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Of this issue of the ELECTRIC RAILWAY JOURNAL 9,000 copies are printed.

Enlisting in the Railway Service

During the discussion on trade agreements at the meeting of the National Civic Federation, Monday, August Belmont reiterated his well-known views in favor of placing employment in transportation companies on a contractual basis, as with the army, police department and other services upon which the welfare of the public intimately depends. There is a great deal to be said in favor of Mr. Belmont's position. A railway company, in ac-

cepting a franchise, assumes certain duties, and the convenience, comfort, and even safety, of the community requires their strict fulfilment. No one is obliged to engage in railway operation, but if he does he is, in a sense, a sub-contractor of the transportation company, and is under the same implied duty of continuity of service, and he should not abandon his work abruptly if there is any danger that the public interests will suffer thereby. It would involve a novel condition if a railway employee should have to sign an actual form of enlistment and suffer a penalty in case of desertion, but there are many arguments in favor of that plan.

Associate Membership for Manufacturers

A study of the list of associate members of the American Street & Interurban Railway Association shows that the advantages of associate membership in that body are not fully appreciated by a great many men who are engaged in the manufacture of apparatus for use on electric railways. The associate membership list of the association includes quite a number of outside engineers and professors of electrical engineering in different universities, as well as an increasing number of operating officials and other employees of railway companies. Among the manufacturing companies, however, there must be many men who are practically as much interested in electric railway engineering and operation as those directly connected with the electric railway companies or those who are engaged in teaching. Conditions in the electric railway industry change so rapidly that unless one follows the development of the art very closely he is apt to get completely out of touch with what is being done. The essential of success in manufacturing is to know the field thoroughly and supply just what it requires. A glance through any issue of the Patent Office *Gazette* will disclose an immense waste of time and money through the patenting of inventions which, though ingenious, are not suited to the conditions for which they are designed. If half of the energy spent on these impracticable inventions had first been devoted to a careful study of the circumstances under which the devices are expected to operate, the inventors might have been able to modify their designs so as to be practicable; at least, the number of impracticable patents would be less.

The same principle is true of those who have to place the goods on the market as well as of those whose duty it is to design them. The present is essentially the age of the engineer-salesman, at least so far as electric railway orders are concerned. So many good devices are now being manufactured for the railway field that it is very difficult for any one to convince a railroad manager of the desirability of any particular piece of apparatus unless he

understands thoroughly its own merits and its adaptability to the railway industry.

There seems to be some misconception as to the qualifications of those who are eligible for associate membership in the American Street & Interurban Railway Association. According to the constitution they are those who are actively identified with street and interurban railway interests and other persons who, in the opinion of the executive committee, have had experience of such a nature as to render desirable their connection with the association. This clause has been construed so broadly by the executive committee up to the present time as to admit to associate membership those who are interested in the work and consider that they can be benefited by associate membership. In addition, each associate member receives a copy of the proceedings of the Engineering Association or of the Transportation & Traffic Association, whichever he may elect, and can thus secure a complete record of the papers and discussions at the annual conventions of either one of these important branches of the association.

The New Haven Electrification

We regard Mr. Murray's contribution on this topic as ranking with the most important Institute papers of the last decade. It is especially noteworthy as marking a departure from the grim policy of silence regarding failures that has too often been an actual obstacle to engineering progress. In this instance the whole story is by no means of failure, but rather of success won by indomitable perseverance and grit in spite of a long succession of obstacles none the less heartbreaking because of their arising from minor rather than fundamental causes. That Mr. Murray has placed them frankly upon record for the benefit of his engineering colleagues is cause for congratulation. A record of difficulties overcome is a guide more valuable to the world at large than a record of easy success.

We shall not attempt here a minute analysis of the progress of the New Haven work. To sum it up broadly, it has been a hard road, the difficulties in which belong neither to rashness nor lack of skill, but rather to the unforeseen, and often unforeseeable, results of new combinations. The system was a grouping of fairly familiar elements in new relations, into which they did not always fit comfortably. It is specially worth noting that the problem which was apparently the most formidable, the construction of single-phase traction motors of extraordinary output, suitable for use on the d.c. circuits of the terminal, was solved successfully, and that, however many failures in service have been recorded, no material part of them can be charged up to motor troubles.

The trouble with the generators, owing to the use of three-phase winding for an output essentially single-phase, was doubtless anticipated as a possibility, without there being any apparent probability of its really becoming of serious magnitude. In fact, it turned out to be a very grave matter indeed, and while it yielded to heroic treatment so far as output is concerned, it cannot fail to have an unfavorable effect on the efficiency of these particular generators. The main point, however, is that the information has been gained which will prevent further trouble,

so that the account is wiped out so far as the art of single-phase traction is concerned. Another very grave difficulty indeed arose with the circuit-breakers, due to the exceptionally high voltage applied to a grounded circuit. This, too, involved the question of degree, and there was little reason to foresee the seriousness of the situation. The remedy, an electromagnetic buffer system, was sufficiently obvious after the situation was fully realized, but this was only after symptomatic treatment had signally failed. Insulation difficulties were another example of the unexpectedly severe adverse effects of the blast from the steam locomotives. Ordinary electric roads have at times experienced this, yet the combination with 11,000 volts produced results apparently all out of proportion with the cause, and again strenuous action was necessary.

As regards the locomotives themselves, the main electrical design seems to have been adequate, and the troubles were largely due to lack of mechanical adaptation to the work. As electric engines they were reasonably successful from the start; as traction machines they developed many minor but exasperating defects. It must not be forgotten that these locomotives were designed for average conditions, with the intention of doubling up on the heavy trains, and while the advisability of this plan may possibly be open to question, the electrical equipment appears to have done its duty according to its lights.

In the overhead work it was probably a mistake not to have installed the secondary catenary much earlier in the game, and it is a question whether the well-tried bow trolley should not have been used instead of the pantograph, which was certainly not a proved success for high speeds. The foreign electric lines could have given a valuable lesson in this particular. Low headroom in places made the trolley problem a serious one at best. To speak in general terms, the insulation necessary in working an 11,000-volt grounded circuit seems to have been considerably underestimated all along the design, and many of the minor, together with some of the major, troubles seem directly chargeable to this cause. This error being remedied, further insulation trouble should be minimized.

Considering the many novel features of the installation, it would have been very extraordinary if numerous troubles had not been found. That the preliminary period of experimental working was so protracted may, perhaps, be chiefly charged to the power house difficulties, which from their nature took long to remedy. Had the generators gone quietly about their business from the start, the other faults in the equipment would have been far more promptly located and remedied. It must not be forgotten that many similar faults would have been found had the road been equipped, for instance, with 2000-volt d.c. motors and appropriate generators. The 600-volt d.c. system can hardly be considered as well adapted to operation of long trunk lines, and the three-phase system, which alone had been pretty well tried out, was barred by the condition of a d.c. terminal section. So the electrification was fought out along the single-phase line, and while the struggle has taken a long time, it has been worth while for the sake of the future art. Now the way seems tolerably clear, and the log book of the next year will be a far more cheerful looking document. May it be clean of delays.

The Discussion of Mr. Murray's Paper

The discussion of Mr. Murray's paper at the Institute meeting was protracted and not uninteresting. It lacked spontaneity until a very late hour, owing to the policy of preparing a carefully selected list of speakers sufficient to exhaust the ordinarily available time. The remarks were in the main read from manuscript, and gave evidence of very careful construction. As was to be expected under such conditions, the debate was mainly an argument on the merits of a.c. and d.c. Only near midnight, when the list of scheduled speakers was exhausted, did the air get cleared of the sort of "odium theologium" that had given a slightly sulphurous flavor to the evening.

The things that loomed large above the smoke of battle were substantially these: First, that in spite of some blunders and more misfortunes, the New Haven road has been able at last to establish a single-phase electric service over approximately 100 miles of trackage, giving, in spite of its earlier troubles, greater immunity from train delays than with the steam service which it replaced. This fact was directly stated by more than one speaker on the New Haven side, and while no definite figures were given, the statement when fully substantiated by them will carry more weight with practical railway men than any amount of technical discussion.

In the beginning there was all the trouble that any d.c. champion could wish. Mr. Stillwell put his finger on one source of mischief when he called attention to the serious results that spring from early indecision followed by undue haste. The fact is that a lot of valuable time which should have been used for experiments was wasted through inactivity. Then, when a decision was reached, no time was left in which to do the thing which should have been done, *i.e.*, to equip a section of line and try out the first locomotive thoroughly before placing the main order in production. This delay has certainly cost somebody a very large sum. And when the plant was actually ready for the initiation of experimental runs the error in the design of the generators interposed more vexatious delays. Mr. Lamme fully explained the curious condition of things which existed and the remedial steps taken. After the experimenting fairly started, progress was rapid, and one after another of the minor defects were rooted out. There is no good reason why the generating and transmission system of the New Haven road should be any less reliable than that of the New York Central, so highly and justly praised by Mr. Armstrong. After this part of the matter is made right by reinsulation and elimination of faulty circuit-breakers, the chief causes of delays will have been removed. We think, however, that the pantograph trolley may have to be replaced by the old, reliable bow trolley before changes cease. In fact, there is a certain lack of flexibility about the pantograph trolley that was probably in some measure responsible for the very severe action on the trolley wire. One would do well to heed the recent Continental practice in such matters. Between the bow trolley and the duplex catenary, which is no novelty abroad, the current collection becomes a very simple matter. But even now the service has been brought to a reasonable condition.

Second: Whatever troubles may have been encountered,

it is pretty evident that the main motors have been singularly successful, in spite of hard conditions of design, followed by hard service. We doubt whether motors of any other type designed for heavy railway work would have given materially less trouble. Of course, it must be frankly admitted that an a.c. commutating single-phase motor will, other things being equal, be heavier and slightly less efficient than a d.c. motor. But this is no substantial hindrance to the use of such a motor in heavy railway work, provided that it is in other respects a thoroughly operative machine. And this is apparently what Mr. Lamme has produced in the motor of the New Haven locomotive.

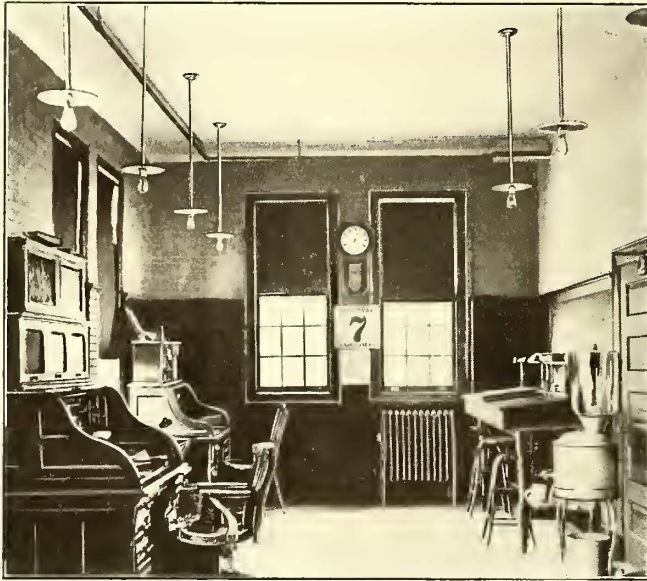
The contention that the cost of the locomotives and other equipment greatly exceeded the estimates is probably true, but in the larger aspect of affairs unimportant. As Mr. McClellan, late in the discussion, pointed out, the costs of this work do not concern the public so much as the cost of doing the equivalent thing again in the light of the experience here gained. And this cost will probably prove to be reasonably low, low enough, in fact, to bear out the general contention of the a.c. contingent. It has been a bitter dose of experience that has been administered, but the results are wholesome, and the remedy is now demonstrated for acceptance in the electrical pharmacopœa.

We do not fully agree with Mr. Wilgus' indictment of the New Haven for trying hazardous experiments at the expense of its stockholders. Mr. Wilgus' own road took some chances on its own behalf in adopting a third-rail system of a kind then unusual, with locomotives having a magnetic design like nothing in the heavens above, the earth beneath, or the waters under the earth. Had the combination failed, we do not conceive that the New York Central would have been blameworthy. It took the best advice it could get, and then went ahead in a comparatively untried field. The New Haven road did the same thing, and while, as a matter of fact, it has had a rather hard time of it, it now seems to be making good, and has secured for its stockholders a system that for their particular purposes possesses great merit. Granted the apparently fixed intention to proceed toward general electrification, the New Haven would assuredly have wronged its stockholders by temporizing with a low voltage distribution system. Dr. Steinmetz, when he got a chance for a word, near midnight, put this phase of the matter clearly enough, showing how essentially different are the conditions of a congested terminal electrification from those found in the general work of long distance railroading. There is no possible reason why any one system should be the best for a long series of diverse purposes. Nor is there any reason to suppose that any final and single solution of the problem of electrification of large railways has yet been discovered. Each system yet tried has strong merits for certain particular purposes, and it is the latter that should guide the judgment in making a choice. A "standard" thing is suitable for use only when it meets the requirements of the case in hand with substantial thoroughness. The world has advanced chiefly through the efforts of those who have been dissatisfied with "standard" beliefs, laws, theories and things.

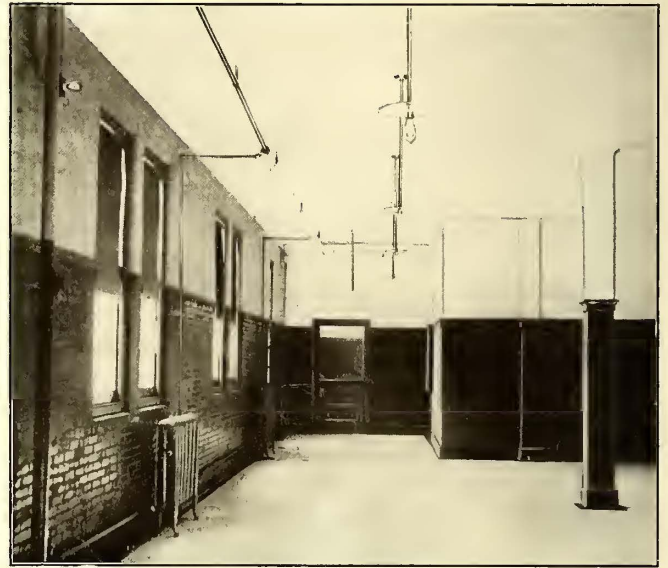
THE LINE AND TRACK DEPARTMENT HEADQUARTERS OF THE BROOKLYN RAPID TRANSIT SYSTEM.
II.—LINE DEPARTMENT, STABLE AND EMERGENCY CREW BUILDINGS

The first article on the Nostrand Avenue line and track department headquarters of the Brooklyn Rapid Transit system, published in the Dec. 5 issue, treated the general features of the installation which, as a whole, comprises three groups: No. 1, line department, stable and emer-

tendent's offices facing on Nostrand Avenue. The adjoining room, also facing this street, is for the clerks, and the third room for the foreman. The rooms adjoining this office on the inner side of the hallway are for the convenience of line inspectors and other employees who have reports to prepare or other inside duties. All of these offices have intercommunicating doors in addition to the hallway exits. Beginning at the entrance, the floor along the other side of the hall is divided as follows: Toilet, second floor stairway, telephone and telegraph room, timekeeper's and



Brooklyn Line and Track Department Headquarters—Typical Office



Brooklyn Line and Track Department Headquarters—Interior View of Line Department Office Section

gency quarters along President Street; No. 2, stock and shop building backed by a steel storage structure, and No. 3, track department building along Carroll Street. The present article will deal with the details of group No. 1.

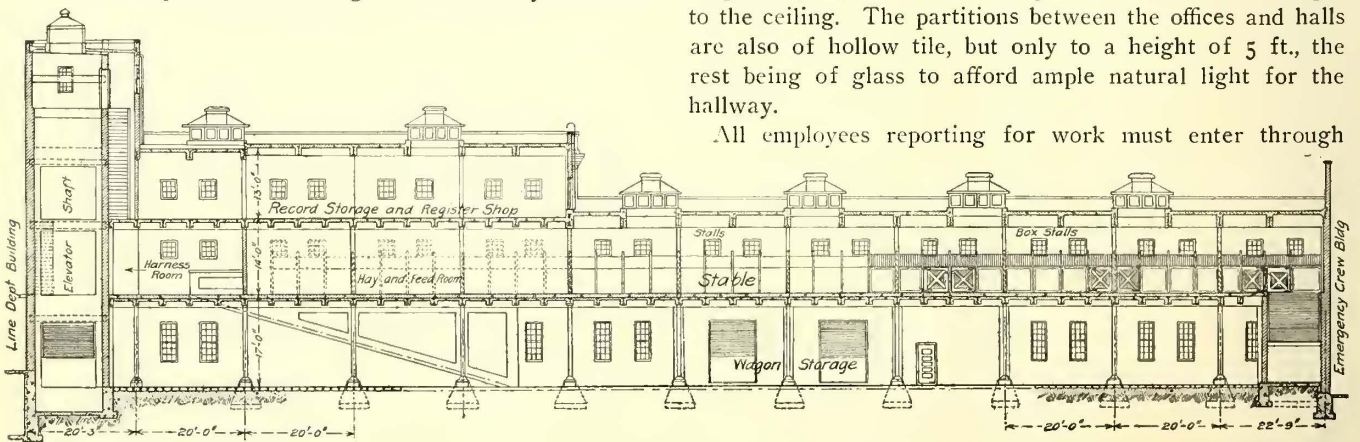
LINE DEPARTMENT OFFICES

The line department building is a two-story structure

starter's office, drafting room and stable superintendent's quarters. All of the offices are equipped with handsome furniture and other conveniences.

The partitions between adjoining offices are of 4-in. hollow tile, plastered with Keene superfine cement up to a height of 7 ft., and with a cheaper cement from that height to the ceiling. The partitions between the offices and halls are also of hollow tile, but only to a height of 5 ft., the rest being of glass to afford ample natural light for the hallway.

All employees reporting for work must enter through



Brooklyn Line and Track Department Headquarters—Cross-Section of Building for Wagon Storage, Stable, and Record Storage and Register Repair Shop

with basement, fronting on Nostrand Avenue and covering an area 101 ft. long by 51 ft. 8 in. wide. The basement, which has daylight illumination through 5-ft. x 3-ft. areas, is used as a storeroom for tools belonging to or used by the line department men. This basement is entered by a concrete stairway on the outside of the building.

The first floor is used for offices as shown on the plan in the first article. Entering the main hall, the first office is the stenographer's room, which leads into the line superin-

the watchman's house alongside the line department building and then either report for orders at the stenographer's room or proceed up the stairway and over the footbridge to other divisions of the property.

PRINTING DEPARTMENT

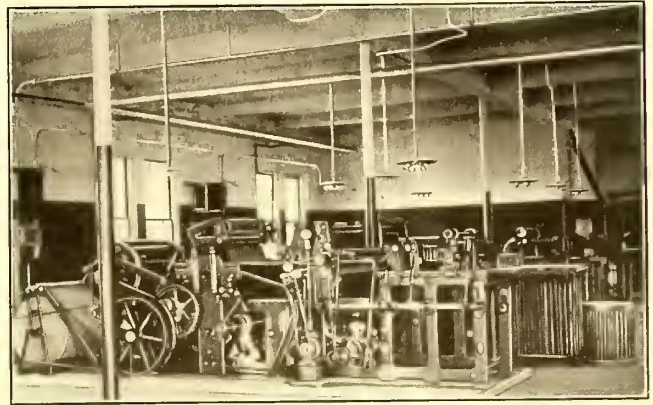
Although the installation in general serves for the line and track department headquarters, the space available made it possible to house several other departments. The most elaborate of these is the printing plant, which has

just been removed from cramped quarters in the old State Street power station of the Montague Street cable line to the second floor of the line department building. For several years past the company has maintained this plant to print daily all the different classes of transfers and identification checks in use on both the surface and elevated divisions. The department is under the jurisdiction of the secretary-treasurer's department and is managed directly by H. A. Crowe.

The new quarters cover an area of 50 ft. x 100 ft. in one room having windows on three sides and skylights. The natural lighting and ventilation consequently is excellent. A special double toilet and lavatory also is provided on this floor. The printing apparatus consists of two Kidder presses weighing 3 tons each; three Meisel presses weighing 4 tons each; one Seybold cutter and three Latham stitchers. Each press is operated by its own motor with the control arranged for instantaneous stopping. Every press is set on a 1¾-in. yellow pine platform which extends 18 in. beyond the machine on all sides and is covered by No. 26 galvanized iron soldered at all joints and turned over a 1½-in. rail all around the four edges. This makes a complete oil pan under each machine and ensures a clean floor. The cutters and stitchers are run by belting from a motor-driven line shaft. The latter also runs a 14-in. swing screw-cutting lathe on which are made all minor repairs and adjustments to the presses.

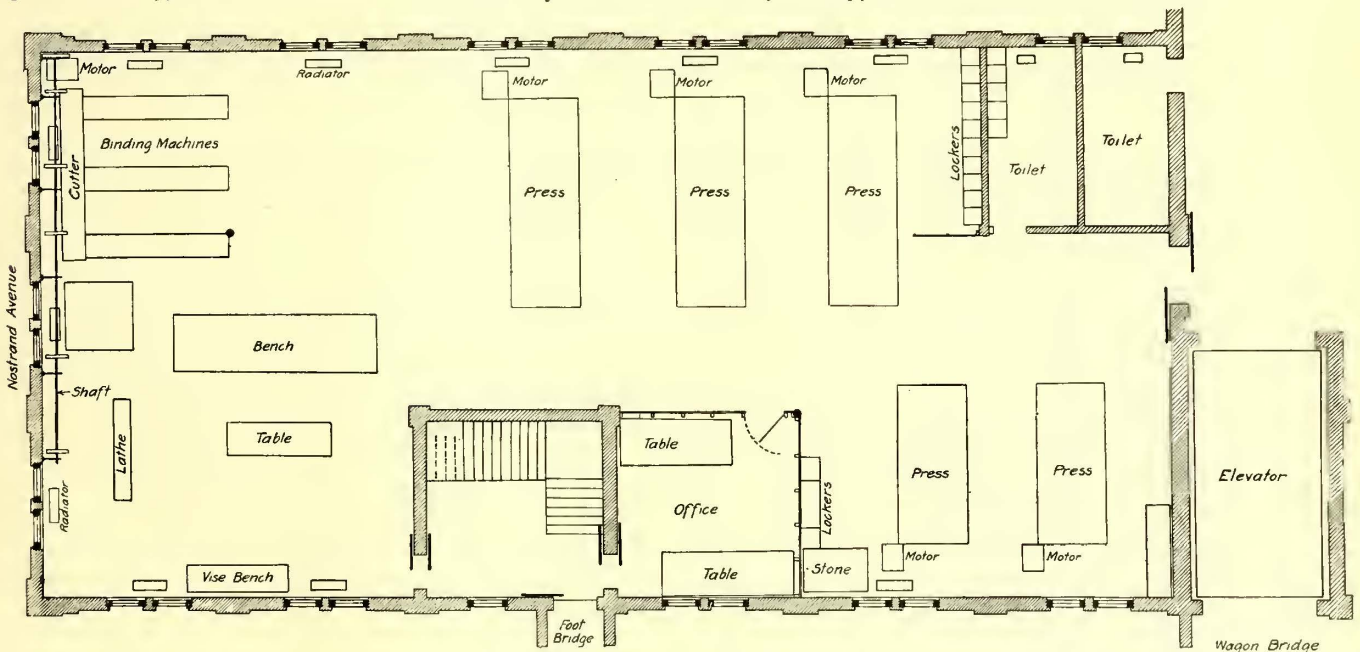
The large amount of work turned out by this plant and the enormous volume of the transfer business is indicated by the fact that in September last there were printed 35,612,200 transfers in six colors, namely, yellow, green, salmon, white and magenta. The net weight of this output was 60,297 lb., or a little over a ton a day. Before

stalled by the Reedy Elevator Company and was designed to meet the strictest requirements of the municipal building department and the fire and accident insurance underwriters. It is probably the largest of its type which has ever been built. It will lift, for instance, to any of the floors a loaded double wagon with horses attached, making



Brooklyn Line and Track Department Headquarters—Transfer Printing Plant in Line Department Building

it possible to deliver large rolls of paper and machinery directly to the pressroom, hay and feed to the stable and boxes of records to the vaults on the third floor of the stable building. On the first floor level the elevator has a door in front of the wagon bridge leading to the shops in the other buildings, thereby affording a level roadway for horses from the elevator or stable to the horseshoeing room and for wagons to the wheelwright, machine and paint shops as occasion may demand either for repairs or delivery of supplies in the most direct manner.



Brooklyn Line and Track Department Headquarters—Plan of Printing Department on the Second Floor of the Line Department Building

moving the plant it was necessary to print a two weeks' extra supply of these transfers, or more than 14 tons.

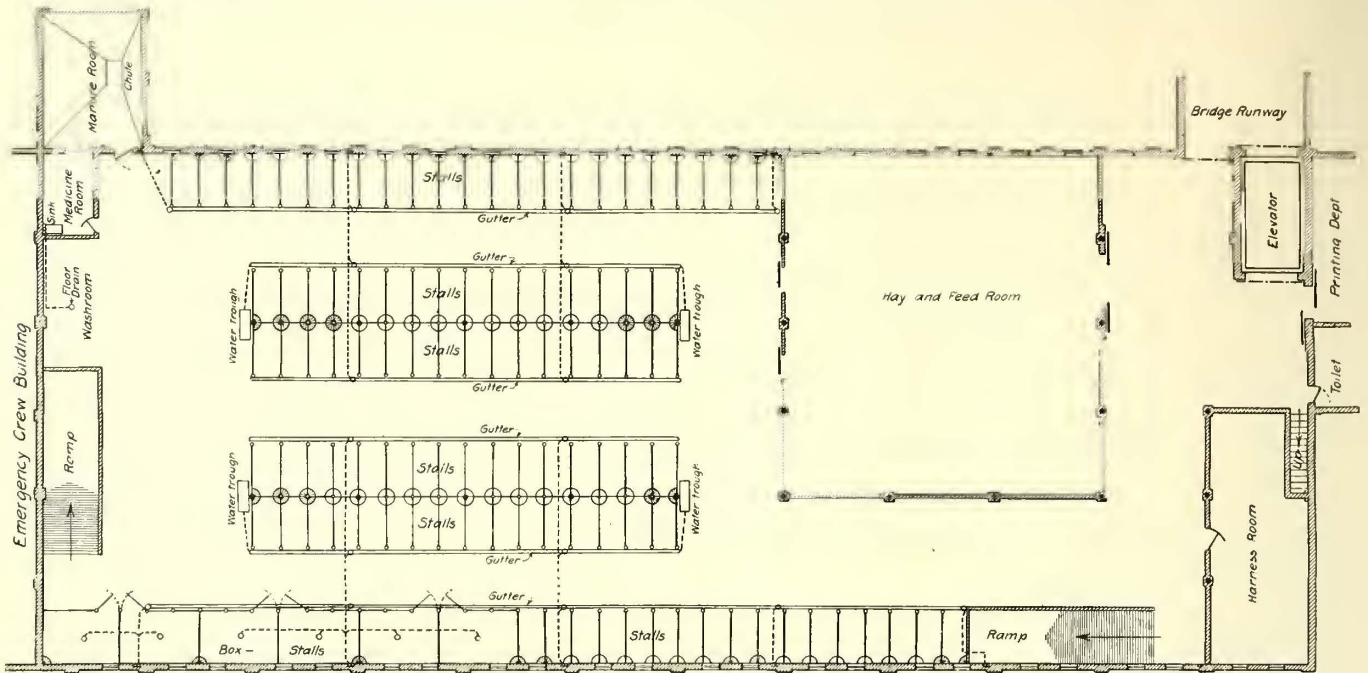
THE MAIN ELEVATOR

Between the rear of the line department building and the easterly end of the stable there is located an electric elevator with a platform 10 ft. 3 in. x 20 ft. 6 in. in the clear. The entrance door to this elevator faces the main inside driveway and there is also a rear door leading to and from the wagon storage. This elevator was built and in-

The capacity of the elevator is 18,000 lb., exclusive of the weight of cars and cables, which gives ample margin for possible increase in requirements. The car is of I-beam construction floored with 3-in. oak. The cage is of steel angles and plates 5 ft. high with a top made of wire grille. The speed of the elevator is 50 ft. a minute. It is operated by a compound-wound 30-hp motor, which, together with the tandem worm-gear drive, is placed immediately over the shaft in a penthouse, the weight resting directly

on the walls. The magnetic control provided consists of two operating switches connected with controller magnets comprising the motor and rheostat connections governing

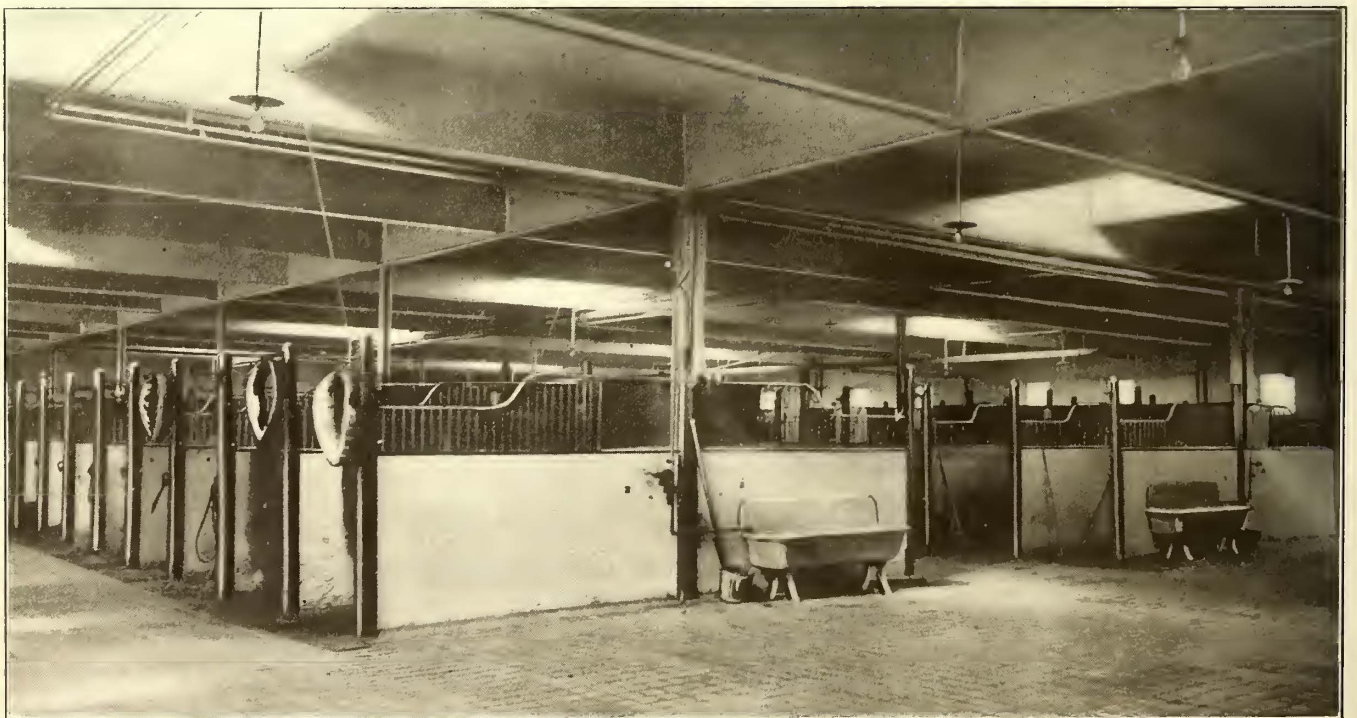
The space thus reserved is paved with granite blocks and provides suitable storage area for the wagons, which are conveniently arranged between the rows of columns carry-



Brooklyn Line and Track Department Headquarters—Plan of Main Stable

the acceleration and direction of movement. The elevator is also provided with the necessary devices for safe operation, including slack cable device and automatic gate at each landing. All openings in the elevator shaft are also protected against fire by automatic rolling steel shutters.

ing the floors above. Plenty of light as well as ample ventilation is secured through the lower fixed and upper pivoted sash windows on the President Street side. One section of this storage, 62 ft. 9 in. x 100 ft. in extent, is enclosed by an iron fence and gate, 10 ft. high, for the



Brooklyn Line and Track Department Headquarters—Part of the Stable, Showing the Single Stalls, Construction Features and Lighting

COVERED WAGON STORAGE

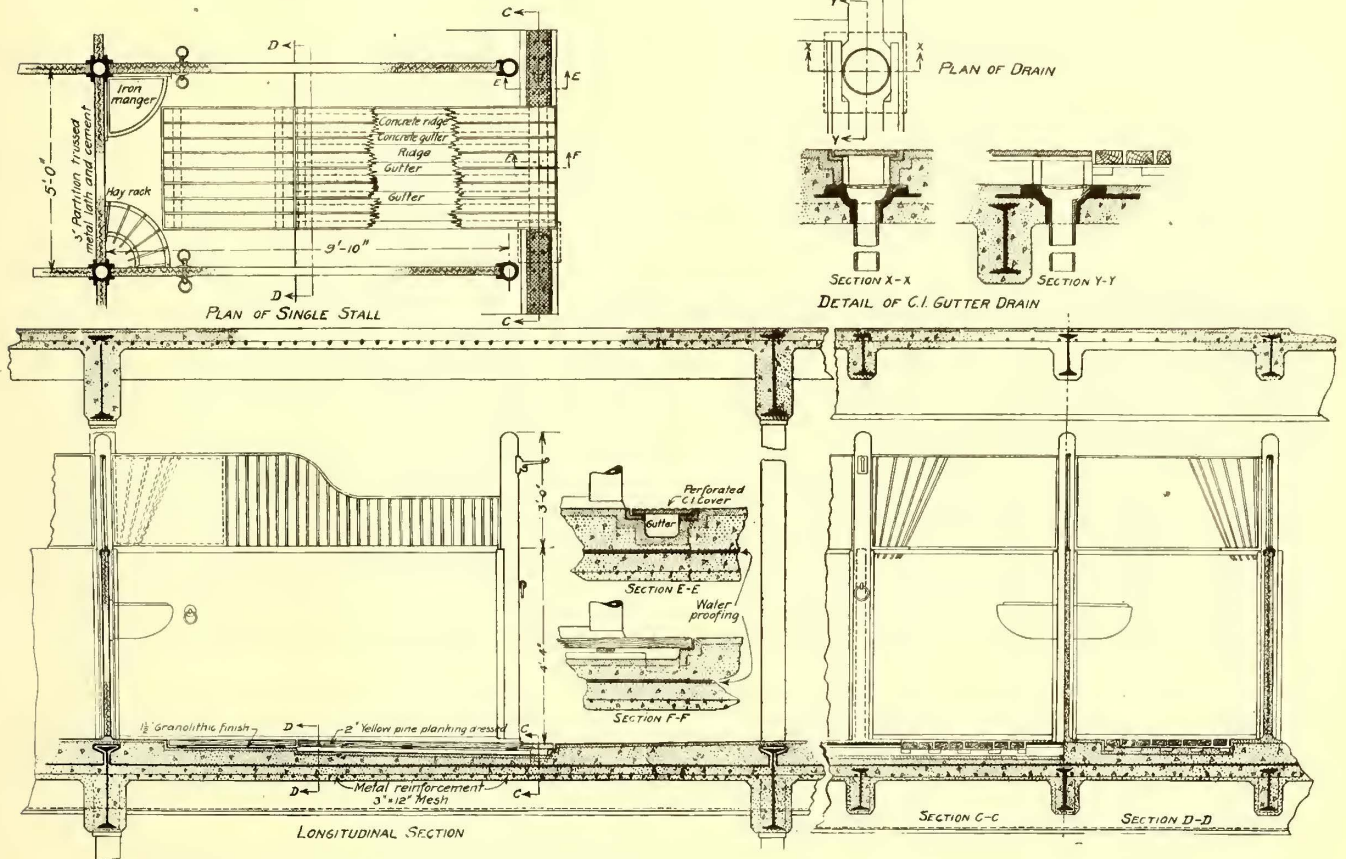
The stable building covers an area 243 ft. x 100 ft. and is constructed over the wagon storage area, the walls being carried down to the ground level on three sides, while the side facing the main inside roadway is left entirely open.

safer storage of vehicles carrying valuable equipment such as reels of cable, copper, tools, etc.

