be the same because of the higher rate of acceleration, and the voltage would in turn be improved because of the reduction in power demand.

Referring again to car body design Mr. Phillips did not think that the element of speed would necessarily make much difference in the proper design of a car body. Rather, the acceleration and deceleration were the more important factors. Mr. Taylor spoke of the severe stresses set up in 50-ton cars which frequently were stopped in 600 ft. from a speed of 60 m.p.h. Car bodies which were of excellent design for use on lower speeds would soon give way under the stresses of high speed service.

Mr. Phillips described briefly the principles recognized in designing a new semi-steel car for street service in Pittsburgh. A $\frac{1}{8}$ -in. steel side plate extending up to the window rail with angles at top and bottom was the carrying member. Theoretically this plate could have been one-half that thickness if assurance might have been had that the material would always remain in its most effective shape. The design of the car framing was similar to that of a steel bridge. In estimating the stresses, the rates of deceleration and acceleration were considered in addition to the loads applied in service. The section modulus of each side plate was something over 110, while the stresses required a section modulus of approximate-

ly 20, including a factor of safety of five. The new Pittsburg Railways Company's car seats 57 passengers, is 45 ft. 6 in. long and weighs complete 46,400 lb. The weight of the body alone is 18,680 lb.

It was stated that the experience of the Pennsylvania Railroad Company, with its all-steel cars had shown that such equipment required 100 per cent more steam for heating than did wooden cars. In the Pittsburgh steel cars it had been found advisable to line the backs of the longitudinal seats as a precaution against uncomfortably low temperature.

ENTERTAINMENT FEATURES

While at Pittsburgh the members of the committee were entertained by representatives of the several large manufacturing plants of the Pittsburgh district. The works of the Westinghouse Electric & Manufacturing Company, the Westinghouse Air Brake Company and the Standard Steel Works were visited. The courtesies of a special new car, as earlier mentioned in the report, were extended by the Pittsburgh Railways Company, for a trip to the Westinghouse plant.

At the Westinghouse plant the committee inspected several new types of apparatus and processes of manufacture; this company now has on order more than 5,000 railway motors. Among these were a part of an order of 1,700 No. 319B motors for the Chicago Railways Company. This type of motor has field and inner pole coils wound with strap. The coils are mounted with flat springs underneath to provide against looseness. A new dust case for enclosing the car axle between the motor axle bearings was seen. The hand operated unit switch type of control attracted particular attention. This equipment, suitable for four 75-hp motors, weighs considerably less than the L-4 or even the K-34B control equipments. It includes a small drum controller on the platform and a group of eight unit switches, carried under the car; 500-volt current cut down by resistance is used for actuating the valves which operate the unit switches. By the addition of a line switch this very small control equipment is suitable for handling four 100-hp motors in heavy service. A new type of gear case made of sheet steel, fastened together by welding, was seen. The oxy-hydrogen flame is used to obtain a neat weld for joining the sheet steel and for adding reinforcements.

The committee inspected the motors and parts of the equipment of the large Pennsylvania locomotives now in course of erection in the Westinghouse shops. These locomotives have two 2000-hp motors each and weigh 166 tons complete. To provide against undue strains in the connecting rods which transmit the power from the large locomotive motors to the drivers a heavy clutch is built inside of the armature spider.

The New Haven freight locomotive equipment also was seen in course of construction. These single-phase motors will have frames and cases made up largely of structural steel, thus introducing a new design. A portable substation enclosed in a fire-proof steel car was seen in course of erection.

ELECTRIC LINES INCLUDED IN AMENDED RAILROAD RATE BILL

The bill which represents the ideas of the present administration at Washington for amendment of the interstate commerce act has been reintroduced in the House of Representatives by Congressman Townsend, of Michigan, who presented the original measure. The bill as introduced anew contains a number of important amendments drafted by Attorney-General Wickersham.

As a result of the hearings before the House Committee on Interstate Commerce, at which representatives of various electric railways complained that the bill discriminated in favor of steam lines by making no provision for joint rates and through routes between the two classes of properties, electric roads are included in the scope of the amended measure.

STANDARD FIRE HOSE HOUSES

In discussing fire preventive and fire-fighting methods and apparatus in connection with electric railway shops, car houses and other buildings, a prominent electric railway engineer recently expressed the opinion that if he could have enough hydrants, properly equipped with hose, axes, crow-bars and other hand tools commonly used by firemen, the hydrants to be located on the property exactly where he wanted them, he would be willing to take his chances with any fire that might start, providing he could be confident that there would always be available at least six well-trained men for handling the hose and fire-tools.

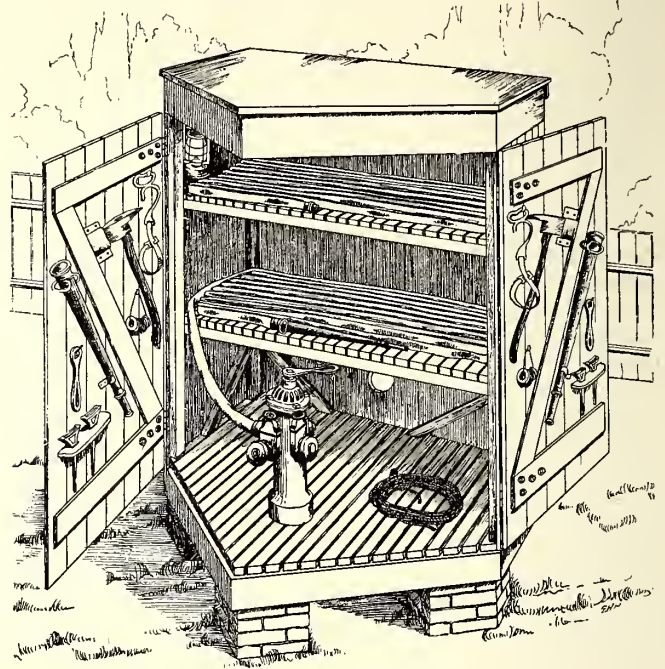
Possibly the foregoing statement should not be taken literally, but it goes to show that in the study of modern fire-fighting methods, which has been taken up actively during the past three years by electric railway engineers, the private fire-hydrant, properly placed with reference to the risks, and properly equipped, is now recognized as an essential factor in preventing the spread of fire in shop and car-house plants.

In many of the older electric railway buildings throughout the country, provision was usually made for one or two hydrants, located on the property, but their purpose was chiefly to give a source of water supply for the use of the regular fire department after it had arrived, or that hose could be attached to them by the men employed at the plant. The hydrant usually stood in the open and the hose, if any hose was provided, was kept in a coil or on a reel, detached from the hydrant and often, as was frequently proved by experience, in a place rendered inaccessible by accumulated rubbish, so that valuable time was lost in getting out the hose when the emergency which required its use arose.

The modern practice in this regard is to have enough private hydrants to cover the entire exposed area, and to protect each hydrant with a small housing in which is kept suitable lengths of hose, always attached to the hydrant, together with a full equipment of axes, bars, spanners, nozzles, lanterns and other hand tools and appliances, where they are always available for instant use.

Recognizing the importance of the private hydrant and hydrant house, the Sprinklered Risk Committee of the Underwriters' Association of New York State some time ago prepared drawings for a standard hose or hydrant house, and suggested a list of equipment that should be included in

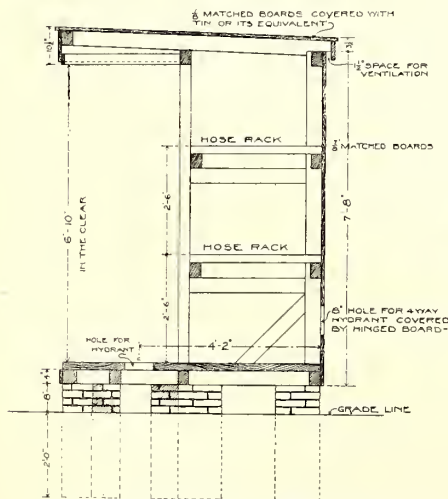
sides are rectangular, but the front, instead of being straight, is brought forward to a point as shown in the engravings. The house is so located with reference to the hydrant as to place the hydrant in the forward or triangular portion, leaving the rear or rectangular portion for shelves and racks upon which hose and other equipment can be stored. Two hinged doors at the front, as shown on the perspective view, give



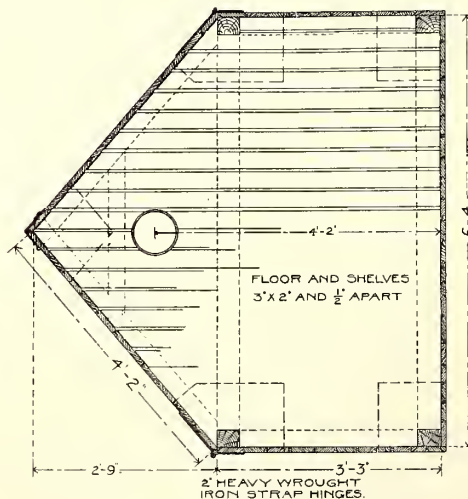
Hose House Completely Equipped

access to the house, and the inner sides of the doors provide room for hanging the smaller tools and appliances.

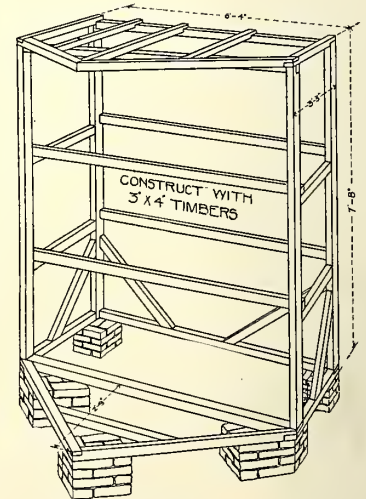
The dimensions recommended for a standard hose house are shown in the detail drawings. The house should rest on brick or concrete piers in order to give an open space of at least 8 in. under the floor. This open space underneath the house is an important feature as it gives circulation of air and assists in keeping the house and the contents dry, as well as tending to prevent freezing.



Side Elevation of Hose House



Plan of Hose House



Hose House Framework

each house. Certain of these drawings are reproduced in this connection. The committee did not specifically describe how the house should be built, but the following description of the houses built for this purpose by one of the prominent electric roads in New York State may be taken as good practice and in conformity with the recommendations of the New York State Underwriters and the National Board of Underwriters.

The house should be completely enclosed. The back and

The framework is constructed with 3-in. x 4-in. timbers. The side walls and doors are formed of matched tongue and grooved strips and the roof should be tight and waterproof. Matched boards, 7/8 in. or 1 in. thick make good material for the sides and roof, and the roof can be covered with tin or tar and felt roofing material. A space of 1 1/2 or 2 in. should be left open under the eaves for ventilation. If a three-way or four-way hydrant is used, 8-in. holes can be provided in the

side walls and in the back to facilitate the attachment of hose. These hose holes should be covered by hinged or sliding doors.

The floor is made by 3-in. by 2-in. slats, placed about $\frac{1}{2}$ in. apart. Two racks or shelves at the back are recommended, as shown in the elevation, for holding the hose, which is laid in folds loosely upon the racks so that it will play out without twisting or kinking. The hose racks are made of 2-in. by 3-in. slats, about $\frac{1}{2}$ in. apart, the slats running from rear to back.

In the house shown in the drawings there are two racks, each of which will accommodate 100 ft. of standard hose, and one of these lengths should always be coupled to the hydrant with play pipe attached.

For yard-hydrant use, Underwriters' standard, cotton, rubber-lined hose, in 100-ft. lengths is recommended. The actual size of this hose is $2\frac{5}{8}$ in. in diameter, and the hose should be capable of standing a bursting pressure of 400 lb. per square inch when new. Hose should be subjected to actual test under fire-fighting conditions at frequent intervals. Hose and hydrant couplings and nozzles should be the same size and pattern and interchangeable with those of the public fire department, or the nearest factory or plant from which assistance may be obtained.

The Underwriters' Association of New York State recommends the following equipment for a standard hose house:

One-hundred ft. of standard Underwriters' hose, stored on bottom shelf and always coupled to hydrant ready for immediate use.

At least 100 ft. extra of Underwriters' hose, stored on upper shelf as shown in the view of the complete house with male end coupling to the front.

Two extra play pipes or nozzles, four spanners, two fire axes, two bars, two ladder straps, one nozzle holder, one heavy lantern.

One wrench should always be kept on the hydrant and a spare one provided for emergency. It is recommended, however, that in place of wrenches for turning on the hydrant, hands wheels permanently attached be used.

Coils of $\frac{1}{2}$ -in. hemp rope to suit the height of buildings should be hung in each house, and a liberal supply of rubber hose-washers kept on hand and hung in a conspicuous place.

Gate valves must be attached to each hydrant outlet, as shown, in order to control each hose stream independently.

The standard hose house recommended by the New York State Underwriters' Association is intended primarily for use in mill yards, but is adaptable for electric railway plants. For the latter service, the equipment can be augmented by several pairs of rubber gloves, wire-cutters and other appliances that will suggest themselves for use in fighting electrical fires. Some railway companies include in the hydrant-house equipment hand extinguishers and pails of sand and of water.

The location of hydrants and hose houses with reference to the various buildings is an important consideration. They should be placed in open spaces, easily accessible, and where they can be kept free from rubbish or any obstructions that would interfere with the use of the hose or appliances under emergency conditions. It is well to place the houses so that hose can be run through doors or windows into all of the buildings; although it should be understood that yard hydrants are not intended to take the place of interior standpipes. Serious delay may be occasioned by placing the hose and appliances at distant parts of the yard, and at the same time the hydrants should not be placed in alleys or so close to buildings that a serious conflagration might interfere with their use. The Underwriters recommend that hydrants and hose houses be placed not nearer than 20 ft. from any building if possible to avoid it.

