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Of this issue of the Street Railway Journal 8000 *copies are printed. Total circulation for* 1907, *to date,* 81,650 *copies, an average of* 8165 *copies per week.*

Lessening Work in the Accounting Department

It is generally accepted that ingenuity is a very desirable quality in the electric railway repair shop employee, for there are always opportunities for a man with this faculty to devise labor-saving machines or inaugurate economical features with regard to practice. The accounting department, however, is not usually considered as possessing the same opportunities for the practical inventor. Nevertheless, there is need for labor-saving machines in the accounting rooms, and to a certain extent there is an even greater opportunity to devise time-saving methods of carrying out the accounting work. At one time a large part of the accountant's duties consisted of routine in which accuracy and rapidity in mental calculations on the part of the accountant or his assistants was the primary requisite. Conditions are rapidly changing, however. Calculating and adding machines of all kinds now take the place of the human brain, so far as mere mechanical processes are concerned. Because of the large amount of small change taken in by electric railways, the adoption of mechanical coin-counters often results in a great saving of labor. Where long lists of names are to be written as on pay rolls and pay envelopes, the addressograph can often be used to advantage. When these machines are once installed, an ingenious man can usually devise forms or probably alter the machines themselves or add attachments to them, so that they can be used in a number of ways to lessen the work.

But this is not the only direction in which the accounting work is susceptible of improvement by ingenuity. Freed from mental routine by machinery, the accountant can devote his attention to other short cuts in methods. Upon this subject a wealth of literature has appeared during the past few years. It is contained in the columns of the technical press, in periodicals devoted exclusively to accounting and in the proceedings of Accountants' Conventions, all showing that a little time spent in devising new methods is exceedingly remunerative. Sometimes whole systems can be replaced by others which enable the same results to be obtained with a minimum amount of work. The labor-saving systems are, of course, devised so as to avoid as far as possible transferring result from one form to another and needless additions of sums. They thus afford a wide field to the "accounting-engineer."

The Status of the Semi-Convertible Car

There is no questioning the fact that car design is one of the most vitally important matters now under consideration by electric railway managers. The rising standards of speed and comfort required by modern rapid transit conditions are directly responsible for the evolution of striking modifications in the rolling stock of urban systems no less than in interurban cars. In the latest designs can be observed so much consideration of the passenger's safety and comfort that it is becoming increasingly difficult to suggest further radical improvements.

The attitude of the public toward changes in car design is in the long run the principal factor which settles the continuance or abandonment of any special type of car.

In many cities the open car with cross seats is regarded with so much favor that considerable hostility has arisen on the part of the public at the suggestion by operating companies that open cars with cross seats and running boards shall be gradually superseded by semi-convertibles. There has been a failure to appreciate the numerous good points of the semi-convertible car with respect to the passenger's standpoint, and the passing of the so-called open car has sometimes resulted in at least a threatened loss of revenue. It is of great importance, therefore, that managers of roads which intend gradually to replace their open cars of the older type with semi-convertibles should do all in their power to emphasize the advantages of the latter. This should be done also in such a way that the public will realize that the companies are mindful of the public's best interests no less than anxious to eliminate the anomalous condition of maintaining two sets of bodies throughout the year, with all the inconvenience and expense of changing trucks and motors to fit the summer and winter seasons separately.

Of course, the time is probably far distant when the old style of open cars will be entirely superseded, and in some cities the requirements of the service may not be favorable to the use of anything else. The open car is in general much less expensive in first cost than any type of heavy semi-convertible car on the market; it is exceeding convenient for the public and is well suited to slow or moderate speed traffic. But speed must be reduced lower than is otherwise desirable, on account of the accident problems; time is lost in stops whenever the passenger on the left-hand end of the seat has to crowd by three or four others—in a recent case this feat had to be performed by a couple with two dress suit cases and six bundles, with no little resulting discomfiture and delay—and when women passengers run back and forth outside the running board trying to make up their minds which of half a dozen available seats to take. It has been well said that the arrival of a sudden shower transforms the open car into a leaky tent, not particularly pleasant to ride in, and again, when two sets of cars are operated on the same system, one for summer and the other for winter, a quarrel generally arises whenever there is room for a difference of opinion among the patrons as to the proper time to operate open cars. The semi-convertible car obviously can be adapted to all weathers and at the same time affords greater comfort and safety to the passengers. Its carrying capacity usually equals if it does not exceed that of the old open type. For all practical purposes it admits as much fresh air in summer as the open car, and owing to its greater weight and consequent inertia it starts with less jerk.

Taking the case as a whole, it is evident that the semi-convertible car is able to supply almost any satisfaction to the public which was possible in the old open vehicle, with the exception of the "adventurous and beatific front seat," as a writer in one of the daily papers put it last summer. Neither is there any provision for the wants of the "end seat hog." But the gains in speed, space allowance per passenger and safety ought to offset these considerations. It is fortunate that the introduction of new types of rolling stock on large systems must be gradual—for to replace say a hundred open cars with new semi-convertibles could easily cost from $600,000 to $800,000. The public thus has the opportunity of becoming slowly accustomed to these changes, which means less trouble all around.

Aspects of Car Testing

The study of the best methods of car testing on electric railways raises an interesting question in the minds of some managers as to the actual value of such tests in the every-day work of a busy system. There is a feeling in some cases that the cost of fitting up a car with instruments and the expense of keeping it out of service for a few days plus the wages or salaries of observers, possible delay to regular traffic and cost of power are too large to warrant the undertaking. Another pertinent matter is the usefulness of the results after they have been secured—the question often comes up in some such form as this: "What shall we do with all these data now that we have gone to the trouble of getting them?"

Some suggestive answers to these queries are furnished by Professor A. S. Richey's New England Street Railway Club paper on "Car Testing," which is abstracted in this issue. Without disparaging the value of shop or stand tests, Prof. Richey shows that the solution of many practical problems depends closely upon the results derived from actual tests of the complete car equipment under service conditions. The indefiniteness of the train resistance factor and the influence of air resistance in items of car shape, size and speed can best be settled by an appeal to experiment, unless the conditions are unusually well known. The determination of constants for use in working up stand tests, for settling the train resistance characteristics of definite curves or grades, the comparison of locomotive train, multiple-unit train, single car, double or four-motor equipment energy consumption for a given schedule, the actual acceleration and braking rate determination, coasting rate, heating values of the motor and train resistance all bear upon the question of operating economy. The efficiency of power-house production depends so intimately upon the variations and volume of the load upon individual machines, and the economical performance of the schedule upon a certain elasticity secured by coasting that the careful interpretation of test results is well worth any reasonable cost, if it can be applied to the betterment of existing conditions.

The use of engineering students as observers in extensive car tests is doubly advantageous, provided the work is given expert supervision. The students gain knowledge of the most practical kind, and under the trying conditions of movement at high rates of speed over an actual roadbed. There is no question that the minor difficulties of observation on a moving car tend to sharpen the faculties of the observers. If students can be employed in car testing with the reward of increased practical knowledge and stimulating training, the cost to the railway company can be greatly reduced, and in some cases made almost nominal. A hundred dollars will bring in rich returns if a little ingenuity and forethought be used, though the cost may run up to perhaps $1,000 if elaborate recording equipment be designed and organized and many days spent in getting autographic test records and figuring up the results. Prof. Richey did

not bring out these particular features of the problem, but did cite two or three cases from practice where the cost to the railway was so slight as not to be underbalanced for a moment by the value of the tests.

Interference with regular traffic ought not to occur with good operating, and if the car be partly stripped of moldings and paneling inside where instruments are screwed in—such as wattmeters for recording work—there should be no injury to the appearance of the rolling stock. In some cases passengers can be carried during tests, though a loss in the earning capacity of the car is inevitable. The service capacity of railway motors can now be pretty closely predicted by the manufacturers, but the value of experimental data under operating conditions is still high, for the regular stops per mile assigned on the factory track are seldom exactly duplicated in the irregular stopping of commercial service. As a basis of specifications covering equipment for service on a large division the car test is particularly satisfying.

Rating of Railway Motors

Electrical machinery at present is almost universally rated in terms of kilowatts or horse-power output with a stated temperature rise after a twenty-four-hour run or practically continuous duty. The output of a machine in service is never absolutely uniform, but is approximately so for generators in central station work where the momentary fluctuations are comparatively small, and are, furthermore, superimposed upon a minimum load line that bears a respectable ratio to the rated capacity of the generators. With electric motors the load is bound to be much more fluctuating, ranging from a practically uniform output at nearly full load in the case of motors driving mill machinery to the extremely ragged load curve met with in motors used to propel cars, operate hoists, rolling mills, etc. As the output of nearly all generators and of many stationary motors is of a practically uniform character, it suffices to rate such machines upon continuous output with a specified temperature rise, as this form of rating closely indicates the suitability of such apparatus for commercial operation. With railway motors and stationary motors adapted for hoist, rolling mill and similar work of intermittent character, it is more difficult to select a rating which can be expressed in simple terms of kilowatts input or horse-power output, and at the same time show the suitability of a motor for a given piece of work or indicate a true comparison between motors of different capacity.

The question of determining whether a better form of rating of railway motors can be prepared than that now used is now occupying the attention of the standardization committee of the A. I. E. E., and in the meetings of the committee there has been a spirited interchange of opinions on this subject by representative railway motor men.

The present method of designating railway motors, the so-called "commercial rating," consists in fixing the horse-power output of the motor which will raise the temperature of the hottest part 75 degs. C. after a stand test of one hour with covers removed. This rating of railway motors has been handed down from the early days of electric railroading, and its strongest advocates have urged its continuance only on the ground of its serving the purpose of an excellent commercial test of both the electrical and mechanical qualities of the motor. They admit that the one-hour rating is not a definite indication of the fitness of a motor for a given service, nor is it a true comparison between motors of different capacities, but they claim that it does have the advantage of expressing in a single simple term an approximate comparison of the electrical and mechanical qualities of motors of different capacities.

Owing to the complicated nature of the calculations involving the selection of a railway motor and the different methods in use by the different manufacturing companies and outside engineers in arriving at its selection, the time may not yet be ripe to settle upon any one method of railway motor determination. To complicate the matter still further, any expression indicating the true service capacity of a motor can probably not be reduced to a single term, but must be put in the form of several terms, or, better still, in curve form. As a method of "rating" railway motors a curve would seem impossible, although it would be extremely useful as indicating the service capacity of the motor. It seems a very wise suggestion, therefore, to continue the one-hour rating of railway motors and not to demand at the present time any universal adoption of the several service determinations offered, owing to the very apparent lack of agreement among authorities. At the same time, and to compensate consulting engineers for the non-adoption of a more satisfactory service rating of railway motors it appears proper to include under the head of "desirable information to be furnished" such data in regard to thermal capacity of the motors, core losses, copper losses and other internal losses, together with continuous current carrying capacity at different voltages with 75 degs. rise, and such other data as would enable a consulting engineer to make as many service calculations as he may desire.

At present the selection of railway motors rests largely in the hands of the manufacturers, a decision which has been rather forced upon them, owing partly to their desire to ensure satisfactory service operation of their apparatus and partly owing to the unpreparedness of the outside engineering profession to act in this matter. The determination of the service capacity of a railway motor is a matter involving elaborate tests and considerable expense, and it is proper that such tests should be made by the manufacturer. There seems to be no reason, however, why results of these tests should not be more widely distributed so as to be available to the consulting engineer who may have the experience and inclination to apply the experimental thermal characteristics of the various motors to a concrete problem. The consulting engineer if thoroughly informed of the requirements of a projected road, and having the thermal characteristics of the various motors as determined by the manufacturers, can then make fully as intelligent a selection as the latter, provided he is willing to give the time necessary for perhaps rather long and tedious calculations. It makes little difference to the consulting engineer whether this additional information about railway motors is presented in the form of a "rating" or not. The main point is to ventilate more widely the conditions governing the operation of railway motors and to be in possession of sufficient test data to simplify the solution of this very perplexing question.

THE ELEVATED SHOPS AND TERMINALS OF THE BROOKLYN RAPID TRANSIT COMPANY—THE THIRTY SIXTH STREET INSPECTION PLANT

Unlike the elevated railway installation of the Brooklyn Rapid Transit Company, at East New York*, where the car storage and manufacturing features are so prominent, the Thirty-Sixth Street plant was laid out purely for the inspection and overhauling of elevated rolling stock. The equipment, therefore, is intended to include only such apparatus as is actually required to fulfil those purposes. The plant is conveniently located along the South Brooklyn or Fifth Avenue Elevated line between Thirty-Sixth and Thirty-Seventh Streets. The brick building here, which formerly served as the terminal station of the Prospect Park and Coney Island Railroad, has been entirely remodeled and enlarged, so to-day little remains of the original structure except the outside framing.

The upper or track-level floor of this building is occupied by the offices of the foreman, timekeeper and clerical help, in addition to an employees' dining room, lockers and lavatories. The remaining level of the track-level floor is taken up by the mill room, which is separated from the offices by a steel lath and plaster partition. Above this is a mezzanine floor used by the operating department as a club room and for company purposes. The bench

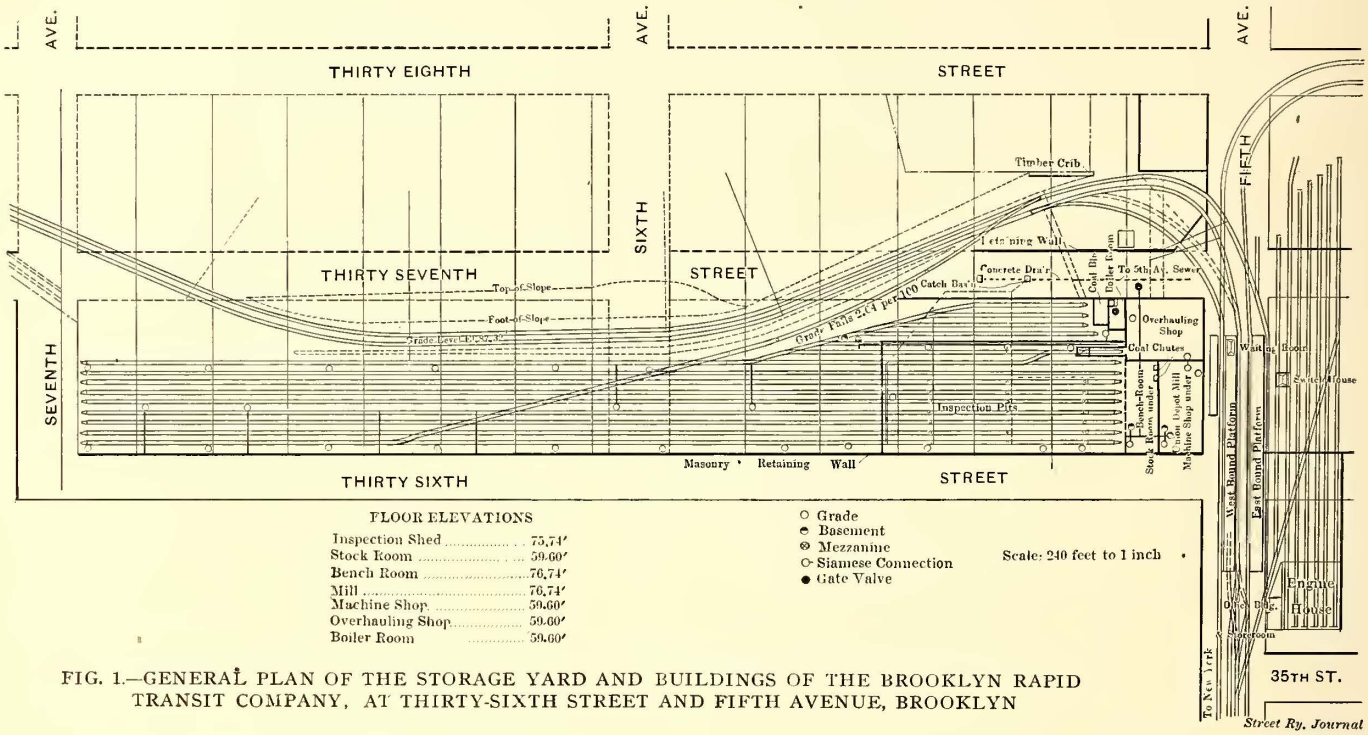


FIG. 1.—GENERAL PLAN OF THE STORAGE YARD AND BUILDINGS OF THE BROOKLYN RAPID TRANSIT COMPANY, AT THIRTY-SIXTH STREET AND FIFTH AVENUE, BROOKLYN