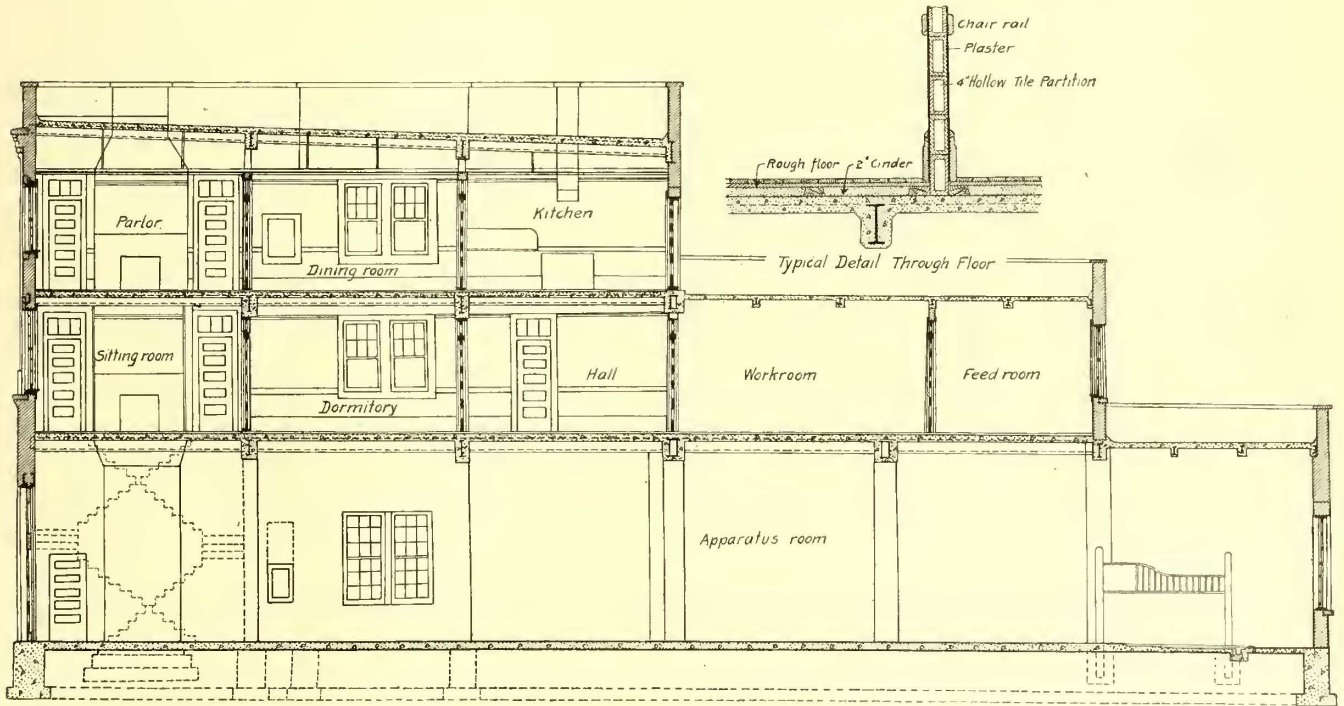
A section of the wagon storage area along the President Street side nearest the emergency building and covering 60 ft. x 33 ft. is walled on all sides except for the door-

ways. It is divided into two rooms having 6-in. concrete floors and 8-in. brick division walls. The larger room, 40 ft. wide, is used as a garage for the company's automobiles, while the other is used for drying blankets and other wet equipment brought in by the line gangs on rainy days.

cinder fill on which are laid yellow pine sleepers holding yellow pine cleats 3 in. wide, spaced 14 in. centers. The space between the cleats is paved with rubber fire hose, which gives a very satisfactory footing for the horses' hoofs. One of the ramps starts from the inside of the



Brooklyn Line and Track Department Headquarters—Details of Stable Floor and Stalls



Brooklyn Line and Track Department Headquarters—Longitudinal Section of Emergency Crew Building

Two horse ramps lead from the wagon storage to the stable proper. The ramps are each designed for 150 lb. live load and are made up as follows: Reinforced concrete slab, 5 in. thick on steel beams, covered with a 2-in.

wagon storage and is carried over a storeroom; the other begins directly at the inside roadway and is closed by an iron gate when not in use. Both ramp openings are also protected by automatic rolling steel shutters.

STABLE

The stable on the second floor, owing to its unusual size, substantial design and splendid sanitation, deserves special mention. The company's engineers made a careful study of the best practice in stable and stall construction and their efforts have resulted in the building of a stable, the detail construction and arrangement of which probably are unrivaled by the largest stables in this country. The quar-

The stall partitions are formed by two cast-iron stall posts joined to a partition which carries the wrought-iron stall guards. These partitions are of cement reinforced with "Trussit" metal lath and, although only 3 in. thick, have been found so strong that not one has been damaged by kicking horses. The stall posts are attached to the floor by means of a heavy base plate secured by a pair of wrought-iron hook bolts turned in under the top flanges of the floor I-beams. Every stall has an iron manger attached to the front post and a harness hook on the rear post. A



Brooklyn Line and Track Department Headquarters—
Lounging Room for the Emergency Crew

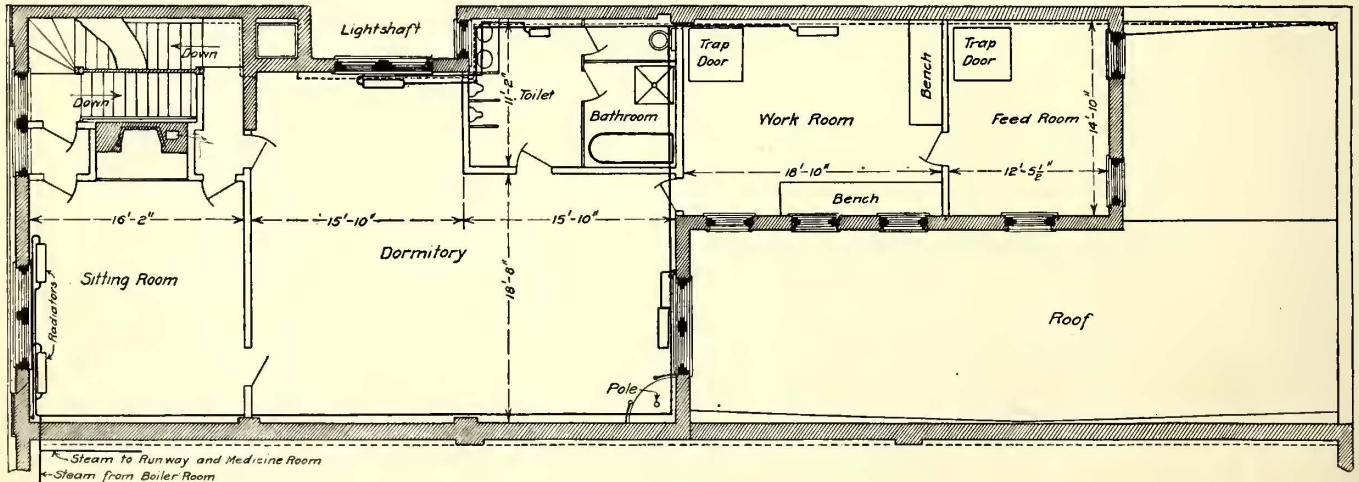
Brooklyn Line and Track Department Headquarters—
Bedroom of the Emergency Crew

ters are divided into 104 single stalls and six box stalls, together with a wash room, veterinary supply room, hay and feed room, harness room, manure room and other stable accessories arranged as shown in the accompanying drawings.

wrought-iron hay rack is placed in the corner between the front and side walls and a large salt cellar in the corner opposite. The watering troughs are located at the ends of the two sets of center stalls, as shown in one of the accompanying engravings.

The construction of the stable floor differs from that in the other buildings because of the special precautions taken for waterproofing and the greater weight and impact which this floor must bear. The entire floor is water-

The box stalls for sick horses are 15 ft. x 10 ft. in area and are built up of "Trussit" lath cement walls 3 in. thick, like the single stall partitions. These walls are 4 ft. 4 in. high with wrought-iron stall guards secured to their tops



Brooklyn Line and Track Department Headquarters—Plan of Living Quarters and other Facilities for the
Emergency Crew

proofed except the portion directly back of the hay and feed room. It is carried on I-beam girders encased in concrete and is made up as follows: 4 in. of concrete with Clinton wire mesh reinforcement to carry 200 lb. of live and dead load per square foot; waterproofing of pitch and tar; a concrete fill of varying depth according to location, as shown in the section of this floor; 1½ in. granolithic finish made extra hard.

through light channels. Each stall has a latched door hinged to one of the posts.

The foregoing construction details indicate to what extent the use of wood has been eliminated. In fact, the only permanent wooden construction consists of the window sash and frames. It is hardly necessary to point out what this absence of wood means from the fire standpoint. However, it is equally beneficial from sanitary con-

siderations. A wooden stable, because of its continued absorption of noxious and unhealthful odors soon becomes a nuisance to the neighborhood despite frequent cleaning; on the other hand, a stable with hard concrete floors, reinforced concrete stall barriers and iron stall posts can with proper flushing and drainage be kept absolutely clean with little more trouble than the turning on and off of a hose. In this installation the floors of all stalls have grooved concrete gutters pitched to continuous plate-covered drains running along the rear and supplied with a soil pipe every 20 ft. The stall gutters are covered with eight 2-in. x 4-in. slats which are removed every day to allow the complete flushing of the individual stalls.

To the sanitary advantages afforded by the construction and drainage systems may be added the fine lighting and ventilation from the numerous windows and skylights. Another noteworthy feature is the isolated location of the manure room, which is in an extension over the main inside roadway. This room is completely enclosed and ventilated by skylights and galvanized-iron louvres. The floor has a scuttle and chute to provide direct and unobjectionable loading to wagons or cars beneath.

The placing of the hay and feed room on the same level as the stalls is somewhat unusual, but more advantageous for handling material than the ordinary loft. This room is completely enclosed by 4-in. tile walls with fire doors on both the elevator and stable sides. The toilet room for the stable men is of the same high standard as that for the office and shop employees.

RECORD STORAGE AND REGISTER REPAIR SHOP

Part of the stable building is carried to a height of three stories, the third floor originally having been intended for use as a hay and feed loft. However, a reduction in the number of stalls left it available for other purposes. It has now been divided into three sections about 32 ft. x 80 ft., each isolated from one another by 4-in. hollow fire walls and protected openings. In two of these there are kept in interchangeable boxes the important documents of the Brooklyn Rapid Transit system. These are placed in storage racks consisting of angle-iron uprights supporting board shelves. The place chosen is not only safe on account of the fireproof construction, but also convenient because of the elevator facilities. The large amount of natural light which the numerous windows afford for the outer section and the skylights for the inside section presents a favorable contrast to the usual dimly lighted and ill-ventilated vaults generally considered good enough for record storage. Fire protection for these important papers is secured by the installation of standpipes and fire-alarm boxes.

Further details concerning the character of these records will be given in a separate article.

The other outside section, like the storage sections, is under the secretary-treasurer's department and is being converted into a shop for repairing and calibrating fare registers, passimeters and canceling boxes. The maintenance of some 5000 cash and transfer registers on the elevated and surface cars, 150 passimeters on the elevated stations and 80 canceling boxes at the Brooklyn Bridge and Coney Island terminal calls for considerable mechanical skill. A well-equipped little workshop with benches, lathes, drill press, grinder and air compressor is to be fitted up for the complete renewal of every part of these delicate machines. The working force of this important though small department will eventually consist of a foreman and three assistants.

EMERGENCY CREW BUILDING

The last building in the first group is a three-story structure used for the quarters of the emergency crew and its equipment. The lower floor, occupying an area of 100 ft. 8 in. x 34 ft., is used for the emergency equipment; the second floor for the living quarters of the crew; the third floor for the living quarters of the chief and his family.

The first floor is provided with stalls for four horses and has one exit leading to the inside roadway and another of the double swing-door type opening on President Street. The greater part of the room is arranged for the convenient storage of the emergency crew's apparatus and also has facilities for washing vehicles. At present the company is using an automobile emergency wagon which is quartered in this building.

The second floor, which is 32 ft. 4 in. shorter than the lower floor, is reached by an iron stairway. It is divided into five rooms by 4-in. hollow-tile plastered partitions similar to those in the office section. The first room, fronting on President Street, is used as a general lounging parlor for the emergency crew. It is finished in quartered oak, has an artistic brick fireplace and is furnished with tables and leather-padded wicker chairs, as illustrated. The next room is the dormitory with metal cots, chairs, clothing hangers, etc. This room has sliding poles similar to those used in fire houses. An adjoining room contains the toilets, tub and shower-bath equipment, all of which are of the finest grade of manufacture. A hallway back of the bedroom leads to a workroom and a hay and feed room having a trap-door opening to the stalls below. The several living rooms on both this floor and the one above are furnished with picture moldings and gas lighting, to add to the general home-like effect.

A separate stairway leads to the third floor which contains five large rooms, 49 ft. 4 in. long over all, for the emergency chief and his family. These rooms are provided with all the conveniences of a high-class flat, even to an ornamental fireplace, dumb waiters, hot and cold water, range, tub baths, etc. Every room except one inside bedroom faces the open air, and even that room has a large skylight. As these rooms do not extend the entire length of the floor below, the walled concrete roof over the work and feed rooms is covered with planking to make it available for use as a courtyard. The ceiling in these rooms is suspended from a concrete roof carried on embedded I-beams and waterproofed with five-ply tar and gravel. The roof is reached by an outside iron ladder carried over the parapet at the rear, thereby avoiding annoyance to the residents of the building.

NOTE

The third and last article in this series will describe the scope and equipment of the different stock, repair and manufacturing facilities and track department offices housed in the second and third group of buildings.

The Austria-Hungarian Diet has granted a subsidy of 500,000 crowns for the construction of an electric railway in the Tyrol.

The management of the Baden State Railways has decided to electrify the Basel-Schoppheim-Zell and Schoppheim-Säckingen lines. The single-phase system, using 15-cycle, 10,000-volt current, will be employed. Energy will be generated by water power at Augst-Wyhlen, on the Rhine, and transmitted to Basel, where it will be converted from three-phase to single-phase.

THE LOG OF THE NEW HAVEN ELECTRIFICATION*

BY W. S. MURRAY, ELECTRICAL ENGINEER, N. Y., N. H.
& H. R. R.

The duty assigned to the engineers of the New Haven Railroad was to provide for the electrical operation of its trains. At the early period of April 1, 1905, when we settled down to this responsible task, the data in the field, upon which to base real conclusions, were about 5 per cent, in comparison with the experience now available. If "Ignorance maketh the brave" I can only say that I am more than thankful we were so ignorant at the outset. To those who may be interested in my conclusion in regard to the New Haven Railroad electrification, I can simply say that if I was in favor of its use three years ago, that now, standing on the more stable ground of experience, particularly in regard to the department of faults, I am doubly in favor of it to-day.

Unlike steam traction, where the number of links in the delay chain is but one, electric traction has its delay chain composed of three links, namely, the power house, line and locomotive. In the conception of the form of power house, line and locomotive to be used in the New Haven system, those interested in its success were led to believe that while the chain of power generation and its transmission and utilization for traction was of a new character, its links, however, were made up of principles long recognized and reliable. They were right in this conclusion, except that it did not include certain phenomena which could not have been anticipated, due to the combination of these old principles in the form of this new chain.

THE SERIOUS FAULTS—POWER HOUSE

The electric power supply for the New Haven road is derived from four three-phase, 11,000-volt steam turbine generators, three of which have an electric capacity of 3750 kv-amp single-phase; the fourth unit consisting of a 6000-kv-amp generator, which can also supply single-phase current to the system.

Although the generators as originally designed were made exceptionally strong and particular attention paid to their insulation, due to the necessity of grounding one-phase, it was found that the utilization of so much single-phase current from a three-phase star-wound generator produced a stray magnetic field completely out of the path of normal lamination. As a result it was impossible to develop for continued operation more than 66 per cent of the normal rating of the generators. Overloads of any character produced abnormally rapid heating, making such operation dangerous, although the generators were guaranteed to carry 50 per cent overload for two hours and 100 per cent overload for two minutes in order to meet the sudden drafts of currents required for a schedule such as exists on the New Haven road. Indeed, at the very start the actual drafts of current showed that the generators must meet imperatively the guarantees as to normal and overload capacities if the electrification were to be successful.

After three unsuccessful attempts at complete correction, each, however, affording some constructive results—months being absorbed in the dismantling and readjusting of the parts of these generators—the final attempt was successful and the generators are to-day operating in the power house, fulfilling the guarantees mentioned previously. But this last-mentioned fact is insignificant when compared with the valuable information that has been derived, which will permit all other generators to be manufactured without the fault described.

LINE INSULATION

None of the problems in line insulation had the appearance of special difficulty and, indeed, did the roadbed provide traffic only for electric trains, the problem would have been simplicity itself. Of the effect of steam locomotive discharges upon insulators, there was no initiative by which to be guided, and it became necessary to decide upon the factors of insulation that would be required. It was thought that ample provision had been made: It proved otherwise. Experience has proved that, in places, just

double the amount is required. It was quickly noted that the greatest number of insulator failures occurred wherever the insulation was subject to the direct blast of the steam locomotive. To correct the difficulty, therefore, it was found necessary to double up on anchor insulators. The intermediate messenger insulators proved adequate and it was not found necessary to increase the impregnated stick insulation between trolley wires at curves, but wood stick insulators had to be added in series with the molded material insulator between the pull-off wire and pull-off post. The original insulators on the anchor-bridge switches were made of molded material and for them was substituted porcelain. It was not necessary to change the feeder insulators on the catenary bridge struts. While very little trouble has been experienced with the form of insulation used for supporting the feeders under highway bridges, it is anticipated that trouble will follow if this is not changed. The present form consists of the corrugated spool-type insulator, for which there will be substituted a regular porcelain double-petticoat insulator.

To-day, instead of line failures being the rule, they have become the exception.

CIRCUIT-BREAKERS

The momentary energy involved in a short-circuit produced upon a line fed by high-power, high-speed turbines is very great. It was stated that the generators were not operating under their guaranteed capacities. Internal heating, due to stray magnetic field, was the cause of the generators failing to meet their designed capacity. This heating was completely cured by the simple addition of a short-circuited winding surrounding the rotating member of the generator, similar to that used in the well-known squirrel-cage type of induction-motor rotors. It is interesting to note here, however, that while the heating is entirely eliminated by this short-circuited winding, its effect on the occasion of a short-circuit is to allow more current to flow. This tendency, however, is controlled by a method later to be described. In the New Haven system, as the current from the power house was fed directly to the line and from there to the locomotives without transformation of voltage by transformers, the inductive element to counteract the surging current was practically negligible; under these conditions there resulted short-circuits which no circuit-breaker apparatus then designed could be relied upon to take care of.

The failure of circuit-breakers, either in the power house or on the line, naturally produced train delays of large or small magnitude. It was difficult to believe that these large circuit-breakers were incapable of taking care of the short-circuits, and some time was wasted in thinking this way. Therefore, we reluctantly but surely arrived at the conclusion that the conditions would have to be changed.

The remedy was simple. Instead of feeding the main line with a direct transmission straight from the power house busbars to the trolleys directly opposite the power house, the current was fed into the line over feeders connected to it at Port Chester and Stamford. By the introduction of this ohmic resistance, amounting to not more than 2 per cent normal drop on the system, we were immediately released from the disastrous effect of short-circuits on our circuit-breaker apparatus. Instead of losing as many as half-a-dozen circuit-breakers in a day, not that many were reported out of commission for a month, and, of course, they were not damaged to the extent of the others nor did they cause any serious delays.

For the feeder resistance, above described, there has since been substituted impedance coils installed in the leads of the generators. These coils act as shock absorbers, protecting the generators. Later there will be installed a circuit-breaker across the terminals of these impedance coils, which, for normal operation, will shunt the current through them, the breakers opening under stress of abnormal flow of current and automatically closing when normal conditions are restored.

TROLLEY WIRE

In the month of May, 1908, after closely observing for a long period the trolley wire and the contact shoes, it became evident to us that within at least one month from that date, if some change was not effected in the contact

*Abstract of a paper read at meeting of American Institute of Electrical Engineers, Dec. 11, 1908.

wire, that the New Haven electric service would cease. Daily reports were showing that the copper trolley wire was breaking at various points; and where it was not broken it had become so badly kinked at the hanger points that it was impossible to operate electric locomotives upon the line without serious arcing. This resulted in violent surging on the locomotive transformers, and, at times, on account of the extremely poor contact of overhead shoes on the line, in reducing the voltage to such a low value as to prevent a sufficient supply of power to enable the locomotive to perform its schedule. An examination of the hard-drawn copper trolley wire throughout its length proved that even after only a few months' operation upon it, its cross-section had been so materially reduced as to point to its short life with a continuance of operation upon it. Especially was this true in the vicinity of the many low highway bridges where the trolley wire approaches the bridge on a 2 per cent gradient. This fault and dilemma were indeed serious. The cause of the difficulty was perfectly apparent, namely, the hard spots in the line which existed at the hanger points.

Many suggestions were offered. None of them, however, offered the speedy installation that was paramount. Mr. McHenry, vice-president of the New York, New Haven & Hartford Railroad Company, made the suggestion that an auxiliary wire be suspended from the present copper wire by clips at its midpoint between the hangers, and followed up the suggestion that this auxiliary wire be made of steel, of the same cross-section as the 0000 grooved hard-drawn copper wire above it. It took two weeks for the manufacturer to draw 2 miles of this wire. It was installed immediately upon its receipt on the main line between Port Chester and Harrison. On the night of its completed erection a special seven-car train with two locomotives was operated upon it for several hours. Previously to the installation of the steel wire there had been installed a section of Phono-Electric wire suspended in a manner similar to that of the steel. The electric train was operated upon them both, officials from both the railroad company and the contracting company being on hand to note their comparative merits. It was the general consensus of opinion that there was less sparking on the hard alloyed wire, and the general tendency was toward adopting that rather than the steel. Though admitting that the operation was better, the steel seemed to be of an entirely satisfactory commercial nature, and all present finally concurred in this conclusion. It is undeniably true that hard alloyed wire would, from a purely operative point of view, be the better of the two, and yet the commercial aspect, which would naturally include its cost, had to be considered, particularly in reference to so large an immediate order as one involving 100 miles of single-phase electric trackage. Again, it is important to note that the steel, besides having the advantage of being a cheaper, harder and stiffer wire, also possesses a lower coefficient of expansion and higher elastic limit, especially valuable characteristics for the service desired. An immediate order of 20 miles followed by another for 40 miles was placed, and as much hard alloyed wire put up as could be obtained between the date of the conclusion to use the auxiliary wire and the final arrival of the first shipment of steel. The auxiliary wire construction on the main line (see *ELECTRIC RAILWAY JOURNAL*, Oct. 10, 1908, p. 859) prevails throughout the whole system, except at the approaches of and under a few very low highway bridges, where the contact system consists of two wires strung in the same horizontal plane.

The New Haven trains have been operating now on the auxiliary wire for several months, and absolutely no kinking has been noted at the hanger points, with the attendant result of a smooth and almost sparkless overhead contact.

LOCOMOTIVES

There were originally purchased 35 locomotives, which was considered an adequate number to take care of the New Haven passenger service. These locomotives were rated on a half-unit basis. That is to say, the half unit was designed to handle about 75 per cent of our trains, the remaining 25 per cent to be handled by two units. Only a short experience in commercial operation revealed two important facts. The first one was of a very encouraging nature, the second, decidedly otherwise. The first was

the proof that the two main parts of the locomotive, namely, the transformers and motors, had sufficient capacity to more than handle the manufacturer's guarantees. The second was the discovery that many of the auxiliary electrical and mechanical parts of the locomotive equipment were not of equivalent capacity. The strength of the chain being measured always by its weakest link, it was immediately seen that the locomotives would be able to handle trailing loads in excess of their guarantees if the auxiliary parts were made of sufficient capacity to furnish the necessary current for the overload conditions. It was simultaneously apparent that more locomotives would be required to provide for an increase of train service and the reduction of time schedule, and an order was promptly placed for six additional ones. Before accepting their design, however, a careful survey was made of all the component parts of the locomotives at hand in order to determine the changes necessary to be incorporated in the six new engines. To accomplish this it was found necessary to make a number of electrical and mechanical changes.

The most important electrical changes made were in the switch groups and brush-holders of the motors. The former lacked carrying capacity and the latter sufficient insulation. To these shortcomings were due the greatest number of our first train delays. The most important mechanical changes necessary were the reinforcement of the truck bolsters and installation of pony wheels (see *ELECTRIC RAILWAY JOURNAL*, Nov. 21, p. 1424). All the minor changes were considered absolutely necessary in order to preserve a low cost of electrical and mechanical maintenance.

To be noted here is the marked value of the spring type of armature and field suspension begun with the New Haven locomotive motors, thus making flexible the entire motor suspension. Indications already predict that this arrangement in combination with the pony trucks will reduce materially the track and locomotive maintenance and repairs. To-day the reconstruction, as above described, has been effected on over 95 per cent of our locomotives.

It seems to be the time and place here to draw attention to a point in design concerning the New Haven locomotives. The specifications upon which the locomotive units were purchased were that each unit would handle a normal trailing load of 200 tons. The writer, by careful measurement of the weights of all the trains (trailing loads) in the New Haven service, found that they averaged 212 tons. It seemed good engineering that if 75 per cent of the service could be handled by locomotives rated upon a basis of 200 tons trailing load, that that would be the correct locomotive unit size; using two units for the remaining 25 per cent of the trains. To-day, three years after this decision, we find that 73 per cent of our trains can be handled with single units, 27 per cent requiring two units. The percentage is slightly different from the original, as the service is slightly heavier.

MINOR FAULTS—GENERATOR BURN-OUTS

Previously to the rearrangement of the feeders and the installation of the choke-coils in the power station, the short-circuits that were experienced on the line had a bad effect on the generators. The prodigious rush of current produced severe strains in the armature windings, strains whose mechanical intensity was made manifest by the movements of the coils. Therefore, during this period of violent short-circuits frequently the generator coils were grounded and burned out. Since the rearrangement of feeders and the installation of choke-coils, the violent short-circuits have disappeared and with them the damaging effects on the generators. It has been found advisable from time to time to connect different generator terminals to the line. By this arrangement the three phases of the generators are in turn worked equally.

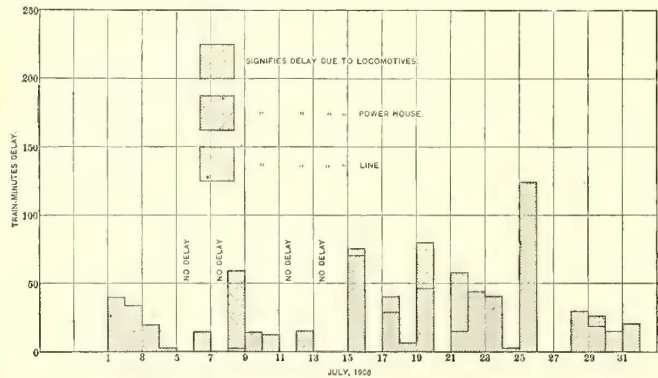
DISTRIBUTION

Although the arrangement of the line in its present feed and trolley connections effects the highest economy in loss of power by transmission, it is questionable to my mind whether this economy is worth some of the disadvantages which accrue from this arrangement. A less efficient method of line transmission, using the same amount of copper for each case, is one in which each track

has its own individual voltage supplied to it and is kept separate from the other trolleys.

CONTACT WIRE

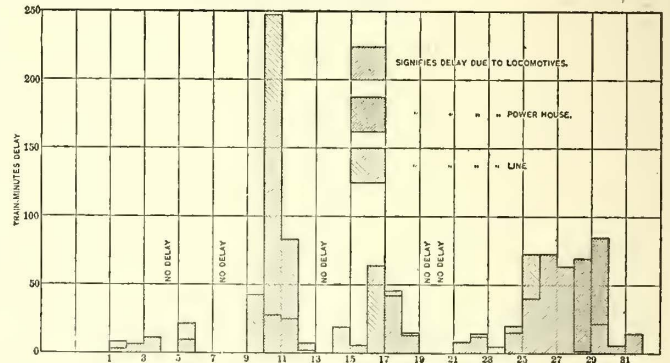
While the auxiliary wire, as previously described, was the panacea of our difficulties, it is fair to believe that even a more sparkless operation can be obtained from an auxiliary wire which, instead of being attached by a rigid clip to the overhead copper conductor, is simply suspended from it by a loop, thus permitting the contact wire to rise slightly as the upward pressure of the pantograph shoe travels along its surface. The contact wire should be an-



Graphic Chart of Train-Minute Delays in July

LOCOMOTIVE CURRENT COLLECTORS

The present cost of pantograph shoes is about 0.06 of a cent a locomotive-mile. We have made various experiments with aluminum, phono, copper and steel rigid and spring-supported pantograph shoes. Shoe life is seriously affected by the amount of soot deposited by the locomotives upon the overhead wire. While we have obtained mileages varying between 600 miles and 1500 miles per shoe with various types used, other roads of lesser speed and not subject to the effect of locomotive stack discharges have obtained as high as 25,000 shoe-miles.



Graphic Chart of Train-Minute Delays in August

chored by turn-buckles to permit slacking and straining of the wire in winter and summer seasons, respectively.

HARD SPOTS IN LINE

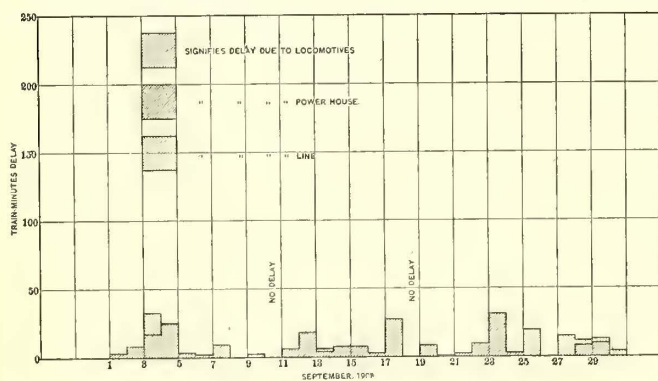
Irregularities in the contact wire may be due to two causes. First, those that exist in the wire as it is manufactured; secondly, those formed on account of hard spots. The former can be taken out; if not, they are usually ironed out in the course of the operation of the shoe on the trolley. The three principal sources of hard spots are derived from hangers, section breaks and deflectors. Modifications in these details of construction have eliminated most of the trouble from this source. The new section break, containing all the flexibility obtained by the auxiliary wire, has been constructed by simply staggering the messenger insulators of each trolley 16 in., thus permitting the anchor bridge trolley wires of the same track to pass at this distance. Each trolley wire is dead-ended to a wood impregnated stick insulator supported by the messenger of its opposite section. By this arrangement practically all inertia is taken out of the section break and a sparkless passage between sections is obtained. The auxiliary wire

THE LOG OF OPERATION

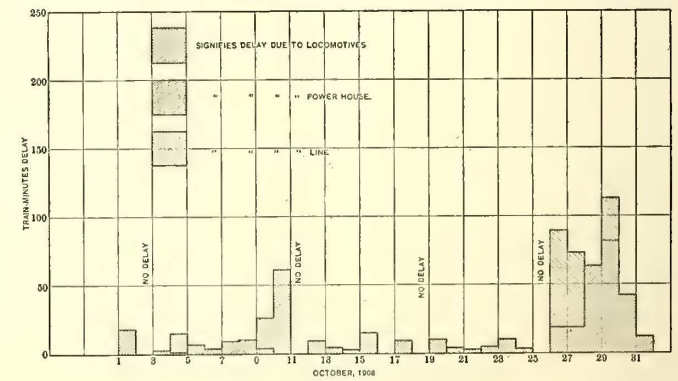
On July 1, 1908, all through and local passenger trains were under electric schedule between Stamford and the Grand Central Station. Beginning from this date of July 1, 1908, data have been compiled of our operation as taken from our records. We are not proud of it, but there were obstacles that stood in the way of its immediate betterment at that time.

On account of the speed restrictions that have been introduced on the electric service until all locomotives have been reconstructed with the new pony truck equipment, it is impossible to compare train-minute delays, for the reason that steam locomotives are permitted to make up time while to electric locomotives this privilege is denied. Individual and collective train-minute delays in the electric zone, due to failures in power house, line and locomotive, are shown graphically for the four months beginning July 1, 1908, in the accompanying diagrams.

The segregation of these failures based upon train-minute delays offers a quick and interesting comparison. It is to be noted that the last two months indicate a great



Graphic Chart of Train-Minute Delays in September



Graphic Chart of Train-Minute Delays in October

construction has been applied to the deflectors and this has greatly reduced the tendency to spark at these points.

SIGNAL WIRES

The catenary bridge struts carrying the cross-arms for the by-pass or feeder wires likewise carry the cross-arms upon which are installed the signal wires. The voltage placed on these signal wires is entirely distinct from the propulsion voltage, it being 2200 volts and 60 cycles. The proximity of the wires of these two systems has been the cause of short-circuits between them, resulting in double failures. It would seem that as the signal system should be completely separated from the propulsion system, it should be installed on an entirely separate pole line.

improvement over the two preceding ones. From the chart have been taken the train-minute delays that have amounted to over 300 minutes per diem, which are treated separately in the following paragraph. It is interesting in reviewing the "cause of delay" that 90 per cent of the causes are of an inconsequent nature and might be reasonably expected when considered in the light of an initial service.

Serious failures of the system causing over 300-minute delays are indicated by the dates of July 14, 16, 20, 26 and 27; Aug. 6 and 8; Sept. 8 and 26 and Oct. 19. A description of the cause of one applies to all of them except those of July 16 and Oct. 19. In every instance, excepting the two dates mentioned, the tie-up was due to simultaneous failure

of several circuit-breakers, due to a short-circuit, thus temporarily disorganizing the distributing system, preventing the electrification of trolley wires.

On July 16 the White Mountain Express left the rails just east of Greenwich station, tying up both east-bound tracks and causing excessive train-minute delays. Except for the electric rail bonds which suffered destruction, no other electrical apparatus was disturbed. One of the electric locomotives attached to this train was immediately returned to service, the other following it the next day after light repairs were made to its pilot and third-rail shoe mechanism.

On Oct. 19, although the impedance coils in the station were in action, a ground occurring on the busbars of the anchor bridge directly outside of the power station, in combination with a defective circuit-breaker, produced a short-circuit which destroyed the operating mechanism of the breaker in question. This unfortunately occurred at a time when temporary connections had been made between the power house and line; on this account a serious delay was experienced in restoring the voltage to the line. Since the complete inauguration of electric service the serious failures in the system have been reduced in the ratio of five to one.

ENGINE REPAIRS

Since the full schedule has been handled by electric locomotives a marked reduction from month to month has been made in the number of engines held out of service for inspection and repairs. The following table shows the daily average number of locomotives out of service for one cause or another:

Month	Reconstruction	Experiment and test	Trucks installed	Inspection	Repairs	No. of trains
July	1.41	0.074	0.37	0.71	1.26	129
August	1.39	0.11	0.23	0.39	1.73	135
September	2.32	0.08	1.64	0.20	0.40	132
October	3.10	0.26	2.22	0.00	0.11	125

On account of the reconstruction being done on the locomotives it has been found necessary to give up on an average three electric locomotives at Stamford and three at New Haven, the new bogie trucks being installed on the engines at New Haven. Thus out of 41 locomotives we have had only 35 to handle the complete passenger service. This has resulted in requiring that the New Haven locomotives handle the service with virtually no spare engines. An examination of the table, under columns "Inspection" and "Repairs," indicating how few have been the engines in the shop for the past three months, is an attest of this requirement.

CAPACITY OF THE ELECTRIC LOCOMOTIVE

The capacity of the electric locomotives was based upon their ability to handle a trailing load of 200 tons in local service with stops averaging those that exist between stations between New York and New Haven. As a matter of fact, the station stops between Stamford and New York average very much greater than between New Haven and New York, and as very quick turns are made at both terminals, the service may be said to be more severe under these conditions than under the guaranteed conditions of purchase. It is interesting to note the trailing loads hauled by the New Haven electric locomotives for the week ending Oct. 24, 1908. These varied from 3 per cent to 70 per cent in excess of the guaranteed hauling power of the locomotives.

COMPARATIVE STEAM AND ELECTRIC ENGINE MILEAGE

Sept. 5 last (Labor Day) offered an interesting day to note what mileages could be made by the electric locomotives. The 38 electric locomotives in service that day made an average of 212 miles. This was made for all classes of service, express, cpress-local and local, over three short terminal runs, namely, Stamford, Port Chester and New Rochelle to New York, the distances being approximately 34, 26 and 17 miles, respectively. Several engines made eight runs, two of them nine and one ten. It is difficult to get an exact comparison for steam locomotive-mileages. All of the electric engines are confined to one division, while the steam locomotives do interdivision service. However, using the records of the 1906 steam service for Labor Day and considering steam locomotives

doing mileage in and out of the present electric zone, out of 117 locomotives the following record is to be noted:

- 10 made over 300 miles
- 20 made between 200 and 300 miles
- 21 made between 150 and 200 miles
- 34 made between 100 and 150 miles
- 32 made under 100 miles

117 Average 158 miles

Thus with division limits double that of the present electric division and with the additional advantage of inter-division runs, the electric mileage for this concrete case averaged 34 per cent better than the steam mileage.

TELEGRAPH AND TELEPHONE

Single-phase electrification affects telegraph and telephone systems whose wires lie parallel with and in close proximity to the railroad. The corrective for this disturbance has proved to be simple and not costly. Briefly described, it consists of compensating transformers whose secondaries are a part of the telegraph and telephone wires and whose primaries receive their voltage from pilot wires strung on the same cross-arms as those bearing the telegraph and telephone wires, and thus having impressed upon them the same voltage, by electromagnetic induction, as the telegraph and telephone wires. The transformer secondary voltage is approximately equal and opposite to the induced voltage on the telegraph and telephone wires and thus constantly compensates for it throughout all ranges of induction due to the single-phase wires. The compensating transformer obviated the necessity of any change in the physical location of the telegraph and telephone lines within the zone of induction.

SAFETY

No fatality to the traveling public has happened by reason of the high-voltage wires since the system has been in operation. This would indicate the safety involved in its construction. Feeder or by-pass wires are not suspended by messengers. On the 300-ft. spans used in this construction which are above passenger platform stations a steel wire with a large factor of safety reinforced by copper for conductivity and supported from the struts by insulators is used.

LIGHTNING PROTECTION

In the New Haven case, where the overhead messenger system is not grounded, lightning has given but slight trouble. This is probably due to the very great number of grounded steel trusses and struts projecting above the electrified wires. Lightning was the indirect cause of one delay, but played only a small part in the real cause which can be attributed to the surge of current occurring at the time lightning caused a ground. The conditions are now such that the circuit-breakers will relieve short-circuits due to this cause.

GROUNDS

Positive grounds between Pintsch gas pipes and both car trucks should be made to avoid any arcs being drawn under the car body. On two occasions the gas in the Pintsch mains of New Haven cars has been set on fire on account of connection with electrified wires. The percentage is low, being two cars in about 400,000 during the period involved, with little damage in either case. Many of our catenary bridges, of both the intermediate and anchor type, serve to support signals. Signal men have been entirely free from coming in contact with the high-tension wires, by the simple provision of grounded close mesh screens interposed between the signal platforms and the high-voltage wires. The value of two grounds can be rated considerably higher than twice that of one.