The increased efficiency, economy, and the fact that the life of the hose is prolonged when stored on slatted shelves in well-ventilated houses, render a proper installation of standard hose houses and equipment desirable in the yards of every electric railway plant. As a matter of fact, in at least one large electric railway repair shop recently visited, standard

hose houses and equipment were found not only in the yards but also on the second story of the building itself, the idea being that a hydrant outlet, covered by a standard house with all the auxiliary equipment, gave better facilities for fighting fire than the regulation standpipe. The doors to the hose houses should be kept closed but not locked. Frequent fire drills should be given to familiarize the employees with the location of the hydrants and hose houses, the use of the equipment and the areas that can be reached from each house.

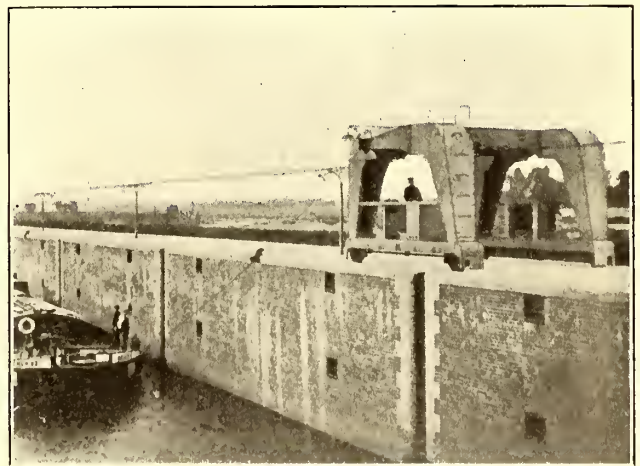
MEETING OF THE COMMITTEE ON POWER GENERATION

A meeting of the committee on power generation of the American Street & Interurban Railway Engineering Association was held at the headquarters of the association, 29 West Thirty-ninth Street, New York City, on the afternoon of Feb. 21, 1910. The chairman of the committee, W. S. Twining, chief engineer of the Philadelphia Rapid Transit Company, and E. D. Smith, superintendent of power stations of the United Railways Company of St. Louis were unable to be present but the following were in attendance: H. G. Stott, superintendent of motive power, Interborough Rapid Transit Company, New York, N. Y.; G. H. Kelsay, superintendent of power, Indiana Union Traction Company, Anderson, Ind.; J. D. Andrew, superintendent of power stations, Boston Elevated Railway Company, Boston, Mass.; and C. E. Roehl, electrical engineer, Brooklyn Rapid Transit Company, Brooklyn, N. Y.

A tentative program as suggested by the executive committee was considered and the following subjects were selected for special treatment in the report of the committee during the coming year: Steam meters, low pressure turbines, condensers, forced draft in connection with the capacity and efficiency of boilers, flue gas analysis, and economical methods of caring for peak load with special consideration of fixed charges.

NOVEL TYPE OF ELECTRIC LOCOMOTIVE

A novel type of electric locomotive has recently been built by the Allgemeine Elektrizitäts Gesellschaft for canal haulage near Bremen. The locomotive runs on a quay which had to be kept clear for the passage of drays and for other purposes. To secure the necessary weight for adhesion it was decided to



Novel Type of Electric Locomotive

build the locomotive in the form of two U's with a connecting girder. The width of each base is only 28 in., so that the driving motor had to be placed in the upper part of the structure. The current is taken from overhead wires, which also carry the current for lighting the quay. The motive power is supplied by one three-phase motor, carried in the upper part of the locomotive, and geared to each of the four wheels.

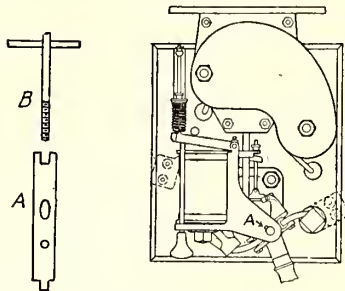
TO REMOVE BRUSHES ON G. E. CIRCUIT BREAKER

BY G. M. COLEMAN

It has been my experience when repairing the brushes on the General Electric circuit breakers that the shaft *A* on top of the bearing is cut flush, as shown in illustration. It is therefore impossible to get hold of it when repairs are to be made. The shaft is generally tight from rust or other causes, and is taken out with difficulty. To remove the shaft the magnet coil must be taken off. As the nuts are on the back of the breaker, the entire breaker must be removed from the car. This causes considerable

work and necessarily entails considerable waste of time.

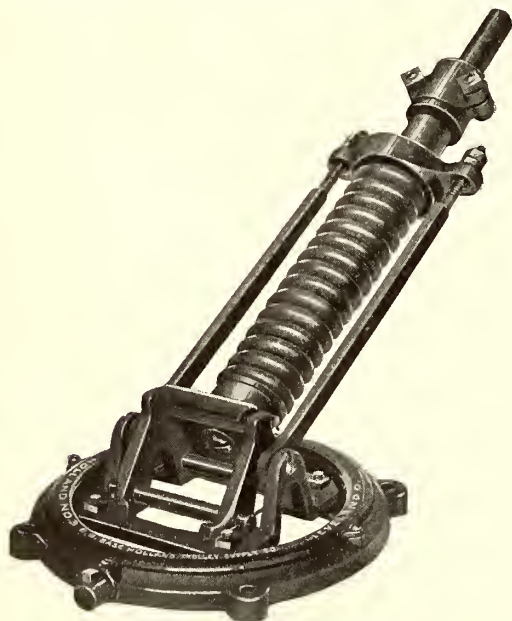
To overcome the difficulty, tap out the end of shaft *A* for a 5/16-in. screw. A small hand wrench can be made by cutting a thread on a 5/16-in. iron rod, as shown in *B*. Then drill a 3/16-in. hole about 3/8 in. from the top of the rod and insert a 3/16-in. bar about 3 in. long to make a good hand hold. This wrench is screwed into shaft *A*, and the shaft is easily pulled out. After all the shafts on the different breakers have been tapped out in this way it is a very easy matter to remove them at any time.



Device to Remove Shaft of Circuit Breaker

A REVERSIBLE BALL-BEARING TROLLEY BASE

A trolley base that is giving satisfaction, especially in suburban and interurban railway work is the No. 3 ball-bearing base made by the Holland Trolley Supply Company, Cleveland, Ohio. This base is 16 in. wide and is equipped with 42 1-in. balls running between two self-cleaning bearings, dust and water being permitted to work their way out through the bot-



Ball-Bearing Trolley Base

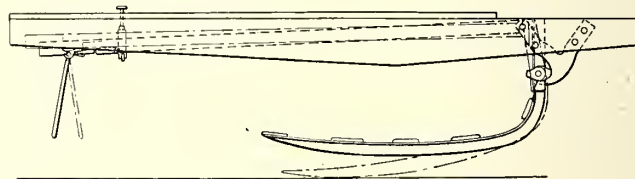
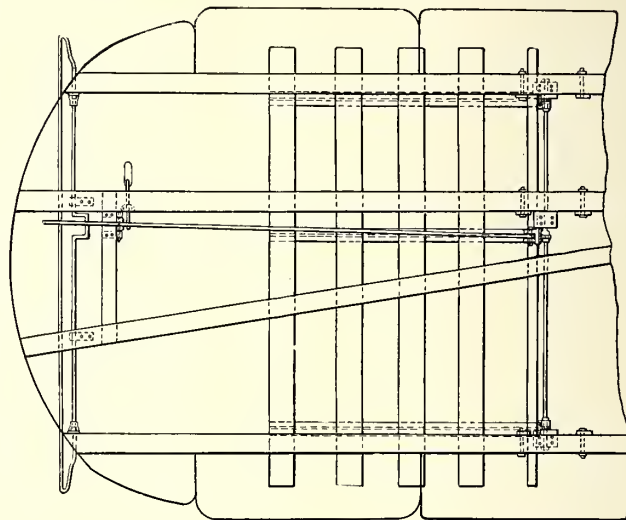
tom of the base. The sleeve is 24 in. long and reinforces the pole. The tension of the spring can be readily altered by adjusting the nuts on either side of the collar which retains the spring.

The base is single acting and reversible and works equally well in either direction. The ordinary tension of the base against the wire is from 25 to 50 lb., but the construction of the base is such that the tension is very little when the pole is pulled half way down.

NEW AUTOMATIC WHEEL GUARD

The accompanying illustration shows a wheel guard for electric cars designed by Edward T. Hardin, general manager of the Hot Springs Street Railway. The rights of this wheel guard have been recently purchased by the Ackley Brake Company, New York, which is placing it on the market.

The wheel guard is normally carried at a height of 3 to 4 in. from the track. It can be dropped to the rails by an automatic tripping device actuated by a gate suspended from the front of the car by contact with a person or object on the track. It can also be operated through foot pedal by the motorman.



Automatic Wheel Guard

The frame of the wheel guard consists of T-irons of suitable strength to withstand the weight of any person or object it might pick up, without straining or bending any of its parts. The guard is pivotally suspended from the frame of the car body and is held raised with a long tripping bar which extends under the platform of the car with its forward end engaging the actuating mechanism of the wheel guard. The position of the guard and other parts of the mechanism when the car is in operation is shown by the solid lines in the side elevation. When in this position, the actuating bar is engaged by a notch to the roller stop, and the upper arm of the gate bears on the under side of the bar. The guard can be dropped automatically by the backward movement of the suspended gate thereby tripping the bar out of engagement with the roller stop, or it can be dropped by the pressure of the motorman's foot on a treadle which also raises the bar from its engagement.

The wheel guard is patented and has been in use for over a year on all the cars of the Hot Springs Street Railway where it has given satisfaction both as regards results and maintenance. The Ackley Brake Company is planning to manufacture this wheel guard on a large scale.

The British Board of Trade has published statistics of mileage and traffic of the tramways and light railways operating in the United Kingdom at the end of 1909. The total route mileage was 2526, representing a capital expenditure of £71,023,239. Net receipts were £4,595,779 and 2,660,000,000 passengers were carried. All but 166 miles of line is worked by electricity. Of the 298 lines or systems, 176 are owned by municipalities and 122 to companies or individuals. The municipally owned lines comprise a total of 1680 miles.

News of Electric Railways

Policy of New York, New Haven & Hartford Railroad in Relation to Electrification and Controlled Lines

Charles S. Mellen, president of the New York, New Haven & Hartford Railroad, made the following references to the probable electrification of the company's lines out of Boston and to the attitude of the State of Massachusetts toward the company in a speech which he made before the New England Boot and Shoe Club, Boston, on Feb. 16, 1910:

"As the New York, New Haven & Hartford Railroad probably has a greater concentration of passenger business than any other railroad in the United States, naturally we expect we shall have to be a pioneer in the substitution of electricity for steam as motive power. In our judgment it will be a mistake, in the present stage of development, to force, by legislative enactment, the electrification of the lines about Boston. Through the natural process of evolution, electric traction will be installed in Boston, and the whole subject may well be left to the managers of the railroads as those more greatly interested even than the public which is to be benefited.

"The situation about Boston is one that is fraught with much greater difficulties than that about New York. From New York to Stamford, the New York, New Haven & Hartford Railroad has only one branch, and it was comparatively easy to electrify a straightaway line compared with electrifying a similar distance about Boston, where the lines branch immediately upon leaving the Union station. It will cost about four times as much to electrify the same distance from the Boston terminal to the south as was the case in New York and correspondingly as much to electrify the lines for the Boston & Maine Railroad to the north.

"There are probably fewer interruptions to the service over the electrified line between New York and Stamford than when the division was operated by steam, and, of course, the comfort of the passengers is promoted and the service has become very popular. It is asking too much to expect Boston to appreciate that it cannot furnish the business to warrant the expense of electrification, and I do not see how the railroads about Boston can be expected to substitute electricity for steam, without the toll collected being increased. A very large proportion of commutation or suburban service is unprofitable at present rates, and unless the substitution of electricity for steam is going to increase it tremendously, and beyond what has been the experience on the west end of the New York, New Haven & Hartford Railroad, I do not see where the business is coming from to warrant the expense.

"There is another complication, and that is the raising of the necessary capital required. We have no difficulty in raising all the money that is necessary for purposes outside of Massachusetts, but this will be the first time that a large amount of capital has been required by the company for purposes within Massachusetts, and opens endless questions regarding the position taken by the commonwealth upon past issues, and to authorize new capital while that already outstanding is under fire might be held to legalize the past transactions, and that may require careful consideration by the authorities. It would be a great mistake to force a situation by legislation upon a company admittedly so far in advance of all others in what it has already accomplished, and in what it is at the present time endeavoring to learn through costly experiments.

"I wish I could say definitely when the work of electrifying the lines out of Boston will commence. While the directors of the New York, New Haven & Hartford Railroad are willing to be advised on many subjects, it is a very large transaction. I believe it is coming within a very short time. I believe you will see works started within two years, and even earlier if there is sufficient encouragement for the construction of the tunnel. The tunnel I regard as the first step for all the improvements about Boston. The initial step to electrification is the tunnel, which must be operated by electricity. When that is com-

pleted, electrification at either side becomes necessary. You are losing no time. The New York, New Haven & Hartford Railroad is spending its money and trying the patience of other people who are, perhaps, more patient than the people about Boston. When the company starts at Boston it will know just what it wants to do before it takes the first step. You are gaining by the delay.

