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CONTENTS.

Objections to a Transfer

The vagaries of human nature are always cropping out in sight of the electric railway operating department. It is no new thing for the public to demand transfer privileges and then to complain of the lack of through car service when it gets them. A case of this kind occurred recently in Boston where to reduce the congestion on a crowded thoroughfare a number of through cars running from Watertown through Cambridge to Park Street subway station were withdrawn, but free transfers were given at Cambridge in each direction to persons desiring to traverse the old route. The usual result followed in the shape of a complaint to the authorities, yet the patrons of the line were asked to do nothing more than is done perhaps 200,000 times a day at the larger elevated stations in the city. An unreasonable passenger can always find something which dissatisfies him. But if the public in general would apply to its transportation a little of the tolerance and good nature which it exhibits inside the department stores, for example, the result would be a lightened burden upon the railway companies and a real improvement in the conditions of transportation service.

The Emergency Crew

The raising of blockades on densely traveled track in city streets requires unusual skill in order to minimize delays as much as possible. In many cases the time required for the emergency crew to reach the spot is several times that needed to remove the cause of traffic obstruction, even with the comparatively limited distances of an urban business center. Over and over it happens that such a crew, with its practiced skill and complete appliances, will clear the track in from five to ten minutes, while the trip from the station to the locality in trouble takes fully as long. All transportation employees should be instructed to make the quickest and fullest possible use of telephone facilities no matter where located and regardless of the cost, as soon as it becomes apparent that skilled assistance will be needed to relieve the situation. It is better also, in most cases to send for the emergency crew at once in cases of derailment or other breakdown than to attempt to repair the car trouble and lose time which might be utilized by skilled assistance. The best locations for the emergency stations is also a question worth careful consideration. It will often happen that changes in city travel will demand the establishment of new stations or a change in location of those in use, to obtain the best results.

The Pennsylvania Railroad and the American Association

The acquisition of the Pennsylvania Railroad as a member company of the American Street & Interurban Railway Association, which was announced last week, is an important event. This company now operates a third-rail line between Phila-

delphia and Atlantic City and within a few weeks will begin the operation by electricity of its New York terminal. These two electric divisions, combined with the suburban electric zone of the Long Island Railroad, which is controlled by the Pennsylvania Railroad, will constitute one of the largest groups of electric track mileage represented in the association. We believe that the new alliance will be beneficial both to the railroad company and to the association. Executive officers of electric railways can profit in many ways from the interchange of ideas as to general policies with men of ripe experience in the steam railway field. On the other hand, there are many specialized branches of electric railway accounting, engineering and operation in which the steam railways operating electric divisions or subsidiary lines are not so experienced. The numerous associations of steam railway departmental officers, such as the Master Car Builders' Association and the American Railway Engineering and Maintenance of Way Association, cannot in justice to the very large majority of their strictly steam railroad membership devote time in convention to the consideration of subjects relating to the electric equipment or operation of a few roads. Even should they do so the results accomplished would usually be duplication of work done by the electric railway associations. The steam railways which have electric divisions logically should belong to both the steam and electric railway organizations, and we hope that the membership of the American Street & Interurban Railway Association and its affiliated associations will soon be further strengthened by the addition of all the steam railways directly or indirectly interested in electric railways of any kind.

Popular Railway Exhibits

Railway companies in large cities are often asked to become exhibitors in popular expositions. When this occasion arises the management is sometimes puzzled to decide which phase of its work is most worthy of being displayed. To attract attention, the exhibit should be novel and, at the same time, so simple in its arrangement as easily to be understood by the layman. On the other hand, to obtain the best results so far as the company is concerned, the exhibit should impress upon the public with the thought and intelligence which have been exercised in the work of providing swift and safe transportation and the readiness of the company to adopt any improvements which tend toward this result. These purposes were cleverly combined in an exhibit made by the United Railways of St. Louis at the Electric Show in that city, as described last week. A complete car equipment was shown and each part was clearly labeled so that within a few moments the observer could obtain a fair conception of the complexities of the average electric railway. At the same time a series of views of early equipment impressed the observer with the stages of development through which the electric railway had passed until its present condition was reached. Series of statistics, prepared by the company, gave those who had more time to devote to the exhibit a vivid idea of its importance to the community as a taxpayer, employer and purchaser, in addition to explaining the size of the organization and traffic handling facilities. It is well that the public should be given such glimpses of the electric railway business if for nothing else than to dispel the illusion that transportation enterprises are gold mines where all income is profit. Great popular gatherings are ideal places for instructive exhibits of this kind. The more the public is made directly acquainted with the problems and costs involved in giving good railway service, the more difficulties will low fare and universal transfer agitators encounter in securing support for their vagaries.

CENTRALIZED POWER SUPPLY FOR SUBURBAN RAILWAYS

The tendency toward the centralization of power plant production in the vicinity of large cities is of immediate interest to the suburban street railway. The policy of generating electricity for local service on a single railway with a relatively poor load factor is in some quarters giving way to the purchase of power from a central plant of very high economy, through the medium of transmission lines serving a wide area of country with electricity for miscellaneous motor applications. We have frequently had occasion to point out the respective advantages of purchased and locally generated railway power. Each case must be determined upon its own merits, bearing in mind all the operating expenses and fixed charges. Managers of small suburban properties often look askance at the figures quoted them for power by companies which make a business of producing it at low cost and selling it at scattered points for a good profit. Without attempting to favor one side or the other of this question it is necessary to recognize that with the suburban electric railway of small capacity expressed in kw average 24-hour load at the distributing center the supply of power to the rolling stock and buildings of the company is fundamentally an incident of the business and not its essentiality. The power company's existence and success, on the other hand, depend upon minimum cost of supply. Distribution does not enter the case as much as might be supposed, since a considerable part of the line and substation investment, if any, is frequently used in the supply of other customers than the railway. The latter imposes a very desirable load, and has the further advantage of not demanding the close regulation of the lighting installation and the factory.

Some sort of power centralization is inevitable as the campaign for economy drives the suburban system, with its uneven loading and tendency towards long hauls, to join hands with other roads in the supply of power to cars moving at relatively infrequent intervals over thinly populated districts. There is room for co-operation here, since the possibilities of high voltage transmission, particularly in localities where hydroelectric power systems are in operation, indicate that it will often pay to discontinue service with small plants operated under adverse load conditions and supply a couple of hundred miles or so of track from a single main station located advantageously with respect to fuel, water and labor supply, and equipped with modern apparatus capable of delivering current to all the lines at a cost which meets the interest, taxes and depreciation on the additional investment necessary, after allowing for the differences in the economy of the old and the new systems. If central station power is too expensive for a given situation it is quite within the bounds of possibility that a co-operative plant can be built and maintained by the interested railway companies at a cost which represents a saving over the old régime of small, scattered, cramped, and more or less obsolete plants, located in the early stages of the art with respect only to the needs of the local suburban lines most closely associated with them, and in no sense distributed

throughout the territory in accordance with the needs of a modern combination of systems fed from a central source. It is purely a question of engineering detail as to how the power facilities of a group of roads can best be modernized, including the cross-connection of feeder and return systems, the installation of suitable measuring apparatus at company boundaries, and the utilization of existing pole lines or rights of way for the improved transmission service.

REDUCTIONS IN THE WEIGHTS OF MOTORS

The problem of decreasing car weights may be divided into three parts relating respectively to the car body, the trucks and the electrical equipment. Of these divisions, the electrical equipment has received hitherto little or no attention. It seems to have been taken for granted that in the design of d.c. motors the limit of ingenuity had been reached in getting the maximum horse-power output from a given weight and space. Nevertheless the auxiliary pole motor is at least as heavy as one of standard design even though its commutating qualities are better. It does not seem improbable that if the same degree of attention should be given to this subject as has been devoted to a reduction of car body weights important savings might be secured. For example, it is said that by using oxidized aluminum instead of fibre insulated copper for field coils, the Hamburg (Germany) Street Railway saves about 100 lb. per 40-hp motor and incidentally eliminates those short circuits arising from charred insulation. Whether time will develop some objections to the plan we are unable to say. Another place for reduction is in the gear case and one maker has made it a point to recommend sheet steel for gear cases in preference to malleable iron as the former weighs about 70 lb. less; sheet steel has also been recommended for motor covers. Another electric company has had considerable success with special gear and pinion metals which have permitted the speed of a 40-hp motor, for instance, to be raised from 500 r.p.m. to 650 r.p.m. and even to 750 r.p.m.

On the whole, we believe that with care it would be possible to reduce the weights of many standard motors by about 20 per cent. It is possible that by the use of some of the modern steels, perhaps vanadium, a material reduction could be effected in the weight of motor shells, as the latter now are certainly more massive than the magnetic circuit conditions demand. Another possibility, though more remote, is that of increasing the maximum gear ratio from 3:1 to 6:1 by employing a chain drive as in storage-battery and gasoline cars.

Still further reductions could be secured, if necessary, though at the expense of efficiency or first cost, by using a fireproof insulation and increased ventilation. The last means, however, cannot well be applied to street railway conditions owing to the lack of space for mounting blower equipments, and to the difficulty of getting clean air if the movement of the car is utilized to force air through piping to the motor interior. It will be appreciated from the foregoing that the reduction of motor weights is more than a theoretical possibility. The manufacturers in laboratory tests and on special orders have shown that they can secure considerable savings along the lines indicated. It lies simply with the railway companies to decide how far it would pay them to go in the use of lighter equipments at the expense of probably greater first cost and some loss in efficiency.

SYSTEM IN THE TRACK DEPARTMENT

Mr. Schreiber's article in this number on the maintenance of way of his company brings up several interesting points which show that economical and accurate methods are just as attainable in the track department as in the other branches of an electric railway. It is true that the track department deals with the bulkiest material and the lowest grade of labor, but the money that the way-engineer can save by being permitted to use the best articles is just as valuable to the company as that obtained by refinements in shop and power station practice. Examples of the economies possible in the way department are afforded by the use of manganese steel linings for buckets and screens in crusher plants. This reinforcement not only greatly lengthens the life of these items but also avoids most of the annoying delays incident to sending for new parts. The practice of marking and tagging the special work cannot be commended too strongly. It would be still better if the track could be stored under cover and at least part of the material arranged according to size. We have in mind a track storage yard where everything is piled in such pell-mell fashion among waist-high weeds that a gang is sometimes obliged to spend hours in hunting for a certain length of rail or particular piece of special work. Frequently the men do not bother to search at all but simply cut down to the required length the first rail available. The result is that this yard and others like it are cluttered up with a lot of useless but costly material. This evil could be greatly reduced by using a systematic method of storage and by decreasing the variety of pieces through the standardization of switches, mates and other parts as suggested in the article mentioned.

Mr. Schreiber has also been a close student of wood preservation and his comments, drawn from experience, are worthy the attention of all companies who fail to appreciate how quickly exposed, untreated timber structures, even in temperate zones, will require continual repair which is more costly in the long run than the initial application of a good wood preservative. To neglect the care of such important timbers as bridge piling and trestles is to invite disaster sooner or later—usually the former.

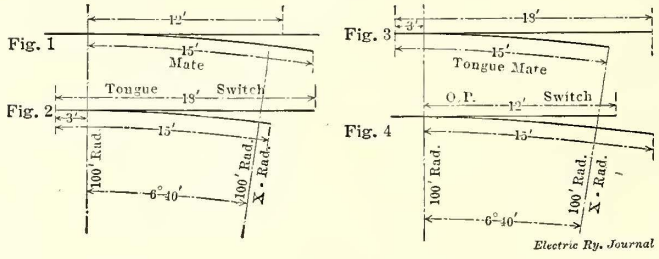
Another interesting point brought up by Mr. Schreiber is the use of adequate symbols, bench marks and the like in the records of the track department. The standardization of such symbols might well be taken up with profit by one of the committees of the Engineering Association. The symbols used by the United States Geographical Survey for its maps could serve as a good foundation for this work. Standard symbols are largely used abroad, while in this country a uniform system for wiring plans has been adopted by the National Electrical Contractors' Association. The use of standard markings would not only facilitate the interchange of data between different companies but would also make it easier in the future to identify records of past surveys than is now the case.

Still another suggestion afforded by Mr. Schreiber's article this week is in connection with forethought on the part of surveying parties. When a party of this kind is sent out to secure data on a particular point, it is an excellent idea to record everything that can be found even if it does not appear to be needed. The extra cost of having the party stay on the ground a little longer is a trifle compared with what it would be if the men had to be sent to the same locality a second time.

SOME SUGGESTIONS FOR ECONOMICAL TRACK MAINTENANCE AND CONSTRUCTION

BY MARTIN SCHREIBER, ENGINEER MAINTENANCE OF WAY, PUBLIC SERVICE RAILWAY OF NEW JERSEY.

It is now a well-proven fact that the advantages of standardization and of a well-defined system for studying all details closely are the possibilities thus afforded of getting the maximum value for every dollar spent in connection with construction and operation. With this thought in mind the writer



Figs. 1 to 4—Track Maintenance—Standard 100-ft. Radius Switch Pieces

attempt to give car clearances in all cases, and especially when it is necessary to plan special radii switches and mates to accomplish that purpose. Often the physical conditions make car clearance prohibitive for any design. Of course if it is possible to get clearance with the standards it should by all means be done. Fig. 5 is a standard crossover, with the standard switches and mates for varying dummy strips. For a distance between tracks of 4 ft. 4 in. and 4 ft. 10 in., one jump frog is used. For a distance between tracks of more than 4 ft. 10 in., two jump frogs are utilized. A crossover with jump frogs and open point switches has the advantage of preventing the main line travel from wearing out the tongues of

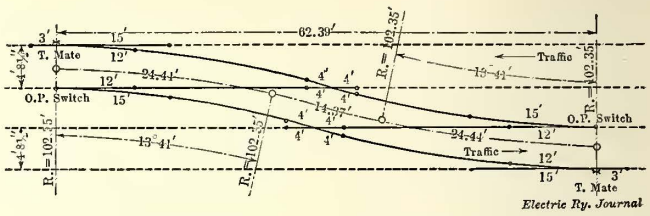


Fig. 5—Track Maintenance—Standard Layout of Cross-Over

proposes to bring out a few recent practical ideas in connection with track work and its accessories.

SPECIAL WORK

In special work for track lay-out, when the best design and material for the particular piece is selected, it is well to go further and standardize the lay-out. It is true not much may be accomplished along these lines with frogs and curved rails, but if all switches and mates are alike, a large advantage is realized. Figs. 1, 2, 3 and 4 show standard 100-ft. radii switches and mates. These designs can generally be used at all locations whether they are for car-house conections, turn-outs, branch-offs, Y's or crossovers. It is understood that special occasions arise where different designs are required, say a long radius curve or an equilateral turnout. However, most urban properties are fortunate if they can start with 100-ft. radii and are likely to compound into 35-ft. radii before the layout adopted. All the standards shown are straight 100-ft. radii. Many advocate spiral switches, but it does not seem that there is much to be gained by further easement when one takes into consideration the limited space, short center radii and slow speed with which an engineer generally contends in city service. If in double-track work the design calls for clearances at curves, a greater variety of switches and mates is required. It is a question whether it pays to

switches, and its life is materially increased—a consideration which is quite an item when the crossover is but seldom used. Fig. 6 will give some idea of the special work carried in stock by the Public Service Railway Company, both for new installations and renewals. Each piece is tagged so that it may be easily located and piled for convenient handling by the crane.

TIMBER.

No better opportunity is afforded for a saving than by purchasing railway timber and ties under careful specifications and adequate inspection. There is a very great variation in wood, and the life of our present market lumber is short at the best. Several steam railroad companies in this country are now employing experts on timber and allowing them to operate along a very broad gage plan. Fig. 7 shows the hemlock stringer and other portions of a trestle of whose

Fig. 6—Track Maintenance—Special Work Storage Yard of Public Service Railway

reconstruction the writer had charge during last summer. It is not his intention to discuss the merits of timber preservation in this article, but it seems that such examples as the one illustrated are quite sufficient to show that we should not hesitate to invest something in a reliable timber treatment to save reconstruction. Fig. 8 is a view of the trestle which replaced the one mentioned. All of the piles used were white oak; the other timbers were Southern long-leaf heart yellow

pine, which was found very desirable because it was unbled and of very slow rate of growth. Besides, after being thoroughly seasoned the lumber was treated in an open tank with a distillate of coal tar. Fig. 9 shows sound and square-edge yellow pine treated ties, installed in connection with the reconstruction of tracks in Newark, N. J. The following is the specification of the company for all untreated ties purchased.

SPECIFICATIONS FOR STANDARD CROSS TIES.

Quality.—All ties to be cut within 10 months from the time of delivery from sound, straight, live and thrifty timber, free from loose or rotten knots, dry rot, wind shakes or any other imperfections affecting the strength or durability of the timber.

Dimensions.—Six inches thick, 8 in. width of face and 8 ft. long. A variation from above specifications will be allowed as follows:

Ties Known as No. 1.	Hewed.	Pole.	Sawed.
Depth not less than.....	6 in.	6 in.	6 in.
Face not less than.....	7½ in.	6 in.	8 in
Length	8 ft to 8 ft. 2 in.	8 ft. to 8 ft. 2 in.	8 ft.
Ties Known as No. 2.	Hewed.	Pole.	Sawed.
Depth not less than.....	5½ in.	5½ in.	5½ in.
Face not less than.....	6 in.	5½ in.	7½ in.
Length.	7 ft. 10 in.	7 ft. 10 in.	8 ft.

Ties which do not conform in size to No. 1 or No. 2 or have any other defects will be classed as cull ties and will not be accepted.

White and Burr Oak and Chestnut.—Hewed ties must be stripped of bark, hewed smooth and clean of all splinters, deep scar marks, straight with faces true and parallel and of uniform thickness with ends sawed off square. Ties hewed from one-half or one-quarter logs, or sawed from large timber will not be accepted.

Yellow Pine Heart Tie.—Ties must be of good, long-leaf Southern yellow pine and must be hewed smooth on all sides with faces parallel and of uniform thickness, with ends sawed off square. Ties must be free from rot, worm holes, wind shakes, loose or unsound knots, red heart and other defects that will impair the strength and durability of the ties. Ties should be hewed so that the heart will be at or near the center of the tie and must not have over 1 in. of sap on each corner,

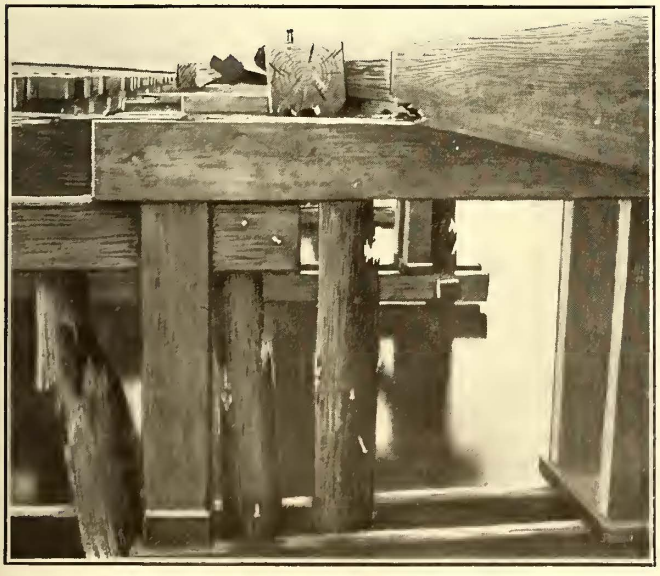


Fig. 7—Track Maintenance—Typical Example of Timber Decay

which means the tie must show 6 in. clear heart on the 8-in. face and 4 in. of clear heart on the 6-in. side. No short-leaf yellow pine ties will be accepted.

Sound and Square Edge Yellow Pine.—Ties must be of good long-leaf Southern yellow pine, or, in other words, must have the same qualities, and must pass the same inspection as the heart pine tie, regardless of the sap.

Cypress.—Hewn cypress must be free from wave, rot, dote, honeycomb and other defects, to show one heart face, allowance 1 in. sap on two opposite corners. Ties must be hewed smooth on all sides, with faces parallel and of uniform thickness and saw butted at both ends.

Inspectors examine each tie before it is placed on the vessel at the point of shipment, and the tie is stamped so that if any tie reaches the yard or later comes on the work in the streets

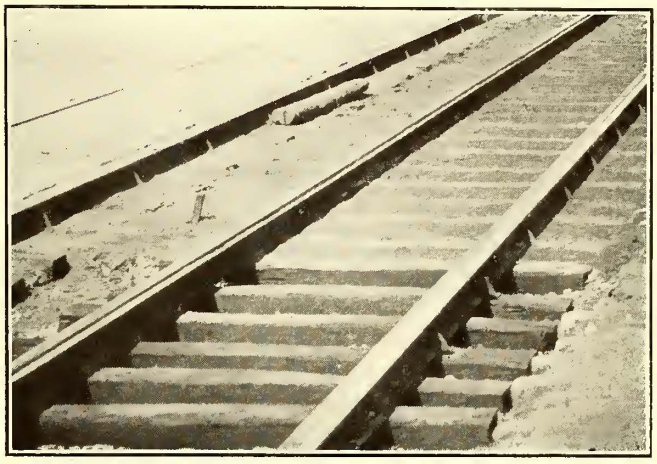


Fig. 9—Track Maintenance—Treated Ties Installed in Newark, N. J.

and does not comply with the specifications, the responsibility may be easily placed. In like manner, all bridge, crossings, plank, and structural timber is inspected and carefully graded according to the specifications under which it was purchased. Our experience has proved that exception is seldom taken to the inspectors' decisions at point of shipment, whereas inspection can rarely be carried out to the satisfaction of either the railway or the dealer if it is done at the point of delivery.

CRUSHED STONE.

Since the extensive use of concrete and stone ballast for track construction, many companies either have become interested in

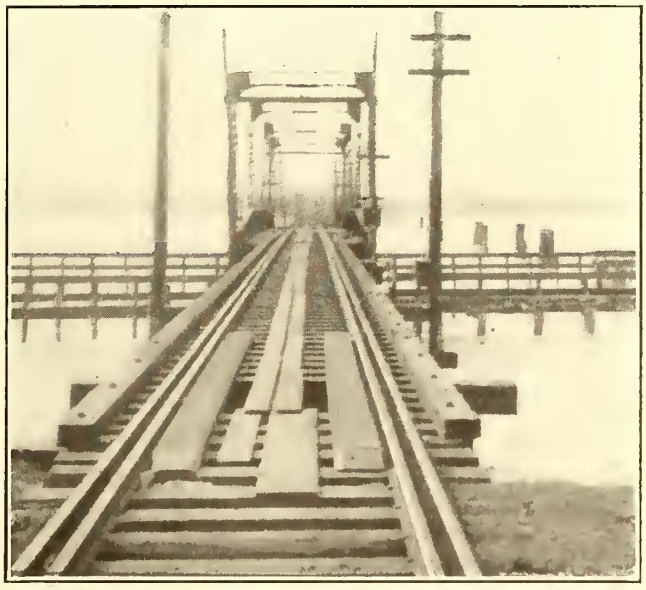


Fig. 8—Track Maintenance—Trestle Rebuilt with Treated Timber

or have acquired quarries and stone crushing plants. The maintenance of the crusher proper is quite a serious problem, especially in handling the harder rocks. Sometimes it costs as much as 5 cents per cubic yard for renewal supply, without figuring on the occasional shutting down of the plant, which is far more expensive and objectionable. Considerable relief from interruptions may be obtained by using manganese steel. In gyratory

type machines, the use of manganese concaves is not new, but this company is now installing manganese steel buckets, ⅛ in. thick, placed on the conveyor runs. It is also using manganese-steel screens with varying perforations for separating the stone into the proper sizes. The screens are not solid manganese, but the outer shell is of ¼-in. soft steel. Inside of the soft steel shell there is riveted a ⅛-in. manganese steel shell. This combination arrangement allows the maximum useful life of the metal.

Fig. 10—Track Maintenance—Manganese Steel Conveyor Buckets

When the manganese steel is entirely worn away, the soft steel screen may be promptly relined. Fig. 10 shows a series of manganese steel buckets in a conveyor at the Fair View quarry, and Fig. 11 shows one of the soft steel buckets replaced. Experience has proven that the manganese buckets will wear five or six times as long as the ordinary iron ones. The cost of delivering crushed stone from the Fair View quarries alongside of the track with a radius of 20 miles averages 47 cents per cubic yard, including labor, power, maintenance of line, track and equipment and general expenses. It was found that the cost could be reduced 9 cents per yard by using trailer cars. A further marked saving is possible if arrangements are made so that the cars will carry a load for at least part of the way on the return trip to the crushing plant. This may be often managed by carefully laying out the work of the supply trains.

CAR HOUSE CONSTRUCTION

Assuming that the property in question is protected by outside insurance companies ,two types of car house are permissible, but both must be sectionalized. The risk must be less than $200,000, and the limit of floor area is 20,000 sq. ft. One type of car house is that having fire-proof brick or concrete walls and a concrete or tile roof; the other type is what is known as mill construction. The facts stated were all clearly brought out in the 1908 convention report of the committee on standard car houses to the American Street & Interurban Railway Association. An economical mill construction design is shown in Fig. 12. It is a four-track bay with a line of 12 in. by 12 in. posts in the center. The roof is similar to the standard mill construction, as recommended by the American Street & Interurban Railway Association, except that the roof girders are standard I-beams covered with Roebling wire lath, which is afterwards plastered, instead of being of timber with awkward looking knee braces. Where the building is finished inside in white with cold water paint, a very neat and substantial construction is obtained. Another advantage of the rolled-steel, covered roof girder is that it is possible to adapt it better for a three-track bay.

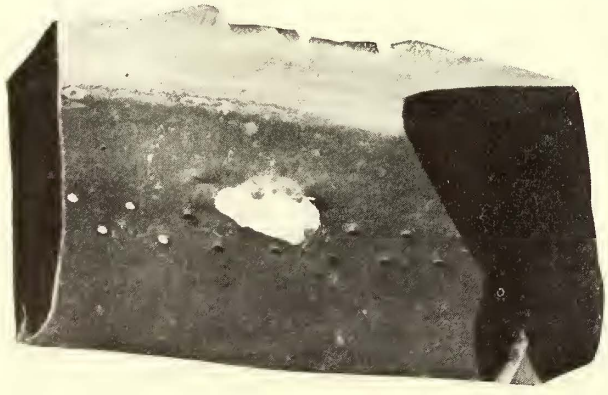


Fig. 11—Track Maintenance—Worn-out Soft Steel Conveyor Bucket

Fig. 13 represents the same car house built with wooden girders. As will be seen, the 24-in. covered I-beams shown in Fig. 12 accomplish the same purpose as the wooden girders in Fig. 13, and give a neater and stronger building. Moreover, the design is cheaper than the wood truss, because one roof girder is required, while with the wood truss two girders must be used. It is practicable by using Bethlehem rolled-steel beams or a flat open truss to go even further with the steeel roof girder by obtaining a single span, four-track mill construction design. The latter type would hardly be permissible with the mill construction wood truss—at least without the use of wood covered iron rods and awkward designs.

Fig. 14—Track Maintenance—Concrete Bridge Built in Freezing Weather

CONCRETE TROLLEY BRIDGES

The company, in constructing a reinforced concrete highway and trolley bridge last winter, naturally was hampered on account of the severe and freezing weather. To attempt to execute concrete work by working a day now and then is poor economy and heating the constituents of the concrete or adding salt to the water has many drawbacks. On looking into what represented the latest practice along this line, it was found that very good results could be obtained by using calcium chloride at a temperature even as low as 15 deg. F. In a cubic yard of one part of cement, two parts of sand and four parts of stone, 20 lb. of calcium chloride may be added. This increases the cost by approximately 25 cents per cubic yard. Fig. 14 is a view of the concrete bridge built with this mixture. So far as the design is concerned, it may be of interest to state that concrete through girders were not used, but concrete arches were turned between entirely encased Bethlehem rolled steel 30-in. girder beams. This scheme allowed the building of the bridge without seriously interfering with the railroad

tracks underneath it, besides obtaining maximum clearance. Thus two very important conditions were satisfied without interfering with the most economical method of construction for the strength required.