TELL-TALES

We have experimented at some length in trying to produce an electrical horn that would be automatically sounded by an approaching train. A horn if used for this service should be a large one. The necessity for tell-tales is a bit of a relic of the barbaric past. The braking is all done from the engine cab, except in yards where, of course, the overhead wires have their normal height of 22 ft. from the rails, permitting safe clearances for manual operation of the brakes.

TRAIN LIGHTING AND HEATING

On account of the necessity of wiring for electric heating and lighting some 2500 coaches, it seems reasonable to retain the present method and apparatus of heating and lighting the trains in the electric zone. To accomplish this it was only necessary to supply each electric locomotive with a small steam boiler used solely for train heating. The Pintsch gas system has been retained intact. Later, when the service is sufficiently extensive, all trains will be heated and lighted by electricity. All multiple-unit cars are to be heated and lighted by electricity.

FATALITIES

We have had several fatal accidents, due to employees coming in contact with electrified wires. In each instance the accident was due to carelessness or violation of instructions, and most of the accidents occurred during the period of construction. The records to-day now seem to indicate that the future will be free from this most regrettable feature.

CROSS-CATENARY VERSUS BRIDGE-BENTS

The excellent results of a year's experience with cross-catenary construction in our Port Chester yard, where as many as 10 tracks are spanned, is tempting encouragement for its application to main-line work.

SINGLE-PHASE OPERATION

The Cos Cob power house has the usual number of men for a station of its output, and the locomotives are operated by the electric locomotive engineer with the customary assistant present for emergency. This crew holds good for single or double-unit trains. An emergency repair train is the guardian of the line, attending to all matters pertaining to its repair and maintenance. Including the night and day crews of the emergency train, the number of men employed to maintain the distribution system is 19. This covers about 100 miles of single track, including yards.

CONCLUSION

The writer has intentionally omitted the discussion of the operating costs of a direct-current versus an alternating-current system; it is his belief that in the electrification of steam roads to-day straight alternating-current traction is the best agency. Granted that the alternating-current traction apparatus has received the trademark of practicability, what further argument does it need in its favor?

DISCUSSION OF MR. MURRAY'S PAPER

Before reading the paper by abstract Mr. Murray said that as a result of the experience with the New Haven electrification he believed that the burden of proof as to what constituted the best system of electrification had now been shifted from the alternating-current system to the direct-current system. He believed that direct current had its field for electric traction. It would be used for a long time, possibly forever, in the motors on street cars in large cities, but the best reason it could offer for its presence there is the fixed charges on the capital which put it there. For new lines, unhampered with fixed charges on obsolete equipment, he believed alternating current would be universally used. The single-phase system as compared with the direct-current system possessed, in his opinion, the characteristics of equal reliability of service, less fixed charges, less operating expenses and higher efficiency.

Calvert Townley, vice-president of the Connecticut Company, a subsidiary company of the New Haven, was the first speaker to discuss Mr. Murray's paper. He pointed out that what the designing, contracting and operating engineers wanted most to know in undertaking a new project is what difficulties are likely to be met and how they can be overcome. For this reason, Mr. Murray's paper was particularly valuable. He believed that, while Mr. Murray had omitted any statement of conclusions, certain conclusions were nevertheless clearly indicated. He

summed these up as follows: First, that the system was put in without having any previous similar installation after which to pattern; second, that many of its fundamental features were either entirely new or had so new an application that their previous use was not much of a guide; third, that various defects developed as the installation progressed, resulting in interruptions and delays to the service; fourth, that these defects in practice have been remedied; fifth, that after five months of complete operation the system has been fully demonstrated to be successful and well adapted to the service for which it was designed. This is best evidenced by the fact that the electric service is now less subject to delays and interruptions than was the steam service which it replaced.

He realized that many mistakes had been made, but the one radical mistake which was really at the bottom of the major part of the difficulties encountered was that the electrification was not begun soon enough. Had more time been allowed for attention to the minor details of the equipment and could the work that had to be done have taken its normal course a majority of the minor troubles developed would never have existed. Furthermore, had there been time for a reasonable operating tryout many of the defects which caused delays to service would have been detected and remedied during the experimental period instead of during actual service.

Referring to Mr. Murray's statement about the record of operation, "we are not proud of it," he said that Mr. Murray spoke for himself alone and not for the other engineers associated with him. The speaker himself was proud of the record and did not believe that it needed any apologies. Mr. Townley then paid a high tribute to the courage and persistency of the contractors and their resourceful and cheerful co-operation with the company's engineers in overcoming the difficulties developed. In his opinion, the keystone of the system as installed on the New Haven was the design of the locomotives. The changes that were made were mostly of a minor character. No trouble had been experienced with the principal elements of the locomotives, namely, the gearless motors. He thought that the feature of spring-supported armatures was especially worthy of mention. The result in the improvement in track maintenance could not fail to be of far-reaching consequence.

W. J. Wilgus, formerly vice-president of the New York Central, was unable to be present, but sent by letter a brief discussion. He criticised the New Haven for making its experiment at the expense of the travelers who paid their fares with the expectation of reaching their destination as nearly on time as possible. He believed that the experimental application of electrical apparatus to untried conditions properly belonged to localities where the results of failure would not be burdensome. He regretted that the information given in Mr. Murray's paper did not include a fuller statement of the delays exceeding 300 train-minutes. The repeated suspensions of traffic for several hours, especially during the rush periods, had been serious and some curiosity prevailed as to the possibility of their recurrence. Regarding the cost of installation, while he admitted that the New Haven had been saved the cost of substations, batteries, etc., he thought that it would be interesting and instructive to know how far this saving had been offset and exceeded by the increased yearly costs incident to the use of overhead trolley construction and alternating-current locomotives; the cost of rectifying errors; the expense of holding steam locomotives in readiness to

haul electric trains; the loss of the benefits which accompany the use of multiple-unit cars in suburban territory and the absence of reliability of service. He did not believe that the facts set forth by Mr. Murray were such as to conclusively prove to the financial interests of the New Haven Company that they had secured for the expenditure of their capital, the system which would earn the greatest interest and afford their patrons a reliable train service.

B. G. Lamme, chief engineer of the Westinghouse Electric & Manufacturing Company, presented a detailed account of the troubles which had been experienced in the operation of the three-phase generators in the power house and referred to the fine records made by the single-phase main motors of the locomotives. He said that the defects developed in the generators had, to a certain extent, been foreseen and it was thought they had been provided for. The heating which developed in the field structure was known to exist in smaller machines of a similar type, but had never developed destructive tendencies. The rotor was known to be subject to high induction. The remedy was believed to be lamination of all the parts of the rotor. This was done, but on testing the first machine it was found that local heating developed under heavy load and damaged the insulation on the coils. An effort was made to eliminate these hot spots, but as soon as one was eliminated others would develop in different places under a continuous heavy load. The bold step was then taken to eliminate the pulsating reactions of the armature by putting a short-circuited winding on the rotor of such design that a very large current could flow in it with but little loss. Accordingly, a complete cage winding was put on one of the rotors of the New Haven generators. This rotor had not been designed originally for this purpose and it was difficult to adopt suitable proportions for the winding. This experiment subsequently proved a success, however, and new rotors with heavy cage windings were built for the three original machines. The fourth machine was built with a solid steel core in the rotor, on the surface of which the copper cage winding is embedded. As this winding completely eliminated the pulsating armature reactions, there was no necessity for laminating the field to protect it from magnetic pulsations. With regard to the motors on the locomotives there were two points in their design that were looked upon as sources of weakness, namely, the life of the commutator when operated on alternating current and the use of preventive leads between the armature windings and the commutator. The 164 motors in service have made a mileage of slightly over 40,000 miles each since being put in operation. The commutators of these motors are in first-class condition, having a good polish, and show relatively little wear. In no case have the commutators been turned unless they had received some mechanical injury. At the present rate of wear, their life appears to be between 15 years and 20 years each. There is relatively little sparking even when the motors are developing from two to two and one-half times their full load torque. The few injuries to motors referred to by Mr. Murray in his paper have been due largely to external causes, such as foreign substances, bolts, tools, water, etc., getting into the motor case, or from unsoldering at the commutator or at the rear end, due to extreme overload. In some cases these injuries have resulted in an actual burning out of a section of the commutator, necessitating partial rewinding. Such commutator windings as have been examined show no dangerous overheating and the preventive leads show no more evidence of heating than the main windings. In fact,

these leads have a better record than the main coils themselves. This is due to the fact that they lie underneath the armature winding proper and are thus mechanically protected to a great extent. Referring to the trouble experienced due to failures of the circuit breakers, Mr. Lamme said that experience with the windings on the generators in the power house indicated that they were being subjected to enormous forces in the end windings. A series of oscillograph tests gave an indication as to the amount of this force. The generators could put out about 15 times their normal full load momentarily on short circuit. The force coming on these end windings would then be 225 times normal. The repeated frequency of these shocks finally resulted in actual displacement of the windings. Precautions were taken to securely brace them in position and by inserting an impedance coil on the trolley side on each machine the rush of current on short circuit was limited to six times that of normal full load. In other words, the shock on the end windings was reduced to 36 times normal and no trouble has since been experienced from their displacement.

L. B. Stillwell agreed with Mr. Townley that in the case of the New Haven electrification, it was apparent that investigations and tests were not carried out with that degree of care and thoroughness which a work of this importance justifies. He said that it was fortunate that the New York Central and the New Haven had not adopted the same system for there was now an opportunity of comparing the possibilities of the two systems which was unprecedented and in any other country but America would have been impossible. While it was true that every problem of electrification must be studied primarily with reference to local conditions and requirements, the experience gained in the electrification of these two roads would go a long way toward supplying the practical information which heretofore it has been impossible for a designing engineer to obtain. He believed that the New Haven installation was an encouraging evidence of the possibilities of electrification of trunk line railways. He thought there was nothing discouraging in the record of four months operation and the record of the performance of the electric equipment of the locomotives. He thought that something would be added to the value of Mr. Murray's paper if figures could be given showing the record of train delays for steam trains during the corresponding months of the preceding year. He thought that the operation thus far had covered too short a period to justify conclusions with respect to the reliability and safety of the high potential overhead trolley and feeders as the system had not been called upon yet to meet the conditions imposed by sleet and snow.

A. H. Armstrong, of the General Electric Company, asked the true cost of the overhead trolley and transmission system of the New Haven. He quoted the estimate of Mr. Westinghouse of \$12,436 per mile for the cost of contact line on the four-track road between Woodlawn and Stamford. Mr. Wilgus in his paper before the American Society of Civil Engineers estimated the labor and material for the same line at nearly \$55,000 a mile. The weight of the locomotives was originally estimated at 78 tons in the specifications but had been increased to 102 tons in the locomotives now in use. He thought that this increase in weight was due to one of two causes, either that the conditions were misunderstood when the locomotives were first designed or else that the necessary changes in the motors and other apparatus might have increased

the weight over the original estimate. He thought it was more than reasonable to say that the cost of the locomotives had increased in the same ratio. It had been his experience that it cost fully 25 per cent more to build an alternating current single-phase locomotive than one of equal weight equipped with d. c. motors.

The cost of the trolley construction was originally estimated at 1/3 of the actual cost, and the increase in locomotive weight resulted in at least an increase of 50 per cent over the cost presumably used in the original estimates. In view of the fact that the trolley construction as installed on the New Haven apparently cost 80 per cent more than 600-volt third-rail construction and the locomotives cost at least double the cost of direct-current locomotives to perform the same service, he thought it was interesting to compare the operating results. The New York Central locomotives have a total weight of 94 1/2 tons, a one hour rating of 2200 hp and a guaranteed trailing load of 400 tons. The New Haven locomotives have a total weight of 102 tons, a one hour rating of 1000 hp and a guaranteed trailing load of 200 tons. With approximately the same total weight, the single d. c. locomotive has a hauling capacity equal to two New Haven units. He presented a list of train weights hauled by a single New York Central unit which included many trains weighing from 400 tons to almost 700 tons. Sixty such trains a day are hauled by the New York Central. To haul these trains with single-phase locomotives would have required at least double the investment in motive power equipment. Referring to the reliability of the d. c. and a. c. system, he compared the New York Central figures of train-minute delays with those of the New Haven as taken from Mr. Murray's paper. The New York Central had a total of 160 minutes, whereas the New Haven for the same period had a total of 5695 minutes, counting all delays of over 300 minutes duration as only 300 minutes. The New York Central figures include delays due to locomotives or operators only. During these four months there were no delays on the New York Central due to failures of the generating, transmission, sub-station, third-rail or feeder distributing systems. The speaker professed his enthusiastic advocacy and belief in the future of the alternating-current locomotive, but he did not believe that its application on the New Haven had been wise or that Mr. Mr. Murray's paper has shown it to be a conclusive success. He summed up by stating that he thought the generating station of the New Haven cost no less, that the transmission and overhead trolley cost 50 per cent more than the third-rail and that the locomotives cost double those used on the New York Central. For these reasons he found it difficult to arouse any enthusiasm in his own mind concerning the a. c. system as installed on that road.

N. W. Storer, Westinghouse Electric & Manufacturing Company, opened his discussion by calling attention to the many misstatements regarding the performance of the New Haven locomotives which were contained in the report of a "Journey of Inquiry in the United States," by an engineer of the Belgium State Railways, reprinted in the bulletin of the International Railway Congress. He called particular attention to the discussion in this report of the single-phase motors in use on the New Haven. These motors have torque characteristics exactly similar to those of a direct-current motor in that with a given current the torque is the same for all speeds, and is not affected by the power factor. The low power factor motor will require slightly larger transformers and generators,

and will also increase the line loss somewhat, but as the power factor of a single-phase railway load usually runs from 80 per cent to 85 per cent, no great additional expense is involved. Referring to other misstatements in this report, regarding the hauling capacity of the New Haven locomotives, Mr. Storer pointed out the ratio of accelerating current and one-hour rating current for the single-phase and direct-current motors. The direct-current motor can take an accelerating current of not over 125 per cent of the one-hour rating. The single-phase motors can utilize an accelerating current of 165 per cent of normal. They are frequently called upon to exert a tractive effort requiring the consumption of 175 per cent of the rated current. These figures apply only to accelerations using alternating current. When the motors are operated on direct current, the New Haven locomotives require about 1000 amp to produce a tractive effort of 11,000 lb.

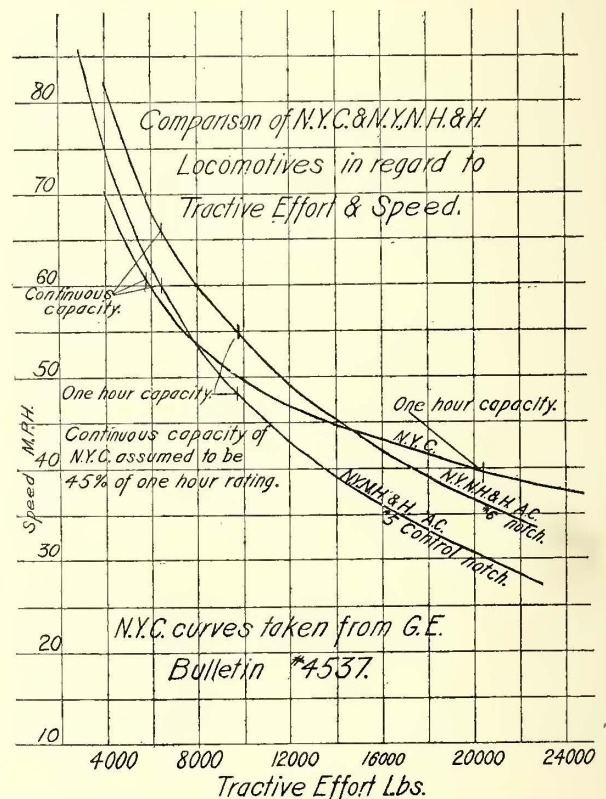


Fig. 1—Comparative Speed and Tractive Effort Curves of New Haven and New York Central Locomotives

The New York Central locomotives, to produce an equal tractive effort require only 500 amp with all of the motors in series. The control of the New Haven locomotives, however, was designed so that a speed of about 21 miles an hour must be reached before all the resistance is cut out, and the operation at lower speeds is necessarily inefficient. These locomotives were not designed for shunting, nor are they used in such service. He presented the curves shown in Fig. 1 herewith to explain further the characteristics of the two locomotives. The curves show the speed and tractive effort. The two curves of the New Haven locomotive are plotted for the two highest voltage taps on the transformers with full line voltage. Both continuous and one-hour capacity are indicated. The continuous rating of the New York Central is assumed to be 45 per cent of the one-hour rating. It will be seen on these curves that the tractive effort at the one-hour rating for the New York Central locomotives is slightly more than double that of the New Haven locomotive. However,

owing to the forced ventilation of the New Haven locomotives, their continuous capacity both in speed and tractive effort is higher than the New York Central locomotive. This indicates that they will handle about the same average weight of train in express service as will the New York Central locomotives, where the service is sufficiently continuous for the latter to get warmed up. In conclusion, he said he had no apologies to make for the performance of the New Haven locomotives. The main motors had more than met the guarantees and the expectations of their designers. Some of the details had proved troublesome, but they had been overcome in a satisfactory manner.

Replying to Mr. Armstrong, Mr. Storer said that the changes in the New Haven locomotives after they had been put in service had not added appreciably to the cost nor to their weight.

E. B. Katte, chief engineer of electric traction, New York Central, offered an explanation of the reasons for no power being available on the third-rail in the two instances mentioned in the log of Mr. Murray's paper. On July 8 a signal pole, which was being erected, dropped across two tracks and broke down the third-rail. There was a short delay in getting the third-rail back in place and the current on. On July 10 a New Haven train was delayed 13 minutes due to power being off from the third-rail, which in this case was broken down by a freight wreck. His experience had been that where the third-rail was broken down due to a wreck, in most cases it had been erected and had been ready for service as soon as the wreck had been cleared and the running rails were again ready for service.

Philip Torchio asked the author of the paper why in correcting the difficulties encountered with the circuit breakers, a form of circuit breaker in which the frame is not grounded had not been used. He also raised another point, which was why three-phase generators had been installed to supply single-phase current. He thought that the use of single-phase generators would have eliminated some of the trouble due to the field distortion caused by the single-phase load.

C. L. DeMuralt expressed his conviction that the New Haven experiment was a failure and in his opinion one of the most serious disasters that the electrical engineering profession had suffered for some time. He differed with Mr. Murray in the explanation of the troubles encountered in the New Haven installation. The only advantage which the single-phase alternating-current system offered over other systems was the use of high-potential current on the contact line, which can be stepped down in voltage by static transformers instead of rotary converters. The high line potential also permits greater distance between feeding-in points. He believed that this single advantage of high pressure and minimum number of substations was more than counterbalanced by the many disadvantages. One of these disadvantages in particular was the deficiency in power of the single-phase locomotive. He compared the relative weights and powers of the New Haven and the New York Central locomotives on a one-hour rating. This gave 23.2 hp per ton of weight for the New York Central locomotives and 9.8 hp per ton for the New Haven locomotives. The overload capacity of the two machines was in about the same proportion. Stating the comparison in another way, the New Haven locomotive, operated as a single unit, has difficulty in hauling more than 8 coaches at reasonable speed and the New York Central continuous-current locomotive can haul without difficulty 15 to 18 coaches at the

same speed. Inasmuch as the cost of the locomotives is very nearly in direct proportion to their weight, the motive power required for the single-phase system costs for the same service more than double the motive power required for the continuous-current system. Analyzing the problem further, he thought that at least 8 or 10 locomotives out of the 31 required for the New Haven service could have been dispensed with had continuous current system been adopted. This would have resulted in a saving in first cost of about \$300,000. Added to the interest on this investment is the annual cost of transporting useless locomotive ton-miles. He believed there was no question as to the commercial success of the single-phase alternating-current system when applied to its proper field, but he believed that it was not suitable for the New Haven installation. The distinct field in which single-phase alternating-current motors can be used successfully was, in his opinion, on long-distance interurban roads with light traffic and light cars.

William McClellan thought that a mistake was being made in confining the discussion chiefly to the relative first costs of single-phase and direct-current systems. The final test was not the relative cost of installation, but the ratio between the receipts and the coal pile. He believed that Mr. Murray realized this, as evidenced by the fact that no figures as to cost of maintenance or operation had been included in the paper. These figures would not be available for some time yet, because the road had been in full operation but little more than five months. He thought that it might be profitable for further discussion to be had on the single-phase system alone, what it can do and what it cannot do, leaving out all comparisons with other systems.

C. P. Steinmetz, chief engineer of the General Electric Company, said that it was especially gratifying to him to have verified from actual experience the statements made by unbiased engineers on purely theoretical considerations, namely, that heavy railroad work can be successfully handled by single-phase alternating-current motors. It was not possible to obtain from this type of motor the same high drawbar pull per ton of locomotive weight nor, in the present state of the art, the same reliability of service, but he felt assured that the experience of the New Haven road has firmly established the single-phase alternating-current system as one of the types of apparatus which can and will be applied in the future electrification of the steam railway systems in this country. It was most important to note that in those cases where direct-current motors cannot be used it has now been shown that single-phase alternating-current system can be used successfully and economically. By this he meant the electric operation of railways with heavy train units which traverse long distances at infrequent intervals. When the time arrives to electrify the transcontinental railways in the United States he was of the opinion that the single-phase system would be used. Summing up, he believed from the evidence now available that those problems which cannot be handled by direct current can be solved by the use of the alternating-current system. Where either direct current or alternating current can be used, for example, terminal electrifications similar to that of the New York Central, the greater drawbar pull per ton of motor weight afforded by the direct-current motor necessarily makes this motor preferable from the point of view of the electrical engineer. The time has now arrived when the responsibility for a decision between alternating and direct current for application in cases where either system may be used is shifted from the electrical engineer to the railway manager. It is now simply a ques-

tion of economics and future policy. Briefly stated, this economic question is whether the higher drawbar pull per ton of motor weight and perhaps the somewhat greater reliability of the direct-current system compensates for the possibility that at some future time the electrification will be extended. Then it may become necessary to replace the motive power equipment or change locomotives at the end of the direct-current zone and the beginning of the alternating-current zone which will extend between terminals operated with direct current.

Minor M. Davis (by letter): It is possible that Mr. Murray's remarks about the effect of single-phase currents upon telegraph and telephone wires will be misunderstood. Transformers are by no means completely corrective, although to some extent they are beneficial. The transformers on the New Haven road are applied only to single-wire operation and they do not neutralize the disturbing effects of the single-phase electric current sufficiently to permit the operation of duplexes, quadruplexes and printer circuits upon the wires. This means that one-half or two-thirds, or even a larger proportion of the carrying capacity of the telegraph wires is destroyed, notwithstanding these transformers. To apply these transformers several otherwise idle wires must be carried upon the poles and these wires and transformers are objectionable. They complicate single-wire equipment and prevent the operation of multiplex systems. Although Mr. Murray refers to the pilot wires and transformers as "not costly," they involve considerable expense. It is more or less of an open question whether it is the duty of a corporation to prevent its electric current interfering with the current of another company or whether it is the duty of the latter to provide its own protection. There is no disposition on the part of the telegraph companies to in any way retard the advancement of the art of applying power. They are willing to exercise all reasonable patience and they would be glad to have the power companies adopt a simple and inexpensive remedy for these disturbances. The writer has given much attention to the subject, but he knows of no remedy for this difficult problem, which is at the same time simple, inexpensive and complete.

A. H. Babcock (by letter): The author has told of many things it is best not to do when it has been decided to install a single-phase system. The paper, however, will be of little value to an engineer who is making up his mind as to a choice of systems, since "The writer has intentionally omitted the discussion of the operating costs of a direct-current versus an alternating-current system." Until persistent rumors of excessive first costs and of high annual operating costs of the New Haven electrification are refuted by a public statement of these costs, quite as frank and open as Mr. Murray's statement of their operating results, conservative engineers will continue to reserve their opinion.

W. S. Murray, the author of the paper, in closing the discussion, replied briefly to some of the points raised by the speakers who preceded him. Referring to the questions asked by Mr. Wilgus in his written communication about the cost of the electrification, he regretted that at the present time he could not make this public. He had the figures in his possession, however, because part of his duties had included a complete inventory of the apparatus installed. He was not afraid of a comparison between the costs of the two systems. The New York Central and the New Haven had power houses of equal capacity. As against the overhead trolley system of the New Haven the New York Cen-

tral had had to install a transmission line of equal capacity, substations, rotary converters, switchboards and a low-voltage third-rail distribution system. He did not believe that any one would question the difference in cost in favor of the New Haven system. If the locomotives were compared on a horse-power basis it was true that the alternating-current locomotive costs more money per horse-power of maximum effort than the direct-current locomotive. Their continuous capacity rating, however, had been pointed out by Mr. Storer, and using this rating as a basis of comparison, there was very little difference in the cost. Answering the point suggested by Mr. Stillwell, he said that the specifications under which the locomotives were built were based on conditions of continuous operation between New York and New Haven. Mr. Stillwell suggested that more of the troubles might have been eliminated and circuit-breaker tests been made on the line previous to beginning operation. It was virtually impossible for this to be done, as the transmission conditions and power demands could not be accurately analyzed in advance. This difficulty and many others might have been obviated had the engineers been given more time. Mr. Armstrong had raised the question of the cost of the reconstructed trolley. The auxiliary wire had been put up at a cost of \$300 per mile of single track. In regard to the cost of the New Haven construction as a whole, it was indeed much more than was originally expected. The engineers had made no definite estimates, however, because it was extremely difficult to decide in advance what types of apparatus and construction were necessary. In writing the paper the author had no intention of answering the many questions brought up by the paper of W. J. Wilgus last spring before the American Society of Civil Engineers. Taking up Mr. Storer's remarks, the speaker emphasized the fact that the continuous capacity of the New Haven locomotives was a vital element. So far as the New York Central service at present was concerned it was little better than a switching service. None of the direct-current locomotives were called on to perform anything like the continuous service required of the New Haven locomotives in hauling trains from the Grand Central station through to the present terminal at Stamford without stop. Answering Mr. Torchio's question as to why single-phase generators had not been installed, Mr. Murray explained that it was the intention to supply current from the Cos Cob power house to all of the company's shops and a number of its direct-current street railway plants. For this purpose polyphase motors were to be installed, and while single-phase generators would undoubtedly give better regulation, they would not offer an opportunity of utilizing current for other purposes as contemplated by the New Haven.

NEW YORK CONVENTION REPORT

The Street Railway Association of the State of New York, through its secretary, J. H. Pardee, has just issued a paper-bound volume of 180 pages, covering the proceedings of the annual convention held in 1907 at Niagara Falls on June 30 and July 1. This meeting was especially noteworthy for its reports and discussions on the classification of accounts, electric express and freight service, repair shop design and pay-as-you-enter car operation. The New York association has long been a model for its thoroughness in handling electric railway problems of both general and local nature, and the contents of this volume prove that it is keeping up its reputation.

MEETING OF THE PENNSYLVANIA STREET RAILWAY ASSOCIATION

The Pennsylvania Street Railway Association met on Dec. 11 in the office of the Central Pennsylvania Traction Company, Harrisburg, Pa., this being the first regular meeting since Sept. 23, 1903. During this period, however, there have been several committee conferences on matters pertaining to legislation. The report of Treasurer Lanus showed a favorable balance of \$2,423, an increase of about \$500 over the previous report. The membership now comprises 29 companies, representing over half the mileage of the State, but much less than half the companies. The following companies were represented at the meeting by the delegates named: Altoona & Logan Valley Electric Railway, C. L. S. Tingley, second vice-president; Central Pennsylvania Traction Company, F. B. Musser, president; Easton Transit Company, H. R. Fehr, president; Hanover & McSherrytown Street Railway, W. H. Lanus, president; Lebanon Valley Street Railway, C. H. Smith, superintendent; Lehigh Valley Transit Company, R. P. Stevens, president; Philadelphia & Easton Electric Railway, J. C. Lugar, treasurer; Philadelphia Rapid Transit Company, F. H. Lincoln, assistant general manager; Scranton Railway Company, C. L. S. Tingley, second vice-president; American Railways Company; Williamsport Passenger Railway, E. H. Davis, manager.

Retiring President Musser appointed Messrs. Fehr, Lincoln and Tingley as a nominating committee. The latter presented the following names, which were unanimously accepted: President, R. P. Stevens; vice-president, E. H. Davis; executive committee, consisting of the president, vice-president, J. B. Callery (vice-president, Pittsburg Railways), F. B. Musser and C. O. Kruger (second vice-president and general manager, Philadelphia Rapid Transit Company). The executive committee will appoint the secretary and treasurer later.

Although the association practically has been dormant for the past five years, a strong effort will now be made to increase the membership. The annual dues are only \$25, so greater numbers are essential if the organization is to do effective work with its regular income. It was stated at the meeting that the Pennsylvania Railroad Commission has expressed its preference to deal with the railways collectively rather than individually, whenever practicable. It is believed that the plenary powers of the State Railroad Commission will soon be increased, and it is therefore essential that the railways of the State should be ready to supply the commission promptly with such information as it requires covering all the railways in the State, and this can be done by an association more cheaply and with better satisfaction to the commission than by the roads individually.

A letter was also read from R. N. Wallis, president of the American Street & Interurban Railway Accountants' Association, in which he called attention to the new classification of the Interstate Commerce Commission. In line with the suggestion made at Atlantic City, he recommended that every State association appoint a committee of one to receive all inquiries regarding the interpretation of doubtful points, such committee to transmit any necessary queries to the classification committee of the Accountants' Association.

The delegates were the guests of F. B. Musser, president of the Central Pennsylvania Traction Company, who entertained them at luncheon.

THE REASONS FOR INCREASED FARES ON MASSACHUSETTS STREET RAILWAYS—IV.

The arguments and statistics presented by the management of the Newton properties in support of the action taken to produce increases in revenue diminished public opposition, but did not prevent complaints to the Board of Railroad Commissioners by various Boards of Selectmen and residents in towns affected by some of the advances. The petitions respecting the different properties in the system were considered at various hearings, but the commission disposed of all the cases in one decision.

The cases were raised before the commission on the petition of the Newton Street Railway in relation to the proposed charge of 1 cent each for transfers; the petition of the Selectmen of Wellesley and Natick and citizens of Needham relative to the increase of fares on the Natick & Cochituate Street Railway; and the petitions of the Selectmen of Natick, Framingham and Ashland, and of the Selectmen, Board of Trade and citizens of Hopkinton concerning the increase in fares on the Middlesex & Boston Street Railway. The other changes in fares affecting the Newton properties were not brought before the commission.

The leading formal argument against the maintenance of an increase in fares was presented to the commission by George A. Sweetser, chairman of the Board of Selectmen of Wellesley. A written argument, submitted by Mr. Sweetser, related to the increase in fares by the Natick and Cochituate Street Railway from the basis of 5 cents to 6 cents.

Mr. Sweetser did not assert that the company was earning an undue amount. His contention was that the increase in revenue should be obtained by other means designed to make the lines of the system which were yielding a disproportionately small return bear the burden of the situation, rather than that the entire system should be called upon to stand sufficient addition to the fares to make the revenues more nearly adequate.

REPLY OF THE COMPANY

A written reply to this argument was filed with the Railroad Commission by Matthew C. Brush, vice-president and general manager of the Natick & Cochituate Street Railway and the other lines in the Newton system. An abstract of the letter of Mr. Brush to the commission follows:

It is agreed that the Natick and Cochituate Street Railway Company, though conservatively capitalized, is not earning a fair and adequate return.

In the argument submitted by Chairman Sweetser occur the following statements:

"The laws of Massachusetts relating to public service corporations are based on the principle of a partnership between the public and the corporation. They require on the part of the corporation a limitation of capital to the actual cost of the property and on the part of the public that it shall pay an amount for service sufficient to pay the cost of furnishing such service and give the company a profit sufficient to enable it to pay a reasonable return on its investment."

"While it might be a debatable question as to what constitutes a fair return or a proper ratio of profit to capitalization it would probably be agreed if a company like the Natick & Cochituate, which had on Sept. 30, 1907, capital stock of \$100,000 and notes of \$199,000, or a total capitalization of \$299,000, were allowed to convert its notes into stock, making in round figures \$300,000 capital, that a profit of \$21,000, or 7 per cent, would constitute a fair return."

"The Natick & Cochituate has a conservative capitalization in proportion to its gross business."

"It is apparent, therefore, that the difficulty of the Natick & Cochituate is not because of too large capitalization for volume of business."

"Inasmuch as the company is prevented from getting the return upon its entire capitalization which appears to be fair * * *"

"The company has properly attempted to secure more economical operation by the reduction of schedule on some parts of the system."

It is further agreed that some legitimate means should be used to bring about an increase in the net revenue of the company.

To meet this necessity it seemed best to the management of the company to increase the unit of fare on the line of the company to 6 cents.

Mr. Sweetser insists that the necessary additional revenue could more properly be secured by the use of one or more of three suggested methods:

1. "Abolition of free transfers at Wellesley Square."
2. "Increase in the unit of fare on Needham branch and Cochituate branch without increasing upon the main line."
3. "So reducing the schedule as to save sufficiently in operation to increase the net revenue."

We are convinced that the suggested methods are inadequate or unadvisable or both, and are based throughout upon fallacious assumptions.

ABOLITION OF TRANSFERS

Taking them up in order:

1. The abolition of free transfers at Wellesley Square.

(A) This would be against the settled policy of your board.

From all the cases in which this matter has been considered we have gathered that it is the opinion of your board that passengers should be entitled to ride from any point within the limits of one town or towns to any other point within the limits of the same town or towns for one unit of fare; also that passengers should be allowed to ride from the center of one town or towns to the center of an adjoining town or towns for one unit of fare.

The application of this principle has resulted from time to time in increased transfer privileges at town centers.

The management feels that it would now be unjust and unadvisable to change the fare limits and give up the transfers at Wellesley Square. Citizens establish their places of residence with reference to their place of business very largely on the basis of car fares. Any tampering with fare limit points will work a hardship on the persons who have thus established their residences, and will tend to cause what seems to be baseless discrimination between persons who live within a short distance of each other. It seems, therefore, that the unit of fare with transfer privileges now given in accordance with the principles of your board should be maintained, and that if a change has to be made (as it does in this instance), the change should be in the unit of fare, and that should be made sufficient to give a fair return on the investment, but the fare limit point, on which people have come to rely, should be left undisturbed.

In the regulation of fares the interests of all the communities who are served by the lines of the company should be considered, and not simply the interests of any one section.

(B) The abolition of free transfers would not result in the predicted increase in revenue.

Mr. Sweetser's figures for what would be gained by giving up the transfers and putting in another fare on the Needham branch, provided the travel on the branch remained the same, are substantially correct—\$7,125.

In his confirmation of the returns on the Needham branch Mr. Sweetser makes, however, certain errors; these errors largely offset each other, and for the sake of a clear understanding of the matter it may be worth while to point them out.

The mistakes result chiefly from failure to take into consideration the manner in which transfer business is carried on. Whenever a transfer is issued from one car to another the car on which the fare is paid keeps half

the fare, while the car on which the transfer is presented is credited with the other half. This fact was neglected by Mr. Sweetser, and his figures are therefore erroneous.

We do not understand exactly how Mr. Sweetser has calculated a total gain from the abolition of transfers. Theoretically, however, if the unit of fare was kept the same and travel remained the same while the transfer was abolished and another 5-cent fare demanded from each person who transferred to the Needham line (65,400) or from the Needham line (78,100), the increase in revenue to the branch and to the main line would be \$7,130.

The great fallacy in Mr. Sweetser's conclusion as to the benefit to be derived from abolishing these transfers is his assumption that with the fare on the Needham doubled the traffic would remain the same. This fallacy of assuming that the traffic remains the same in spite of any changes in the fare is one which is found throughout Mr. Sweetser's brief, and vitiates all his conclusions.

The fact is, of course, that when the fare is increased the travel diminishes; just to what extent it is impossible to say. Experience from the line of the Newton & Boston Street Railway Company, where free transfers were given up, leads to the belief that decrease in traffic would be so great as to take away almost entirely the benefit of the increased fare. With the decrease in the number of persons riding upon the line not only would the company fail to get the extra fares to make up the predicted \$7,125, the additional revenue, but it would also fail to get fares which make up the present income from the branch which Mr. Sweetser uses as his foundation.

MAKING BRANCHES SELF-SUPPORTING

2. Making increases on the Needham and Cochituate branches only, with a view to making them "self-supporting."

In the first place, it is practically impossible to treat the branches to which Mr. Sweetser refers as separate companies. They are not organized or conducted as separate companies. While for certain purposes it may be useful to consider them as such, to treat as really separate for purposes of fare regulation these lines not separately conducted and running through substantially smaller territory leads to serious errors.

Mr. Sweetser's division of capitalization between these branches in proportion to the gross receipts on each is purely arbitrary. Their capitalization is, in fact, in the enterprise as a whole, and we know of no basis on which it can be correctly proportioned to the different branches. The fact that the capital actually invested or used in the branches cannot in fact be estimated vitiates Mr. Sweetser's premises as to what should be the gross receipts for the branches. It is still more difficult to estimate the cost of operation for each branch.

Mr. Sweetser's calculation of the cost of operation for the branches and the main line is made in a very simple manner. He has taken the average operating expenses of the road for the year 1907, which were 15.78, and multiplied that by the mileage operated upon each branch and upon the main line. He estimates that these results represent the actual operating expenses for the respective lines.

This method, however, does not give a result which at all represents the facts; the expense of operation for the Needham branch, for example, is much less than the expense of operation for the main line.

On the Wellesley-Lower Falls line are four-motor cars which run at a reasonably high speed; while on the Needham line small single-truck cars are run at a relatively slow speed. The running expense of the two types of car is, of course, very different, and, furthermore, the expenses for accidents on the high-speed line are much greater than the expenses for accidents on the low-speed line.