"If Massachusetts is content to execute her own laws within her own territory, she will have enough on her hands to occupy her time fully. It is no part of the business of this commonwealth to seek to extend by agreement with the New York, New Haven & Hartford Railroad, under threats of punishment, her jurisdiction over the actions of a public service corporation in neighboring States that have never been declared incompetent to arrange their own affairs, and which solicit neither advice nor assistance in such matters.

"The people of Massachusetts should not attempt to control the action of the New York, New Haven & Hartford Railroad in holding the stock of the Rhode Island Company of the State of Rhode Island and financing its necessities and activities in the State, or the Connecticut Company, the New England Company, the New York, Westchester & Boston, the New York, Ontario & Western or the Central New England in New York State.

"The endeavor of the commission in this respect is to secure an extension of the jurisdiction of the commonwealth of Massachusetts, based upon the ownership by the New York, New Haven & Hartford Railroad of a line into Springfield, less than 6 miles in length; to exercise that jurisdiction through bringing pressure to bear upon savings banks investments in this State to force us to retire from the class of business in other jurisdictions that those jurisdictions and the officers of the company have thought it wise and proper to develop, promote and profit by.

"The policy of the New York, New Haven & Hartford Railroad with reference to electric railways will be to let them scverely alone in Massachusetts and so to handle them in other jurisdictions that perhaps the object lesson elsewhere will work a change in the sentiment and policy of the commonwealth of Massachusetts. I trust it is not beyond the limits of probability that Massachusetts may yet learn something from what is happening elsewhere."

Certificate of Exigency Denied the Boston, Lowell & Lawrence Railroad

The Massachusetts Railroad Commission has refused to grant a certificate of public convenience and necessity to the Boston, Lowell & Lawrence Electric Railroad, which desired to build a high-speed interurban railway to connect Boston, Lowell and Lawrence. The decision was reached after the presentation of exhaustive engineering testimony which was reviewed by the *ELECTRIC RAILWAY JOURNAL* of June 26, 1909, page 1172. The board decided the question by a majority vote. Chairman Hall, however, recorded his opinion in favor of the road. In the decision the commission says, in part:

"In the territory which would be served by the petitioners there are several steam railroads and street railways. The principal demand for the proposed railroad came from citizens of Lowell and Lawrence. A few citizens, however, of the cities and towns along the proposed line appeared in its favor; but most of the witnesses from Somerville, Medford, Winchester and Arlington opposed the granting of the certificate. The principal argument upon which this opposition was based was that adequate service was being rendered by the existing railroads and street railways, and that so far as these several communities were concerned the proposed electric railroad would entail large and needless expenditure of money and cause property damage along the proposed route. It was further contended in opposition that the proposed connection at Sullivan Square would add to the congestion upon the Boston Elevated Railway during the rush hours, both at the station

and in the train service through the Washington Street tunnel. The managements of the several railroads and street railways operating in the territory which would be served by the proposed railroad objected upon the ground that the building of such a railroad would exercise a very detrimental effect upon their lines.

"A primary test to be applied to applications of this character is whether the net results of the proposed undertaking promise public gain or public loss. The public convenience and necessity must be measured as a whole, giving due regard to the entire territory within which the proposed railroad is to be constructed. So measured, a majority of the board is of the opinion that public convenience and necessity do not require the construction of a railroad as proposed in the agreement of association for the formation of the Boston, Lowell & Lawrence Electric Railroad. The chairman, being of opinion that the public convenience and necessity require the construction of the proposed railroad, records his dissent from the conclusions of the majority of the board."

Cost of Improvements on the Salem Division of the Boston & Northern Street Railway

To counteract the testimony of residents that the company had neglected the physical condition of its property in Salem, the Boston & Northern Street Railway, Boston, Mass., has filed with the Massachusetts Railroad Commission the following statement of money expended for improvements on its Salem division between 1902 and 1910:

TRACK RECONSTRUCTED AND CONSTRUCTED		
Within the city limits, 64,270 ft.....	\$284,479	
Outside the city limits, 132,906 ft.....	336,562	
		\$521,041
POWER STATION ADDITIONS		
One 300-kw generator }	\$10,363	
One 500-hp engine }		
One 350-hp boiler.....	8,527	
One 500-kw motor-generator.....	13,729	
Two 250-hp boilers and feed pumps.....	3,000	
One 1200-kw generating unit.....	119,527	
		155,146
CARS, ADDITIONS		
Nine 12-bench cars.....	\$21,020	
Nine 30-ft. cross-seat box cars.....	52,078	
Fifteen 34-ft. easy access cars.....	117,727	
Three single-truck Wason shear plows }	13,806	
One double-truck shear plow }		
		204,631
Line improvements.....		81,381
Total.....		\$1,062,199

Companies Which Paid Five Per Cent Dividends in Massachusetts

The Massachusetts Railroad Commission has transmitted to the Bank Commissioner of Massachusetts the names of the following street railways which have earned and properly paid without impairment of assets or capital dividends of not less than 5 per cent upon all their outstanding stock for the five years ending Sept. 30, 1909: Boston Elevated Railway; Boston & Revere Electric Railway, Boston; Citizens' Electric Railway, Newburyport; Dartmouth & Westport Street Railway, New Bedford; East Middlesex Street Railway; Fitchburg & Leominster Street Railway, Fitchburg; Holyoke Street Railway; Pittsfield Electric Street Railway; Springfield Street Railway; Union Street Railway, New Bedford; West End Street Railway, Boston; and Worcester Consolidated Street Railway.

Order Regarding Lighting of Subway

The following order was adopted by the Public Service Commission of the First District of New York on Feb. 15, 1910, regarding the lighting of cars and stations of the Interborough Rapid Transit Company:

"That on or before April 1, 1910, the Interborough Rapid Transit Company shall so illuminate by electricity its subway stations that passengers may read conveniently therein, such illumination to be not less than the present illumination over the east platform of the Brooklyn Bridge station; and it is further

"Ordered, That the Interborough Rapid Transit Com-

pany shall hereafter install and maintain in every subway passenger car operated by it, except those now or heretofore operated by it, a storage battery lighting appliance of sufficient capacity to operate four 12-cp lamps at their rated candle-power for at least three hours, such storage battery lamps to be instantly and automatically available whenever the other lamps in the car shall for any reason fail to furnish light."

Meeting of New England Street Railway Club.—The regular monthly meeting of the New England Street Railway Club was arranged to be held in the American House, Boston, Mass., on Feb. 24, 1910, at 8 p. m. Charles B. Edwards, chief engineer of the Fore River Ship Building Company, of Quincy, Mass., was to present an address on the subject, "Power Plant Installation of a Modern Battleship," and Milan V. Ayres, electrical and mechanical engineer of the Boston & Worcester Street Railway, who is a member of the Massachusetts Bar, was to address the club on the subject, "The Lawyer and the Engineer."

Chicago Loop Situation.—To decide upon some concerted action to relieve the congestion on the Union loop in Chicago, representatives of the four elevated railways in Chicago have agreed to form an elevated railway commission in which the city shall also be represented. It is proposed that the president and chief engineer of each of the companies shall be a member of the commission, while Bion J. Arnold, chairman and chief engineer of the Board of Supervising Engineers, Chicago Traction, and Alderman Milton J. Foreman, chairman of the local transportation committee of the City Council, will undoubtedly represent the city. It is probable that the representatives of the various companies on this committee will be as follows: Northwestern Elevated Railroad, M. B. Starring, president, and E. C. Noe, chief engineer; Chicago & Oak Park Elevated Railroad, Clarence A. Knight, president, and C. M. Mock, chief engineer; South Side Elevated Railroad, Charles V. Weston, president, and Garrett T. Seely, chief engineer; Metropolitan West Side Elevated Railway, B. I. Budd, president, and James Walker, chief engineer.

Storm in the Central West.—On Feb. 16, 17 and 18 the Central West was visited by a very severe snow storm, and the reports from Springfield, Cincinnati, Indianapolis, St. Louis, Cairo and other cities indicate that the fall of snow was between 10 and 15 in. Steam railroad traffic was seriously interfered with and the operation of the electric railways was also hampered. On Feb. 17 eight cars of the Ohio Electric Railway were reported stalled between Columbus and Dayton, and service over that line between Springfield and Columbus had to be abandoned. On the line of the Ohio Electric Railway between Dayton and Springfield only four cars were operated on Feb. 17. At Indianapolis on Feb. 17 service was interrupted on the interurban lines, and the Indianapolis Traction & Terminal Company, operating the city lines, maintained service only with the greatest difficulty. Service in Cairo, Ill., was entirely abandoned for a short while. On Feb. 16 and 17, 16 in. of snow fell in St. Louis. The storm continued 36 hours. On the evening of Feb. 16 the United Railways had 35 sweepers in service, followed by 50 cars equipped with scrapers. In addition the company maintained a frequent all-night schedule on as many lines as possible so as to keep the road open. According to records of the local weather bureau at St. Louis, the storm was the worst which that city has experienced since 1884.

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—In connection with his request to the legislative committee on railroads to aid the company to validate its securities in Massachusetts, T. E. Byrnes, vice-president of the New York, New Haven & Hartford Railroad, declared that in the next 10 years his company expects to spend \$50,000,000 in the development of its transportation facilities in Massachusetts. He said that the attitude of the Massachusetts Legislature toward the New York, New Haven & Hartford Railroad has prevented the expenditure of \$25,000,000 in improvements in the vicinity of Boston. The company is willing, he said, to build a tunnel connecting the North and South stations. He estimated the cost of electrifying the suburban lines of the New York, New Haven & Hartford Railroad and the Boston & Maine Railroad at between \$25,000,000 and \$40,000,000.

Financial and Corporate

New York Stock and Money Market

February 22, 1910.

There has been a vast improvement in the condition of the stock market during the past week. Not only have prices regained much of the losses sustained earlier in the month, but the sentiment of the traders is much more hopeful. The anxiety that was the occasion of the recent decline has practically disappeared and there has been considerable buying by small outside investors. Traction shares are fairly active and have shared in the general recovery.

The money market continues to be satisfactory. Rates remain reasonable and the banks appear to be willing to meet all demands from legitimate traders. Quotations yesterday were: Call, 2 to 3 per cent; 90 days, 3½ to 3¾ per cent.

Other Markets

The shares of the Rapid Transit and Union Traction companies have been affected by the strike. On Feb. 21, on heavy sales, Rapid Transit declined to 24½ and closed at that figure, while Union Traction sold as low as 49.

In the Boston market, Massachusetts Electric has been less active than earlier in the month, although the prices have shown no disposition to decline. There has been some trading in Boston Elevated and quotations are higher.

In the Chicago market there has been little trading in traction shares. The issues of the Chicago Railways Company are almost entirely out of the market, Series 2 being the only shares traded in. Prices are unchanged.

In the Baltimore market there has been no trading in traction stocks. The bonds continue to be fairly active at former prices.

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

	Feb. 15,	Feb. 21,
American Railways Company.....	*46¾	a47
Aurora, Elgin & Chicago Railroad (common).....	a57½	a57
Aurora, Elgin & Chicago Railroad (preferred).....	a92	a93
Boston Elevated Railway.....	129¼	129¼
Boston & Suburban Electric Companies.....	15	a16½
Boston & Suburban Electric Companies (preferred).....	72	72
Boston & Worcester Electric Companies (common).....	8	a11
Boston & Worcester Electric Companies (preferred).....	a45	a44
Brooklyn Rapid Transit Company.....	72½	73¾
Brooklyn Rapid Transit Company, 1st pref. conv. 4s.....	83¾	83
Capital Traction Company, Washington.....	a134	*134
Chicago City Railway.....	a195	a195
Chicago & Oak Park Elevated Railroad (common).....	*2	*2
Chicago & Oak Park Elevated Railroad (preferred).....	*10	*10
Chicago Railways, pteptg., ctf. 1.....	a108	a106½
Chicago Railways, pteptg., ctf. 2.....	a29	a32
Chicago Railways, pteptg., ctf. 3.....	a14	a15
Chicago Railways, pteptg., ctf. 4s.....	49	*9
Cleveland Railways.....	*91½	*91½
Consolidated Traction of New Jersey.....	a76	a76
Consolidated Traction of New Jersey, 5 per cent bonds.....	a105½	a105½
Detroit United Railway.....	*63	*62
General Electric Company.....	153¾	154½
Georgia Railway & Electric Company (common).....	107½	a108
Georgia Railway & Electric Company (preferred).....	a88	a88
Interborough-Metropolitan Company (common).....	20¾	22
Interborough-Metropolitan Company (preferred).....	53½	55¾
Interborough-Metropolitan Company (4½s).....	81¾	82½
Kansas City Railway & Light Company (common).....	a30	a30
Kansas City Railway & Light Company (preferred).....	a72¼	a68
Manhattan Railway.....	*136¾	*136¾
Massachusetts Electric Companies (common).....	a18¼	a18¼
Massachusetts Electric Companies (preferred).....	a84	83½
Metropolitan West Side, Chicago (common).....	a17	a17
Metropolitan West Side, Chicago (preferred).....	a52	a55
Metropolitan Street Railway.....	*18	*16
Milwaukee Electric Railway & Light (preferred).....	*110	*110
North American Company.....	79½	80¾
Northwestern Elevated Railroad (common).....	a17½	a17½
Northwestern Elevated Railroad (preferred).....	a70	a70
Philadelphia Company, Pittsburg (common).....	*50½	a51½
Philadelphia Company, Pittsburg (preferred).....	*43¾	a45
Philadelphia Rapid Transit Company.....	*26¾	a24½
Philadelphia Traction Company.....	*89	89
Public Service Corporation, 5 per cent col. notes.....	*100½	*100½
Public Service Corporation, cts.....	a105	a104½
Seattle Electric Company (common).....	a115	a116
Seattle Electric Company (preferred).....	a106	a105
South Side Elevated Railroad (Chicago).....	a53	a53
Third Avenue Railroad, New York.....	10	*10
Toledo Railways & Light Company.....	11¾	*11¾
Twin City Rapid Transit, Minneapolis (common).....	112	113¾
Union Traction Company, Philadelphia.....	*51½	49½
United Rys & Electric Company, Baltimore.....	a13¾	a14
United Rys. Inv. Co. (common).....	*33	37
United Rys. Inv. Co. (preferred).....	67	68
Washington Ry. & Electric Company (common).....	37	*37
Washington Ry. & Electric Company (preferred).....	a87¼	*87¾
West End Street Railway, Boston (common).....	a95	a95
West End Street Railway, Boston (preferred).....	a109	a106
Westinghouse Elec. & Mfg. Company.....	68	70½
Westinghouse Elec. & Mfg. Company (1st pref.).....	120	*120

a Asked. * Last Sale.