FIELD ENGINEERING

Good way engineering has not been very conspicuous in the past on many properties, because guessing and the rule of thumb have prevailed. Intelligent engineering has often been

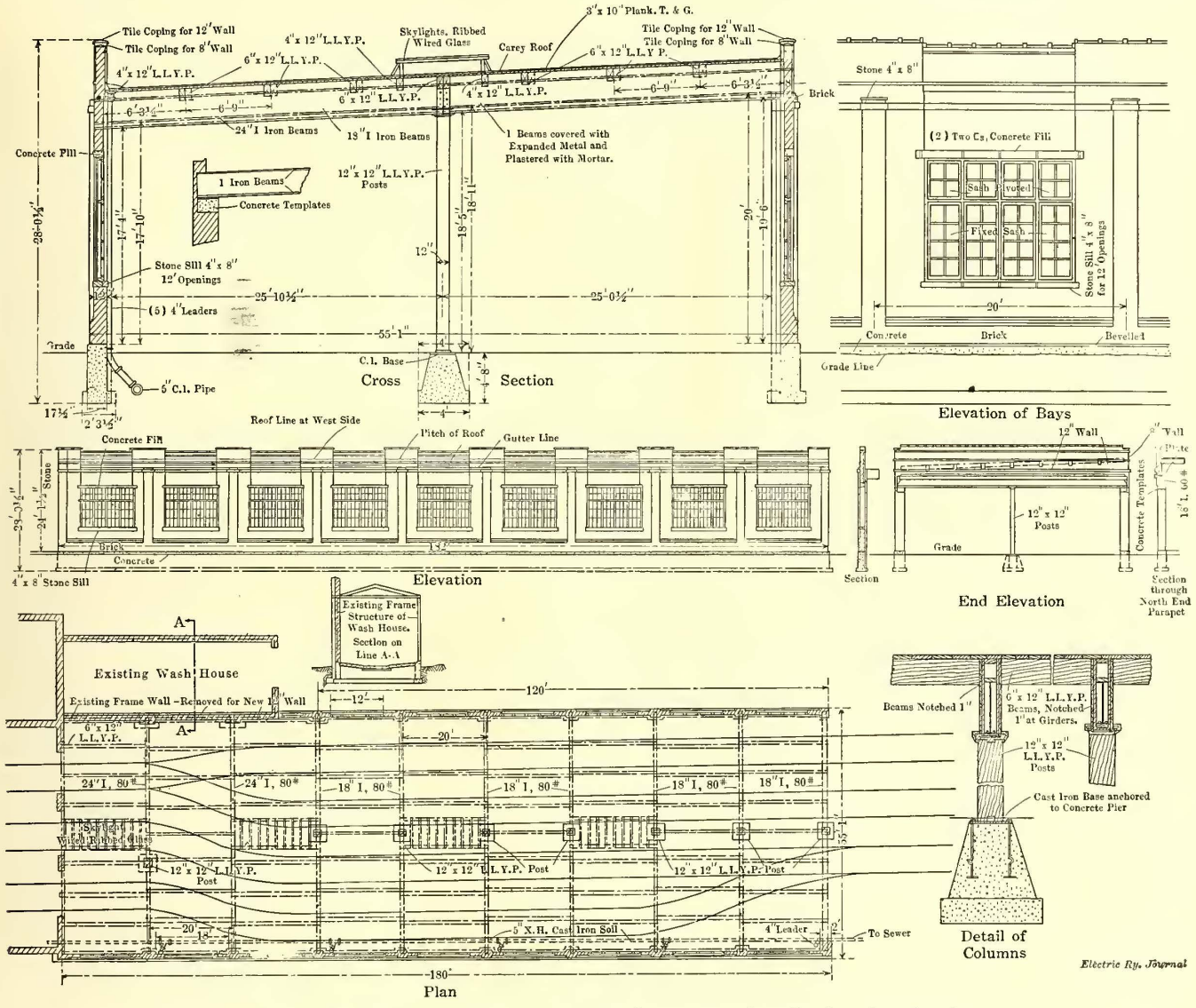


Fig. 12—Track Maintenance—Economical Mill Construction Design for Car House

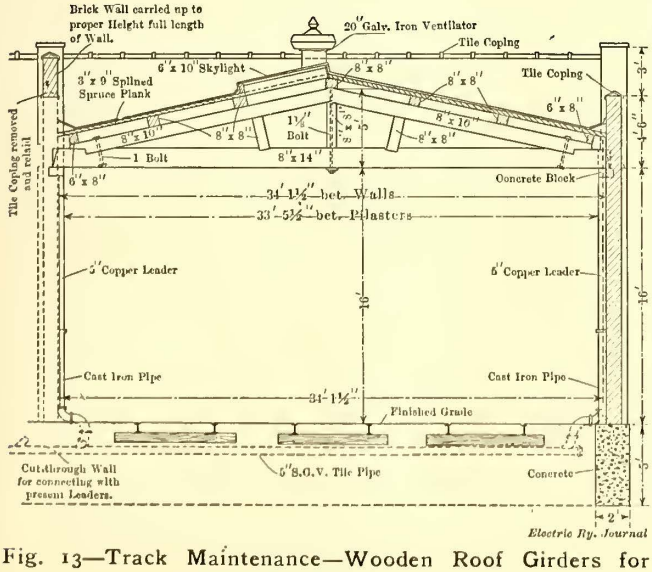


Fig. 13—Track Maintenance—Wooden Roof Girders for Car House

REPORT.

CORRESPONDENCE OF	R. E. Hanforth, Gen. Mg'r.
DATE OF CORRESPONDENCE	Feb 19, 1910.
SUBJECT.	Wye encroachment at Morrisville car Barn on property of Howard Beard
DETAILS.	
ASSIGNED TO	C. E. Means. DATE. Feb 21, 1910.
DATE OF REPORT.	Feb 23, 1910.

REMARKS.

A survey of our property lines was made, and as built conditions shown on sketch attached. The rail does not intersect the property of Beard, nor is it on the sidewalk. It is suggested that a lock switch be placed in the westerly leg of wye to prevent possible derailment on account of the splitting of the switch which I understand was cause of original complaint.

Fig. 15—Track Maintenance—Engineering Report on Track Work

looked upon as an unnecessary expense and non-productive, and where a good report was needed outside engineers were retained. Often the latter would get substantial fees for negative

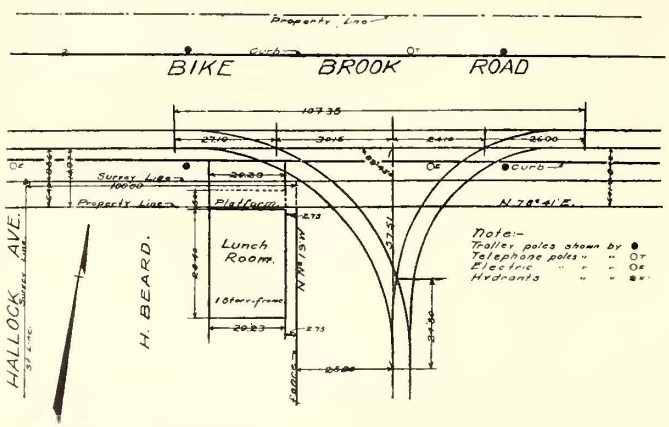


Fig. 16—Track Maintenance—Engineering Report on Track Work

results due to their unfamiliarity with local conditions. It pays, in most cases, to make careful surveys and numerous and intelligent investigations and reports. If this is done, there is

PUBLIC SERVICE RY. CO. STANDARD SYMBOLS.

Rubble uncoursed.	Property lines.	Public Crossing.	over grade	Trolley Pr. black Pole. Pro. red	
Rubble in mortar.	Property line foreign	Private crossing.	under Grade over grade	Trolley P. do F. do foreign do	
Brick.	County lines.	Private and 2ndry road.		Telegraph do T. do Pole.	
Ashlar Masonry.	Township lines.	Streams.	blue	Telephone do P. do pole	
Dressed Masonry.	City lines.	Canals.	blue	Electric light pole do E. do	
Concrete + Steel.	Street or block lines.	Roads.		Combination do pole. C. do	
Concrete.	Cattle guard.	Contour lines.	Yellow	Catch basin.	
Solid rock.	Original Center line	Hitching post.		Arc. lamp.	
Seamy rock.	Survey lines. and points red	Demension lines. red		Incandescent lamp.	
Earth.	U.S. Harbor lines.	Block Signal.		Gas lamp.	
Sand.	Turnstile.	Signal line.		Oil lamp.	
Gravel.	Railroad under Construction	Present track.		Hydrant. nozzle.	
Marsh.	Railroads	Proposed track.		Manhole. Spec. Kind	
Mud.	Street railroad.	Foreign track	Not block	Meter.	
Stone ballast.	Surface + Grade line. red	Abutments walls etc.		Riser.	
Cinder ballast.	North point	Bottom of slope.	Medium line.	Valve.	
Timber.	Bldgs and Villages.	Top of slope.	Fine line	Wagon Scale.	
Water.	Cities and towns.	Cribbing.		Power house.	
Glass.	Bench mark. B.M.	Road Crossing.		Gas holder	
Tree. Give Size.	Triangulation Station.	Track Scales.		Gas generator	
Water pipe.	Monument.	Interlocking tower.		Sub. Station.	
Conduit.	Transit point.	Compressed air box		Carbarn	
Steam pipe.	Telegraph line No. wires	Track drain		Draw bridge.	
Compressed air pipe.	Mail Box. U.S.	Watering trough.		Culvert.	
Compressed air Station.	Embankment.	Derail. Derail lever		Truss.	
Sewer pipe.	Cut.	Switch Stand		Trestle.	

C.E.M.

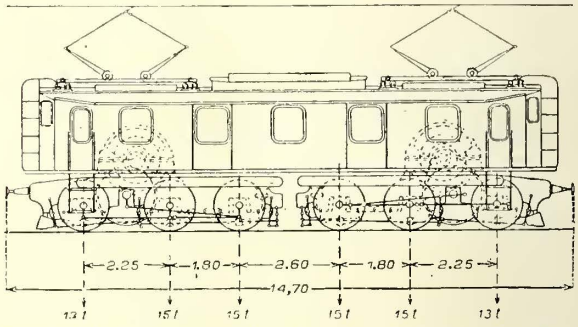
Fig. 17—Track Maintenance—Bench Marks, Monuments and Symbols

no need to go over the same ground again and again, and the cost of engineering will be decreased in proportion to the work and the efficiency of the organization will be increased. Figs. 15 and 16 are from a typical report on track work. This report, which is carefully filed, places the responsibility on the particular individual and is a good guide to show the efficiency of the different men and to compare their respective work. Surveys and field engineering should be carefully done, and when a corps is sent out on a location for any particular data, it is better to make a complete survey of the whole place or location. All the notes may not be particularly interesting at the time, but should be systematically filed for future reference.

Fig. 17 shows a group of the standard conventional signs for drawings and survey notes of the Public Service Railway Company. A standard system of symbols makes it possible for note books to be kept in a neat and readable condition so that they may be understood by any one. It is not necessary in this event to call in the man who made the notes to decipher them from the records.

HEAVY ELECTRIC LOCOMOTIVE FOR BERNESE ALPS

The Oerlikon Company of Oerlikon-Zürich, Switzerland, is building for the Bernese Alps Railways an electric locomotive of the design shown in the accompanying illustration. This locomotive, when operated at 42 km (28.5 miles) an hour will develop a normal tractive effort of 12,800 kg (28,160 lb.) at the wheels, this being equivalent to a normal motor rating of 2000 hp. The locomotive is being built as a unit, 14.7 meters (48 ft. 3 in.) long over the bumpers and mounted on two three-axle trucks. Each motor truck will carry a 1000-hp motor and power will be transmitted to the wheels through gearing, an intermediate shaft and cranked axles. The motor will be unsymmetrically mounted with relation to its truck. The



Single-Phase Locomotive for the Bernese Overland Railway

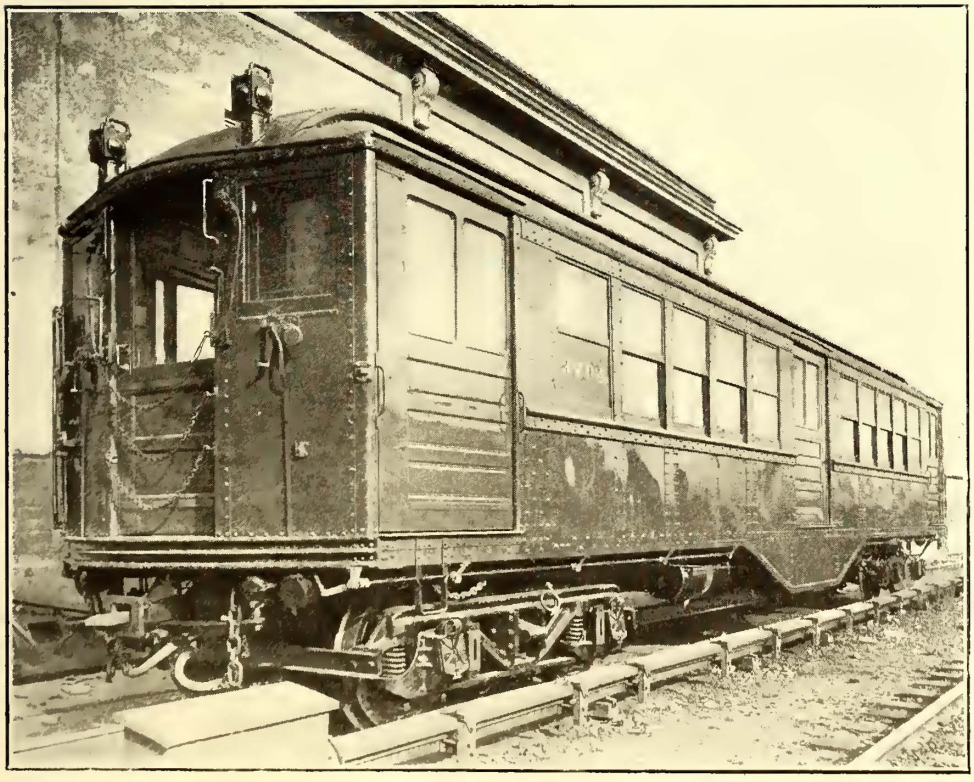
gear ratio will be 3.25:1. The diameter of the locomotive driving wheels has been fixed at 1350 mm (54 in.), so that the normal turning moment of the driving motors will be 13300 meter-kg (9602 ft.-lb.). It is stated that these motors are the largest of the single-phase series type ever built as they will weigh 9800 kg (21,560 lb.) which corresponds to a weight of 7.4 kg (16.28 lb.) per meter-kg (7.22 ft.-lb.), normal turning moment. The main transformer of each motor weighs 5500 kg (12,100 lb.) and serves to step down the line potential from 15,000 volts to 420 volts, 15 cycles. The electrical equipment weighs 42 metric tons (2204 lb. per ton), making the total weight 86 metric tons. It will be observed from the diagram that the weight on the front and end axles will be 13 metric tons, while that on the other four axles will be 15 metric tons. The maximum speed of this locomotive will be 70 km (43.4 miles) an hour.

One of the most striking and novel incidents in connection with the international mourning for King Edward VII of England was the almost universal stoppage of tramway traffic for a given time on the occasion of the King's funeral, Friday, May 20. In a general way, this took place at the time when the final obsequies were going on at Windsor, but in other instances the running of the cars was either wholly suspended for the day, or was interrupted for one or two hours between noon and 2 o'clock in the afternoon.

CENTER SIDE DOOR STEEL CARS FOR NEW YORK SUBWAY

The first steel cars built for the Interborough Rapid Transit Company's subway service were designed in 1904 and were described in the STREET RAILWAY JOURNAL for Oct. 8, of that year. During 1907 50 cars of an altered design were purchased, the principal changes in these cars over the original design being (1) in the side framing which was constructed so as to readily admit of the installation of center side doors; (2) widening of the vestibule side doors to 50 in.; (3) complete fire proofing; (4) reduction in weight, and (5) eliminating of all interior finish. In 1909, the Interborough ordered 110 cars of a still newer design, having center side doors, from the American Car & Foundry Company. Later 40 cars of the new design were ordered from the Standard Steel Car Company and 100 from the Pressed Steel Car Company, which also received a subsequent order for 75 more cars. The first 250 cars have been delivered and are now being equipped with motors and control apparatus in the company's shops at 129th Street and Third Avenue.

The 1909 type cars are notable on account of the marked reduction in their weight, which has been made possible through the use of Hedley anti-climbing devices which permitted reducing the weight of the superstructure. The original steel cars, designed in 1904, weigh complete on trucks 79,200 lb.; the 1907 type cars weigh complete 77,700 lb., while the 1909 type cars weigh complete only 73,400 lb. This reduction in weight of the 1909 type car has been accomplished largely by the substitution, wherever possible of light pressed shapes with suitable flanges instead of using plates riveted to structural shapes. The main members of the under frame have not been changed in size or strength but for the floor beams

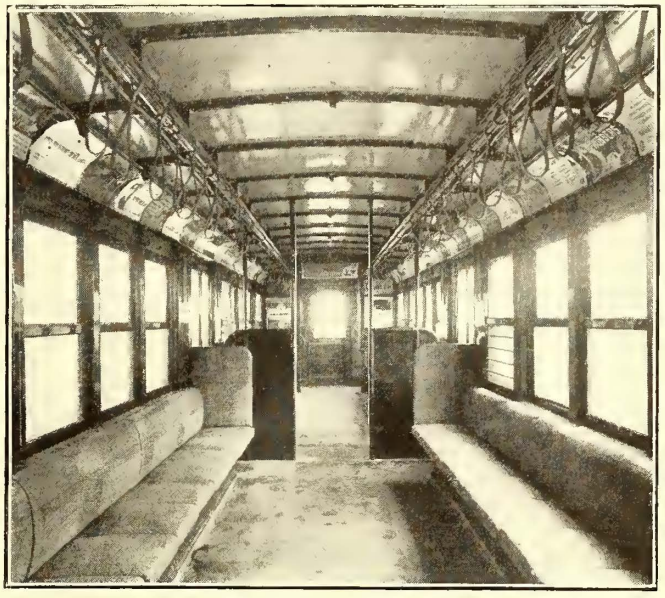


Interborough Steel Car—End and Side View

light pressed steel shapes have been used in place of angles. In the roof and sides, also, pressed shapes have been substituted for angles. Other features of the new car are the absence of all concealed riveting, improved sanitary details and the center side door arrangement and operating mechanism.

UNDERFRAME

The underframe consists of two 6-in. 12 ¼-lb. I-beam center sills and two 6-in., 8 lb. channel side sills on the outside of which are riveted the side sheets. The longitudinal sills are continuous from one platform and sill to the other. A rolled-steel Hedley anti-climber bumper beam, 5½ in. high and having



Interborough Steel Car—Interior View

three ribs, is riveted with corner angles and cast steel reinforcing plates directly to the ends of the longitudinal sills. It is stiffened against telescoping by the ⅛-in. top floor plate and a ¼-in. bottom anti-telescoping plate 23 in. wide. The anti-climber extends around the end of the car and forms the platform and sill without either wood or steel backing. The end bulkheads are supported by two light pressed channel floor beams just outside of the bolsters. Both the side and center sills are heavily reinforced under the platform to prevent sagging of the platform when heavily loaded or buckling in the event of a collision. The center sills have a 5-in. x ⅜-in. plate riveted to their webs and extending 4 ft. outside of the bolster and 5 ft. 3⅜-in. inside of the bolster. The side sills have similar plate 4 ft. 3 in. long riveted to the inside of the channel webs. Built up bolsters made of a ¾-in. x 9-in. top plate and a 1-in. x 9-in. bottom plate are used. The transverse floor beams are 4-in. pressed steel channels. In the center of the car the sills are stiffened by the needle beams and two transverse diaphragms between the needle beams which brace the dropped side girders under the center door openings. The needle beams are built up of ½-in. x 4-in. top and bottom plates with 3/16-in. pressed channel fillers between sills. The diaphragms are pressed from ¼-in. plate with 1⅝-in. flanges.

SIDE AND ROOF FRAMING

The side framing, which, with the sheathing plates, forms a deep girder, is designed to carry a large part of the load between bolsters. No. 13 gage-steel plates are riveted on the outside of the side sills and posts up to the belt rail. At the

center-door opening, a fish-belly girder 26-in. deep and 13 ft. long is built below the side sill to carry the load across under the door. This girder is composed of a 5/16-in. x 3-in. x 5-in. bottom flange angle reinforced with a 7/16-in. x 2½-in. x 2½-in. angle. The bottom flange of the channel side sill is cut away at the ends of the drop girder just far enough to permit the flange angles to project up and be securely riveted to the web of the side sill. The web plate of this drop girder is cut from one piece 12 ft. 11¼ in. long and 4 ft. 7¼ in. wide.

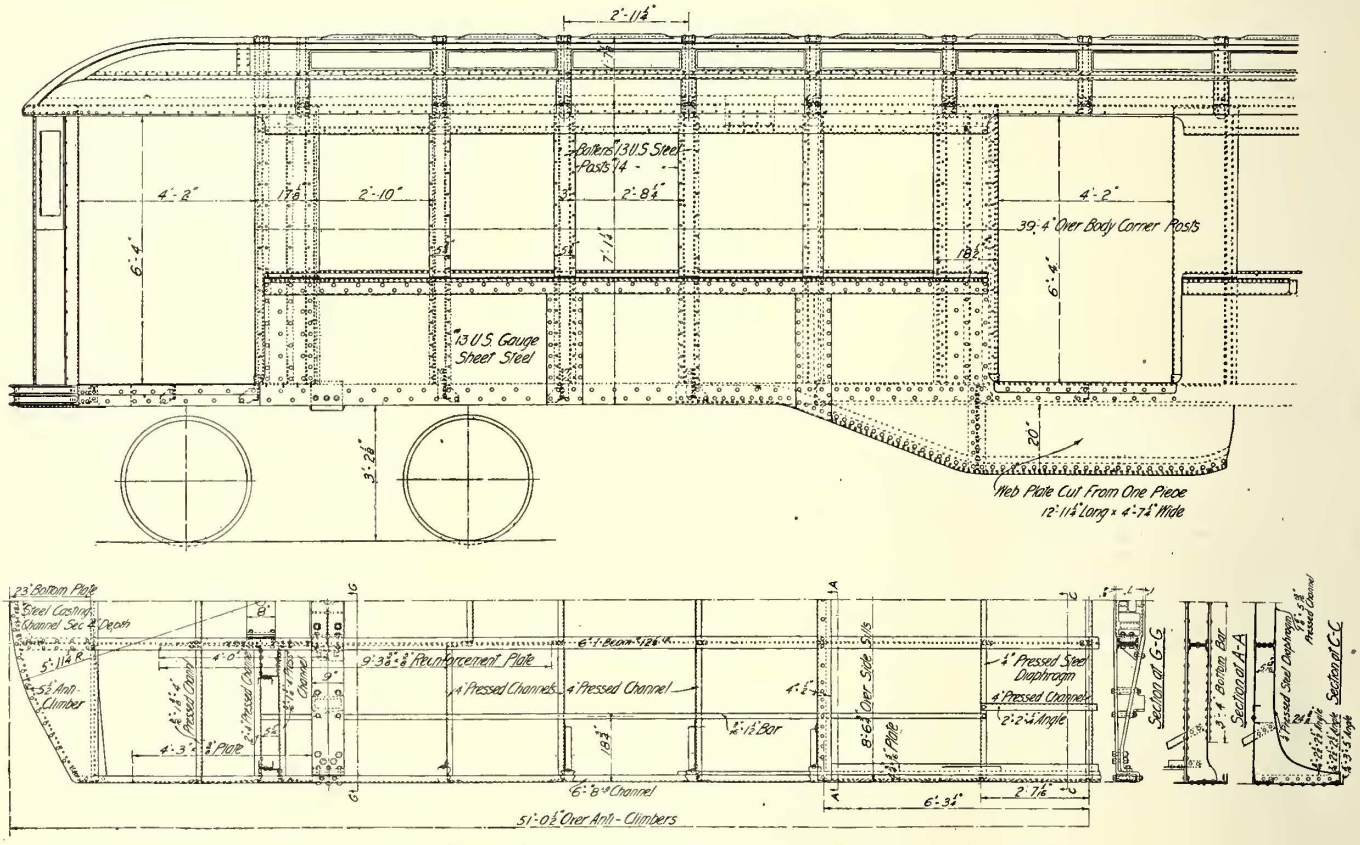
The window posts are substantially the same design as used in the 1907 cars. They are pressed of No. 14 gage-sheet steel into a hollow box section with grooves and ridges into which the sashes fit and are held by curved flat springs. Each post is braced at the bottom on the inside with a light angle. An outside belt rail formed of a special angle section weighing 6.75 lb. per ft. is riveted to the posts just below the window sills and is covered with a pressed steel rounded molding. The door posts, like the window posts, are pressed steel hollow box sections, formed in two pieces to permit the sliding doors to enter the door pockets.

stead of glazed sash, these shutters being operated from inside the car with continuous deck-sash openers. The apron of the upper deck is formed by an inverted U-shaped deck plate and the deck-roof sheets extend over and are riveted along their edges to the horizontal web of this section. The entire roof construction is designed to be watertight without calking of seams and all riveting is accessible and easily cut to remove or replace damaged parts.

The platform-hood construction consists, principally, of two light diaphragms connecting the body deck with the hood bow and supporting the platform-roof plates.

FLOOR AND SEATS

The floor of the car body is formed of corrugated-steel sheets on which is placed a covering of composition flooring 15/16 in. thick at the sides and crowned to 1 5/16 in. thick at center of car. The top covering is applied only in the aisle between seat risers; under the seats only the corrugated-steel sheets are used. The aisle floor is rounded up at the junction with the seat risers to a radius of 3 in. to eliminate a corner for the collection of dirt. On the platforms sheets of ⅛-in.



Interborough Steel Car—Part Plan and Side Elevation of Framing

At the eaves, the letter board, eaves fascia molding and side plate are formed by a single pressed section ⅛ in. thick, which fits over and is riveted to the tops of the posts. The carlines which are one-piece pressed channels bent to the curvatures of the upper and lower deck, are formed with flanged ends which are riveted to the top of the posts. An angle bracket on top of each post is also riveted to the carline and to the top flange of the plate and letter-board section, thus securely tieing together the side and roof framing. No headlining is used on the upper or lower deck, but an advertising card rack, formed of a curved No. 22 gage plate, is riveted to the inside fascia molding section and to a ¾-in. angle at the top. This plate covers the bottom curve of the carlines and the riveting at the top of the posts.

The lower deck roof is formed of curved steel sheets 1/16 in. thick, which are bent over on the outside of, and riveted to the letter board on their lower edge and are riveted to a pressed section which forms the upper-deck sill. The deck ventilator openings are closed with pressed-steel shutters in-

steel are used, which are rolled with small diamond-shaped corrugations on their top surface.

The seats in the car are all longitudinal, the center side doors and passageways taking the place of the eight cross seats used in the earlier types of cars.

DOORS AND WINDOWS

All side windows have double wooden sashes. The lower sash is stationary and the upper sash drops. Round bolt sash locks are used, the bolts fitting into holes punched in the box posts. The center and platform side doors are pressed steel, 50 in. wide. They are pressed in two parts, which are afterwards welded together.

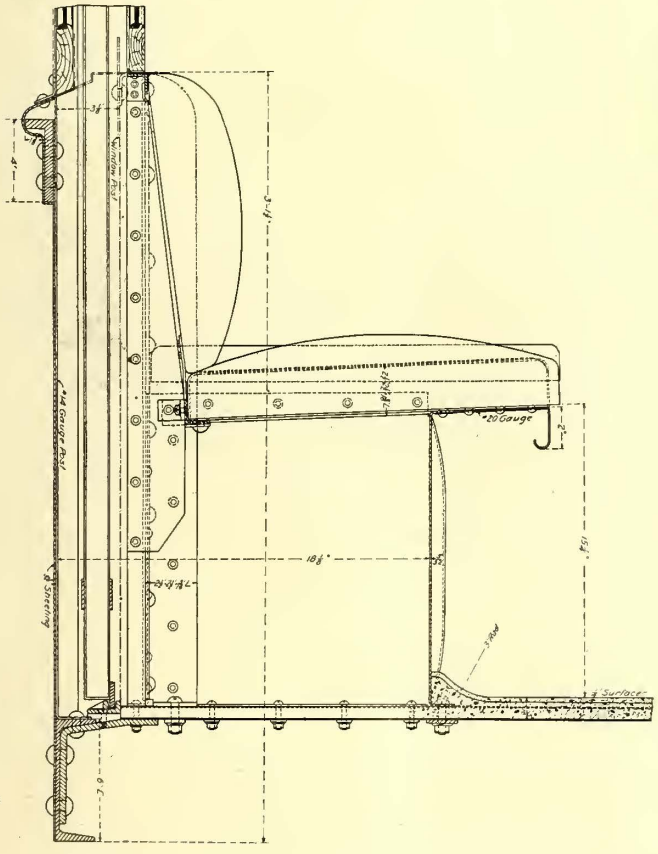
DOOR-OPERATING MECHANISM

The platform side doors are operated mechanically with the Interborough standard door-operating mechanism, but the center side doors are operated pneumatically with mechanically controlled valves.

The center side doors are moved by a double piston air engine mounted on the floor of the car at one side of the

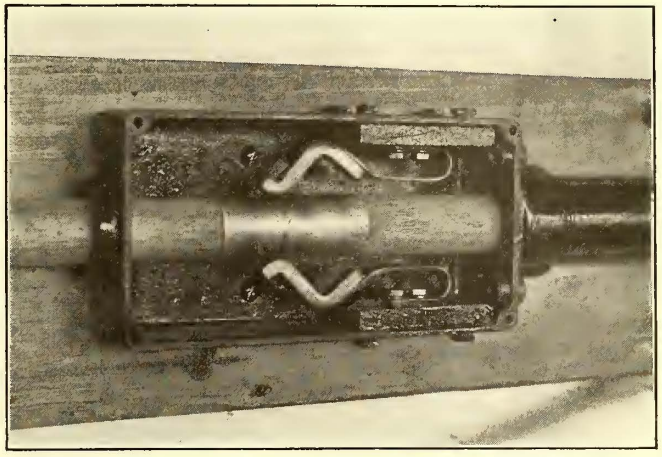
door opening, under the seats. The crosshead of this engine carries a rack, which engages with a sector gear connected to the end of a long radial arm. The outer end of this arm carries a roller, which moves in a vertical slot formed on the rear edge of the door. In the closed position of the door, the radial arm lies horizontally and locks the door shut and it cannot be opened unless air is admitted to the engine and the arm is raised by the movement of the sector gear. The sector gear is not rigidly fastened on the radial arm, but carries a short crank which bears against the radial arm in closing the door. The door, therefore, may be closed by hand by a platform guard without moving the sector gear or the air piston.