The calculations with regard to the expenses of the branches also leave out of account the fact that a large proportion of the expenses of the company, such as those for management, are fixed, and would not be reduced by the giving up of the branches, yet the branches are charged according to the figures submitted with proportion of such expenses.

It does not seem unfair that those who travel chiefly upon the main line of the company should contribute some-

thing toward the maintenance of the branch lines which are not so profitable, if such is the case.

It must be considered that capital is invested in the enterprise as a whole. Those who invest their money in these lines cannot foresee which would be profitable and which would not be profitable. The branches as well as the main line were built under the certificate of your board that they were required by public convenience and necessity. It does not seem reasonable, if it turned out that one branch brings less return than another, that the patrons of the successful line should get the full benefit of the lucky judgment and should bear none of the burden of the unlucky judgment. It seems more reasonable that the enterprise into which capital has gone as a whole should be treated as a whole.

The arrangement of the fare so as to make the branch lines contribute enough to make them "self-supporting," according to submitted calculations, would result in much partial inconvenience to the public.

The Needham line is three miles long. It would be difficult for the public to understand why it should be expected to pay, say, an 8-cent fare for traveling these three miles when it can travel two and three times that distance on the main line for 6 cents. This would be a system of regulation to which the public is unaccustomed, and to which it would not readily become adjusted.

In view of the above considerations, we submit that it is impracticable and unadvisable to attempt to regulate the fares upon the branch lines on the basis of the supposed expense of such lines. The supposed expense is, of course, to be considered in regulating the rate of fare, but there are many other conditions which must also be given weight.

The most important of these are perhaps questions of practical convenience, questions of the fare history in the locality and questions of practical railway management. It seems to us that the fare cannot be regulated on any one principle which will obliterate all difficulties, and that each fare situation must be treated by itself on consideration of all pertinent conditions. We feel that any principle which might be laid down in deciding one case might prove inadequate and lead to unjust results and apply without modifications to other cases.

PROPOSED REDUCTION IN SERVICE

3. Reduction in service as to effect a sufficient saving in operation to increase the net revenue.

The figures on which are based the conclusions as to economies to be effected by the reduction in service are erroneous. It is a fact that on Jan. 15, 1908, the service was changed from 15-minute to 20-minute time, resulting in the saving in mileage of 203 miles. This change, however, was temporary, and during the coming summer months the company will run practically the same mileage as last year. For the past five or six weeks the company has been running Saturdays, Sundays and holidays a mileage equivalent to last year's mileage on corresponding days; as a result of rearrangement of turnouts, it is the present plan to operate 10-minute service through the afternoon and early evening hours, giving an equivalent mileage to 15-minute service throughout the 18 hours; consequently the assumption that there will be a saving of 74,000 miles during the year is erroneous.

Furthermore, the statement of the amount to be saved per mile through decreased operation is incorrect. Your board will have in mind the marked increase in cost of power on all properties for the year 1906-1907, which was particularly noticeable on the properties of the Boston Elevated.

It is also true that any reduction in mileage does not give the corresponding reduction in cost per car mile of any of the items which go to make up operating expense; that is, the assumption that the company will save 10.65 cents per car mile not operated is not in accordance with the fact; on Mr. Sweetser's theory, if the mileage was cut in half, the expenses would be decreased in the same proportion.

The submitted calculations also leave out of account the fact that with a decreased mileage the revenue is somewhat decreased; that is, there is not the same travel when fewer cars are run as when more cars are run.

It is stated that the company will receive from the uni-

form increase in the unit of fare to 6 cents, which has been put into operation, an increase in gross receipts of \$20,000. It is submitted that this is an incorrect prediction. It leaves out of account any decrease in travel. As a matter of fact, the returns of the company for the time in which the increased fare has been in effect do not show an increase approaching 20 per cent. It is not expected that this increase will more than enable the company to pay a return upon its invested capital within the figure recognized as fair by the petitioner.

A FAIR RETURN

When the hearings were held before the commission Mr. Sweetser supplemented his brief by oral argument. The question of a fair return was brought up. The transcript of the hearing shows that an interesting discussion took place.

Mr. Sweetser contended that the 6-cent fare charged from Newton Lower Falls to Natick was compensation for service given which, considered with reference to the earnings of the road, yielded the road a profit of more than 8½ per cent, taking that division alone by separating the proportionate part of the capital which was applicable. The road from Wellesley Square to Needham, he said, showed an actual loss, and those who used that line were not paying for the actual service or the cost of the service which was rendered. If \$50,000 should be invested by the company in building a new line to Weston and that line should prove to be unprofitable, that is, if the business judgment of the men who constructed the line should be poor, Mr. Sweetser asked if the company would be justified in taxing the patrons who rode on another line in the system to pay a fair sum for the service rendered, a sum which would yield the company ample return for what it gave. Would the company be justified in additionally burdening some patrons simply to pay for poor judgment in building that extension?

Chairman Hall, of the Railroad Commission, asked Mr. Sweetser if he would apply that as a general railroad proposition.

Mr. Sweetser thought he would.

Chairman Hall asked if the proposition applied to fixing rates.

Mr. Sweetser said it was stated at the outset that every street railway company was entitled to a fair return.

Chairman Hall asked on what a company was entitled to a fair return.

Mr. Sweetser said on its capital.

Chairman Hall asked if Mr. Sweetser meant that and the latter replied that he did.

In answer to another question Mr. Sweetser said the company was entitled to a fair return on the capital it had invested. He claimed that if a street railway company built an extension which was not self-supporting or reasonably so, it seemed to him to be an exercise of poor business judgment which the company should stand and not the patrons of the profitable part of the line.

Chairman Hall said Mr. Sweetser did not stand, then, by his proposition that the company was entitled to a fair return on its capital. The last proposition controverted the first one. The commission wanted all the light it could get; he was not going to prejudge the case; but if Mr. Sweetser stood by his first proposition that the company was entitled to a fair return on its capital, then his second proposition was fallacious; if his second proposition was true, the first was not.

Mr. Sweetser said he agreed that if a system was taken as a whole—that if a street railway company could build a branch without any reference to whether it is profitable

or not and burden the patrons of its profitable portion to pay the fares of those who rode on the branch, his other proposition was inconsistent.

Chairman Hall said he asked for information. Did Mr. Sweetser still contend that the rule was consistent, that the company was entitled to a reasonable return on its capital.

Mr. Sweetser said he did not make that as a broad statement to be applied to a system as a unit without any reference whatever to its detail.

Chairman Hall said the question was one where the main line paid and the branch did not. Mr. Sweetser had said the fare on the branch might be increased until it paid; that is, it might be increased enough to make a reasonable return on the branch. Supposing there was not enough travel to make the branch pay its part of the expense, what could be said then?

Mr. Sweetser said he thought the answer was that which he had made previously. If there was a burden to be borne, if the company had exercised poor business judgment in building an unprofitable branch, it seemed to him that the burden over and above a reasonably fair return must be one which the company should bear and not the patrons of the other portion of the line which was profitable.

Chairman Hall thought that would make the question one of whether the operation of the line should be discontinued and asked about the people in a territory where that problem arose.

Mr. Sweetser said that on this main line there were over 2,000,000 people entitled to public consideration. Those people were paying 1 cent each that 135,000 or 140,000 might be benefited thereby. If it was a question of the greatest good for the greatest number, it seemed to him there was only one answer to that situation and that was that if a branch line wanted a service which was expensive, and perhaps ought not to be given, in all fairness the residents on the branch line ought to pay as much as possible to compensate the railway for the service given.

Chairman Hall asked about the theory that interurban companies were developers of the territory.

Mr. Sweetser said that each territory should bear its fair proportion of the cost of the service which was given to it. A man who rode on the Needham line should be willing to contribute a sum which represented as far as possible a proper relation between the cost and the service which he received.

Chairman Hall asked about the effect of an arbitrary change of divisions on a computation on this basis.

Mr. Sweetser said he would have to make some other calculation, but that he had tried to take the divisions of the roads somewhat in the order in which they were built and somewhat according to the territory through which they were constructed.

A. A. Ballantine, of Gaston, Snow & Saltonstall, counsel for the company, said he wanted to ask Mr. Sweetser one question. Mr. Sweetser had proposed a theoretical basis for regulating fares. Suppose the slate were wiped out and there were no street railways and a body of men started in to build a line and they judged it was a good thing to build from Lower Falls to Natick and at the same time from Needham up to Wellesley and that both lines would pay; but when the roads had been operating it appeared that the profitable line was from Lower Falls to Natick and that the Needham line did not prove profitable. As he understood Mr. Sweetser's contention, it was that the people of Wellesley traveling between Lower

Falls and Natick should get all the benefit of successful and wise judgment of the line that would pay between Newton Lower Falls and Natick, and that they should not contribute anything to make up the deficit caused by the unsuccessful judgment in putting in the capital as a whole; in other words, that there should be no allowance whatever for any errors in judgment or any errors in condition which would make what seemed good judgment work out badly. He asked whether it was not fair to the men who put their money into the enterprise as a whole to have the enterprise treated as a whole and why it was not fair that something should go from the profitable portion to make up what had proved to be unprofitable in the hands of the men who put their money into the one enterprise. Ought the men who put their money into the enterprise as a whole to wipe out their capitalization and say they had simply sunk their money and the people contributing to the main line get all the benefit which proved to be successful and have an interest only in that portion of the investment?

Mr. Sweetser said that if a street railway company could build any line that it might choose and then make another system bear the burden of an unprofitable line, of even reckless judgment on the part of the street railway company about a line which was a pure speculation, that might justify the company in burdening a profitable part of the line with a branch line in adjoining territory.

Mr. Ballantine suggested that it be conceded in this case that the judgment was not reckless, but that it was poor business judgment and that no one could point out which line would be successful and which would not.

Mr. Sweetser said he thought it would be difficult to state a case in which fair business judgment would expect any very substantial return from the territory served by the Needham line for a considerable period.

Chairman Hall suggested a water case as an illustration. If a water company should be incorporated in Newton, and Newton was a booming town and increasing in population at the rate of 10,000 a year, and a water plant for 100,000 was established and in two years the boom was off, should the rates be raised or the boom declared off?

Mr. Sweetser said that was rather an abnormal case.

Chairman Hall said such cases had happened.

Mr. Sweetser said he had not any doubt that in a case like that some adjustment would have to be made. He was interested when the facts in regard to Hopkinton were first brought out. There was a community, if he understood the facts correctly, in which there were many manufacturing, and they contributed very considerably to the travel on the street railway. For some reason those factories left the town and all the people who had been dependent upon them were thrown out of work; and yet the people had homes for which they had paid; they were struggling under a burden and were obliged to go out of town to labor. That probably had the effect of stimulating travel in a limited way on the line of railway.

Mr. Ballantine said it seemed to him that the enterprise must be treated as a whole. They were dealing with communities that were close together. If they went into the matter to find out exactly how much each unit of transportation cost they would have a task which could not be solved; about the same condition as on any single street railway where some people were carried 10 miles and others 2 miles. He thought it was impossible to estimate what the transportation cost. In this case there were fixed charges of management, power and other expenses. The

practical aspects of the situation had to be considered. The theoretical aspect went into the enterprise as a whole and it seemed fair that the whole enterprise should pay a reasonable return, including every practical question of the arrangement of fares to accommodate the public and every practical difficulty that might arise. If the people of Needham found they were paying 8 cents or 9 cents for a haul which was practically one-third of what the people in Wellesley were getting, considering the practical difficulties, he thought there would have to be established something of a zone system and not an attempt made to accomplish the impossible in trying to say what should be charged for each unit.

QUESTIONS AND ANSWERS

Answers to a number of questions propounded by the Needham Board of Trade were filed with the commission. Some of these questions, showing the analytical character of the inquiry to which the company was subjected, and the answers, were as follows:

Question.—State fully the agreement between the Newton & Boston and the Newton as to exchange of tolls for trackage and transfer of passengers.

Answer.—Trackage rental is paid for at the rate of $4\frac{1}{2}$ cents per car-mile run by each company over the rails of the other and each company pays to the other $2\frac{1}{2}$ cents for each foreign transfer taken up.

Question.—Explain the extra cost of repairs of cars and electrical equipment of the Newton & Boston as compared with the Natick & Cochrane and Newton on the basis of proportion of cars owned.

(The report for the year ending Sept. 30, 1906, shows Newton & Boston, \$8,008.59; Natick & Cochrane, \$6,168.04; Newton, \$15,603.73.)

Answer.—The roadbed and track of the Newton & Boston company is not (as a whole) in as good condition as that of the other roads mentioned and the schedule speed is fully as high, the result being that the service required of the Newton & Boston equipment is more severe and the equipment, being older, requires more attention than that of the other roads. The Newton & Boston company has been obliged to lease from the Newton Street Railway Company 5 cars, as it was short of cars suitable for the traffic and could not afford to buy new cars. The Newton Street Railway, therefore, leases to the Newton & Boston company 5 cars at a rental per day of \$1 per car, the Newton & Boston company to maintain such cars. The above rental received by the Newton Street Railway for the use of the said cars is a low rental for their use, as the cars represent an investment of \$4,200 apiece.

Question.—In report for year ending Sept. 30, 1903, the Newton & Boston reports 32 cars owned; in the year 1905, only 16 cars are reported as owned by the Newton & Boston. What disposition was made of the 16 cars? What was the amount charged on the equipment account as the cost of the 16 cars disposed of, and, if sold, how much was received from the sale of same, and to whom?

Answer.—The Newton & Boston company has sold in the past five years 16 cars which it could not use owing to their age and condition. The amount received from the sale of the 16 cars was \$20,728.46, which amount was credited to the cars and equipment account. The amount paid for these cars when purchased it is impossible to state owing to the fact that the various parts of the cars were purchased at different times and had been interchanged over a period of many years, and as the cars were sold as a whole it is impossible to give the figures of cost.

Question.—Explain how it is that on the basis that motive power is supplied the affiliated roads "at the cost

to the Newton & Boston plus a profit" there is an increase in the Newton & Boston charge in 1906 over the year 1905. (Reports show that in 1905 the power cost \$47,838.42 and there was \$47,646.36 sold, leaving a balance of \$192.06, which appears as the charge on the Newton & Boston account for that year; while in 1906, the cost is given as \$69,797.49 and the amount sold as \$65,760.63, leaving a balance of \$4,036.86, which appears as the charge for motive power to the Newton & Boston for that year.)

Answer.—The Newton & Boston company formerly sold power to the affiliated roads under contracts on a car-mileage basis. These contracts all expired in or before 1902. Since that time the Newton & Boston company has sold power on the basis of station cost, plus a percentage which has varied from 10 per cent to 25 per cent. This variation in amount added to station cost causes a variation in net results of the Newton & Boston company, as indicated in reports. The affiliated roads found that they could buy power from other sources at a rate less than the station cost to the Newton & Boston company, plus 25 per cent. The directors of the Newton & Boston company, feeling that the loss of the business of supplying power to the affiliated roads would be a loss to the company, reduced the profit to be added to station cost from 25 per cent to 10 per cent. The results to the Newton & Boston company of supplying power to other companies for the past nine years show that while the power to run the cars of the Newton & Boston company has cost 1.67 cents per car-mile, it has cost the Newton Street Railway 2.39 cents per car-mile and the Natick & Cochrane 3.57 cents per car-mile, thus showing a cost for power to the Newton & Boston company very much less than the cost of power to all the affiliated companies.

Question.—State if in figuring the cost of the motive power to be sold, "at cost plus a profit," charge is made for interest on the capital invested in the power plant and for insurance and depreciation of plant.

Answer.—In figuring the cost of motive power no charge is made for interest on capital invested or for insurance or depreciation. Under the standard system of accounts prescribed by the Railroad Commissioners this is not done, either in the case of the capital invested in power plant or in any other portion of the companies' property.

Question.—Explain the variance in cost of motive power charged up to the Newton & Boston since the year 1900, giving the figures for each year and why no charge appears for motive power prior to 1900.

Answer.—The labor and supplies entering into the cost of power have increased since the year 1900 in some cases as much as 50 per cent. Prior to that year the Newton & Boston company had expended very small sums in the repair and maintenance of its power plant. Since the year 1900 it has been necessary, owing to the increasing age of the machinery and buildings, to spend unusually large sums each year in maintenance of plant.

Question.—State if the directors of the Newton & Boston company are agreed that the present patronage of the road shall pay for the burden of debt incurred by former managements by their mistakes and unskilful operations.

Answer.—All liabilities and debt incurred by all the managements of the Newton & Boston company are equally a liability of the company. The present directors of the Newton & Boston company, some of whom have been associated with the company since its organization, feel that the only mistake of the management that has been made has been an attempt to carry the public at too low a rate of fare and that had a proper fare been charged upon the lines of the company from the beginning the present burden of debt would not be upon the company. The unskil-

ful operation alone is shown by the attempt to furnish transportation at what has proved to be less than actual cost, and the public has benefited at the expense of the stockholders of the company ever since the company has operated its lines.

Question.—State if the directors of the Newton & Boston company anticipate or have reason to believe that if the advance in the rate of fare instituted July 15, 1907, is maintained, the increase in revenue will be sufficient to avert the receivership now threatening the company, as stated at the hearing, Sept. 9, 1907.

Answer.—The directors of the Newton & Boston company trust that the revision of the fare situation may result in a revenue sufficient to warrant the company continuing to operate its lines, but are unable to judge until after a trial whether such revision of fares will result in a hoped-for increase of revenue.

Question.—Has the company any accurate data showing the receipts and the cost of transporting the passengers from and to Needham over the Newton & Boston lines?

Answer.—The company has accurate data showing the receipts and the cost of transportation of its passengers. It cannot differentiate between the cost of carrying passengers over one portion of its lines and that of carrying its passengers over another portion of its lines. This the officers of the company believe to be impossible, the cost of operation being determined by the number of miles and the number of car-hours run by the cars of the company.

Statements of daily gross passenger revenue, car mileage and car-mile earnings, as compared with the corresponding days of the previous year, were filed with the Railroad Commission.

DECISION OF THE COMMISSION

The decision of the commission, rendered on July 31, 1908, was published in full in the *ELECTRIC RAILWAY JOURNAL* of Aug. 8, 1908, page 444. The board approved the withdrawal of free transfers on the Newton Street Railway as an experimental measure for one year.

The board was also of the opinion that it ought not to recommend to the Middlesex & Boston and the Natick & Cochituate Street Railway, the other roads which participated in the hearings, a reduction in the 6-cent rates of fare.

(To be continued)

Plans have been prepared for the electrification of part of the lines of the Ouest Railway entering the Saint Lazare Station, in Paris. The railways from Paris to Saint Germain and from Paris to Argenteuil will be rendered entirely independent of the main lines to Normandy, and both will be worked electrically. They will run into Saint Lazare and terminate in an underground station, with a platform length of 600 ft., accommodating six lines of rails. The existing passages on the level will all be abolished, and will be replaced by subways and by overhead galleries. The current employed for traction purposes will be at a pressure of from 600 to 650 volts, and will be taken from a third-rail, placed alongside the track. The high-tension three-phase current from the generating station will be conveyed by means of underground cables to transformer stations distributed along the line. It is intended to run from 12 to 20 trains hourly, but this number may be increased to 24 trains per hour. The estimated expenditure amounts to \$5,800,000 for the rails, the workshops and the electrical equipment, and \$4,000,000 for the rolling stock, the sub-stations and transformers, together with the conductors for the high-tension current.

HEARINGS ON THROUGH ROUTES AND JOINT RATES IN NEW YORK

The hearing before the New York Public Service Commission, First District, on the order requiring joint rates and through routes between the Third Avenue Railroad and the Central Park, North & East River Railroad was resumed on Dec. 3 and Dec. 7.

Milton G. Starrett, engineer, was recalled for further examination and was cross-examined by Oliver C. Semple, assistant counsel for the commission. Mr. Semple at one point during the hearing raised a question about the average cost of special work. John M. Bowers, of counsel for the Central Trust Company of New York, objected to evidence of that character. He did not think it was material to the inquiry to take up questions of values until they could be gone into fully and completely. Herbert J. Bickford, of counsel for the receiver of the Third Avenue Railroad, united in this objection.

Mr. Semple said it seemed to him that the point was material. If the testimony as to depreciation had any value at all in the case it must be for the purpose of advising the commission as to how much allowance should be made out of operating expenses to carry the property and the amount of depreciation, and therefore the amount of the allowance, depended on the cost of particular items of work about which the witness had testified. Mr. Bickford said that the question had not been entered into by the companies and they insisted that if it was taken up it should be as evidence produced by the commission; it was not proper cross-examination.

Chairman Willcox said it seemed to him that the commission should be advised as to how far the witness was posted on the general work about which he was testifying, and the objection was therefore overruled. Mr. Semple then asked Mr. Starrett various questions suggested by his testimony in the case of the Third Avenue Railroad franchise tax for 1901.

The question of whether the inquiries put by Mr. Semple were relevant was brought up again and Mr. Semple said that if the testimony as to the depreciation and life of the property had any value whatever its only value was to enable the commission to set aside from earnings a certain amount to take up the depreciation and the testimony did not help the commission a particle unless it knew what value had been considered. Mr. Bowers said that questions of the character asked by Mr. Semple became evidence for the commission, although not at the expense of the commission.

Mr. Starrett defined the depreciation which he had in mind as the change in value due to the deterioration of the property on account of wear. He thought that in his testimony he had included deterioration due to breakage and rust also. Obsolescence and supersession were not considered.

Under examination by Mr. Bowers it was testified by Mr. Starrett that the depreciation which he had discussed did not take into consideration the fact of the change of power used for the operation of the plant, as, for example, from horse to cable, and from the latter to electricity.

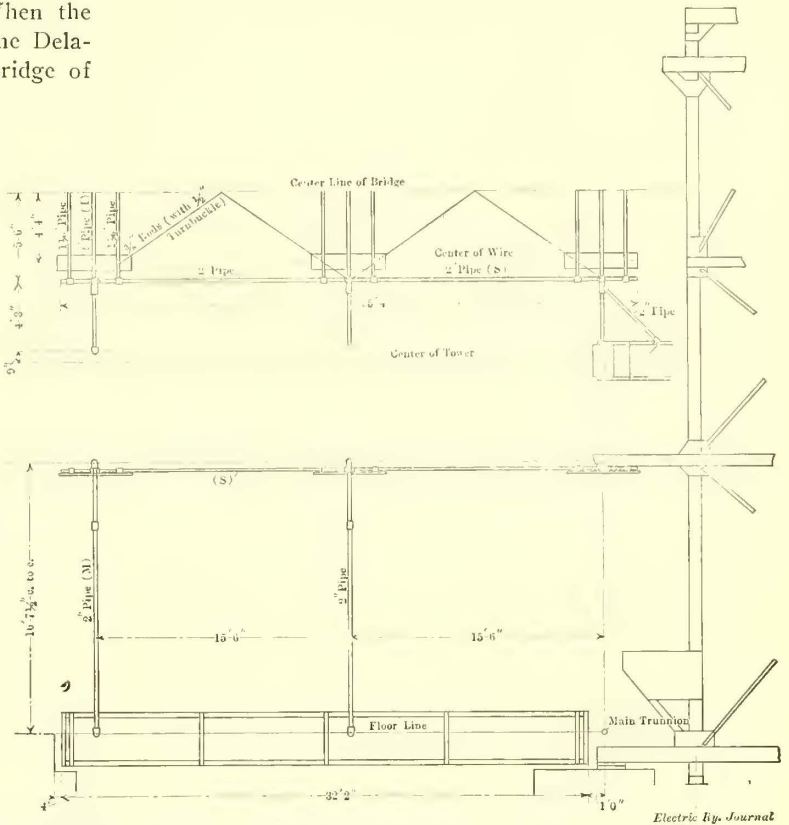
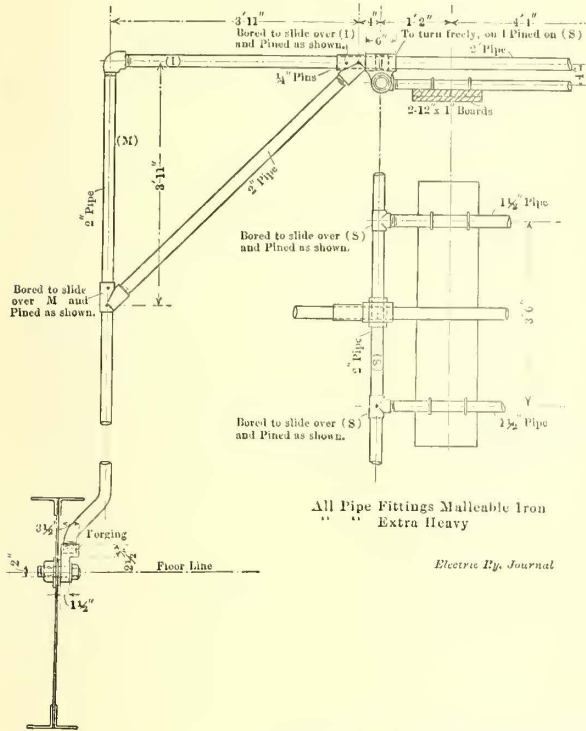
The hearing was adjourned to Dec. 8.

The report of the Commissioner of the New South Wales Government Railways and Tramways for the quarter ending Sept. 30 shows a revenue from tramways amounting to \$1,242,520, an increase of \$100,070. The expenditures were \$964,030, an increase of \$24,260.

FOLDING OVERHEAD WORK FOR BASCULE BRIDGE

A clever piece of folding overhead work is in daily use on the Perry Street bridge of the Trenton Street Railway Company system, Trenton, N. J., of which Peter E. Hurley is the general manager. Its simplicity and freedom from cumbersome parts are most noticeable. When the Pennsylvania Railroad Company, which operates the Delaware & Raritan Canal, decided to install a lift bridge of

It was considered especially desirable to have a form of construction which would allow the cars to pass on and off the bridge easily without any destructive arcing from the trolley wire, and at the same time not interfere with other construction when the bridge was up. The applica-

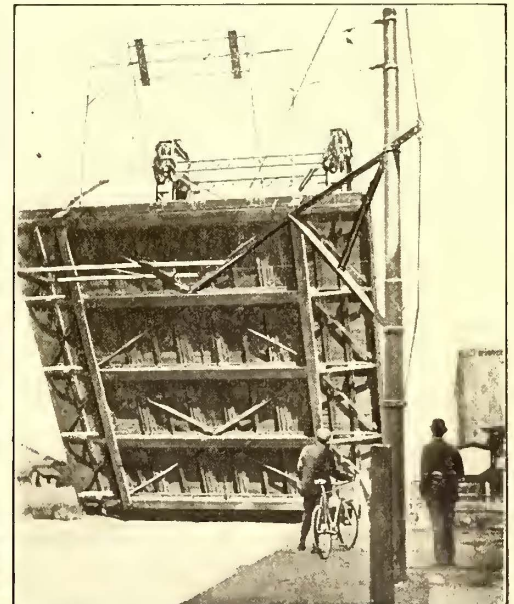
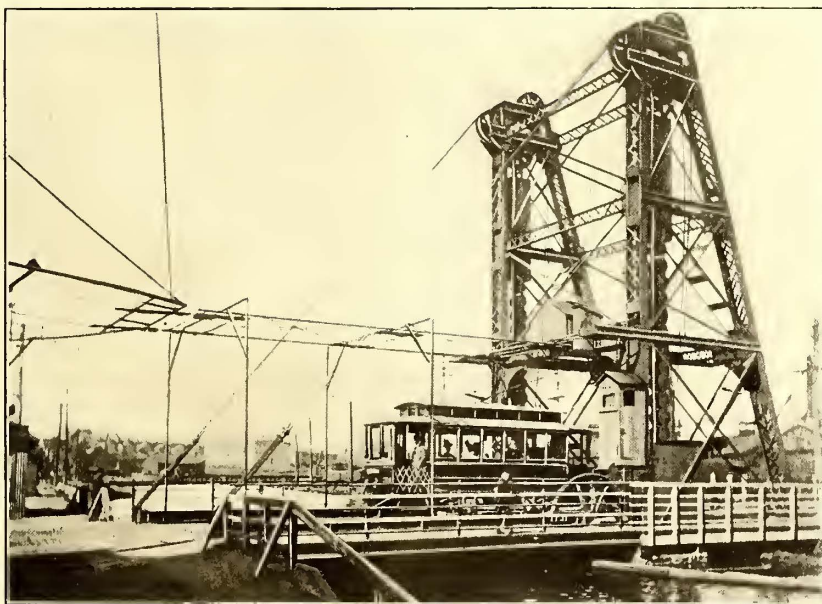


Trenton Street Railway Bascule Bridge—Details of Folding Overhead Work

the bascule type at Perry Street instead of the old-style swing drawbridge, the question of suitable overhead construction for the Trenton Street Railway line arose. Chief

tion of the folding frame principle, as described in the following paragraphs, successfully solved the problem.

The uprights, which are of 2-in. piping, are pivoted by



Trenton Street Railway Bascule Bridge, Showing the Condition of the Overhead Construction when the Bridge Is in Service as a Roadway and When It Is Raised

Engineer Thomas K. Bell, of the Interstate Railways Company, which controls the Trenton system, evolved the idea of a simple hinged arrangement, which would not readily become disarranged.

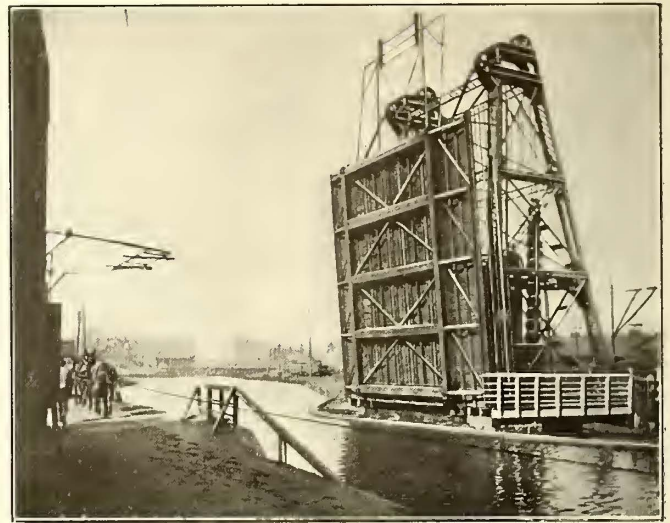
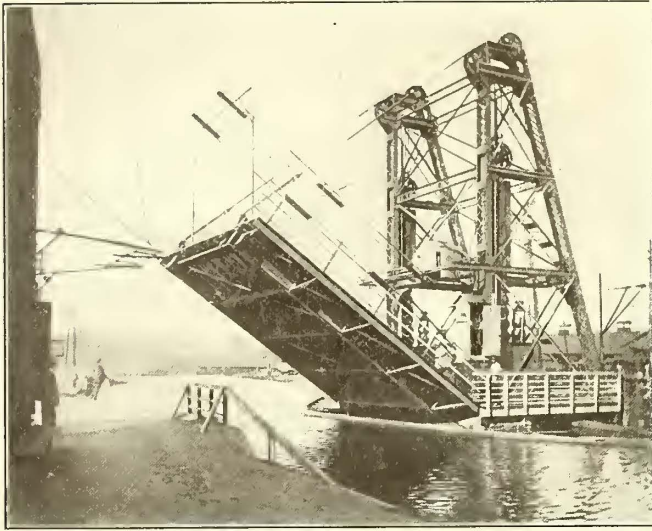
forged brackets to the sides of the main girders on a level with the bridge floor, and are tied together at the top of each bent by one 2 1/2-in. and two 1 1/2-in. pipes, and also by cross-rods 3/8 in. in diameter. The 2 1/2-in. pipe nearest the

tower is supported on the tower structure and acts as a trunion for two 2-in. horizontal pipes which act as spacing struts for the upright members. The trolley wires are supported from a 12-in. x 51-in. plank which hangs by trunnions from the cross pieces connecting the uprights.

The pipe frame is perfectly rigid and keeps the trolley

with the black center between the tracks. These signals are placed at intervals determined by the speed of trains at different points on the road, varying in distance from 200 ft. to 1000 ft. apart.

By watching a motorman operate his train passengers can readily understand the use of these spacing signals. If you are following another train, notice that the motor-



Trenton Street Railway Bascule Bridge, Showing the Gradual Folding Up of the Overhead Construction as the Bridge Is Raised

wire taut at all times, so that any upward movement of the bridge simply changes the angle which the uprights make with the bridge floor, so that as the bridge opens the frame folds up, and as it closes the frame opens. In the illustrations published the various positions of the overhead work are shown.

SAFETY DEVICES ON THE METROPOLITAN WEST SIDE ELEVATED RAILWAY

The Metropolitan West Side Elevated Railway Company, of Chicago, has recently printed and issued to its patrons 50,000 bulletins descriptive of the safety devices used in protecting its passengers against injury. Such a circular, describing details of operation in a clear and frank way, shows the modern trend of railway managers in acquainting passengers with improvements made primarily for the benefit of the traveling public, as contrasted with earlier methods, in which the public was not taken into the company's confidence.

There are two reasons for presenting to the readers of the *ELECTRIC RAILWAY JOURNAL* the earlier mentioned circular. First, it describes an entirely new and satisfactory method of spacing trains operated on short headway; second, it is a good example of how details of railway operation can be presented so that they will be understood by all passengers. An abstract of the bulletin follows:

The management of the Metropolitan West Side Elevated Railway Company has endeavored to provide additional safeguards in the operation of its trains, and with this end in view has installed certain safety and signal devices in which it believes its patrons will be interested.

SPACING SIGNALS

On an elevated railroad, running trains at a short interval during the rush-hour period, it has been a problem to devise ways and means of spacing these trains proper distances apart. This company has devised a system of spacing signals which adds a measure of safety to the operation of trains.

Our patrons undoubtedly have noticed the white signals

man on your train will not pass the signal ahead of him unless the train preceding him has passed the next signal.

The rule is that a motorman shall not pass a signal until he can see the next signal ahead. He cannot see the next signal ahead until the preceding train has passed it. This will be understood by referring to sketch, Fig. 3.

Fig. 1 shows the signal, which can be easily recognized, and Fig. 3 shows two tracks. Train No. 3, which is shown by a dark square, is nearly opposite signal *A*. It will also be observed that the motorman, being on the right side in his cab, and necessarily looking diagonally across to the next signal, which is marked *B*, cannot see this signal until train No. 2 has passed signal *B*. In other words, as long as train No. 2 is in the space between Signals *A* and *B* the view of the signal *B* is obstructed and cannot be seen by the motorman of train No. 1.

One of the purposes which all signal systems serve is to require the motorman or engineer, as the case may be, to constantly keep his eyes on the track ahead in order to observe the signals and not violate the rules. This spacing signal system involves constant watchfulness on the part of the motorman to see that he is not going closer to the train ahead than the limits prescribed by the signals.

Another purpose that this spacing system serves, for example, is that if two trains 1000 ft. apart are both running at the same speed, say 20 miles an hour, and the first train comes to a sudden and unexpected stop, the motorman of the next train, if attending to duty, will note instantly that the preceding train has stopped, due to the fact that he cannot see the next signal ahead. The distances between signals are ample to allow of a stop being made in time to prevent a collision.

In addition to the five senses—namely, sight, smell, feeling, hearing and taste—there should be in the case of motormen and engineers the sense of distance and the sense of speed. These last named senses vary according to the men, just as the five senses vary in acuteness in different persons. Hence these signals aid in defining distance and also in regulating speed.

The train is made a part of the signal, as it clears the block behind it as it passes. This is the automatic feature of the system. It is evident that since no signal is given but the one which says "proceed," the motorman understands that there is a condition of danger at all times when he cannot see the signal. Herein is the system "normal danger." A wrong indication is impossible. Either the train has passed out of the block or it has not. If the lat-

ter is the case, the motorman waiting for the signal is aware of it by the absence of any signal; if the former, he knows it by his ability to see the end of the block ahead.

Traffic on this road is very heavy during the morning and evening rush hours, the time interval between trains reaching a minimum of 40 seconds. During other parts of the day this interval is greater, being sometimes as much as 5 minutes. Eighteen hundred trains daily pass through the Marshfield Avenue interlocking plant, 800 of them going northwest, the rest to the south and west branches.

AUTOMATIC SAFETY TRIPS

This company is now installing another device which will be of interest to patrons, inasmuch as it forms a posi-

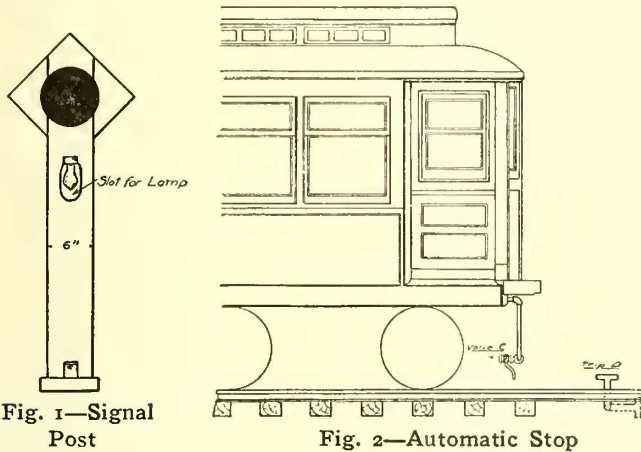


Fig. 1—Signal Post

Fig. 2—Automatic Stop

tive safeguard at junction points, such as Robey Street, Marshfield Avenue, Ashland Avenue, Market Street, Fifth Avenue Terminal, and also tracks crossing the Chicago River.