Report of Detroit United Railway

The report of the Detroit (Mich.) United Railways for the year ended Dec. 31, 1909, as presented at the recent annual meeting of the company, compares as follows with the report of the company for the year ended Dec. 31, 1908:

	1909.	1908.
Gross earnings.....	\$8,047,554	\$7,114,760
Operating expenses.....	5,042,724	4,559,123
Net earnings from operation.....	\$3,004,830	\$2,555,637
Income from other sources.....	144,833	94,950
Gross income less operating expenses.....	\$3,149,663	\$2,620,593
DEDUCTIONS.		
*Interest on funded and floating debt and taxes:		
Detroit United Railway.....	\$1,325,568	\$1,138,799
Rapid Railway System.....	159,578	135,050
Sandwich, Windsor & Amherstburg Railway..	26,804	23,785
Detroit, Monroe & Toledo Short Line Railway	147,166	122,131
Detroit, Jackson & Chicago Railway.....	221,013	198,900
	\$1,880,129	\$1,618,665
Credited to depreciation reserve.....	400,000	300,000
Credited to contingent liability reserve.....	100,000	50,000
Total deductions.....	\$2,380,129	\$1,968,665
Surplus income.....	\$769,534	\$651,928

*1908 taxes included in operating expenses.

PASSENGER STATISTICS, 1909.

Revenue passengers.....	142,981,316
Transfer passengers.....	41,629,844
Employee passengers.....	5,770,881
Total passengers.....	190,382,041
Receipts revenue passenger.....	.0528
Receipts per passenger.....	.0396

MILEAGE STATISTICS, 1909.

Car mileage.....	32,699,206
Earnings car mile.....	\$0.2461
Expenses car mile.....	.1542
Net earnings car mile.....	.0919

The condensed balance sheet as of Dec. 31, 1909, shows:

ASSETS.	
Value of entire property.....	\$38,717,468
Treasury securities.....	2,320,459
Accounts current.....	630,314
Prepaid taxes.....	42,000
Current assets, such as cash, accounts receivable and material and supplies.....	798,210
Discount on gold notes and bonds.....	376,393
Total.....	\$42,884,844
LIABILITIES.	
Capital stock.....	\$12,500,000
Mortgage bonds and gold notes.....	24,903,000
Vouchers payable, bills payable, unredeemed tickets, etc.....	818,645
Total reserve fund.....	1,418,660
Surplus account (less adjustment) and net income, 1909.....	3,244,539
Total.....	\$42,884,844

In presenting the report J. C. Hutchins, president of the company, said:

"At the beginning of 1910 the company had outstanding \$3,050,000 of its three-year gold notes issued to pay for betterments and extensions. During the year it sold \$1,066,000 of its 4½ per cent consolidated mortgage gold bonds and applied the proceeds to pay off and retire \$1,000,000 of these notes. This leaves outstanding of the company's three-year notes, issued for the same purposes, \$2,050,000, as shown in the balance sheet, \$2,000,000 of which are due and payable Feb. 15, 1910, and \$50,000 May 1, 1910. Provision has been made to pay out of the company's resources \$500,000 of this remaining amount Feb. 15, 1910, and to extend the balance for periods of six and 12 months.

"The company, as in previous years, made liberal expenditures during this year in the maintenance of its tracks, rolling stock and other properties. On Jan. 1, 1909, the company's depreciation reserve stood credited with \$688,614. Large expenditures were incurred for extensive renewals of tracks and foundations, involving heavier construction to meet increased traffic conditions on various city lines, a part of the cost of which, to wit, \$50,000, was charged against this depreciation reserve. There was added to the credit of the depreciation reserve during the year \$400,000, leaving said fund with a present credit balance of \$1,038,614. At the beginning of the year the company's surplus stood credited with \$2,491,164. There has been credited to the contingent liability reserve the sum of \$100,000 out of the earnings of the year 1909, making \$300,000 in the reserve, and leaving a surplus of \$3,244,539."

Consolidation of Surface Railways in Chicago

The details of the consolidation of the Chicago City Railway, the Calumet & South Chicago Railway, the Southern Street Railway and the Hammond, Whiting & East Chicago Railway, plans for which were noted in the ELECTRIC RAILWAY JOURNAL of Jan. 1, 1910, page 47, were effected on Feb. 21. The board of directors of the new Chicago City & Connecting Railways consists of James B. Forgan, John J. Mitchell, Samuel Insull, John A. Spoor, Edward Morris, Harrison B. Riley, E. K. Boisot and Ira M. Cobe. The shares and bonds of the four roads will be deposited with E. H. Gary, A. J. Earling and S. M. Felton as trustees, who have the power to issue securities. The total capitalization in stocks and bonds of the four companies entering into the merger follows:

Chicago City Railway.....	\$40,500,000
Calumet & South Chicago Railway.....	10,750,000
Southern Street Railway.....	1,575,000
Hammond, Whiting & East Chicago Railway.....	510,000
Total	\$53,335,000

For the new corporation there will be issued \$22,000,000 in bonds. The capitalization of the new company thus remains about equivalent to the value of properties as appraised by the city. A. J. Earling, of the board of trustees, has been president of the Chicago, Milwaukee & St. Paul Railway since 1899 and is a director in a number of other large undertakings. S. M. Felton is president of the Chicago Great Western Railway, having previously served in the same capacity both the Mexican Central Railroad and the Chicago & Alton Railroad. E. H. Gary, chairman of the United States Steel Corporation, is a former Chicagoan, having been for 25 years a practising attorney in that city.

Earnings of Interborough Rapid Transit Company for Year

The Interborough Rapid Transit Company, New York, N. Y., has made public the following comparative statement of earnings for the years ended Dec. 31, 1909, and Dec. 31, 1908:

	1909.	1908.
Gross receipts.....	\$27,903,377	\$25,417,340
Operating expenses.....	10,759,738	10,869,546
Net earnings.....	\$17,203,639	\$14,577,793
Other income.....	*737,689	1,034,362
Total income.....	\$17,941,328	\$15,612,155
Interest, rents, etc.....	\$10,468,035	\$10,208,531
Taxes	1,692,651	1,715,177
Total charges.....	\$12,160,686	\$11,923,708
Surplus	\$5,780,641	\$3,688,447
Dividends	3,150,000	3,150,000
Surplus	\$2,630,641	\$538,447

*The decrease in other income is largely due to the policy, inaugurated on July 1, 1909, of not crediting the interest upon the advances made for the construction of the New York & Long Island Railroad tunnel.

In 1909, 543,172,774 passengers were carried as compared with 494,846,348 in 1908.

Franchise Assessments in New York

In its annual report to the Legislature, the State Board of Tax Commissioners calls attention to difficulties in basing the special franchise tax on the net earnings of public service corporations, the method indicated by the Court of Appeals in its recent decisions involving the tax of the Jamaica Water Works Company. It says:

"The Special Franchise Tax law was a revenue measure intended for the benefit of the localities by increasing their revenues. If, however, the net earnings rule must be applied in disregard of general conditions, and if the rule must be applied from information contained in the records of these corporations, which is substantially all the information upon the subject of net earnings this board can obtain, it will largely wipe out the special franchise valuations in New York City in respect to street surface railroads, where these franchises are supposed to be and doubtless are of very substantial value."

Referring to the franchises held in Greater New York, the commission says in part:

"In New York City there is a well-regulated system and schedule of rates for the granting of these privileges, which, as a rule, represent a value very much higher than the valuations fixed by this board. In the case of street surface railways in that city there is a provision of the railroad law, existent for many years, which precludes the granting of such franchise, except upon condition of the payment of 3 per cent of the gross earnings for the first five years of its existence, and 5 per cent of such gross earnings thereafter, and corporations are apparently willing and anxious to accept these grants on that basis. Can it be said that these conditions—these sales prices—have no influence on the question of the value of these privileges, unless such value can be verified by the application of the net earnings rule?"

To do away with the confusion often caused by present methods the commission recommends that real property assessments be made against the property itself, and not against individuals. The board says that by this method the chances of property escaping its just share of tax burdens would be minimized.

The New York State Board of Tax Commissioners has completed its special franchise tax assessments for New York City. The total for 1910 is \$468,887,100, as compared with \$474,001,900 for 1909 and \$492,492,970 for 1908. The final assessments of the principal street railways for 1909 and the tentative assessments for 1910 follow:

	Final. 1909.	Tentative. 1910.
Brooklyn Rapid Transit.....	\$55,252,700	\$53,886,500
Coney Island & Brooklyn Railroad.....	2,543,000	2,750,000
Hudson & Manhattan Railroad.....	8,000,000	11,770,000
Long Island Electric Railway.....	25,000	425,000
Manhattan Railway.....	78,500,000	78,686,300
New York & Queens County Railway.....	2,275,000	2,275,000
Pennsylvania Tunnel & Terminal.....	15,000,000	16,426,000
Richmond Light & Railroad Company.....	534,900	550,000
Interborough Rapid Transit.....	24,012,000	112,000
Dry Dock, East Broadway & Battery Railroad Forty-second Street, Manhattanville & St. Nicholas Avenue Railway.....	1,400,000	1,400,000
Third Avenue Railway.....	4,206,000	4,206,000
Union Railway	7,920,000	7,920,000
Westchester Electric Railroad.....	3,986,000	4,600,000
Bleecker Street & Fulton Ferry Railroad...	121,000	150,000
Broadway & Seventh Avenue Railroad.....	730,000	730,000
Central Crosstown Railroad.....	7,955,000	7,955,000
Central Park, North & East River Railroad.	660,000	660,000
Christopher & Tenth Street Railroad.....	2,750,000	2,750,000
Eighth Avenue Railroad.....	1,172,000	1,172,000
Forty-second Street & Grand Street Ferry Railroad	4,800,000	4,800,000
Metropolitan Street Railway.....	1,600,000	1,600,000
New York & Harlem Railroad (City Line)...	20,258,000	20,258,000
	9,343,000	9,343,000

Hammond, Whiting & East Chicago Railway, Hammond, Ind.—The Hammond, Whiting & East Chicago Railway has been incorporated with a capital stock of \$1,000,000 by Robert S. Knox, Charles R. Moore, Samuel R. Jenkins, Frank G. Murray and Edgar H. Plank to succeed the Hammond, Whiting & East Chicago Electric Railway, Hammond, Ind.

Hudson Companies, New York, N. Y.—Harvey Fisk & Sons, New York, N. Y., offer for sale at 100 and accrued interest \$11,000,000 of the 6 per cent secured convertible gold coupon notes of the Hudson Companies. The principal is payable on Feb. 1, 1913, and the interest is payable on Feb. 1 and Aug. 1. The Guaranty Trust Company, New York, N. Y., is trustee of the issue.

Lehigh Valley Transit Company, Allentown, Pa.—The stockholders of the Lehigh Valley Transit Company will vote on April 21, 1910, on a proposition to authorize an issue of \$15,000,000 of bonds, to provide for refunding existing bonds, for extensions, improvements, etc.

Metropolitan Street Railway, New York, N. Y.—Judge Lacombe in the United States Circuit Court in a decision rendered on the application of the New York & Harlem Railroad, for an order directing the receivers of the Metropolitan Street Railway either to pay the back franchise taxes on the Madison Avenue, Eighth Avenue and Ninth Avenue lines of the company or else turn them over to the lessor companies considered a request from the receivers seeking instructions as to the issuance of receivers' certificates to pay the back franchise taxes, and as to their course with respect to the Federal corporation tax. The court directs the receivers to spend about \$313,900 on the Madison Avenue line for repairs and \$505,850 on the Eighth and

Ninth Avenue lines for like purposes. The decision says the State franchise tax in arrears is estimated at about \$3,000,000 on all the lines now operated by the receivers of the Metropolitan Street Railway after making allowance for equalization according to the recent decisions of the State courts. The Court authorizes the receivers to negotiate with the proper authorities for the payment of all these taxes, including the \$400,000 which the New York & Harlem Railroad has already advanced on account of the taxes on the Madison Avenue line to prevent a sale, and states that when a decision has been reached as to the exact amount they may come to him with an application for receivers' certificates to discharge this indebtedness. According to the court, if foreclosure and sale intervene before these negotiations are over, the receivers have at least kept off the disintegration of the property. As to the Federal corporation tax, Judge Lacombe says that inasmuch as it is based on net earnings and the Metropolitan Street Railway has no net earnings, the question as to its payment does not arise. In regard to the various lessor roads in the Metropolitan system which still enjoy net earnings, the court declares that the question is one that must be taken up by each road with its counsel. Argument was heard on Feb. 11, 1910, by Judge Coxe in the United States Circuit Court on the motion of Attorney-General O'Malley to remand to the State courts the suit brought for the forfeiture of some of the franchises of the Bleecker Street & Fulton Ferry Railroad and the Twenty-third Street Crosstown Railroad, for the reason that they had failed to operate a number of the branches of their railroads. Judge Coxe directed counsel to present briefs in the case.