The striking edge of the door is fitted with a novel steel-cushion shoe, which prevents any injury to a person who may be caught between the door and the jamb as the door is closing. This device consists of a U-shaped pressed-steel shoe about 6½ in. wide and the full height of the door, which fits loosely over the striking edge of the door. It is carried by two studs, which are fitted into the ends of two pivoted bell-



Interborough Steel Car—Section Through Bottom of Center Door Post

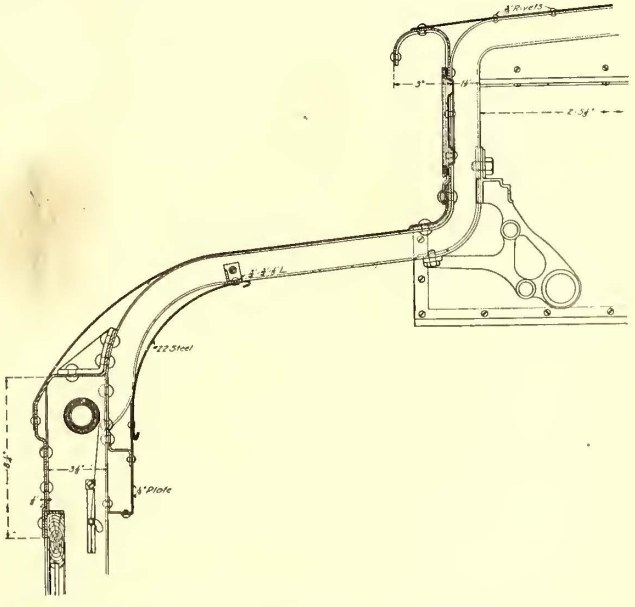
crank arms mounted inside the door stile. These studs work in radial slots in the door and when any pressure is applied on the shoe, it is forced back against the edge of the door. The upper bell crank has a short horizontal arm, which is connected with a vertical rod and turnbuckle to a horizontal arm on the lower bell crank. When the shoe is forced back, either at the top or bottom, the studs move in the radial slots and rotate both bell cranks simultaneously. The lower bell crank is T-shaped and the bottom vertical arm is connected to a round rod, which runs back through the bottom door rail and projects beyond the door about 6 in. On the end of this rod is a cam engaging with a fixed pawl on the back edge of the door and sliding on a square rod 5 ft. 3 in. long parallel to the bottom door track. When the bell cranks are moved by any pressure on the shoe, the round rod in the door is pulled forward, causing the cam to engage with the pawl and make a one-quarter turn. This causes the square rod on which the cam slides to also turn one-quarter revolution. At the extreme end of the square rod is fixed a crank arm, which is connected through a flexible spring with an auxiliary pin valve. This valve, when opened by the turning of the square rod releases all pressure from the cylinder of the air engine and prevents further movement of the piston and door until the pressure on the cushion shoe is removed and the bell cranks assume their normal positions. This device is very sensitive and operates quickly. In regular service, the doors begin to close when the guard turns the control valve handle



Interborough Steel Car—Signal Contact Attached to Sliding Doors

on the end of the car, and advance through an entering stream of passengers by a series of short movements, if at all obstructed. The mechanically operated platform doors are also equipped with the cushion shoes which serve, however, only as a spring cushion on the edge of the door and are not connected to any checking device.

The main control valves of the center side door air engines are operated by the guard standing between cars. A small crank arm, which moves in the same direction as the



Interborough Steel Car—Section Through Top of Side and Roof

manual operating mechanism handles, is mounted on the outside of the vestibule end. This crank carries a sector gear which engages with a geared counterweight crank disk. From this crank an iron rod runs down the sheathing and back of the anti-climbing end sill to a crank arm rigidly fastened to a 1-in. longitudinal pipe shaft under the side sill. The shaft extends under the air engine where a crank arm and connecting rod to the main valve are fitted. The counterweight on

the crank disk holds the operating mechanism in either the full on or off position. The majority of air motors and controlling apparatus has been made by the National Pneumatic Company, Chicago, and 50 cars have been equipped by the Consolidated Car Heating Company, New York.

TRAIN SIGNAL

All of the doors of the center door type cars are fitted with electrical contacts to provide a continuous train-starting signal instead of ringing bells from car to car. A one-wire signal circuit is carried though these contacts on each door of the car and is connected between cars with a special jumper. In the motorman's cab of each motor car is mounted a signal lamp connected to the signal circuit and to ground. In service all signal lamps except that in the operating cab must be cut out with a snap switch.

Current from the third rail is fed to the signal circuit only on the last car of the train and in order to light the lamp in the operating cab in the first car all doors and their contacts must be closed. The connection to the source of current is made by a special loop jumper, which is inserted in a terminal box at one end and into the signal circuit outlet at the other end. In order to insure that one of these jumpers is not connected up on any other car but the last in the train, the plug which fits into the terminal box is formed with a projection, which lies in front of the face of the drawbar. This plug, therefore, cannot be inserted on any car which is coupled to another behind it and can only be used on the last car in the train.

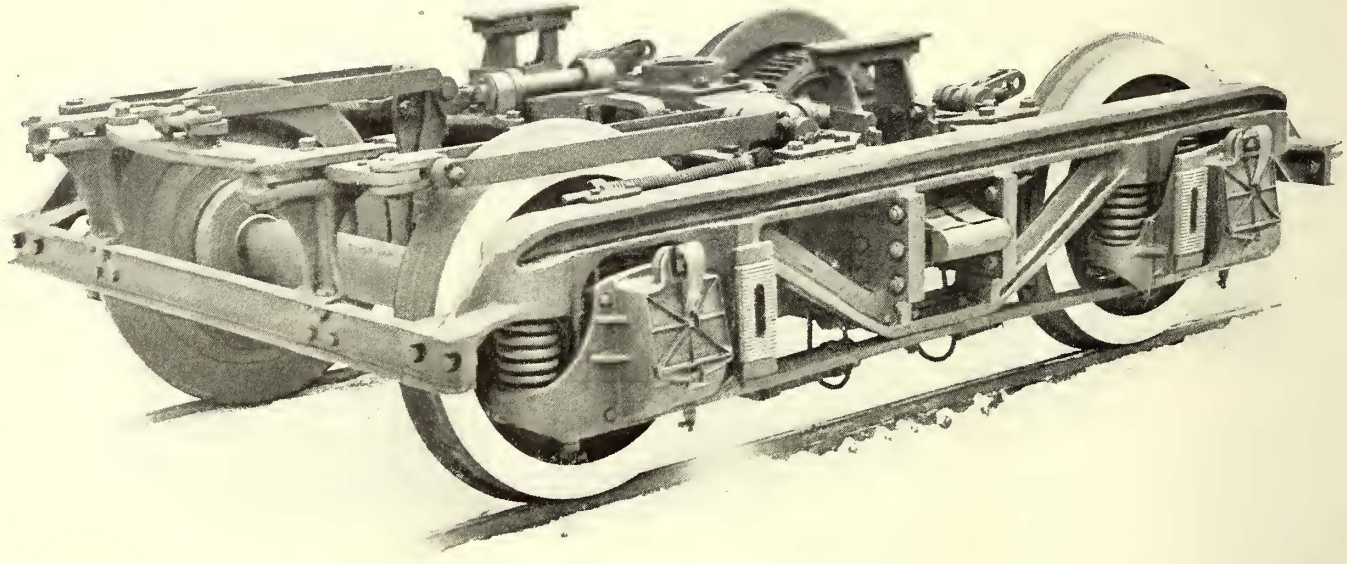
The contacts on the doors consist of two standard controller fingers bearing on the top and bottom of a round wooden rod, which is flexibly connected to the back edge of each door near the floor. A brass collar is fitted on this rod near the outer end and when the door is completely closed, this ring is between the two spring contacts and completes the circuit.

MISCELLANEOUS FEATURES

The arrangement of apparatus in the motorman's cab is the same as in the 1907 type cars. The door enclosing the master controller and brake valve swings out and locks into a door on the opposite panel of the end bulkhead. A motorman's seat folds up against the bulkhead behind this bulkhead door. All switches and fuses are mounted on a slate panel enclosed by a door on the end bulkhead on the left-hand side of the platform.

The arrangement of folding seats and barrier partitions opposite the center side doors is shown in one of the illustrations from a photograph. Two 2-in. iron pipes rise from the floor to the lower deck opposite the center of the doors on each side. A cross rail 4 ft. above the floor connects the two vertical pipes and a third vertical pipe nearer the door sill is bent in at the top and screwed into the same fitting which holds the cross rail. This forms an effective barrier dividing the space opposite the door into two aisles, each 24 in. wide. The outside of each of these aisles is formed by a folding seat, which is raised when the center doors are in use and is lowered when the platform doors only are used. When raised these seats are locked up by a spring catch, which can be turned only with a standard car-door key. When lowered the outer edges of the seats rest on a shelf formed on the pipe barrier. The purpose of these center door barriers is to provide four separate entrances or exits on each side of the car so that four streams of passengers can be loading or unloading at the same time. No attempt is made to compel passengers to enter or leave by any one door or doors.

The cars are all equipped with sanitary hand pole straps. These consist of loops of light steel tubing with the ends riveted to a sleeve which fits over the hand pole. The sleeve contains a spiral spring, which holds the loops up under the lower deck out of the way when not used by standing passengers. The part of the tubing which is grasped by the hand is coated with baked white enamel, which is easily cleaned and disinfected.



Interborough Steel Cars—Hedley Cast Steel Motor Truck

Other special equipment of these cars includes Westinghouse electro-pneumatic brakes, and Hedley cast-steel frame trucks, which were built by the American Locomotive Works.

This type of truck is found to be the most economical for subway operation and also possesses an increased factor of safety on account of minimum number of parts. The accompanying illustration from a photograph shows the simple and substantial construction of this type of truck.

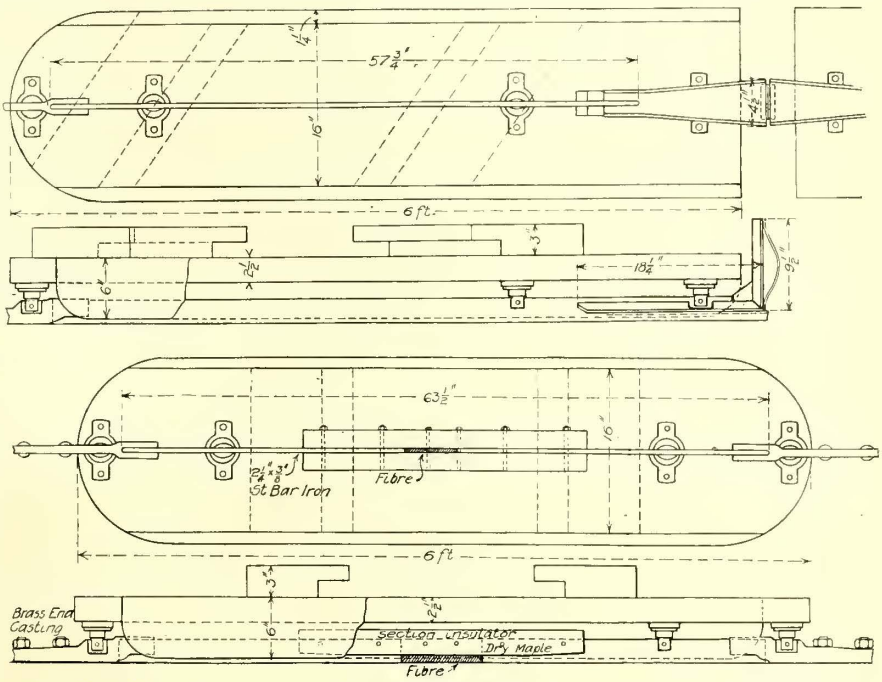
Theodore P. Shonts, president of the Interborough-Metropolitan Company and the Interborough Rapid Transit Company, New York, N. Y., who is chairman of the board of trustees of Drake University, Des Moines, Ia., has made a cash gift of $50,000 to the university.

The executive committee of the International Exhibition of Railways and Land Transportation has issued circular No. 19 relative to this exhibition which is being held in Buenos Aires, Argentine Republic, from May to November, 1910. The pamphlet contains, besides statistical tables on the population and railways of Argentine, a list of instructions for exhibitors, also information relating to the matter of juries and awards for the best exhibits. Several engravings are presented showing the pavilions of the various countries which are represented at the exposition. Among these are the United States, Germany, Austria, England, France, Italy and Belgium.

BROOKLYN LINE DEPARTMENT—SPECIAL OVERHEAD WORK AT MOVABLE BRIDGES

The Brooklyn Rapid Transit Company operates across 11 movable bridges, five over Newtown Creek, two over Gowanus Canal, two over Coney Island Creek, one over Wallabout Canal and one over Flushing Creek. Five of these bridges are of the Scherzer rolling lift type, five are swing bridges and one is a special bascule design. The following paragraphs will explain the overhead construction used on some of these bridges to cover the principal features of folding overhead trolley work in Brooklyn.

Two views are presented on page 1063 of the Hamilton Avenue Scherzer rolling lift skew bridge over the Gowanus Canal, one with the roadway in the normal position and one in the raised position to show the folding of the trolley wire and the type of spring contact. Each of the four end trolley troughs contains a bar-iron fiber section insulator contact as shown on this page. On one-half of the bridge the wires are fed through a double-throw single-pole switch from the bridge attendant's switchboard so that the power is cut off on the overhead wires before the bridge-moving motor is started. The other half of the bridge is fed through the spring contact which engages in similar contact on the live half referred to. On both this bridge and the Union Street bridge, shown in one of the illustrations, the feed wire is run in conduit which is carried up an end post of the bridge and thence along the bridge girders to the trolley troughs.

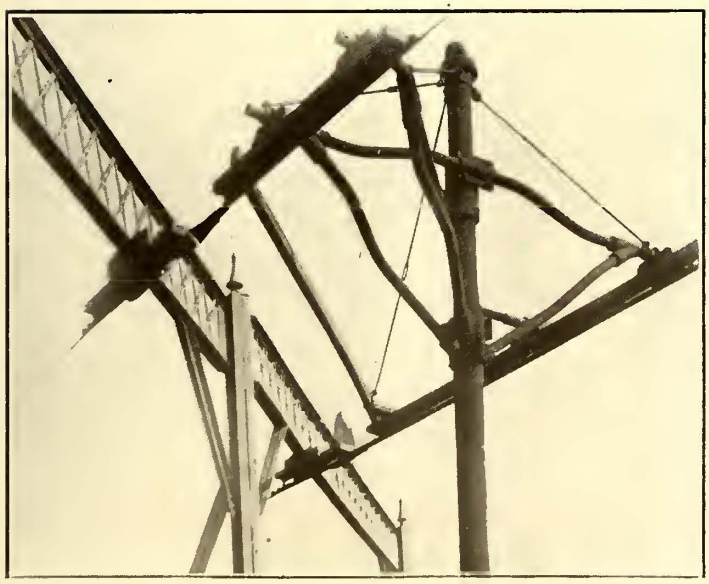


Brooklyn Line Department—Overhead Trolley Connections on the Hamilton Avenue Bridge

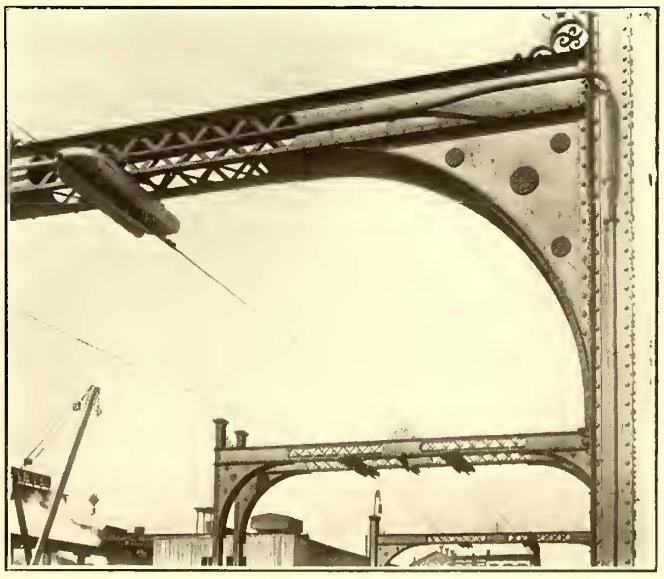
The wire on the separate leaves of the Hamilton Avenue bridge is kept taut by means of a slot in the bar on the land portal. The bridge wires are attached to each end of the bar thereby allowing the tension of the wire on the bridge to be balanced against that of the trolley wire beyond the bridge. The wire employed for this purpose is No. 0000 steel. Flexible iron wire and stranded copper were tried previously, but were not successful in securing the maximum strength. Even this heavy steel wire will crystallize and break off. Owing to the way the bridges of the Hamilton Avenue type close, there is a good deal of whipping about of the ends which produces a severe strain on the trolley wire. Those stresses which are due to changes in temperature are largely relieved by the contraction of the steel bridge itself, but provision must be made for contact between the two halves of the bridge in cold weather by allowing sufficient play in the spring contacts.

On the Union Street bridge, a new type of contact has been put in service. This consists of a single blade on the bridge engaging with a pair of blades on the other half of the bridge similar to a knife switch and jaws. This insures making contact even when there is transverse motion of the bridge. It should be stated that all of the overhead fittings on all of the bridges are of iron with the exception of the trolley end castings which are of copper or brass.

The West End Bridge over Coney Island Creek is fed from a knife-switch contact made automatically at the north end of the bridge when the latter closes. Attention is called to the overhead pantograph frame between the troughs of the forward end of the bridge. This frame is hinged and folds up like a jack-knife when the bridge opens and the bridge counterweight chamber comes down. The forward end of the frame then slides on a guide between the rails. It will be understood,

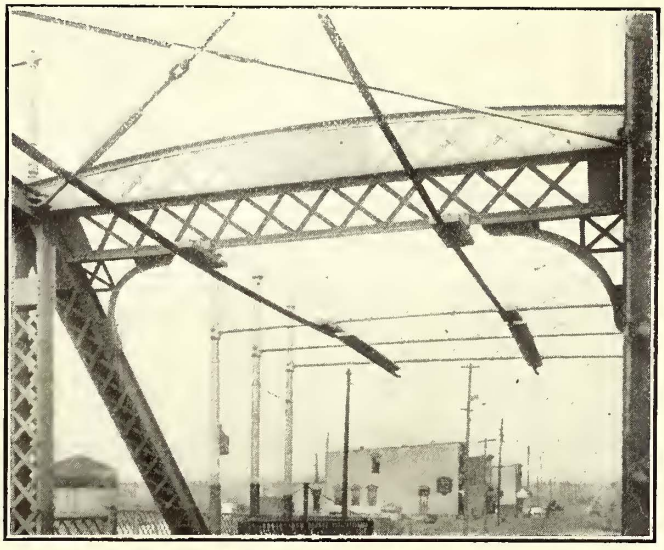


Brooklyn Line Department—Overhead Work at the Washington Avenue Bridge

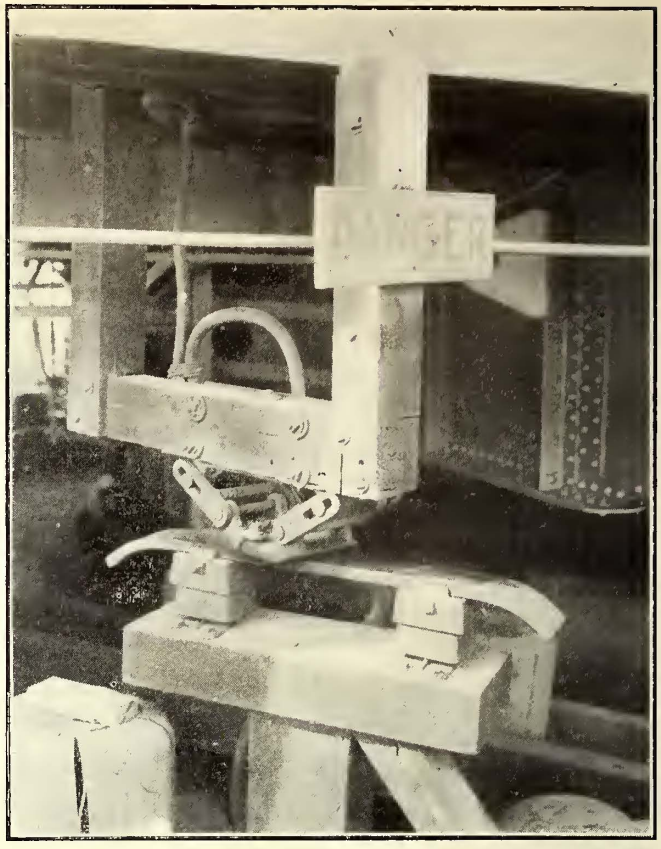


Brooklyn Line Department—Union Street Bridge Feeder to Trolley Wire

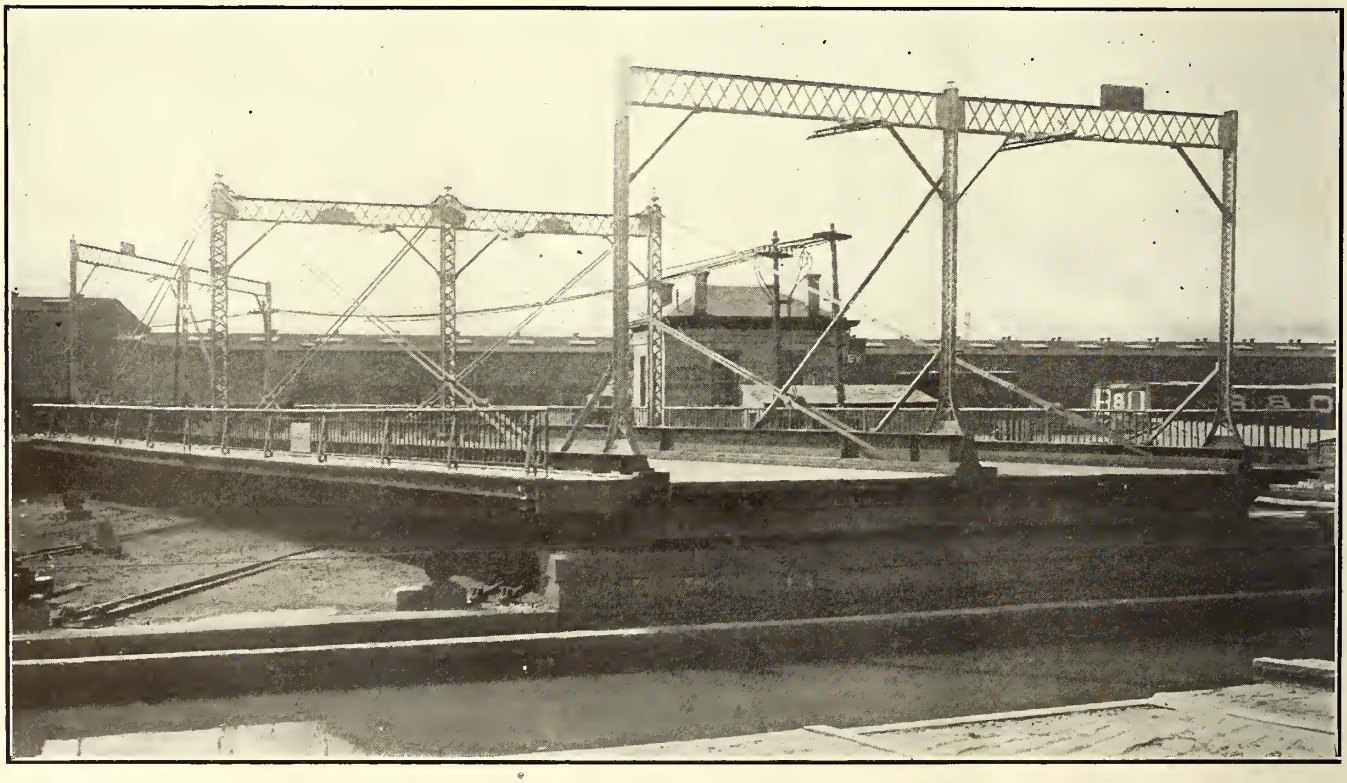
of course, that power is cut off automatically as soon as the bridge begins to move. The pantograph can readily be renewed if it should become injured in service. The peculiar backward motion of this bridge makes this device necessary as there is no other way in which the overhead construction could be cared for readily without resorting to cumbersome counterweights, pulleys or the like. To secure satisfactory operation, great care must be taken in making the dead-end support of the trolley wire on the land portal very rigid so that the alignment will remain unchanged. Otherwise a gap will be formed between the fixed and movable ends of the bridge and the trolley wire, thus causing rapid wear to the overhead work, injury to the poles and delays to traffic.



Brooklyn Line Department—Overhead Work on the Metropolitan Avenue Bridge



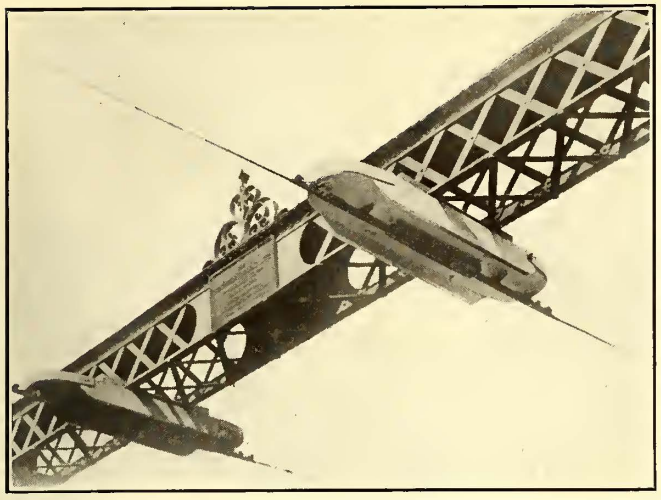
Brooklyn Line Department—Contact Shoe on the Metropolitan Avenue Bridge



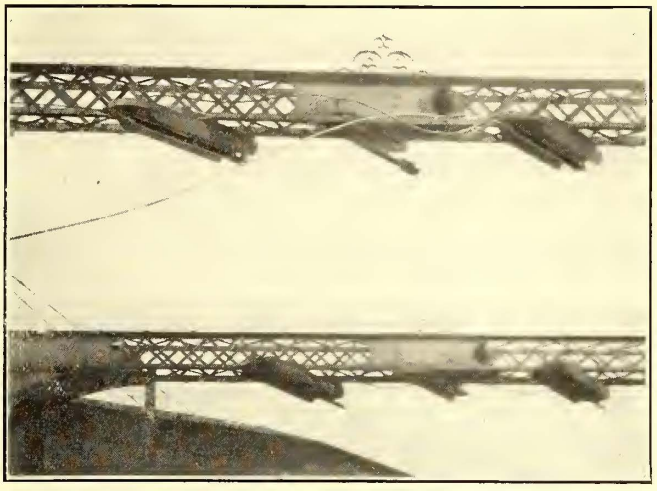
Brooklyn Line Department—Retractile Bridge on Washington Avenue When Back of the Wallabout Canal

The Washington Avenue retractile bridge, illustrated on this page, like the other movable bridges, is operated by a motor installed on the shore and supplied with power through a submarine cable. On each end of the bridge there is mounted a third-rail contact shoe to engage with a short piece of third-rail which in turn is connected to the track for the ground return. The Washington Avenue bridge is mounted on a number of trucks placed on tracks, the whole being moved to and from the canal with an endless rope and motor-driven windlass. The trolley wire on the bridge is fed from the contact shoe and rail which form a circuit only when the bridge is closed.