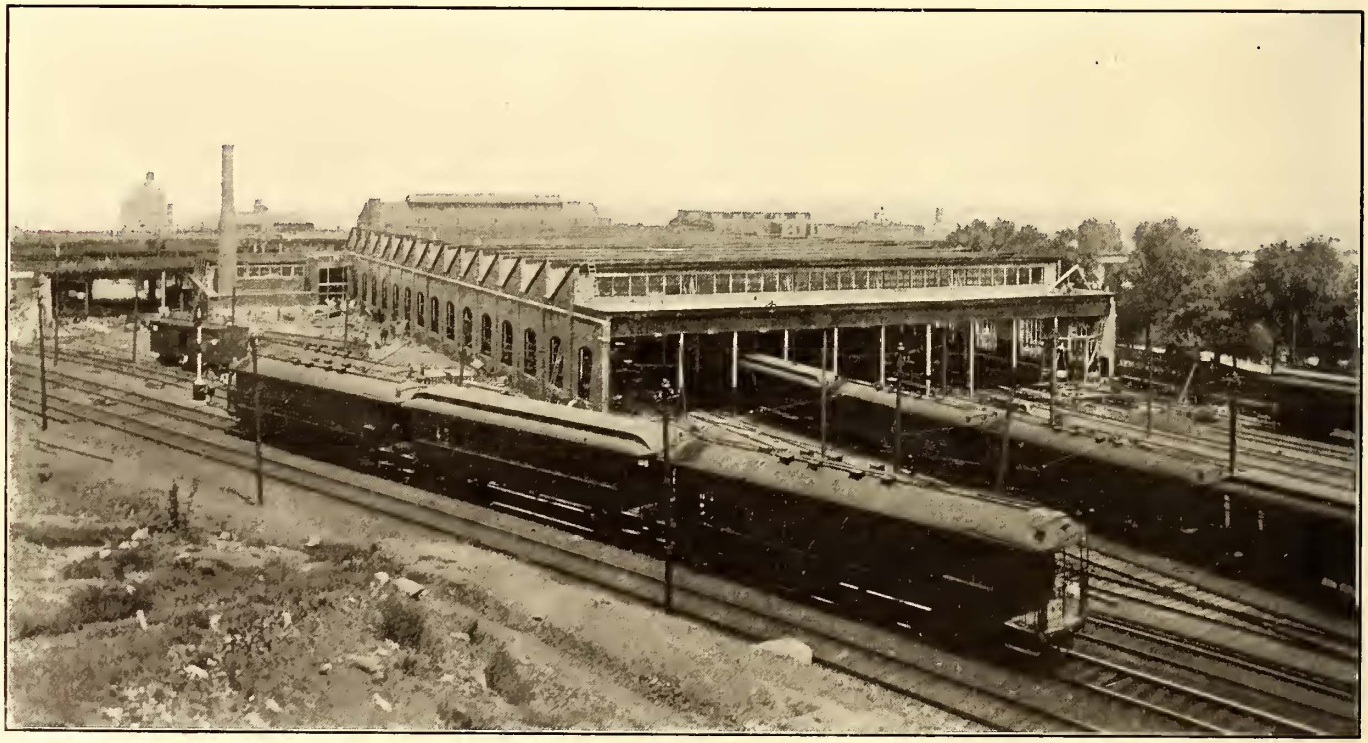


FIG. 2.—GENERAL VIEW OF THE THIRTY-SIXTH STREET INSPECTION PLANT, TAKEN FROM THE STORAGE YARD

* See Street Railway Journal, Feb. 9, Feb. 16 and March 2, 1907.

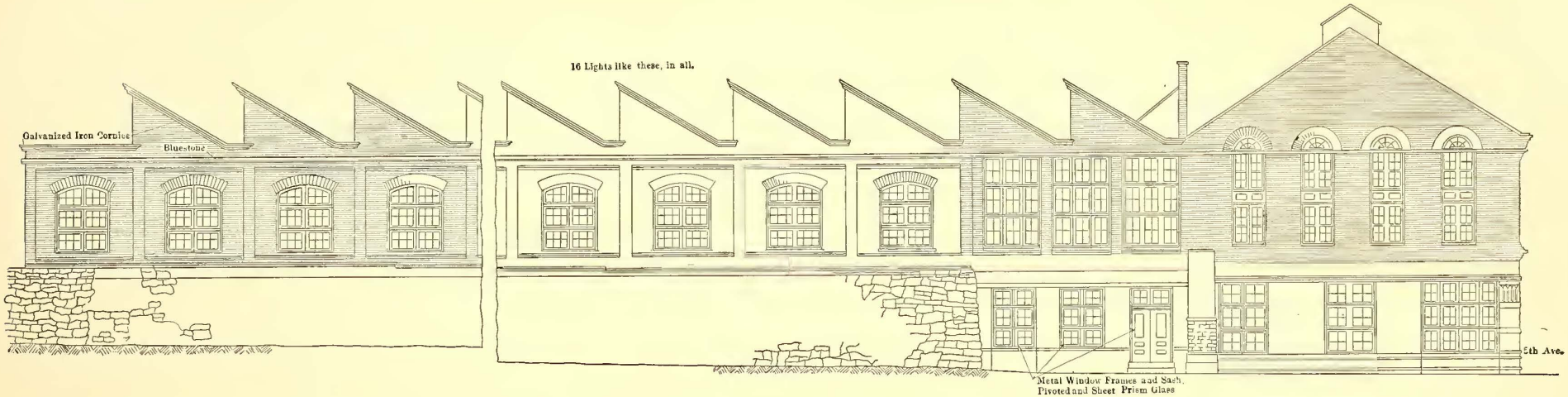


FIG. 3.—LONGITUDINAL ELEVATION OF THE THIRTY-SIXTH STREET INSTALLATION, SHOWING THE OFFICE BUILDING AND INSPECTION STRUCTURES

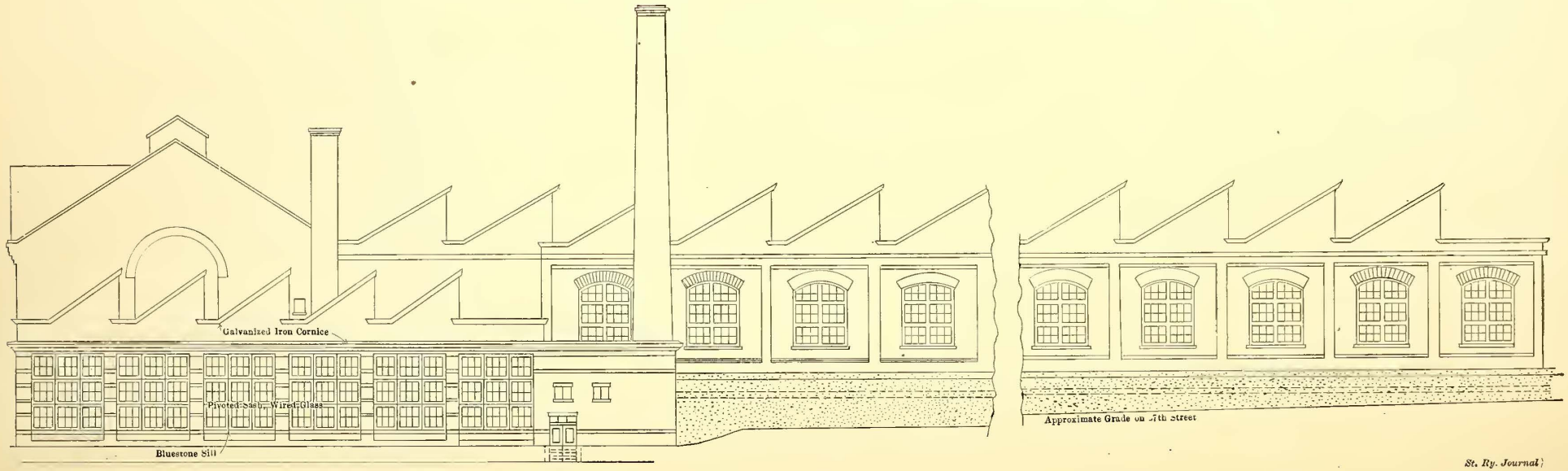


FIG. 4.—LONGITUDINAL ELEVATION OF THE THIRTY-SIXTH STREET INSTALLATION ON THE THIRTY-SEVENTH STREET SIDE, SHOWING MACHINE SHOPS (OFFICE BUILDING IN BACKGROUND), STEAM-HEATING PLANT AND THE INSPECTION STRUCTURE

room adjoining the mill room is directly behind the inspection tracks and forms a part of the inspection shed proper.

The overhauling shop is a new structure on the Thirty-Seventh Street side of the remodeled building, with its floor about 17 ft. below the track floor which corresponds to the upper floor of the remodeled building. By examining the plan drawing Fig. 6 it will be noted that the blacksmith and machine shops as well as the stock room are flush with the general layout also shows that there are four car-washing and storage tracks on the south side of the inspection shed. The innermost track of this set is used for unloading coal to the top of the concrete coal bunkers supplying the boiler house.

FIRE PROTECTION

Owing to the peculiar conditions involved at

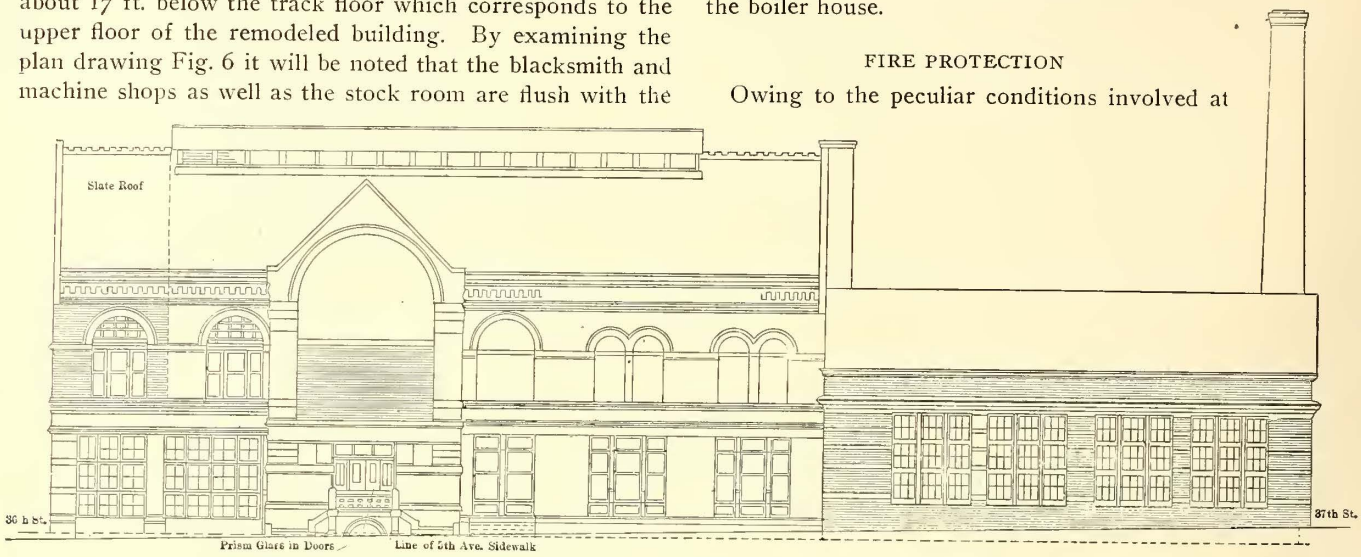


FIG. 5.—ELEVATION ON FIFTH AVENUE, SHOWING OFFICE BUILDING AND END OF MACHINE SHOP

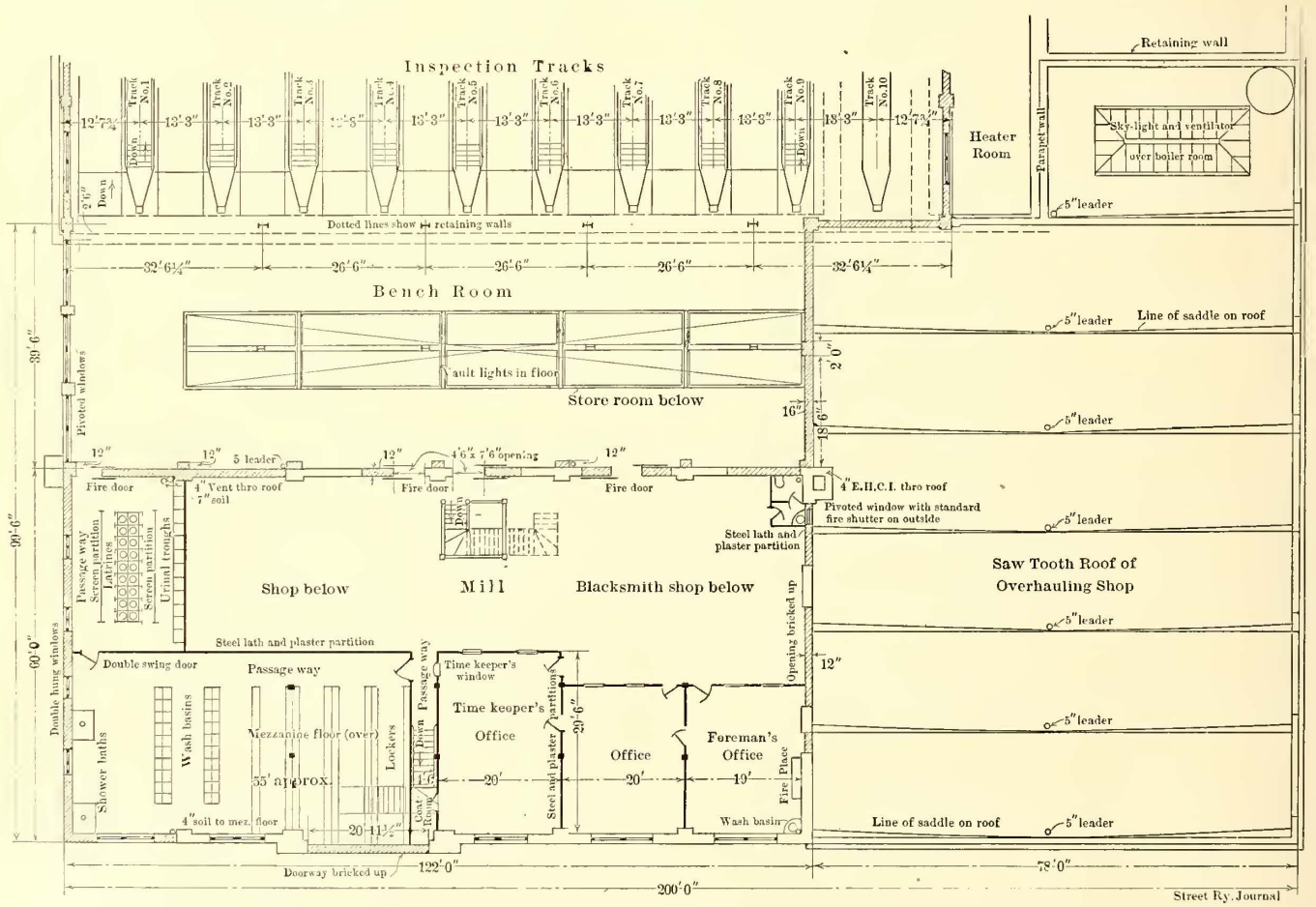


FIG. 6.—GENERAL PLAN OF TRACK-LEVEL FLOOR, SHOWING ALSO THE ROOF OF OVERHAULING SHOP AND HEATING PLANT

truck overhauling shop, but extend under the track floor of the office building. The location of the boiler house is shown in elevation and plan in Figs. 4 and 6, respectively.

The balance of the ground at this point is taken up by the inspection sheds, which will be described later in detail, and by a large storage yard on the east containing nine tracks extending to Seventh Avenue. The plan of the the Thirty-Sixth Street plant, due to the remodeling of the terminal building and the entirely different construction adopted for the machine shop and inspection shed, it was found necessary by the fire underwriters to divide the layout into three separate fire risks. The first risk covers the reconstructed building which is separated by a fire wall from the inspection shed, this wall extending from the street level

to 3 ft. above the highest point of the saw-tooth roof of the inspection shed, as indicated in the side elevation, Fig. 3; risk No. 2 comprises the overhauling shop; risk No. 3 the bench room and inspection shed with the stock room underneath.

In compliance with the specifications of the fire underwriters all openings leading from one room to another are protected by standard fire doors. The locations of these doors will be mentioned when referring to the different departments. The fire-protective means throughout the inspection shed and storage yard consist of frost-proof hydrants, each furnished with 100 ft. of 3½-in. standard fire hose. In addition to this equipment there are also in the inspection shed a number of salt-water fire pails suspended from columns between the tracks. Similar equipments of fire pails, standpipes and hose will be found in the track-overhauling shop, the mill room, bench rooms and other parts of the remodeled building. Chemical fire extinguishers are also installed in the latter. In addition there is a shop fire brigade. At present, the start of a fire would be indicated by the blowing of a steam whistle, but the company is now thinking of improving on this scheme by installing a Gamewell inside fire-alarm circuit in addition to one of the same type now installed but which communicates only with the city fire-alarm system.