Whenever a junction of two or more tracks exists, the right of way for trains is governed by a signal termed a "semaphore." When the semaphore is set at danger, indicated by blades being in a horizontal position during the daytime and by a red light at night, it means that the motorman must come to a stop, that the right of way has been given to the train on the other track, or tracks, as the case may be. In order to bring the train to a stop, even though the motorman fails to observe the signal set at danger, a device, known as an automatic train stop, is being installed. Briefly, this is a T-shaped bar (D, Fig. 2), which is raised from between the ties in the center of the tracks each time the signal is set at danger, and when

The rule of the company in regard to operation of trains during foggy or stormy weather is as follows:

A motorman shall operate his train at a speed so that he can stop in the distance that he can see. That is, if he can only see 10 ft., he must be prepared to stop within a distance of 10 ft. He must disregard all attempts to make time or to maintain the schedule. The only requirement is to operate his train so as to conform to the above rule, giving safety consideration above all other things, regardless of whether it takes one or two hours, or more, to make a trip. The motormen are all warned when leaving the terminals to observe Rule 47, which is practically given above. At various points on the road extra men are posted as pilots to further warn the motormen of any danger which may exist.

All important junction points are equipped with the most modern interlocking apparatus for the operation of switches and signals, and with the addition of the safeguards above mentioned, and the close attention to duty of those responsible for the actual operation of trains, there should be no occasion for accidents during stormy or foggy weather, or at any other time.

In case of a blockade the spacing signal effectually prevents a disastrous overload of the generating equipment. Ordinarily, when an electric line whose trains operate on short headway is blockaded, it is found that when the blockade is removed all the motormen will attempt to start at once, and thus overload the distribution system, so that the circuit-breakers relieve the generating equipment of the excessive load by cutting the power off of the third-rail or trolley. The requirements in connection with this system of spacing signals are such that while ordinarily the trains are kept apart according to the signal boards, it is permissible if a blockade occurs on account of an open drawbridge or such similar cause, for the motorman to close up the intervals between the trains, and thus not unduly occupy the tracks to the rear. After such a blockade, according to the rules under which the signals are used, a train is not permitted to start until the train ahead of it has cleared its signal; thus the trains accelerate one by one, and no unusual demand for power is thrown upon the station.

When these spacing signals were put into service the trainmen were instructed as to their use, and the result has been eminently satisfactory. For the first violation of the rule, which says that under no condition, except

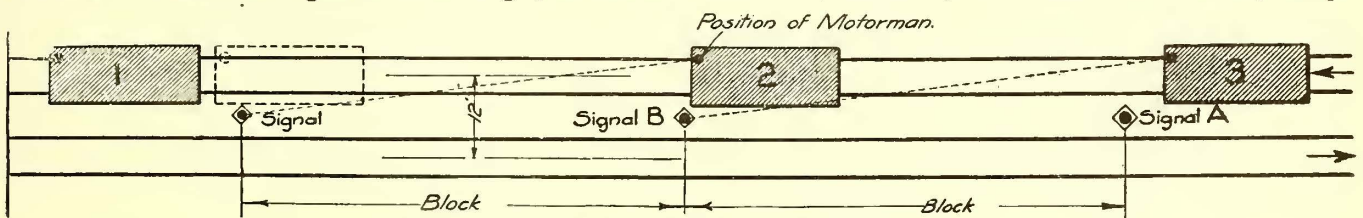


Fig. 3—Location of Signals on Double Track

the signal goes to safety the T-bar disappears between the ties. The purpose of this T-bar is to engage a valve (C, Fig. 2) located on the end of each motor car. When the valve handle comes in contact with the T-bar it instantly sets the air brakes on the train and brings the train to a sudden and abrupt stop.

This device is also being installed on all the tracks crossing the river bridge. The signals are interlocked with the bridge machinery, and the bridge cannot be raised until the signals which are located on each track are all set at danger. When these signals are set at danger the automatic train stop is raised at the same time, working in conjunction with the signal, so that if a motorman does not see, or fails to obey the signal, the train is brought to an abrupt stop.

FOGGY OR STORMY WEATHER

Some passengers have inquired at various times what rules are in effect during very thick or foggy weather.

in case of emergency, shall two trains be in the block at the same time, a 30-day lay-off is the penalty, and that the second violation of this rule is punishable by immediate discharge.

The signals are spaced according to the knowledge of the requirements at each location, and are so located that a motorman can stop his train within the distance of two signals, whatever his speed may be. The placing of the signals involved a close study of the train movements. The signals being between the tracks and the motormen on the outside of the tracks, it was decided to use the same signals for trains in each direction, the motorman always being governed by the side nearest to him. As a train leaves a station its rate of acceleration for about 75 ft. is not very great, so the first signal was put about that dis-

tance from the end of the platform. The second signal was placed the length of a maximum (five-car) train, or 250 ft., further. The third signal was located 350 ft. from the second. This arrangement is the same on both sides of every station, so that a train approaching a stop enters first the 350-ft. block, then the 250-ft. block, then the 75-ft. block, and on going out of the station passes through these same blocks in reverse order. There are two reasons for this arrangement. The principal one is that it permits of the quickest acceleration of speed. Suppose a train to have just left a station and another train to have stopped immediately behind it. The second train has to wait only until the train ahead of it has traveled 250 ft. before it can pass the 75-ft. signal. It will take about as long for the rear train to proceed from a dead stop to the 75-ft. signal as it will the train ahead to pass at moderate speed from the 75-ft. signal to the 250-ft. signal, and also the rear train could pass through the second block at medium speed while the train ahead was rapidly accelerating. This minimizes the amount of time required for a train to enter a station, unload and leave. The second reason for this uniform arrangement of boards is that a train entering a station is enabled to proceed by the same signals that govern the departure of a train on the opposite track from the same station.

The block system is suspended between the limits of all interlocking plants. The signal nearest the entrance to the interlocking is lettered "Out." The first spacing signal past the interlocking signal is lettered "In."

This train spacing system is the invention of two officers of the road, M. J. Feron and B. J. Fallon, the former the superintendent and the latter the engineer of maintenance of way. It is said to be fully protected under the patent laws.

NEW SINGLE-PHASE RAILWAYS ABROAD

Recent reports from the Allgemeine Elektrizitäts Gesellschaft and the Siemens-Schuckert Werke indicate several additional contracts for single-phase railways taken since the preparation of the list published on page 1423 of the issue of this paper for Nov. 21. The contracts for the Allgemeine Elektrizitäts Gesellschaft include one of the Padua-Fusina Railway, in Italy, 21.7 miles in length, with a trolley potential of 6000 volts at 25 cycles. Ten motor cars will be used, each equipped with two 80-hp motors. Another line is the Lötschbergbahn, in Switzerland, on which a trolley voltage of 15,000 at 15 cycles will be used. One locomotive, equipped with two 800-hp motors, will be employed. A coal mine road at Menzelschacht, in Germany, 3.1 miles in length, will also be equipped with a locomotive with three 40-hp motors; 220 volts at 40 cycles will be employed. The company also has a repeat order for the Blankenese-Ohlsdorf line for 25 cars, each to be equipped with two 180-hp motors. The present single-phase motor capacity of the roads in operation or under contract with the Allgemeine Company amounted in November of this year to 42,480 hp.

The latest contract of the Siemens-Schuckert Werke is that for the Wiesentalbahn, between Basel and Schopfheim, in Germany, 34 miles in length, on which a trolley potential of 10,000 at 15 cycles will be used. There are 10 locomotives, each equipped with two 450-hp motors. The aggregate capacity of single-phase railway motors of this company in operation and under contract amounted in October to 33,490 hp.

FINANCIAL CONDITION OF MASSACHUSETTS STREET RAILWAYS*

BY JAMES L. RICHARDS, PRESIDENT NEWTON STREET RAILWAY AND OTHER COMPANIES CONTROLLED BY BOSTON SUBURBAN ELECTRIC COMPANIES

About one year ago it was my misfortune to become more or less actively interested in street railway matters and about that same time it was my good fortune to have the pleasure of listening to remarks of one of your members upon the condition of street railways as they then existed, and the gentleman who made the very able address to which I refer in closing said, as I remember it: "These are the conditions as they exist, and what are you going to do about it?"

My associates at that time realized that something radical would have to be done in connection with the street railway properties with which I am connected, or else those properties would have to go into the hands of receivers; and I think it may be of interest to you to know what we have done and how we did it, not that the methods adopted by us were necessarily the best, or that we worked them out as well as they might have been, but you must remember that we were the first to take up, in a large way, the question of changing the unit of fare, and those who take similar action in the future will, at least, have the benefits, in a large measure, of our work and experience.

When this matter came up for definite consideration with us, we all agreed that the net revenues of the companies must be increased if we were to continue operating the properties. We first considered the feasibility of materially curtailing the service and reducing wages, which might have accomplished the desired results, but believing that the public, as a whole, would be fair in the matter if it fully understood a situation, and believing that the patrons of our various roads wanted, above all things, good service for which they would be willing to pay a reasonable price, including a fair return on the actual money invested in the enterprise, and also having in mind the hardship to our employees, many of whom had been with the companies for a long time, should we reduce wages to the level of three or four years ago, we deemed it advisable to change the unit of fare on the most unprofitable roads owned by us from 5 to 6 cents, and on others to abolish certain free transfer privileges and, when transfers were issued, to charge 1 cent extra for them.

Many said that it would be impossible to change the unit of fare from 5 to 6 cents as the public was so accustomed to the nickel fare and because 6 cents was an odd amount and would cause great inconvenience. We believed that, while these matters might be objectionable, we could overcome them, as well as other more serious obstacles, by a campaign of education.

Our directors did not sit down around their board table and decide off-hand that they would advance the fare on a given date and send out notices to that effect, but went over the conditions fully, mapped out a plan of campaign of publicity, which might require months to finish, before deciding when changes should be made.

The first thing we did was to have an inventory of our property made by an able and independent engineer whose abilities were recognized by the public, and one who had no connection whatever with our properties. We wanted this information for the reason that, while we knew there was no "water" in our securities originally, and while we believed that our properties had been kept up to such a high standard that they would show no material shrinkage, we realized that the public might not know those facts, and in going before the public and proposing the radical changes that we intended we wanted to be sure of our foundation, and we realized that if we could show that our properties were actually worth to-day a given amount of money we would be justified in asking that the public should pay for the service received, consisting not only of the cost of operating the properties, but also a fair return on the cash invested in them.

It took some two months to have the appraisal made,

*Abstract of address before Massachusetts Street Railway Association, Exchange Club, Boston, Dec. 9, 1908.

for the work was done thoroughly, and, when it was received, we found that the present worth of our properties, taken as a whole, was about equal to their capitalization, floating and bonded indebtedness. With this information you can readily understand that we were in a good position to meet the argument of anyone to the effect that we were trying to pay dividends on "watered" securities, etc.

In the meantime we had statements prepared regarding each of our roads, from the time that they were incorporated, giving full information regarding capital stock, notes payable, bonds, gross earnings, operating expenses, net earnings, fixed charges, net divisible income, per cent dividends paid, amount dividends paid, surplus for year after dividends, surplus for all years to date, passengers carried for year, car-miles operated, earnings per car-mile, operating expense per car-mile, average operating expense per car-mile in State, average operating expense, per cent of operation to gross, miles of track owned and operated, gross earnings per mile of track owned and operated, operating expense per mile of track owned and operated, equipment (cars, motors), number employed, rate of pay, conductors and motormen, and rate of fare for each year of operation. These statements we had verified by an expert accountant in whom the public had confidence, the accountant making affidavit to the effect that the figures were correct. These statements we had printed, and mailed one of them to every voter in the territory served by the property in which that voter was interested.

We then had a series of conferences with the various aldermen in the cities in which we operated and the selectmen in the towns where we operated and explained to them the situation exactly as it was. In addition to the aldermen and selectmen we invited to these meetings other prominent citizens, like city solicitors, representatives, etc. We usually had at these meetings from 10 to 20 men, and we probably had 8 or 10 such conferences, so that we finally sat down and talked over with all of these people the situation in a way that they might understand it fully, and I usually made the proposition to the gentlemen that, if they doubted the figures as presented, they might select an auditor to verify our statements.

I want to say in this connection that, without exception, after we had gone over these matters thoroughly with the representatives of the towns and cities served by us, they accepted the situation as it existed and treated us fairly, which only verifies what I have so often said, that the public, as a whole, when it understands matters fully, is fair. The trouble is the public as a rule does not understand the facts relating to public service corporations for which, in my opinion, the companies themselves are at fault for not having, in the past, taken the public into their confidence and acquainted it with the facts.

Personally, I am a believer in publicity. The more the people know about the corporations serving them, the better it will be for both the public and the company, and I want to say right here that the public is welcome to, and I will be glad to give it, any information about the 15 (more or less) corporations with which I am connected. As perhaps some of you know, it is on that basis that I have met the public the past few years in matters relating to the gas companies of Boston, and I think the results have been, by comparison, satisfactory to all concerned. These results, summed up, mean a saving to our customers in their gas bills of over \$800,000 this year, as compared with their bills about two years ago and to the company a prosperous business and the confidence of the public, which is one of the most valuable assets that a public service corporation can have.

PUBLIC MEETINGS

We spent many evenings in talking before local organizations, at clubs and sometimes at so-called "indignation" meetings, but in every instance, after we had presented our side of the case fully and frankly, the large majority of the people seemed to be with us. I remember very well one meeting in particular: it was an "indignation" meeting held in Natick, Mass. You will remember that Natick is a manufacturing town, and a large number of the citizens use the railroad in getting to and from their work. There were about 1,000 people present at the meet-

ing and to start with we did not seem to have the majority with us, but, within a few minutes from the time that we commenced to talk, that entire audience was as quiet and respectful as any church audience I ever saw. After talking with them frankly and freely, we answered all questions, made further explanations when required, and the result was that the gathering, although starting as an "indignation" meeting, ended in a most satisfactory way to us.

It is our custom to have the heads of all of our departments meet once each month, at which time we have a simple dinner and afterwards some member gives a paper on the subject, or subjects, which he thinks of the most importance to our companies. After the paper is read, the subjects are discussed by all present. The people attending these meetings consist of the president, vice-president, general manager, assistant general manager, treasurer, assistant treasurer, auditor, division superintendents, heads of the claim department and of the purchasing department.

Our general manager also organized what we call the "Suburban Railway Club," consisting of all of our employees—motormen, conductors, track men, line men, barn men, etc. Half of these men meet one month, the other half the succeeding month, so that once in two months we meet all of our employees. The results of these meetings are that we not only get better acquainted with each other, but the employees become more thoroughly interested in their work, and therefore, look out for the interests of the public and the company better than they otherwise would.

When we first took up this question of changing the unit of fare, it was discussed very freely with the heads of departments, and later with the conductors and motormen, who were given all information possible so that they, in turn, could talk to the public as they met people from day to day.

You gentlemen must realize how important it is that the employees of a corporation, who come in daily contact with the public, should serve the public and the corporation in the proper spirit, for the opinion that the public have of a public service corporation is formed principally from experiences in meeting the subordinates of that company, and no matter what the ideas, principles and desires of the chief executives of a public service corporation may be, the confidence, respect and good will of the public will not be obtained by a corporation unless the employees, with whom the public comes in contact daily, are of the right sort.

Now, all of this work took time, weeks and months, most of it being done in the evenings; but, when it was once done, we were prepared to make the advances in our fares, which we had a right to do without going to the commissioners, and to petition the commissioners for the right to charge for transfers on certain roads, and, perhaps as most of you know, everything we asked for was granted and in the proper spirit, and we are now conducting the business, under these changed conditions, with no more friction than existed before the changes were inaugurated, and I say to you gentlemen, whose companies are suffering on account of insufficient income, that if you will go about it in the right way, you will find no difficulty whatever in accomplishing the desired results. To give you an idea of the value of the preliminary work, I want to say that the communities consisting of several towns served by one of our largest roads which advanced the fare from 5 to 6 cents, besides making some other changes, never filed a single petition for a hearing, or a remonstrance because of the action taken by us.

Much of the work which we did was necessitated because most of the public believed that our electric railroads, as a whole, were profitable. People knew that but a few years ago the roads did make money, and also were aware of the fact that the present owners paid a high price for the properties. I remember very distinctly that at one of the meetings, such as I have referred to, a gentleman stated that he understood that the present owners paid about \$200 per share for the stock of the company, and that being the case, he did not believe that it was necessary to advance the fares in order that the owners might receive a reasonable return on the capital invested. I told the gentleman that he was mistaken in his statement that the owners paid about \$200 per share for the stock, for the

fact was, as I told him, that we paid nearly \$300 per share and that we got a "gold brick." I called his attention to the fact that the capital stock of the company had not been increased for a number of years, in fact, since the present owners had purchased control of the company, but that, in the meantime, in order to make various improvements, to which I called his attention, and to buy new cars, new equipment, etc., a floating indebtedness had been incurred of something over \$200,000 for the reason that that was the only way that we could pay our bills, as we had not been able to get any of the present stockholders to subscribe for new stock at par. I then stated that I would like, then and there, to open a subscription list for \$200,000 of the capital stock, at par, of the company under discussion, and asked the gentleman if he would head the list and, if so, for how much. As he declined to subscribe for any of the stock at par, you can realize that his argument had little, or no, effect.

REPAIRS AND MAINTENANCE

It is true that many of the companies, which are now unprofitable, were, during their early history, successful, and it is not necessary for me to call your attention as to why many of the successful properties of the past have been unprofitable in recent years, for you all realize that, when an electric railroad is first built, the expenses are comparatively small, being made up principally of the wages paid the conductors and motormen, power bills, and small sums for clerk hire, but, as the roads became older, it was, as you realize, necessary to repair, rebuild and replace, and these items grew larger each year, as the roads became older, until repairs and maintenance formed a substantial amount of the operating expenses. The roads have had not only these increased expenses to contend with, but also increased costs of everything, including labor and material, during the last seven or eight years. We have had to meet these increased expenses referred to, and, as you know, we have from time to time had additional burdens put upon us both by local and State legislative bodies. In our own case, as I remember it, fully 50 per cent of our total operating expense consists of labor. If we paid the same rate for labor to-day that we did a few years ago the difference in our payroll would equal a dividend on the stock of our various companies.

Now, the public does not realize all of these things, and will not until informed by you and others.

I can imagine you gentlemen asking, What have been the results of these changes made by the management of the Boston Suburban Electric properties? In the year ending Sept. 30, 1907, the Newton Street Railway Company paid 2½ per cent in dividends. In the year ending Sept. 30, 1908, the same road paid 5 per cent in dividends. In the year ending Sept. 30, 1907, the Middlesex & Boston paid 1 per cent in dividends, and in the year ending Sept. 30, 1908, the same property paid 5 per cent. The Natick & Cochituate paid 2 per cent during the year ending Sept. 30, 1907, and 6 per cent during the year ending Sept. 30, 1908. The three roads mentioned have a mileage of about 80 miles, or considerably more than half of our entire mileage. While the Newton & Boston paid no dividend in either year, its deficit for the year ending Sept. 30, 1908, was considerably less than in the preceding year.

RESULTS OF 79 OPERATING ROADS

Through the courtesy of the Board of Railroad Commissioners, I have been able to obtain from the reports filed with that board for the fiscal year ending Sept. 30, 1908, the results of the 79 street railways operating in the State of Massachusetts, and I know that they will be of interest to you.

The 79 roads referred to have a capitalization of \$76,914,189.96; funded debt, \$66,298,500.00; notes and loans payable, \$12,704,398.40; making a total investment of \$155,917,088.36. These roads paid in dividends \$3,950,965.24, and they paid in taxes \$1,987,608.33.

The roads in the State outside of the cities of Boston, Springfield and Worcester have a total investment of \$75,751,874.79. They paid in dividends \$1,329,156.74 (about 3¼ per cent on their capital stock). The same 73 roads paid in taxes \$727,019.77.

The roads in Springfield and Worcester have a total investment of \$17,370,748.61, paid in dividends \$533,398, and in taxes \$275,269.66.

The two roads in Boston, Elevated and West End, have a total investment of \$62,794,464.96, paid in dividends \$2,088,410.50, and in taxes \$985,318.90.

Forty of the 79 roads in the State paid no dividend during the year mentioned. One road paid 1 per cent, one road paid 2 per cent, six paid 4 per cent, nine paid 5 per cent, eleven paid 6 per cent, one paid 7 per cent, nine paid 8 per cent, and one paid 10 per cent. The 40 roads above mentioned that paid no dividends paid taxes amounting to \$96,108.60, and the total net deficit of these roads up to Sept. 30, 1908, was \$508,616.64.

From the above you will note that the community received from all the street railways a little more than one-half as much in taxes as the corporation paid to the owners. Is there any other enterprise in the State that pays as large a percentage of its net receipts to the community in taxes? If so, I am not aware of that fact.

The foregoing, it seems to me, is a most deplorable and discouraging showing, both to the investors and the community served by these various street railways. It shows conclusively that the roads, as a whole, are far from prosperous, and the result must be poorer service in many instances than is satisfactory to the public, and the curtailment in the future development of property through the aid of street railways; for who is going to invest new money in an enterprise in which over one-half of the companies engaged in that enterprise are paying no dividends?

Is it not high time that a concerted action should be taken, not only by those directly interested in street railways, but also by the citizens themselves, to relieve the companies of some of the burdens that have recently been imposed upon them? And I think that an effort should be made without delay to relieve the roads, for the present at least, of the so-called excise tax.

CONDITIONS ON BOSTON ELEVATED RAILWAY

Gentlemen, you must do something, in my opinion, not only to increase your receipts, but to decrease your burdens. I believe that even the Elevated will have in the mediate future a difficult task to maintain its present dividend unless relieved through abolition of free transfers, or some of the burdens now imposed upon it are removed.

Let us consider the Elevated situation for a few minutes, for doubtless it is believed by the general public that that company is the most prosperous and is in the strongest financial position of any street railway in the State.

The first full year that the West End Street Railway operated was that ending Sept. 30, 1889. There was then owned and leased 253 miles of track. During the year ending Sept. 30, 1908, the Elevated owned and leased 478 miles of track.

During the year ending Sept. 30, 1889, the car-miles run were 16,573,831, and during the year ending Sept. 30, 1908, the car-miles run were 51,625,143.

During the year ending Sept. 30, 1889, the revenue passengers carried were 104,243,150, and for the year ending Sept. 30, 1908, 273,132,584, showing that 6.29 passengers were carried for each car-mile run during the year ending Sept. 30, 1889, and 5.21 per cent passengers carried for each car-mile run during the year ending Sept. 30, 1908.

During the year ending Sept. 30, 1889, there were no free transfers given by the West End.

During the year ending Sept. 30, 1908, it is estimated that free transfer privileges were given by the Elevated to 158,683,900 passengers.

The total amount invested in permanent property by the West End on Sept. 30, 1889, was \$12,910,606.

The amount invested in permanent property, on which interest must be earned, by the Elevated on Sept. 30, 1908, was \$66,793,638, this last item made up as follows:

Cost of West End property.....	\$36,983,132
Cost of railway equipment and real estate of elevated actually used	21,582,372
Cost of railway equipment and real estate of the Old Colony Company leased.....	689,954
Cost of Tremont Street Subway.....	4,343,225
Cost of East Boston Tunnel.....	3,194,955

In the 19 years referred to, from Sept. 30, 1889, to Sept. 30, 1908, the miles of track increased 102 per cent; the car-miles run increased 211 per cent; revenue passengers increased 162 per cent; and revenue passengers per car-mile decreased 16 per cent. The amount invested, on which interest must be earned, increased \$53,883,032, or over 417 per cent. Taxes increased \$817,758, or 488 per cent.

I assume that at the end of the next five years the following additional facilities will have been added to the Elevated system:

Forest Hills extension, estimated cost.....	\$1,550,000
Washington Street Tunnel, with approaches, necessary connections, etc., estimated cost. (This will add less than three miles of single track to the system.).....	10,000,000
(Considering that this amount of money would build nearly 400 miles of surface tracks, some idea of what a piece of property like the Washington Street Tunnel must earn in order to pay fixed charges can be had.)	
Subway between Park Street and Cambridge Bridge, with the necessary connections, estimated cost.....	1,750,000
Cambridge Subway, estimated cost.....	7,500,000
Elevated extension between North Station and East Cambridge, estimated cost.....	3,960,000
Elevated extension between Sullivan Square, Everett and Malden, estimated cost.....	3,500,000
River Bank Subway, estimated cost.....	3,000,000
Power stations, equipment, etc., to operate the above will cost several million dollars more.	

In addition to these extraordinary construction expenses, the average additions to the surface system during the next five years will be about \$5,000,000 more, and so we have a total of something over \$40,000,000, on which additional interest must be earned five years hence. Those interest charges, even at the low rate of 4 per cent, which is less than the rate for tunnel rental, would undoubtedly amount to in the vicinity of \$1,600,000.

Assuming that the revenue passengers increased during the next five years at the average rate they have during the past ten, namely, 9,181,129 per year, there will be carried during the year ending Sept. 30, 1913, 45,995,645 passengers more than were carried last year, making a total of 319,038,229 passengers.

Ten years ago the average operating expense per revenue passengers of the Elevated was 3.62 cents. The average operating expenses of the Elevated the past year were 3.46 cents. This shows a saving in ten years of 0.16 cent.

Providing economies in operation can be made at the same ratio during the next five years as during the past 10, the operating expenses per passenger would then be 3.38 cents, and would leave of the 5-cent fare 1.62 cents to be applied to interest, taxes, rentals and dividends. The 319,038,229 passengers referred to, at 1.62 cents profit mentioned, would produce net earnings of \$5,168,419.

The amount paid the past year for interest (after taking out that accrued on construction expenditures), taxes and rentals was \$3,580,247; and if to this is added the necessary interest, taxes and rentals, as shown above, for additions to be made, we have a total of over \$5,100,000, or about the same as the net profit on the estimated number of passengers to be carried, leaving nothing for dividends or depreciation, or any extraordinary expenses.

If dividends are to be paid on additional capital stock of the Elevated road, where is the large increase in additional revenue passengers coming from to pay them? It seems to me that the financial question of every street railway in the State, including the Elevated, is a most serious one.

RELATIONS WITH THE PUBLIC

Now, as to the relations between street railways, or any public service corporation, for that matter, and the public. A public service corporation, to be a success in the broad sense of that term, must be mutually beneficial to the stockholder, the public and the employees, and while it may be true that the character of legislation enacted in the past would lead one to suppose that the interests of a public service corporation and the community were different, I contend that their interests are absolutely identical, and think the sooner that fact is recognized by both the corporations and the public the better it will be for all concerned.

It is of the utmost importance to any community that it should receive from the public service corporation serving it the very best accommodations, and the more successful a corporation is the better service it will be in a position

to render, and if good service is not rendered by a corporation that is successful then the public not only can demand, but obtain, the service to which the community served is entitled.

On the other hand, an unsuccessful corporation, no matter what its desires may be, is not in a financial position to render the accommodations that it would like, or that the public has a right to expect.

Therefore, it seems to me that when public convenience and necessity require the services of a corporation—whether it be lighting, transportation, or anything else—it is poor economy for any community to restrict or embarrass the corporation with unnecessary burdens, and thereby make it difficult for the corporation to be successful, for by so doing the very objects for which the franchise was granted will be defeated.

TRACTION LINES DEVELOP TERRITORY

I think we will all agree that traction companies have done more to develop suburban districts and add to the comforts of the communities than any other kind of enterprise, and I believe that those who put their money into public enterprises of this nature are entitled to a liberal return on the capital invested, for persons investing in property of this kind are not only taking a risk, for which they are entitled to something, but are also investing their money which would earn them a reasonable return if invested in some other enterprise.

About a month ago a gentleman familiar with street railway affairs called on me and stated that the wisdom of our action regarding publicity had been seriously questioned by many connected with street railway enterprises, and asked me for my opinion on the subject. His question was a surprise to me, for I could not believe that any enterprising street railway management could question the desirability of acquainting the public with all the facts regarding his property.

Now, gentlemen, I can assure you that this is not a "pet theory" of mine, this publicity business; but the desirability of publicity for public service corporations has been drilled into me from my own personal observation, and if you will pardon me for a few moments, I will review very briefly some of my experiences along the lines of publicity during the past few years.

Most of you will probably remember the gas situation in Boston previous to July 1, 1902, when the present owners obtained control of the various companies, and, remembering it, you will recollect that the reputation enjoyed by the gas companies was not an enviable one. Within a very short time after I became connected with the companies, petitions for lower-priced gas were filed and hearings held, and the question of municipal ownership was under consideration and advocated by some of the press and many of the aldermen and councilmen of the city of Boston. During the hearings for lower-priced gas I invited the experts for the petitioners, Prof. Edward Bemis and others, to investigate our records and books, telling them that anything they wanted, which we had, they could have; in fact, I gave them the same opportunity for information that we ourselves had. My proposition seemed to surprise our opponents, but I made it in good faith, knowing that the company had nothing to cover up, and if our opponents knew all the facts, I felt that their opposition would be greatly modified. I made the same proposal to the late Professor Parsons, who, as you will remember, was the principal advocate of municipal ownership. My offer to those gentlemen was not a bluff, but was made in sincerity, and they availed themselves, to a greater or less extent, of my proposition. The result was that within a comparatively short time the late Professor Parsons publicly stated that he did not believe that municipal ownership was a good thing for the city of Boston, so far as the gas business was concerned, and I believe that the company has no firmer friend to-day than Professor Bemis, who was the chief expert used against us in the argument for lower-priced gas and during our consolidation period.

Since consolidation we have gone to a substantial expense each year to employ an independent auditor to audit our books, and in writing the expert to audit our accounts we requested him to examine the accounts not only to find whether the amounts collected had been honestly ac-

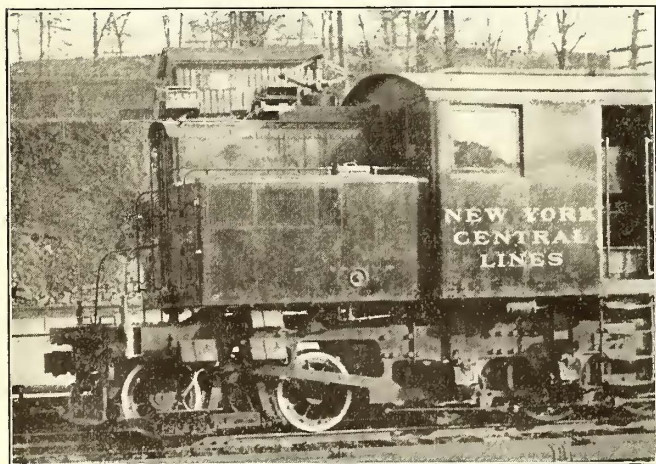
counted for, but also to ascertain if any money had been spent illegitimately. We knew that the company had not spent money illegitimately, but believed that many of the public did not realize that fact, hence my desire to have the audit made, and after it was made we published it, together with additional information, such as our various costs, expenses, etc., so that every one of the 120,000, or thereabouts, of our customers could know all the facts regarding the important points of our business in which they were interested, the same as we knew them ourselves. This method we have followed for a number of years, and, although it has cost some money, I think it the best investment the company ever made.

In closing I want to say to each and every one of you that, in my opinion, publicity is a good thing for every public service corporation that is conducting its business honestly (there is no excuse for any company to do otherwise), and if any of you gentlemen believe that giving the public all the information possible is a mistake, all I can say to you is, "Try it and see what the results will be."

CHANGES IN THE NEW YORK CENTRAL ELECTRIC LOCOMOTIVES

The New York Central & Hudson River Railroad is now making certain changes at the Harmon shops in several features of its present electric locomotives, so that they will conform in general to the improvements embodied in the last 12 locomotives purchased. One of the new engines, No. 3235, is shown in the accompanying illustration.

Probably the most interesting change is the replacement of the single pony axle at each end by a two-axle truck having a wheel base of 6 ft. This change is being made on the old locomotives without any interference with the existing underframing, the additional axles being applied after removing the air cylinders and brake rigging to the outside of the truck. The new locomotives also have the brake rigging and air cylinder outside hung to facilitate inspection and give more space under the locomotive.



Latest Type of New York Central Electric Locomotive, with Four-Wheel Bogey Trucks

The underframing of the new locomotives is somewhat longer, thereby allowing room for a platform at each end of the cab.

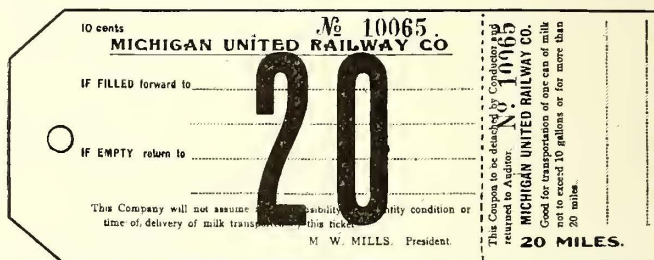
In the new design provision has been made for braking the main truck by hand in emergencies. The bogey wheels are braked by air, independent of the other wheels, whereas the original pony wheels were not provided with brakes. A slight change has been made in the truck by placing springs in the journal box gibs to take up the end thrust from the driving axles.

Two changes have been made in the method of current

collection. One is the removal of the contact shoes from the main frame to the bogey trucks, where the shoes can follow curves with greater ease. The other is the substitution of a modified design of overhead collector. This change consists of the use of a larger piston for raising and lowering the collector and the simplification of the toggle mechanism. The only change in the electrical equipment is the use of contactors for reversing instead of a reversing switch, as this brings about a slight reduction in the number of parts to be maintained.

NEW MILK TICKETS OF MICHIGAN UNITED RAILWAYS

The Michigan United Railways Company, which connects Kalamazoo, Battle Creek and Jackson and Lansing and St. John, Mich., has recently adopted a new form of milk ticket. The tickets are printed on manila cardboard, as shown in the accompanying illustration, and are 6 in.



Michigan United Railways—New Milk Ticket

long x 2½ in. wide. This style of ticket was adopted so that a conductor at a glance might be able to know the distance for which transportation had been purchased for a can of milk. A recent ruling of the Michigan Railroad Commission requires transportation lines to carry milk in patent cans of 10 gal. or less at the following rates:

- 1 to 20 miles, 10 cents.
- 21 to 30 miles, 15 cents.
- 31 to 50 miles, 20 cents.
- 51 to 70 miles, 25 cents.

The rate for cream is about 50 per cent higher than that for milk. The new tickets were designed by F. W. Brown, general freight and passenger agent of the Michigan United Railways, so that milk and cream could be handled without confusion according to this scale of rates. It was thought that unless some sort of a ticket of the type adopted was prepared, which would enable conductors to readily tell that the proper transportation charge had been made according to the number of miles the can was to be carried, there would be more or less confusion and inaccuracy. The new tickets also assist materially in the work of checking in the auditing office. The zone method of charging for the handling of milk requires that a ticket readily distinguishable in amount be used, and therefore the scheme of indicating the mileage with large figures was adopted. In general, the tickets for the various mileages are similar, the only difference being in the face value of the ticket as printed in the upper left-hand corner, varying according to the proper rates, with the large figures indicating the mileage limit for which a can may be carried with one of these tickets attached. It was at first thought that various colored cardboards could best be used to distinguish the tickets for the mileage zones, but on consultation with the printers it was found that the cost of the tickets could be cut down considerably by using only plain manila tickets, indicating the mileage value of the ticket in the large figures as shown. These figures vary in color.

MEETING OF EXECUTIVE COMMITTEE OF MANUFACTURERS' ASSOCIATION

A meeting of the executive committee of the American Street & Interurban Railway Manufacturers' Association to receive the report of the treasurer as to the expenses of the Atlantic City convention and to elect officers for the ensuing year was held at the headquarters of the American Street & Interurban Railway Association, 29 West Thirty-ninth Street, New York, on Dec. 11. Those in attendance at the meeting were Messrs. Ellicott, Evans, Hequembourg, Heulings, Porter, McGraw, Partridge, Peirce, Hawley, Williams, Castle and Martin. President Ellicott presided at the meeting.

The report of Mr. Sisson, the treasurer, was presented by Mr. Hawley, chairman of the finance committee, and was as follows:

RECEIPTS	
By balance from 1907.....	\$5,544.11
Membership dues at \$35.....	10,045.00
Received for space.....	17,278.88
Received for extra badges.....	975.00
Received from Atlantic City Hotel Men's Association	1,250.00
Received from other sources.....	155.31
	\$35,248.30
DISBURSEMENTS	
Exhibit expense	\$16,428.59
Exhibit committee	1,550.43
Entertainment	4,943.55
Stationery and printing.....	2,425.85
General expense	2,868.44
Refunds	179.50
	\$28,396.42
Balance on hand Dec. 11, 1908.....	\$6,851.88

Among the topics discussed was that of increasing the membership of the American Association. It was suggested that as the representatives of the manufacturers are constantly visiting non-member companies as well as individual officers who are eligible as associate members, they make a special effort to urge these gentlemen to become members of the main association. It was also proposed to have four vice-presidents instead of three, the additional vice-president to have charge of the relations with the parent association. This will require an amendment to the by-laws and it was voted that the proposed amendment be submitted to the members for a letter ballot.

The following officers were then elected for the ensuing year: President, J. R. Ellicott; vice-presidents, Howard F. Martin; Chas. C. Peirce; K. D. Hequembourg; treasurer, C. S. Hawley; secretary, George Keegan; chairman of committee on conference, James H. McGraw; chairman of committee on membership, Chas. C. Castle.

The report of the Glasgow (Scotland) deputation which attended the congress of the International Tramways Union at Munich in September last has been submitted. Among other things, it is suggested that air brakes should be tried on the Glasgow cars, and that the matter of screening the driver from the weather should be further inquired into. With the system of transfer tickets in use in Munich they disagreed. The process of linking up the Glasgow Corporation and the Dumbarton tramways has now been completed, except for the canal bridge, which is the only break in the long run from the city to Loch Lomond.

COMMUNICATION

CHARGES FOR HANDLING FOREIGN EQUIPMENT ON C. E. R. A. LINES

CENTRAL ELECTRIC RAILWAY ASSOCIATION,
ANDERSON, IND., Dec. 3, 1908.