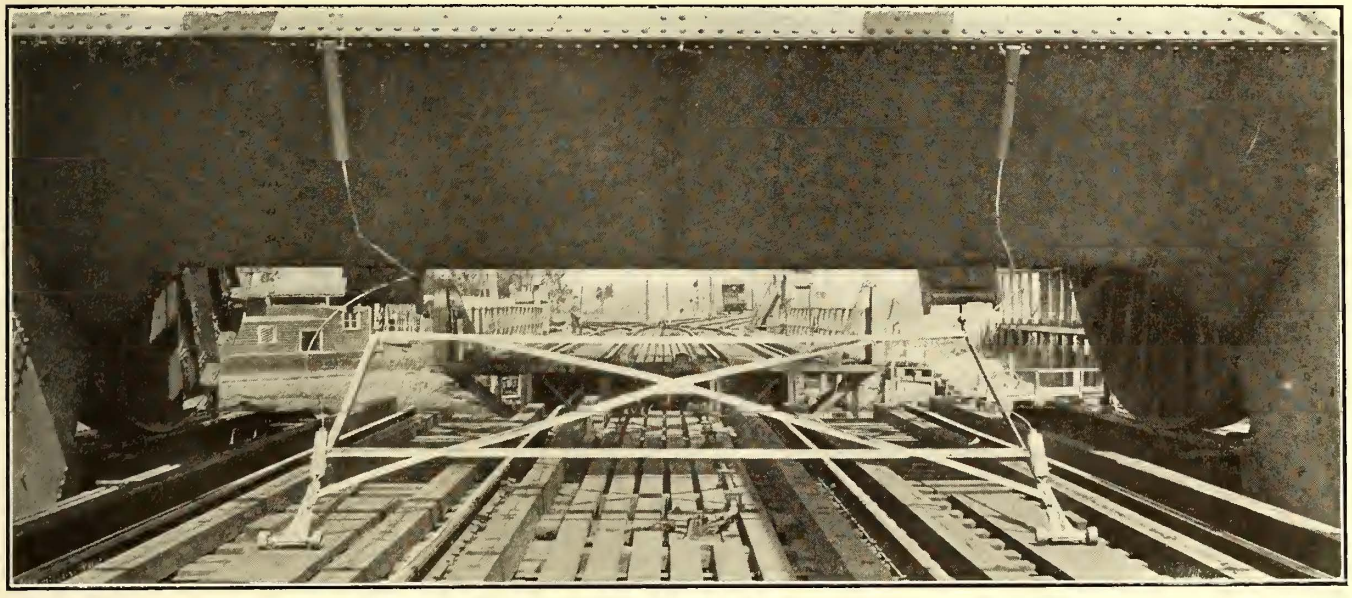
The Metropolitan Avenue bridge, shown on this page, is of the center-pier swing type. Its motor is operated through



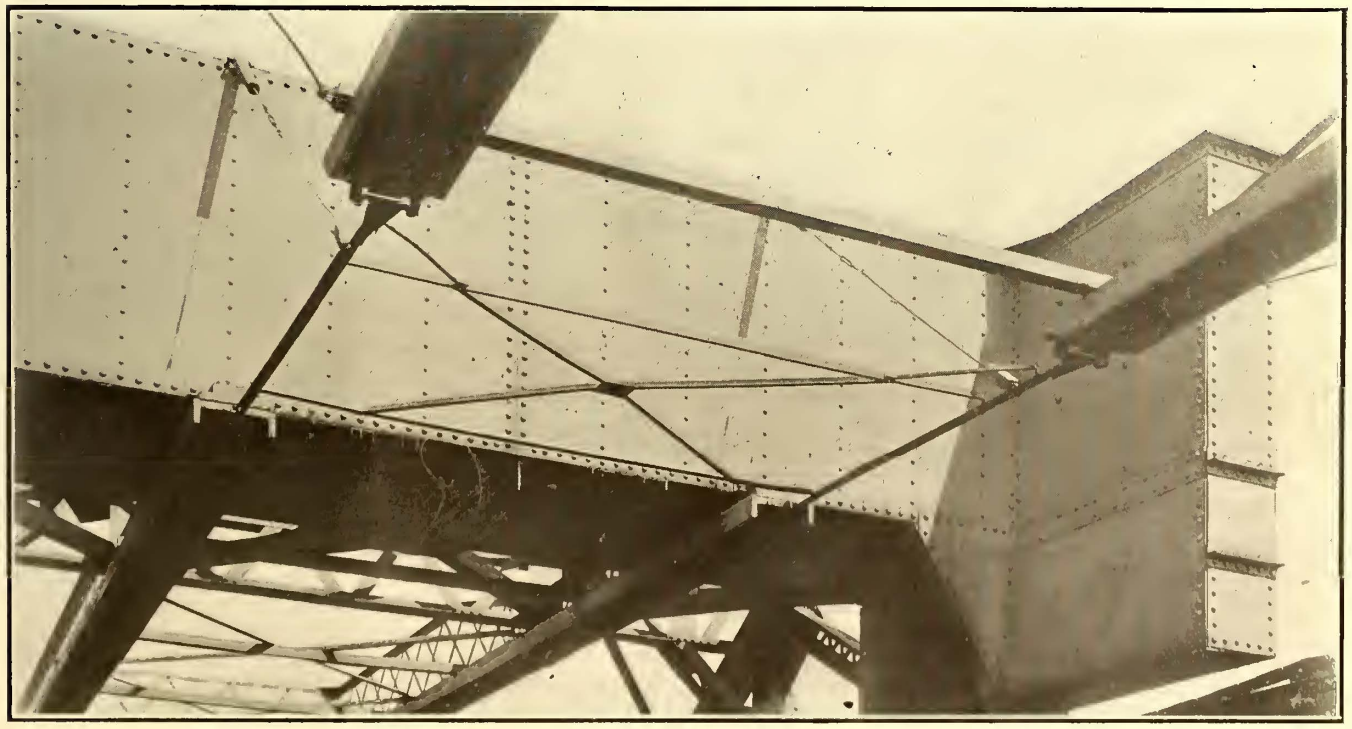
Brooklyn Line Department—Entrance Troughs on Hamilton Avenue Bridge



Brooklyn Line Department—Overhead Connection on Hamilton Avenue Bridge When the Latter Is Raised



Brooklyn Line Department—West End Bridge with Pantograph Down



Brooklyn Line Department—West End Bridge with Pantograph Up

power sent by way of a submarine cable to a contact rail and shoe on the pier and thence through the motor controller which is also mounted on the bridge. A contact shoe which is provided at each end of the bridge engages with a short piece of contact rail under the land piers to supply power to the overhead trolley only when the bridge is closed. A special form of spring contact is employed to make use of the bridge car rails for a ground return. In addition, a submarine return is provided to supplement these rails because this bridge is opened very frequently.

SYSTEMS OF RAILROAD ELECTRIFICATION

The electrification of steam railroad services was discussed at a meeting of the electrical section of the Western Society of Engineers, Chicago, Tuesday evening, June 7, at which Frederick Darlington, of the Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., read in abstract a paper entitled, "Economic Considerations Governing the Selection of Electric Railroad Apparatus." The paper described the several systems of electrification which are available at the present time—the direct-current system, the single-phase system and the three-phase system—and discussed impartially the inherent limitations of each. The proportion of cost factors for the generating, distribution and locomotive elements of electrification with each of the three systems was given in detail, with some figures on the cost of maintaining electric motors and locomotives of the three types referred to.

TRANSMISSION EFFICIENCY.

Mr. Darlington referred to the high cost with d.c. operation of the power transmission and distribution apparatus, which he said generally cost more than either the power plant or the electric locomotives and motor cars. This item was liable to be between 40 and 60 per cent of the total electrification cost, and was especially high where heavy trains are to be operated requiring large units of power distributed over long sections of track. Even with 1200 volts on the trolley wire, the cost of direct current distribution apparatus is still the largest cost item for electrical equipment.

In connection with three-phase motors he pointed out that these machines could be built for higher potentials than either d.c. or single-phase motors, hence did not usually use transformers on the locomotives or cars. But the difficulties of separate insulation of the two trolley wires employed had generally prevented the use of as high distribution potential for three-phase lines as for single-phase lines. Thus the usual practice in three-phase lines was to use 3000 volts, and 6000 volts was high for them. Three-phase motors also required more uniform potential than either single-phase or d.c. motors, hence, to maintain better potential regulation on the trolley at the relatively low voltages at which three-phase trolleys were generally operated as compared with single-phase trolleys, it was necessary to locate the transformer stations closer together on three-phase lines than on single-phase lines. For heavy trains the number of transformer stations would generally be more than double as many, and under certain conditions three or four times as many for three-phase as for single-phase installations.

There was another point about three-phase transformer stations for railroads which Mr. Darlington thought was more important now than it was a few years ago when it was not practical to use as high a potential on transmission lines as could be advantageously used to-day. Three-phase transformer stations required either one three-phase transformer or three single-phase transformers. It was much more costly, he said, to build one very high voltage three-phase transformer or three single-phase transformers than one single-phase transformer of the same aggregate output. In other words, the cost of transformers per kw of capacity was very much greater for three small units than for one large unit, especially when they are for very high primary potentials such as 100,000 or 110,000 volts. It was now well established that 110,000 volts or thereabouts will be widely used in large long distance power transmission schemes, the increase in potential over the practice of a few years ago having been brought about largely by improvements in line insulators, especially of the suspended type.

The speaker said that he could not state just what the relative cost of three-phase and single-phase power transmission and distribution systems will average for the ordinary requirements of railroads, but it was clear that with two trolley wires for the three-phase system instead of one wire as for single-phase, and with transformer stations two or three times as frequent for the three-phase as for the single-phase system the cost for the three-phase system would be considerably increased and would probably average somewhere from 30 per cent to 80 per cent more for three-phase than for single-phase.

The speaker also thought the constant speed characteristic of the three-phase motor a disadvantage because it imposed heavy demands upon the power station when the train was surmounting grades. He thought a variable speed a great advantage in railway work.

COMPARISON OF WEIGHTS.

Single-phase railway motors, he said, were heavier and more costly than direct-current railroad motors of the same capacity. The difference was somewhere between 10 per cent and 25 per cent in weight and 25 per cent to 50 per cent in cost in favor of direct-current motors as compared with single-phase motors. The transformers required for single-phase electric locomotives would generally constitute about 5 per cent to 10 per cent of the total locomotive weight, and the motors themselves would generally constitute about one-quarter to one-third of the locomotive weight. On the other hand, additional weight seldom had to be put into the locomotive frame and running gear to carry the extra weight of the transformers and single-phase motors when compared with direct-current motors, because when the locomotive frame was designed with sufficient strength to withstand the shocks encountered in operation it would be strong enough to carry all the load put upon it with single-phase apparatus. Three-phase motors were claimed by their advocates to be lighter and cheaper than direct-current motors of the same capacity, but the speaker doubted whether this was correct in the larger sizes, especially when the d.c. motor had commutating poles.

In conclusion the speaker stated that the reliability of the single-phase system had been demonstrated on the New Haven and Grand Trunk railways.

DISCUSSION.

In opening the discussion, G. T. Seeley, of the South Side Elevated Railroad Company, Chicago, who presided, remarked that when his road adopted electricity in 1896 it was burning anthracite at an average cost of from $4 to $4.50 per ton. With the substitution of electric power, the cost of the cheaper coal which could be used to advantage in the power house did not exceed $1.50 per ton, while the total amount burned was less than that previously fired in locomotives. As the result of this early electrification, the cost per car-mile was reduced by one-third.

Remarking that there was only one electric railway company in Cook County which did not purchase all or part of its energy for operating its cars from the Commonwealth Edison Company of Chicago, acting chairman Seeley called upon W. L. Abbott, chief operating engineer of the Commonwealth Edison Company. Mr. Abbott observed that electrification of main lines and terminals was a matter to be really reckoned with by steam railroads in the near future. He also pointed out that the generation of energy in a central power house permitted the use of cheaper grades of coal, and in some instances might avoid the necessity for the steam road's hauling its own coal. These savings, he felt, might represent the difference between operation at a profit and operation at a loss, in the straitened condition in which many railroads find themselves to-day.

W. B. Jackson, consulting engineer, Chicago, called attention to the successful operation of several three-phase roads with which he is acquainted, and predicted that the last word had not yet been said on the subject of three-phase electrification.

A. P. Jenks, of the General Electric Company, Chicago, took

exception to some of the remarks by the author of the paper in comparing direct-current with single-phase electrification costs. For short roads giving frequent service, he felt that 600-volt, direct-current operation would show up more favorably than single-phase, while for the interurban of average length he asserted that 1200-volt, direct-current was as economical as 6600-volt single-phase. Mr. Jenks said that the cheaper operation secured by avoiding rotary converter substations with their attendants was offset by the higher maintenance of alternating-current systems, at least in the case of reports which he had recently examined. High-voltage, direct-current has the advantage of lower first cost compared with the single-phase, he remarked, and was equal in all respects for interurban service. For trunk-line work he suggested that even higher direct-current voltages might be developed, as the result of which operation might be secured the equal of anything accomplished by alternating-current electrification. Mr. Jenks also called attention to the importance of standardization in railway equipment, pointing out that the 600-volt and 1200-volt systems closely approximate familiar electric railway practice.

A. Bement, consulting engineer, Chicago, referred to the public's appreciation, amounting almost to discrimination, in favor of electric service where electric railways parallel steam roads. As an example, he referred to the condition at San Francisco, where steam railroads and electric railways were in competition, each having ferry lines across San Francisco Bay. By far the larger per cent of the traffic preferred the electric line, although the fare and frequency of service was precisely identical.

E. N. Lake, of the Board of Supervising Engineers, Chicago Traction, declared that the two important points of standardization and interchange had not received sufficient attention in the paper. He remarked the large number of different voltages, frequencies and constructions employed in present single-phase practice, and declared that some standard specification would have to be determined upon before universal electrification of railroads could be hoped for. In the case of a wholly new design, he inquired of the author of the paper, what voltage, frequency and construction would be employed for the best operation?

G. H. Lukes remarked the change shown in a few years by the papers read before the Western Society of Engineers, indicating the advance from considering the electrification as suitable only for limited conditions, to the present broad appreciation of electric systems as applicable anywhere in ordinary steam railroad service.

Clarence Renshaw, of the Westinghouse company, Pittsburgh, reasserted the point of the present availability of electrification for all kinds of steam railroad services—terminals, tunnels and trunk lines. The complications of the three-phase distribution system, he thought, presented serious objections to that system. In answer to Mr. Lake's inquiry for a standard specification, he suggested that an 11,000-volt, 15-cycle, single-phase, alternating-current system could be taken at once as an absolute standard of electrification for the future development of railroad work. He added that 25-cycle, 11,000-volt electrification would also be entirely suitable for the service, and that every road in the country might be electrified uniformly with the New Haven installation, handling successfully all kinds of service. Mr. Renshaw then compared the large difference in transmission losses between high-voltage, alternating-current distribution lines, and with the lower voltages available with direct-current trolley. The New Haven electrification, he remarked, was in fact the only example of real trunk-line electrification, besides being the only one which has so satisfied the management that further extensions of the system have been approved. The New Haven company was now experimenting with two types of electric freight locomotives. With the higher voltage available with the single-phase system, said Mr. Renshaw, one unit in the power house can cover a greater section of track than with the low-voltage direct-current systems, thus securing a more uniform loading of the machine. The alternating-current, single-phase system, he declared, was the only one that is entirely suitable for handling both suburban and through train service. The first single-phase line to go into use—that of the Indianapolis & Cincinnati Traction Company—had secured maintenance records showing a cost of ¾ cent per car-mile, a figure which Mr. Renshaw declared was much lower than several examples of 600-volt, direct-current electrification he had examined.

In answer to a question, Mr. Darlington, author of the paper, gave the information that the power factor in the case of the New Haven electrification was between 80 and 85 per cent, probably not as good, he said, as it might have been had 15 cycles been used. Mr. Darlington again reminded his audience that his paper undertook only the comparison of the present systems of electrifications as applied to heavy railroad service, and that in his remarks he had thus far undertaken to discuss not future possibilities, but the present accomplishments with these systems. In an interesting prediction of the future of transportation in Illinois, Mr. Darlington remarked that the electrified railroads would purchase their energy from three or four large central power houses operated by companies which would make a business of selling energy for this purpose, thus doing away with the present low load factors encountered in electric railway power generation. At the present time, the three-phase system did not meet thoroughly satisfactorily all conditions of speed control, said Mr. Darlington, and he reminded Mr. Jackson that in one of the installations of which the latter had spoken earlier in the evening two motors were employed in the car, one being used for each of two of the three efficient speeds, and the two motors being operated in cascade for the third efficient speed. Such a scheme entailed carrying non-productive motor equipment throughout a large proportion of the car travel. Mr. Darlington objected also to the point previously made that a three-phase transformer can be built more cheaply than the equivalent rating in single-phase apparatus.

REDUCTION OF TROLLEY DELAYS ON THE BROOKLYN BRIDGE

BY F. VAN Z. LANE, C.E., ENGINEER IN CHARGE OF TRAFFIC DEPARTMENT OF BRIDGES, CITY OF NEW YORK.

When the writer assumed charge of traffic on the Brooklyn Bridge, it was very soon found that poor condition of the trolley car equipment operating over that structure was responsible for a great many delays to the service there, and inasmuch as the bridge is the terminus of seventeen lines, any delay there not only had local consequences but affected the service in the greater part of Brooklyn.

The table presented on page 1066 summarizes the specific cause of these delays. It was worked up from daily reports which give the delays, by divisions, of each line crossing the bridge. These daily reports are tabulated every month and copies of the monthly reports are distributed through the railway companies to the superintendents of the different divisions. This plan has had the effect of stimulating competition between the different divisions to secure a low record of delays.

The value of this table or system is shown conclusively by comparing the figures for March, 1907, with those of last March. During that time the delays per 100 cars have been cut down from 49 seconds to 9.9 seconds and the average time of delay has been reduced from 4.4 minutes to 2.2 minutes—just one-half.

The net result is shown by the fact that the number of cars operated has been increased 40 per cent during the 5 to 6 p. m. rush hour. It was possible to operate an average of only 236 cars during this hour in March, 1907, whereas the average for the same period in last March was 335. This is the greatest number of cars ever operated from New York over the Brooklyn Bridge during any one hour. At the same time the "consistency or reliability of service" which is as important as the amount, has improved, so that in the year 1909 the rush hour

schedule was operated 82 per cent of the time, whereas for the year 1907 it was operated only 4 per cent of the time.

The prevention of equipment delays has been only one of many things employed in increasing the limit of trolley service that can be operated over the Brooklyn Bridge, both as to amount and reliability. It may be stated, however, that the methods of ascertaining the causes of all other delays and preventing their recurrence have been just as carefully systematized and remedied.

BROOKLYN BRIDGE TROLLEY DELAYS DUE TO DEFECTIVE EQUIPMENT

	Coney Island & Brooklyn Railroad		Brooklyn Rapid Transit Co.	
	March, 1907	March 1910	March, 1907	March, 1910
Number of cars	18,575	19,670	95,311	107,165
Number and causes of delay				
Fuses—Number	18	1	...	...
Minutes delay	78	2	...	...
Trolley poles—Number	9	...	25	15
Minutes delay	48	...	124	44
Trolley ropes—Number	6	1	8	2
Minutes delay	15	2	27	4
Trolley wheels—Number	...	...	6	...
Minutes delay	...	...	23	...
Motors—Number	24	2	15	13
Minutes delay	106	3	79	29
Control fuses—Number	...	1	9	35
Minutes delay	...	1	37	61
Brakes—Number	2	...	27	9
Minutes delay	13	...	109	23
Fenders—Number	4	...	...	...
Minutes delay	27	...	...	...
Resistance—Number	3	1	4	3
Minutes delay	15	4	20	7
Controllers—Number	11	...	10	6
Minutes delay	52	...	48	15
Hot Resistances—Number	...	...	11	2
Minutes delay	...	...	60	7
Overhead switch—Number	1	1	...	1
Minutes delay	2	3	...	3
Trolley leads—Number	4	...	3	...
Minutes delay	22	...	14	...
Gears—Number	2	...	...	...
Minutes delay	8	...	...	...
Total				
Number of delays	84	7	118	86
Minutes delay	386	15	541	193
Per cent of cars	16.25	15.6	83.75	84.5
" " delays	41	7.6	59	92.4
" " time delayed	41.5	7.2	58.5	92.8

Note.—In 1907 delays equalled 49 sec. per 100 cars; in 1910, 9.9 sec. per 100 cars.

FOLLOWING UP CONTRACT WORK ON THE LONDON COUNTY COUNCIL TRAMWAYS

The London County Council Tramways make use of several interesting report forms to keep track of the progress on large contracts for cars and trucks as they are carried toward completion from day to day in the manufacturers' shops. Furthermore, the tramways employ a staff of inspectors to see that the work and materials supplied are in accordance with the specifications, and the responsibility of the inspectors is so direct that there is not the slightest difficulty in placing the blame should any part betray a defect in service. An idea of the thoroughness of this follow-up and inspection system may be obtained from a glance at the accompanying reproductions taken from the weekly report book on "Materials and Finished Parts Inspected," which was printed in connection with a contract made for 175 sets of maximum traction trucks. It will be observed that the item number is given, the name of the part, the number of pieces required in all, the number passed up to the end of the preceding week, the number passed every day and the total to the end of the reporting week, also the names of the inspector and the manufacturer. In addition to the foregoing columns, it is usually necessary to have a like number of columns opposite to cover the report on the item after it has been turned, machined, bored or otherwise finished ready for assembly. It therefore happens that most parts are subject to two examinations, one when they are in the rough and another when they are in the finished state.

Contract No. ....

LONDON COUNTY COUNCIL TRAMWAYS.

PROGRESS OF WORK ON CONTRACTS.

Contractor's Name .....

....

Nature of Contract .....

175 sets of maximum traction trucks

Number of days completion overdue .....

Amount due as liquidated damages .....

Remarks as to progress of work .....

....

Plow carrier trucks (units) shipped to date..... 171

Plain trucks (units) shipped to date..... 171

Plow carrier trucks (units) delivered to date..... 171

Plain trucks (units) delivered to date..... 171

Sets of trucks licensed and in service..... 128

Plow carrier trucks (units) completed and ready for licensing 43

Plain trucks (units) completed and ready for licensing.. 43

Summary for the General Manager to Show Progress on a Given Contract

(792) LONDON COUNTY COUNCIL TRAMWAYS. No.....

Report of Progress of Car Bodies at the Works

of Messrs. ..... *for week ending* 190

Contract .....

Remarks:

Totals.

Particulars.	For week ending	To date.	For past week.
Bodies laid down			
Roof covers do.			
Underframes do.			
Bodies despatched			
Roof covers do.			

No. of car in course of construction.	Location. Bay No.	Location. Berth No.	Body framed.	Panelled.	Roofed	Power cables.	Lighting wires.	Ceiling boards.	Roof canvassing	Seats.	Mouldings.	Vent gears.	Brass furniture.	Lower saloons only. Platforms.	Dashes.	Stairways.	Stanchions.	Handrails.	Movable steps.	Sand gears.	Brake gears.	Painted.	Fitted up.	Robbed down.	In colour.	Lined and varnished.	Varnished.	No. of car in course of construction.

Weekly Car Body Progress Report

LONDON COUNTY COUNCIL TRAMWAYS.

(904) **175 sets of Maximum Traction Trucks—materials and finished parts inspected.**

Item.	Name of part.	No. required.	Number of unfinished parts inspected and passed.	At works of Messrs.	Inspector.	Machining, &c., required.	No. required.	Number of finished parts inspected and passed.	Where passed.	Inspector.
01	Driving wheel axle	350	No. passed to Sat. week endg. Mon. Tues. Wed. Thurs. Fri. Sat. Total No. passed for week ending 190... Total No. passed to date 190... Number yet to be passed.			Turning Milling Keyway	350	No. passed to Sat. week endg. Mon. Tues. Wed. Thurs. Fri. Sat. Total No. passed for week ending 190... Total No. passed to date 190... Number yet to be passed.		

Typical Arrangement for History of a Truck Part

On this particular contract for 175 trucks, report columns were printed for 208 pieces relating to the trucks and 12 pieces relating to the conduit plow-carriers. At the end of the week each inspector turned in his report book to the headquarters of the tramways, where the rolling stock superintendent assembled the data in all the books to determine the state of the work, and then filled out for the general manager the form called "Progress of Work on Contracts," substantially as shown in the accompanying reproduction.

The third form shows the weekly report which is sent to the general manager every Monday morning, stating the progress of work on individual car bodies under construction. Each portion of the car body as completed is checked off, and a study of the gaps will show whether or not some parts of the work are being held up through the failure to carry out some other work which should be done first. Thus, if there is a delay in the installation of the power cables, the work on seats, molding, brake gear and other items is necessarily delayed. Hence these reports are of value in showing whether the car builder is slow or whether the trouble is due to some sub-contractor's failure to deliver material.

UNITED STATES CENSUS REPORT ON ELECTRIC RAILWAYS IN 1907

An abstract of the forthcoming census report on electric railways has just been issued at Washington by the census bureau. It shows that in 1907 the total number of miles of line, by which is meant length of first main track or roadbed, was 25,547.19, as compared with 16,645.34 in 1902, the per cent of increase being 53.5. The total number of miles of track, including sidings, was 34,403.56 in 1907, as against 22,576.99 in 1902, the per cent of increase amounting to 52.4. Of the total number of miles of track, those operated by electricity in 1907 numbered 34,059.69 and in 1902, 21,907.59. The per cent of increase was 55.5. The trackage operated by animal power in 1907 was 136.11 and in 1902, 259.10. The per cent of decrease amounted to 47.5. The trackage operated by cable in 1907 was 61.71 and in 1902, 240.69, the per cent of decrease being 74.4. The trackage operated by steam in 1907 was 146.05 and in 1902, 169.61, a decrease of 13.9 per cent.

The cost of construction and equipment in 1907 was $3,637,668,708, as compared with $2,167,634.077 in 1902, the per cent of increase amounting to 67.8. The number of employees in 1907 was 221,449, and in 1902 it was 140,769, the per cent of increase being 57.3. The total number of cars in use in 1907 was 83,641, as against 66,784 in 1902, an increase of 25.2 per cent. The number of passenger cars in 1907 was 70,016, as compared with 60,290 in 1902. The per cent of increase was 16.1. The number of all other cars in 1907 was 13,625, and in 1902 it was 6,494, the per cent of increase being 109.8.

The total number of passengers in 1907 was 9,533,080,766, as against 5,836.615,296 in 1902, an increase of 63.3 per cent. The number of fare passengers in 1907 was 7,441,114,508, as compared with 4,774,211,904 in 1902, the per cent of increase being 55.9. The number of transfer passengers in 1907 was 1,995,658,101, and in 1902 it was 1,062,403,392, the increase amounting to 87.8 per cent. The number of "free" passengers in 1907 was 96.308,157. The statistics of 1902 furnish no figures of this kind. The number of fare passengers per mile of track in 1907 was 216,522, and in 1902 it was 212,217, the per cent of increase being 2.

The car mileage, including passenger, express, freight, mail, etc., in 1907 was 1,617,731,300, as compared with 1,144,430,466 in 1907, an increase of 41.4 per cent.

In 1907 the number of power houses was 829, as against 805 in 1902, the increase representing 3 per cent.

The steam and gas engines and water wheels used in generating electricity were reported as having 2,476,479 hp in 1907 as compared with 1,349,211 in 1902, an increase of 1,127,268 hp, or 83.6 per cent. The kilowatt capacity of generators in 1907 was 1,723,416, and in 1902, 898,362, an increase of 91.8 per cent.

The gross income of the operating companies in 1907 was $429,744.254, and in 1902 it was $250,504,627, an increase of 71.6 per cent. The operating earnings in 1907 were $418,187,858 as compared with $247,553,999 in 1902, the increase being 68.9 per cent. The income from other sources in 1907 was $11,556,396, and in 1902 it was $2,950,628, an increase of 291.7 per cent. The income from passenger service formed 99 per cent of the total income from operation in 1890, but this proportion decreased to 94.5 per cent in 1902 and to 91.4 per cent in 1907. The percentage that the income from sources other than operation formed of the gross income was 1.2 per cent for both 1902 and 1890, and by 1907 it increased to 2.7 per cent.

The per cent ratio of operating expenses to operating earnings in 1907 was 60.1, and in 1902 it was 57.5.

The total capitalization outstanding of the operating and lessor companies in 1907 was $3,774.772,096, while in 1902 it was $2,308,282,099, an increase of 63.5 per cent.

The average number of "fare" passengers per car per year was 106,277 at the census of 1907 as compared with 79,187 for 1902 and 62,237 for 1890.

The greatest actual increase in the net trackage in any State was reported for Ohio, the increase amounting to 1,337.36 miles. The next largest increases were in Indiana, with 1,272.15 miles; Pennsylvania, with 1,257.49 miles; California, with 1,184.39 miles; Illinois, with 1,096.15 miles, and New York, with 1,011.29 miles. The largest relative gain occurred in Idaho, when the track increased from 3.50 miles in 1902 to 73.09 miles in 1907, or 1,988.3 per cent.

The use of electricity has made it possible to increase the size of the passenger cars, which accounts for the fact that there was, from 1902 to 1907, an increase in the total number of only 16.1 per cent. The truth of this is evidenced by the fact that the increase in the number of fare passengers, 55.9 per cent from 1902 to 1907, was much greater than the corresponding increase in the number of cars.

The contents of the report are in two parts. Part I pertains to the statistical phase of the subject and comprises a chapter on scope and method; another on comparisons with the censuses of 1902 and 1890; the third relates to power-plant equipment and output of stations; fourth, track and rolling stock; fifth, traffic; sixth, capitalization; seventh, financial operations; eighth, employees, salaries and wages, and ninth, sale of current by electric railways. Part II concerns the technical side of the subject, and the first chapter covers equipment; the second, fares and transfers; third, use of electricity by steam railroads; fourth, interurban railways—economic, financial and social features; fifth, franchises, public regulation and public ownership, and sixth, foreign tramways and electric railways. There are 187 tables and 4 supplementary tables; also 2 appendices, 3 maps and 7 diagrams. The illustrations in halftone are 30 in number and show overhead construction, third-rail coverings, underground stations and steel cars in tunnels, subway tunnel tracks, prepayment cars, side-rod electric locomotives, etc.