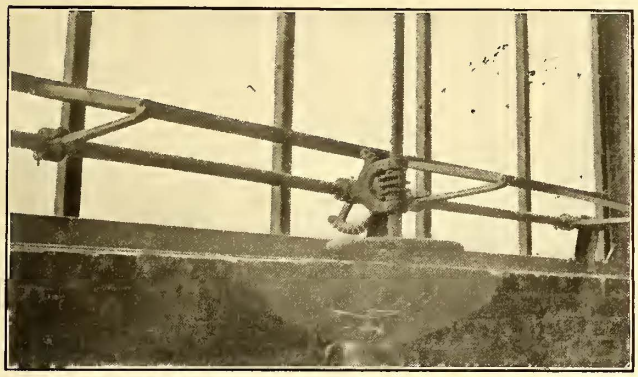


FIG. 8.—DETAIL OF WINDOW-OPENING MECHANISM

HEATING SYSTEM

For supplying heat to the offices, shops and inspection pits in connection with the blower system, a steam plant was built adjacent to and level with the machine shop. It is also adjacent to the upper end of the inspection shop, but being on a lower level, the parapet wall of the inspection building serves for the rear wall of the steam plant. The south wall is a portion of the concrete retaining wall as shown on Fig. 10, while the other two, which were especially built, are of brick. Abundant light is furnished by an 8-ft. x 22-ft. skylight and the front windows. The floor is composed of 6-in. concrete. The steam generating equipment consists of two horizontal return boilers which supply steam for the heater coils in the blower room and mill room.

As also shown in Fig. 10, the main blower room is between the upper end of the tenth track in the inspection shop and the steam plant. The latter, of course, is at a lower level but is separated from the blower room only by the parapet wall. Hence there are no leakage or other losses in conveying the steam, nor is there any necessity of maintaining a long line of piping. The main blower outfit consists of ten heater coils and a Buffalo blower driven by a 30-hp motor; the other heater installation, which is mounted on a platform in the mill room, has five heater coils and a blower driven by a 12½-hp motor. Both mo-

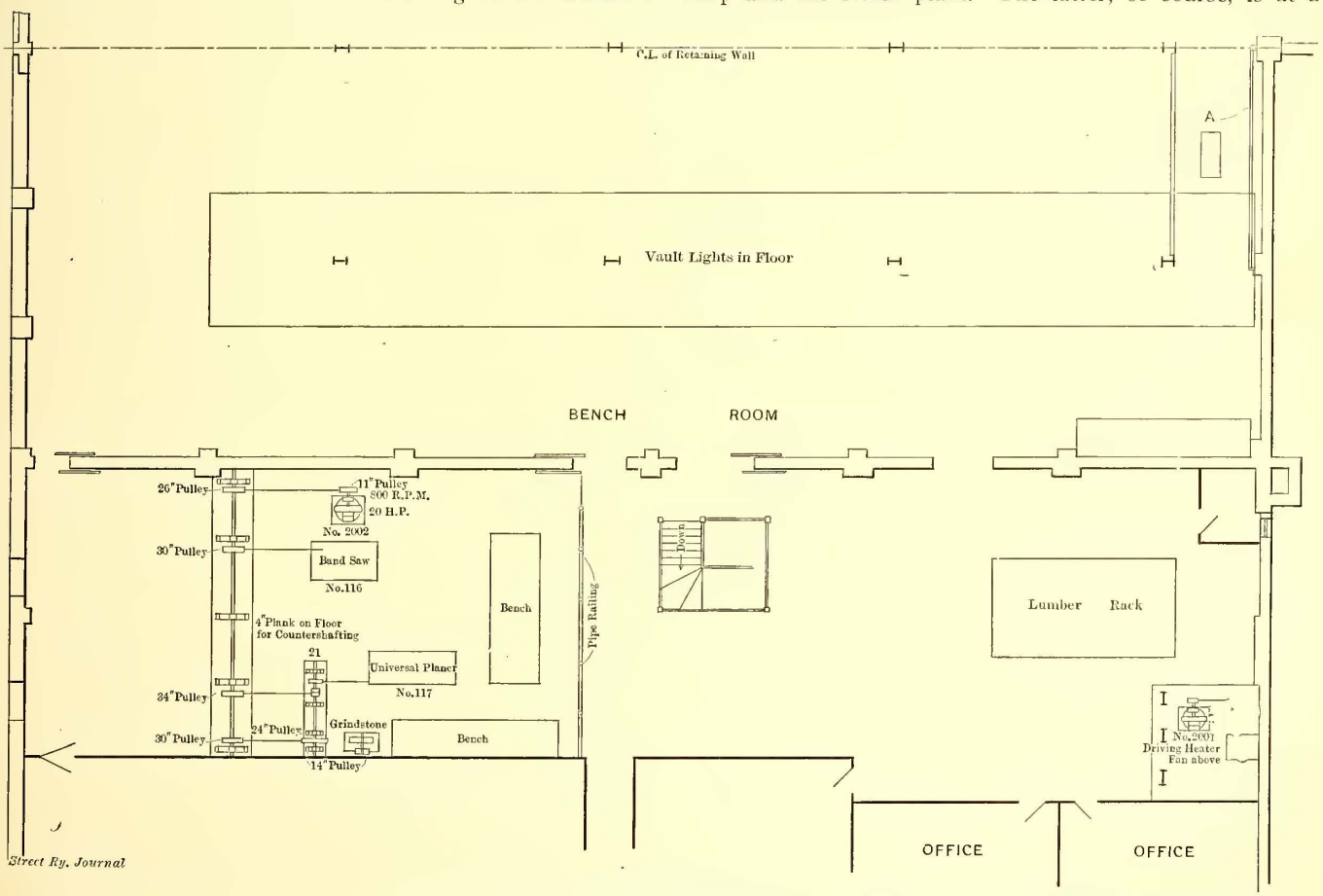
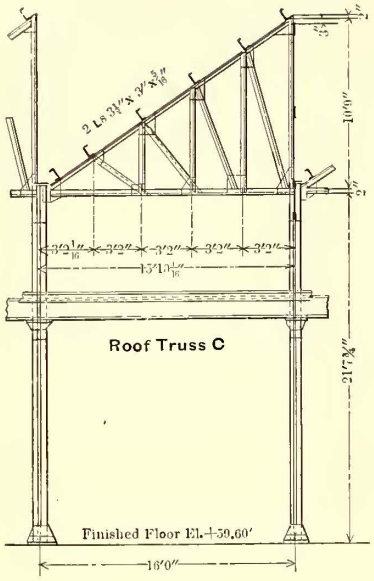
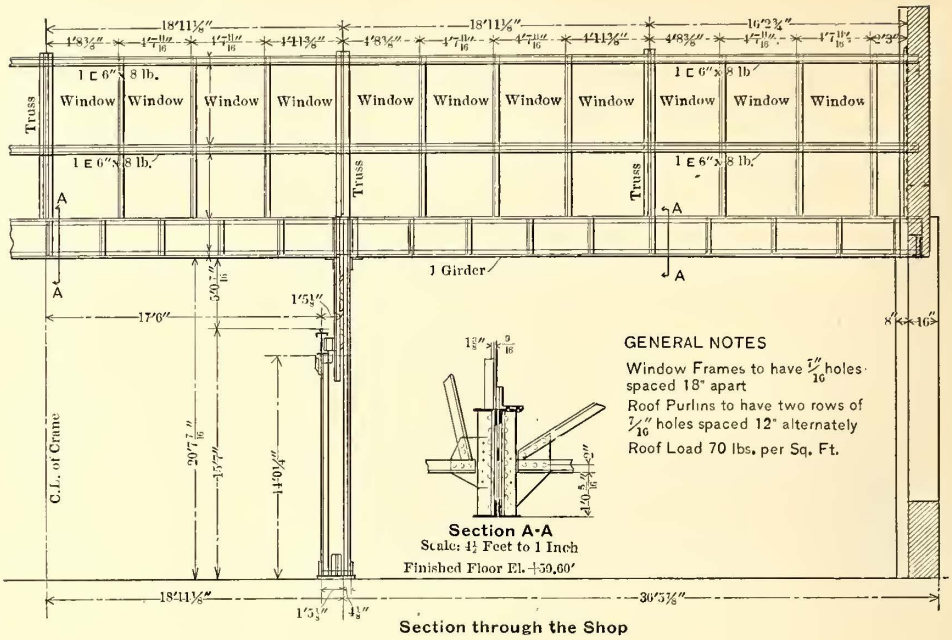
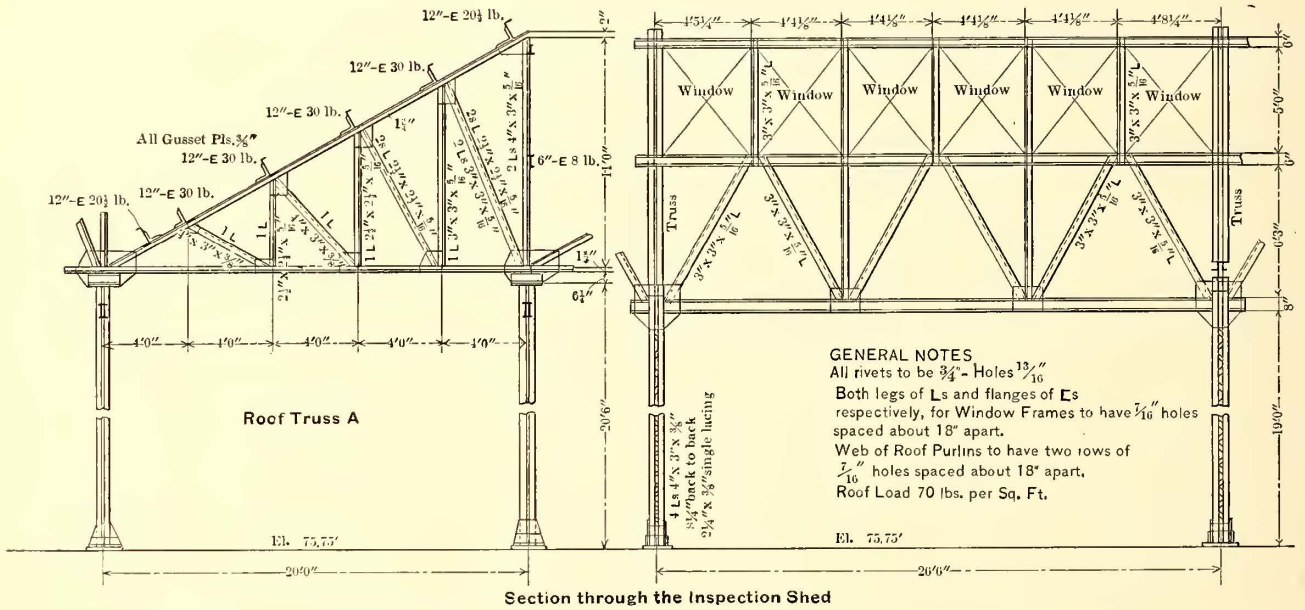


FIG. 7.—REBUILT PART PLAN OF SECOND FLOOR OF THE THIRTY-SIXTH STREET TERMINAL, SHOWING LOCATION OF BENCH AND MILL ROOMS, BLOWER, OFFICES, ETC.

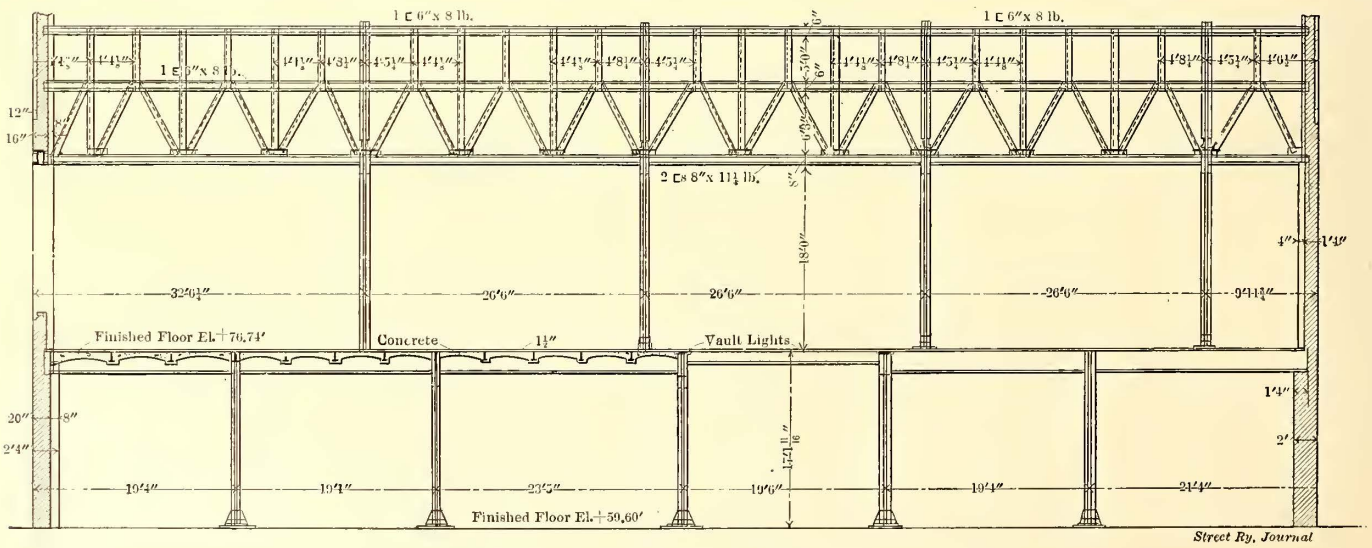




Section through the Shop



Section through the Inspection Shed



Section through Bench and Stock Room

FIG. 9.—TYPICAL SECTIONS OF THE STEEL SAW-TOOTH CONSTRUCTION AT THE THIRTY-SIXTH STREET PLANT OF THE BROOKLYN RAPID TRANSIT COMPANY

tors are of Northern manufacture designed for variation in speed to correspond to heating conditions. Air to be heated is usually taken from the inspection shop, but there is an 8-in. air inlet on the Fifth Avenue side which can be used in summer for distributing cold air. The main blower forces the hot air through pipes leading to the different parts of the buildings as well as to the pits. Details of the pit heating are shown in Fig. 10, from which it will be noted that the air is sent through a concrete conduit which gradually decreases from 5 ft. x 6 ft. to 4 ft. x 3 ft., as branches of the latter dimension are led between the pairs of pits. Along these branches at intervals of 24 ft. are tile conduits with 12-in. openings leading to the pits on each side. These openings are controlled by dampers. The advantages of this method of pit heating have already been pointed out in the article covering this feature at East New York.

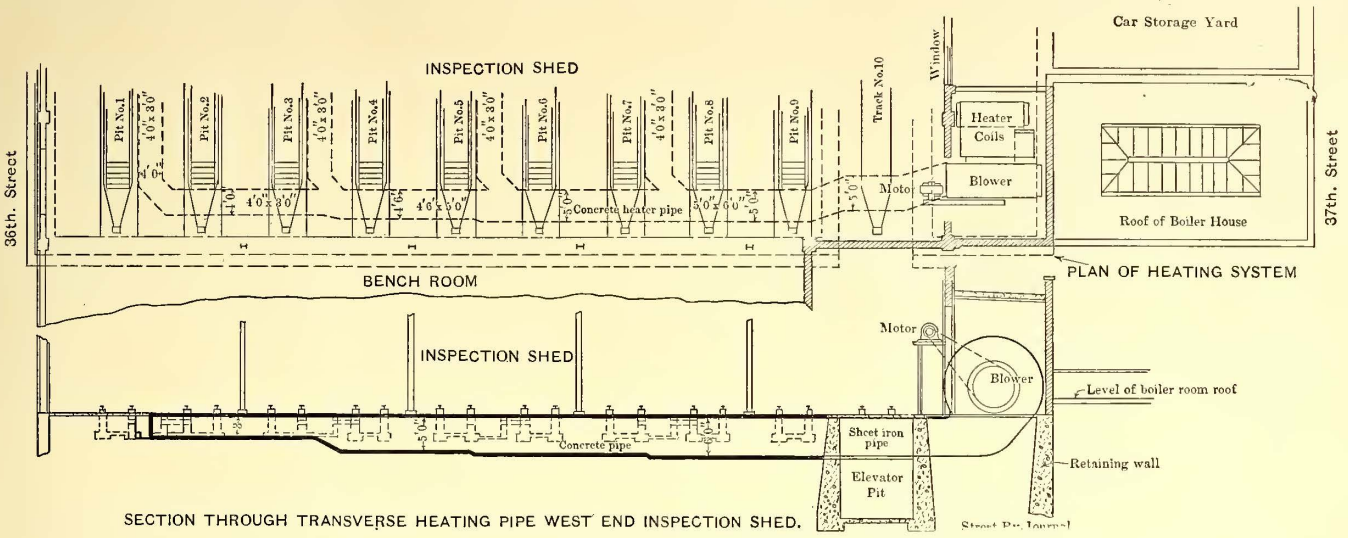


FIG. 10.—DETAILS OF THE HEATING SYSTEM AT THIRTY-SIXTH STREET, SHOWING PARTICULARLY THE MANNER OF HEATING THE PITS

THE THIRTY-SIXTH STREET INSPECTION SHED

The inspection shed is 320 ft. to 350 ft. long and 144 ft. 6½ ins. wide. It consists of five bays, the outer ones being 31 ft. 8¼ ins. and the remainder 26 ft. 6 ins. wide between rows of columns. The roof is carried on lattice girder posts spaced 20 ft. centers, between which are carried the triangular trusses of the saw-tooth construction. These trusses are located for a clear headroom of 20 ft. 6 ins. They are of simple construction with purlins of 12-in. channels spaced 4½ ft. apart, upon which H. W. Johns asbestos roof covering is carried. All of the windows and the saw-tooth lights of the inspection shed are of metal framing and wire glass, according to the A. E. Rendle Company's "Paradign" system, instead of wood framing as at East New York. Owing to the absence of adjoining buildings and outside fire walls both sides of the inspection structure are furnished with the same style of pivoted window sash which gives such excellent light at the East New York shops. The opening mechanism of this sash is shown in Fig. 8.