New Orleans Railway & Light Company, New Orleans, La.—Bertron, Griscom & Jenks have extended until March 1, 1910, the time for assenting to their proposition to buy from the stockholders of the New Orleans Railway & Light Company \$4,000,000 of the common stock and \$2,000,000 of the preferred stock of the company, as noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 12, 1910, page 295.

Pittsburgh & Allegheny Valley Railway, Leechburg, Pa.—The Safe Deposit & Trust Company, Pittsburgh, Pa., trustee under the mortgage of the Pittsburgh & Allegheny Valley Railway dated July 15, 1904, will offer the property of the company at auction, free of all liens, at Kittanning on March 21, 1910, under a decree entered on Jan. 22, 1910, by the Court of Common Pleas of Armstrong County.

Pittsfield (Mass.) Street Railway.—The New England Investment & Security Company has taken an option on the stock of the Pittsfield Street Railway at a price said to be \$275 a share, with a bonus of \$75,000 to the Dolan interests, which have long controlled the majority of the stock of the company.

Public Service Investment Company, Boston, Mass.—Stone & Webster, Boston, Mass., offer for subscription at 98½ \$300,000 of a new issue of 6 per cent cumulative preferred stock of the Public Service Investment Company, which was organized with authority to hold and deal in stocks, bonds and notes, or other securities and owns securities of companies under the management of Stone & Webster. The stock now offered for subscription is part of an authorized issue of \$1,500,000 of preferred stock.

Twin City Rapid Transit Company, Minneapolis, Minn.—At the annual meeting of the stockholders of the Twin City Rapid Transit Company, held on Feb. 15, 1910, it was decided to increase the number of directors, and A. E. Ames and Henry M. Pellatt, Toronto, Ont., were elected as additional members of the board. The directors whose term of office had expired and the officers were all re-elected.

Youngstown & Ohio River Railroad, Youngstown, Ohio.—At the annual meeting of the Youngstown & Ohio River Railroad, the following officers were elected: Will Christy, president; George A. Stanley, vice-president; Charles S. Thrasher, secretary and treasurer; J. D. DeWees, general manager. The company's affairs have been in the hands of Will Christy, Warren Bicknell and George A. Stanley, as syndicate managers, but it is probable that a distribution of securities will be made shortly. The company has entered into a contract with the Warren Bicknell Company, Cleveland, Ohio, as operating manager.

Traffic and Transportation

Service in Rochester

The Public Service Commission of the Second District of New York, acting on suggestions and recommendations made by C. R. Barnes, electric railroad inspector of the commission, addressed a communication to the Mayor of Rochester and one to the New York State Railways, Rochester Lines, on Feb. 16, 1910, in reference to the complaint of the Mayor of Rochester regarding the service of the company, especially the congestion of cars on Main Street. In these communications the commission emphasized the statement that its efforts have so far been directed to the relief of congestion on Main Street during the evening rush hours and that no attempt has been made to devise any means of furnishing additional facilities on any of the lines in the city except that which will be reflected on the different lines by the more rapid and regular movement of cars through the business center of the city, but that the investigation of traffic conditions along the lines of the present and future requirements of the city will be continued. The communication to the company contained the following suggestions:

"The substitution of the far-side stop for the present near-side stop in all sections of the city.

"The rerouting of the interurban cars of the Rochester, Syracuse & Eastern Railroad and the Sodus Bay cars of the New York State Railways, removing them from Main Street between the Four Corners and Clinton Street. These cars, west bound, to be diverted from Main Street through Franklin, Andrews, State, Exchange and Court Streets, returning to Main Street at Clinton Street and crossing Main Street at the Four Corners.

"The putting in of crossovers on North St. Paul Street and on South Avenue near Main Street, connecting the double tracks in both of these streets, and the turning back of the cars on the North St. Paul Street and South Avenue line on either side of Main Street between 5 p.m. to 6:30.

"The employment of six additional inspectors on Main Street and side streets between Pindell Alley and Elm Street.

"A detailed set of rules for the government of motormen, conductors and inspectors intended to increase efficiency in operation by these employees which will result in reducing delays to cars to a minimum and add to free car movement.

"The placing of an emergency wagon equipped for trolley work and wrecking purposes on Water Street near Main Street during the evening rush hours."

The communication of the commission to the company also contained recommendations in detail for rules to govern the action of motormen, conductors, inspectors, inspectors at passenger stops and patrol inspectors, all designed with the end in view of expediting the movement of cars in the congested district. They are, for the most part, largely of local interest and relate to specific instructions for meeting conditions peculiar to some phase of the situation in Rochester. The recommendations of the commission to the city, however, indicate that the municipality can do a great deal more than in the past toward assisting the company in serving the community. These recommendations follow:

"It is respectfully suggested that the City of Rochester can aid materially in expediting the passage of street cars over street intersections and in the loading and unloading of passengers.

"It is respectfully recommended that the traffic officer stationed at the junction of St. Paul and Main Streets be instructed to give precedence to street car movement over the crossing in preference to vehicular traffic whenever possible. Difficulties arising at this street crossing occasion a very large percentage of the delays, and vehicular traffic should not be allowed, in the opinion of the commission, to delay the movements of street cars. Owing to the existence of a double track upon Main Street at this point, such delay may at times become inevitable for a brief period, but it is believed that the recognition of the superior claim of street car traffic over vehicular traffic by traffic officers will result in much relief.

"It is further respectfully recommended that the city cause the removal of all snow and slush from the street at loading points, in order that passengers may readily reach the cars and may be able to stand near the track ready to embark upon the cars immediately upon their stopping. Careful attention to this one point will save much delay during the winter season.

"It is expected by the commission that the foregoing recommendations to the street railroad company will be put in operation by that company on Feb. 21, 1910. This will give the company ample time to make the proper preparations and also to familiarize the public with the new requirements, which familiarity on their part is to some extent essential to the success of the new measures. Charles R. Barnes, the commission's inspector of street railroads, will give his personal attention during the week commencing Feb. 21, 1910, to the operation of these measures, and will also continue to collect data for further suggestions as to improvement and relief of unfavorable conditions now existing."

Hearing on Normal School and Business College Fare Bill

The committee on street railways of the Massachusetts Legislature gave a public hearing on Feb. 8, 1910. House bill 299, which provides that the rates of fare charged by street and elevated railways for the transportation of pupils of normal schools and business colleges between home and school, shall not exceed one-half the regular fare, tickets to be sold in lots of 10 each. The bill amends Sec. 72, Chap. 112, Revised Laws, which makes compulsory half fare for the pupils of public or private schools.

Bentley W. Warren, Boston, Mass., on behalf of the Massachusetts Street Railway Association, stated that the street railways object to being made compulsory assistants in charitable activities. Most of the companies mentioned by persons favoring the bill had never paid a dividend, with the exception of the Boston Elevated Railway, which was exempt by statute from making any special rate, and the Old Colony Street Railway, which had paid moderate dividends. It was unjust to require the stockholders of a company not paying dividends to meet the expenses of the grown people who attend such institutions. Moreover, most of the business colleges paid a reasonable return. There were no valuable franchises in the State except the rights of the Boston Elevated Railway in its elevated structure; and in general there was not a franchise in the State which could not be terminated without compensation. The companies could capitalize only their actual investment, and there were no franchise values which could be taken as a basis for reduced fares as required by the bill. There was just as much reason to make electric light companies supply current at half price to business colleges as to lay the burden of reduced fares upon the street railway.

Under the Revised Laws, Ch. 112, Sec. 72, street railways are required to transport pupils of the public schools to or from school at a rate of fare not exceeding one-half of the regular fare charged for the transportation of other passengers between the same points. In the case of *Commonwealth vs. Interstate Consolidated Street Railway*, 187 Mass., p. 436, the Supreme Judicial Court sustained the statute as applying to public school pupils, and this was again sustained by the United States Supreme Court in 207 U. S., p. 79, but on the technical ground that the Interstate Consolidated Street Railway had been incorporated after the statute had been passed. By the statutes of 1906, ch. 479, sec. 72, ch. 112, Revised Laws, was amended to include pupils of private schools. Under this amendment the pupils of parochial, tonsorial, business, normal and other institutions sought the reduced fare and hence arose the case of *Commonwealth vs. Connecticut Valley Street Railway*, 196 Mass., p. 309. The company refused to transport at this rate a student attending the Northampton Commercial College, and the Supreme Judicial Court held that the pupils of business and normal schools were not entitled to the benefit of the statute. About two years ago the Legislature amended the statute to include evening school pupils (Ch. 530, Acts 1908). The question of the constitutionality of this act was before the courts and it would be unwise to extend the statute in view of the intimation of the

Supreme Court that it would not sustain an extension beyond the original intent of the law.

Long Island Companies Increase Wages

The New York & Queens County Railway, Long Island City, N. Y., of which W. O. Wood is president and general manager, and the New York & Long Island Traction Company and the Long Island Electric Railway, Long Island City, of which Mr. Wood is vice-president and general manager, increased the wages of their motormen and conductors on Feb. 1, 1910. The statement by the New York & Queens County Railway to its employees regarding the change follows:

"Taking effect Feb. 1, 1910, the rates of pay of the conductors and motormen are increased as follows:

"For the first and second years of service, 21 cents per hour instead of 20 cents per hour.

"For the third, fourth and fifth years of service, 22 cents per hour instead of 21 cents per hour.

"For the sixth and succeeding years of service, 23 cents per hour instead of 22 cents per hour.

"Employees will be advanced from the lower to the higher rates in the same manner as at present, upon completion of the periods of service above mentioned."

The statement of the New York & Long Island Traction Company to its employees regarding the change follows:

"Taking effect Feb. 1, 1910, the rates of pay of conductors and motormen are increased as follows:

"The flat rate of 20 cents per hour is abolished.

"For the first and second years of service, 21 cents per hour.

"For the third, fourth and fifth years of service, 22 cents per hour.

"For the sixth and succeeding years of service, 23 cents per hour.

"In the case of employees who have not been continuously in the service since their first employment by the company as conductors and motormen, their length of service will be based upon the date when they entered upon their last period of service."

The statement of the Long Island Electric Railway to its employees regarding the change follows:

"Taking effect Feb. 1, 1910, the rates of pay of conductors and motormen are increased as follows:

"The flat rate of 20 cents per hour is abolished.

"For the first and second years of service, 21 cents per hour.

"For the third, fourth and fifth years of service, 22 cents per hour.

"For the sixth and succeeding years of service, 23 cents per hour.

"In the case of employees who have not been continuously in the service since their first employment by the company as conductors and motormen, their length of service will be based upon the date when they entered upon their last period of service."

Finding of Massachusetts Commission in New Bedford Service Case

The finding of the Railroad Commission of Massachusetts in the case of the petition of the Selectmen of Fairhaven regarding service by the Union Street Railway, New Bedford, Mass., follows:

"After giving a hearing upon the petition of the Selectmen of Fairhaven relative to service on the Union Street Railway the board investigated the service rendered by the Union Street Railway between New Bedford and Fairhaven and inspected the rolling stock and the general condition of the Fairhaven line, and concludes that, with the exception of certain cars to which the attention of the company was called and upon which repairs have been or are now being made, the equipment is in good condition. It appeared that the company was not furnishing adequate service during the late afternoon. An extra car has been installed to relieve the congestion on the car scheduled to leave New Bedford at 6:08 p. m., and the board believes

that the use of this car, together with the suggested repairs, will relieve the situation.

"It should be added, however, that cars are at times overloaded or delayed from causes which cannot be remedied under present conditions, as the opening of the draw of the Fairhaven bridge, operated under direction of the Federal Government, and the grade crossing of the New York, New Haven & Hartford Railroad are factors that will at times disarrange the operating schedule."

Freight Service Between Providence and Attleboro.—The New England Investment & Security Company, Springfield, Mass., has established a freight service between Providence, R. I., and Attleboro, Mass.

Employees, Firemen and Policemen Requested to Surrender Seats.—The Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind., has requested members of the police force, firemen and employees of the company to surrender their seats to passengers paying cash fares on the lines of the company in Fort Wayne.

Accident Record in Atlanta.—The Georgia Railway & Electric Company, Atlanta, Ga., reports that for the year ended Dec. 31, 1909, the company transported 50,570,953 passengers, including cash fares, transfers and passes; that not a passenger was killed or seriously injured, and that only eight persons were killed in connection with the operation of the system.

Verdict Against Indiana Company for Issuing Pass.—The Evansville Suburban & Newburg Traction Company, Evansville, Ind., has been fined \$500 by the Circuit County Court at Evansville in an action brought against the company by the Railroad Commission of Indiana for violating the anti-pass law of that State. The company gave free transportation to a shipper over its line who used the pass in going to and from a building which he was erecting along the line of the company. It is said that the case will not be appealed.

Schedule of New Line Between Warsaw and Peru.—The schedule adopted by the Winona Interurban Railway for its new line between Warsaw and Peru, which was placed in operation on Feb. 14, 1910, as noted in the *ELECTRIC RAILWAY JOURNAL* of Feb. 19, 1910, page 332, provides five passenger trains and one freight train each way per day with an average running time of about 2 hours and 40 minutes for the 42 miles. It is expected that track connections will be completed early in March with the lines of the Indiana Union Traction Company at Peru.