CARBON BRUSH CHANGES OF THE VIRGINIA RAILWAY & POWER COMPANY

The Virginia Railway & Power Company, Richmond, Va., has recently adopted the practice of slotting all of its commutators and using LeCarbone brushes in connection with them. This decision was the result of a series of careful tests carried out on a number of motors which had been giving considerable commutator trouble. After the commutators were slotted and used with the new brush, their wear was cut down practically to nothing. Not only was flashing largely eliminated, but it was also found feasible to adopt a lighter brush-holder spring tension. The old tension varied from 5 lb. to 15 lb. per holder according to the condition of the brush-holder springs. It is the practice of the Virginia Railway & Power Company to reduce this pressure to 4½ lb. per square inch of brush contact area. The LeCarbone brush is also giving three to four times the life of the replaced brushes, a result which is due in part to the lowering of the brush-holder tension.

PROTECTION OF LINEMEN WORKING ON HIGH TENSION TRANSMISSION LINES

The practice of a number of electric railway companies in protecting linemen against accidental shocks while repairing high-tension transmission circuits is briefly described in the following paragraphs. The precautions taken vary with the different companies. In addition to cutting out the section under repair at the adjacent substations the use of a grounding chain or wire at the point where repairs are being made is quite general.

WESTERN NEW YORK & PENNSYLVANIA TRACTION COMPANY

Part of the substation operating rules of this company are as follows:

"When the linemen have communicated with the substation and notified the operator that they are going out on the line, the operator will state in writing what linemen have so reported. He will then throw out the high-tension line and will under no circumstances again throw in this line until he has received reports from all the men or gangs who have reported for work in looking up the trouble. This rule must be adhered to to the letter, regardless of who gives orders to throw in the line, inasmuch as failure to do so is liable to cause the death of some employee working on said line.

"In case of trouble on a line, as above noted, the operator will note on the back of his daily report the time at which the men reported for duty in looking up this trouble. He will also report the time that each of said linemen or gangs report back, and also the time at which the trouble is reported cleared up. He will then note the time at which the line is again thrown into service. The matter of exact time of the above events is very essential and important and the substation operators will be held responsible therefor.

"When repairs are to be made on the high-tension line as noted, the operators in each of the substations will not only throw out their high-tension oil switch in connection with the said line, but will also open the high-tension disconnecting switches. They will, however, note that they are to leave the disconnecting switches on the lightning arresters in the closed position.

The rules for the governing of the linemen are in accordance with the above and when looking for trouble, they are required to report in at every telephone jack-box along the line. When making repairs, the linemen use a chain fastened to an insulator on the top of a pole about 10 ft. long. This chain is thrown around the three wires in order to short-circuit the line, and in turn is grounded to take off any static which may exist.

BEEBE SYNDICATE LINES

On two of the properties, the Rochester, Syracuse & Eastern Railroad and the Syracuse, Lake Shore & Northern Railroad, the transmission lines, carrying 33,000 volts, are in duplicate, being on each side of the track 28 ft. apart, and in case repairs are necessary on any one of the lines, communication is had with the power house by means of the telephone. When assured that the current is off the line required to be repaired, the linemen are required to drive a grounding bar, attached to a steel chain, well into the ground and throw the chain over the top wire so that it is in contact with all three wires, forming an absolute ground for the entire circuit. This ground is left on at one or more points during the time the transmission line is under repair, and upon removal of the grounding chains, the power house is again notified that the line is cleared. Such notification is given only by the foreman of the overhead line, who is responsible for all his men being clear of the circuit before the removal of the grounding chains and notice given to the power house. This precaution seems to be all that is necessary, as it has worked perfectly and we have never had an accident from repairs to the transmission line.

On the Auburn & Syracuse and Syracuse & South Bay lines the duplicate transmission lines are on the same poles. They are too near one another to allow of work being done on either while the current is in the other one. It is necessary, therefore, to do this work at night after the power house has closed down, but the same precautions are observed during the work as noted above. The transmission lines are in the form of an equilateral triangle, with one wire on the top of the poles and two wires on the cross-arms. With this form it is very easy to get all three wires in contact on the same chain.

NEW YORK STATE RAILWAYS

The rules covering linemen working upon operating transmission lines are to the effect that no employee is to touch any high-potential wires without first grounding the line, which is done by means of a short chain pulled over the transmission wires by means of a small rope. In case a man desires to work on a line, he calls the station or stations at which he wishes to have the line killed and the station operator pulls out the switches and reports back to him that the line is clear. The lineman then throws a rope over the transmission line and draws the small chain, above referred to, over the wires, thus grounding the line. After the work is done the same lineman who called the line out telephones back to the station that the line is clear and ready to be thrown in again. Only in extreme cases is any other man permitted to call the line back in, as it is very important that the same man who requests that the line be cut out should report that the line is clear. The station operator takes the name of the man when he first calls and when he reports that the line is clear, thus eliminating as far as possible any chance of getting orders confused. Transmission lines are not grounded at the substations, as the company feels that the man who should do this is the man who is actually doing the work.

THE SEATTLE (WASH.) ELECTRIC COMPANY

The substations are tied together electrically by means of three-wire, three-phase, 13,000-volt lines. With two exceptions they are connected by two separate circuits on different pole lines. This arrangement allows one of the lines to be dead while making repairs on it, while the other line temporarily carries the full-load current. As a further protection, when the men are working on either of the lines, chains are thrown across them on either side of the point at which the work is being done, so that if by accident the circuit should be cut in from either substation it would throw a dead short on the line and thus protect the linemen. While working on 2300-volt primary lighting circuits and other high-tension lines of the distribution system the linemen are furnished with rubber gloves and protective rubber shields. As further protection, in case of very wet weather, the circuits are opened when repairs are being made.

MILWAUKEE (WIS.) ELECTRIC RAILWAY & LIGHT COMPANY

Careful and explicit instructions are given to all men who are intrusted with this class of work. They are furnished with grounding chains, but before using these the linemen control the feeders through a dispatcher, who receives their orders for cutting in and out lines and transmits them to the proper power houses, advising the linemen by telephone when the lines are supposed to be dead.

ALBANY SOUTHERN RAILROAD

It is the practice of the line foremen to work on high-tension lines only after he has ascertained from the power house that the current has been shut off and has further assured himself that all substation switches have been opened so that no direct current can be converted into alternating current through the rotary at the substation, thus keeping the line alive. After ascertaining that the power house and substation attendants have done their work properly, the next procedure is to short-circuit and ground all wires of the transmission line. This is accomplished with three bamboo rods about 5 ft. long with a copper hook fastened at one end of each, which hooks are in turn connected to each other and to a suitable ground. This device is always placed between the lineman and the power plant and left connected to the wires until all work is finished.

NORTHERN ELECTRIC RAILWAY

The Northern Electric Railway buys all the current required for the operation of its trains from the 60,000-volt network of the Pacific Gas & Electric Company. The protective practice

of the latter company is of interest. The safety of linemen against accidental shock is primarily insured by the use of mechanical grounding devices, which are installed on incoming and outgoing lines at all switching stations. These devices are so arranged that by the operation of a lever located either within or without the station grounded metal arms are raised simultaneously into contact with the three wires of the circuit to be repaired. If the other end of this circuit terminates in a switching station it is shorted and grounded in the same way, thus affording double protection to the workmen on the line. As it is impossible to positively interlock all switches and grounding levers between distant substations, a system of load and line dispatching, similar to the train dispatching system of a railroad, has been developed and put in operation to insure the correct sending, understanding and execution of orders. Each switch and grounding device is designated by its own number, which is painted conspicuously on a marker attached to the operating handle of the switch. These numbers and their respective location, both geographically and electrically, are shown on the map of transmission lines and their connections posted in the chief dispatcher's office, which is connected by telephone to each distant switching station. The manipulation of all circuits is directly controlled by the dispatcher and no switch can be moved without his orders. In each case when it is found necessary for linemen to do work on any section of line a request must be forwarded through the nearest station to the dispatcher to have the desired circuit killed. The dispatcher upon receipt of such request telephones an order to the operators of the proper switching stations, who record the order in an order book and repeat it back to the dispatcher, giving hour and minute of its receipt. The operators then move their switches and grounding devices in accordance with the orders received and telephone back to the dispatcher that the orders are completed, again giving the hour and minute. Linemen are then notified that the circuit is safe to work on. If the line is to be again required for service the line foreman is instructed to complete his work or clear the line within a certain definite time and notify the dispatcher accordingly. In all cases line foremen are instructed to secure advice from the proper switching operator regarding the condition of a circuit before permitting their men to work on it.

HUDSON VALLEY RAILWAY COMPANY

This company has about 100 miles of 22,000-volt transmission circuits. On the same pole is a private telephone line running to the dispatcher's office and connecting the different power houses and substations. The company makes nearly all its repairs between the hours of midnight and 5 a. m. The superintendent or line foreman makes arrangements with the power house to have a certain line or section of line made dead at a stated time. As soon as the current is taken off, the operator in charge of the station calls the train dispatcher asking him to put an order on his train order book that such a section of line is dead for "John Doe," lineman, to make repairs. Each repair man is provided with a portable telephone. Before going on any line he must first call the train dispatcher to ascertain if the circuit is dead. When informed that it is dead he grounds and short-circuits the wires, then makes his repairs, reporting to the train dispatcher as soon as he is clear from the line. The train dispatcher in turn notifies the station operator that the line can be re-energized. The only posted order is that "no employee shall attempt to make any repairs to a high-tension line without first ascertaining from the train dispatcher that the line is dead, then grounding and short-circuiting the wires before handling them." The grounding device used is made from No. 8 flexible rubber-covered wire and is provided with bamboo handles about 3 ft. long, with spring hooks to engage the line wires.

BERKSHIRE STREET RAILWAY

Most of the work on this company's high-tension transmission lines is done at night after the current is shut off. When it is necessary to make repairs in the daytime the lineman notifies the dispatcher's office and does not attempt any work on the line until he is notified in turn by the dispatcher that the current has been shut off. In the power station there are sign boards to be hung on the switches when the current is off, notifying the engineer that the current should not be turned on until he receives word from the dispatcher. All linemen have been instructed also when working on any of these lines in the daytime, to protect themselves by short-circuiting the line between themselves and the power station by throwing a chain over the lines.

PORTLAND (ORE.) RAILWAY, LIGHT & POWER COMPANY

The only standing orders of this company for the protection of linemen working on high-tension transmission lines are that the man in charge of all work to be done on any of our high-tension lines shall call in by telephone to the head operator located in the one of the substations, for the line to be shut down, and that the same man shall again call in that the line is clear and ready to be started. The head operator in the substation is notified ahead of time of the name of the man who is to do the work and who is to call in for the line. There are no special grounding irons or other devices used on the lines or in substations to insure complete grounding of the circuits under repair, but the linemen, as a rule, take the precaution to throw a chain across the various legs to make sure that the line is dead, and they leave this chain on as long as they are working upon the line.

UTAH LIGHT & RAILWAY COMPANY

All high-tension switching is done by a chief operator located at Jordan substation, in Salt Lake City. All linemen or substation operators apply to him for authority to open or close any line switches. A special form is used for recording switching orders from the dispatcher, and all orders are repeated back to insure accuracy. After a circuit has been opened it is grounded at least two points before permission is given to the linemen to begin work. In addition to this ground the circuit is also grounded at the point where work is to be done. Linemen use for this purpose a long, flexible wire soldered to a steel spike about 18 in. long which is driven into the ground. The other end of this wire divides into three branches, each connected to a clip on the end of a wooden handle 3 ft. long. These clips are hooked over the three wires of the circuit, thus giving a combination ground and short-circuit. After completing the repair work the same man to whom the dispatcher gave authority to work on the line must report all clear before current is again turned on. The report of another man will not be acted upon under any circumstances. Except in emergencies not more than one man or one gang is allowed to work at the same time on a double-circuit pole line.

ILLINOIS TRACTION SYSTEM

Before linemen are permitted to work on a high-tension transmission line they must call the substations on each side of the trouble and ascertain that the disconnecting switches are open and the line is dead. A chain 60 ft. long made up of links with a ⅝-in. sharpened rod on one end, is used to ground the line at the point of repair. Each party of linemen must protect themselves separately and not depend on another party.

The gist of some results obtained in a study of the thermal conductivity of fire clays at high temperatures made at the University of Illinois, is of interest in boiler-house practice. Very little accurate work herctofore has been done with a view to obtaining by direct methods a measure of the amount of heat that escapes through the walls of furnaces. Any loss through boiler housings of course reduces the efficiency of the steam generating unit and only recently have steps been taken to provide against such losses by the use of air-tight furnace walls and special heat insulation. A report of the thermal conductivity tests cited states that the heat transferred through the 20-in. walls of a 210-hp Heine boiler when working under full load with average temperatures of 1400 deg. F. inside and 150 deg. F. outside, is 172,000 b.t.u. per hour. This is about 1.6 per cent of the total heat generated. The investigators point out that methods are available for carefully measuring the heat lost through the various parts of the walls.

MOTOR CARS ON THE PRUSSIAN GOVERNMENT RAILWAYS

The Prussian Government is making extended use on some of its branch lines of independent motor-cars operated by steam, gasoline and storage batteries. At the end of 1908 an aggregate of 762 miles of track was equipped with these motor-cars, individual lines being from 4 to 32 miles in length.

By far the largest number of motor-cars are operated by storage batteries, with which experiments have been continuously conducted since 1907. At first old steam coaches were used and the batteries were placed under the seats. Each car was equipped with two 50-hp motors and weighed, without passengers, 32 metric tons, of which the battery weighed 10 tons. These cars had a radius of action of about 37 miles and ran about 100 miles a day. The performance varied from 26.4 watt-hours to 32 watt-hours per metric ton-mile.

The experience with these equipments was so satisfactory that in 1908 57 more were purchased and in 1909 33 more. These later cars were designed especially for storage-battery operation and are of the twin-body type, shown in the accompanying diagram. The principal dimensions are as follows: Length over buffers, 84 ft.; width over-all, 9 ft. 10 in.; wheelbase, 28 ft. 10 in. The batteries are carried in isolated end compartments 8 ft. 10 in. x 8 ft. 2 in. The cars empty weigh from 54 to 55 metric tons.

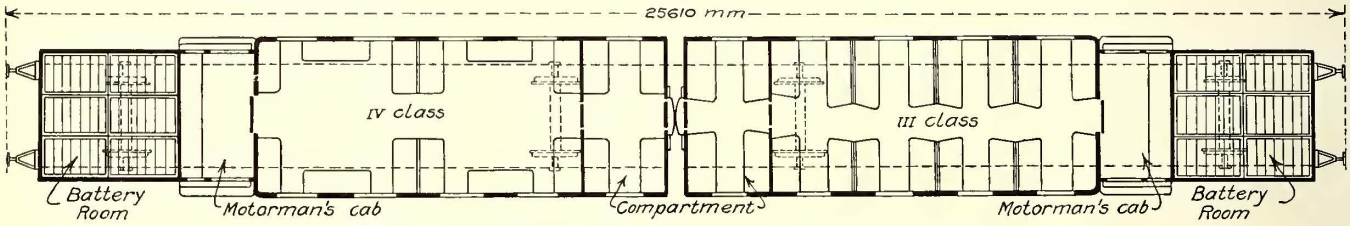
The battery equipment of the new cars is intended for a run of 62 miles on one charge for a complete load of 62 metric tons and speeds up to 31 m.p.h. Under test conditions the most recent cars have shown a power consumption of only 21.7 watt-hours per metric ton-mile without exceeding a speed of 24.8 m.p.h. The storage-battery equipment per twin car consists of 168 Hagen cells, having a discharge capacity of 368 amp-hours at 350 volts. Either battery half can be operated independently. The normal motor equipment consists of two A.E.G. interpole 80-hp series motors which have shunt resistance next to the field coils to secure higher speeds on the last running points.

One accumulator car has been equipped with shunt-wound motors to test the value of recuperating energy on down grades. Acceleration is secured by grouping the cells in various combinations, but the car weighs about 10 tons more than those using series motors because four 50-hp motors are used. Nevertheless the maximum acceleration of the shunt-wound outfit is only 0.329 m.p.h.p.s. against 0.56 m.p.h.p.s. with the series motors. The amount of power returned to the battery is about 0.9 kw-hours per stop, but this result is gained at the expense of considerable electrical strain on the equipment. The economy of the method of starting by grouping the cells is shown in the following comparison between the shunt motor-car and the series motor-car: Shunt motors, stations 1.43 miles apart, average speed 20.5 m.p.h., power consumption 32.8 kw-hours per metric ton-mile; series motors, stations 2.05 miles apart, average speed 16.7 m.p.h., power consumption 20 kw-hours per metric ton-mile.

A feature of all the electric cars is the provision of a "dead-man's" handle as it is the eventual intention to operate these cars with one man only.

The gasoline-electric car is 55 ft. 7 in. long, 8 ft. 6 in. wide and weighs 83,270 lb. empty. The motive equipment is carried on the truck, the engine and generator being in the center, with one motor on each of the end axles, geared as in street railway service. The gasoline engine drives an interpole 80-kw generator whose voltage can be varied from 0 volt to 650 volts through a 2.5-kw, 70-volt exciter, which is also used to supply lighting and ignition current. The two motors are usually operated at 575 volts.

The Prussian Railways are also trying five steam cars. It is believed the Government railways will purchase more shunt-wound motor accumulator equipments and gasoline-electric cars. The several types of coaches installed were designed by Geheimer Oberbaurat Wittfeld.



Plan of Prussian Storage Battery Car (Dimensions in MM.)

HEARING BY MASSACHUSETTS COMMISSION ON NORTH READING FARES

The Railroad Commission of Massachusetts gave a hearing recently upon the petition of the Selectmen of North Reading, Mass., for a fare reduction upon the line of the Boston & Northern Street Railway between Reading Square and the North Reading-Andover boundary. The petitioners were represented by Solon Bancroft, Boston. H. E. Reynolds, assistant general manager, appeared on behalf of the company. The petitioners requested a fare reduction from 10 cents to 5 cents between Reading Square and the Andover line, in order to accommodate summer residents at Martin's Pond, a small body of water located in North Reading about ¼ mile south of the Andover line.

The company introduced a letter from Robert S. Goff, general manager, which stated that North Reading Junction and Elm Square are fare limits on the through Lawrence-Reading line. There are two special fare limits, in accordance with the board's policy, in the section referred to—one being between North Reading Center and the Boston & Main Railroad station, Reading, and the other between Walnut Corner and Reading Square. The service is at most half-hourly, and the income from local riding is comparatively small and certainly unprofitable. Such business as is derived from the section between Walnut Corner and the Reading-Andover line is solely from this small colony of campers who patronize the line during the summer season. Mr. Goff pointed out that under these conditions it cannot be reasonable for the company to reduce the fare solely for this transient trade. To do so would make the fare limits dependent either on some fancied natural attraction, or the business zeal of some real estate man. The matter has twice before been before the board with respect to Reading and Wakefield fares, and has been left undisturbed. Little reason appears which would justify a change in existing fare limits, and the condition of the company is not such as to warrant any reduction in its charges. The petitioners' claim that business would be increased by reducing fares does not appear tenable to the company.

Mr. Reynolds showed that the fares are entirely reasonable in relation to the distances to which they apply. A 5-cent fare covers the trip from Reading Square to Walnut Corner, 4.45 miles. From Walnut Corner to Elm Square, Andover, 5 miles, a 5-cent fare applies. The rate is only a little more than 1 cent per mile throughout the disputed territory. He contended that the permanent inhabitants of the district are all well accommodated. The proposed relocation of fare limits would upset the scheme of fare distribution in the country adjoining Andover and Reading. Chairman Hall intimated that the alteration of the fares as desired would lead to serious complications. There must always be a district just beyond a fare limit which feels itself aggrieved,

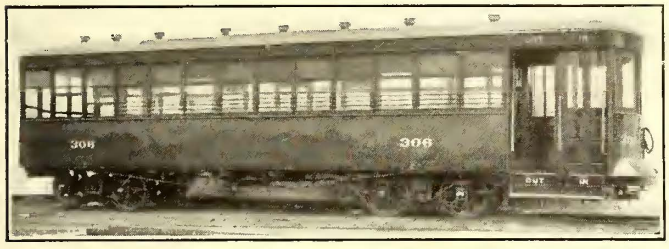
and it is not clear how the company can earn more money if the change is made.

In its finding the board said:

"It appeared at the hearing that substantially the entire settled portion of North Reading is at present served for a single fare, and that patrons were able to ride to and from North Reading Center and Reading Square, Reading, for the same amount. A ride is also obtainable from North Reading Center to and from Andover Square, Andover, for 5 cents. Viewing this territory as a whole, the board is of opinion that the fares now established by the company are reasonable and that it ought not to make any recommendation for a reduction or readjustment of fares."

PAY-AS-YOU-ENTER TRAILERS FOR THE NORTHERN TEXAS TRACTION COMPANY

The Northern Texas Traction Company, Fort Worth, Tex., has lately received from the American Car Company seven trailer cars of the rather unusual design shown in the two accompanying illustrations. These cars are of the pay-as-you-enter type, having an exit and entrance vestibuled platform at one end only. The cars are of straight sheathed-side construction and turtle-back roof, so that there are no monitor deck windows. They are 40 ft. 6 in. long over all and are divided into two compartments, the rear vestibule, which is flush with the rest of the car floor, being reserved for smokers. Slat seats are used in both compartments, those in the general passenger section being of the reversible type. The seating capacity is approximately 54. The principal dimensions are as follows: Length over dashing sheathing, 39 ft; width of sills over sheathing, 8 ft. 5 in.; inside height from top of floor to underside of headlining, 7 ft. 6 in.; wheel base of trucks, 4 ft. 6 in. The trucks are fitted with St. Louis 33-in. wheels, having 3-in treads and flanges ¾ in. deep by 1⅛ in. thick.



Pay-As-You-Enter Trailer for Northern Texas

Interior of Pay-As-You-Enter Trailer

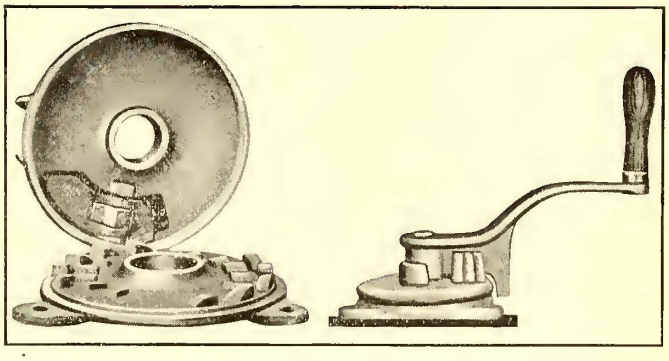
The bottom framing, except the side sills, is of white oak. The side sills are of 4½-in. x 7¾-in. long leaf yellow pine reinforced at the bolster by a 6-in. x 4-in. angle iron 5 ft. long and weighing 12.3 lb. per foot. The cross framing is tenoned into the side sills and reinforced on one side with a 3/16-in. x 4-in. steel plate for the full length. On the opposite side there is a ¼-in. angle iron bolted through the cross sills and side sills. The end sills are reinforced with steel plate. The bolsters are made of 1-in. x 8-in. steel, machine fitted and with cast fillers. The floor boards are 13/16-in. yellow pine. The body framing is of white oak. The outside panels are made of No. 14 sheathing steel fastened to the post and window rails with screws. The corner posts are 3¾-in x 4-in. and the side posts 2¼-in x 4-in. The inside finish of the car body is mahogany, except from the truss plank to the window rail, which is No. 18 sheet steel painted to conform with the interior finish. The ceiling is of Indestructible fiber board. The inside trimmings, including the sash locks, are of oxidized solid bronze, but the register and handstrap brackets are of painted malleable iron. Ventilation is provided by 6-in. ventilators in the roof.

The single platform is of the pay-as-you-enter type, 6 ft. 6 in. over the dasher sheathing, with doors and grab handles installed as illustrated. The windows are provided with Pantasote curtains made by the Curtain Supply Company. They are also provided with O. M. Edwards bronze sash lock and rack and compression rolls. Push buttons are installed at each side post.

The bodies are mounted on the J. G. Brill Company's trucks similar to the No. 420 design but of sufficient capacity to carry the car body with 2⅓ times the seating load. The cars were built under license of the Pay-as-You-Enter Car Corporation.

THREE CONTROLLER CHECKS

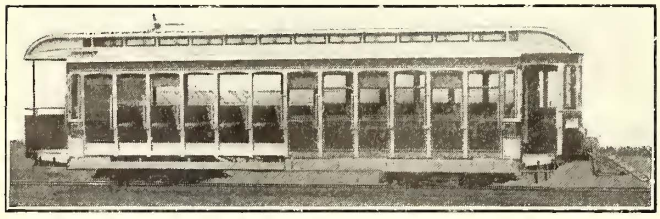
The Porter Railway Switch Company, Detroit, Mich., is making three designs of controller checks or regulators known respectively as the New York or type "A," the Wilson or type "B" and the Porter or type "C," of which "A" and "C" are illustrated. The outside casings of all are made of malleable iron and the single working piece of steel. No parts require lubrication or inspection. Type "A" is for use in connection with any controller and may be installed without any fitting whatever. The construction of this type is such that if the handle is withdrawn too far in releasing for the next stop, it will not permit the advance to the following stop. Thus, what is called the short drawback will not permit the motorman when in a hurry to withdraw the controller drum from its proper connections. This device is lighter than either of the two other styles and is strong enough for all ordinary work. Type "B" is like type "A" except that it is much heavier and stronger and intended for those who care to have a device which cannot be put out of order by any ordinary means. Both designs are considered entirely foolproof. Type "C" is a controller check with an operating part similar to that of the other regulators, but is so constructed that it will feed fast or slow; furthermore, a double time stop is caused on the last series position so that the motors have sufficient time to be accelerated properly before they are advanced to multiple position. This feature represents a most desirable improvement. The economies effected by devices of this kind in saving power and reducing equipment failures are evident.



Types C and A Controller Checks

ONE-SIDE CONVERTIBLE CARS FOR THE NORTHERN OHIO TRACTION & LIGHT COMPANY

The Northern Ohio Traction & Light Company, Akron, Ohio, has lately received six one-side convertible cars from the G. C. Kuhlman Car Company. As shown in the two accompanying illustrations, these cars are fully convertible on one side but have drop sash on the inner side, thus following the type designed by the Cleveland (Ohio) Electric Railway some years ago. The Akron cars are 44 ft. 2½ in. long over the sheathing and 35 ft. 6 in. over the car body proper. The maximum width is 8 ft. 6 in. The front platform is 4 ft. long and the rear platform 5 ft. long. The windows as well as the lower panels on the outside of the car are fitted with the Brill convertible car mechanisms so arranged that they will raise into the roof. The bronze trimmings, fixtures and push button circuit are all in accordance with the standards of the Cleveland Electric Railway. The general inside finish of the cars is in slightly stained cherry. The ceiling is of three-ply poplar veneer in the top deck and five-ply veneer on the side ceiling. It will be observed from the interior view that part of the rattan seating is detachable so that when the car is closed, the end portions can be turned at right angles to make up a longitudinal seat on one side.



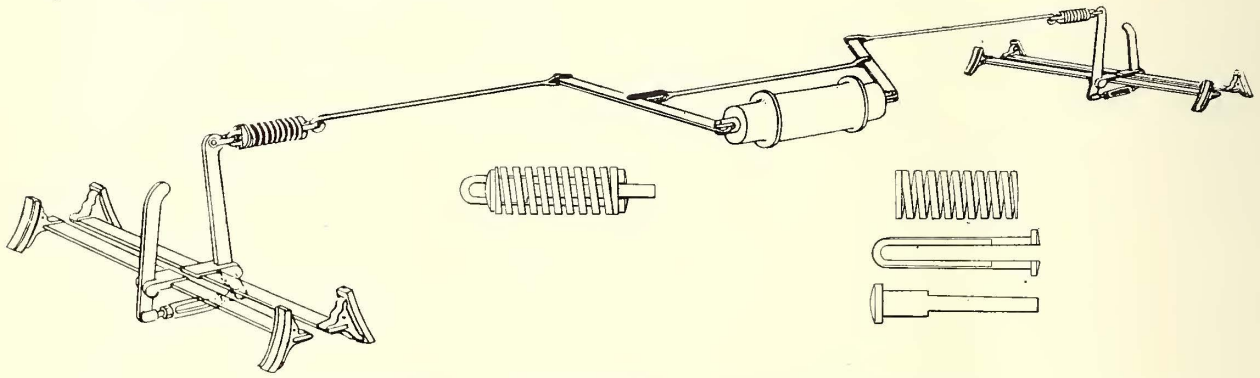
Convertible Side of the Northern Ohio Traction Car

Seating Arrangement of Northern Ohio Car When Open

The cars are equipped with four Westinghouse No. 101 motors and M. P. lightning arresters, Peacock hand brakes, Dayton Manufacturing Company's U. S. headlights, Germer hot-air heaters and Eclipse fenders. All wiring was done in accordance with the requirements of the National Electric Code. Porcelain tubing is used for encasing wires wherever they pass through the floor.