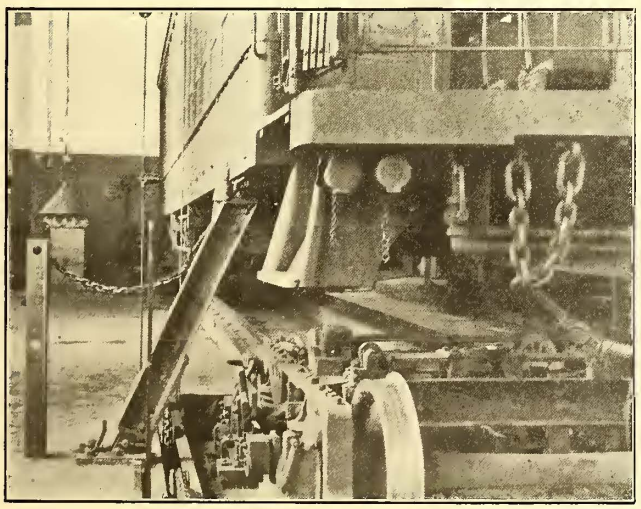


FIG. 11.—STEEL SUPPORTS HOLDING UP CAR AS TRUCK IS LOWERED

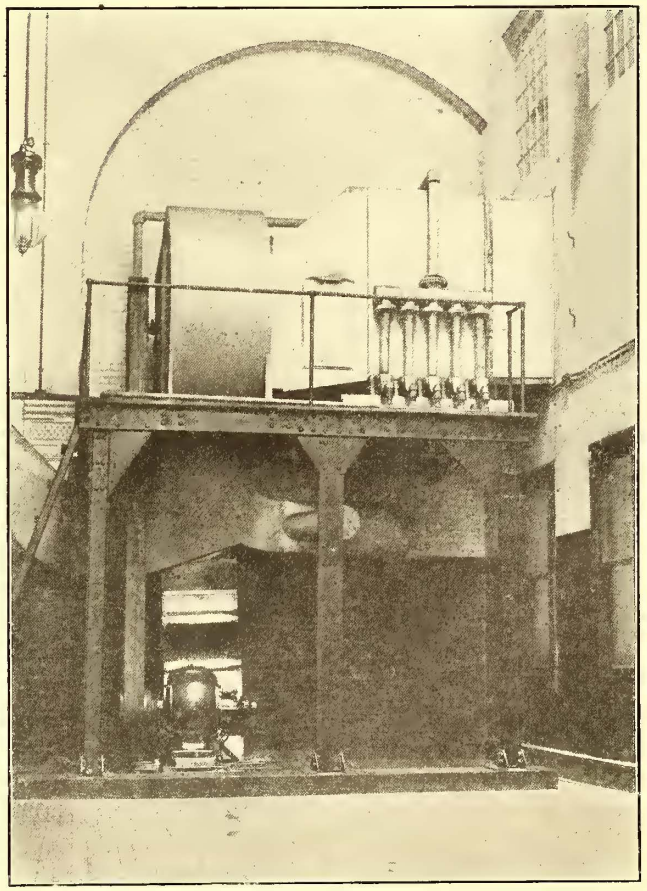


FIG. 12.—BLOWER AND HEATER COILS MOUNTED ON PLATFORM

The entering end of the inspection shed can be closed by Kinnear steel rolling doors having insulated trolley jumpers. It might be noted here that in connection with elevated car operation in steel truss inspection sheds considerable difficulty was experienced in the past with multiple-unit trains in cases where the pole of the first car of a train would be taking current from the wire inside the building at the same time that the pole of a following car was in contact with the metal parts above the entrance, thus causing injurious short-circuits. This trouble has been overcome by placing on the bottom chords of all trusses 2-in. x 4-in. wooden strips, thereby effectually preventing such short-circuits.

The ten tracks in this shed, spaced 13 ft. 3 ins. center to center, have a total capacity of sixty standard elevated motor cars. Nine of the tracks are furnished with pits similar to those at East New York, but the track nearest Thirty-Seventh Street is reserved for cars which are run to the elevator to have their trucks removed for overhauling in the shop below. To secure additional capacity for such cars the adjoining track is now being adapted for that purpose by the installation of a cross-over.

To carry on minor repairs a hard maple work table has been placed along the Thirty-Sixth Street side. On the opposite side are racks for controller drums and for car headlights. The headlight rack is shown in detail in Fig. 15. There is also a testing and charging track for the storage batteries required in connection with the Westinghouse

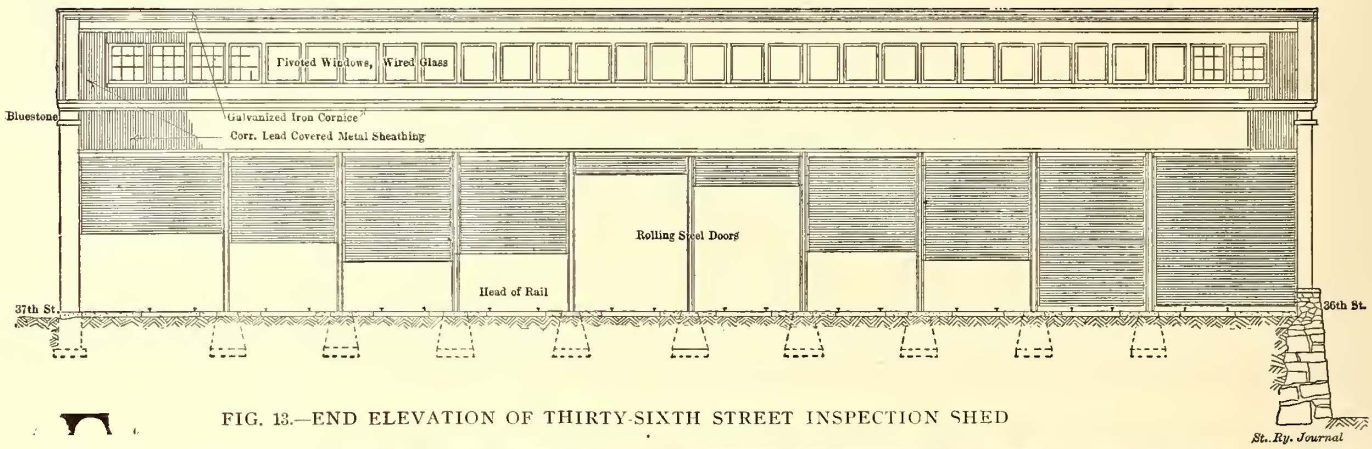


FIG. 13.—END ELEVATION OF THIRTY-SIXTH STREET INSPECTION SHED

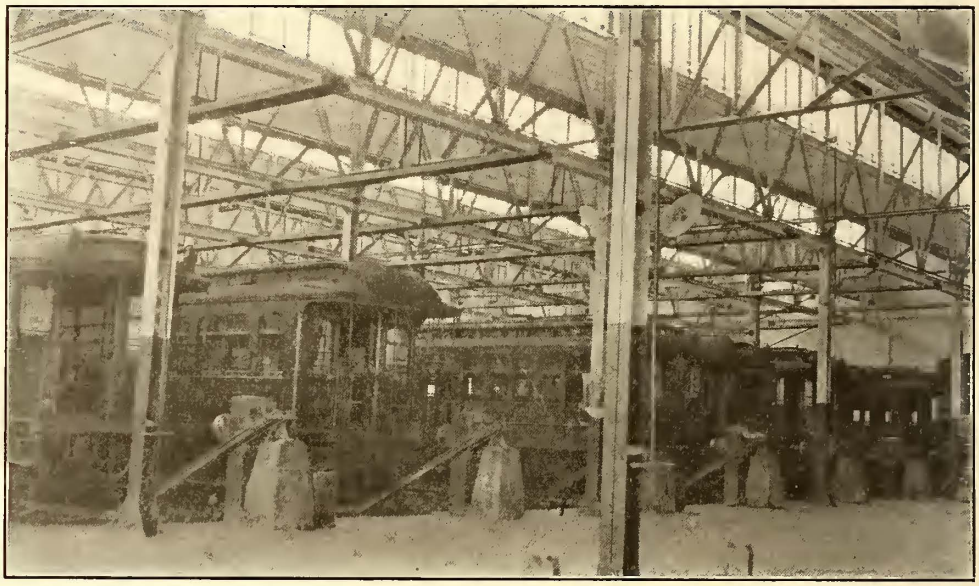


FIG. 14.—UPPER END OF THE INSPECTION SHED

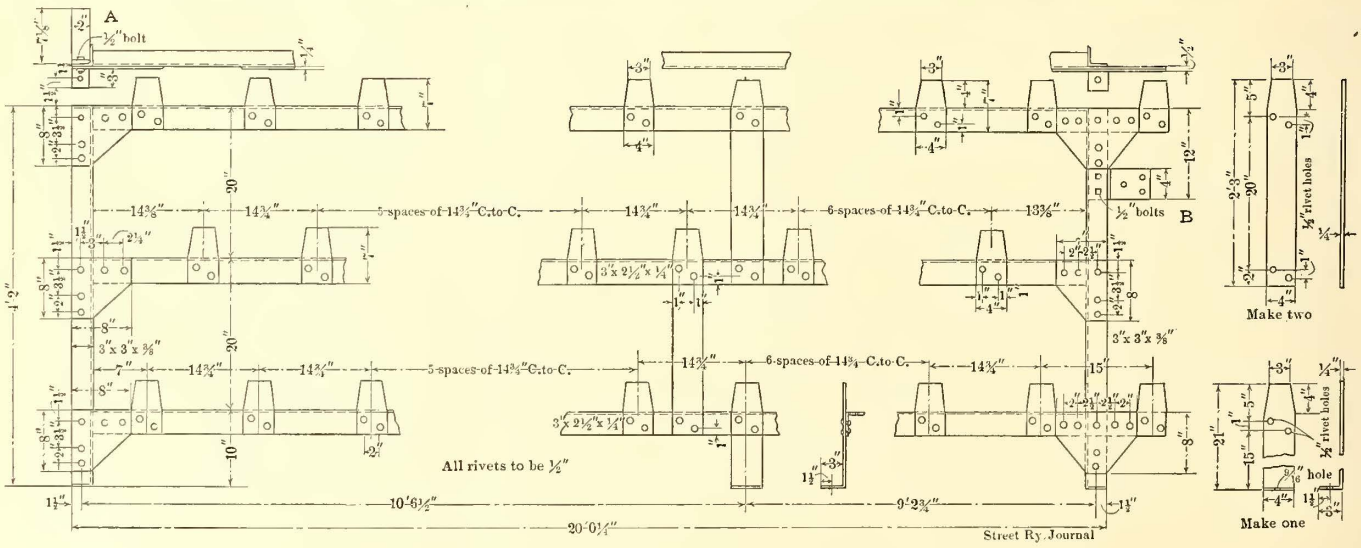


FIG. 15.—CONSTRUCTION DETAILS OF HEADLIGHT RACK

unit switch control system. The interesting type of wooden boxes used for taking the armatures of compressor motors to the company's Fifty-Second Street shop deserve some attention. These boxes, which are illustrated in Fig. 20, have neither top nor bottom, but are of such width that when an armature is laid in the groove provided only the ends of the axles are exposed. Hence when a number of them are placed one upon another they are completely protected from injury. Iron handles are attached to the sides for convenience in carrying. The illustration showing these armature boxes also includes a view of the racks for compressor armatures and of the metal lockers for storing small metal parts used in the inspection shed.

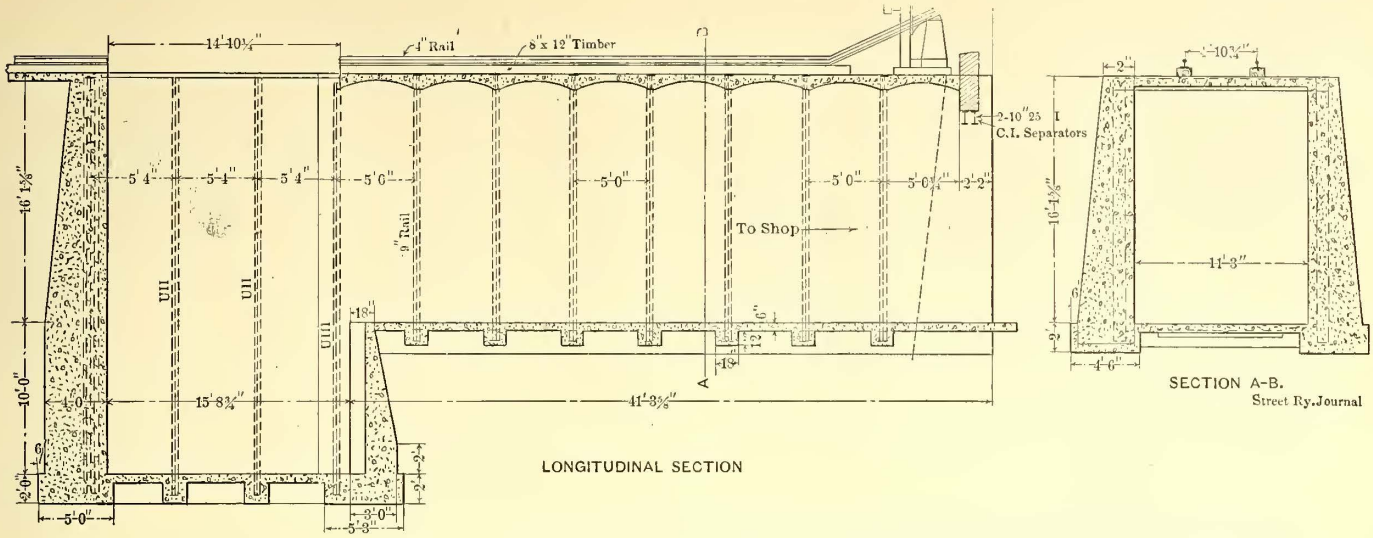


FIG. 16.—LONGITUDINAL AND CROSS-SECTIONS OF THE TUNNEL UNDER THE ELEVATOR TRACK OF INSPECTION SHED AT THIRTY-SIXTH STREET, USED FOR CONVEYING TRUCKS TO THE OVERHAULING SHOP

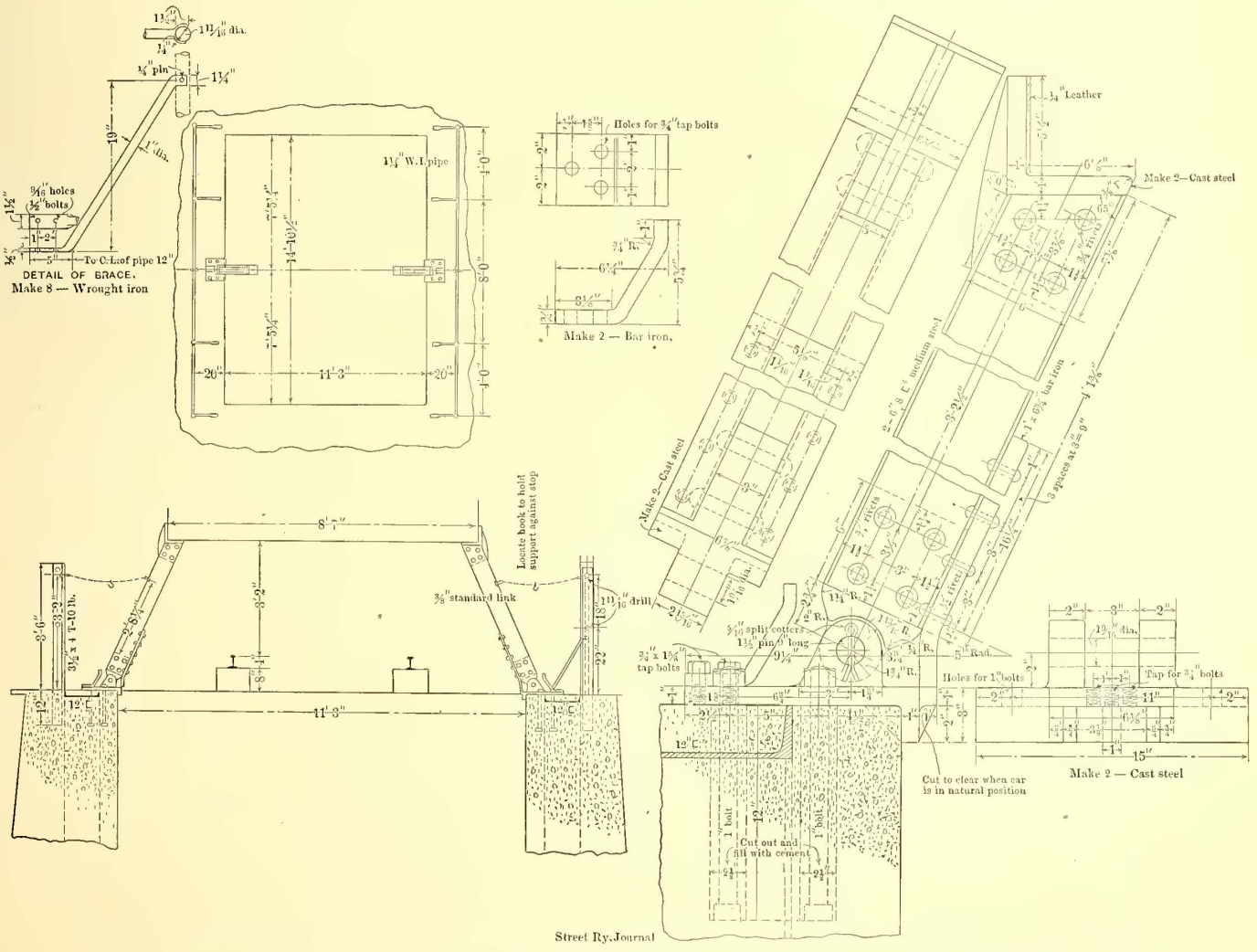


FIG. 17.—CONSTRUCTION DETAILS OF THE STEEL CAR SUPPORTS USED AT THE THIRTY-SIXTH STREET SHOP

The means for lowering trucks to the overhauling shop

differ somewhat from the procedure at East New York, in using steel instead of wooden struts to support the car during the time a truck is being lowered and a dummy substituted. It will be noted from the accompanying detail drawing, Fig. 17, that these pivoted supports are made of two 6-in. medium steel channels, each fitted at the end with an irregular shaped casting having a rectangular top to fit the corners of the car. To avoid scratching the side of the car these end rests are padded with ¼-in. leather.