Louisville Railway Relief Association.—The report of the Louisville Relief Association for the year ended Dec. 31, 1909, has been made public. The total receipts for the year amounted to \$4,614.95, of which \$4,176.50 was collected as dues, \$128.45 interest on reserve fund, \$300 contributed by the Louisville Railway and \$10 contributed from an outside source. A total of \$4,770.60 was paid out during the year, of which \$2,803.60 was paid to members for sick benefits, \$1,625 for death claims, \$192 for salaries, \$150 for general expenses. The balance on hand on Jan. 1, 1910, was \$4,512.85.

Traffic Agreement Pending Between Brooklyn Rapid Transit Company and Long Island Railroad.—An agreement is pending between the Brooklyn Rapid Transit Company and the Long Island Railroad whereby arrangements will be made for operating trains of the Brooklyn Rapid Transit Company from the Delancey Street terminal of the Williamsburg Bridge in New York over that structure and over the Broadway elevated line of the Brooklyn Rapid Transit Company to Euclid Avenue, in the East New York section of Brooklyn, where the trains will be run over an incline to a connection with the tracks of the Long Island Railroad at Euclid and Atlantic Avenues and thus continue over the Long Island Railroad from East New York to Jamaica. The incline connection between the elevated structure of the Brooklyn Rapid Transit Company and the Long Island Railroad is now utilized only in the summer, during which elevated trains of the Brooklyn Rapid Transit Company are operated over that system and the lines of the Long Island Railroad to points on Jamaica Bay and to Rockaway Beach.

Personal Mention

Mr. J. D. Dewees has been appointed general manager of the Youngstown & Ohio River Railroad, Leetonia, Ohio.

Mr. A. A. Crawford has been appointed superintendent of motive power of the Youngstown & Ohio River Railroad, with offices at Leetonia, Ohio.

Mr. William H. Wadsworth has resigned as master mechanic of the Boston & Worcester Street Railway, South Framingham, Mass., and Mr. E. S. McLean has been appointed to succeed him.

Mr. E. S. McLean, who has been connected with the Boston & Worcester Street Railway, South Framingham, Mass., for several years, has been appointed master mechanic of the company to succeed Mr. William H. Wadsworth, resigned.

Mr. Elmer S. Olmsted, who has been assistant electrical engineer of the Boston (Mass.) Elevated Railway since 1902 and who has been connected with the company for 10 years, has resigned from the company to become vice-president of the Cheatham Electric Switching Device Company, Inc., Louisville, Ky.

Mr. James D. Mortimer has been elected vice-president of the Milwaukee Electric Railway & Light Company and the Milwaukee Light, Heat & Traction Company, Milwaukee, Wis., to succeed Mr. C. W. Wetmore, resigned, and has also been elected secretary of the companies to succeed Mr. Silas W. Burt, resigned.

Mr. Albert H. Stanley, general manager of the London Underground Electric Railways Company, London, Eng., has also been appointed managing director of the London United Tramways Company. This company owns and operates an extensive trolley system in the northwestern part of London and its stock is largely owned by the Underground Electric Railways Company, with which Mr. Stanley will remain associated as general manager. This appointment, then, comes as an extension and broadening of his duties. Mr. Stanley succeeds in his new position Sir Clifton Robinson, who has long been one of the most prominent figures, if not the most prominent, in tramway circles in England, but has concluded to retire from active management of the London United Tramways. The announcement was made on Feb. 2, 1910, at a dinner of the members of the Metropolitan Association of Electric Tramway Managers of London, of which Sir Clifton Robinson is president this year.

Mr. W. O. Woodard has been appointed traffic manager of the Chicago, Lake Shore & South Bend Railway, with headquarters at Michigan City, Ind. Mr. Woodard entered railway service with the Pennsylvania Railroad, and remained in the employ of that company until 1901, when he became connected with the Lake Erie & Western Railroad, which he served until 1905 in various capacities in the freight department. In December, 1905, Mr. Woodard became connected with the accounting department of the Terre Haute, Indianapolis & Eastern Traction Company. Subsequently he served in the passenger and freight departments of this company. He next accepted the position of division freight and passenger agent of the Ohio Electric Railway, at Dayton, Ohio. In 1908 he returned to the service of the Terre Haute, Indianapolis & Eastern Traction Company and remained with the company until March, 1909, when he was appointed traffic manager of the Indianapolis, Crawfordsville & Western Traction Company.

Mr. Gerhard M. Dahl has been appointed street railway commissioner of Cleveland by Mayor Bachr under the terms of the franchise to the Cleveland Railway approved at the election on Feb. 17, 1910. Mr. Dahl was born at Fort Howard, Wis., on June 8, 1876, where he attended the public schools and was graduated with honors. He then entered the University of Wisconsin, from which he was graduated in 1896. Later he completed the course in law at the University of Wisconsin and opened an office at Stevens Point, Wis., where he served two terms as prosecuting attorney, an office which he filled with satisfaction to his constituents. Through the influence of Senator La Follette of Wisconsin, Mr. Dahl became interested in politics. In the fall of 1906 Mr. Dahl established a connection with the law office of M. B. & H. H. Johnson, through Mr. T. H.

Hogsett of that firm. Mr. Dahl took a prominent part in the campaign of 1908, and was in constant demand thereafter as a public speaker. He was nominated for city solicitor of Cleveland last fall on the Republican ticket, but was defeated by Mr. Newton D. Baker, the only Democrat who was elected to office.

Mr. George Quackenbush, assistant general freight agent of the Chicago & Alton Railroad, has been appointed traffic manager of the Illinois Traction System, Peoria, Ill., to succeed Mr. H. H. Roseman, whose resignation takes effect on March 1, 1910. Previous to his connection with the Chicago & Alton Railroad Mr. Quackenbush was connected with the Iowa Central Railroad. Retiring temporarily from the Chicago & Alton Railroad Mr. Quackenbush accepted the position of manager of the Western Union Telegraph Company at Denver, Col., but later returned to the Chicago & Alton Railroad. He has acted in many capacities in the freight department of the Chicago & Alton Railroad, his last position being assistant general freight agent, with offices at Springfield, Ill. When the Chicago & Alton Railroad was reorganized recently with the other lines controlled by the Hawley interests, Mr. Quackenbush was transferred from Peoria, where for a number of years he had been division freight agent, to Springfield and given the title of assistant general freight agent. Mr. Quackenbush will have his office at Springfield, Ill.

Sir Clifton Robinson, as noted elsewhere in this department has retired as managing director of the London United Tramways, London, Eng., in favor of Mr. Albert Stanley, general manager of the London Underground Electric Railways. At a dinner of the Metropolitan Association of Electric Tramway Managers, of which Sir Clifton Robinson is president this year, he stated that he had been associated with tramway enterprises for 50 years, and felt that the time had come when he should lay aside some of the burdens of his life work. He congratulated the company as well as the association that the management of the London United Tramways would be in the hands of Mr. Albert Stanley. Sir Edgar Speyer, in behalf of Mr. Cator Scott, chairman of the London United Tramways, expressed the regret of the company at the retirement of Sir Clifton Robinson and its gratitude at the ability displayed by him in his management of the affairs of the company. It is understood that Sir Clifton Robinson will take a long trip in the East to investigate tramway matters for the firm of bankers of which Sir Edgar Speyer is a member.

Mr. C. F. Baker has been engaged by the Massachusetts Electric Companies, Boston, Mass., to examine the power plants and equipment on the Boston & Northern Street Railway and the Old Colony Street Railway, in consultation with Mr. C. F. Bancroft, superintendent of motive power and machinery of the companies, and make recommendations regarding changes in the system. Mr. Baker has been connected at different times with the Edward P. Allis Company, the Pillsbury Mills & Elevator Company and the West End Street Railway, now the Boston Elevated Railway. For a number of years he was superintendent of motive power and machinery of the West End Street Railway, in charge of all power plants, machinery and car shops, and the inspection, design and maintenance of the rolling stock of the company. The Charlestown, Dorchester and Harvard power stations of the Boston Elevated Railway were built under Mr. Baker's supervision and the "central" power plant of the company was changed over from belted to direct drive while he was with the company. Mr. Baker left the Boston Elevated Railway to become superintendent of power for the Brooklyn (N. Y.) Rapid Transit Company, and 20,000 kw of steam turbine equipment were installed under his direction in Brooklyn. For a year Mr. Baker was located at Baltimore, Md., in charge of field work for Mr. L. B. Stillwell, consulting engineer of the United Railways & Electric Company, Baltimore, Md., in building new power and substations and changing over, moving and installing machinery and reorganizing the power and transmission departments of that company. Mr. Baker was also connected with the Hudson & Manhattan Railroad as superintendent of equipment. Mr. Baker is a member of the American Society of Mechanical Engineers, past president of the New England Railroad Club and past president of the American Street & Interurban Railway Engineering Association.

Construction News

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

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

RECENT INCORPORATIONS

***Fort Smith & Interurban Railway, Fort Smith, Ark.**—Chartered in Arkansas to build a 25-mile electric railway between Greenwood, Bonanza and Fort Smith. Capital stock, \$100,000. George Sevgel, Ft. Smith, president, and his associates are St. Louis and New York capitalists.

***Peoria Northern Railway, Peoria, Ill.**—Incorporated in Illinois in the interests of the McKinley syndicate to build an electric railway from Peoria along the Illinois River through Chillicothe, Sparland, Lacon and Henry to Bureau. Incorporators: H. E. Chubbuck, H. J. Vance, H. C. Dillon and W. J. Achelpohl, Peoria, and W. H. Carnahan, Champaign.

***Peoria Southern Railway, Peoria, Ill.**—Chartered in the interests of the McKinley syndicate, for the purpose of constructing an electric railway from Peoria to Pekin. Incorporators: H. E. Chubbuck, H. J. Vance, H. C. Dillon and W. J. Achelpohl, Peoria, and W. H. Carnahan, Champaign.

***Central Interurban Railway, Des Moines, Ia.**—Incorporated to build and operate interurban electric railways in Iowa. Capital stock, \$10,000. Incorporators: J. B. Green, W. P. Clark, J. H. Phillips, W. M. Taylor and C. R. Keyes.

***Washington, Marlboro & Drum Point Railway, Power & Light Company, Annapolis, Md.**—A bill has been introduced in the Legislature to incorporate this company which proposes to construct an electric railway in Prince George and Calvert Counties, Maryland, starting at Drum Point. Connection will be made into Baltimore over the railway which has been projected between Drum Point and Baltimore by the Lauderbach syndicate, New York, and on which construction is to be started during the spring. Applicants for the charter are: C. A. M. Wells, William C. Carroll, Charles C. Mayer, Reese Carpenter, H. Magruder, F. C. Carmody, E. A. Fuller and G. F. Owens.

***Omaha, Western & Lincoln Railway, Lincoln, Neb.**—Incorporated in Nebraska to build a 219-mile electric railway from Omaha to Hastings, with a branch to Lincoln. Officers: Frank F. Schaaf, president and general manager; A. P. Tilley, treasurer, and J. B. Erwine, secretary. Headquarters, Lincoln.

Johnstown (Pa.) Traction Company.—Application for a charter was to be made on Feb. 18 by this company which was recently formed to take over the lines of the Johnstown Passenger Railway, Johnstown, acquired by the American Railways Company, Philadelphia.

***Montreal Central Terminal Railway, Montreal, Que.**—Application has been made by this company for a charter giving it the power to make agreements with the Montreal Terminal Railway, Boston & Maine Railroad and also to acquire the franchise of the Montreal Light, Heat & Power Company, the Central Heating Company, the Saraquay Electric & Water Company, and the Canadian Light & Power Company. It is said that the company expects to expend \$500,000 within two years.

***Spokane Railway & Power Company, Spokane, Wash.**—Incorporated to build and operate electric railways in Washington. Capital stock, \$2,000,000. Incorporators: H. L. Moody, D. M. Drumheller and Alfred Coolidge.

Wenatchee Valley Railway & Power Company, Wenatchee, Wash.—Incorporated in Washington to build an electric railway from Wenatchee via Cashmere and Peshastin to Leavenworth. Capital stock, \$2,500. Incorporators: H. A. Chapin, Ralph Vermilya, A. J. Linville, John Godfrey and L. J. Nelson. [E. R. J., Feb. 12, '10.]

FRANCHISES

Atlanta, Ga.—The Council has granted the Georgia Railway & Electric Company one perpetual franchise and three 40-year franchises to build new lines through certain streets of Atlanta.

***La Grange, Ga.**—The City Council has granted a 50-year franchise to C. M. Awtrey and G. E. Dallis, La Grange, to construct an electric railway in La Grange.

***Hamtramck, Mich.**—Arthur O'Connor and Matthew Finn have applied to Council for a 30-year franchise to build an electric railway in Hamtramck.

Gilbert, Minn.—The Mesaba Traction Company has been granted a franchise to construct an electric railway in Gilbert. This is part of a plan to build an electric railway between Eveleth and Virginia. W. M. Prindle, Duluth, and W. D. Chapman, Chicago, are interested. [E. R. J., Feb. 5, '10.]

Lincoln, Neb.—The Lincoln (Neb.) Traction Company has applied to the City Council for a franchise granting it the right to build four extensions to its lines through certain streets of Lincoln. The company agrees to begin construction by Aug. 1.

Columbus, Ohio.—Application has been made to the County Commissioners by the Ohio & Southern Traction Company for a franchise to build a 2-mile extension of its electric railway from Hartman Farm to Shadeville.

Stroudsburg, Pa.—The Stroudsburg & Water Gap Street Railway has been granted a perpetual franchise by the Council to build a 2-mile extension of its electric railway along the highway extending through the Delaware Water Gap. A further extension of 3½ miles will connect this company's line with the lines of the Portland & Bangor Traction Company at Portland. Engineers are now at work on the proposed extension. The franchise stipulates that work must be completed by July 1, 1911. A. A. Holbrook, Wilkes-Barre, general manager.