RESILIATOR FOR ELECTRIC RAILWAY BRAKE RIGGING

The Johns-Streeter Company, New York, is making a novel brake rigging device called the Streeter resiliator, the object of which is to minimize the vibration of the cars from truck pounding. It is stated that when this shock absorber is applied to the pull rods of the brake rigging as shown in the accompanying drawing, the shoes will adjust themselves on the wheels. The latter feature tends to the elimination of skidding. The resiliator is made to receive most of the braking shock under all conditions so that the strains on the rigging should be reduced appreciably. The resiliator also prevents objectionable chattering and helps to give quick braking release.



Resiliator Applied to Brake Rigging; also Assembly and Parts

TANTALUM LAMPS FOR CHICAGO RAILWAYS CARS

The Chicago Railways Company, during the past six months, has made extensive tests of tantalum lamps for use in street cars. These tests were performed by equipping regularly operated cars with sample lamps and keeping accurate records of the car-miles, lamp-hours, voltage and replacements. Within the past few weeks all the cars on the Van Buren Street line, which are of the large pay-as-you-enter type, have been equipped with tantalum lamps. Different makes of lamps are being tried on other cars and if the results of the present tests are satisfactory the installation of tantalum lamps on all new and rebuilt cars of the Chicago Railways Company will be permanent.

The new pay-as-you-enter cars of the Chicago Railways Company are illuminated with a row of nine 16-cp lamps on each side of the car and three 32-cp lamps spaced along the center line of the upper deck. The circuits of the side lights includes a 16-cp lamp in an illuminated destination sign box. Each circuit of the 32-cp lamps includes a headlight lamp and a lamp over the conductor's head on the rear platform. Three forms of tantalum lamps are used in equipping each car. The lamp used in the headlight is a 32-40-cp, 70-watt tantalum with an extra small bulb; the platform and center lights are 32-cp, 70-watt tantalums, and the side and sign lamps are 16-cp, 35-watt tantalums. Several different forms of filament winding are under consideration with a view to obtaining a lamp with low breakage. Various arrangements of frosting on the bulbs have been tried and discarded in favor of clear glass. It has not been found practical to place tantalum lamps on some of the older cars having center fixtures, which hold the lamps at an angle greater than 15 deg. with the vertical.

News of Electric Railways

Cleveland Traction Situation

The hearings on the demand of the employees of the Cleveland Railway for an increase of wages to 32 cents an hour were begun during the week ended June 11, 1910, before Judge Willis Vickery of the Common Pleas Court, Elroy M. Avery, and Robert D. Beatty, receiver of the Eastern Ohio Traction Company, who constitute the board of arbitration. It was contended on behalf of the employees that the cost of living had increased to such an extent that the wages were not sufficient to support the men and their families; that the 2044 men in the employ of the company worked on an average of 7 hours and 21 minutes a day; that the average pay was $1.79 3-5 per day, or $655.54 a year, if the employee worked every day in the year, and that some of the men were compelled to be idle for several hours during the day between their runs.

At the opening session, G. M. Dahl, street railway commissioner, stated that an increase which could be paid out of the surplus earnings from operation could be granted by the company without going before the Council, but that if the men were allowed the 7½ cents which they asked, the matter would have to be taken before the City Council, as such an increase would make it impossible for the company to meet the expense of the increase at the present rate of fare without incurring a deficit. There should be no interference with the Tayler ordinance. The average wage received by the men now is 24½ cents an hour, which is higher than in most cities. Henry J. Davies, secretary of the Cleveland Railway, also presented some figures along this line. Mr. Davies said that if the increase which is now asked for had been in effect for March, April and May, the expenditures would have increased $102,068, or an equivalent of $1,109.37 per day, and that there would have been a deficit for these months of almost $21,000. The company would have had to increase the fare charge one-fourth of a cent per passenger to offset the loss.

On behalf of the men a comparison was made between the wages of the street railway employees in Cleveland and those received by workers in trades, and it was argued that the pay of the street railway men is insufficient. A table of expenses was prepared to show that the cost of living for a year for a family of man and wife and three children was $786.57, or $2.15 a day. Reference was also made to the wages paid on Vancouver roads, at Oakland, Cal., and at Butte, Mont., to street railway employees. Final arguments were made on June 11, and the board adjourned to meet at the call of Judge Vickery to consider the claims presented.

Transit Affairs in New York

The Interborough Rapid Transit Company has sent to the Public Service Commission a communication in which is embodied a proposition for the extension of its system. It purposes to third-track the Second Avenue, Third Avenue and Ninth Avenue elevated lines of the Manhattan Railway, and to build certain elevated extensions in the Bronx, one being an extension of the Third Avenue line through Webster Avenue, Gun Hill and White Plains Avenue, to Becker Avenues as a two-track line, with the privilege of hereafter building a third track; the other extension being in Jerome Avenue from about 149th Street and Eighth Avenue, across McComb's Dam Bridge, up River Avenue and Jerome Avenue to about 194th Street, with the privilege of hereafter building a third track all the way. It is also proposed that an arrangement be made for the operation of the Steinway tunnel under the East River, from the Grand Central Station, New York, to Long Island City, for a 5-cent fare to Long Island City, and for a connection over the Queensboro Bridge with the Second Avenue elevated line, so as to afford another through route with a 5-cent fare to Long Island City. Aside from making a connection between the Steinway tunnel and the subway in New York, at or near the Grand Central Station, the proposition does not embrace additional subway development or extension.

Particulars of the terms which the Brooklyn Rapid Transit Company is prepared to offer for the use of the Centre Street loop subway to run trains from the Williamsburg Bridge to the new Municipal Building have been received by the Public Service Commission. For the two western tracks, from the bridge to the terminus, the company submits two propositions: One per cent on $4,000,000, the estimated cost of that portion of the subway, for the first year and an advance of ½ per cent for each year up to five, and after that period interest and sinking fund not to exceed 5 per cent. The alternative is for the company to pay a rental basis on actual car miles operated, at the rate of 4½ cents a car-mile. This is based on an estimate of 4,562,000 car-miles a year. The company explains that if it cannot then use the tracks to the full capacity of 10-car trains, but must be restricted to the 6-car trains allowed on the bridge, it will reduce its offer in the same proportion from 5 per cent to 3 per cent. The Centre Street loop cost approximately $10,000,000, but the company figures that the portion it wishes to use could be built for a maximum of $4,000,000. The matter has been referred to the commission sitting as a body.

Mayor Gaynor has signed the bill which was passed by the Legislature at the session just closed to permit the transfer of the property of the New York & Long Island Railroad by the trustees to another company, so as to allow the tunnel of the company under the East River to Long Island City to be operated. Governor Hughes has also signed the bill, and it is expected that the property will be transferred to the Interborough Rapid Transit Company, or an allied company.

Program of Meeting of New York Association

The following program has been announced for the twenty-eighth annual meeting of the Street Railway Association of the State of New York, to be held at the Hotel Otesaga, Cooperstown, N. Y., on June 28 and 29, 1910:

JUNE 28, MORNING SESSION, 10:00 A. M.

Roll call.

Reading of communications and minutes of previous meetings, president's address, reports of executive committee, treasurer and secretary, and reports of committee

(a) City Rules,

(b) Classification of Accounts.

Paper, "The Problem of the 5-Cent Fare," by Henry W. Blake, editor of the ELECTRIC RAILWAY JOURNAL.

Discussion, On the advisability of adopting the Interurban Rules as promulgated by the American Street & Interurban Railway Association in October, 1909.

Miscellaneous business.

JUNE 28, AFTERNOON SESSION, 2:30 P. M.

Reading of communications.

Paper, "Latest Development in Car Wheels for Electric Railways," by V. S. Yarnell, of the Carnegie Steel Company.

Paper, "Standardization of Track Construction in Paved Streets," by T. E. Tilton, engineer of maintenance of way of the New York State Railways.

Discussion, informal. On street railway accounting system as promulgated by the Public Service Commission of the State of New York.

Miscellaneous business.

Appointment of nominating committee.

JUNE 29, MORNING SESSION, 10:00 A. M.

Reading of communications.

Paper, "Railway Motor Gears and Pinions," by F. W. Williams, of the General Electric Company.

Paper, "Recent Development in Multiple-Unit Control," by Clarence Renshaw, of the Westinghouse Electric & Manufacturing Company.

Miscellaneous business.

Report of nominating committee.
Election of officers.
Adjournment.

ENTERTAINMENT, JUNE 28

3:00 p. m., automobile ride for ladies; 5:00 p. m., baseball game, managers vs. supply men; 8:00 p. m., banquet, dancing.

ENTERTAINMENT, JUNE 29

10:00 a. m., bridge whist contest for ladies; 12:00 noon, boat trip on Lake Otsego; 2:00 p. m., luncheon for ladies at Five Mile Point Inn; 3:00 p. m., Clock golf, putting contest for ladies.

The banquet will be held on June 28, at 8:00 p. m. The speakers will be: James S. Sherman, Vice-President of the United States; John N. Carlisle, of the Public Service Commission of the First District of New York, and Ralph Birdsall, pastor of Christ Church, Cooperstown. Honorary, active and associate members, guests and the ladies will be provided with banquet tickets. Each allied member will also receive one ticket. Extra tickets will be sold at $5 each. Extra bars will be provided to association badges without charge by H. M. Beardsley.

Accommodation at the Hotel Otesaga can be arranged by communicating with J. D. Price, Hotel Bretton Hall, Eighty-sixth Street and Broadway, New York, N. Y. The Hotel Otesaga will open on June 23.

No provisions have been made for a general exhibit of appliances and apparatus by allied members, but any exhibit will be welcomed, and arrangements for space can be made directly with the manager of the hotel.

New Line Opened on Long Island.—The South Shore Traction Company, Patchogue, L. I., placed in operation on June 11, 1910, the part of its line between Babylon and Amityville, about 9 miles long.

Detroit United Railway Will Not Accept Webster Ordinance.—J. C. Hutchins, president of the Detroit (Mich.) United Railway, has replied to Mayor Breitmeyer's letter to the company about the Webster grant. Mr. Hutchins says that the company cannot accept the terms of the Webster ordinance with the value of the property of the company as reported upon by Mr. Barcroft written into the ordinance. Mr. Hutchins says that the total value as stated by Mr. Barcroft is a gross under-valuation of the company's property, and that the directors of the company would betray the trust imposed in them if they should agree to the Barcroft figures.

Railway Electrical Engineers at Buffalo.—The spring semi-annual convention of the Association of Railway Electrical Engineers, formerly the Association of Car Lighting Engineers, was held at the Statler Hotel, Buffalo, N. Y., on June 7 and 8, 1910. About 15 railroads were represented. The meeting was held for the purpose of reviewing and discussing the work of the committees and the progress made during the six months since the last convention in October, 1909. Among the matters transacted by the convention was the adoption of the Gibbs train connector as standard for establishing electrical connections from car to car. The Pullman Company has already equipped most of its cars with this type of connector, and many of the railroads are preparing to make their cars uniform with the standard practice. Other subjects considered were the change from 110 to 64 volts for head-end train-lighting systems, the use of 30-volt tungsten lamps for train-lighting and a standard classification of accounts.

Fire in Des Moines.—On May 26, 1910, at 3.50 a.. m., fire started in the south half of the car house of the Des Moines (Ia.) City Railway at Second Street and Locust Street, Des Moines, where emergency line wagons and line construction headquarters were maintained. The night men were eating lunch, preparatory to starting early morning work when the fire started, and the flames gained such headway that it was possible to get only one car and 5 horses out of the building. One of the horses was badly burned and had to be shot. Twenty-one cars, of which 14 were double-truck passenger cars, all in regular service, four single-truck line cars, a wrecking car and single-truck passenger car were destroyed. The property was all insured, and a settlement has been made. Up to June 6, 1910, the company had not closed any orders for replacing the equipment destroyed. The company proposes to build some double-truck cars in its own shops, but if it is possible to get delivery within 60 or 90 days from the car-builders the company will place an order for 10 or 15 cars. The car house, a brick and frame structure, iron clad, 132 ft. x 132 ft., its contents, and the equipment, were a total loss, aggregating $80,000 to $85,000, with insurance between $40,000 and $45,000.

Arbitration Board Suggested to Fix Physical Values in Toledo.—Nau, Tanner & Rusk, Cleveland, Ohio, who are examining the books of the Toledo Railways & Light Company, Toledo, Ohio, for the city, recently asked to be furnished with a schedule or inventory of the property of the company. Under date of June 10, 1910, Albion E. Lang, president of the company, replied to the communication of Nau, Tanner & Rusk. Mr. Lang said substantially: "We beg to say that some of the information asked for by you is now shown on our books and monthly statements, such as the number of miles of track owned and operated and its location, also the number and type of all cars, number of power stations, car houses, etc. All this, together with the physical property itself, are open for your independent inspection. If the city authorities deem it necessary or desirable for the city of Toledo and this company to agree upon a method of reaching a valuation of our street railway property, as part of a comprehensive solution of the franchise question, we will be pleased to present to any board of engineers, upon whose selection we can both agree, all such detail, data and information as may be required by such engineers in making such valuation. We do not see that the furnishing of such schedule and inventory as you ask, independent of a method of reaching a valuation as above outlined, would make for progress."

LEGISLATION AFFECTING ELECTRIC RAILWAYS

Massachusetts.—The House has passed the bill which provides for an investigation of the common control by holding companies of the gas, electric light and street railway companies. The Senate bill to authorize the Boston Elevated Railway to purchase and hold the stocks and bonds of other street railways has been read a third time in the upper branch. Amendments to this bill provide that the leases of the Tremont Street subway, the Washington Street and East Boston tunnels shall, upon expiration, be extended to the original lessees, the Boston Elevated Railway. The Boston company is willing to accept extensions of these leases to the dates when the bonds issued by the City of Boston to pay for the construction of the subways and tunnels respectively become due, at a rate of rental in each case to be determined by the Railroad Commission and Boston Transit Commission, sitting jointly. The House bill to authorize the use by street railways of the tracks of steam railroads has been passed by the Senate to be engrossed. The resolution relative to the electrification of steam railroads in the Boston district has been passed to be engrossed by the Senate, with an amendment which exempts the Boston, Revere Beach & Lynn Railroad, a narrow-gage line. Governor Draper has signed the bill to permit the New York, New Haven & Hartford Railroad to purchase the stock of the Berkshire Street Railway. Under the terms of the act the company will expend approximately $2,000,000 on extensions and improvements. Governor Draper has also signed the bill to provide for an investigation by all the standard-gage steam railroads operating at Boston of the problem of electrification within the metropolitan district, the results to be reported to the Joint Commission on Metropolitan Improvements during the coming fall, to form the basis of a further report by the commission, this second report to be submitted to the Legislature of 1911 early in January. The House resolution to provide for an investigation of the common control of gas, electric light and street railway companies by persons, firms and corporations has been rejected by the Senate, as recommended by the committee on ways and means. The bill to authorize the Boston & Eastern Electric Railroad to build a tunnel under Boston Harbor has been passed to be engrossed. A resolution to provide for an expression of opinion by the voters of the State as to the desirability of steam railroad and street railways combining has been defeated in the House.

Financial and Corporate

New York Stock and Money Market

June 14, 1910.

Wall Street during the past week has been in a state of uncertainty and of conflict. Prices have been ragged and irregular; rumors have been plentiful and trading has been spasmodic. Dealing is done by professionals, and there is no evidence of outside investment or speculation.

Rates for money continue to be low and the banks are liberally supplied. It is not so easy, however, for small traders to borrow, as bankers are very conservative. Rates to-day were: Call, 2½ to 3 per cent; 90 days, 3¼ to 3½ per cent.

Other Markets

Tractions have been dull in the Philadelphia market during the past week. The report circulated to-day that Ladenburg, Thalmann & Company, New York, N. Y., had been buying Rapid Transit securities caused some activity in the stock, but the price did not materially advance.

In Chicago there has been some trading in Chicago Railways stocks—all of the series being dealt in. There have been only nominal changes in price. Other tractions have been neglected.

There continues to be some trading in Boston Elevated and the Massachusetts Electric issues in the Boston market, although it is not as active as a few weeks ago. Prices are barely being maintained at former levels.

United Railways stock has been selling in the Baltimore market in small lots at 13 to 13⅛. The market is beginning to take some interest in the issue. The bonds are still selling at old figures.

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

	June 7.	June 14.
American Railway Company	a44	a44¼
Aurora, Elgin & Chicago Railroad (common)	*57¾	a60
Aurora, Elgin & Chicago Railroad (preferred)	*94¼	a93
Boston Elevated Railway	a128	a127
Boston & Suburban Electric Companies	14	a14
Boston & Suburban Electric Companies (preferred)	a74½	a74¼
Boston & Worcester Electric Companies (common)	a10½	a10½
Boston & Worcester Electric Companies (preferred)	a41	a41
Brooklyn Rapid Transit Company	78⅞	77½
Brooklyn Rap. Transit Company, 1st pref. conv. 4s	83½	83¾
Capital Traction Company, Washington	a131	a130
Chicago City Railway	a195	a195
Chicago & Oak Park Elevated Railroad (common)	*3¼	*3¼
Chicago & Oak Park Elevated Railroad (preferred)	*7½	*7½
Chicago Railways, ptcptg., ctf. 1	a75	a80
Chicago Railways, ptcptg., ctf., 2	a19	a18½
Chicago Railways, ptcptg., ctf., 3	a9	a11
Chicago Railways, ptcptg., ctf. 4s	a5½	a6⅜
Cleveland Railways	*91½	*91½
Consolidated Traction of New Jersey	a75	a76
Consolidated Traction of N. J. 5 per cent bonds	a104	a103½
Detroit United Railway	50½	*50½
General Electric Company	143½	146½
Georgia Railway & Electric Company (common)	a110	a107½
Georgia Railway & Electric Company (preferred)	a88	*88
Interborough-Metropolitan Company (common)	18⅞	18½
Interborough-Metropolitan Company (preferred)	51⅞	52¼
Interborough-Metropolitan Company (4½s)	78¾	79
Kansas City Railway & Light Company (common)	a25	a25½
Kansas City Railway & Light Company (preferred)	a76¾	a79
Manhattan Railway	130	136
Massachusetts Electric Companies (common)	a16½	a16¾
Massachusetts Electric Companies (preferred)	a82½	a83
Metropolitan West Side, Chicago (common)	*18	a21
Metropolitan West Side, Chicago (preferred	*56	a62¼
Metropolitan Street Railway	*15	*15
Milwaukee Electric Railway & Light (preferred)	*110	*110
North American Company	67¾	69⅛
Northwestern Elevated Railroad (common)	*17	a18
Northwestern Elevated Railroad (preferred)	*56	a57
Philadelphia Company, Pittsburg (common)	a47½	a48½
Philadelphia Company, Pittsburg (preferred)	a44	a43½
Philadelphia Rapid Transit Company	a18½	a19½
Philadelphia Traction Company	*85¼	*85¼
Public Service Corporation, 5 per cent col. notes	*96	*96
Public Service Corporation, ctfs.	a102	a101
Seattle Electric Company (common)	a111¾	a110½
Seattle Electric Company (preferred)	a102½	a101
South Side Elevated Railroad (Chicago)	a65	a62
Third Avenue Railroad, New York	5½	5¾
Toledo Railways & Light Company	*9¼	8½
Twin City Rapid Transit, Minneapolis (common)	109¼	109½
Union Traction Company, Philadelphia	a47¼	a46¼
United Rys. & Electric Company, Baltimore	a13	*13
United Rys. Inv. Co. (common)	*37	*37
United Rys. Inv. Co. (preferred)	*65	*65
Washington Ry. & Electric Company (common)	a33¼	a34
Washington Ry. & Electric Company (preferred)	86½	a87½
West End Street Railway, Boston (common)	a88	*88
West End Street Railway, Boston (preferred)	a102½	*102½
Westinghouse Elec. & Mfg. Company	61¼	61
Westinghouse Elec. & Mfg. Company (1st pref.)	*125	a125

a Asked. * Last Sale.

Plan for Merger of Chicago Railways and Consolidated Traction Company.

At the meeting held in New York on June 8, 1910, between the representatives of the Chicago (Ill.) Railways and the Chicago Consolidated Traction Company to consider the differences which were responsible for the appointment of receivers for the Chicago Railways, the consolidation of the companies was considered, and a committee, consisting of J. B. Payne, W. O. Underwood, L. C. Krauthoff, Andrew Cook, J. W. Hamer, Charles G. Dawes and Edward C. Kohlsaat was appointed to consider the matter and report at a meeting to be held in Chicago on June 14, 1910. The following tentative plan for the merger has been suggested, and is said to have been accepted as satisfactory by practically all of the representative parties involved:

"1. With a view to adjusting all complications and controversies and in the interest of the public and all concerned, the Chicago Railways is willing to purchase all of the lines and properties of the Chicago Consolidated Traction system (within and outside the city limits), free and clear of all liens, incumbrances and charges, and accompanied by the release of all claims, demands, and liabilities of every nature and character, in respect of said properties and of the holders of each and every outstanding security of said company and its constituents against the Chicago Railways, or any other corporation, person, or property.

"The above is upon condition that the necessary franchise ordinance will be passed or that the necessary amendments to the Chicago Railways ordinance will be made.

"The Chicago Railways will rehabilitate the properties within the limits of the city by means of bonds issued under a new rehabilitation mortgage, or if the same can be done, under its existing first (or rehabilitation) mortgage.

"2. The Chicago Railways, for the purpose of acquiring said properties and in consideration of said releases, will create:

"(a) A purchase money mortgage to secure an authorized issue of $———— of purchase money bonds. This mortgage will be a lien on the property purchased, subject to a mortgage securing rehabilitation bonds. The purchase money mortgage will also be a lien on the property of the Chicago Railways subject to existing first and consolidated mortgages.

"(b) A funding mortgage to secure an authorized issue of $———— income bonds. The principal obligation to be absolute, but the interest to be payable only out of the annual earnings of the two properties after paying prior charges. This mortgage will be a lien on the two properties, subject to the aforesaid purchase money, rehabilitation, and consolidated mortgages.

"3. The purchase money bonds to be issued:

"(a) For the principal of the underlying bonds of the North Side lines.

"(b) For the principal of the underlying bonds of the Cicero & Proviso Street Railway and Ogden Street Railway, to the extent of an amount equal to the same percentage on the valuation to be placed by the city on that portion of the lines of said companies which lie within the city limits, which the new bonds to be issued for the underlying bonds of the North Side lines may bear to the aggregate of the city valuation placed on said North Side lines within the said city.

"(c) To provide funds to pay allowances and charges in receivership proceedings, etc., say, $800,000.

"4. The funding bonds to be issued:

"(a) For 50 per cent of the stock of the North Shore Street Railway.

"(b) For 50 per cent of the principal of the bonds of the Evanston Electric Railway.

"(c) For 50 per cent of the principal amount of the general mortgage bonds of the Consolidated Traction Company.

"(d) For 50 per cent of the balance of the principal amount of the Cicero & Proviso Street Railway and Ogden Street Railway bonds, after deducting the amount of the purchase money mortgage bonds issued on account of said bonds.

"(e) For the accrued interest on the underlying bonds of the North Side Electric Railway and for the same proportion of the accrued interest of the Cicero & Proviso Street Railway and Ogden Street bonds as the percentage of

purchase money bonds to be issued on account thereof.

"5. The rate of interest on said purchase money mortgage shall be 4 per cent for the first five years and 5 per cent thereafter. The rate of interest on said funding income bonds, payable out of annual earnings as aforesaid, shall be 4 per cent per annum, noncumulative.

"6. This proposition is open until June 14, 1910, and during such longer period as the Chicago Railways may from time to time and in its discretion specify."

Philadelphia Rapid Transit Company Financing

Special meetings of the stockholders of the Philadelphia (Pa.) Rapid Transit Company and the Union Traction Company, Philadelphia, Pa., have been called for June 20, 1910, to authorize the directors to carry into effect the plans for financing the proposed loan of $5,000,000 which were prepared by a committee composed of J. J. Sullivan, Robert A. Balfour, George W. Elkins, William H. Shelmerdine and Clarence Wolf. In the Electric Railway Journal of June 4, 1910, page 1005, the statement of the Philadelphia Rapid Transit Company, giving a brief outline of the plans for refinancing, was published. The report by Messrs. Sullivan, Balfour, Elkins, Shelmerdine and Wolf says:

"The Philadelphia Rapid Transit Company at present is the owner of an insurance fund of a present value of upward of $1,750,000. This represents an investment of cash in the insurance business of but $250,000, which was charged to the capital account of the Union Traction Company in 1896, when the insurance fund was first started. The balance of the fund represents accumulations, or rather profits, which have accrued to the companies from having carried their own insurance, their payments into the fund never having been any greater than would have been required had the indemnity been carried in insurance companies. The wisdom of thus carrying insurance has been fully justified by the resulting profit of $1,500,000. But the requirements of the company to-day for improving its system and conducting transportation are such that it can no longer afford to tie up nearly $2,000,000 in a collateral business, however profitable.

"When this property was leased by the Union Traction Company to the Philadelphia Rapid Transit Company in 1902 the Union Traction Company received credit in the settlement for the full value of this fund as it then stood, $850,000, so that the fund to-day is the absolute property of the Philadelphia Rapid Transit Company. The lease, however, provides that the railroad property shall be kept insured by a fund and by policies in at least as large an amount as was carried at the time of the lease, and the clause of the lease referring to insurance vests with the boards of directors of the two companies the power to say to what extent this insurance shall be carried in companies and to what extent by the fund.

"It being so plainly to the advantage of the property at this time to use this fund for other purposes, and to substitute for the protection which it affords policies in accredited companies, the recommendation of this committee to both corporations is that additional insurance should be placed on the property to the extent of at least $1,850,000, whereupon the insurance fund should be released and the Philadelphia Rapid Transit Company, as the managing company, be permitted to use the securities as the basis of a loan or to sell the same, the money in either event to be applied to the general corporate requirements of the company.

"An additional method of financing recommended by your committee is for the Union Traction Company to purchase from the Philadelphia Rapid Transit Company all its rolling stock for $1,500,000, and then to lease the same to the Philadelphia Rapid Transit Company for 10 years, at a yearly rental of one-tenth of said purchase money and interest at 5 per cent, and at the end of said lease to sell the same to the Philadelphia Rapid Transit Company upon payment of $1. In order to obtain the money to make such purchase, the Union Traction Company will create a car trust on an assignment of said lease and a guarantee by it of the rentals payable thereunder. This equipment has already been inventoried and appraised by an expert selected by the fiscal agents of the Philadelphia Rapid Transit Company, Drexel & Company, the amount of the appraisement being upward of $2,000,000. Your committee has conferred with Drexel & Company, who are willing to purchase this issue of car trust certificates, amounting in the aggregate to $1,500,000, the certificates to carry a return at the rate of interest of 5 per cent per annum.

"The details of the car trust will be left in the hands of the attorneys for the two companies and the bankers, with instructions, however, that the papers are to be so drawn as to protect fully the Union Traction Company, both with respect to title and possession of the equipment, in case default should at any time be made by the Philadelphia Rapid Transit Company."

Atchison Railway, Light & Power Company, Atchison, Kan.—W. B. McKinley, Champaign, Ill., and his associates in the Illinois Traction System, have exercised the option which they secured recently on a controlling interest in the Atchison Railway, Light & Power Company. Mr. McKinley is reported to have said: "It is our intention to build an interurban railway to connect Atchison with St. Joseph and Leavenworth, but it is a little premature to announce exactly what we intend to do, as we have not decided."

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—The Chambersburg, Greencastle & Waynesboro Street Railway has filed a mortgage for $1,000,000 in favor of the Chambersburg Trust Company, Chambersburg, Pa., to secure an issue of bonds in that sum to retire $300,000 of first mortgage bonds and $300,000 of second mortgage bonds, the remainder to be used for improvements and extensions.

Connecticut Valley Street Railway, Northampton, Mass.—The stockholders of the Connecticut Valley Street Railway have voted to issue $100,000 of 6 per cent. cumulative preferred stock to be offered in exchange, at par, for an equal amount of the first and refunding bonds of the company due on June 1, 1929. The exchange is subject to the approval of the Railroad Commissioners.

Consolidated Railway & Power Company, Fayetteville, N. C.—The property of the Consolidated Railway & Power Company was sold under foreclosure recently to J. S. Newton, Fayetteville, N. C., and his associates, for $65,500. Henry T. Deshat, Philadelphia, Pa., representing the bondholders, bid $65,000 for the property. This is the second time the property has been offered for sale recently under foreclosure, the court not having confirmed the bid made at the previous sale.

Dayton, Covington & Piqua Traction Company, Dayton, Ohio.—Wirt Kessler, West Milton, Ohio, and W. A. Gibbs, Cambridge, Ohio, formerly division manager of the Ohio Electric Railway, have been elected directors of the Dayton, Covington & Piqua Traction Company.

Eastern Ohio Traction Company, Cleveland, Ohio.—On June 11, 1910, the eastern division of the Eastern Ohio Traction Company system was sold at auction by Robert D. Beatty, receiver of the company, to H. P. McIntosh, president of the Guardian Trust Company, as representative of the first-mortgage bondholders, for $755,334, which is about $5,000 more than the upset price. The holders of the $1,000,000 of bonds have agreed to accept $800,000 of new bonds and forego their interest for two years, so that the property may be rehabilitated.