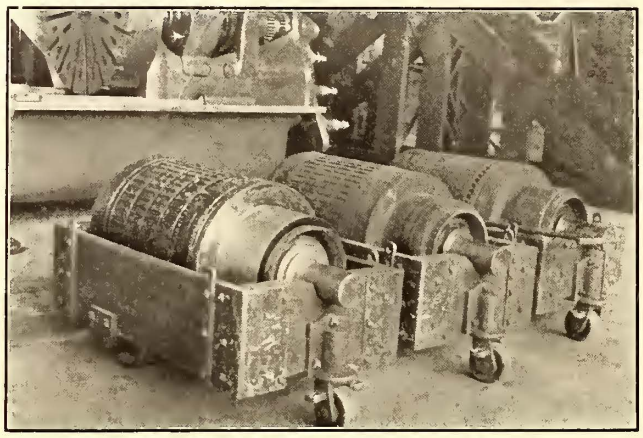


FIG. 18.—ARMATURE TRUCKS USED IN THE MACHINE SHOP

Owing to the layout of the grounds at Thirty-Sixth Street the overhauling shop, while lower than, is not directly beneath, the inspection building. The trucks to be overhauled are lowered about 16 ft. on an Otis plunger elevator driven by a 55-hp Northern motor. The trucks are then taken to the overhauling shop through a concrete tunnel 41 ft. ⅝ ins. long and 11 ft. 3 ins. wide. As at East New York, these trucks are moved along the track by their own motors through power obtained by a controller and resistance outfit placed in the overhauling shop.

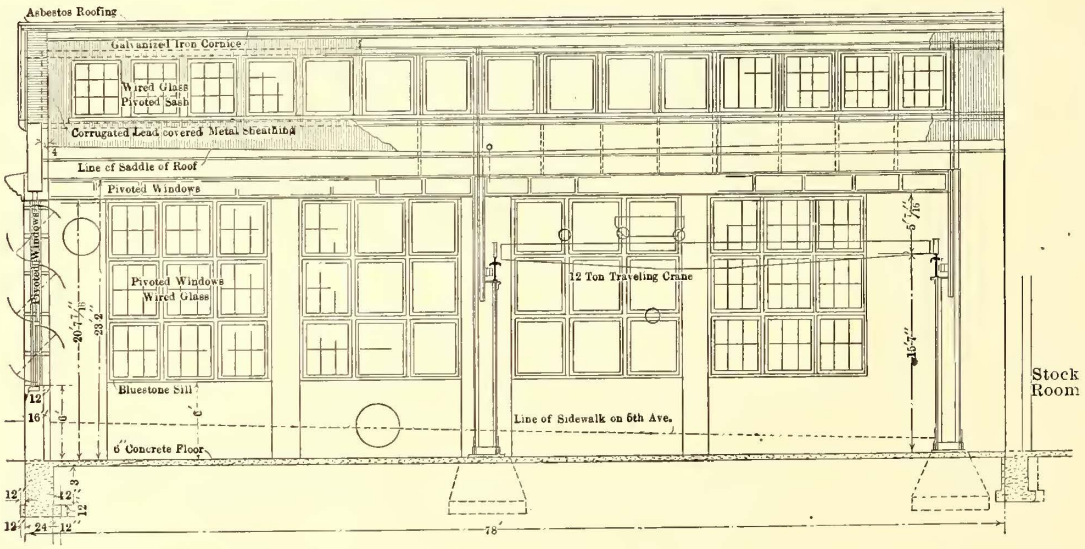


FIG. 19.—TRANSVERSE SECTION OF MACHINE SHOP, SHOWING THE LIGHTING ARRANGEMENTS

TRUCK OVERHAULING AND MACHINE SHOP

The general location of the truck overhauling and machine shop will be noted in Figs. 3 and 4, which are respectively the Fifth Avenue and Thirty-Seventh Street elevations. The floor of the shop is at a lower level than the offices, and the foreman's headquarters are so located that he can look down into the shop without leaving his desk.

Like the inspection structure, the shop building is furnished with a roof of the saw-tooth type covered with asbestos. Additional light is secured through the pivoted window sash on the Thirty-Seventh Street and Fifth Avenue side, opposite which the work benches are placed. The shop is divided by steel columns into six bays. The first bay starting from Fifth Avenue is 18 ft. wide; the next four, 16 ft. each, and the one adjoining the steam plant, 17 ft. 2 ins.; its width is 78 ft. All of the bays are 21 ft. 7¾ ins. high except the sixth, which is 22 ft. 1 15-16 ins. The floor is of concrete. All openings to adjoining rooms are protected by standard fire doors.

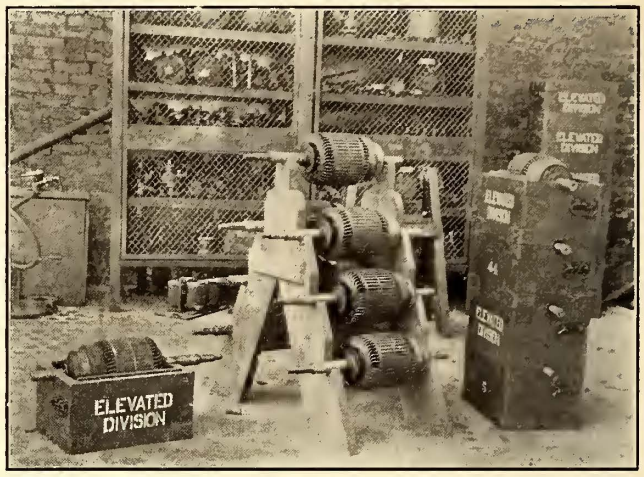


FIG. 20.—ARMATURE RACKS AND BOXES, SHOWING ALSO THE METAL LOCKERS

When a truck is brought into the shop from the tunnel previously mentioned, it is carried to one of the seven stub overhauling tracks by a 15-ton box crane which has a span of 35 ft. There are also four swinging air hoists attached to the posts. These are very convenient for picking up wheels and other parts on the overhauling tracks or taking a piece from one tool to another within reach without calling upon the larger crane.

The tool equipment in this shop is not intended for manufacturing purposes as at East New York, and hence is not so elaborate. All of the tools and motors are numbered for the sake of convenient reference at the office of the superintendent of equipment. Of the machine tool equipment in the shop, the following are group-driven by a 10-hp motor as shown in Fig. 24: No. 101, one emery grinder; No. 102, one 18-in. Place drill press; No. 103, one No. 1 Robertson hack saw; No. 109, one 14-in. Washburn sensitive drill; and No. 110, one bolt cutter. The independent-driven tools are made up as follows: No. 107, one 42-in. Pond wheel

lathe driven by a 15-hp motor; Nos. 108 and 104, one 36-in. and one 24-in. Putnam engine lathe driven by 10-hp and 5-hp motors, respectively; No: 105, one 54-in. Dresses radial drill of the simplex type, driven by a 2½-hp motor; and No. 106, one 24-in. Cincinnati shaper driven by a 5-hp motor. All of the motors were manufactured by the Northern Electric Company except those used on the crane which were supplied by the General Electric Company, and the 4½-hp motor used in the blacksmith shop.

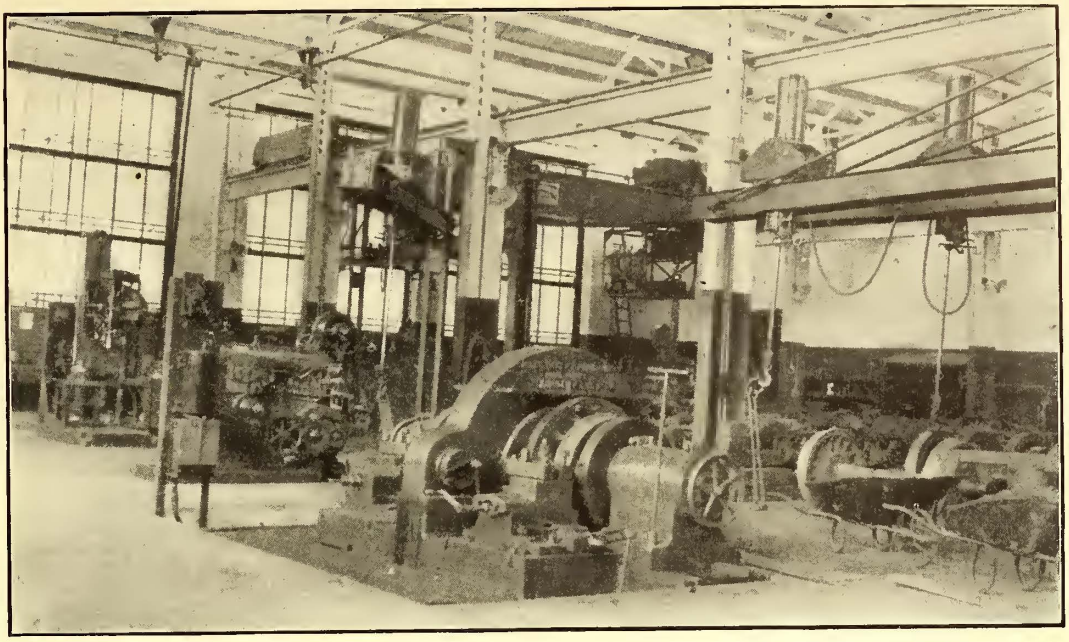


FIG. 22.—VIEW IN MACHINE SHOP, WITH THE TRUCK-OVERHAULING TRACKS ON THE RIGHT

WHEEL STORAGE, BLACKSMITH SHOP AND TOOL ROOM

The wheel storage tracks and blacksmith shop are under the office building and adjoin the truck overhauling shop, from which they are separated by a brick wall with standard fire doors. At the Fifth Avenue side, however, there is a gap of 4 ft. 6 ins. (closed by a double fire door) for a 2-ft. gage transfer track used for bringing car wheels to the five sets of storage tracks. The latter are of the double-rail type as installed at East New York.

This section contains the following machines used in connection with wheel work, besides five 4000-lb air hoists for carrying the wheels over each storage track; No. 113, one Ingersoll-Sergeant Class E air compressor driven by 45-hp motor for supplying air to the hoists, air hammer, armature cleaner, etc.; No. 114, one Watson-Stillman 150-ton wheel press driven by a 7½-hp motor; and No. 115, one No. 1 Springfield wheel grinder driven by a 10-hp motor. This grinder is used for flat wheels.

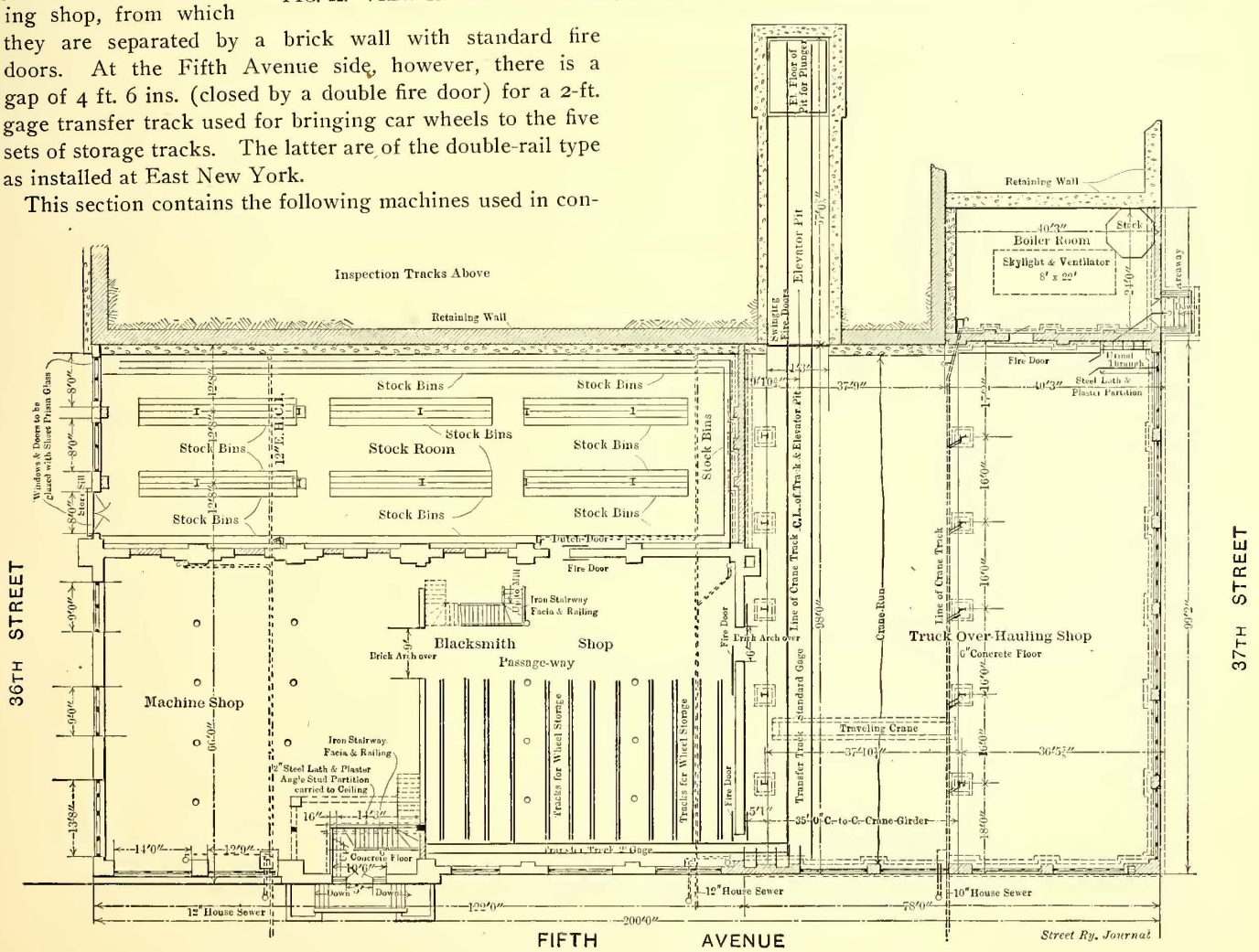


FIG. 21.—PLAN OF TRUCK-OVERHAULING SHOP AND OF THE DEPARTMENTS UNDER THE MAIN FLOOR OF THE TERMINAL BUILDING

age tracks and contains the following: Three Buffalo down-draft forges with 4½-hp Western Electric motor; an armature blower of the type used in East New York; and

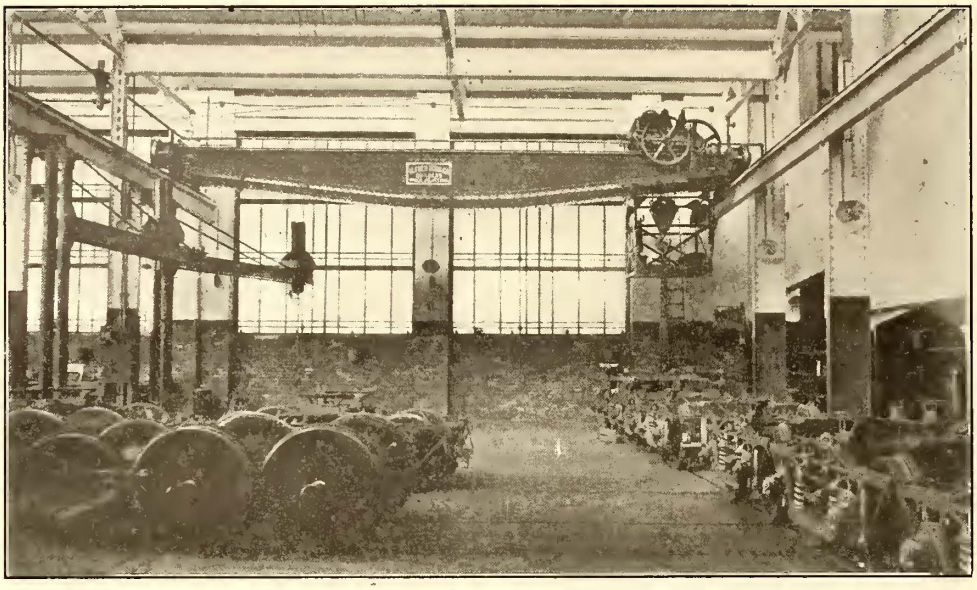


FIG. 23.—CRANE TRAVELER IN SHOP OVER THE TRUCK-OVERHAULING TRACKS

As shown in Fig. 25, the tool room is located just outside the wheel storage and blacksmith shops. It is in most respects like the one in East New York except that the vertical tools such as drills and the like will be placed in grooves instead of being mounted upright. This will make it more convenient to put the tool check in the place of the tool taken. The balance of this part of the building which receives light from the Thirty-Sixth Street side is unoccupied at the present time except for miscellaneous job work.