To the Editors:

A statement of the method by which the committee on handling equipment when used on lines owned and controlled by member companies of the Central Electric Railway Association reached the schedule of charges published in your issue of Nov. 28 may be of interest.

The original cost of a car, with interest and depreciation, was taken into consideration, interest being figured at the rate of 5 per cent and depreciation at 7½ per cent. To this amount was added the approximate cost of the regular maintenance of the equipment. In the case of passenger equipment a motor car was valued at \$10,000 and it was estimated that such a car would make an average run of 300 miles per day or 109,500 miles per year. The cost of the car would then be as shown in the table below:

Interest on the investment.....	\$0.0045
Depreciation0068
Maintenance, approximately0200
	\$0.0313

For a passenger trailer, whose value was taken at \$3,000, the figures would be as shown in the following table:

Interest on the investment.....	\$0.00136
Depreciation00205
Maintenance (estimated at approximately two-thirds of motor car).....	.01333

Total cost per car-mile..... \$0.01674

As the cost obtained for a passenger motor equipment, as shown above, amounts to over 3 cents per mile, the committee considered that 4 cents per mile was a proper charge, and provided a minimum charge of \$4 or of 100 miles per day for chartered cars. Another condition which influenced the selection of the 4 cents per mile rate was that steam roads charge \$5 per day for their passenger coaches when used on foreign lines, independent of the distance traveled. An electric motor car is worth as much or more than a steam-road passenger coach and in most instances would be operated more than 100 miles per day, so that it was thought the charge should not be more than 4 cents per mile. Otherwise, on long runs, an electric motor car would cost a receiving line so much more than the steam road would have to pay for its car that the former would be at a disadvantage in competition with the latter.

On account of the small revenue received for a passenger motor car operated less than 25 miles on a foreign line it was thought that the minimum should be placed at \$1 and that charges should be made in multiples of 25 until the mileage had reached 100, after which the straight 4-cent rate would be charged. The minimum of 100 miles per day for a chartered car was because the fixed minimum charge for chartered cars on all lines will cover this figure.

In a similar manner as the cost for passenger trailers was about 1 2/3 cents per car-mile, the committee decided that 2 cents per mile was the proper charge to be made for them. It was argued further that no charge for the use of a foreign car should be made less than \$1. Hence it was decided that if a trail car was run 50 miles or less on a foreign line the \$1 minimum would be charged, or if run over 50 miles, the charge would be \$2. As freight trail cars

cost approximately the same as passenger trailers, the 2-cent rate was decided upon as the charge for them.

As the average value of a freight motor car is approximately \$7,500, its cost per car-mile for interest, depreciation and maintenance is not much less than that of a motor passenger car, especially since the number of miles made by a freight car is usually much less than that made by a passenger car. The earning capacity of a freight car, however, was not considered equal to that of a passenger car and this will be particularly true on through runs over a foreign line because through freight rates are necessarily considerably less than the sum of the local freight rates. Hence the revenue per car-mile of the freight motor car will not be large, and it was decided that a fair rental value for it would be at the rate of 3 cents per car-mile, with a minimum of \$1 for 25 miles and \$2 for 50 miles. Finally on account of the likelihood of a freight car taking the greater part of a day to cover any distance between 50 miles and 100 miles, it was decided that the charge between these distances should be \$3.

Freight trail cars, box, flat or gondola, are estimated to cost from \$1,200 to \$2,000. A freight trailer was considered by the committee to be practically the same as a passenger trailer, as its maintenance would amount to about the same on account of the severe usage to which it is put, and while the interest and depreciation charges would be somewhat less, the total cost would differ so slightly from that of a passenger trailer that the committee decided that an equal charge should be made for both passenger and freight trailers.

For freight trailers the same \$1 minimum should apply as for the other equipment, allowing 48 hours from the time of delivery to the receiving road for unloading and return of the car. This was considered necessary to enable the electric railroads to compete with the steam lines. A high per diem charge after 48 hours was made so as to make it to the interest of the receiving road to return the trailer without delay. This was thought necessary on account of the small number of freight trailers generally owned by electric railway companies, and because the use of the car by the owner would probably be worth as much as the per diem charge made by the committee.

It was estimated that a motor car, either passenger or freight, on its own power would be worth 25 cents per car-mile on account of the risk of the receiving line in operating the car, and it was thought equitable to the receiving company to allow it some profit for handling the car. If handled as a trailer behind regular service, the possible delay to the regular train and risk involved was estimated to be worth the small profit allowed the line.

H. A. NICHOLL,
Chairman of the Committee.

The demand for rails, structural iron and steel and electrical machinery in the Philippine Islands has increased the importation of this class of material to \$2,500,000 for 1907. This large figure is due chiefly to the construction of the electric railway in Manila.

A combination of English, French, Hungarian and Austrian capitalists has made proposals to the Austrian Minister of Commerce with a view to the electrification of the Fiume-Moravian Railway. Large power stations will probably be erected to utilize the waterfalls near Otocacs. A water channel will be constructed to a central station generating 36,000 hp, to be eventually enlarged to a horsepower of 100,000.

PAY-ON-PLATFORM CAR

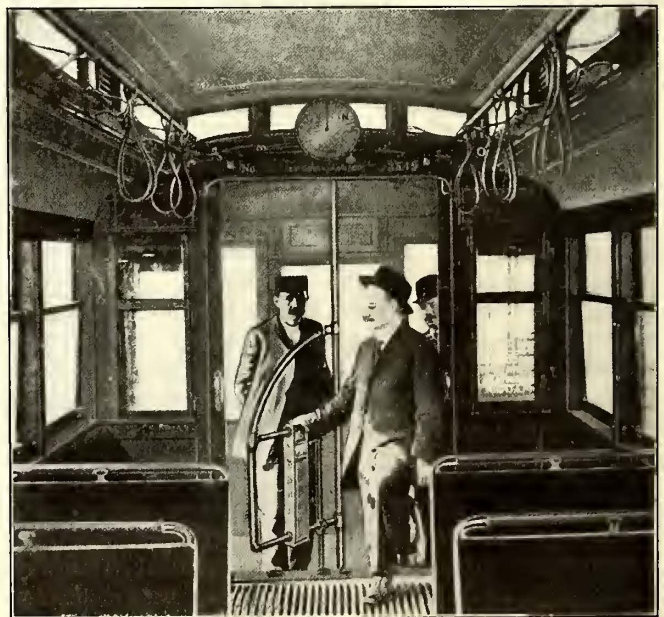
The Pittsburg Railways Company is now using a form of prepayment car known as the "pay-on-platform" type. The characteristic feature of this design is the gate arrangement, by means of which the conductor can double the exit or entrance width to provide for unusual loading or unloading conditions.

By referring to the accompanying drawing it will be seen that the fixed portion of the platform railing is at



Exit from Pay-on-Platform Car

right angles to the middle of the platform step, and is curved outward to allow the conductor to stand on the platform without being in the direct path of passengers. The movable portion of the gate which swivels on the fixed rail is usually in line with the center of the car, so that when the two sliding body doors are open equal space is allotted for entrance and exit. In terminal and other

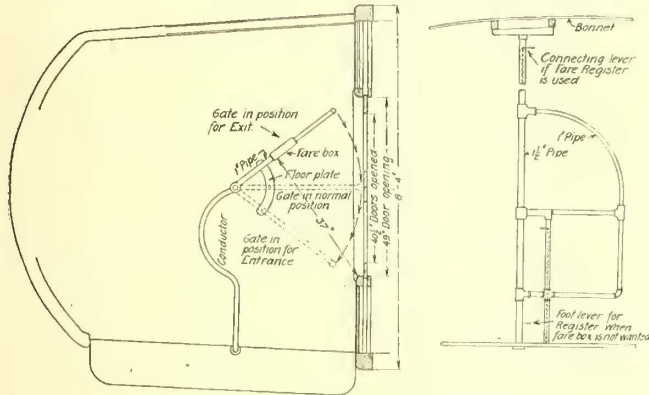


Entrance to Pay-on-Platform Car

rush service, however, it is often desirable to load or unload cars with the least possible congestion. It is this want which appears to be met by the swinging gate in the "pay-on-platform" car; thus, if many people desire to board the car at one time, the conductor simply lifts the short vertical pipe in the gate out of one hole in a curved floor casting and swings it over to drop into a

hole at the other end, thereby locking the gate and making both doors available for entrance. Rapid exit from the rear of the car is provided by swinging the gate to the other end and locking as before.

It should be noted that the gate can be swung over so far that it effectually prevents entering the exit door from the steps, and that an upper pipe on the gate prevents climbing over the dividing structure. The railing is adapted for use with or without a fare-box. An auxil-



Plan of Platform of Pay-on-Platform Car

ary railing may be employed to keep the motorman from coming into contact with passengers.

The accompanying drawing shows this principle applied to a car with an over-all width of 8 ft. 4 in. and a maximum double-door opening of 49 in. The minimum length of platforms recommended is 5 ft. to secure reasonable freedom of movement for two streams of passengers. No structural changes whatever are needed in cars with platforms of these dimensions. The Pittsburg cars have short longitudinal seats at the ends. This plan facilitates prepayment operation. This seating arrangement, however, is common to many cars in which quick passenger movement is desired, so that this form of prepayment car involves no diminution of the normal seating capacity. The Pittsburg cars are of the single-end type, and were built by the St. Louis Car Company, but are not equipped with the fare boxes shown in the half-tone engravings.

The right to use the principle of the "pay-on-platform" car has been placed on the market by a recently organized corporation with headquarters in St. Louis, having the name Pay-on-Platform Car Company.

AIR SANDER VALVE

Among the modern specialties used on the latest cars of the Chicago City Railway Company are the "Keystone" air sanders and traps made by the Electric Service Supplies Company. An application of the supplementary air-sander valve as installed with a motorman's air-brake valve is shown in the illustration. The handle for operating this valve projects directly above the air-brake valve so that it can be operated by the pressure of the thumb of the same hand used to apply the air brakes and if necessary simultaneously with the air-brake valve handle irrespective of the latter's position. A slight pressure on the handle will open the valve, which closes again as soon as released to prevent waste.

With this valve sand may be applied while the brakes are being set, thereby preventing the locking and flattening of the wheels. Where desired this valve may be placed in any other position independent of the brake valve. The brass handle can be detached for use at either end of

the car. This valve is also made in a double form as a combination sander and whistle or pneumatic gong valve. On interurban lines, where both a gong and whistle are used, a three-way valve provided with a small handle is



Supplementary Air Sander Valve Installed with Air Brake Valve

placed in the system so that either the whistle or gong can be operated at one side of the double valve and the sander on the other side. By using such valves all devices for the control of the car, the operation of the gong, the application of sand, etc., are within instant reach of the motorman's hand.

THE DEAD LEVER

A subscriber calls attention to a typographical error which appears in the calculation of the force applied to shoe No. 2 in the article on the dead lever on page 1466 of the issue of Nov. 28. The factor should have been 18/12 instead of 24/14, as stated.

The lack of co-ordination which has characterized the construction of underground electric railways in London without any physical connections, says the London *Electrical Review*, finds its counterpart in Berlin at the present time, at all events from the point of view of the various schemes. For instance, the municipal project for an underground line at Wilmersdorf is still in an initial stage, the Berlin municipal line from the north to the south remains under consideration, the Schoneberg scheme is in a preliminary condition of construction in consequence of delay in the sanctioning of the necessary loan, the proposed suspended railway is partly put off, and the authorized eastern section of the old Underground Railway Company is still in course of preparation. No systematic junction of any of these lines, where such would be possible, is in contemplation, and to them has now to be added a project submitted to the municipal authorities by the Allgemeine Company for the construction of an underground and elevated railway from Gesundbrunnen to Kottbusertor.

News of Electric Railways

The Cleveland Traction Situation

Judge R. W. Tayler of the United States Circuit Court on Dec. 12 granted the Municipal Traction Company leave to appeal from his decisions in the receivership case to the court of appeals at Cincinnati. The Cleveland Railway had been invited to join with the Municipal Traction Company in the appeal, but a representative of the company appeared in court and announced that the Cleveland Railway had no desire to take part in the action. No formal reply was made to the notice received by this company.

The accountants employed by the receivers of the Municipal Traction Company were denied the right to go over the books of the Pay-Enter Fare Box Company, and were forced to make up their accounts from the evidence taken before Special Master Irvin Belford in November. They found a pass book to one of the national banks in Cleveland in which \$2,000 was credited to the Fare Box Company on Nov. 16, 1908. J. B. Tanner, auditor of the Municipal Traction Company and treasurer of the Fare Box Company, stated that this money was paid in by the Mayor in July or August and had been kept in the strong box until the order by Judge Tayler relative to the cash in the hands of the Municipal Traction Company released it for deposit.

On Dec. 10 the receivers of the Municipal Traction Company terminated the agreements with the Pay-Enter Fare Box Company and stopped the payments of cash from the unexpended balance in the hands of its officers at the time the receivers were appointed. As was testified in the hearing, about \$10,000 had been turned over to the Fare Box Company, for which acknowledgment was made by memoranda placed in the cashier's drawer. The payrolls have been met from this money so far. All payrolls have passed through the receivers' hands and the output of the factory has been delivered to them. They have decided, however, that it is advisable to have the advice of the court regarding this matter in the future. No wages or expenses other than the payrolls have been paid from this fund. Ten or 12 boxes have been delivered since the receivers were appointed and material is on hand for a number of others, purchased before the receivership was created. The receivers have simply made up the payrolls out of this money and received the boxes that were completed, but have not operated the plant. As the use of the boxes made has not been decided upon in Cleveland and as the company has made no arrangements to do business in other cities, there is some question as to what the course of the management will be. The court will also have to decide whether the Municipal Traction Company or the men who put up the \$2,000 as 20 per cent of the capital stock really own the machinery and supplies in the plant operated by the company.

The receivers have recently examined several other fare boxes, including the Brill and the Coleman. The 60 fare boxes made by the Pay-Enter Fare Box Company have cost from \$250 to \$275 each, which is between three and four times the quotations for the other boxes. The price of \$250 to \$275 included all the experimental work. The receivers plan to give all the boxes submitted a practical test.

All Wade Park Avenue cars will hereafter be routed around the Union Station loop. That will give a much better service to the station than has heretofore been maintained. At one time during the management of the Municipal Traction Company a pony service was used and there was much complaint, as all Union Station passengers were compelled to transfer to it. Since then East Cleveland cars have been routed around the station and the Wade Park cars give still additional service.

Councilman Charles S. Horner has announced that he will oppose any attempt of the receivers to collect the \$38,000 paid out by the Municipal Traction Company to complete the loops the city built about the post-office and Public Square. He says that the city had no authority or right under the law to build street car tracks there, that the acts were illegal and that there never was a city fund and never could be one from which money could be appropriated for paying a debt incurred by the city in laying these loop lines. A portion of this cost was met with the \$85,000 paid to the city as rental for the use of the streets occupied by the Quincy Street and Central Avenue lines, after the franchises were declared to have expired by the United States Supreme Court.

A meeting of the creditors of the Municipal Traction Company was held on Dec. 12, and various matters relating to the debts were discussed. In all, claims amounting to \$500,000 will be filed with the court on Dec. 18, it is said. Many of these claims have already been filed with the master commissioner and others are in the form of liens.

In addition the Cleveland Railway has a claim of \$220,000 for rental, and it is possible that it will also file a claim for deterioration of the property while in the hands of the Municipal Traction Company.

The report of Ernst & Ernst, accountants, regarding the Pay Enter Fare Box Company, filed with the receivers' report to the United States Circuit Court at Cleveland, showed cash receipts of \$34,592.91 and cash disbursements of \$29,364.65, leaving an apparent cash balance of \$5,228.26. The cash balance reported to the accountants by Tom L. Johnson in his letter of Dec. 10, 1908, exclusive of the \$2,000 fund, was \$2,508.10. Payments reported to have been made by Mr. Johnson, per his letter of Dec. 10, since Dec. 9, 1908, the date of the accountants' report, amount to \$5,721.62. The accountants say that an overpayment of \$3 and an error not accounted for by Mr. Johnson amount to \$492.62, making a total amount of \$5,228.66.

Unpaid vouchers to Dec. 9, 1908, amounted to \$7,078.06, not including the payroll estimated by Mr. Johnson as \$850. The amount shown to have been paid to Loftin Johnson, the Mayor's son, is \$1,066.

The summary of receipts shows regular vouchers of \$20,000 advanced by the Municipal Traction Company between Oct. 12 and Oct. 21, the day before the referendum election. In addition, \$11,933.95 is evidenced by tickets in the cashier's office between these dates, and \$2,658.96 on Oct. 22.

In the list of disbursements a few of the larger amounts are as follows: Machinery, \$4,829.67; patents, \$630; L. E. Johnson, \$1,066; experimental, \$503; labor, \$11,785.66.

The accountants state that they were refused access to the journal, ledger and other books of the company and that their statement is made up from vouchers and other papers they were able to secure.

The report to be issued by the receivers of the Municipal Traction Company for October shows a deficit of \$29,547.

Appropriation Asked for New York Public Service Commission for 1909

The Public Service Commission of the First District of New York has submitted to the Board of Estimate of New York City an application for \$987,500 to cover the expenses of the commission for 1909. The letter of the commission to the Board of Estimate states that the purposes for which such moneys are required are:

Rental, including telephones.....	\$64,000
Furniture	5,000
Special services and investigations.....	50,000
Contingencies	5,000
Executive, Engineering, Statistics, Franchises, Gas and Electricity and Inspection Bureaus and Departments—salaries and disbursements, including stationery, supplies, printing, maps, plans, engineering supplies and library.....	863,500
Total.....	\$987,500

"Under the Rapid Transit act the commission is supervising extensive improvements at Ninety-sixth Street which will greatly enlarge the capacity of the subway constructed under Contract No. 1 made with John B. McDonald, and additional station facilities at Bowling Green under Contract No. 2, which will make possible an increase in the service to Brooklyn.

"On Route 9-0, being the loop line connecting the Manhattan terminals of the three bridges, construction work is now in progress on all of the five sections, and will continue during the coming year, requiring extensive supervision.

"Plans are being prepared for the Broadway-Lexington Avenue route and for Broadway, Brooklyn.

"There are now under way, or about to be begun, arbitration proceedings arising out of Contracts Nos. 1 and 2, as well as out of the loop contracts, the expense of which cannot at this time be anticipated. Nor does this commission at this time estimate the expenses that may necessarily arise from the commencement during the coming year of subway construction for which contracts are not now authorized, or from the additional work that may be necessary after the present injunction is renewed as to gas companies and the decision by the Supreme Court of the United States of the case now before it.

"In addition to the powers and duties as to uncompleted work and new work under the Rapid Transit act, the exercise of the new and additional powers under the Public Service Commissions law with reference to railroads, common carriers, gas and electric companies, their capitaliza-

tion, service, and rates, and the inspection of gas meters, and of locomotive boilers, have made investigations and orders necessary to the proper supervision and control of said corporations, and like investigations and orders will be requisite during the coming year, as well as actions and proceedings in the courts. The commission now has under way an appraisal of the property, tangible and intangible, of the various street railway companies within the city."

The Westinghouse Reorganization

The following statement of assets and liabilities of the Westinghouse Electric & Manufacturing Company, dated Sept. 30, 1908, was submitted to the court by the receivers in their application to Judge James S. Young in the United States District Court, Pittsburg, with reference to their discharge:

ASSETS.	
Property and plant.....	\$20,961,908
Stocks and bonds of other companies.....	31,188,310
Raw materials, finished stocks, etc.....	9,874,373
Cash.....	9,059,990
Subscriptions to new stock.....	6,000,000
Special cash deposit.....	1,535,120
Accounts receivable.....	5,488,827
Notes receivable.....	1,227,982
Deferred assets.....	2,963,984
Total.....	\$88,318,694
LIABILITIES.	
Capital stock.....	\$40,370,150
Convertible 5 per cent sinking and gold bonds.....	22,134,877
Debenture certificates due July 1.....	1,196,000
Collateral 6s, 3-year notes, due Aug. 1, 1910.....	6,000,000
Collateral 5s, 10-year notes, due Oct. 1, 1917.....	2,702,703
Collateral 4s, 5, 6 and 15-year 5 per cent notes.....	1,474,650
Current accounts, interest, taxes, etc.....	2,452,602
Subscription securities of affiliated companies.....	756,945
Reserve, inventory adjustments, etc.....	178,473
Surplus.....	10,279,292
Total.....	\$88,318,694

Judge Cross, of the United States Circuit Court at Newark, N. J., on Dec. 9, signed an order discharging the auxiliary receivership established for the Westinghouse Electric & Manufacturing Company in New Jersey.

Philadelphia Employees Ask for Revision of Wage Agreement.—The employees of the Philadelphia (Pa.) Rapid Transit Company have presented to the company a petition for an increase in wages from 21 cents to 25 cents an hour and for the modification of the agreement between them and the company governing the hours of labor.

Meeting of New York Railroad Club.—A meeting of the New York Railroad Club will be held at the building of the United Engineering Societies, New York, on Dec. 18. A brief business session will be held, after which the meeting will take the form of a Christmas entertainment and social reunion. A special vaudeville program has been arranged.

Northwestern Electrical Association.—The annual meeting of the Northwestern Electrical Association will be held at the Hotel Pfister, Milwaukee, Wis., on Jan. 20-21. An address will be made by Prof. B. H. Meyer, of the Railroad Commission of Wisconsin, on public service questions; and there will be discussions of the rulings of the commission as to rates, etc.

Full Vestibules Asked for Albany Cars.—The Public Service Commission of the Second District of New York has been asked by the local division of the Amalgamated Association of Street & Electric Railway Employees of America at Albany to request the United Traction Company of Albany to inclose its winter cars with full vestibules. The cars are now equipped with a vestibule open at the sides.

Southwestern Electrical & Gas Association.—The minutes of the meeting of the Executive Committee of the Southwestern Electrical & Gas Association on Oct. 27 have been published in pamphlet form. They show a cash balance on hand under date of Oct. 24, 1908, of \$951,38. The association has 12 active members and 22 associate members. The next meeting of the association will be held at Dallas, Tex., in May, 1909.

Combined Passenger and Freight Subway Suggested for New York.—The Public Service Commission of the First District of New York received on Dec. 12 a statement signed by D. D. McBean, a contractor, taking exception to the plan proposed by W. J. Wilgus for a general freight terminal and subway, and submitting a counter proposal for a general passenger and freight subway for all the railroads entering New York.

Effort to Further Construction of Brooklyn Subway.—The Board of Estimate of New York on Dec. 11 referred the question of whether the Public Service Commission of the First District of New York should be asked to secure

bids for the first section of the Fourth Avenue subway, Brooklyn, to a select committee consisting of the Comptroller, the president of the Board of Aldermen and the presidents of the boroughs of Manhattan and Brooklyn.

Public Utilities Law Proposed for Indiana.—At the second annual convention of the Indiana Manufacturers' & Shippers' Association, held at Indianapolis on Dec. 16 and 17, a committee of 11 members of the association, including manufacturers, shippers, lumbermen, telephone and telegraph operators and electric light and water works managers was appointed to draft a public service bill to be presented to the next session of the Indianapolis Legislature for passage.

St. Louis' Transit Needs.—John I. Beggs, president of the United Railways, St. Louis, has proposed that the various civic and mercantile organizations of the city appoint a special committee to consider street railway conditions in St. Louis and outline plans for improvements and extensions. Mr. Beggs says that plans for the future should include a provision for the construction of a subway in the heart of the city, and that the scheme of development to be formulated by this board should comprehend the time when the city of St. Louis and the county will be one.

Purchase of Tunnel Between New York and Long Island Urged.—A delegation from civic organizations in Queens County called on the Public Service Commission of the First District of New York on Dec. 8 to protest against the lack of transportation facilities in Queens Borough and to ask the commission what had been done regarding the offer of the Belmont interests to sell the Steinway tunnel to the city for approximately \$7,300,000. Representatives of the commission said that the matter was now under consideration but that they did not feel inclined to express their views before the final decision was announced.

Prizes Offered for Automatic Car Couplers.—Baron Mayor des Planches, the Ambassador of Italy at Washington, has transmitted to the United States Department of Commerce and Labor pamphlets relative to a prize competition offered by the National College of Italian Railway Engineers, for an automatic car-coupling device, and invites Americans to participate. Details may be had on application to the Italian embassy in Washington. The first prize is about \$2,000 and a large gold medal given by the King of Italy. The second prize about \$1,000. Competitors must present their application for admission to the competition by Dec. 31, 1908.

Increase in Use of Electricity in Chicago.—At a luncheon of the Electric Club of Chicago on Dec. 9, P. Junkersfelt, electrical engineer of the Commonwealth Edison Company, in outlining the growth of the company during the past 20 years said that 20 years ago the generating equipment of the company consisted of 600 kw in belted Edison bipolar generators whereas the company now has three central stations with a total capacity of 140,000 kw, a considerable part of which output is purchased for railway use in Chicago. Thirteen large substations with a total rated capacity of 72,000 kw are supplied from the main generating stations, which burn 750,000 tons of coal per year.

Chicago Railways Reconstruction Plans for 1909.—John M. Roach, president of the Chicago Railways, has outlined the work which this company plans to complete during 1909, the second of the three years allowed in the rehabilitation ordinances. The program calls for the expenditure of \$10,000,000. Very satisfactory progress has been made with the rehabilitation of the property and it is thought likely that the entire work can be completed during 1909. About 150 of the 650 cars under construction have been delivered and are being put in service where most needed at the rate of about 25 cars per week. According to the ordinance the Chicago Railways, at the end of the three-year rehabilitation period, must have available for service 1200 double-truck cars. Before the delivery of the 650 pay-as-you-enter cars now being put into service the company had about 400 of its former standard double-truck cars in use and was only obliged by the ordinance to purchase about 150 more. Mr. Roach has said, however, that the ordinance is to be interpreted as meaning that the company must have 1200 new pay-as-you-enter cars, and in accordance with that view an order will be placed early in the spring for 550 additional pay-as-you-enter cars to be built and delivered in the fall of 1909. Although progress was delayed by the slow delivery of materials during the summer, about 65 miles of track of a most substantial type have been rebuilt. The ordinances require the reconstruction of 74 miles more, and in addition to this the company's program includes 26 miles of extensions to be built during 1909. In preparation for the work of 1909 the company is contracting for 400,000 sq. yd. of granite block and will soon place orders for the necessary special work.

Financial and Corporate

New York Stock and Money Markets

DECEMBER 15, 1908.

The course of the stock market during the last week has been like that of the week previous, somewhat erratic. Advances and losses have been shown, and there has been more trading in the cheaper securities than at any other time during the present upward movement. Sales could not be called either very large or very small, so that it is a fair description to say that the market was colorless. Such market leaders as Union Pacific, Reading and Steel common, while still occupying the most prominent places in the volume of trading, are not monopolizing the interest of the Street as they did during the fall. Chesapeake & Ohio, Toledo, St. Louis & Western preferred, Wabash and many other low-priced stocks which have been inert for months are beginning to figure in the daily sales. One feature of the week which was particularly interesting was the sudden activity which developed in New York traction securities. Issues of the Interborough-Metropolitan, Metropolitan Street Railway and Brooklyn Rapid Transit were in demand and all recorded advances. The Government reports of the principal crops indicate the producers will have more to spend in the coming year than ever before. The proposed investigation of the methods of Wall Street is evidently welcomed by the governing bodies of the exchanges concerned. It is believed that such an investigation as Governor Hughes proposes will have a beneficial effect upon the methods of transacting business and will increase the confidence of the public.

The bond market continues to be as strong as ever, and the houses that deal in this class of investment securities receive many inquiries from outside purchasers.

The money market is a little stronger, as far as the rates for loans are concerned, and the demand is somewhat better. The shipments of gold to Paris have not cut any figure in the apparent volume of cash on hand; plenty of money is available for borrowers. Rates to-day are quoted at 2 to 4 per cent for call loans and 3 to 3½ per cent for 90-day paper.

Other Markets

Traction stocks were almost entirely out of the market in Boston. A few shares of Boston Elevated were sold at 128½ to 129, and an occasional block of Massachusetts Electric was sold at 12. There was little activity in the bond market.

In the Philadelphia market, the traction stocks played a very important part in the trading. Philadelphia Rapid Transit and Union Traction were especially prominent. There seemed to be liberal supplies of stock for sale, and prices closed the week at a slight recession from those of the week previous.

In Chicago there was little interest in traction securities. Even the Chicago Railways issues were in small demand and prices on all the "series" were a trifle easier. Chicago Subway stock was active.

United Railway bonds were the features of the traction trading in the Baltimore market.

Among the traction securities sold at auction in New York during the past week were: \$5,000 St. Paul City Railway 5 per cent bonds, at 108½; \$5,000 Union Elevated Railroad, Chicago, 5 per cent bonds, at 90; \$5,000 United Traction & Electric Company, Providence, R. I., 5 per cent bonds, at 107½; 300 shares Chicago Union Traction, at 2½; 20 shares Sixth Avenue Railroad Company, at 126.

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

	Dec. 8.	Dec. 15.
American Railways Company, Philadelphia.....	*46	46
Boston Elevated Railways.....	131	128¾
Brooklyn Rapid Transit Company.....	57½	56¾
Chicago City Railway.....	185	180
Cleveland Railway.....	75	—
Consolidated Traction Company of New Jersey.....	276	275½
Consolidated Traction Company of New Jersey, 5 per cent bonds.....	104½	104½
Detroit United Railway.....	*54	*55
Interborough-Metropolitan Company.....	157½	16½
Interborough-Metropolitan Company (preferred).....	36½	39½
Manhattan Railway.....	151½	148½
Massachusetts Electric Companies (common).....	12	12
Massachusetts Electric Companies (preferred).....	58	57¾
Metropolitan West Side Elevated Railway, Chicago (common).....	a17	a20
Metropolitan West Side Elevated Railway, Chicago (preferred).....	a50	a55
Metropolitan Street Railway.....	*27	30
North American Company.....	76¾	72½
Philadelphia Company, Pittsburg (common).....	43½	43¾
Philadelphia Company, Pittsburg (preferred).....	44	43½
Philadelphia Rapid Transit Company.....	22½	21¾
Philadelphia Traction Company.....	90	90½
Public Service Corporation, 5 per cent collateral notes.....	a100	a99½
Public Service Corporation certificates.....	a75¾	a75¾
Twin City Rapid Transit Company, Minneapolis (common).....	94	95
Union Traction Company, Philadelphia.....	51¾	49

* Asked.
 † Last sale.

Metropolitan Street Railway Reorganization

The Stone & Webster Engineering Corporation, Boston, Mass., has opened a New York office at 45 Cedar Street, which will be in charge of Eliot Wadsworth, who has long been connected with the company. This office has been opened principally for participation in the reorganization of the Metropolitan Street Railway Company, although it is the intention of the company to maintain a permanent branch in New York. Guy E. Tripp, vice-president of the Stone & Webster Corporation and at the head of its management association, will make his headquarters in New York, where he will serve in the capacity of expert adviser of the joint reorganization committee of the Metropolitan Street Railway. Mr. Tripp will give advice both as to the financial reorganization of the company and as to the physical reorganization of the properties. He is now making a thorough investigation of the situation and will make a full report to the committee. The joint reorganization committee is composed of John W. Castles, chairman; Donald Mackay, Otto H. Kahn and W. P. Dixon. E. S. Marston, chairman of the 4 per cent refunding bondholders' committee, and Alexander J. Hemphill, chairman of the 5 per cent collateral bondholders' committee, are ex-officio members of the joint committee. L. C. Krauthoff is the counsel. So far, it is claimed that only preliminary investigation of the various properties has been accomplished in the direction of reorganization.

Annual Report of the Montreal Street Railway

Gross earnings of the Montreal Street Railway during the year ended Sept. 30, 1908, aggregated \$3,677,432, an increase of 4.96 per cent over the previous year. As operating expenses increased but 2.55 per cent, net earnings showed a gain of 8.58 per cent. The sum of \$72,011, representing interest from the securities of the Montreal Park & Island Railway, was added to the net earnings from operation, making the total income \$1,591,049. From this amount there was deducted \$454,638, comprising interest, rentals and the percentage of earnings paid to the city of Montreal. The payment to the city aggregated \$242,431, an increase of \$27,591 over the preceding year. Appropriations from the surplus remaining after provision for the dividend of 10 per cent on the stock amounted to \$200,000, of which \$175,000 was for contingent account and \$25,000 for the fire insurance fund. The final surplus was \$35,687 and the balance sheet surplus as of Sept. 30, 1908, stood at \$2,042,216. There were some adjustments in the surplus account during the year, due to the fact that the discount on £460,000 of bonds sold was charged to that account while the premium on installments paid on \$1,000,000 stock sold at 125 was credited to surplus. The proceeds of the bonds and the installments paid on the stock were used to retire \$292,000 bonds which matured on Feb. 1, 1907, and £208,000 notes as well as floating debt.

The following statement shows some of the financial results during the period of 12 years:

Year ended Sept. 30.	1908.	1907.	1897.
Gross earnings.....	\$3,677,432	\$3,503,643	\$1,342,367
Operating expenses.....	\$2,158,394	\$2,104,653	\$736,428
Expenses—per cent of earnings.....	58.69	60.07	55.05
Net earnings.....	\$1,519,038	\$1,398,990	\$605,939
Passengers carried.....	90,746,032	86,741,212	32,047,317
Car earnings per passenger—cents.....	3.96	3.95	4.17
Transfers.....	30,343,113	28,675,256	8,765,903
Total passengers carried.....	121,089,145	115,416,468	40,813,220
Car earnings per passenger, total carried—cents.....	2.97	2.97	3.28

No division of operating expenses is presented, indicating the relative expenditures for maintenance and operation, but, as shown, there was a reduction in the percentage of gross earnings expended for operating expenses. L. J. Forget, the president, states in his report to shareholders: "These satisfactory results are attributed to some extent to the fact that the principal main lines of the company are now equipped with modern cars of the pay-as-you-enter type, which not only have induced travel but enable the conductor to collect his fares properly." The \$175,000 appropriated for contingent account was designed for renewals. Added to the balance of \$11,638 carried forward from previous years, this made a total of \$186,638, against which there was charged \$157,285 during the year.

The fire insurance fund was increased during the year by the appropriation from earnings, as stated, and by the addition of \$17,950 received as interest on investments. The amount to the credit of the fund at the close of the fiscal year was \$423,959.

President Forget states to shareholders: "The new power house at Hochelaga was completed and put in operation in February, providing timely assistance during the heavy snow storms of last winter. The opera-

tion of the plant has been most satisfactory in every respect.

"The storage battery at Maisonneuve was completed in November.

"In April your directors entered into a 10-year contract with the Montreal Light, Heat & Power Company on satisfactory terms, for the supply of 1000 hp for use in the summer months only.

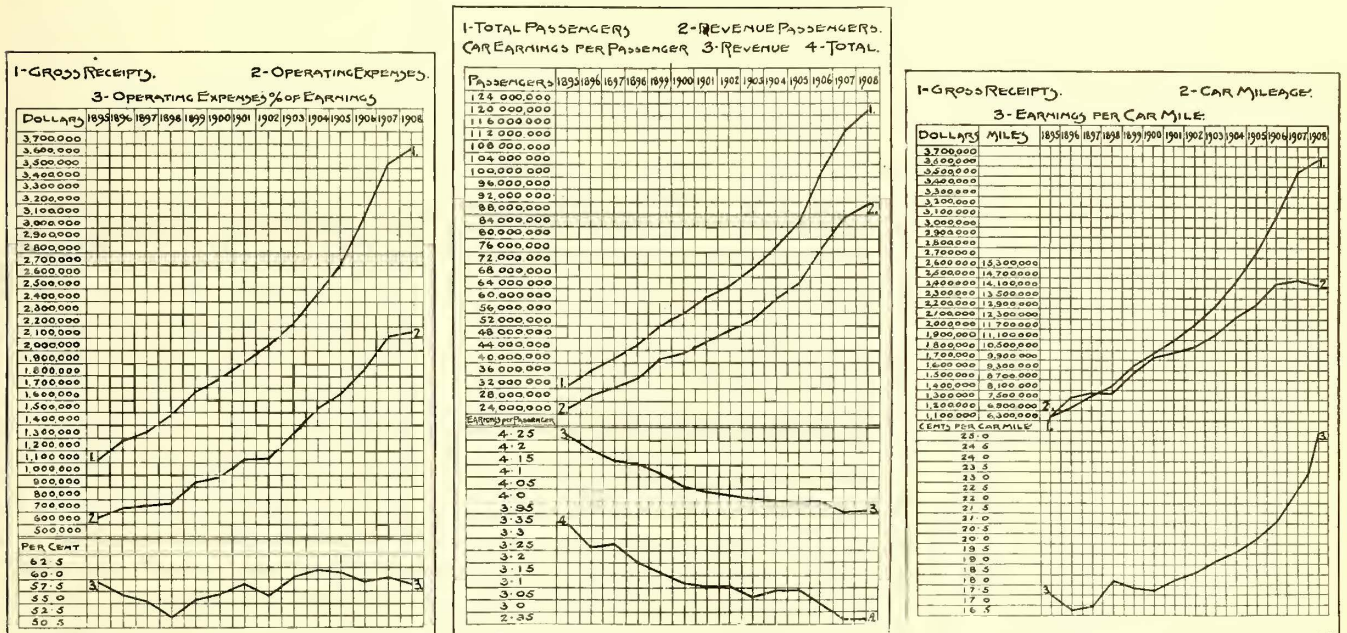
"The city council has not taken up the question of granting this company further facilities in the way of new streets, in order to assist the company to handle the increasing traffic. It is to be hoped that, in the general interest and welfare of the public, the council will give the matter the attention it deserves.