Hammond, Chicago Heights & Southern Traction Company, Chicago, Ill.—The Hammond, Chicago Heights & Southern Traction Company, which has a 16-mile line under construction between Hammond and Lansing, has filed a first mortgage with the Western Trust & Savings Bank, Chicago, Ill., as trustee, to secure an issue of $250,000 of 5 per cent 30-year bonds.

Illinois Traction System, Champaign, Ill.—The McKinley interests, which control the Illinois Traction System, have purchased the property of the Marseilles Water & Light Company and the Marseilles Land & Water Company, Marseilles, Ill., which includes a hydroelectric station of 3000-hp capacity and a transmission line from Marseilles to Ottawa, paralleling the Chicago, Ottawa & Peoria division of the Illinois Traction System.

Massachusetts Electric Companies, Boston, Mass.—Curtis & Sanger, Estabrook & Company, Parkinson & Burr

and H. C. Wainwright & Company, Boston, Mass., are offering at 123½ and accrued dividends, yielding 4.85 per cent, the unsold portion of $403,000 of cumulative preferred stock of the Old Colony Street Railway, and $587,600 of cumulative preferred stock of the Boston & Northern Street Railway.

Norfolk & Portsmouth Traction Company, Norfolk, Va.—The directors of the Norfolk & Portsmouth Traction Company have declared operative the plan for refinancing the company proposed by Middendorf, Williams & Company, Baltimore, Md., and have called for deposits of stock with the Trust Company of North America, Philadelphia, Pa. An abstract of the letter to the stockholders of the company announcing the plan was published in the ELECTRIC RAILWAY JOURNAL of May 28, 1910, page 957.

Northampton Traction Company, Easton, Pa.—James W. Fox, Howard Thomas, Charles E. Hoch and J. Fred Mooney have been elected directors of the Northampton Traction Company to succeed Chester Snyder, A. R. Dunn, W. J. Daub and F. S. Bixler.

Northwestern Corporation, Walla Walla, Wash.—The American Power & Light Company, New York, N. Y., which is controlled by interests identified with the Electric Bond & Share Company, New York, N. Y., has acquired from the Northwestern Corporation, through H. M. Byllesby & Company, Chicago, Ill., the electric railways in Walla Walla, the interurban electric railway from Walla Walla to Milton, the gas properties in Walla Walla and North Yakima, Wash.; Lewiston, Idaho, and Pendleton, Ore.; the electric light properties in Walla Walla, Pendleton and Athena, and other interests.

Owensboro (Ky.) City Railroad.—The Owensboro City Railroad has filed a mortgage with the American Trust & Savings Company, Evansville, Ind., to secure an issue of $200,000 of second mortgage bonds to be used for extensions and improvements.

Sedalia Light & Traction Company, Sedalia, Mo.—E. F. Swinney and William H. Powell have been appointed temporary receivers of the Sedalia Light & Traction Company. John P. Reynolds, Arthur Wainwright and Frederick J. Bradlee, Boston, Mass., have been appointed a committee of bondholders to receive deposits of bonds.

Sioux City (Ia.) Service Company.—N. W. Halsey & Company, Chicago, Ill., are offering for subscription at 97 and interest the $1,000,000 of first and refunding mortgage sinking fund gold bonds of the Sioux City Service Company, which they purchased recently, as noted in the ELECTRIC RAILWAY JOURNAL of May 7, 1910, page 846. These bonds are dated Jan. 1, 1910, and are due Jan. 1. 1928, but are redeemable at 105 on any interest date.

Twenty-eighth & Twenty-ninth Streets Crosstown Railroad, New York, N. Y.—The sale of the property of the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad under foreclosure has been postponed until June 29, 1910.

United Railroads, San Francisco, Cal.—White, Weld & Company, New York, N. Y., and J. S. Wilson, Jr., & Company, Baltimore, Md., offer at par and interest equipment 6 per cent gold certificates of the United Railroads, guaranteed as to principal and interest by the United Railways Investment Company. The total issue of certificates is $400,000, dated July 15, 1910, and maturing $50,000 annually from July 15, 1911, to July 15, 1918, inclusive, without option of prior redemption. The certificates are secured on 80 pay-as-you-enter cars, which cost $500,000, $100,000 having been paid in advance in cash.

West Penn Traction Company, Connellsville, Pa.—An initial quarterly dividend of 1½ per cent has been declared on the preferred stock of the West Penn Traction Company, payable June 16, 1910, to holders of stock of record on June 15, 1910.

Youngstown & Ohio River Railroad, Salem, Ohio.—The Youngstown & Ohio River Railroad has sold to C. E. Denison & Company, Boston, Mass., and Cleveland, Ohio, $1,000,000 of an authorized issue of $2,500,000 of first mortgage 5 per cent bonds, dated April 1, 1910, and due on April 1, 1935, but subject to call after 5 years at 105 and interest. Interest is payable in April and October at the First National Bank in New York, or at the office of the Citizens' Savings & Trust Company, Cleveland, Ohio.

Traffic and Transportation

Trail Car Operation in Washington

The Interstate Commerce Commission, Washington, D. C., on June 11, 1910, ordered that Section 27 of the rules and regulations for the operation of trail cars in the District of Columbia be stricken out and that a new section be substituted to provide that after Jan. 1, 1912, no trail car shall be operated in the District of Columbia to carry passengers, unless it is equipped with double trucks and there is a separate conductor for each car of the train.

In connection with this matter the District Electric Railway Commission, under date of June 9, 1910, transmitted a letter to the Interstate Commerce Commission recommending the promulgation of this order. In this letter the District Electric Railway Commission said, in part:

"Subsequent to the promulgation by the Interstate Commerce Commission of the order of Feb. 18, 1910, requiring that each car operating in the District of Columbia shall be in charge of a separate conductor, and in obedience to a subsequent order of your commission, a communication has been received from each of the two principal companies operating trail cars, which communication sets forth in detail the plans of the respective companies relative to the trailer proposition. These communications state, among other matters:

"First: That both companies intend to cease operating trailers after Oct. 1, 1913.

"Second: That it has been the policy of both companies for some time past gradually to eliminate the trailer and that they propose to continue that policy as rapidly as circumstances may justify or means permit.

"Third: That the Washington Railway & Electric Company does not intend to extend the operation of trailers to any lines other than those on which this equipment is now being operated.

"Fourth: That on and after Oct. 1, 1910, the Washington Railway & Electric Company proposes to discontinue the operation of trailers on the regular all-day schedules on the Ninth Street and Georgetown lines, and limit the operation of trailers to tripper service and additional extra service during rush hours.

"Fifth: That in the case of the Capital Traction Company the remodelling of two car barns and an increase of power plant will be necessary before all the trains now in operation can be replaced with larger single equipment.

"Sixth: That the abandonment of the present double equipment, even in the time prescribed in their statement, will entail a heavy financial loss, especially in the case of the Capital Traction Company, the greater portion of which company's equipment is of the single truck motor and trailer type.

"Previous communications received from these companies contain statements concerning the cost of providing two conductors for all trains operated and the alleged danger of having two conductors, through the misunderstanding of signals.

"The Washington Railway & Electric Company has ordered for delivery by Aug. 1, 1910, 50 new double-truck pay-as-you-enter cars to replace the trains now in service on the Ninth Street and Georgetown lines, and the Capital Traction Company is remodelling its Georgetown car barn and has purchased a site for a new power station.

"After a most careful investigation this commission has concluded to limit the time in which the present single-truck double equipment may be operated in the District of Columbia, providing what is thought to be a reasonable period in which to secure substitute equipment, as well as means for housing and power to operate the same, and to specify certain conditions under which double-truck trailers only may be operated after the expiration of that period.

"This commission has the honor to recommend, therefore, that the order of your commission relative to the provision of a separate conductor for all cars operated in the District of Columbia, promulgated on Feb. 18, 1910, be rescinded, and that in lieu thereof, there be promulgated an order to the effect that after Jan. 1, 1912, no trail car shall be operated in the District of Columbia to carry passengers unless

it is equipped with double trucks and there is a separate conductor for each car of the train."

The communication then refers to improvements made by both the Washington Railway & Electric Company and the Capitol Traction Company, on their own initiative and at the suggestion of the commission, improvements in schedules and other matters that are largely of local interest, and concludes as follows:

"These and other improvements, together with the partial elimination of trailers, have added much to the comfort, convenience and safety of the traveling public, and this commission is pleased to note that there appears to be a general tendency on the part of the railways to continue this policy and maintain an efficient, safe and up-to-date service."

Bulletin to St. Louis Employees on Courtesy

In a bulletin addressed to its employees and posted in the car houses of the company, recently, the United Railways, St. Louis, Mo., says:

"1. All passengers are entitled to civil, polite treatment. Do not lecture nor scold, nor make sharp retort. Keep silent if you can not make courteous reply. All this, notwithstanding there may be provocation.

"2. Be patient and courteous, especially to women; do not offend a woman by word or act; do not lay your hands on a woman or child, except to save them from injury; do not have a woman arrested or in any way offer her an indignity.

"3. Stop for passengers; do not run by any one. Take them on in safety and land them safely. It is not humane to injure any one, nor is the responsibility for having done so pleasant. All the passengers place their comfort and safety and the pleasure of the ride in your hands; do not disappoint them.

"4. Be prompt, industrious and persistent in the collection of fare. Disputes as to payment of fare or the validity of transfers are unfortunate, but when the conductor has made every civil and respectful endeavor to set the matter right he has performed his duty—there being a possibility of error on both sides—and he will not go to the extreme of a quarrel, a fight or an ejection from the car.

"5. In making change, take pains to be accurate, and if the change given is unsatisfactory, give other change, and do not dispute over it; a very important part of your duty is to please every passenger."

Fare Change on New Hampshire Electric Railway.—The New Hampshire Electric Railways, Haverhill, Mass., is following again this year the plan adopted about a year ago whereby on certain lines it charges a 5-cent fare from May 1 to Nov. 1, and a 6-cent fare from Nov. 1 to May 1. This arrangement was made to accord with certain local conditions, and particularly with reference to pleasure traffic on certain branches of the company's system.

Increase in Wages on Lowell & Fitchburg Street Railway.—The Lowell & Fitchburg Street Railway, Ayer, Mass., which for some time has paid motormen and conductors in its employ a flat rate of 20 cents an hour, has recently established the following graduated scale of wages: First year, 20 cents per hour; second year, 21 cents per hour; third year, 22 cents per hour; fourth year, 23 cents per hour; fifth year, 24 cents per hour; thereafter, 25 cents per hour.

Change Proposed in Issuing Transfers in Tacoma.—The Tacoma Railway & Power Company, Tacoma, Wash., proposes to return to the system of having conductors issue transfers when passengers pay their fares, instead of having the conductors issue the transfers at junction points. The system of having conductors issue transfers at junction points has been in use for two years, and it is to be abandoned on account of the delay in car movement which is caused when a number of passengers desire to change at the same intersection.

Employees Accept Company's Offer in Detroit.—The employees of the Detroit (Mich.) United Railway have voted to accept the terms of service proposed by the company and to dissolve the board of arbitration, of which two members had been selected. The new schedule of wages calls for 23 cents an hour for the first six months, 26 cents an hour for one year and 28 cents an hour after eighteen months, whereas the former terms of service provided for 23 cents an hour for the first year, 25 cents for the second year and 27 cents after two years had been served with the company.

Fare Boxes in Pittsburgh.—On June 13, 1910, the Pittsburgh (Pa.) Railways put fare boxes in operation on its 40 new pay-on-entrance cars. Previous to putting these fare boxes in operation the company circulated among its patrons a leaflet describing the proper method of paying for the ride, and the suggestion was made that if they had the exact change or a ticket they could pass into the car quickly and, possibly, ahead of other passengers who had to wait for change. The result of this campaign of education was very satisfactory, and up to 8 a. m., with the 40 cars, only about $60 to $70 in change had been required.

Increase in Fare on Atlantic City Lines.—On June 1, 1910, the fare between Atlantic City and Pleasantville, on both the Atlantic City & Shore Railroad and the Atlantic & Suburban Railway, was increased. Heretofore there has been a straight 5-cent fare to Pleasantville, a distance of 7 miles, over the intervening marsh land between Pleasantville and Atlantic City, which provides practically no traffic. Under the new arrangement there are three rates of fare: Monthly commutation, 60 rides (within the month), $3.90; package tickets, six rides, 50 cents; cash fare, 10 cents. This increases the fare to Ocean City and intermediate points, but rates in the fare zones beyond Pleasantville have not been increased.

Handling Six-Cent Fares During Heavy Traffic.—On days when traffic was heavy the Hartford & Springfield Street Railway, Warehouse Point, Conn., experienced difficulty in taking up the 6-cent fare which it has been collecting for the last seven months. H. S. Newton, general manager of the company, has devised a plan of having a ticket agent start from the rear end of the car to sell 6-cent tickets, while the conductor starts in the usual manner and collects fares in the front of the car. By the time the two men meet about half the passengers on the car have been provided with 6-cent tickets, which are easily collected by the conductor. This method makes it possible to save time and to collect all fares on through lines. The use of ticket agents on the cars is confined to only three limits.

Traffic Agreement Between Schenectady and Albany Companies Approved.—The Public Service Commission of the Second District of New York has approved a traffic agreement made in 1908 between the United Traction Company, Albany, N. Y., and the Schenectady Railway in relation to the use of the tracks of the United Traction Company by the Schenectady Railway in Albany, Watervliet, Troy and Green Island, which provides that the Schenectady Railway may operate its passenger cars over the tracks owned by the United Traction Company in Albany, solely as agent of the United Traction Company, and that the Schenectady Railway as agent may operate its passenger cars over the tracks owned and leased by the United Traction Company in Watervliet, Troy and Green Island.

Interstate Commerce Commission Overruled.—The United States Circuit Court of Appeals has denied the jurisdiction of the Interstate Commerce Commission over street railways whose lines traverse adjoining cities which are in different states. In effect the decision restores the condition under which the Omaha & Council Bluffs Street Railway charged a 10-cent fare from either Omaha or Council Bluffs across the Missouri River bridge and into the loop district of either city, and an additional fare of 5 cents from the loop district to the outlying portions of the city. The complaint against the company was brought by the West End Improvement Club, and an abstract of the conclusions of the commission in the case was published in the Electric Railway Journal of Dec. 25, 1909, page 1281.

Steam-Electric Agreement Approved.—The Public Service Commission of the Second District of New York has approved an agreement between the Central New England Railway and the Poughkeepsie City & Wappingers Falls Railway which provides for passenger service over the Central New England Railway, from the freight station formerly occupied by the Poughkeepsie & Eastern Rail-

road to the Hudson River State Hospital, and from a point near the hospital to the junction of the Central New England Railway, with the main line of the New York Central & Hudson River Railroad in Poughkeepsie. The service is to be furnished by means of electric cars, which are to be operated by the Poughkeepsie City & Wappingers Falls Railway. They will replace the present steam cars operated over this branch.

Increase in Service Ordered on New York Line.—The Public Service Commission of the Second District of New York has ordered the New Paltz, Highland & Poughkeepsie Traction Company, New Paltz, N. Y., to increase its passenger service between Highland and Highland Landing, and to restore the service recently discontinued between Highland Ferry and the crossing of the West Shore Railroad at Highland Landing. The company is ordered to operate a car between the ferry at Highland Landing and the east side of the West Shore Railroad to meet each train operating on the West Shore Railroad and to operate on each week day service leaving New Paltz for the ferry at Highland Landing, about 12 o'clock noon, and a car leaving Highland Landing about 12.45 p. m. for Highland, and one leaving the ferry at Highland Landing about 1.15 p. m. for New Paltz. This service is to begin on June 20, 1910.

Complaint Against New Haven Railroad.—The Public Service Commission of the Second District of New York has served upon the New York, New Haven & Hartford Railroad the complaint of Edwin Fiske, individually, and as Mayor of Mount Vernon, in which he alleges that the present passenger fares over the railroad have been in existence for 31 years; that the number of passengers carried by the railroad in 1880 was about 6,000,000, and is now about 90,000,000; that the population of Mount Vernon consists largely of the families of those who do business in New York City, and travel back and forth daily as commuters on the railroad; and that an increase over the present commutation or regular one-way fares would be unreasonable, unjust, excessive, and in violation of a contract made in 1879 by the defendant and a committee of persons whereby as a consideration for the discontinuance of certain proceedings the New York & New Haven Railroad acquired the right to build a part of its railroad in Westchester County, and the present rates of fares were fixed and agreed upon for the benefit of commuters in that vicinity. The commission has served the complaint upon the railroad with an answer returnable within 10 days.

Arbitration in Connecticut.—In the ELECTRIC RAILWAY JOURNAL of June 11, 1910, mention was made of the agreement entered into by the Connecticut Company and its employees to submit to arbitration the readjustment of the terms of service of the motormen and conductors in the employ of the company. The board of arbitration which is to consider the matter is to be composed of three members, one chosen by the company, one by the men, and the third by these two. Clarence Deming, one of the editors of the *Railway Age Gazette*, who is a resident of New Haven, has been selected by the company as its representative, and it is anticipated that the men will announce the appointment of their representative within a few days. The wages now paid by the company on its several divisions follow: New Haven and Hartford—21 cents the first year, 21½ cents the second year, 22 cents the third year, 23 cents the fourth year, 24 cents the fifth year, 25 cents the sixth year; New London, Stamford, Meriden, Bridgeport, Waterbury, Derby, New Britain, Norwalk and Putnam—20 cents the first year, 21 cents the second year, 22 cents the third year, 22½ cents the fourth year, 23 cents the fifth year, and 24 cents the sixth year; Middletown and Torrington—19 cents the first year, 19½ cents the second year, 20 cents the third year, 21 cents the fourth year, 22 cents the fifth year, 23 cents the sixth year. The men ask for a flat rate of 30 cents an hour, applicable to all divisions, with time and one-half for overtime. Each party to the arbitration is to pay the arbitrator chosen by it for his services, the services of the third arbitrator to be paid for jointly by the company and the men. All expenses of the board of arbitration are also to be borne jointly. The decision reached by the arbitrators is to be binding on the company and the men for not more than two years from June 1, 1910.

Personal Mention

Mr. J. Fred Mooney has been elected secretary of the Northampton Traction Company, Easton, Pa., to succeed Mr. A. R. Dunn, resigned.

Mr. Charles E. Hoch has been elected treasurer of the Northampton Traction Company, Easton, Pa., to succeed Mr. Chester Snyder, resigned.

Mr. A. L. Ruff has been appointed assistant freight and passenger agent of the Oregon Electric Railway and the United Railways, Portland, Ore.

Mr. Sherman Culp has been elected president of the Sandusky, Norwalk & Mansfield Electric Railway, Norwalk, Ohio, to succeed Mr. G. A. Bartholomew.

Mr. S. S. Burtsfield has been elected general manager of the Sandusky, Norwalk & Mansfield Electric Railway, Norwalk, Ohio, to succeed Mr. G. A. Bartholomew, who has retired as president and general manager of the company.

Mr. Horatio A. Foster, who has been associated with Mr. Bion J. Arnold in the appraisal of the property of the Detroit United Railways at Detroit, has recently moved to Pittsburgh, where Mr. Arnold has been engaged by the Mayor to study the traction situation.

Mr. G. A. Bartholomew has retired as president and general manager of the Sandusky, Norwalk & Mansfield Electric Railway, Norwalk, Ohio, and Mr. Sherman Culp has been elected to succeed him as president of the company, and Mr. S. S. Burtsfield has been appointed general manager to succeed him.

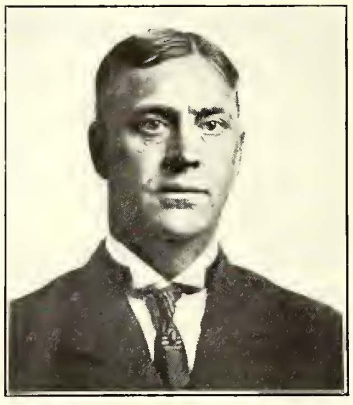
Mr. A. M. Courtney, who has been appointed superintendent of maintenance of way of the San Antonio (Tex.) Traction Company, was born in Clay County, Mo., in March, 1857. At the age of 17 years he left school to drive a six-yoke train of oxen from Los Animas, Col., to Santa Fé, New Mex. He was next employed by the Barlow & Sanderson Overland Stage Line Company. Returning to Missouri, through Iowa and Nebraska, he was employed by various railroads in construction work. Going west again, he entered the service of the Denver & Rio Grande Railroad. Next Mr. Courtney did some prospecting, and for two years was marshal of Liberty, Mo. In 1890 he entered the employ of the San Antonio Traction Company, and has served the company as motorman, conductor, timekeeper and track foreman.

Mr. W. B. Rockwell, general manager of the Syracuse & Suburban Railroad, Syracuse, N. Y., has resigned to accept the position of manager of the Eastern Pennsylvania Railways, Pottsville, Pa. He will assume the duties of his new position within a few days. Mr. Rockwell was one of the pioneers in electric traction, having taken an active part in the construction of one of the early Van Depoele roads in Scranton, Pa., in 1885. Subsequently he built other roads at Athens, Pa., and Middletown, N. Y. He also constructed the Staten Island Midland Electric Railway, and in 1895 planned and built Midland Beach on the southern shore of Staten Island, now one of the most popular beach resorts around New York City. He left Staten Island to become manager of the Syracuse, Lake Shore & Baldwinsville Railway and then of the Syracuse, Lake Shore & Northern Railway, resigning the latter position to become general manager of the Syracuse & Suburban Railroad. The general managers of the Eastern Pennsylvania Railways, with which Mr. Rockwell is now connected, are J. G. White & Company, Inc., New York, N. Y.

Mr. J. M. Boyer, who has been appointed superintendent of the Marion Railway, Light & Power Company, Marion, Ohio, to succeed Mr. Kade Neiswender, resigned, began his railway career as a motorman with the Columbus Railway & Light Company, Columbus, Ohio, on June 5, 1893. In 1902 Mr. Boyer resigned from the Columbus Railway & Light Company to become connected with the Columbus, Buckeye Lake & Newark Traction Company, operating an interurban railway from Columbus to Newark, Ohio, and continued with the company for more than three years. On March 1, 1905, Mr. Boyer entered the service of the Columbus, London & Springfield Railway. Later, the Columbus, London & Springfield Railway was purchased by the Ohio Electric Railway, with which company Mr. Boyer

continued in the freight department. From March 1, 1905, to March 1, 1907, Mr. Boyer was employed in the office of the Ohio Electric Railway, and from March 1, 1907 to Sept. 1, 1907, he was train dispatcher for the company. On Sept. 1, 1907, he became connected with the Buffalo & Lake Erie Traction Company, in charge of the interurban line from Erie to Westfield, N. Y. On March 1, 1910, he resigned from the Buffalo and Lake Erie Traction Company, and on June 1, 1910, was appointed superintendent for the Marion Railway, Light and Power Company.

Mr. M. E. Graston has been appointed general manager of the Indianapolis, New Castle & Toledo Traction Company, New Castle, Ind. Mr. Graston has been in railroad work for the last 21 years. He entered the service of the Cleveland, Cincinnati, Chicago & St. Louis Railway in 1889, and finally became station agent of the company at Wabash and at Rushville. In January, 1905, Mr. Graston became connected with the Indiana Union Traction Company, Anderson, Ind., as division freight and passenger agent, with headquarters at Indianapolis. He has resigned from the Indiana Union Traction Company to become connected with the Indianapolis, New Castle & Toledo Traction Company, and was to enter upon his duties with that company on June 15, 1910. Mr. Graston will have his headquarters at Indianapolis. The Indianapolis, New Castle & Toledo Electric Railway is a 40-mile electric railway under construction to connect Indianapolis, Greenfield, New Castle, Muncie, Richmond, Winchester and Toledo.



M. E. Graston

Mr. H. M. Adams, general freight and passenger agent of the Spokane, Portland & Seattle Railway, has also been appointed general freight and passenger agent of the Oregon Electric Railway and the United Railways, Portland, Ore., in which offices he will be assisted by Mr. A. L. Ruff, who has been made assistant freight and passenger agent of the Oregon Electric Railway and the United Railways. Mr. Adams was born at Clinton, Ia., on Jan. 3, 1867, and entered railway service in 1880 as a messenger with the St. Louis & San Francisco Railway at Cherryvale, Kan. Subsequently he served with the Kansas City, Fort Scott & Gulf Railroad and the Southern Kansas Railroad in various capacities, and in 1886 became chief clerk in the general baggage department of the Southern Kansas Railway. He continued with the Southern Kansas as clerk, and in other capacities, until October, 1887, when he entered the employ of the Oregon Railway & Navigation Company as chief clerk of the general baggage department. On Dec. 1, 1889, Mr. Adams accepted a position with the Union Pacific Railway at Portland. From June 1, 1890, to June 10, 1893, he was baggage agent of the United Carriage & Baggage Transfer Company at Portland. Mr. Adams then spent a year in South America. On his return he served consecutively as ticket clerk of the Union Pacific Railway and Oregon Railway & Navigation Company at Seattle, clerk with the Oregon Railway & Navigation Company at Portland, traveling freight and passenger agent of the Oregon Railway & Navigation Company, chief clerk of the general freight department of the company, general agent of the company at Spokane, assistant general freight agent of the company at Portland and assistant traffic manager of the Great Northern Railway at Seattle, Wash.

OBITUARY

A. R. Seagrave, formerly well known as a street and electric railway promoter, died at Toledo, Ohio, on May 31, aged 75 years. Mr. Seagrave was one of the officers of the Central Passenger Railroad, Toledo, which was absorbed by the Toledo Railways & Light Company.

Construction News

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

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

RECENT INCORPORATIONS

Marysville & Colusa Railway, Colusa, Cal.—Incorporated in California to build a 30-mile railway from Marysville through Yuba City to Colusa. Capital stock, authorized, $1,500,000, of which $30,000 has been subscribed. Directors: Charles H. Hammon, Leon J. de Sabla, Samuel Lilienthal, George E. Springer and Herbert W. Furlong. [E. R. J., May 14, '10.]

***San Francisco & Transbay Railroad, Niles, Cal.**—Application for a charter has been made in California by this company to build a 70-mile suburban railroad from Niles to Dumbarton and crossing the bay with connections to Redwood City and Woodside through San Francisco. A branch is to run from Redwood to Woodside and from Dumbarton to Warm Springs. Capital stock, authorized, $1,500,000; stock subscribed, $70,000. Incorporators: E. Schnulenbaus, J. Comerford, A. Mulverhill and L. Block, San Francisco.

Kansas City, Kaw Valley & Western Railway, Bonner Springs, Kan.—Chartered in Kansas to build an interurban electric railway to connect Bonner Springs and Kansas City, and with the ultimate purpose to extend the line to Lawrence and Topeka. It is expected to start construction within the next few months. This new company will take over the property of the Kansas City & Bonner Springs Railway, which has 5 miles in operation, and will connect with the Kansas City Western Railway from Bethel to Kansas City. Capital stock, $1,500,000. Headquarters, Bonner Springs. Incorporators: John W. McDanield, John C. Finney, Bonner Springs; A. L. Cooper and W. H. Caffrey, Kansas City, Mo., and Charles Knabb, Hiawatha. [E. R. J., Aug. 7, '09.]

***Horse Cave & Eastern Railway, Horse Cave, Ky.**—Application for a charter will be made by this company in Kentucky to build a 25-mile railway from Horse Cave, Ky., on the Louisville & Nashville Railroad, southeast via Hiseville and Knob Lick to Edmonton. The line will eventually be extended 25 miles southeast to Burkesville, on the Cumberland River. It is expected to use gasoline or gasoline electric cars for passenger and mail service, and steam will be used for handling freight. Surveys will be made in July. Louis Edwards, 1463 Arlington Avenue, St. Louis, Mo., is the promoter.

***Southern Pennsylvania Traction Company, Chester, Pa.**—Chartered in Pennsylvania to operate a railway in Delaware County. Capital stock, $10,000.

***Graham (Va.) Electric Railway.**—Incorporated in Virginia to build an electric railway in Graham. Capital stock, maximum, $50,000; minimum, $25,000. Officers: J. F. Dudley, president; William Mitchell, vice-president; R. B. Williamson, secretary, and C. W. Keister, treasurer, all of Graham.

Bellingham-Skagit Railway, Bellingham, Wash.—Incorporated in Oregon for the purpose of constructing an electric railway in Bellingham and Skagit County. Capital stock $1,000,000. Officers: Charles M. Drummond, president; Clark D. Chapman, Portland, treasurer. [E. R. J., June 11, '10.]

FRANCHISES

Alabama City, Ala.—H. H. Rogers, representing the Noccalula & Southwestern Railway, Gadsden, has been granted a franchise by the Council to build a railway in Alabama City. [E. R. J., May 14, '10.]

Santa Cruz, Cal.—The Union Traction Company has been granted a 50-year franchise by the Council to extend its railway in Santa Cruz to Laveaga Park.

Stockton, Cal.—The Central California Traction Company, San Francisco, has asked the Council for a 50-year franchise to build an electric railway over certain streets and highways of San Joaquin County. Samuel B. McLenegan, Stockton, general manager.

Moline, Ill.—The Tri-City Railway, Davenport, Ia., has been granted a 20-year extension of its franchise to build a railway in Moline.