***San Marcos, Tex.**—C. L. Hopkins, San Marcos, representing a syndicate of capitalists, has applied to the City Council for a franchise to construct an electric railway in San Marcos.

Provo, Utah.—The Board of County Commissioners has granted to Jesse Knight a 50-year franchise for an interurban electric railway from the south to the north boundaries of Utah County. [E. R. J., Feb. 5, '10.]

TRACK AND ROADWAY

Calgary (Alta.) Electric Railway.—T. H. McCauley, superintendent, advises that this company expects to build 9 miles of new track in Calgary.

British Columbia Electric Railway, Ltd., Vancouver, B. C.—This company is reported to have made an agreement with the Canadian Pacific Railway whereby it will construct 10 miles of new line in South Vancouver and Point Grey municipalities, provided the Canadian Pacific Railway will lease to it the Vancouver & Lulu Island Railway for a term of years.

United Railroads, San Francisco, Cal.—This company, through Ford, Bacon & Davis, New York, N. Y., will purchase poles, cross-arms and copper for use on its city lines.

Vallejo & Northern Railway, Vallejo, Cal.—This company has entered into agreement with the Northern Electric Railway, Chico, and the Central California Traction Company, San Francisco, whereby it is to pay its share of the cost of tracks to be used jointly by the three electric railways. T. T. C. Gregory, Suisun, president. [E. R. J., Oct. 23, '09.]

Pueblo & Suburban Traction & Lighting Company, Pueblo, Col.—This company, it is stated, will build a 4-mile extension from Pueblo to the City Park. F. J. Vail, purchasing agent.

Steamboat Springs, Col.—Joseph Monette, Lawrence, Mass., who was recently reported to be interested in a plan to build an electric railway to connect Steamboat Springs with the Three Forks mining district of Colorado and Wyoming, writes that the project will be taken up in the spring, when a preliminary organization will be effected. [E. R. J., Feb. 12, '10.]

Shore Line Electric Railway, New Haven, Conn.—This company announces that its proposed 40-mile railway between Essex and Stony Creek will be complete this spring. Nearly all of the roadway has been finished, except a stretch in Guilford. Work remains to be done on several small bridges owing to the delayed arrival of materials. The poles have been set and the wires strung for long dis-

tances. The power house on Connecticut River at Saybrook has been completed. Cars will be run into New Haven over the tracks of the Connecticut Company.

City Suburban Railway, Brunswick, Ga.—This company expects to extend its line at once in the southern section of the city to connect the Albany and Newcastle Street lines. T. D. Aiken, general manager.

Kankakee (Ill.) Electric Railway.—This company advises that it expects to relay 5 miles of track with 70-lb. rails. B. M. Rollins, Kankakee, purchasing agent.

Fort Wayne & Springfield Railway, Decatur, Ind.—This company advises that it expects to place contracts during the next 60 days for the construction of 12 miles of track, using 70-lb. rails, 10,000 oak ties and 600 40-ft. 7-in. top cedar poles. The company will also erect a 20-ft. steel bridge. W. H. Fledderjohann, general manager.

South Bend & Logansport Traction Company, South Bend, Ind.—This company advises that its proposed 24-mile electric railway is under construction. It will connect South Bend, Lakeville, Plymouth, Rochester, Lake Maxinkuchee, Logansport and Bogansport. Power will be obtained from Indiana & Michigan Electric Company. Capital stock, \$400,000. Officers: Thos. P. Moredock, 11 American Trust Building, South Bend, president; Henry F. Coleman, Logansport, vice-president; Virginius Nicar, 11 American Trust Building, South Bend, secretary; Alexis Coquillard, South Bend, treasurer; J. M. McCampbell, South Bend, general manager. [E. R. J., Dec. 25, '09.]

Des Moines, Winterset & Creston Electric Railway, Des Moines, Ia.—At the annual meeting of this company recently held in Creston the following officers were elected. R. Brown, Creston, president; Jerry Wilson, Adair County, first vice-president; M. Harris, Madison County, second vice-president; A. A. Yynn, secretary, and W. W. Walker, treasurer. The plans of the company include the construction of an electric railway from Des Moines to Winterset and Creston. [E. R. J., July 17, '09.]

Motor Grand Traction Company, Belleville, Kan.—This company announces that construction will begin in the spring on its 150-mile gasoline motor railway which is to extend from Belleville to Concordia, Minneapolis, Salina, Canton, Newton and Wichita. Capital stock, \$1,000,000. The Securities Selling Company, Montreal, Que., Can., has been awarded the contract for selling the stock. Repair shops will be at Belleville, Kan. Officers: E. S. Alnutt, Belleville, president and general manager; E. N. Van Hosen, vice-president; C. F. Davis, secretary, and W. S. Ball, treasurer. [E. R. J., Feb. 12, '10.]

Rockland, So. Thomaston & St. George Railway, Rockland, Maine.—This company advises that it expects to build 4 miles of new track. John T. Berry, purchasing agent.

***Springfield, Mo.**—F. C. Yentsch, Mount Vernon, Mo., is reported to be interested in a plan to organize a company for the building of a 60-mile interurban railway from Springfield to Haseltine, Nichols, Halltown, Paris Springs, Mount Vernon, Hoberg, Stotts City and Carthage.

***Lewiston, Mont.**—S. W. Gebo is said to have made a proposition to some of the leading financial interests of Lewiston in which he proposes to prepare for the construction of two electric railways, one from Lewiston to Kendall and the other from Lewiston to Philbrook via Moore.

***Osceola Construction Company, Lincoln, Neb.**—This company has been organized for the purpose of building the Omaha, Western & Lincoln Railroad Company's projected line from Omaha to Hastings, and a branch to Lincoln. The total length of the system will be 219 miles. Headquarters, 140 South Thirteenth Street. Officers: Frank E. Schaaf, president and manager; Charles Butler, vice-president; A. J. Schaaf, secretary; A. P. Tilley, treasurer.

***Tecumseh, Neb.**—Press reports state that T. P. Kennard, Lincoln, is interested in a plan to construct an interurban electric railway from Lincoln to Auburn, via Cheney.

Lakewood, N. J.—Charles R. Le Compte, who is interested in a plan to construct a 9-mile electric railway between Lakewood and Point Pleasant, is said to have announced that work will be started as soon as the weather permits. [E. R. J., March 27, '09.]

Public Service Railway, Newark, N. J.—This company has ordered 1800 tons of girder rails from the Pennsylvania Steel Company.

***Albuquerque, N. Mex.**—The people of Albuquerque have accepted the proposition made by J. H. Barrett, Pittsburgh, Pa., to build an electric street railway on the east side of Albuquerque.

New York State Railways, Rochester (N. Y.) Lines.—The Public Service Commission of the Second District has issued an order to this company to construct a grade crossing over the New York Central & Hudson River Railroad tracks in Lyell Avenue to connect with the Buffalo, Lockport & Rochester Electric Railway, Rochester. By this decision the latter company is given a clear running track into Rochester.

New York & North Shore Traction Company, Roslyn, N. Y.—This company advises that it will begin work early in the spring on double-tracking its railway from Flushing to Bayside. All necessary material has been ordered. Geo. B. Thomas, Roslyn, general manager.

***Altus, Okla.**—Harry Bradford, El Reno, is said to be planning to construct an electric railway in Altus provided the city will furnish the power, the city to receive one-half the proceeds of the railway in return for the power furnished and the franchise.

Easton & Washington Traction Company, Easton, Pa.—This company has awarded the contract for building an extension from Port Murray to Lake Hopatcong via Hackettstown, N. J., to the M. P. McGrath Contracting Company, 409-410 Trust Building, Easton, Pa. W. O. Hay, Easton, purchasing agent.

Irwin-Herminie Traction Company, Irwin, Pa.—This company has started work on the concrete piers for its 350-ft. bridge at Hahntown. Materials for track-laying and overhead work are on the ground and the bridge will be completed about March 1. The company expects to have its line from Hahntown to Irwin in operation on May 1. Cars are now running between the former place to Herminie.

West Penn Railways, Pittsburgh, Pa.—This company has made extensive plans for connecting lines and extensions. From Scott Haven, its present terminus in Allegheny County, a branch will be built to West Newton and Hunker, where connection will be made with the Greensburg-Connellsville division. This will be 16 miles in length. Another extension will be built from Greensburg to Latrobe, a distance of 10 miles. Engineers are running lines for a line from West Newton to Donora, on the Monongahela River. At the former place crossing will be made over the new bridge spanning the Youghiogheny River, a franchise having been secured from the Westmoreland County Commissioners. This division will run through Monessen and Webster. The line from Irwin to Trafford City will be rebuilt.

Bradford County Traction Company, Towanda, Pa.—This company advises that it will begin work about April 1 on its projected 16-mile railway between Towanda, Wester, Milan, Greenslanding, Athens, Sayre and Waverly. The location of the power plant has not been definitely decided upon. Capital stock, \$50,000. Officers: George R. Hill, president; John C. Ingham, secretary, and W. W. Jennings, treasurer. [E. R. J., Feb. 12, '10.]

Greenville, Spartanburg & Anderson Railway, Greenville, S. C.—The organization of this company, which proposes to build an electric railway from Belton to Greenville and Spartanburg, has been perfected by the election of the following officers: W. J. Thackston, president and treasurer; J. R. Vandiver, vice-president; T. F. Hill, secretary, and E. A. Smith, chairman executive committee. The capital was fixed at \$600,000. The purchase of the Anderson Traction Company's property was consummated. [E. R. J., Jan. 15, '10.]

***San Marcos, Tex.**—B. G. Neighbors, San Marcos, and Joseph Jennings, Martindale, are said to have revived the project of building an interurban electric railway from San Marcos to Luling.

Uvalde & Leona Valley Interurban Railway, Uvalde, Tex.—This company has recently made surveys and partially secured rights of way and capital for its proposed 25-mile electric railway from Uvalde to Batesville. M. M. Mc-

Farland, vice-president and general manager. [E. R. J., Dec. 25, '09.]

Spokane & Inland Empire Railway, Spokane, Wash.—This railway has awarded to the American Bridge Company a contract for 238 tons of girder bridges for elevated crossings at Spokane.

Puget Sound Electric Railway, Tacoma, Wash.—This company announces that \$106,187 will be spent for improvements to its lines this spring. A second track will be built at Black River and Argo and a siding at Riverton. George O. Snider, purchasing agent.

Fairmont & Clarksburg Traction Company, Fairmont, W. Va.—This company expects to build during the summer a 20-mile extension of its electric railway to connect Mount Claire, Lost Creek and Janelew. S. L. Watson, president.

SHOPS AND BUILDINGS

Omaha & Council Bluffs Street Railway, Omaha, Neb.—It is stated that plans are being prepared by this company for an addition to its car shops in Omaha. The addition will be used for entirely new work and the present shops will be used for repair work. [E. R. J., July 17, '09.]

Lehigh Traction Company, Hazelton, Pa.—This company expects to build a new car house at Thirteenth Street and Gordon Street, Allentown. It is also planned to erect a paint shop 80 ft. x 100 ft. adjoining the office building in Allentown to be two stories high.

Shamokin & Mount Carmel Transit Company, Shamokin, Pa.—This company intends to build as soon as the weather permits an additional car house 200 ft. x 48 ft. It will be a steel structure with corrugated iron roof and sides. Monroe H. Kulp, Shamokin, general manager.

Puget Sound Electric Railway, Tacoma, Wash.—This company is said to be considering plans for the erection of a car house on Bay Street, Tacoma; also passenger stations at Puyallup, Black River and Renton.

POWER HOUSES AND SUBSTATIONS

Sheffield (Ala.) Company.—This company has recently purchased from the Westinghouse Electric & Manufacturing Company a 300-kw rotary converter and a 40-kw exciter. W. R. Hall, Sheffield, general manager.

Aurora, Elgin & Chicago Railroad, Chicago, Ill.—This company expects to enlarge its power house at Batavia this spring. A two-story sandstone addition will be built at the northern end of the plant and a 2500-kw generator will be installed. W. P. Harvey, purchasing agent.

Mason City & Clear Lake Railway, Mason City, Ia.—This company has recently purchased the following apparatus: one 1500-kw, 2300-volt, 60-cycle, three-phase turbogenerator and 500-kw rotary converter from the General Electric Company; two 500-hp Sterling boilers from Babcock & Wilcox Company and condensing apparatus from Henry R. Worthington. The rotary converter will be installed at Emery. In addition, the company will build a 5-mile, three-phase, 13,200-volt transmission line from Mason City to Emery. [E. R. J., Dec. 4, '09.]

Frederick (Md.) Railroad.—This company advises that during the next three weeks it expects to purchase an engine and generator of 300 to 400 kw capacity to replace a 14-in. x 26-in. x 36-in. Wright steam engine, and a Westinghouse 200-kw, 500-volt, shunt-wound, six-pole, d.c. generator. W. S. Taylor, general manager.

New York & North Shore Traction Company, Roslyn, N. Y.—This company states that its power house which is under construction on Little Neck Bay, L. I., between Bayside and Douglaston, will be in operation about May 1. The company has ordered for its power house two 1000-kw Westinghouse horizontal turbines, Westinghouse Machine Company stockers, Babcock & Wilson boilers and Worthington condensers. All contracts for accessories have been placed.

Stroudsburg & Water Gap Street Railway, Stroudsburg, Pa.—This company states it expects to build during the next month a new power station, of 500 kw capacity, at Stroudsburg and will operate its own plant in the future instead of purchasing power from the Monroe County Water Power Company. A. A. Holbrook, Wilkes-Barre, general manager. [E. R. J., Nov. 27, '09.]