"During the past winter the company was obliged to refuse payment of a portion of the city's account for snow, and a suit is now pending in the courts. The result of this suit will establish whether or not the council is obliged to carry on the work of snow removal in a legitimate and economical manner. The snow fall, according to the McGill records, was over 1 ft. less than the previous year, but notwithstanding this the city claims to have expended \$202,640, an increase over the previous year of \$71,898.

"At the request of the council the company made a proposition to take over the snow removal, charging the city one-half the actual cost and limiting the city's contribution to

ard Wetherill, Chester, Pa.; John S. Black, Atlantic City, N. J.; Garnett Pendleton, Upland, Pa.

Boston (Mass.) Elevated Railway.—F. S. Mead, who is chairman of the committee of the stockholders of the West End Street Railway who are opposing the consolidation of that company with the Boston Elevated Railway, said recently in explanation of the position taken by the interests he represents: "The committee feels that the Boston Elevated Railway is offering the West End Street Railway stockholder a security which is not the equal of that which he now possesses. The acceptance of the Elevated Railway's proposal means that the stockholders of the West End Street Railway is taken into partnership. This stockholder, to-day—so long as there are no bonds outstanding—is virtually a creditor of the Boston Elevated Railway. By assenting to the consolidation, he becomes an equity holder and his position is less secure. We believe that stockholders of the West End Street Railway should more thoroughly investigate both sides of the controversy. To this end, a financial and physical examination should be made of the property of the West End Street Railway, and an intelligent opinion formed as to the real and strategic value of the property in case the unexpected happens and there is a dissolution of the West End-Boston Elevated operating agreement at the expiration of the lease in 1922. We are not asking for proxies, but desire to put ourselves



Diagrams Showing Operations of the Montreal Street Railway

\$1,500 per mile of street. This proportion would limit the city's cost to much less than it is doing the work for now with the prospect of a large saving to the public treasury. Although pressed to come to some decision in the matter, none has been arrived at, and the matter is apparently in abeyance.

"The company has paid to the city of Montreal the usual property taxes and percentage on earnings amounting to \$258,817 and on account of snow removal \$81,714, making a total of \$340,531, an increase over last year of \$44,212.

"The Montreal Park & Island Railway continues to show satisfactory progress, the net surplus for the year turned over to the Montreal Street Railway on account of interest being \$72,011, an increase of \$16,910 over last year.

"The Montreal Terminal Railway shows a net loss of \$5,162. Since the closing of the year, which ended in June, the earnings have shown satisfactory increases and your directors anticipate that the Montreal Street Railway will receive some return from its investment in this company in the near future."

Asheville (N. C.) Rapid Transit Company.—The property of the Asheville Rapid Transit Company, including Overlook Park, was sold at auction on Dec. 8 at Asheville for \$25,000, the upset price, to R. S. Howland, representing the bondholders of the company.

Atlantic & Suburban Railway, Atlantic City, N. J.—The Atlantic & Suburban Railway was incorporated in New Jersey on Dec. 7 with \$650,000 of authorized capital stock as a reorganization of the Atlantic City & Suburban Traction Company recently foreclosed. The directors are: Robert Wetherill, president; William S. Blakeley and Rich-

ard Wetherill, Chester, Pa.; John S. Black, Atlantic City, N. J.; Garnett Pendleton, Upland, Pa.

Camden & Trenton Railway, Camden, N. J.—The first mortgage bondholders' committee of the Camden & Trenton Railway, of which Edward Powell is chairman, met at Philadelphia on Dec. 11. A. M. Taylor, chairman of the general mortgage bondholders' committee, submitted a plan for the reorganization of the property. The committee agreed to accept the terms of the plan, provided Mr. Taylor would become president of the company, and to direct the rehabilitation and operation of the property. The terms of the plan are not yet ready for publication.

Chicago & Milwaukee Electric Railroad, Chicago, Ill.—The receivers of the Chicago & Milwaukee Electric Railroad report earnings as follows for October: Gross receipts, \$49,325; operating expenses, \$41,803; net earnings, \$7,522. They also report earnings as follows for the period from Jan. 28 to Oct. 31: Gross receipts, \$468,451; operating expenses, \$330,507; net earnings, \$137,944.

Danbury & Harlem Traction Company, Danbury, Conn.—The property of the Danbury & Harlem Traction Company will be sold at White Plains, N. Y., on Jan. 23 under foreclosure proceedings brought by the Knickerbocker Trust Company, New York.

Lehigh Valley Transit Company, Allentown, Pa.—Assents having been received from the holders of a large majority of the outstanding preferred and common stock of the Lehigh Valley Transit Company, the voting trust has been extended as to the assenting certificates for a fur-

ther period of three years from Nov. 3, 1908, the trustees having power to terminate the trust earlier.

New Orleans Railway & Light Company, New Orleans, La.—The Canal-Louisiana Bank, the Whitney-Central Bank, and the Hibernia Bank, New Orleans, have exercised their option on \$2,441,000 general mortgage 4½ per cent bonds of the New Orleans Railway & Light Company, dated 1907, which were pledged in 1908 to secure an issue of \$1,300,000 6 per cent notes due June 20, 1909, but subject to call on any interest day at 101. The sale has enabled the company to pay practically all of its outstanding debts incurred for improvements and additions. The amount of general mortgage bonds outstanding is increased by the sale to \$17,484,000.

Northwestern Elevated Railroad, Chicago, Ill.—It is reported that Blair & Company, New York, who are largely interested in the Northwestern Elevated Railroad, the Chicago & Oak Park Elevated Railroad and the Union Elevated Railroad, have representatives in Chicago to take up the question of consolidating the elevated railroads, and that it is desired so to arrange matters that the elevated railroads may become a party to the proposed consolidation of the surface railways and the Commonwealth Edison Company.

Philadelphia, Coatesville & Lancaster Passenger Railway, Parkesburg, Pa.—The property of the Philadelphia, Coatesville & Lancaster Passenger Railway is advertised to be sold under the terms of the mortgage (without foreclosure proceedings) at Lancaster on Dec. 30, the interest due on the \$600,000 mortgage for which the Integrity Title Insurance, Trust & Safe Deposit Company, Philadelphia, is trustee, being in default. The road is partly built in Chester County, and considerable grading has been done in Lancaster County. At auction in Philadelphia on Dec. 9, \$32,000 5s, due 1934, were sold at 10 per cent.

Third Avenue Railroad, New York, N. Y.—Judge Lacombe of the United States Circuit Court signed on Dec. 10 an order permitting the Central Trust Company, New York, to file a claim with Special Master Childs against the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway, which is now under control of Frederick W. Whitridge as receiver of the Third Avenue Railroad. The claim of the Central Trust Company is for \$100,000 and is based on three mortgages held by it as substituted trustee under the first consolidated 4 per cent gold mortgage of the Third Avenue Railroad, dated May 15, 1900. The three mortgages, aggregating \$100,000, constitute outstanding liens against the property described, which is now owned by the Forty-second Street, Manhattanville & St. Nicholas Avenue Railway. Under the court's order of Feb. 8, 1908, the time for the filing of claims with Special Master Childs expired on March 12, 1908. The new order is necessary, therefore, to permit the filing of this claim.

United Railways Investment Company, San Francisco, Cal.—Patrick Calhoun, president of the United Railroads of San Francisco, has confirmed the purchase by the United Railways Investment Company of the property of the Stanislaus Electric Power Company. The power company has outstanding \$9,000,000 of common stock and \$3,000,000 of preferred stock, and also an issue of \$6,000,000 in bonds, a total of \$18,000,000. The United Railways Investment Company, which is the holding corporation for the United Railroads of San Francisco and the Philadelphia Company, Pittsburg, is at present capitalized at \$34,000,000, of which \$15,000,000 is preferred and \$19,000,000 common stock. The capacity of the plant of the Stanislaus Electric Power Company will be 64,000 hp, of which 24,000 hp will be purchased by the United Railroads of San Francisco for operating its lines, and 40,000 hp is sold for light and power purposes.

Virginia Passenger & Power Company, Richmond, Va.—Judge Waddill in the United States Circuit Court at Richmond, on Dec. 7, entered orders granting the Metropolitan Trust Company, New York, trustee of the Virginia Passenger & Power Company's debenture bonds, the Bowling Green Trust Company, New York, trustee under the consolidated mortgage, the Central Trust Company, New York, trustee under the mortgage of the Richmond Passenger & Power Company and certain other creditors, permission to appeal from the judgment of foreclosure sale ordered by him on Oct. 24, 1908.

Washington Water Power Company, Spokane, Wash.—The stockholders of the Washington Water Power Company have authorized the directors to issue \$15,000,000 in bonds and have accepted the proposition of Lee, Higginson & Company, Boston and New York, and Moffat & White, New York, to take the entire issue. The price is not given out. Of the issue \$6,000,000 will be placed on the market in 1909, at which time \$1,000,000 in new stock will also be issued. The company plans to expend \$7,000,000 in the betterment and extension of its railway, power and light systems in and near Spokane.

Traffic and Transportation

Ten-Cent Fare Upheld by New York Commission

The Public Service Commission of the First District of New York, in an opinion written by Commissioner Bassett, has dismissed the petition of the Flushing Association against the Brooklyn Heights Railroad for a 5-cent fare in either direction between Ridgewood, Brooklyn, and Flushing, Long Island. The ground for the complaint was that the extra fare is illegal and in violation of the terms of the company's charter. The company in its answer denied that the extra fare is illegal and said that the franchise under which the various routes to Flushing are operated expressly authorizes a fare of at least 10 cents. Further, the company said that a reduction in fare would involve a loss so severe as to be confiscatory. The opinion of the commission follows in part:

"The railroad maintains a so-called free zone in order to eliminate the possibility of a passenger being charged 10 cents for a short ride. Such a charge might result, in case a single arbitrary point were fixed for the collection of a second fare, if a passenger happened to board a car just before reaching the second fare point and traveled a short distance beyond the point. The method involved in the operation of the free zone is to limit the collection of the second fare to passengers who have boarded the car some distance before reaching the second-fare point. The length of the free zone between Cedar Grove Cemetery and Maspeth depot is 4.073 miles. The length of the combined free zone on the Flushing and North Beach line is 3.158 miles, and this latter figure is the shortest distance for which the 10-cent fare is charged. The 10-cent fare for this distance would apply only in the case of a passenger traveling from the northerly portion of the North Beach route to the easterly portion of the Flushing route or vice versa, and, as a matter of fact, owing to the conditions of population in the territory just outside of the free zone on the Flushing line, and the territory just outside of the free zone on the North Beach line, it would be extremely unlikely that a passenger would begin and end his journey in such a manner as to confine it to that particular 3.158 miles. It is admitted by the complainant that the average distance traveled by passengers transferring from the easterly portion of the Flushing line to the northerly portion of the North Beach line, or from the northerly portion of the North Beach line to the easterly portion of the Flushing line is about five miles through a sparsely settled territory.

"The outlying portion of the Flushing route runs through the former villages of Corona, Newton and Maspeth. The testimony shows that about three-quarters of a mile separates the edge of Flushing from the high ground in Corona, and that most of this three-quarters of a mile is marsh lands adjacent to Flushing Creek and its tributaries. The more or less sparsely built up portions of Corona and Elmhurst are contiguous. About a quarter of a mile separates the settled portions of Elmhurst and Maspeth. For some distance south and west of Maspeth depot on all three routes, namely, Grand Street, Flushing Avenue and Flushing-Ridgewood routes, the territory is rather sparsely built up, but the Flushing-Ridgewood line, after transferring to the elevated, and the two surface lines, after crossing the old Brooklyn city boundary at or near Newton Creek, pass through thickly settled territory.

"Taking up in order the grounds on which the complainants base their claim, it is to be observed:

"(1) That the fact that a passenger may ride 20 miles for a single fare of 5 cents results from the elaborate system of transfers maintained by the companies, some of which are made mandatory upon a company by the automatic operation of the Railroad Law, and some of which, as, for instance, the transfer between the Brooklyn Heights Railroad and the Brooklyn Union Elevated Railroad at Fresh Pond station, and the transfer between the Brooklyn Union Elevated Railroad and the Brooklyn, Queens County & Suburban Railway at Cypress Hills, are a voluntary arrangement between the distinct though affiliated companies of the Brooklyn Rapid Transit System. For these transfers, which have been characterized as voluntary, there is no statutory requirement, and no way has been discovered in which they could be enforced in case the companies should discontinue unless the Public Service Commission should find that a 5-cent fare was the reasonable limit for a through route over connecting lines. The fact that various combinations of these compulsory and voluntary transfers make possible a ride of 20 miles for 5 cents does not constitute by itself a sufficient legal reason why the Flushing-Ridgewood line should be operated to its terminus for 5 cents.

"(2) The fact that some passengers are charged a second fare on passing out of the free zone, while others are not,

is a result of the free-zone system of operation and does not constitute any unlawful discrimination or preference. The sole purpose of the distinction is to relieve passengers who have traveled a short distance from paying a 10-cent fare. Passengers who traverse the same territory are charged the same fare, and there would seem to be no discrimination unless it be a discrimination to carry passengers the 10 miles and over between Park Row, New York, and Cedar Grove Cemetery for 5 cents and to charge a passenger 10 cents for the 5 miles between the junction of Flushing Avenue and Grand Street, for instance, and Flushing. All classes of passengers are treated alike under the same conditions, and the fact that the fare in one case constitutes a higher rate per mile than in the other cannot be said to be unlawful because unequal. It is no more an inequality than exists everywhere on the street railways in a city, arising from the fact that some passengers ride but a few blocks, while others ride from one end of the line to the other. It can hardly be said that the exaction of a second fare per se constitutes an unlawful discrimination provided the length of the run justifies the fare; and the operation of a free zone makes possible a closer equality of charges than would be possible if a single second fare point were established.

"(3) The Grand Street surface line and the Flushing Avenue surface line, with their transfers through to Flushing, and the Flushing-Ridgewood line, from Fresh Pond station to Flushing, would probably come within the provision of Section 101 of the Railroad Law if it were not for Section 1538 of the Charter of the City of New York. Section 1538 of the Charter of the City of New York stays the operation of Section 101 of the Railroad Law. It provides as follows: 'Sec. 1538. This act shall not extend the territorial operation of any rights, contracts or franchises heretofore granted or made by the corporation known as the mayor, aldermen and commonalty of the City of New York, or by any of the municipal and public corporations which by this act are united and consolidated therewith, including the counties of Kings and Richmond, and the same shall be restricted to the limits, respectively, to which they would have been confined if this act had not been passed; nor shall this act in any way validate or invalidate, or in any manner affect such grants, but they shall have the same legal validity, force, effect and operation, and no other or greater than if this act had not been passed.'

"The evidence shows that the gross earnings of the Grand Street line to North Beach for the year 1907 were \$210,976.52; total expenses, including taxes, fixed charges and special appropriations for betterments not chargeable to capital, \$256,095.77, leaving a deficit for the year of \$45,119.45; in the case of the Flushing Avenue line from Park Row, gross earnings of \$182,766.09; total expenses, \$225,197.60, leaving a deficit for the year of \$42,431.51; in the case of the Flushing-Ridgewood line, from Fresh Pond Junction to Flushing, gross earnings were \$116,644.01; total expenses, \$168,772.13, leaving a deficit for the year of \$56,128.12. These figures are based on a car-mile cost of operation of 16.27 cents for the entire Brooklyn Heights Railroad, and a total cost per car mile of 28.57 cents, including operation, taxes and fixed charges.

"As stated above, the Brooklyn City Railroad was leased to the Brooklyn Heights Railroad in 1893. The fixed charges last referred to include as the principal part of the rental a 10 per cent dividend on the stock of the Brooklyn City Railroad, which leases these three lines and many others to the defendant herein. The portion of rental thus taken for dividends averages 4.95 cents per car mile. The remaining portion of the said rental is made up of interest on funded debt. There is no separate capitalization of these lines, but the average funded debt of the Brooklyn City Railroad covering the property leased to the Brooklyn Heights Railroad is \$67,017 per mile.

"The earnings taken are the cash receipts on the various lines involved in this proceeding. The passenger receipts per car mile average as follows: On the Flushing-Ridgewood route, 19.33 cents; on the Grand Street route, 22.76 cents; on the Flushing Avenue route, 22.57 cents.

"The foregoing figures show that the receipts are clearly short of the average cost of operating the road, including taxes and fixed charges. Even if the portion of the rental representing dividend be entirely eliminated from the average cost per car mile the remainder would amount to 23.62 cents per car mile, which is still in excess of the average passenger receipts on any of the three lines in question. Inasmuch, therefore, as none of these lines earns enough to pay operating expenses, taxes and interest on such funded debt, it seems to me that the proper conclusion is that these lines are operated at a loss. At the request of the complainant the commission caused an examination to be made by its engineers of the cost of operating the Flushing Avenue, Flushing-Ridgewood and Grand Street lines.

The report of the engineers shows that the above stated cost of operation is not excessive. The evidence shows an average of eight passengers per car passing Cedar Grove Cemetery in each direction between the hours of 5:30 a. m. and 4:30 p. m., and that in other hours the average is less. There is no special rush hour in either direction.

"It may be said that if the extra fare to Flushing were not charged more passengers would ride, and this would lessen the operating cost per passenger mile. The answer to this is that the distance to be traversed is so great and the trip to Manhattan by surface car takes so long a time that it is quite uncertain as to how much a reduction of fare would increase the traffic. The same rule will not operate that might be true on rides of moderate length in the thickly populated districts. The evidence shows that the Long Island Railroad station is within a stone's throw from the terminus of the defendant's line at Flushing, and that in the morning rush hours the steam railroad platform is covered with people waiting to go to Manhattan by the steam trains at 20 cents fare, while the defendant's trolley cars start out from the same point not more than one-half filled. It is therefore apparent that one reason why people do not travel more on the defendant's cars is because of the long time consumed in proceeding the 12 miles to the Brooklyn Bridge. There is no reason to believe that a reduction of fare would cause such an increase of business as would wipe out the deficit.

"I conclude, therefore, that the extra fare to Flushing is neither illegal nor unreasonable, and I recommend that the complaint be dismissed."

Commission Amends Rules Governing Operation in Washington

The District Electric Railway Commission of Washington, D. C., has recently amended the regulations for the operation and equipment of street railways in the District of Columbia as adopted on July 7, 1908, and published in the ELECTRIC RAILWAY JOURNAL of July 18, 1908. The amendments follow:

"8. That the conductors of all street cars operated in the District of Columbia be required to make announcement at each junction point, and at each point at which on line crosses another, of the street and connection which is there made.

"9. That the use by any street railway in the District of Columbia of car wheels causing unnecessary noise or unevenness in operation, commonly known as 'flat wheels,' be, and the same is, prohibited.

"10. All new double-truck suburban or interurban electric cars placed in service in the District of Columbia on or after Jan. 1, 1909, shall be equipped with an approved type of air brake in addition to the usual hand brake.

"11. All new street railway cars placed in service within the District of Columbia after Jan. 1, 1909, and having a distance from the car floor to the rail of more than 30 in. shall be provided with two steps between the rail and the car floor. No step of any type of car placed in service after above-named date shall have a rise of more than 16 in.

"12. (a) All closed cars that are operated in the District of Columbia between Dec. 1, 1908, and April 1, 1909, and between Nov. 1 and April 1 of each year thereafter, and which are equipped with heating apparatus which can be used, shall have such heating apparatus in operation whenever the outside temperature is lower than 40 deg. Fahr. above zero, and shall be warmed to a temperature not less than 40 deg. Fahr. nor more than 60 deg. Fahr. above zero.

"(b) All closed cars which are equipped with heating apparatus but which are not equipped with connections so that that apparatus can be immediately used, shall be provided with such connections on or before Jan. 1, 1909; and when such connections are provided the heating apparatus shall be used in accordance with the requirements of paragraph (a) of this section.

"(c) On and after Nov. 1, 1909, no closed car shall be used within the District of Columbia which is not equipped with a suitable and efficient heating apparatus, and no type of heating apparatus shall be installed in any car which is not now equipped with heating apparatus unless said type shall have been approved by the Interstate Commerce Commission."

The commission has also modified Section 7 of the regulations as originally adopted so as to read:

"7. Flagmen shall be stationed at the crossings of all street car lines, when in the judgment of the Interstate Commerce Commission the public safety requires the same. And from and after the direction of the commission to any street railway to station a flagman at any such crossings, it shall be unlawful for any motorman to run or operate

any motor car over such crossing in the absence of a flagman. No street car shall stand upon a street or avenue for a longer period than five minutes unless the way be obstructed, nor stop so as to obstruct a street crossing or intersecting street; and no street car shall follow a preceding car moving in the same direction at a less interval than 100 ft. unless coupled thereto.

"Every suburban electric car in motion between sundown and sunrise shall be provided with a headlight which shall be located on the front dash, and a tail light which shall be located on the side of the car near the roof at the rear end. The tail light shall show red toward the rear and green toward the front. Oil must be used for fuel in tail light. To take effect Dec. 1, 1908."

Constitutionality of Massachusetts Half Fare in Question.

—The constitutionality of the Massachusetts half-fare law of 1908 is now in question before the Attorney-General of Massachusetts as a result of the refusal of the Boston & Northern Street Railway to grant half rates to pupils in the evening schools of Haverhill.

Schuylkill Railway Closes Power Plant Temporarily.—Lack of water has caused the Schuylkill Railway, Reading, Pa., to suspend operation temporarily at its power plant at Girardville. The plant at Mahanoy City is not affected by the scarcity of water, and the entire system is being run on regular schedule from that station.

Reduction in Fare Asked in Massachusetts.—Mayor Hurley, of Salem, has petitioned the Railroad Commission for a reduction in fares on the Highland Avenue line of the Boston & Northern Street Railway between Salem and Lynn and Salem and Boston. A 5-cent fare is desired between Salem and Lynn. A hearing will be held on Jan. 1, 1909.

Extension of Time on Vestibule Orders.—The Public Service Commission of the Second District of New York has extended the time within which the Westchester Traction Company, Ossining, N. Y., shall comply with the order of the commission requiring vestibules to be installed by Jan. 1, so that, with the exception of 12 cars, the company shall have all of its closed cars used in passenger transportation equipped with vestibules on or before Jan. 15, and shall have all of its cars so equipped on or before Feb. 1, 1909.

Philadelphia Company Returns to Old Tickets.—The Philadelphia (Pa.) Rapid Transit Company has again placed on sale the old form of six-for-a-quarter tickets to take the place of the new form recently introduced. For the purpose of correcting certain abuses the company on Nov. 1 introduced a new form of commutation ticket which was non-transferable and good for only one fare at a time. Abuse of the new tickets by the public caused the withdrawal of the restrictions one week later, but the tickets were continued on sale until the supply was exhausted.

Boston Elevated Railway Asks Approval of Cambridge Subway Connection.—The Boston (Mass.) Elevated Railway has petitioned the Railroad Commission to approve the route of a double track elevated railway connection between the northerly end of the Beacon Hill Tunnel and the Charles River bridge at Cambridge Street, forming a part of the route between Harvard Square, Cambridge, and Park Street, Boston. The distance is about 900 ft. from the intersection of Phillips and Grove Streets northwesterly across private land, Lindall Place, West Cedar and Charles Streets to the bridge. This action is taken as a result of the failure of the Aldermen of Boston to act on the petition presented to them by the company on Sept. 29.

Central Electric Traffic Men Prepare New Passenger Rates.—A meeting of representatives of the electric railways included in the membership of the Central Electric Traffic Association was held in the office of the Central Electric Railway Association, in Indianapolis, Ind., on Dec. 12, and 26 of the 40 roads in the association were represented. The principal purpose of the meeting was to establish a tariff for 1909. Notwithstanding the great amount of work done by A. L. Neereamer, secretary of the association, and his assistant, the 10 hours employed in going over the rates in last year's schedule proved too short to reach a conclusion and Mr. Neereamer was instructed to proceed with the work and the meeting was adjourned on Jan. 4, 1909.

Public Service Commission Asks for Brooklyn Schedules.—The Public Service Commission of the First District of New York on Dec. 12, ordered the Coney Island & Brooklyn Railroad and the Brooklyn Heights Railroad to file on or before Dec. 14 the operating schedule for several lines as of Dec. 11. Daily thereafter the companies must file a sworn statement showing for the previous day the number of cars in use on the route, the number of full trips made, the number of car miles run, the number of passengers

carried and the seating capacity of the types of cars in use. This order affects the Flushing Avenue line, the Putnam Avenue and Halsey Street line of the Brooklyn Heights, and the De Kalb Avenue line of the Coney Island & Brooklyn Railroad.

Heavy Traffic Under the Hudson River During Fog.—A dense fog hung over New York and vicinity on Nov. 23 and 24 and seriously interfered with traffic on the elevated and surface railways and especially with harbor traffic. Several ferries suspended service temporarily and those that did continue to operate were unable to maintain their schedules. As a result many commuters coming from New Jersey to business in New York sought relief from the tedious journey by water across the Hudson River in the tunnel of the Hudson & Manhattan Railroad, which reports that about 136,000 persons were carried in the two days. The company adhered to its regular 3-minute headway during the rush hours, but increased the number of cars in its trains. The traffic was handled on schedule and without an accident.

Petition to Dismiss Action Against Yonkers Railway for Joint Fare.—Leslie Sutherland, receiver of the Yonkers (N. Y.) Railway, has applied to Commissioner Decker of the Public Service Commission of the Second District of New York and to Commissioner Eustis of the Public Service Commission of the First District of New York to dismiss the complaint of the Mayor of Yonkers about the abolition of through rates between New York and Yonkers over the lines of the Yonkers Railway and the Union Railway, New York. Mr. Sutherland says that the proposition to establish joint rates agreed to by him and the receiver of the Union Railway having been rejected by the Yonkers Council, it had been submitted to Justice Morschauer, who had directed that it be submitted again to the Council, and if again turned down that an appeal be made to the courts setting forth the facts.

P. S. C. Orders Affecting Operation in New York.—The Public Service Commission of the First District of New York has asked the receivers of the Metropolitan Street Railway, New York, to show cause why more cars should not be run on the Eighth Street crosstown line. The commission has also made permanent the increase in the number of trains operated by the Interborough Rapid Transit Company on the Sixth Avenue line of the Manhattan Elevated Railroad. The commission wants sufficient cars run on the crosstown line to give an excess of 10 per cent of seats over the number of passengers riding, or else the running of a car every minute past a given point. The commission has modified an order to the Interborough Rapid Transit Company issued last February calling for more trains to Fifty-eighth Street, but stipulates that the company shall continue to operate the increased number of trains to Harlem.

Birmingham Railway, Light & Power Company Issues Folder.—The Birmingham Railway, Light & Power Company, Birmingham, Ala., has issued a very artistic folder containing a bird's-eye view of the Birmingham district for distribution locally in Birmingham and vicinity and to interests throughout the country which are identified with developments in the Birmingham district. The cover is in brown and gray with a general view of the city at the top and typical scenes showing the extraction of coal, limestone and iron ore at the bottom, grouped artistically and surmounted by the cupolas of belching furnaces as indicative of the wealth in natural resources of Birmingham. The descriptive matter is illustrated by half-tones of the principal points of interest in the city and of scenes along the company's lines. Details of operation of the various routes of the company are also given. The bird's-eye view of the city is 38 in. long by 14 in. wide.

Private Railroad Supervision in Massachusetts.—The action to be taken by the Massachusetts Railroad Commission in reference to a petition filed on Dec. 14 by the Old Colony Street Railway for the approval of private track operation in Quincy, Mass., may establish an important precedent as to the extent of the Board's supervisory authority over private railroad lines in the State. The Old Colony Street Railway entered into an agreement with the Fore River Shipbuilding Company on Dec. 7, 1908, by which the railway company is permitted to operate its cars by the overhead trolley system over a connection between its Quincy Avenue line and the works of the Fore River Company. The Fore River Company has constructed a railroad for private use in Quincy, a part of which lies between its works and the point of connection with the Old Colony System. The railway company asks the commission to approve the condition of these tracks for operation, which is provided for in the agreement between the two companies. This is the first case of the kind which has come before the commission.

Personal Mention

Mr. E. L. Kasemeier has resigned as auditor of disbursements of the Seaboard Air Line and will be connected with the accounting department of the Ohio Electric Railway.

Mr. S. L. Nelson has resigned as general manager of the Peoria (Ill.) Railway and not as vice-president and general manager of the company, as stated in the *ELECTRIC RAILWAY JOURNAL* of Dec. 12.

Mr. F. J. J. Sloat, who has been district superintendent of the Ohio Electric Railway in charge of the western and southern divisions, with headquarters at Dayton, Ohio, has resigned, effective on Jan. 1, to manage mining property in Nevada in which he is interested. Mr. W. A. Gibbs, district superintendent of the eastern and northern divisions of the company, with headquarters in Columbus, will succeed to the duties performed by Mr. Sloat.

Mr. Frank J. Duffy, formerly manager of the Beaumont (Tex.) Traction Company, has been appointed general manager of the company, and general manager of the Jennings Electric Light & Power Company, Jennings, La., and the Southern Railway & Light Company, Natchez, Miss., all controlled by the same interests. Mr. Duffy has been associated with the Beaumont Traction Company for the past six years as secretary-treasurer and as manager. He will reside in Natchez, Miss, and spend part of each month at Jennings and Beaumont.

Mr. N. B. Rhoads, formerly superintendent of the Key West (Fla.) Electric Company, has been appointed manager of the Beaumont (Tex.) Traction Company. Mr. Rhoads entered street railway work in 1900, at Richmond, Va., and finally was appointed assistant superintendent of the Richmond Traction Company, from which he resigned to accept a similar position with the Savannah (Ga.) Electric Company. Later he was appointed superintendent of the Savannah Electric Company and afterward became superintendent of the Key West (Fla.) Electric Company, operating the electric railway and lighting properties in Key West.

Mr. Joseph O'Hara has been appointed superintendent of the Illinois Valley Railway, La Salle, Ill. Mr. O'Hara served in various capacities with the Grand Rapids (Mich.) Railway for about five years and was previously connected with the Pere Marquette Railway for two years and as superintendent of the Eastern Ohio Traction Company, Cleveland, Ohio, for four years. Mr. O'Hara also was superintendent of transportation of the Aurora, Elgin & Chicago Railroad, Chicago, Ill., from August, 1903, to October, 1907, when he resigned to become superintendent of transportation of the Washington, Baltimore & Annapolis Electric Railway, Washington, D. C. He resigned from the Baltimore, Washington & Annapolis Electric Railway on June 1, 1908. Mr. O'Hara reports to Mr. H. E. Chubbuck, general manager of the Illinois Traction System, with headquarters at Champaign, Ill.

Mr. R. N. Wallis, treasurer of the Fitchburg & Leominster Street Railway and president of the American Street & Interurban Railway Accountants' Association, was presented a silver loving cup by the members of the Fitchburg & Leominster Street Railway Relief Association on Dec. 5 as a token of appreciation on their part of the courtesies extended to them individually and collectively from time to time by him. Mr. Wallis has been treasurer of the association since its organization 13 years ago, and during this time it has built up a fund of \$1,400. The dues are 10 cents a week and \$10 is paid for five weeks in case of sickness and \$50 is paid on the death of a member. The inscription on the cup is: "Presented to R. N. Wallis, Dec. 4, 1908, by the Fitchburg & Leominster Street Railway Relief Association in appreciation of his services as treasurer."

Mr. A. D. McDonald has been appointed auditor and secretary of the Los Angeles-Pacific Company and of the Los Angeles Interurban Railway, Los Angeles, Cal., to succeed Mr. J. A. McBride, resigned. Mr. McDonald is only 30 years old. He began his business career in 1901 with the Southern Pacific Railroad in Texas. Three years later he was transferred to San Francisco as chief clerk of the accounting department of the Southern Pacific Railroad, in which capacity he served for two years, and in 1906 he was given charge of all companies auxiliary to the Southern Pacific that were handled in connection with its offices in San Francisco. In December, 1907, after Mr. E. H. Harri-man had acquired a substantial interest in the Los Angeles-Pacific Company, Mr. McDonald was transferred to Los Angeles and made auditor of that company, in which position he remained until he was appointed to succeed Mr. McBride.

Construction News

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

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

FRANCHISES

Warsaw, Ind.—The City Council has granted the franchises to the Winona Interurban Railway and the Winona & Warsaw Interurban Railway to operate cars over the tracks of each in the city of Warsaw. The two franchises previously granted to the Winona Interurban Railway and the Winona & Warsaw Interurban Railway have expired.

Flint, Mich.—The Flint Council has granted permission to the Saginaw & Flint Electric Railway, Saginaw, Mich., to enter the city by way of Saginaw Street. The road will connect with the Detroit United Railway at Witherbee Street. The State Railroad Commission has given the company the right to go under the Pere Marquette Railroad tracks near Clio.

Mineola, N. Y.—The New York & North Shore Traction Company has been granted a franchise by the Nassau Supervisors to build and operate an electric railway on the Roslyn Road near Clinton Avenue, Mineola, a distance of about 700 ft., to connect with the present line on Willis Avenue at a point about 200 ft. south of Searing Avenue. The line is to be a connecting link between the branch from Mineola to Hicksville, now being built, and the Mineola, Roslyn and Port Washington line. The grant is for 99 years. The company is given a year to begin work, and the road is to be completed and in operation within one year.

New York, N. Y.—The Queensboro Bridge & Jamaica Railway and the Manhattan & Queensboro Railway have presented applications to the Board of Estimate for franchises, the latter to operate an electric road across Fifty-seventh Street and the Queensboro Bridge, and the former to operate a line from the Manhattan plaza of the bridge out to Jamaica, in Queens, with a number of spurs.

Waterville, N. Y.—T. F. McBride, representing the Utica Southern Railway, appeared before the Village Board at its last meeting, requesting an extension of the franchise granted the company. The franchise was extended one year. [E. R. J., Dec. 12, '08.]

Toronto, Ont.—The Ontario Railway & Municipal Board has issued an order giving the Toronto Railway permission to run its lines on Adelaide Street from Jarvis to Bathurst, on Bay Street from Front to Queen, on University Avenue from Queen to College, on Richmond Street from Victoria to Church, and on Wellington Street from Church to York. The order is issued upon application of the company that the city be restrained from interfering with the construction of the lines on these streets.

Philadelphia, Pa.—An ordinance has been introduced in the Select Council by Charles Seger, providing for the construction and operation of an underground railroad by the Delaware Tunnel Railroad and authorizing a contract to be made between that corporation and the municipality. In the ordinance the authority is specified for the company to build underground one or more tunnels under the Delaware River from the State boundary line opposite Market Street, northwesterly under the river to Delaware Avenue and Arch Streets, to Second, to Market, to Chestnut, to Delaware Avenue, to the middle of the river, with branches. Further, the ordinance provided for a pneumatic tube service for mail and parcels and a light, heat and power service in connection with the tunnel railroad. Work must be commenced within a year of the signing of the contract between the corporation and the municipality, and must be completed within five years thereafter. This is the Delaware River channel project for which charters were obtained recently by interests represented by Ben Wolf, Edwin Wolf, I. H. Silverman, W. A. Stern and L. R. Eisenthal. [E. R. J., Nov. 28, '08.]

Brownsville, Tex.—Two applications have been filed with the city clerk for street railway franchises and will come up at the next meeting of the City Council; one application was filed by W. H. Mason, Jr., and L. H. Hallan and associates, and one by J. B. Scott and associates. In these applications it is agreed to give bonds in any sum required by the city, to begin actual construction within 60 days after the franchise is granted. The franchise is asked for 20 years.

North Yakima, Wash.—Frank E. Farquhar, Tacoma, has applied to the City Councils of Roslyn and Clealum and the Commissioners of Kittitas County for a franchise for an electric railway connecting those two towns and Lake Clealum.

Morgantown, W. Va.—The Deckers Creek & Cheat River Railway, through its president, H. R. Warfield, has filed in the County Court notice that application will be made at the January term of the court for the franchise and privilege of building and operating a street railway over the public roads and streets controlled by the county, commencing at a point near Morgantown and running along Deckers Creek and Cheat River to a point on the boundary line of West Virginia and Pennsylvania, near Point Marion. [E. R. J., Oct. 10, '08.]

Green Bay, Wis.—Formal application to lay tracks on Twelfth Street has been made by the Bay Shore Street Railway. This company was recently incorporated to build a line to Bay Beach. Arthur C. Neville and Frank E. Murphy arc said to be interested in this enterprise. [E. R. J., Oct. 31, '08.]

Oconomowoc, Wis.—The Milwaukee Western Electric Railway and the Milwaukee Light, Heat & Traction Company have applied to the Common Council for franchises to build lines in Oconomowoc. The application made by the Milwaukee Western Electric Railway stipulates that company begin work within 30 days after the granting of the franchise and complete the road by Jan. 1, 1910.

Pewaukee, Wis.—The Milwaukee Light & Traction Company has asked for a franchise in Pewaukee.

Thermopolis, Wyo.—S. A. Broadwell, who holds franchises from the town of Thermopolis and the State of Wyoming, to build an electric railway from Thermopolis to the hot springs in the State reserve, has petitioned for an extension of the time limit for beginning work until October, 1909. The State has signified its willingness to abide by whatever action is taken by the Thermopolis Council.—[E. R. J., Aug. 15, '08.]

RECENT INCORPORATIONS

***Taylorville-Nokomis Traction Company, Taylorville, Ill.**—This company has been incorporated to construct an electric railway from Taylorville to Witt, Ill., via Nokomis. Headquarters, Taylorville. Capital stock, \$5,000. Incorporators: W. B. Adams and A. R. Adams, Taylorville; P. M. Klinefelter, Morrisonville, Ill.; Alfred Griffin and W. F. Brockman, Nokomis, Ill.

***Brownstown Water, Light & Traction Company, Indianapolis, Ind.**—This company has been incorporated for the purpose of building and operating water and light plants and street and interurban railways. Headquarters, Indianapolis. Incorporators: H. Jackson, James B. Thompson and W. B. Holton.