The stock room shown in Fig. 21 is isolated from the overhauling shop by a solid 16-in. brick wall, and from the other departments on the same floor by a similar wall with fire doors. This room is illuminated by drop lamps. It is 119 ft. long and about 37 ft. wide.

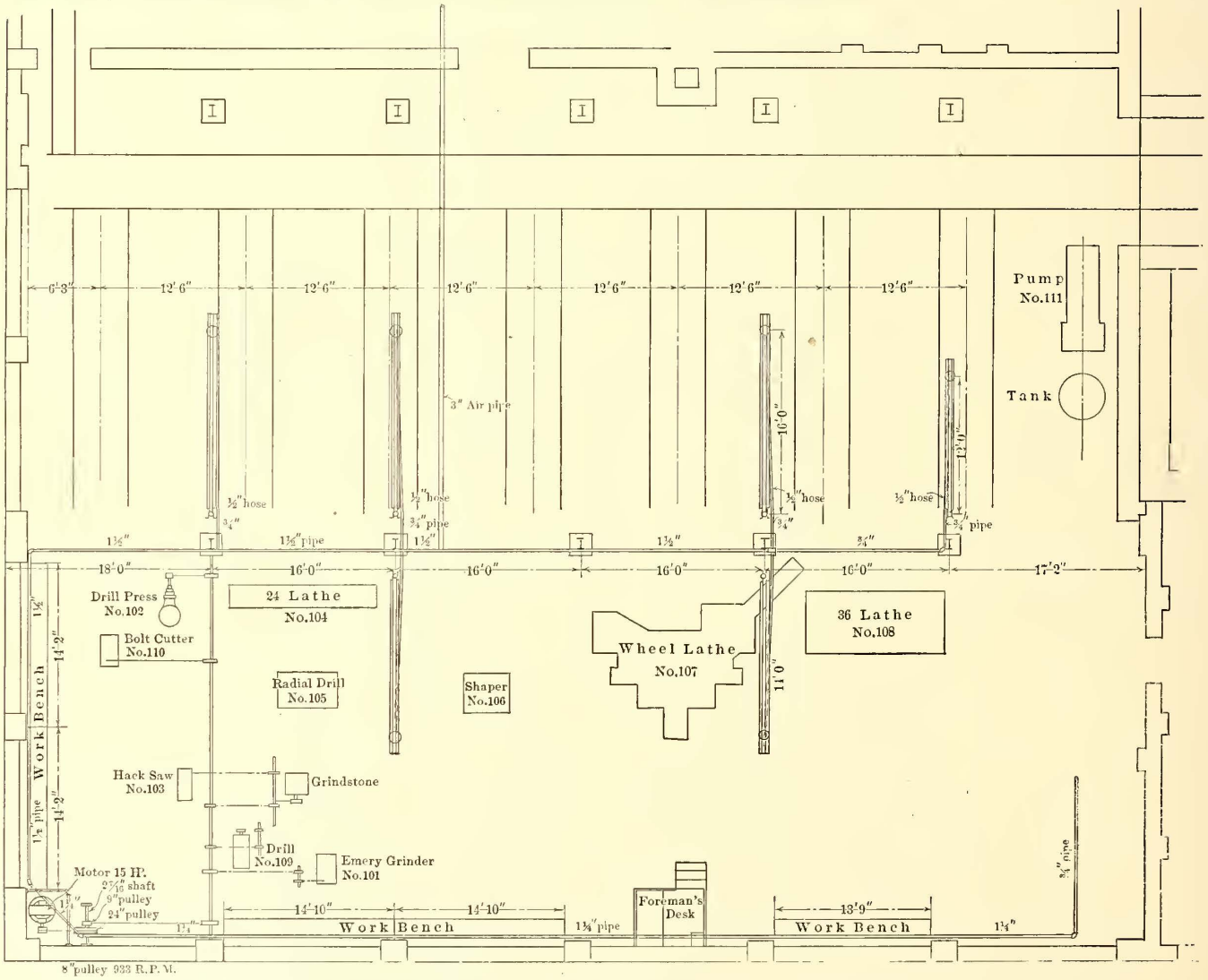


FIG. 24.—GENERAL PLAN OF OVERHAULING SHOP, SHOWING LOCATION OF OVERHAULING TRACKS, TOOLS, ETC.

No. 112, a 250-lb. Billings post air hammer. The forges are supplied with soft coal through chutes from the inspection shop floor which leads to an intermediate 5-ton bin. Like the rest of the divisions on this level it has a concrete floor 6 ins thick.

Most of the material is stored in bins which are num-

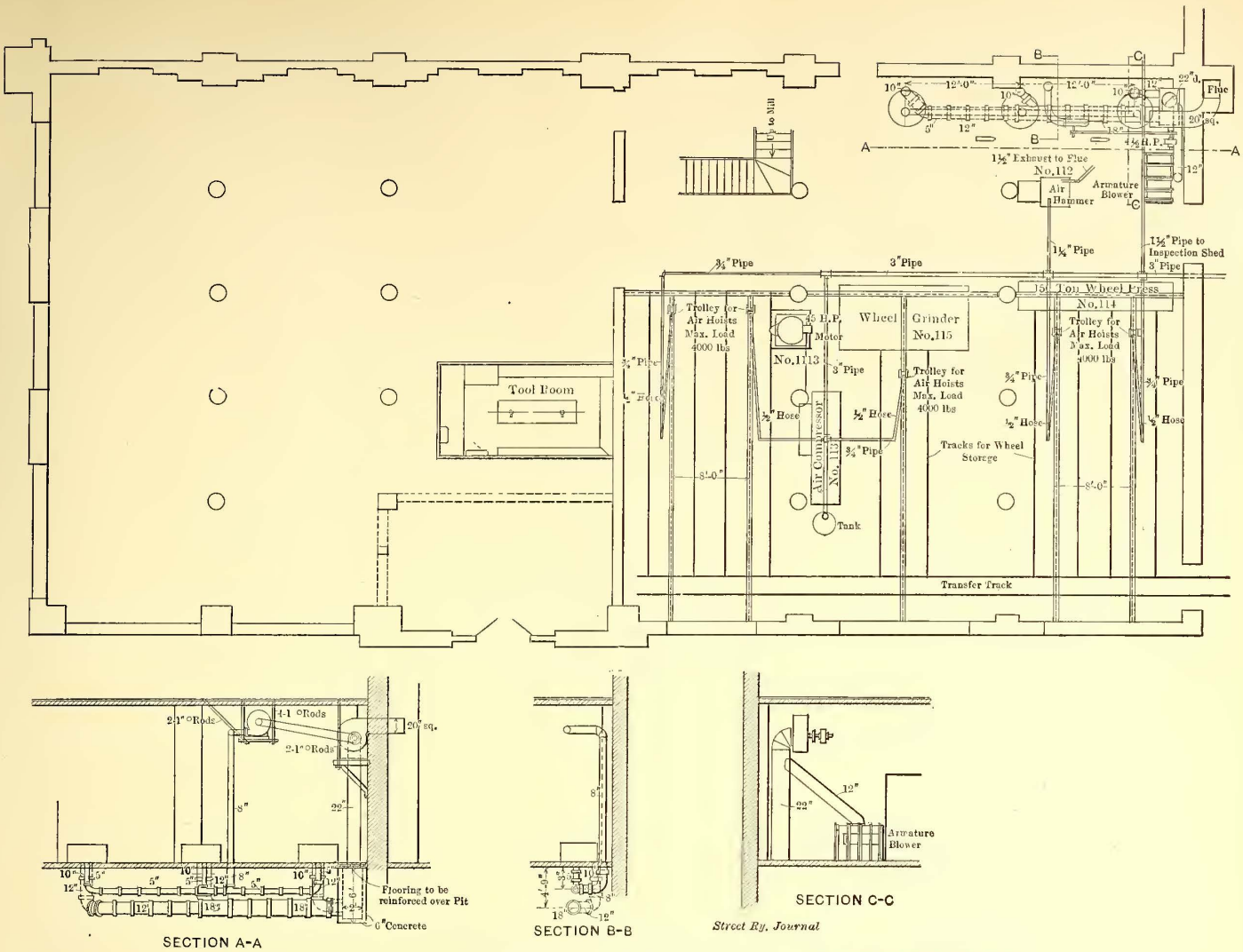
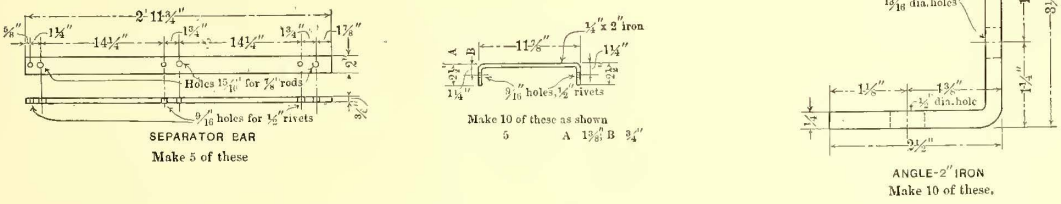


FIG. 25.—DETAIL PLAN AND SECTIONS OF BLACKSMITH SHOP AT THIRTY-SIXTH STREET



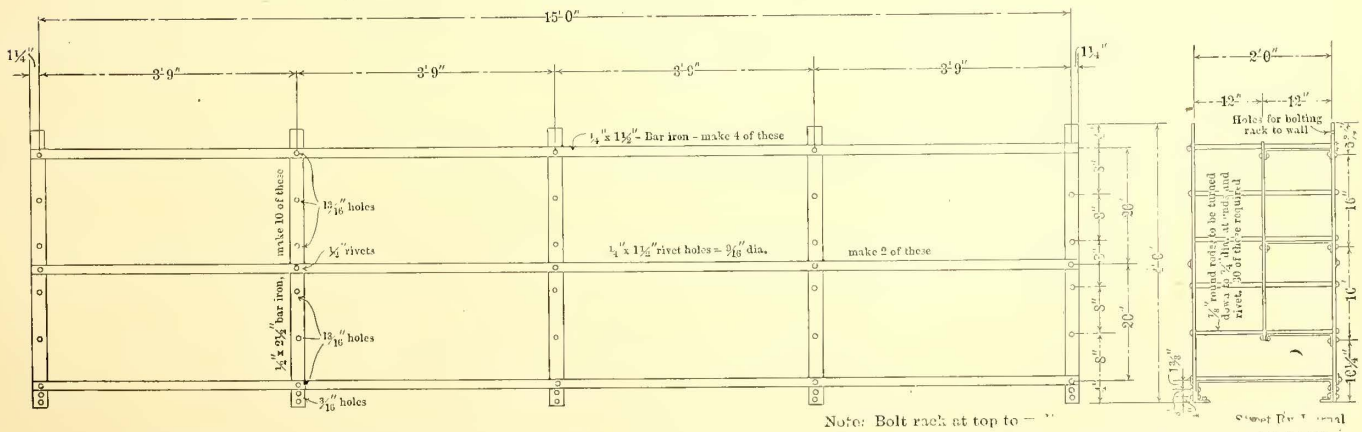


FIG. 26.—CONSTRUCTION DETAILS OF IRON RACK USED AT THE THIRTY-SIXTH STREET SHOP FOR STORING TROLLEY-POLE TUBING AND THE LIKE

bered serially, each number corresponding to some particular item. An interesting feature of the stock room is the wall rack built for storing trolley-pole tubing, piping or other long pieces of metal. It is 15 ft. long, 4 ft. wide and 2 ft. high, and, as shown in the construction drawing, Fig. 26, is divided into sections by separator bars and rods. The use of this rack secures more systematic storage and naturally makes it possible to handle the material with greater ease than if it were lying scattered on the floor.

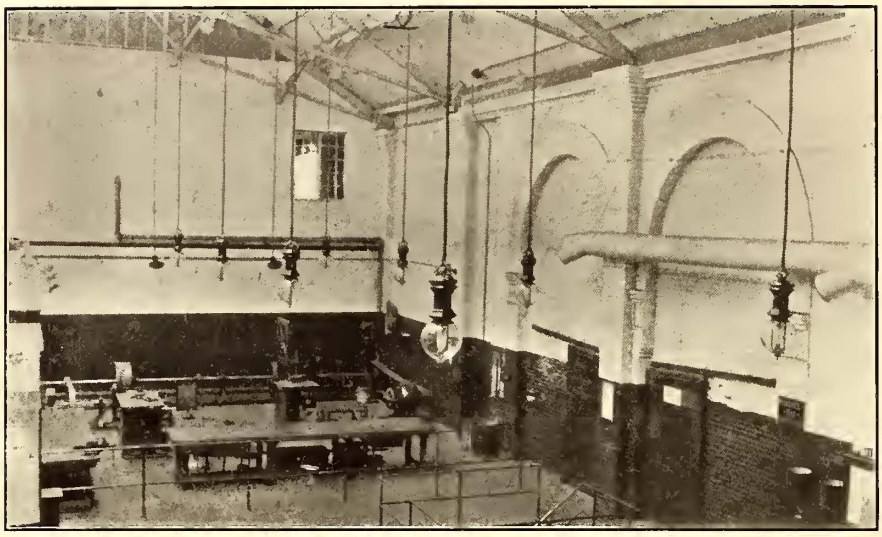


FIG. 27.—VIEW OF MILL ROOM

The oil room is enclosed by a brick wall, the only openings being the standard fire doors to the overhauling shop. To comply with the standard fire underwriters' requirements, the floor is pitched toward a center drain to prevent the accumulation of oil resulting from possible leakage from barrels and tanks.

MILL ROOM, BENCH ROOM, EMPLOYEES, ETC.

The mill room is in the remodeled terminal building, being located between the offices and bench room, as shown in Fig. 6. It is separated from the offices by a steel lath and plaster partition and from the bench room by a 12-in. brick wall and fire doors. This shop is well illuminated by means of a vault light, arc lamps and five-light clusters. The tools in this room are all driven from one countershaft. They consist of No. 116, which is a No. 50 Fay & Egan scroll saw, and No. 117, a Fay & Egan Universal planer. The countershaft is connected to a 20-hp motor. There is also a fan in the mill room driven by a 12½-hp motor. An interesting point about the scroll saw is the application of a wooden guard to prevent injury to the workmen from contact with the blade.

The bench room is directly over the stock room and at the head of the inspection tracks. The benches are located along the walls. This room is also used for tool and material lockers and miscellaneous carpenter work.

The size of the installation at Thirty-Sixth Street did not warrant the company in going to heavy expense in fitting up a special building for the convenience of officers and employees as at East New York. However, the men at the smaller plant have not had their interests neglected either. A large, airy room opposite the office is set aside for clothes lockers, and near by there is located a comfortable toilet room with hot and cold water, porcelain sinks and shower baths.

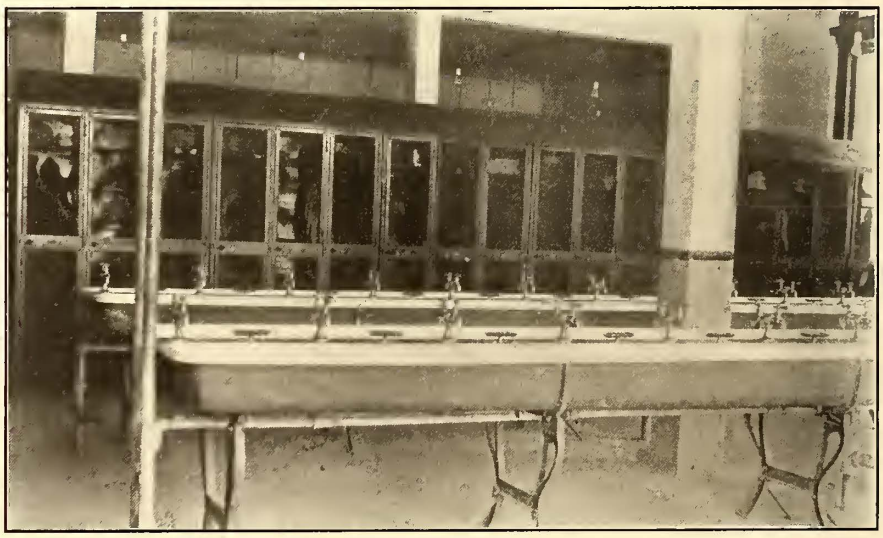


FIG. 28.—LOCKER AND WASH ROOM

RAIL CORRUGATION IN NEW YORK

Through the courtesy of Oren Root, Jr., vice-president and general manager of the New York City Railway Company, this paper is permitted to present some particulars as to the extent and character of rail corrugation in New York City. This information is embodied in a report to Mr. Root by W. T. Dougan, engineer of maintenance of way of the company, and was prepared to answer an inquiry which had been sent to the New York City Railway Company on this subject.