Indianapolis, Ind.—The Indiana Union Traction Company, Anderson, has been granted permission by the Commissioners of Marion County to construct a double-track for about 2 miles west of Laurence, where a branch extends from the main line to Fort Harrison.

New Albany, Ind.—The Louisville & Northern Railway & Lighting Company, New Albany, has been given a franchise by the Board of Public Works of New Albany, Ind., to construct an addition to its line, giving transportation facilities to the fair grounds of the county.

Lansing, Mich.—The Detroit, Lansing & Grand Rapids Railway, Grand Rapids, has been granted a franchise by the Council to build a railway over certain streets in Lansing. This 156-mile railway will connect Plymouth, Northville, South Lyon, Brighton, Howell, Fowlerville, Webberville, Eagle, Portland, Saranac, Mulliken, Sunfield and Lake Odessa, with terminals at Detroit and Grand Rapids. F. A. Bean, chief engineer. [E. R. J., May 14, '10.]

St. Charles, Mo.—The St. Louis-Kansas City Electric Railway, St. Louis, has asked the Council for a franchise to build a railway over certain streets in St. Charles. This proposed 225-mile electric railway will connect St. Louis and Kansas City. [E. R. J., April 23, '10.]

North Tonawanda, N. Y.—James S. Simmons, Niagara Falls, representing the Frontier Electric Railway, has asked the Common Council for a franchise to build an electric railway within the city limits. This proposed railway, which is to connect Buffalo and Niagara Falls, has acquired all the rights to the old Buffalo, Thousand Island & Portland Railroad between Buffalo and Niagara Falls.

***Charlotte, N. C.**—It is stated that Cameron Morrison and P. C. Whitlock will ask the Board of Aldermen for a franchise to build a street railway in Charlotte to extend from the city limits to the Country Club, 5 miles east of Charlotte.

Napoleon, Ohio.—The Fostoria, Napoleon & Defiance Railway, Toledo, has asked the Council for a franchise to build an electric railway through Napoleon. This is part of a plan to build a railway through Seneca, Wood, Henry, Hancock and Defiance Counties. Charles A. Bliss, Bowling Green, president. [E. R. J., March 25, '10.]

Harrison, Pa.—The Tarentum, Brackenridge & Freeport Street Railway, Tarentum, will ask the Commissioners for a franchise to build an electric railway over certain streets in Harrison. This is part of a plan to build a railway through Allegheny County. [E. R. J., Jan. 29, '10.]

Brownsville, Tex.—B. G. Stegman advises that he and associates have obtained a 25-year franchise to operate a 4-mile street railway in Brownsville. Gasoline motor cars will be used. [E. R. J., June 4, '10.]

Cleburne, Tex.—P. E. Coons, representing Daniel Hewitt, will soon ask the City Council for a franchise to build a street railway in Cleburne. [E. R. J., May 7, '10.]

Richmond, Va.—The Richmond & Henrico Railway has been granted a six months' extension of its franchise by the City Council for completing its new Church Hill viaduct and proposed railway. [E. R. J., Jan. 29, '10.]

Sistersville, W. Va.—The Parkersburg & Ohio Valley Electric Railway, Parkersburg, has been granted a new franchise by the City Council to build a railway in Sistersville, with the provision that the line is to be completed by Sept. 1. This 4-mile railway, which connects Sistersville and Friendly, is being rebuilt and it is expected to extend it to Williamstown.

TRACK AND ROADWAY

Glendale & Eagle Rock Railway, Los Angeles, Cal.—This company has started work on the extension of its railway from Glendale to Verdugo Park, and it will probably be extended to La Canada and La Crescenta. E. D. Goode, president.

Corn Belt Electric Railway, Cornell, Ill.—H. W. Knight, it is said, has revived the plan to build an electric railway to connect Chicago, Plainfield, Platteville, Lisbon, Seneca, Ramsden, Budd, Blackstone, Cornell, Streator, Flanagan, Gridley, El Paso, Kappa, Hudson, Kerrick, Normal, Bloomington, Mackinaw and Peoria, and there meet St. Louis connections. [E. R. J., July 24, '10.]

Springfield & Jacksonville Railway, Springfield, Ill.—This company, which is building an electric railway between Springfield and Jacksonville, is said to be considering the building of an extension to Winchester and Quincy. [E. R. J., Feb. 19, '10.]

Oklahoma-Kansas Railway, Baxter Springs, Kan.—This company has retained as consulting engineers the W. K. Palmer Company, Kansas City, Mo., and will soon start surveys for its proposed 23-mile electric railway to connect Columbus, Galena and Baxter Springs, Kan., and Sunny Side, Lincolnville, Hattanville and Miami, Okla. C. F. Lambert, Kansas City, Mo., chief engineer. [E. R. J., March 12, '10.]

Topeka (Kan.) Railway.—This company has been offered the right of way of the West Side Circle Railway for the purpose of building an extension of its railway from Topeka to Gage Park. It is expected to start work in six months, and to finish the line in one year.

Covington, Big Bone & Carrollton Railroad, Covington, Ky.—This company, which was recently given a franchise to enter Covington, has given bond of $25,000 to the City Council of Covington to insure the completion of the work of the company. The company plans to build a 22-mile railway between Covington and Big Bone. M. J. Crouch is interested. [E. R. J., May 7, '10.]

Hagerstown (Md.) Railway.—This company is said to be considering plans for building an extension from Williamsport to Winchester, via Hedgesville. W. C. Hepperle, Hagerstown, purchasing agent.

United Railways & Electric Company, Baltimore, Md.—This company has decided to extend its Edmundson Avenue line to Orangeville.

Lansing, Mich.—J. W. Ewing and J. S. Mudge, it is said, are promoting a project to build an electric railway to connect Lansing and Grand Ledge. [E. R. J., Jan. 22, '10.]

Twin City Rapid Transit Company, Minneapolis, Minn.—This company is said to be considering plans for the construction of a direct line to Stillwater. W. J. Hield, Minneapolis, general manager.

Summit McComb Motor Line Company, Summit, Miss.—This company advises that it expects to incorporate within the next two weeks, and that its 5-mile railway is nearly completed. It will connect Summit and McComb City, reaching the Godbold Mineral Wells and Summit. It will operate four gasoline motor cars. Station and repair shops will be at Summit. Capital stock authorized, $40,000. Officers: Ted Blackmore, president and treasurer; Dr. V. Simmons, vice-president; Clem V. Ratcliff, secretary and general manager. [E. R. J., June 4, '10.]

St. Louis County Belt Railroad, St. Louis, Mo.—This company advises that it will probably start construction next year on its 30-mile railway circling St. Louis and passing through Maplewood, University City, Ferguson, Affton, Carsonville, Old Orchard, Redlight, Clayton and Prospect Hill. This proposed railway will cross eleven steam railways, ten electric railways and five railroads now under construction. The company intends to sell its treasury stock until enough money is raised to defray the expense of preliminaries. It will then organize an operating company, with a capital equal to the cost of building the railway. Capital stock, $300,000. Officers: Thomas M. Gallagher, president; Bert. H. Lang, vice-president; James E. Hereford, treasurer; Edward W. Rannells, secretary, and James D. Houseman, general manager. [E. R. J., Nov. 13, '09.]

***Lewiston, Mont.**—E. N. Begeman has announced his intention of building an electric railway between Lewiston and Holland. It is said that over $100,000 will be subscribed toward the project in Lewiston.

South Shore Traction Company, Patchogue, N. Y.—This company has opened its first section of its railway from Babylon to Amityville, a distance of 9 miles. When completed, it will run from Patchogue through Islip, Bay Shore, Babylon, Freeport, Rockville Centre and Lynbrook to Jamaica, thence across the Queensboro Bridge to Manhattan, a distance of 54 miles.

*Salisbury-Spencer Electric Company, Salisbury, N. C.—This company has been organized to build a railway between Salisbury, Concord and Spencer. Capital stock, $400,000. Officers: W. F. Snider, president and treasurer; T. H. Vanderford, vice-president; T. J. Jerome, secretary; H. W. Frund, superintendent. Clement & Clement and Jerome & Mannes, attorneys.

Wheeling, Cadiz & Tuscaramas Traction Company, Cadiz, O.—This company advises that it has awarded the contract for building its railway from Wheeling, W. Va., to Uhrichsville, Ohio, a distance of 60½ miles. It is the intention to extend the line to Newark so as to connect Wheeling with Columbus, Ohio. A. Evans Townsend, president. [E. R. J., Oct. 16, '09.]

Zanesville & Meigs Valley Traction Company, Zanesville, Ohio.—This company is preparing plans to begin work soon on its projected 26-mile railway to connect Zanesville and Beverly. [E. R. J., Jan. 1, '10.]

Welland, Ont.—C. J. Laughlin, who is securing a franchise to construct a street railway in Welland, states that the line will be completed in five months and will be built on both sides of the canal to Welland Junction. [E. R. J., March 26, '10].

Tarentum, Brackenridge & Freeport Street Railway, Tarentum, Pa.—This company has nearly completed the preliminary arrangements and work will soon be started on this proposed interurban electric railway to be built through Allegheny County. [E. R. J., Jan. 29, '10.]

Memphis (Tenn.) Street Railway.—This company has filed an application for an amendment to its charter covering new lines and extensions of existing lines to be built.

Houston (Tex.) Electric Company.—This company expects to begin work at once on its proposed 2½-mile extension in the Third Ward in Houston.

Temple Northwest Railway, Temple, Tex.—This company has secured all rights of way between Temple and Gatesville, and it is expected that the entire line between Temple and Hamilton will be ready for track laying Sept. 10. This proposed 100-mile railway will connect Temple and Comanche, via Bell, Coryell and Hamilton Counties. W. J. MacDaniel, president. Headquarters, Moss Rose Building, Temple. [E. R. J., April 16, '10]

Mount Adams Railway, White Salmon, Wash.—This company advises that it will start construction Sept. 1 on its proposed 40-mile electric railway to connect White Salmon, Bingen, Bristol, Pine Flat, Snowden, Timber Valley, Glenwood, and probably Trout Lake and Husum. Its power house will be located near White Salmon and will have a capacity of 10,000 hp. The repair shops will be in White Salmon. It will furnish power for lighting and for manufacturing purposes. Capital stock authorized, $50,000; bonds authorized, $800,000. Officers: Rudolph Lauterback, White Salmon, president; Tunis Wyers, vice-president; Theodore F. Shepler, secretary and general manager, and Hubert L. Simpson, treasurer. [E. R. J., May 21, '10.]

Fairmount & Pittsburgh Railway, Fairmount, W. Va.—This company has taken over the rights and franchises of the Waynesburg & Monongahela Electric Railway, which covered Waynesburg, Marianna and Carmichaels, on the Monongahela River. Another line has been secured from Morgantown to Blacksville, and also another one from Fairmount to Mannnington and Blacksville, on the State line, which passes through Greene and Washington Counties, via Waynesburg, Ten Mile, Lone Pine, Snodgrass and Bridgeville to Pittsburgh. The company will use the tracks of the Pittsburgh Railways within the city limits. Plans for construction are now being considered and work will soon be started. J. Fred Seatty, general manager. [E. R. J., March 19, '10.]

Union Utilities Company, Morgantown, W. Va.—This company reports it will build 2 miles of new track with 75-lb. T-rails.

Burnsville, Glenville & Parkersburg Company, Parkersburg, W. Va.—This company recently incorporated to build a railway from Burnsville to Parkersburg, via Glenville, has nearly completed surveys and will start construction shortly. It has organized by electing the following officers: M. J. Bartlett, Clarksburg, president; Henry Spies, Buckhannon, vice-president; C. E. Heiner, Buckhannon, secretary-treasurer, and L. W. Bartlett, general manager. [E. R. J., June 11, '10.]

Cincinnati Construction Company, Janesville, Wis.—This company has secured right of way and franchises, and contracts have been signed that provide for the completion within six months of its proposed railway to connect Madison and Janesville via Edgerton, Stoughton, Lake Kegonsa and Lake Waubesa. H. H. Zigler, Columbus, Ohio, president. [E. R. J., March 26, '10.]

SHOPS AND BUILDINGS

British Columbia Electric Railway, Victoria, B. C.—This company, it is said, will soon ask for bids for the construction of a proposed depot in New Westminster, B. C., to cost, it is estimated, $80,000. [E. R. J., Oct. 23, '09.]

Indiana Union Traction Company, Anderson, Ind.—This company has awarded to Thomas & Heaton, Tipton, Ind., the general contract for the erection of a one-story brick passenger and freight depot and substation on East Main Street, Elmwood. It will be 80 ft. x 100 ft., and will cost, it is estimated, $16,000. [E. R. J., March 5, '10.]

Wichita Railroad & Light Company, Wichita, Kan.—This company will start the construction of its new car house on North Waco Avenue, Wichita, about Aug. 1. It will be 110 ft. x 300 ft., and will contain office, quarters for the men, repair shops, paint shop and trackage for 45 cars. Two fire walls will run through building, making three complete and separate houses. A contract has been made with this company by the Arkansas Valley Interurban Railway, whereby the latter will be permitted to store its cars temporarily in the new structure.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—This company is planning to build a station and freight sheds at Humberstone. E. F. Seixas, general manager.

Pittsburgh (Pa.) Railways.—This company has asked bids for building its new car house to be located at Forbes Street and Craft Avenue, Oakland. [E. R. J., Feb. 19, '10.]

Galveston-Houston Electric Railway, Houston, Tex.—This company, which is building an interurban railway between Galveston and Houston, is reported to have purchased a site for its passenger station in Galveston which will have a front of 60 ft. on Twenty-first Street, running westward 165 ft. and between Post Office Street and Church Street. Negotiations are under way for a station site at Houston.

POWER HOUSES AND SUBSTATIONS

Pueblo & Suburban Traction, Pueblo, Col.—This company is installing new coal and ash handling apparatus, new pumps, condensers, cooling towers, boilers, stokers, etc., at its power plant.

Aurora, Elgin & Chicago Railroad, Chicago, Ill.—This company will install two additional 500-lb. Edge Moor water tube boilers in its power plant at Batavia this summer.

Evansville (Ind.) Railway.—This company has awarded a contract for building two new power stations, to be located at Rockport and Newburg, to the General Electric Company, Cincinnati. Work on the new stations will be begun on the arrival of the material.

Mt. Hood Railway & Power Company, Portland, Ore.—This company is building a power house at Bull Run. The plan will use water diverted across a peninsula from the Sandy River.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—This company will build a substation at Pen Mar to be 22 ft. x 32 ft. The company is installing a 500-kw Allis-Chalmers turbine in its power station at Waynesboro.

Richmond & Henrico Railway, Richmond, Va.—It is reported that this company has purchased a site for its power house at the foot of Louisiana Street, Richmond.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—This company will build an addition to its present power house, enlarging its capacity from 20,000 to 80,000 hp. Three 20,000-hp steam turbines will be installed.

Manufactures & Supplies

ROLLING STOCK

Columbus (Ga.) Railroad will probably purchase three single-truck semi-convertible cars, but it has not been definitely decided what type and size they will be.

Rockland, South Thomaston & St. George Railway, Rockland, Maine, expects to purchase a construction car with motors, a tower car, several snow plows and a number of fare registers.

Aurora, Elgin & Chicago Railway, Chicago, Ill., has received from the Niles Car & Manufacturing Company five city cars for local service in Aurora and four interurban cars for the Fox River division.

Des Moines (Ia.) City Railway proposes to build some double-truck cars in its shops, and, if it is possible to secure delivery within 60 or 90 days, to order 10 or 15 cars to replace equipment destroyed in the fire at its car house on May 26, 1910.

Philadelphia (Pa.) Rapid Transit Company, noted in the ELECTRIC RAILWAY JOURNAL of June 4, 1910, as contemplating the purchase of 20 new cars for its elevated division, has placed an order with the Pressed Steel Car Company for these cars.

Hudson & Manhattan Railroad, New York, N. Y., in conjunction with the Pennsylvania Railroad, will purchase 88 motor equipments for joint use on the main line of the Pennsylvania Railroad, which is to be electrified between Harrison and Jersey City.

Calgary (Alta.) Street Railway has placed an order with the Ottawa Car Company for three cars for immediate delivery. The Calgary Street Railway has recently received three 45-ft. cars from the Preston Car & Coach Company equipped for prepayment operation.

Illinois Traction System, Peoria, Ill., has ordered 10 interurban motor cars, five trailer observation cars and 29 single-truck city cars for prepayment operation from the Danville Car Company. Mention of the contemplated purchase of these cars was made in the ELECTRIC RAILWAY JOURNAL of May 14 and May 28, 1910.

Athens (Ga.) Electric Railway, reported in the ELECTRIC RAILWAY JOURNAL of March 19, 1910, as having ordered three semi-convertible cars from the American Car Company, has specified the following details for these cars:

Seating capacity	36	Couplers	Brill
Weight	17,000 lb.	Curtain fixtures	Acme
Length of body	25 ft. 4 in.	Gongs	Brill
Over vestibule	34 ft. 9 in.	Hand brakes	Brill
Width over sills	8 ft.	Heaters	Consolidated
Over posts at belt	8 ft.	Journal boxes	Brill
Body	wood	Motors	GE
Interior trim	bronze	Registers	Ohmer
Underframe	wood	Roofs	monitor
Air brakes	Nat. B. & E. Co.	Sanders	Brill
Axles	Brill	Seats	Brill Winner
Bolsters, body	Brill	Seating material	cane
Bolsters, truck	Brill	Side bearings	Brill
Brakeshoes	Brill	Springs	Brill
Bumpers	Brill	Trucks	Brill 39-E
Car trimmings	Brill	Varnish	Murphy
Center bearings	Brill	Ventilators	Brill

TRADE NOTES

H. H. Westinghouse has been elected president of Westinghouse, Church, Kerr & Company, Ltd., to succeed the late W. C. Kerr.

Consolidated Car Fender Company, Providence, R. I., has secured an order from the Coney Island & Brooklyn Railroad for 500 wheel guards.

Wisconsin Engine Company, Corliss, Wis., has appointed George B. Foster sales manager of its Chicago office, with headquarters in the Fisher Building.

William L. Austin, formerly vice-president of the Baldwin Locomotive Works, Philadelphia, Pa., has been elected president of the company to succeed the late John H. Converse.

Louis J. Costa, formerly district manager of the Jandus Electric Company, with office in Philadelphia, has resigned to accept a position with the Philadelphia office of the Allis-Chalmers Company.

Lord Manufacturing Company, New York, N. Y., announces the appointment of the Mathias-Hart Company, 514-516 Atlantic Avenue, Boston, Mass., as its agent for the New England territory.

Modoc Company, Fernwood, Pa., manufacturer of Modoc liquid car cleaner and brass polish, pure oil soap and soap powder, has just completed a building which enlarges its manufacturing facilities about 40 per cent.

Theo. G. Empie, Wilmington, N. C., reports that the trade in crossties has been quite active, and that there is a moderate movement in Southern white cedar poles. He has more than 15,000 poles, from 25 ft. to 70 ft., on hand for immediate shipment.

L. J. Wing Manufacturing Company, New York, N. Y., has recently sold the Delaware, Lackawanna & Western Railroad, for its Bliss and Auchincloss collieries at Nanticoke, Pa., 28 20-in. Typhoon turbine blowers for forced draft on 3500 hp of boilers.

A. D. McAdam, who was recently elected vice-president of the St. Louis Surfacer & Paint Company, St. Louis, Mo., and Western sales manager of the Ohio Malleable Iron Company, Columbus, Ohio, will have his headquarters at 1101 Fisher Building, Chicago, after July 1, 1910.

Ball & Wood Company, Elizabethport, N. J., is now building steam turbines of high pressure, low pressure and mixed flow, Rateau Smoot designs, 500 kw being the smallest size; d.c. generators, 500 kw, 600 kw, 750 kw and 1000 kw of the Smoot type. Alternators are built from 500 kw up.

Federal Storage Battery Car Company, New York, N. Y., reports that the first Beach car equipped with Edison storage batteries has been in operation on the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad, New York, N. Y., for 8534 miles up to May 31, in all kinds of weather and under all conditions of track.

Consolidated Car-Heating Company, New York, N. Y., has built a new all-steel, lightweight, ventilated core type of electric heater and switches for controlling same. It will be exhibited at Booth 460-1, Young's Million Dollar Pier, Atlantic City, N. J., at the Master Mechanics' and the Master Car Builders' conventions, June 15-22. A new safety door signal device will also be shown in operation.

C. G. Young, New York, N. Y., an engineering firm, which makes a specialty of compiling reports for financing, and is engaged largely in engineering and construction, devising plans, methods and the operation of public utilities and industrial companies, has taken additional office space, enlarging its present suite on the eighth floor of 60 Wall Street. Mr. Young sailed for Europe on June 15 on the *Lusitania* for a business trip.

Pay-Within Car Company, Philadelphia, Pa., calls attention to the fact that the prepayment cars to be installed on the Cleveland Railway's lines, and mentioned in the Cleveland notes in the issue of May 14, 1910, are to be built under the pay-within patents. The Cleveland Railway Company has taken out a license with the Pay-Within Car Company and has also purchased devices for equipping 100 cars under these patents. These cars are now being put through the shops at the rate of about one a day.

Westinghouse Machine Company, East Pittsburgh, Pa., shows in its annual report for the year ended March 31, 1910, a net income for the year of $875,845. The net income for the last quarter was at the annual rate of $1,321,145. This compares with an average annual net income for the last eight years of $720,543. The report also shows that the orders received during the fiscal year aggregated $5,123,612.52, an increase of $2,322,536.58, and that the billing in shop product for the fiscal year amounted to $4,065,618.74, an increase of $1,300,912.94.

Dorner Railway Equipment Company, Chicago, Ill., reports that it has just sold second hand or rebuilt cars as follows: Oklahoma (Okla.) Railway, to double-truck, open city cars; Menominee & Marinette Light & Traction Company, Menominee, Mich., two 20-ft. closed motor cars, mounted on Brill trucks, and three eight-bench, open trail

cars; Yazoo City Municipal Traction Company, Yazoo City, Miss., two 10-bench, open trail cars; Manitowoc & Northern Traction Company, Manitowoc, Wis., one 40-ft., double-truck closed car, fully equipped.

Edge Moor Iron Company, Edge Moor, Del., sold to the Cedar Rapids & Iowa City Railway & Light Company during the past year four 500-hp Edge Moor water-tube boilers. They are 15 tubes high, 17 tubes wide, have two drums, and are built for 225-lb. working pressure. Superheaters and chain grate stokers were furnished in connection with the boilers. One of the boilers was erected by the railway company during the winter and the other three are being erected at the present time.

Joseph Dixon Crucible Company, Jersey City, N. J., at the annual meeting of its stockholders re-elected the old board of directors, consisting of George T. Smith, William Murray, William H. Corbin, Edward L. Young, George E. Long, William H. Bumsted and Harry Dailey. The board of directors re-elected the former officers, namely, George T. Smith, president; William H. Corbin, vice-president; George E. Long, treasurer; Harry Dailey, secretary; J. H. Schermerhorn, assistant treasurer and assistant secretary. William H. Corbin was also re-elected as counsel.

Sterling Varnish Company, Pittsburgh, Pa., has brought out two new insulating varnishes, Sterling elastic and Sterling extra elastic, which, besides being both oil and waterproof and excellent insulators, have unusually high heat resisting properties. The elastic varnish will withstand heat equal to the boiling point of water for 15 days, and the extra elastic varnish will withstand the same heat for 30 days without affecting any of its properties. The Sterling Varnish Company is distributing samples of its extra elastic insulating varnish for testing purposes.

Beach Manufacturing Company, Charlotte, Mich., has organized the Beach Manufacturing Company, Grand Forks, N. D., and will manufacture steel for bridges, cast iron and corrugated metal culverts, wheel and drag scrapers, rod graders, road plows, etc. A new plant at Grand Forks is in operation. The Beach Manufacturing Company, Portland, Ore., has also been organized, and will manufacture at Portland, Ore., the same line of materials as the Beach Manufacturing Company at Grand Forks. The company's triple expansion cast iron culverts and its corrugated metal culverts are claimed to be well adapted for electric railway work, as it is easy to install them and they are said not to be affected by frost or traffic.

Harold U. Wallace, Chicago, Ill., has established offices in the Marquette Building, Chicago, as a consulting engineer. Mr. Wallace will report, examine or survey proposed steam, electric and hydraulic properties, and undertake to supervise their construction. An announcement by Mr. Wallace describes the large engineering works which he supervised during his connection of 11 years with the Illinois Central Railroad. Since 1905 he has been engaged in private practice and has supervised the construction of four d.c. and one single-phase line, four electric power stations, two irrigation dams and made examinations and surveys for various proposed irrigation projects, hydroelectric works and steam and electric railroads.

Neemes Brothers, Troy, N. Y., have recently installed three sets of their shaking and dumping grates, 7 ft. 6 in. x 9 ft. 8 in., in the new power plant of the Hartwick Power Company; also 20 sets of the same type in the power station of the Johnstown & Gloversville Railway. During 1908 Neemes Brothers equipped the new Smith Street power plant of the Coney Island & Brooklyn Railroad with six sets of their shaking and dumping grates, 12 ft. x 12 ft. 7 in. Recently they changed the rear half of these six sets of grates to a strictly dumping type of grate. One of the particularly striking installations of their grates is at the plant of the Hartford (Conn.) Electric Light Company, where there are two 1950-hp Bigelow-Hornsby water-tube boilers. The grates for these boilers are 8 ft. 8 in. x 24 ft. 8 in. in each boiler. This plant has also six Aultman Taylor, Babcock & Wilcox type water-tube boilers, which are likewise equipped with Neemes grates 7 ft. 6 in. x 12 ft. 7 in. The entire equipment of this plant is 952 sq. ft. of grate surface, or an average of 119 sq. ft. per grate, and the two large grates averaging 212 sq. ft. each.

Electric Service Supplies Company, Philadelphia, Pa., has recently greatly extended its long list of electric railway equipment supplies, and some of the new apparatus is described in Catalog No. 4, just issued. One of these devices is a new method of locking a controller handle to the controller shaft. The handle has a socket made on three sides to conform to the controller shaft. The fourth side is fitted with a downward tapering wedge which is adjusted by means of a thumb screw so as to take up all wear on both handle and shaft. The company has also increased the number of types of automotorneers which it manufactures for different controllers and can now supply this well-known device for practically every standard type of controller. The company has also added very largely to the appliances which it has made of the Keystone air valve for different purposes. These valves are now made to operate by foot, by hand and by cord, and in single and double types, and are useful for operating pneumatic sanders, gongs and whistles—in fact, all pneumatic car apparatus. Another interesting appliance recently brought out by the company is the Keystone electric block signal which is designed for hand operation on single-track lines with turn-outs. It is of the usual lamp form, but well constructed, with asbestos board frame, quick-break switches and enclosed fuses, and is of neat design and good workmanship. The company has also brought out a line of water-tight telephone boxes for use in locations subject to extreme moisture, such as in mines, subways, tunnels, etc. These telephones are also suitable for general outdoor use where apparatus is needed which is not only weather-proof but also water-tight.

ADVERTISING LITERATURE

R. S. Mueller & Company, Cleveland, Ohio, have issued a folder describing and illustrating their universal test clip.

Vilter Manufacturing Company, Milwaukee, Wis., has just issued a new catalog illustrating and describing its Corliss engines.

Sterling Varnish Company, Pittsburgh, Pa., has issued an 8-page booklet which is descriptive of Sterling elastic and extra elastic insulating varnishes.

De Laval Steam Turbine Company, Trenton, N. J., is now printing a new catalog in which its high efficiency centrifugal pumps will be fully described and illustrated.

Miller Improved Gas Engine Company, Springfield, Ohio, describes and illustrates its gas engines in a 24-page booklet. Miller engines are manufactured in sizes from 50 hp to 300 hp for use of natural or illuminating gas.

Russell Car & Snow Plow Company, Ridgway, Pa., has issued a catalog in which various types of snow plows and flangers for steam and electric railroad service are described and illustrated.

W. H. Matthews & Brother, St. Louis, Mo., have issued "Matthews' Book of Underground Conduit Specifications" for distribution among electric railway, light, power, telephone and telegraph companies.

Louis Blessing, Jackson, Mich., is mailing a circular in which his cantilever beam railway tie is described and illustrated. Experimental tests are being made with this type of tie by the Michigan Central Railroad.

Electric Service Supplies Company, Philadelphia, Pa., has issued a supplement to Catalog No. 4, Vol. II, in which are shown new and improved devices and revised lists of material covered in the company's general Catalog No. 4, Vol. II, of car equipments and supplies. The new publication is dated June 1, 1910.

Archbold-Brady Company, Syracuse, N. Y., engineers and contractors, has recently published in pamphlet form an article which appeared in the *Electrical World* for May 14, entitled "Supports for Transmission Lines." In this article the author, Mr. Wilkinson, describes a number of towers of different types used in high-tension transmission work.

Trussed Concrete Steel Company, Detroit, Mich., has issued a 16-page catalog outlining the standard types of the united steel sash. The catalog also contains tables of dimensions of the standard sizes of the united steel sash. The Trussed Concrete Steel Company is also distributing a Kahn system pocket scale, accompanied by a typical example showing the use of the scale.