***Atlantic City & Suburban Railway, Atlantic City, N. J.**—This company, which is a reorganization of the Atlantic City & Suburban Traction Company, has been incorporated in New Jersey, with a capital stock of \$650,000. Incorporators: Robert Wetherill, Garnet Pendleton and William S. Blakeley. Robert Wetherill, who is president of the company, recently bought the property of the Atlantic City & Suburban Traction Company at receiver's sale.

***Manhattan & Queensboro Railway, New York, N. Y.**—Incorporated to operate an electric railway 3½ miles long from Eleventh Avenue and Fifty-seventh Street, New York, to Thompson Avenue and Vandam Street, in Long Island City. Capital stock, \$40,000. Headquarters, 43 Exchange Place, New York. Directors: Stuart Hirschman, Michael J. Degnon, Charles G. Meyer, Arthur B. Turner, Francis Gilbert, Stewart W. Eames, William F. Hencken, New York; William H. Williams, Jr., Astoria, and Clancy D. Boynton, Perth Amboy, N. J.

***Queensboro Bridge & Jamaica Company, New York, N. Y.**—This company has been incorporated to operate 20 miles of electric road from the west line of the plaza or terminal, through the Belmont tunnel at Forty-second Street and Park Avenue to Union Hall and South Street and the proposed new Pennsylvania Railroad station, Archer Place and Hillside Avenue, and Wexford Terrace, on property of the Jamaica Estates, and at Pauline Street, Queens County. Capital stock, \$200,000. Directors: Stuart Houseman Building, Grand Rapids, Mich. D. C. Jackson B. Turner, Francis Gilbert, Stewart W. Eames and William F. Hencken, New York; William H. Williams, Jr., Astoria, and Clancy D. Boynton, Perth Amboy, N. J. Principal office, 43 Exchange Place, New York.

***Claremore Street Railway, Claremore, Okla.**—This company has been incorporated in Oklahoma to build a street railway in Rogers County. Capital stock, \$300,000. Incorporators: W. J. Perdue, C. F. Godbcy, O. C. Wing, H. Jennings and Hiram Stephens.

***Allegheny & Northwestern Railroad, Philadelphia, Pa.**—This company has been chartered to build a line between Mars and Evans City, 7 miles. Capital stock, \$70,000. Directors: John G. McPherson, president; David Dillinger,

William E. Heller, C. S. Jarvis and J. L. Killip, all of Philadelphia.

***Banksville & West End Street Railway, Pittsburg, Pa.**—A charter has been issued to this company to build 3 miles of line in the vicinity of Banksville. Capital stock, \$18,000. Incorporators: W. E. Kusen, A. J. Schmidt, C. A. Steutz, W. P. Heckman, and J. D. C. Miller. [E. R. J., Nov. 28, '08.]

***Mt. Carmel & Locust Gap Transit Company, Mt. Carmel, Pa.**—This company has been chartered to build a 2¼-mile line between St. Mary's Cemetery and Locust Gap. Capital stock, \$30,000. Directors: Edmund W. Samuel, Mt. Carmel, president; William Kiefer, Jr., Thos. J. Kiefer, Jos. D. McConnell, and Robert D. Heaton.

TRACK AND ROADWAY

***Alabama Railway & Electric Company, Opelika, Ala.**—Judson C. Chapman, vice-president of the Alabama Railway & Electric Company, is authority for the statement that construction work is to be commenced within 90 days on the projected electric railway from Opelika, through Eufaula to Dothan, Ala. Mr. Chapman states that the use of gasoline motor cars has been decided upon. Capital stock, authorized, \$200,000; issued, \$100,000. Officers: A. M. Buchanan, Opelika, president; Judson C. Chapman, Atlanta, Ga., vice-president and purchasing agent; J. M. Shelly, Atlanta, Ga., secretary and treasurer. All communications should be addressed to J. C. Chapman, Century Building, Atlanta, Ga. [E. R. J., July 4, '08.]

***Mountain Home, Ark.**—An electric railway from Willak Springs, Mo., to Mountain Home is being projected by S. E. Cotter, Springfield, Mo. A meeting will be held shortly to consider the matter of raising a bonus. A total of \$125,000 is asked.

***Phoenix, Ariz.**—H. J. Bennet is reported to be interested in a plan to construct an electric railway between Phoenix, Tempe and Mesa.

***Kansas-Colorado Railroad, Pueblo, Col.**—The ELECTRIC RAILWAY JOURNAL is advised that this company has awarded the contract for grading, ties, bridges, steel equipment, power stations, overhead material, etc., to A. B. Hulit, Central Block, Pueblo, Colo. The company has already begun construction work on its electric railway which will extend from Canon City through Colorado Springs to Dodge City, Kan. Plans are now being drawn by Sargent & Lundy, Chicago, Ill., for the first of the two or three power plants to be erected. It has already been decided to locate one of the stations at Garden City, Kan. The total length of the railway system will be 375 miles. [E. R. J., July 4, '08.]

***Danbury & Bethel Street Railway, Danbury, Conn.**—This company has given formal notice of its intention to apply for a charter for the extension of its line from Lake Kenosia to the New York state line.

***Capital Traction Company, Washington, D. C.**—This company contemplates, during 1909, the addition of 6.8 miles of single track to its lines.

***Chicago (Ill.) Railways.**—This company has decided to reconstruct the Stony Island Avenue loop so as to bring both the Calumet and the Hammond cars past the terminal outward bound.

***Chicago, Fox Lake & Lake Geneva Railroad, Chicago, Ill.**—M. B. Louis, vice-president and general manager, writes that this company plans to begin construction work next spring on its proposed electric railway which is to link Chicago with Lake Geneva and the Fox Lake region. It is to be a standard gage road, 70 miles in length, and will be operated by electricity. The overhead trolley system will be adopted. Capital stock, authorized, \$2,000,000. Bonds, authorized, \$2,000,000. Headquarters: 108 La Salle Street, Chicago Ill. Officers: George M. Seward, president; M. B. Louis, vice-president and general manager; Charles E. Wise, secretary and treasurer. [S. R. J., Dec. 14, '07.]

***Illinois Valley Railway, La Salle, Ill.**—The ELECTRIC RAILWAY JOURNAL is advised by H. E. Chubbuck, general manager, that grading has been completed for half of the extension which this company is building between Ottawa, the present terminus of its line, and Streator, Ill. The new extension will be 18 miles long.

***Quincy Horse Railway & Carrying Company, Quincy, Ill.**—This company contemplates constructing from 3 to 5 miles of new track during the coming year.

***Fort Wayne & Springfield Railway, Decatur, Ind.**—This company contemplates the addition of 12 miles of track to its railway in 1909. The new extension will be built from Decatur through Monroe to Berns, Ind.

***Kokomo & Western Traction Company, Kokomo, Ind.**—It is officially announced that this company has completed the survey for its proposed electric railway which is to

extend from Kokomo to Burlington, a distance of 16 miles. C. C. McFann, president. [E. R. J., Nov. 21, '08.]

Toledo & Chicago Interurban Railway, Kendallville, Ind.—A. J. Purinton, manager, advises that work has just been started on a combined bridge and culvert to be built of reinforced concrete at the intersection of the electric line with the Baltimore & Ohio tracks about 2 miles west of Garrett, Ind. In the past considerable trouble has been experienced at this location on account of high water and it is anticipated that this extensive concrete work will thoroughly protect the railway embankment. The National Concrete Company, Indianapolis, Ind., has the contract for the work.

Wawasee, Ligonier, Topeka & Lagrange Railway, Lagrange, Ind.—This company is reported to have awarded a contract to W. C. Ross, Chicago, Ill., to build the first section of its line from Ligonier to Cromwell, a distance of 4 miles. J. N. Babcock, Topeka, Ind., president. [E. R. J., Nov. 21, '08.]

Evansville, Mt. Carmel & Olney Electric Railway, Evansville.—The Tennis Construction Company has received the contract from the Evansville, Mt. Carmel & Olney Electric Railway for making the preliminary and complete surveys of the right of way of that line. E. Q. Lockyear, secretary. [S. R. J., March 14, '08.]

Vincennes, West Baden & Louisville Railway, Vincennes, Ind.—Anthony M. Yelton writes that the Vincennes, West Baden & Louisville Railway expects to begin grading on its projected line within 60 or 90 days. The line will connect Vincennes, Petersburg and Jasper with Frecht, Monroe City, Algiers, Ottwell and Ireland. It is to be standard gage road, and together with sidings will consist of 48.5 miles of single track. It is planned to operate both gasoline and electric cars. Amusement parks will be established and operated by the company at Vincennes, Petersburg and Jasper. In addition, Mr. Yelton states that it is the plan of the company to furnish power for lighting to all important points along the route. Headquarters, 116 North Seventh Street, Vincennes, Ind. Capital stock, authorized, \$1,500,000; issued, \$30,000. Bonds, authorized, \$1,500,000. Officers: Thomas H. Adams, Vincennes, president; Anthony M. Yelton, Vincennes, secretary; John O. Davis, Evansville, Ind., treasurer. [S. R. J., May 23, '08.]

Albia (Ia.) Interurban Railway.—The ELECTRIC RAILWAY JOURNAL is advised that this company plans to build, in 1909, a branch line from Albia to Buxton, a distance of about 9 miles.

Wichita Railway & Light Company, Wichita, Kan.—This company has been granted permission to construct a line on Waco Avenue north to the city limits. Work on the new line is to be begun on or before April 1, 1909, and the line is to be in operation from Ninth Street to Twenty-first Street within one year.

Lexington & Interurban Railway, Lexington, Ky.—This company contemplates building a 12-mile extension next year connecting Lexington and Nicholasville. The company also expects to add 2 miles of track to its local system.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Maine.—The Waterville and Augusta line of this company was formally opened for traffic recently. The company now operates about 140 miles of track. John R. Graham, Bangor, Maine, president.

Grand Rapids, Hastings & Battle Creek Interurban Railway, Grand Rapids, Mich.—A. C. Sekell writes that this company has secured nearly all the rights-of-way for its proposed electric railway. It will connect Grand Rapids, Hastings and Battle Creek and will be about 5.3 miles in length. It is the plan to install the overhead trolley system. Power for the operation of the line will be furnished by the Commonwealth Company, Jackson, Mich., and the Grand Rapids & Muskegon Power Company. Headquarters, Houseman Building, Grand Rapids, Mich. D. C. Jackson and Wm. B. Jackson, Chicago, Ill., electrical engineers; J. J. McVean, Grand Rapids, chief engineer; A. C. Sekell, Grand Rapids, local representative. [S. R. J., Sept. 1, '06.]

Northern Traction Company, Hibbing, Minn.—R. F. Berdie, president, writes that the Northern Traction Company has completed 3 miles of grading and laid rails for a distance of three-quarters of a mile in Hibbing. The road when completed will connect Hibbing, Chisholm, Buhl, Mt. Iron, Virginia and Eveleth. Capital stock, authorized, \$350,000. Officers: R. F. Berdie, Hibbing, president and general manager; J. H. Healy, Hibbing, vice-president; S. Levy, Duluth, Minn., secretary and treasurer. [S. R. J., Aug. 31, '07.]

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss.—This company expects to build 6 miles of new track next year. The new line will extend from Gulfport to Long Beach and Pass Christian.

Kansas City & Olathe Electric Railroad, Kansas City, Mo.—The ELECTRIC RAILWAY JOURNAL is officially informed that this company expects to resume construction work next year on its projected electric road connecting Zarah, De Soto, Eudora and Lawrence, Kan. About 40 miles of track will be built.

Gallatin Valley Electric Railway, Bozeman, Mont.—H. L. Casey, secretary, writes that steps are now being taken by the Gallatin Valley Electric Railway to let the entire contract for the construction and equipment of this road. The line will extend from Bozeman to Ferris Hot Springs and Salesville, Mont., a distance of 18 miles. It is the intention of the company to start construction work about Feb. 1, 1909. Power for the operation of the road will be rented from the Butte Electric & Power Company, Butte, Mont. Four motor cars will be placed in service when the line is completed. The repair shops will be erected at Bozeman. Capital stock authorized, \$1,000,000; issued, \$300,000. Officers: Ray M. Hart, president; H. L. Casey, secretary; George Cox, treasurer, all of Bozeman. [S. R. J., May 30, '08.]

Asheville & Carolina Electric Railway, Asheville, N. C.—It is announced that this company has awarded the contract for building the section between Asheville and Hendersonville to the Carolina Construction Company. [E. R. J., July 18, '08.]

Weaverville Electric Company, Asheville, N. C.—This company expects to build next year a new line connecting Asheville with Weaverville, a distance of about 3 miles.

Liberty & Jeffersonville Electric Railroad, Liberty, N. Y.—It is officially announced that this company will build during 1909 an extension to Kanoza Lake, 14 miles.

Interborough Rapid Transit Company, New York, N. Y.—This company has written to the Public Service Commission for permission to build a station at 190th Street on the Broadway division of the subway. At present there is no station between 181st and Dyckman Streets. The property owners of the district have advocated the construction of a surface railroad, but it is pointed out by the company that because of the steep grades such a road would have to traverse its operation would be costly and dangerous. In order to do away with the need of a surface line the company is now willing to construct a station. The matter was referred to Commissioner Maltbie for report.

Port Jervis & Delaware Valley Railroad, Port Jervis, N. Y.—The ELECTRIC RAILWAY JOURNAL is informed that this company has begun making the surveys for its proposed standard gage electric railway, which is to extend from Port Jervis, N. Y., to Milford, Pa., a distance of 8 miles. The overhead trolley system will be used. Upon the completion of the line, the company expects to operate six cars. Power will be rented from the Interstate Hydro-Electric Company, Port Jervis, N. Y. Capital stock authorized, \$200,000; issued, \$150,000. Bonds, authorized, \$150,000. F. A. Sawyer, president; Alfred Marvin, Port Jervis, N. Y., secretary and treasurer. [E. R. J., Dec. 5, '08.]

***Bellefontaine, Ohio.**—A number of business men of Bellefontaine and Sidney held a conference at the former place recently with John T. Adams, Columbus, in regard to the construction of an electric railway between the two points. The proposed line is 25 miles long and passes through DeGraff, Quincy and Pemberton. At Sidney it would connect with the Western Ohio and at Bellefontaine with the Ohio Electric Railway.

Miami Transit, Light & Power Company, Lebanon, Ohio.—Charles H. Hough, president, writes that this company hopes to build 25 miles of new tracks during 1909 between Xenia and Lebanon.

Port Arthur (Ont.) Electric Street Railway.—At the coming election the ratepayers will vote on a by-law providing for the expenditure of \$25,000 for improvements to that portion of the Port Arthur Electric Street Railway being operated within the limits of Port Arthur. A by-law, providing for the expenditure of \$170,000 for improvements to the road in Fort William, will also be voted on by the ratepayers of Fort William.

***Pilot Rock, Ore.**—Douglas Belts and A. R. Turner, Pilot Rock, south of Spokane, are said to be interested in a plan to connect Pilot Rock, Nye, Albee, Ukiah, Umatilla, Hermiton, Echo and Pendleton by an electric railway.

Lebanon & Southern Street Railway, Lebanon, Pa.—This company has been organized, with a capital stock of \$500,000, to construct 38 miles of track, having its eastern terminus at Womelsdorf, where connection will be made with the Reading & Womelsdorf Traction Company, and its western terminus at Campbelltown, where it will connect with the Campbelltown & Hummelstown Street Railway. Work is to begin in the spring on the Lebanon, Schaefferstown and

Womelsdorf branch, which, when completed, will close the only break in the line of street railways connecting Philadelphia with the State Capitol. J. M. Shenk, president; W. P. Coldren, vice-president, and Frank F. Houck, treasurer. [E. R. J., Oct. 10, '08.]

Austin (Tex.) Electric Railway.—It is announced that this company will add 2 miles of track to its present line next year.

Spokane & Inland Empire Railroad, Spokane, Wash.—It is stated that this company contemplates an extension of 8 miles up California Creek from gravel pit No. 2 on the Palouse line east of Mica.

Fairmount & Mannington Railroad, Fairmount, W. Va.—This company expects to extend its line from Mannington to Flaggy Meadow Run, a distance of 2 miles. Work on this extension is to begin next year.

SHOPS AND BUILDINGS

Los Angeles-Pacific Company, Los Angeles, Cal.—This company has leased the entire Masonic Temple Building on Hill Street, just south of the company's depot and is remodeling it for its general offices, which were recently destroyed by fire in the Knox Building on Fourth Street.

Manchester (N. H.) Street Railway.—The ELECTRIC RAILWAY JOURNAL is advised that this company has contracted for an additional car house on Depot Street in Manchester. This car house will be 86 ft. x 154 ft., and is to be erected on land recently purchased by the company. This acquisition will give the company over 600 ft. frontage on Depot Street and three car houses within less than one minute's run from the main business center of Manchester.

POWER HOUSES AND SUBSTATIONS

Denver City Tramway, Denver, Colo.—It is reported that this company is negotiating a deal with the Central Colorado Power Company for power to operate the street railway system in Denver and the interurban lines the company is planning to build.

Americus Railway & Light Company, Americus, Ga.—This company on Dec. 9 purchased the entire plant of the Americus Illuminating & Power Company, taking over the gas plant mains, electric plant and other properties. The railway company has recently installed a power plant in connection with the proposed electric railway system now under construction. William A. Dodson, Americus, vice-president. [E. R. J., Dec. 12, '08.]

Union Railway, New York, N. Y.—It is announced that this company will erect a new substation, to be equipped with six 1500-kw rotary converters and air-cooled transformers.

Utica & Mohawk Valley Railway, Utica, N. Y.—The receivers of the Hudson River Electric Power Company have leased to the Utica & Mohawk Valley Railway the steam electric plant in Utica and about 38 acres of land, the substations at Little Falls, Frankfurt and Oriskany and the transmission line from Utica to Clark Mills for a period of one year from Dec. 1, at an annual rental of \$38,000. The railway company is to have the privilege of a second lease for a year from Dec. 1, 1909.

Oklahoma (Okla.) Railway.—This company is installing a new Fowler-Stores double compound engine at its Belle Isle power station. The complete unit will have a capacity of 850 kw, with a 50 per cent overload capacity.

Portland (Ore.) Railway, Light & Power Company.—This company is said to have prepared plans for a power station to be erected at First and Jefferson Streets, and work on the building will be started Jan. 1. From this station power will be distributed throughout the southern part of the city, south of Washington, and to practically all the car lines on the West Side. The new building will be 50 ft. x 100 ft. in dimensions and two stories high, with a full basement. It will be constructed of reinforced concrete and brick. Much of the apparatus now in station A will be transferred to the new building, and the change will also necessitate the installation of new apparatus.

Scranton (Pa.) Railway.—This company has awarded the contract for the erection of its new power station to Peter Stipp, Scranton. The new structure will be built in the rear of the present power plant. The contract provides for the construction of a boiler room and a retaining wall along the Lackawanna River. The buildings will be of reinforced concrete, and will eventually be equipped with boilers having a total capacity of 7200 hp.

Washington Water Power Company, Spokane, Wash.—It is announced that this company will erect a power plant and substation at Post and the Spokane River to be 100 ft. x 200 ft. Part of the building will be partitioned off and used for a passenger station until an adequate passenger station can be built.

Manufactures & Supplies

ROLLING STOCK

Albia Interurban Railway, Albia, Ia., is in the market for one coal car.

United Traction Company, Reading, Pa., is equipping its Oley Valley cars with hot-water heaters.

Tri-state Traction Company, Steubenville, Ohio, expects to buy immediately hot-water heaters for five cars.

Fort Wayne & Springfield Railway, Decatur, Ind., announces that it will be in the market early in 1909 for two new passenger cars.

Mahoning & Shenango Railway & Light Company, Newcastle, Pa., has equipped the front vestibules of its cars with electric heaters.

Keokuk Electric Railway & Power Company, Keokuk, Iowa, will soon be in the market for three single trucks to replace old equipment.

Rochester (N. Y.) Railway is rebuilding several city cars in its shops. New vestibules are being added to some of the company's car equipments.

Monterey & Pacific Grove Railway, Monterey, Cal., is planning to buy two or three new summer cars to be used during the season 1909.

Hull Electric Company, Aylmer, Que., will be in the market early in 1909 for four single-truck closed passenger cars and for one snow sweeper.

Quincy H. Railway & Carrying Company, Quincy, Ill., will soon be in the market for six or eight trucks, either single or double, to replace old equipment.

Rochester & Eastern Rapid Railway, Rochester, N. Y., has completed specifications for the four cars which the company will purchase, as announced in the ELECTRIC RAILWAY JOURNAL.

United Railways Investment Company, San Francisco, Cal., is reported to be in need of new cars. It is not expected, however, that new equipment will be ordered before early next summer.

Newport & Fall River Street Railway, Fall River, Mass., has purchased from the Wason Manufacturing Company, Springfield, Mass., one new shear snow plow, of the latest type.

Houghton County Traction Company, Houghton, Mich., expects to be in the market early in 1909 for several more interurban double truck cars similar to those recently purchased.

Vancouver Traction Company, Vancouver, Wash., has received two additional cars from the American Car Company, St. Louis, Mo. They were put into service on the Franklin Street extension.

Fairmont & Mannington Railway, Fairmont, W. Va., will shortly place an order for two semi-convertible interurban double truck cars similar to those recently purchased from The J. G. Brill Company.

Wheeling Traction Company, Wheeling, W. Va., it is said will soon be in the market for several double-truck cars for suburban service. Specifications are now being drawn up and bids will be asked for early in 1909.

Birmingham Railway, Light & Power Company, Birmingham, Ala., has recently purchased a sprinkling car of 4000 gal. capacity, for use both in city and in interurban service. The car is equipped with double trucks, four GE-57 motors and air brakes.

Houston Electric Company, Houston, Tex., is planning to purchase a number of new cars of the double truck, semi-convertible type now in use upon the company's line. It is understood that these cars will be ordered subject to delivery next spring.

Cleveland, Ashland & Mansfield Traction Company, Cleveland, Ohio, is reported to be planning the purchase of a complete passenger and baggage car. The Cleveland Construction Company, Cleveland, Ohio, has charge of the construction of this new railway.

Johnson City Traction Company, Johnson City, Tenn., whose order of new cars was referred to in the ELECTRIC RAILWAY JOURNAL of Dec. 12, announces that the two cars were purchased from and rebuilt by the Washington Railway & Electric Company, Washington, D. C. The cars are 27 ft. long, with single trucks.

Detroit United Railway, Detroit, Mich., is reported to be planning the purchase of 75 cars during the year 1909. These equipments will be in addition to the 25 cars ordered from the G. C. Kuhlman Car Company the first of this month, details of which were published in the ELECTRIC RAILWAY JOURNAL for Dec. 12, 1908.

Third Avenue Railroad, New York, is having constructed at the shops of the General Electric Company, Schenectady, a gasoline-electric motor car to be tested on the streets of the city. The car will be electrically operated, the generator and gas engine being carried in a compartment at one end. It will be similar in general design to the suburban cars in use on Western railroads.

Illinois Traction System, Danville, Ill., will order at once five 42-ton electric locomotives, four large motor express cars and 25 80,000-lb. capacity box cars. GE-205 commutating pole motors have already been purchased for these equipments. The company recently has received 35 80,000-lb. capacity coal cars and will soon receive two 60-ft. sleeping cars and the eight passenger trailer cars, the order for which was placed with the Danville Car Company in August, and described in the issue of the *ELECTRIC RAILWAY JOURNAL* for Aug. 8. These eight cars will be used for train operation of the company's interurban lines and will have complete multiple unit control and air brake equipments, but no motors. The company has also purchased one single-truck snow sweeper from the McGuire-Cummings Manufacturing Company, Chicago.

Rock Island Southern Railroad, Monmouth, Ill., is asking prices on trucks to be used on the 22 new cars which, as has been announced, the company will purchase. These trucks are to conform to the following specifications: Ten pairs of trucks, each truck to be suitable for 2 125-hp single-phase motors, to carry a center bearing load of 35,000 lb., 7-ft. 6-in. wheel base, 6½-in. axles, 7½-in. gear fit. The journals are to be of the M. C. B. type 5½ x 10 in. in size. Symington center and side bearings are to be provided. Three pairs of trucks for 50-ft. baggage and freight cars, of 40,000-lb. capacity, with the other specifications as noted above; nine pairs of trailer trucks with specifications as noted above, excepting that these trucks are to have a wheel base of 6 ft. 8 in.

Joliet & Southern Traction Company, Joliet, Ill., reports that the five cars ordered from the American Car Company, St. Louis, Mo., as noted in the *ELECTRIC RAILWAY JOURNAL* for Dec. 12, 1908, are to be of the combination passenger and baggage type and are to have a seating capacity of 50 passengers. Two of the cars are to be delivered in April, two in May and one in June. The other specifications are as follows: Wheel base, 6 ft.; length over vestibule, 45 ft.; length over bumpers, 47 ft. 1 in.; height of sill of trolley base, 12 ft. 6 in.; wood underframe and body. The special equipment will include National Brake & Electric air brakes; type M control; Tomlinson couplers; Forsythe No. 88 curtain fixtures; Pantasote dark green curtain material; Cooper hot-water heaters; Ohio Brass sanders; Brill 27 E-1 trucks.

Third Avenue Railroad, New York, expects to order 200 convertible type, double-truck cars, as soon as the specifications which are now being drawn up are completed. Last August this company placed an order with The J. G. Brill Company for 100 12-bench open cars. This was to fill part of the road's requirements for 150 cars, and some cars on this order have already been delivered. It is announced that the remainder of the order still undelivered has been canceled. The new cars to be built will be suitable for both summer and winter service, will have center aisles and will be built under license of the Pay-As-You-Enter Car Corporation. The bodies will be at least 28 ft. long, mounted on double trucks carrying four motors of a type similar to those recently ordered. It is expected that the new cars will be ready for service in May of next year.

Gulfport & Mississippi Coast Traction Company, Gulfport, Miss., has ordered from The J. G. Brill Company three semi-convertible cars, with a seating capacity of 32 passengers. The length of the car bodies will be 21 ft. 4 in., length over all 31 ft. 4 in., width over all 8 ft. 2 in. The bodies of the cars and the underframes will be made of wood. The interior finish of the cars will be in cherry and the trimmings in bronze metal. Roofs will be monitor deck. They will be equipped with hand brakes only. In addition to the above the cars will be furnished with the following special equipment: Brake rigging, Brill; couplers, Hovey; curtain fixtures, Forsyth; curtain material, print duck; gears and pinions, G. E.; gongs, Dedenda; hand brakes, Brill; headlights, Neal; journal boxes, Brill; motors, type and number, two GE-67; paint, green, with yellow and red; seats, Winner rattan; trolley poles and attachments, US-6; trucks, type and make, Brill, 21-E.

TRADE NOTES

St. Louis Car Company, St. Louis, Mo., has appointed Nicholas Le Grand its New York representative, with headquarters at 1706 Broadway.

Illinois Car & Manufacturing Company has been incor-

porated at Chicago with a capital stock of \$100,000. P. H. Joyce and Geo. J. Kuehler, Chicago, are among the incorporators.

National Brake & Electric Company, Milwaukee, Wis., announces that its office in Los Angeles, Cal., will hereafter be located at 524 South Los Angeles Street, having been removed from 129 East Fifth Street.

St. Louis Car Wheel Company, St. Louis, Mo., at a recent meeting of its board of directors, elected Allen Gray president of the company, to succeed John W. Nute. John J. Morse, who has been secretary and treasurer of the company, was elected manager.

C. A. Manufacturing Company, Austin, Tex., announces that the Western Electric Company of Denver, Colo., will hereafter have charge of the distribution in that territory of the "C. A." wood preservers. This practically adds Denver as another distributing point for the C. A. Company.

Electric Storage Battery Company, Philadelphia, Pa., has received an order from the Gulfport & Mississippi Coast Traction Company, Gulfport, Miss., for 288 G-9 cells, booster and carbon regulator, with accessories. The apparatus is for use in the power station of the railway company.

Western-Southern Electrical Show will be held in Cincinnati, March 13-27, 1909. This exhibition is intended to show the advantages of Cincinnati as a location for electrical manufacturing plants. It is announced by the promoters that already 30 per cent of the space has been subscribed for.

Golden West Exposition, which will take place in London next May at Earl's Court, the home of great expositions in Great Britain, will be a distinctively American show. Many of the most prominent business men on both sides of the water are interested in this exposition, and it promises to be one of the most attractive ever held in Europe.

Seymour & Brownstone Construction Company, Indianapolis, Ind., has filed articles of incorporation, with capital stock of \$150,000. The object of the corporation is to construct electric and steam railroads and do a general contracting and construction business. Albert K. Press, W. T. Devoor and L. P. Osenback are the organizers.

Herbert E. Stone has just become connected with the Dearborn Drug & Chemical Works as manager of sales in the Eastern Department, with headquarters in New York City. Mr. Stone was formerly president of the National Association of Steam Engineers and recently manager of the Pittsburg office of the Chapman Valve Company.

Barney & Smith Car Company, Dayton, Ohio, has elected A. M. Kittredge president to succeed J. D. Platt, who resigned on account of ill-health. H. M. Estabrook is promoted to vice-president to succeed Mr. Kittredge. The connection of Mr. Kittredge with this company dates back to 1884, when he was made assistant superintendent. In 1888 he was made superintendent and vice-president in 1890.

Dossert & Company, 242 West Forty-first Street, New York City, has received an order from the Chicago City Railway Company for 75 special solderless two-way connectors for 1,000,000 circ. mil cable; also an order for a large quantity of strain clamps for 750,000 circ. mil cable, and solderless two-way connectors for 1,500,000 circ. mil cable from Gellatly & Company, Pittsburg, Pa.

Union Switch & Signal Company, Swissdale, Pa., has secured the contract for furnishing signals and relays on the Guymard cut-off of the Erie Railroad. This line runs from Guymard, N. Y., to Highland Mills and is intended as a low-grade freight line. The signals are style "S" two-arm electric motor, the signal arms working in the lower quadrant. They will stand normally in the clear position, and the distant signals will be controlled by the track circuits through polarized relays, without line wires.

Arthur D. Little Laboratory, Boston, Mass., has made an improvement on the old method of determining the temperature of a coal pile by driving pipes and hanging thermometers in them. A special coal auger has been designed which is similar in form to that used in mines, but is provided with a means of inserting a small maximum thermometer near the point. The point of the auger can be driven 20 ft. in three to five minutes. About 10 minutes are required for the thermometer to attain the temperature of the surrounding coal. Temperatures taken in this manner are much more accurate than those obtained by hanging a thermometer down a pipe where there is more or less circulation of air, making it impossible to locate the hottest spot. Temperatures obtained by means of the auger have been found to be 40 deg. Fahr. higher than by the pipe method.

J. J. Treveres, 20 Broad Street, New York, has recently

had issued to him a patent on an automatic registering device to be applied to the entrance platforms of street railway cars. The device consists of a spring supported platform placed in the entrance passageway and connected by a system of levers to the register inside the car in such a way that when the platform is slightly depressed by the weight of a passenger stepping upon it the register is rung. As applied to cars with long rear platforms the automatic registering platform is preferably placed in the entrance passageway near the step, so that all persons who board the car automatically cause the register to ring, whether they move inside the car or remain on the platform. The spring supports can be adjusted so that the platform will be depressed sufficiently to register a fare with any desired weight, preferably from 40 to 60 lb. A feature of the patent is the application of a buzzer inside or outside the car arranged to ring as long as the platform is depressed. This provides an audible indication that fares are not being registered if persons board the car while the buzzer is ringing. Another feature is the attachment of a vertically moving semaphore signal outside the car above the lower deck, which rises and falls with each complete movement of the register and stays in a vertical position as long as the spring supported platform is depressed. In this way an inspector on the street can tell whether the device is operating as it should and also check the number of passengers boarding the car by the number of movements of the signal target.

ADVERTISING LITERATURE

Hicks Locomotive & Car Works, Chicago, Ill.—The latest leaflet issued by this company offers a number of rebuilt flat cars with new bodies and extra heavy trucks. Various other items of second-hand equipment are mentioned.

I. R. Nelson & Company, Newark, N. J., is sending a souvenir calendar which contains an unusually well-printed colored panel, "Lincoln the Rail Splitter." The picture is 14 in. x 10 in., and is as rich in tone and accurate in detail as an oil painting.

Manhattan Electrical Supply Company, New York.—This company is sending out a number of small folders describing its Christmas novelties and its large line of dry batteries. The stock of this company includes almost every form of electrical novelty known to the trade.

Worcester Polytechnic Institute, Worcester, Mass.—A descriptive catalog of the Engineering College of this institution is being mailed to the public. It is handsomely illustrated with views of the buildings and laboratories. This school has a high rank in the field of technical education.

Ohio Brass Company, Mansfield, O.—A supplement has been issued to general catalog No. 7, published in June. Since the time of publication the company has developed a number of new devices which are cataloged in this supplement. Among these are new types of mine hangers and special insulating and splicing devices. Other new devices and improvements on old devices also are described.

W. N. Matthews & Brothers, St. Louis, Mo.—This company is sending out a folder descriptive of heavy-conductor open-work installation, containing an article which was published in the *Electrical World* of Sept. 19. The article was prepared by Arthur Gillman, and is accompanied by numerous line drawings and technical details. It will be found of general interest to street railway men and to central station men.

B. F. Sturtevant Company, Hyde Park, Mass.—A pamphlet descriptive of the centrifugal fans manufactured by this company is being sent to the trade. It is claimed that 50 years' constant improvement in the manufacture of these machines has brought them to a point of perfection that is not excelled by any similar apparatus. The booklet is liberally illustrated with pictures of varieties of these fans.

W. Martin Johnson, New York, N. Y.—One of the hand-somest little booklets that has appeared recently is being sent out by W. Martin Johnson, consulting specialist on illustrations and decorative designs. Typographically, and in the matter of illustrations, this little publication is unique. Mr. Johnson was formerly vice-president of the Schoen-Steel Wheel Company. His address is No. 1 Madison Avenue, and he is prepared to give advice on all decorative publication subjects.

Technical Publicity Association, New York, publishes in its "Bulletin" for November a portion of a paper recently prepared by Charles S. Redfield, president of the association, upon the subject of "The Trade Paper in Europe." Mr. Redfield's opinion of the European trade paper is that it does not compare at all favorably with similar publications in this country. He claims that the trade paper is not an

institution over there which the merchants feel there is any necessity for supporting.

Security Bank Note Company, Philadelphia, Pa.—A pamphlet has just been prepared by this company for distribution among corporation lawyers and promoters of street railway companies. This publication sets forth the value of good printing in connection with promotion enterprises, and gives some history of the company which is sending it out. It is claimed that the Security Bank Note Company is in a position to do exceptionally attractive work in this direction as it has been long in the business and is thoroughly equipped.

Standard Roller Bearing Company, Philadelphia, Pa.—Catalog No. 24, which has just been issued by this company, supplants all previous catalogs as far as price lists are concerned. It is a very comprehensive publication, and describes everything in which the roller bearings made by the company are used. Instructions for the proper application of ball and roller bearings are included, together with information as to the best methods of installation. Diagrams are given to show the efficiency of these bearings and the book is liberally illustrated with views from the company's plant.

Trussed Concrete Steel Company, Detroit, Mich.—A recent leaflet issued by this company is descriptive of "Trus-Con," a liquid waterproofing which it is claimed is scientifically compounded so as to thoroughly seal every pore and render every mineral surface absolutely impermeable to water. It is a chemical product and it is said contains no glue or gelatine or vegetable oils. "Trus-Con" Frigate it is claimed in another leaflet issued by the same company will allow cement to settle and harden under abnormal temperature conditions. It is a compound dissolved in the water with which the concrete is mixed.

Yale & Towne Manufacturing Company, New York City.—An attractively prepared little booklet from this company is being mailed to the trade descriptive of chain blocks, electric hoists, trolleys and cranes. The publication goes into the history of the development of the differential pulley block and tells what an effect this improvement has had upon the art of hoisting. It is claimed that the advent of electricity has practically perfected the power-operated hoisting machinery to a point where any operation seems to be possible. Tables giving hoisting speed and full specifications are included in the pamphlet and all working parts are illustrated in detail.

American Wood Preserving Company, 430 The Rookery, Chicago, is sending a circular to railway, telephone and telegraph companies, in which is given a complete description of the company's method of preserving butts of poles against decay. Cross arms, insulator pins, ties, floors and roofs of freight equipments, bridges, docks and every other kind of construction where wood is used, may be treated successfully by the same system that is used in treating poles. Antiseptine, which is the name of one of the company's preservatives, is described as a chemical combination of the most powerful insoluble antiseptic and very heavy, self-impregnating, vehicular oils of extremely high boiling point, which carry the permanent preservatives into the wood fibers. Antiseptine, when properly applied, is guaranteed to prevent decay, checking, water-soaking, etc., whether the wood treated with it is located in water, in dirt or in the air or in each at different periods of the year. It is said to meet the requirements for wood preservation laid down by the government authorities.

Western Electric Company, Chicago, Ill.—This company is sending out two little booklets containing instructions for the installation and operation of generators and motors. One of them refers to design E and the other to design L motors manufactured by the Western Electric Company. Each of the books contains full instructions for the operation and maintenance of these motors so as to secure the highest efficiency. The instruction books are illustrated with half-tones, also with line drawings showing the construction of generators and motors, and will prove valuable to anyone operating this class of machinery. A leaflet describing a new three-wire generator is being distributed by this company also. It is claimed that there are many points of special merit in this generator, among which are that it has only one slip ring, and no auxiliary apparatus whatever is necessary for its operation. The publication is well illustrated and contains descriptions of the working parts of the new machine. Circular No. 1078, recently published by this company, is an attractive 16-page booklet relating to the new magneto telephone wall sets which have been lately placed upon the market. These telephone sets differ from those which they have replaced in having the line binding posts inside the set, and in the re-design of the bell, generator and switch hook. This gives the new apparatus an attractive appearance.