In comparison with other roads the New York City lines have experienced comparatively little trouble from rail corrugation. Where the corrugations have appeared the distance between crests is from 2½ ins. to 3 ins. in most cases and the spots are indicated by bright and dark places on the rail. On the four lines on which the trouble has been noticed the corrugations have appeared in the cases of three of them entirely on straight track, while on the fourth they have developed more frequently on the outside rails of long-radius curves. On all of the four lines the traffic is fairly heavy. As the corrugations have given no appreciable trouble no measures have been taken to overcome the difficulty.

It is also interesting to mention that the corrugations have occurred in almost all cases at the points where the cars begin to brake for a stop. This would indicate that the cause is to be found in the fact that the car wheel slips for a few inches, then revolves, then slides again. In one instance on Broadway, on a long-radius curve, where the track gage was from ⅜ in. to ½ in. wide and the rails were so worn that the flange of the inside wheel impinged against the tram of the rail so that the wheel must necessarily slip more or less on the outside rail, it was found that the outer rail was corrugated while the inner rail was not.

This indicates that the slipping of the car wheel may have been the cause of the corrugation. Other instances have occurred where one rail has become corrugated while the opposite rail on the same track, upon which the wheel must slip practically as much as on the first rail, has shown no corrugation.

Once started, the corrugations tend to multiply and grow deeper. They may be started by a hard or soft spot in the rail, and a tight track gage or a wide gage, if causing the wheel to slip, may be the cause of corrugation.

As an indication of the extent to which the presence of corrugation may be attributed to tight track gage it might be said that at Amsterdam Avenue and 181st Street, where the New York City Interborough Railway Company maintains a crossing over the tracks of the New York City Railway Company, the expansion of the rails of the first company, which took place last summer, resulted in the tightening of the track gage of the New York City tracks. Shortly after this, corrugation began to appear at the point referred to, although none had previously existed, leading one to believe in this case at least that tightened gage had much to do with causing the rail corrugation.

NEW HYDRO-ELECTRIC PLANT OF THE SPOKANE & INLAND EMPIRE RAILROAD COMPANY

Some two years ago or more Jay P. Graves and associates decided to enter the electric light, heat and power field in the city of Spokane in connection with their traction business, at that time in its infancy. Accordingly, they had all the important power sites near Spokane examined. The site selected is about 10 miles down the Spokane River from Spokane and at a point where the river cuts through a deep granite rock gorge. It so happens that at this point the surface of the river at high water is about 320 ft. wide, while at low water the channel is on the west side of the river about 100 ft. wide and approximately 20 ft. deep, while on the east side of the river there is a rock bottom approximately 200 ft. wide, which stands above the water at low water. This made an ideal location, inasmuch as the power house could be placed in the deep part of the stream and the dam, which would have to be about 225 ft. on the crest, could be built practically on dry rock. The canyon was deep enough so that a dam 60 ft. high could be built and at the highest water not overflow the rock contour. By building a dam of this height, a lake was created about 4½ miles long, having a superficial area of about 400 acres, the advantage of such a development, of course, being that with the storage capacity a peak load on the lower power plant can be handled at least twice as large as the normal flow of the river would admit without storage. Having acquired the necessary property, it was decided in April, 1906, to proceed with this development by transferring the property to the Spokane & Inland Empire Railroad Company. This company employed Sanderson & Porter to be the designing and constructing engineers, and made arrangements with Wm. F. Zimmerman to enter the employ of the Spokane & Inland Empire Railroad Company as consulting engineer. Plans were made and the work started about July 1, 1906.

The power house will be approximately 110 ft. across the stream, 87 ft. high from low-water mark and approximately 85 ft. from the up-stream walls of the power house to the down-stream walls. It is designed to accommodate four units of 5000 hp each, the initial installation being two such units. The wheel pits will be open flumes closed by head gates, each unit consisting of four 42-in. adjustable bucket wheels built by the Holyoke Machine Company, of Holyoke, Mass. The shaft of these wheels will run directly through the dam wall and be connected by a flange coupling to a 3750-kw, three-phase, 2200-volt, 60-cycle alternator, the shaft of which will carry an exciter of sufficient size to excite three units. The turbine speed regulator will be placed between the generator and the dam wall. The switchboard, electrically operated, to which nothing but the low-tension wires are to be connected, will be placed in the center of and on the down-stream side of the power house, so that the switchboard operator will have full view of each and every machine. A traveling crane, hand-operated, will cover the entire length of the dynamo floor. The height of the building will be such that the second floor, 30 ft. above the dynamo room floor, will be used for all the switchboard apparatus; both high and low-tension switches and their connections being made on this floor.

The dam wall will be so constructed that the space between each set of retaining piers may be used for the transformers, there being one set of raising transformers, raising the voltage from 2200, the machine voltage, to 60,000, the line voltage adopted. These transformer rooms will be built entirely of concrete, access to them being through fireproof iron doors.

The transformer rooms will drain directly to the tail-race and the transformers will have an oil drain with a valve which can be operated from the dynamo room, discharging the oil into the tail-race, and to be used at any time in case of fire. A gantry floor covered by a hand-traveling crane will extend over all the transformer rooms, also partly over the turbine pits, so that the turbine wheels, as well as the transformers, can be placed or raised out of their position by a single traveler and delivered to the gantry floor; the gantry floor will be on a level with the roadway leading to the power house. The main water gates will be double-leaf sliding gates, operated by rack and pinion hoist, motor driven. Each turbine chamber will be supplied with an auxiliary filling valve.

The power house building will be of steel construction, brick filled. The dynamo room floor and the switchboard floor, however, will be reinforced concrete. The dam extending from the power house to the east bank will be of cyclopean concrete work. There will be a water stop wall on the west side of the building to the west bank 85 ft. high from low-water mark in the tail-race to the west bank. It is expected that this plant will be in operation on or about Dec. 1, 1907.

The energy from this plant will furnish light, heat and power for the city of Spokane, the Inland Empire Company having a broad franchise in the city. It will also be used to develop the country through which the lines of the Inland Empire system operate, furnishing power as far south as Moscow and possibly farther. The Inland Empire Railway system owns other power sites which will be developed when the power from this development shall have been used. The work of construction is in direct charge of F. M. Sylvester, local manager for the constructing engineers.

The attempt made last week to rob the passenger depot of the Cincinnati, Dayton & Toledo Traction Company at Spring Grove and Linden Avenues, Cincinnati, resulted in the robbers getting about $80. They blew the safe open, and in so doing wrecked the office.

THE PASSENGER STATIONS OF THE HUDSON COMPANIES

Work on the equipment of the Hudson Companies is now so far advanced as to make possible an account of the plans for the passenger stations in New York, Jersey City and Hoboken. As will be remembered, the Hudson Companies are building a double-track underground electric railway from the corner of Cortlandt and Church Streets, New York, to the Jersey City station of the Pennsylvania Railroad, thence north to a point just above the present Erie Railroad station, thence under the Hudson River to Christopher Street, New York, thence via Christopher Street and Sixth Avenue to Thirty-Third Street. Spurs will be built from the corner of Sixth Avenue and Ninth Street to Astor Place, where connection will be made with the present subway; from the main line in Jersey City to a point adjoining the present station of the Delaware, Lackawanna & Western Railroad, and from the Jersey City station of the Pennsylvania Railroad south to the station of the Central Railroad of New Jersey, in Communipaw. In addition, the company has leased the present tracks of the Pennsylvania Railroad from Jersey City to Newark, and will conduct a through business over these tracks via its tunnel to both of its main terminals in New York. A map of the entire route appeared in the Street Railway Journal for Nov. 25, 1905.

The Cortlandt, or downtown, terminal station in New York will be the largest of any. Here the company has secured on Cortlandt, Dey, Fulton and Church Streets two plots, one measuring about 230 ft. x 210 ft., the other about 180 ft. x 190 ft., on which it is erecting two twenty-two-story buildings. All the floors of these two buildings except the ground floor and basement will be leased for office purposes, and the company is guaranteeing occupancy by May 1, 1908. The convenience of these offices to the railway station, it is thought, will appeal especially to manufacturers who desire offices in New York and who have factories or warehouses in Jersey City and Newark, or in their neighborhood.

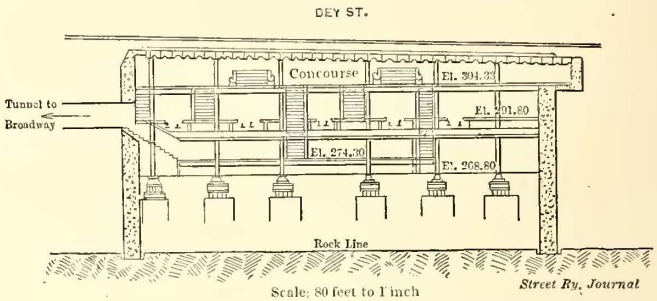


FIG. 1.—CROSS SECTION OF CORTLANDT STREET STATION

Electric railway interest in the building centers principally in the arrangement of the floors on and below the street level devoted to railway purposes. As shown in the longitudinal and cross sections (Figs. 1 and 2), entrance to

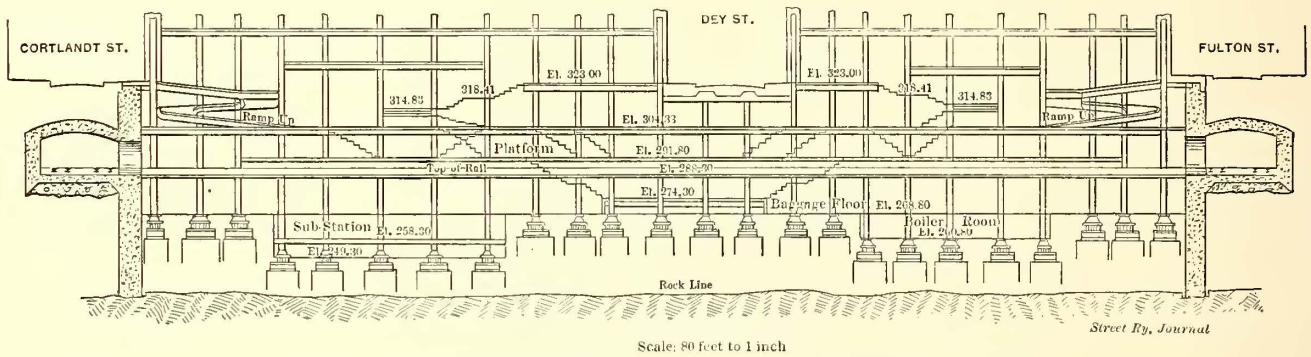


FIG. 2.—LONGITUDINAL SECTION OF CORTLANDT STREET STATION

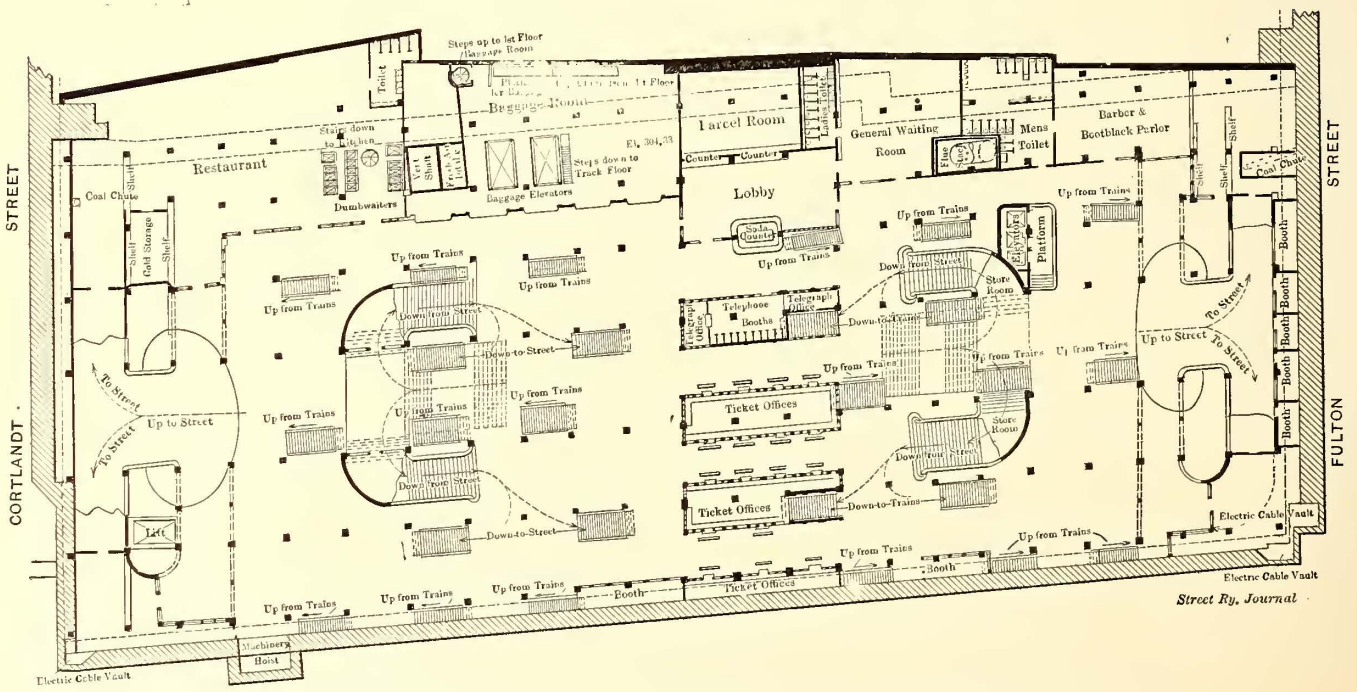


FIG. 3.—PLAN OF CONCOURSE FLOOR, WITH WAITING ROOM, TICKET OFFICES, ETC.

the Cortlandt Street station is provided from Fulton, Cortlandt and Dey Streets, and by a tunnel connecting with the Fulton Street station of the present subway. From Fulton and Cortlandt Streets the passengers descend by inclined planes or ramps, and from Dey Street by stairs to the concourse floor, a plan of which is shown in Fig. 3. This floor contains the usual waiting rooms with ticket offices, baggage rooms, restaurant, etc., and is connected by stairs with the platform level shown in Fig. 4. Here there are five loops which enter on the Cortlandt side and leave on the Fulton Street side with 90-ft. radius curves. A novel feature of this station is the separation of inbound and outbound passengers. As has already been described, the cars are provided with center and end entrances on each side, and incoming passengers will be discharged on to the inbound platform on one side of the car before outbound passengers are admitted from the outbound platform on the other side of the car. The length of the platforms is 370 ft., allowing accommodation for eight-passenger-car trains, which it is expected can be dispatched on a headway of 1½ minutes. Underneath the five passenger platforms is a mezzanine passageway, connecting with the Dey Street tunnel to the Fulton Street subway station of the Interborough Rapid Transit Company.