Manufactures & Supplies

ROLLING STOCK

Phoenix (Ariz.) Railway had four cars destroyed when its car house burned recently.

Macon Railway & Light Company, Macon, Ga., is in the market for six pay-as-you-enter cars.

Rochester, Syracuse & Eastern Railroad, Syracuse, N. Y., it is rumored, will soon buy some new rolling stock.

Conestoga Traction Company, Harrisburg, Pa., has contracted with The J. G. Brill Company for one 10-bench open car.

Poughkeepsie City & Wappingers Falls Electric Railway, Poughkeepsie, N. Y., is making inquiries regarding two or three cars.

Connecticut Company, New Haven, Conn., had two cars destroyed and three others partially destroyed in a fire at its car house in Middletown, Conn.

Boston & Northern Street Railway, Boston, Mass., has ordered six pairs of heavy trucks, type C-60, for freight cars from the Standard Motor Truck Company.

Havana (Cuba) Central Railroad has purchased 10 semi-convertible cars from The J. G. Brill Company to be mounted on Brill No. 27 GE-1 trucks.

Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., has placed an order with The J. G. Brill Company for two 29-ft. combination passenger and smoking cars.

Virginia Railway & Power Company, Richmond, Va., has ordered five pairs of type C-50 trucks from the Standard Motor Truck Company for use on its Richmond & Petersburg division.

Stone & Webster Engineering Corporation, Boston, Mass., it is reported, will soon order a parlor car and a motor car for its Puget Sound property and about 12 cars for Fort Worth.

Ohio Valley Electric Railway, Huntington, W. Va., has ordered three double-truck cars from the Jewett Car Company, Newark, Ohio. The cars are to be 39 ft. over all, equipped with GE-80 four-motor equipments and GE air brakes.

Honolulu Rapid Transit & Land Company, Honolulu, Hawaii, has ordered 10 15-bench open cars from The J. G. Brill Company through Crossman & Sielcken, 96 Wall Street, New York. The cars will be mounted on Brill No. 39-E trucks.

Columbus, Delaware & Marion Railway, Columbus, Ohio, reported in the *ELECTRIC RAILWAY JOURNAL* of Nov. 20, 1909, as being authorized by the court to order five new cars, has purchased this number from the Jewett Car Company, Newark, Ohio.

Lexington & Interurban Railway, Lexington, Ky., mentioned in the *ELECTRIC RAILWAY JOURNAL* of Feb. 12, 1910, as having lost a number of cars by fire, has ordered six 20-ft. 8-in. semi-convertible and two 46-ft. combination interurban cars and six Brill No. 27-MCB trucks from The J. G. Brill Company.

Rockland, South Thomaston & St. George Railway, Rockland, Maine, mentioned in the *ELECTRIC RAILWAY JOURNAL* of Dec. 4, 1909, as contemplating the purchase of one construction and two freight cars, will also order one snow plow, two flat cars, one tower car and perhaps an additional construction car.

Baltimore & Washington Transit Company, Washington, D. C., will receive within the next month from the John Stephenson Company two side-entrance cars adapted for pay-as-you-enter service. The cars will be mounted on special Brill 21-E trucks and will be equipped for operation with gasoline by the May Development Company, New York, N. Y.

TRADE NOTES

Burton W. Mudge & Company, Chicago, Ill., announce the appointment of Otto P. Hennig as sales manager in charge of sales, advertising and purchasing.

Albert & J. M. Anderson Manufacturing Company, Boston, Mass., are calling attention to the "Anderson Trolley

Ear," the product of "over 20 years' study of service requirements."

Railway Specialty & Supply Company, Chicago, Ill., has appointed Fred A. Preston general sales agent. The company manufactures the P. & M. rail anchor and other railway devices.

Jones & Laughlin Steel Company, Pittsburgh, Pa., has appointed Charles A. Fisher, formerly assistant auditor and assistant treasurer, treasurer of the company to succeed J. B. Laughlin, resigned.

McKeen Motor Car Company, Omaha, Neb., has received an order from the Oregon Railroad & Navigation Company for a 70-ft. steel motor car and from the Oregon & California Railroad for a 70-ft. steel motor car.

L. J. Wing Manufacturing Company, New York, N. Y., has opened an office in Chicago at 1785 Old Colony Building, where a stock of blowers will be carried. The office is in charge of J. J. Arnsfield, the Western manager of the company.

National Engineering & Construction Company, Dover, Del., has been incorporated in Delaware by William S. McGuire, New York City; J. D. Fackenthal, Brooklyn, N. Y., and James W. Williams, Watson, Pa., with a capital of \$500,000.

Harrison Engineering Company, New York, N. Y., manufacturer of the Harrison aertube heater, has opened a branch office at the Real Estate Trust Building, corner Broad and Chestnut streets, Philadelphia, Pa., in charge of J. J. McKee as manager.

Wonham, Magor & Sanger, New York, N. Y., announce the resignation of Basil Magor, who will become president of the Wonham-Magor Car & Manufacturing Company. Wonham, Magor & Sanger propose to change their name to Wonham, Sanger & Bates.

Cleveland Frog & Crossing Company, Cleveland, Ohio, announces that L. G. Parker, for many years connected with the engineering department of the Lake Shore & Michigan Southern Railway, and also with the Chicago Terminal Transfer Railroad, has joined its sales department.

Protectus Company, Philadelphia, Pa., has been purchased from the receivers by W. C. De Armond. The manufacturers of high-grade paints for the protection of metal and wood, insulating paints and marine compositions will be conducted under the name of the Protectus Paint Company.

Pantasote Company, 11 Broadway, New York, N. Y., announces that the new Agosote Mill Board Company will open its plant at Trenton, N. J., about April 1, 1910. The company will then furnish boards of American manufacture to the trade. The capacity of the new plant will be 10,000,000 sq. ft. per year.

Holland Trolley Supply Company, Cleveland, Ohio, announces that it has acquired the sole manufacturing and selling rights of the Ludlow track drilling machine, a large number of which are in use on many railways. It is stated that this is the only drill made which will drill and ream railroad tracks by electricity.

Green, Hook & Company, Hudson Terminal Buildings, New York, N. Y., has been organized to manufacture and sell chemicals for boiler treatment. The main laboratory and works will be at Jersey City, and a branch laboratory at Baltimore, Md. Sales offices will be opened in Boston, Philadelphia, Baltimore, Norfolk and Havana, Cuba. Jacob W. Hook and Stanley K. Green are interested.

M. P. McGrath Contracting Company, Easton, Pa., has been incorporated in New Jersey for \$125,000 to carry on railroad construction and proposes to make a specialty of electric railway work. The officers of the company are: M. P. McGrath, president; J. F. Mooney, secretary and treasurer. Mr. McGrath has to his credit the construction of a considerable number of electric railways in various parts of the country.

General Concrete Construction Company, Chicago, Ill., has appointed E. M. Lara contracting engineer. Since he was graduated from Cornell University Mr. Lara has been engaged in steam and electric railway work, in the sale of

engineering supplies, and at one time was associate editor of the *Street Railway Review*. The General Concrete Construction Company undertakes the construction of tapering concrete chimneys for all services.

King-Lawson Car Company, Middletown, Pa., at the annual meeting of the stockholders on Feb. 9, 1910, elected the following directors: Thomas Lawson, G. O. Draper, Edward Bailey, Harold C. Hansen, Paul A. Kunkel, Arthur King and Howard W. Bible. The directors organized by electing the following officers: Thomas Lawson, president and general manager; H. W. Bible, vice-president; H. C. Hansen, treasurer, and P. A. Kunkel, secretary.

Merchants Steel & Supply Company, Chicago, Ill., has been organized with a capital stock of \$100,000, and will buy and sell scrap iron and steel, new and relaying rails, cars, locomotives and railway supplies and equipment. The company's offices are in the Marquette Building, and a yard will be provided to handle its materials. W. K. Kenly is president and treasurer of the company; W. T. Twomely, vice-president and general manager, and L. W. Parker, secretary.

Columbia Machine Works & Malleable Iron Company, Brooklyn, N. Y., reports that the Boston & Northern Street Railway and Old Colony Street Railway are among the largest users of its well-known pinion pullers. In February, 1909, these companies ordered two pinion pullers and they proved so satisfactory that a month later the companies placed an order with the Columbia Machine Works & Malleable Iron Company for 26 more, making a total of 28 pinion pullers for one customer.

Crocker-Wheeler Company, Ampere, N. J., held a convention during the week commencing Feb. 14, 1910, of the district and branch office managers at the company's main offices and works at Ampere, N. J. Confidence is expressed as to the business possibilities for electric motors, generators and transformers during 1910 by this company, and as this company has retained its entire organization during the dull business season, it feels prepared to meet all demands for the classes of machinery which it manufactures.

American Ship Windlass Company, Providence, R. I., manufacturer of the Taylor stoker, has recently sold to the Detroit Edison Company four 13-retort Taylor stokers to be used with two 2300-hp Stirling boilers. The company says: "This great output from a single boiler is secured by double firing with a stoker at each end, each boiler having a furnace 26 ft. x 15 ft. The Taylor stoker was selected because of its great overload capacity. So far as known by the manufacturers, these are the largest stokers in the world."

Gulick-Henderson Company, Pittsburgh, Chicago and New York, inspecting engineers, metallurgists and chemists, announce that J. W. Henderson has resigned as treasurer to become manager of the Verona works of the Standard Steel Car Company, formerly known as General Castings Company. The metallurgical and foundry department of the Gulick-Henderson Company, which was directly under Mr. Henderson, will in the future be taken care of by W. G. Ireland, who is well equipped by many years' experience to take up the work.

Lord Electric Company, New York, N. Y., announces that this year it has sold more of its various products than in any six months of any previous year since it has been in business. Large orders have been received for Earll trolley catchers and retrievers, controlators, lightning arresters and other specialties. The company considers such results proof of the satisfaction secured in operation with the devices which it handles. The company has received an order for the complete equipment of the cars of a representative electric railway of the United States with Earll catchers. This is in addition to several hundred catchers ordered since Jan. 1, 1910.

H. W. Johns-Manville Company, New York, N. Y., announces that the Chicago and Baltimore branches will be moved about March 1, 1910, to new locations with more room. The Chicago branch, now on Randolph Street, will occupy the four-story and basement building at 27-29 Michigan Avenue. With 32,500 sq. ft. of floor space, offices,

store and stock rooms will be amply provided for all under one roof. The Baltimore office, store and warehouse will be located at 30 Light Street, where the company will have considerably more room than before. A large stock of J-M products will be kept in both branches and the company will be in much better position than ever to give all orders prompt attention.

Western Electric Company, Chicago, Ill., has made known its returns for the first two months of its fiscal year. Taking into consideration the ratio which these first two months bear to the fiscal year as a whole, it is estimated that the year 1909-1910 will show a gross business of approximately \$61,000,000. With this estimate realized, the current year will rank as second best in the company's history, being exceeded only by gross earnings of \$69,000,000 in 1906. The sales for January, 1910, showed an increase of 46 per cent over January, 1909. Much expansion and extension work is promised for the current year, and with the money raised by the issue of \$5,000,000, two years 4½ per cent collateral trust notes secured by \$6,250,000 of first mortgage 5 per cent bonds the company is in a position to meet the demands upon it without borrowing at higher interest rates. Authorization for extensions to the Hawthorn plant calling for the expenditures of about \$500,000 have already been made, and it is likely that the year's extensions and improvements will total much larger. The company reports the adoption of telephones for dispatching trains on several railroads. Among those which have installed the system in the South are the Georgia Railroad, for 245 miles, the Chesapeake & Ohio, on its Cincinnati division, the Norfolk & Western Railroad Company, on a large portion of its line, the Seaboard Air Line, for two of its divisions, and the Atlantic Coast Line, on one division. Elsewhere in the country similar interest in the use of the telephone for this service prevails. For instance, the Boston & Maine Railroad has installed telephone equipment for train dispatch on three of its divisions, one 70 miles in length, one 95 miles in length and one 51 miles in length.

ADVERTISING LITERATURE

Arthur S. Partridge, New Bank of Commerce Building, St. Louis, Mo., has issued under date of Feb. 19, 1910, List 32 of electrical machinery, cars and equipment which he is offering for sale.

American Carbon & Battery Company, East St. Louis, Ill., has issued a card on which it recommends that flat spots and rough commutators be done away with by the use of American carbon brushes.

Wickes Brothers, Saginaw, Mich., have issued their February "Monthly Stock List of Power Equipment." The company will also send on request its lists on metal-working machinery, electrical equipment, contractors', mining and quarry equipment and woodworking and sawmill machinery.

Jeffrey Manufacturing Company, Columbus, Ohio, in its twenty-page illustrated Booklet No. 36, says: "Our facilities for manufacturing high-grade steel and cast-iron spiral conveyors are unsurpassed. We employ every modern appliance in shop equipment and every known economy in shop practice in an effort to produce the very best spiral conveyors possible at a minimum cost. We carry large stocks and can ship promptly any of the Helicord or Sectional flight steel spiral conveyors listed as stock sizes. Any special styles or sizes practicable to structure will be made up and shipped on the shortest possible notice."

Barrett Manufacturing Company, New York, N. Y., announces in a four-page folder that it has just introduced a new reinforced waterproofing felt called "Tartex." It is constructed of the best-quality tarred felt and cotton drilling in such a way as to make an unusually pliable sheet, the tensile strength and waterproofing properties of which, says the company, are absolutely unapproachable by any other similar material. The roofing specifications of the Pennsylvania station, now building in New York City, call for coal-tar pitch and tar felt "equal to that manufactured by the Barrett Manufacturing Company." A handsome photograph, 13 in. x 8 in., of the station is "tipped in" on the folder.