Figs. 5 to 8 illustrate the Hoboken sub-terminal, which is particularly interesting on account of the arrangement made for connecting at this place with the passenger station of the Lackawanna (steam) Railroad, the surface trolley cars of the Public Service Corporation and the elevated cars of the latter which use the North Hudson viaduct to reach Jersey City Heights. Fig. 5 is a plan at this point of the Public Service loop and terminal, which is directly above the Hudson Companies' terminal. As will be noticed, the elevated cars are brought in from the west, and after discharging passengers are carried around a loop to three outbound platforms. The surface cars are also brought in from the west and discharge on a platform about 250 ft. in length, separated by a barrier from the inbound platform of the elevated cars. They then traverse a second loop and can load passengers from the Hudson Companies' lines on two other tracks or from Hoboken on three tracks. Connection with the Lackawanna Railroad station is made through a passageway leading to a concourse directly under the surface track. The Hudson Companies' station proper at this point

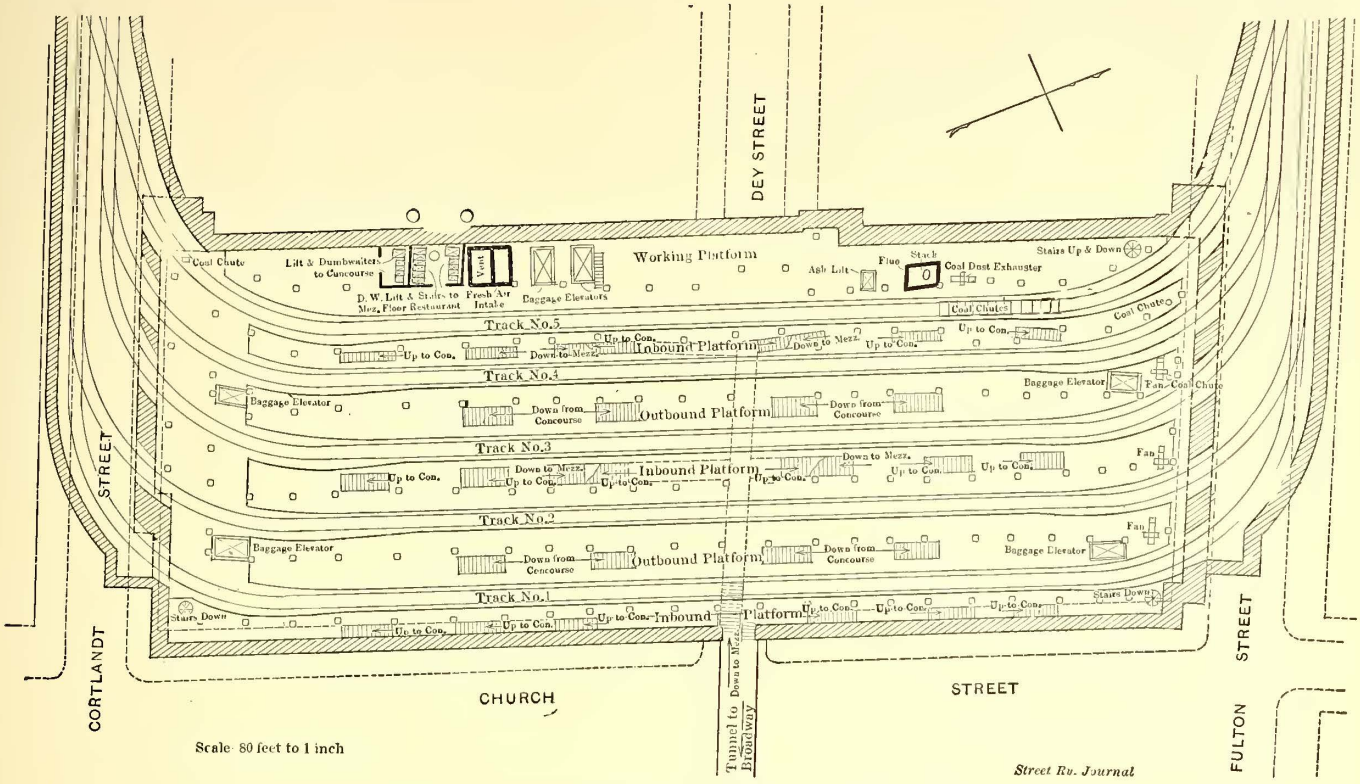


FIG. 4.—PLAN OF STATION AT CORTLANDT STREET

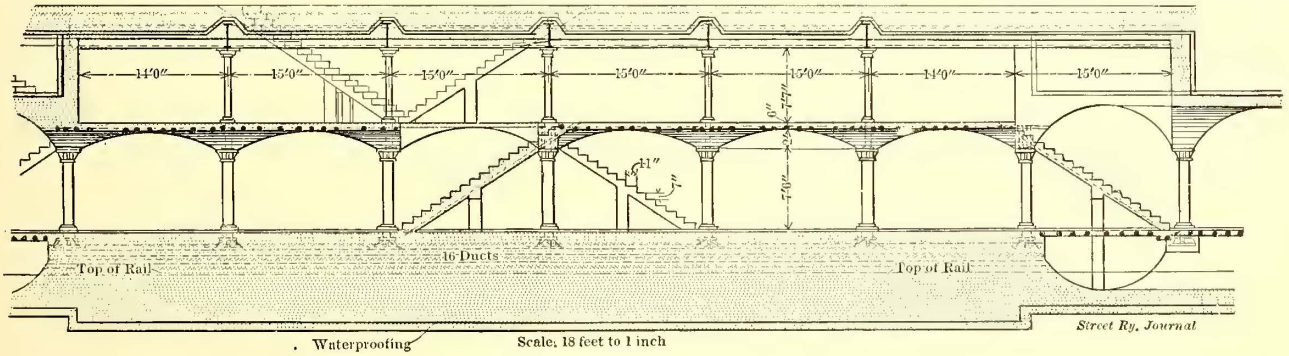


FIG. 7.—LONGITUDINAL SECTION AT HOBOKEN TERMINAL

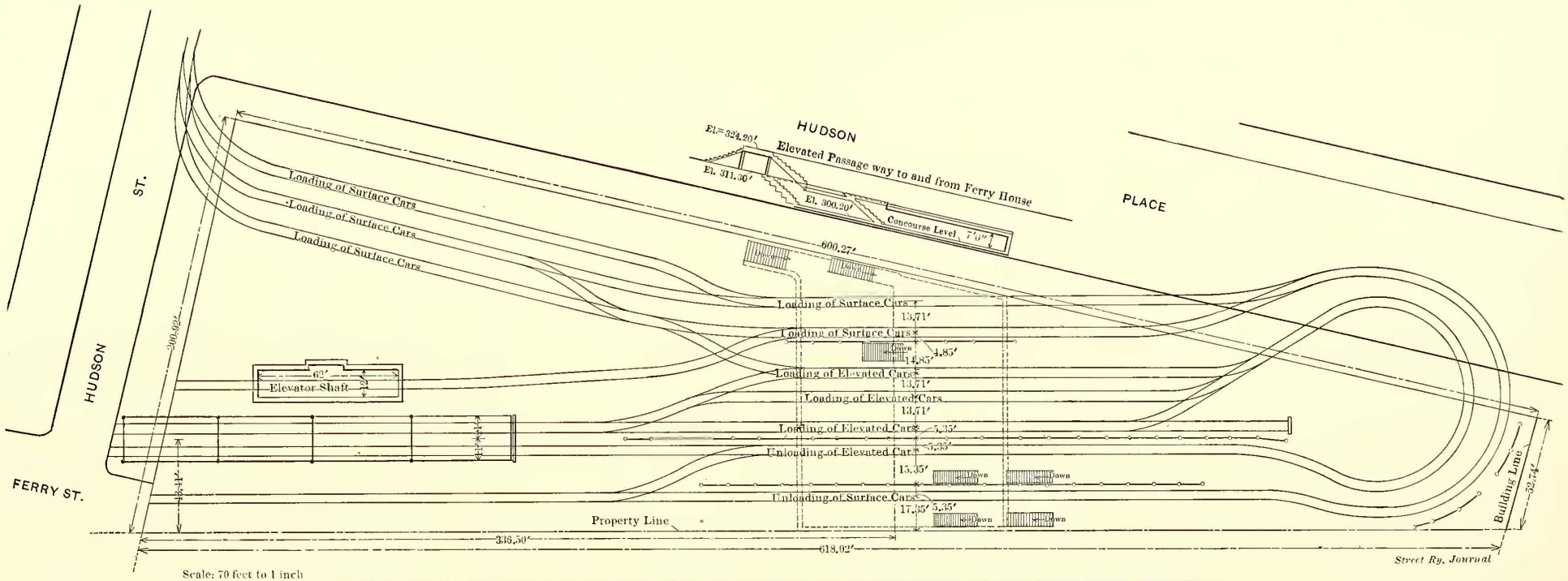
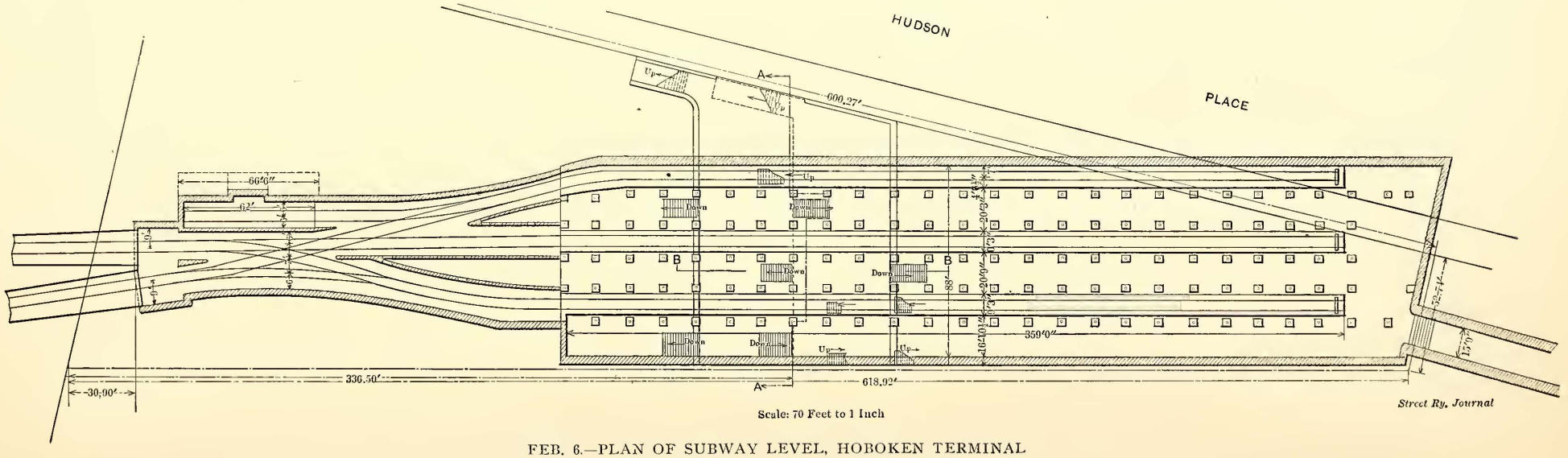


FIG. 5.—PLAN OF SURFACE TRACKS AND STAIRWAYS TO CONCOURSE AT THE HOBOKEN TERMINAL



FEB. 6.—PLAN OF SUBWAY LEVEL, HOBOKEN TERMINAL

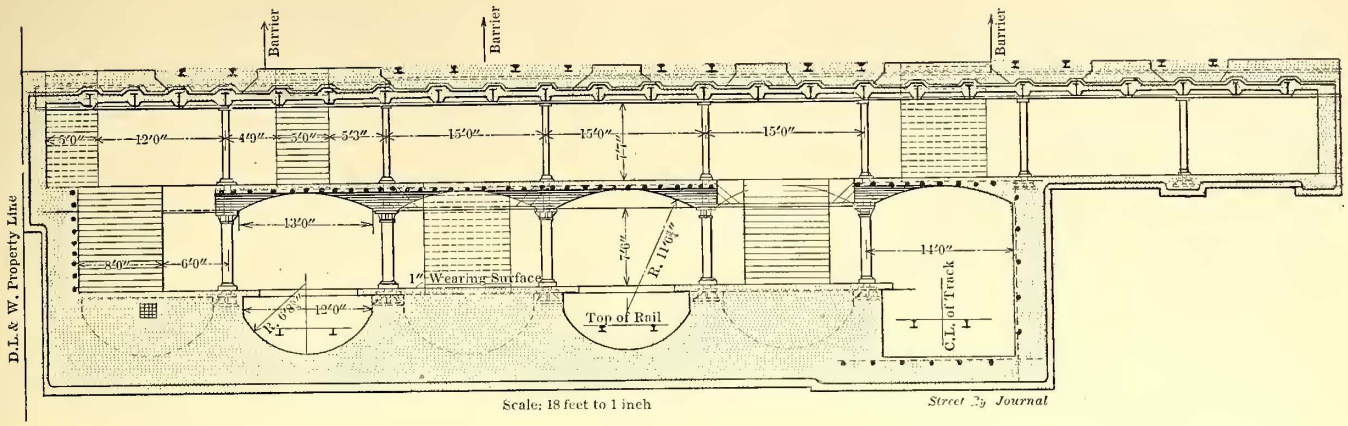


FIG. 8.—CROSS SECTION AT HOBOKEN TERMINAL

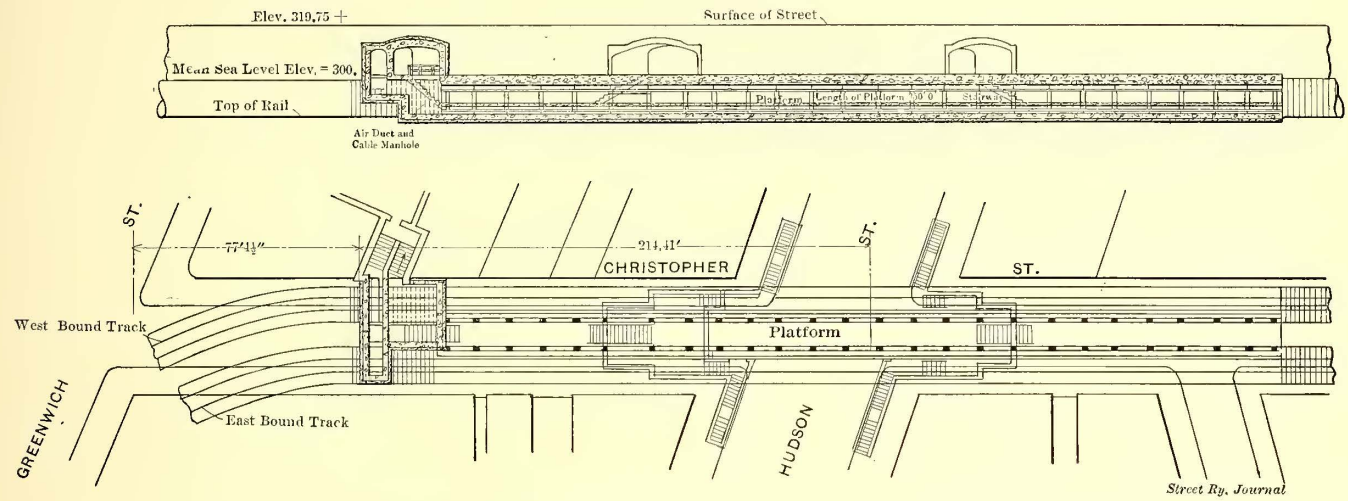


FIG. 9.—PLAN AND LONGITUDINAL SECTION OF THE HUDSON STREET STATION, NEW YORK

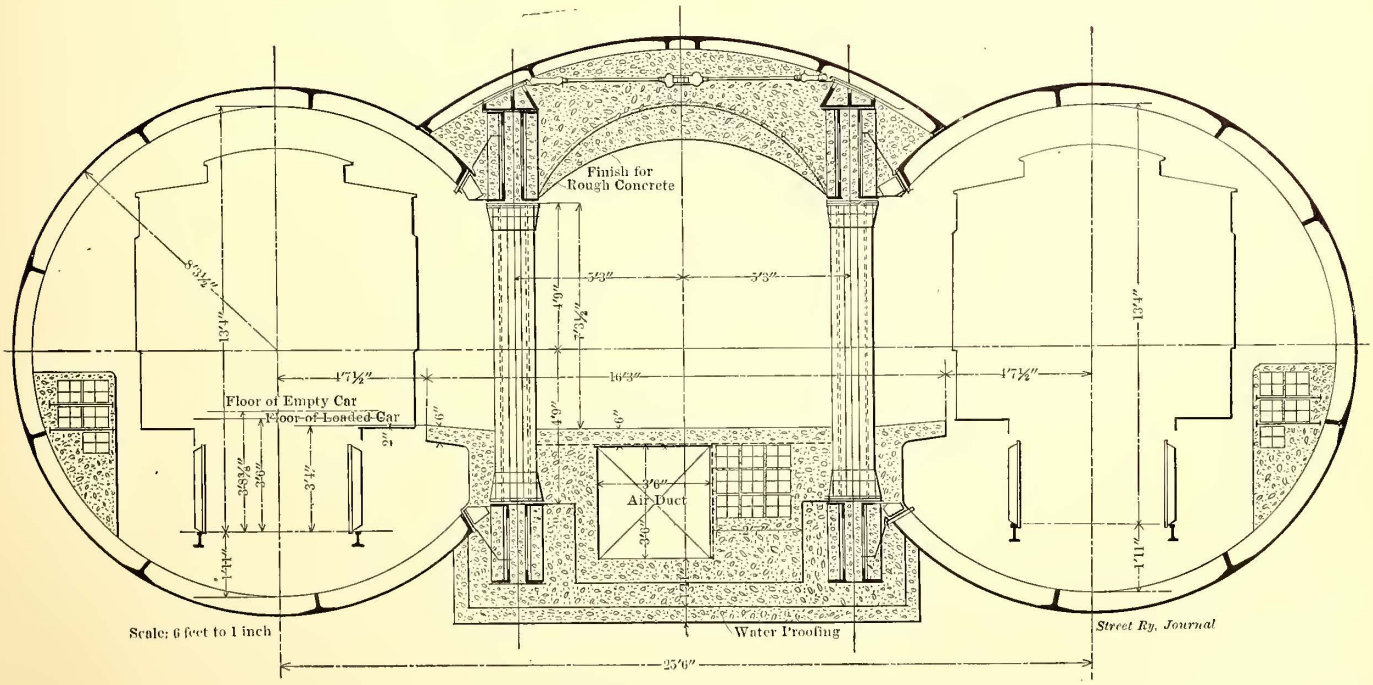


FIG. 10.—CROSS-SECTION THROUGH THE HUDSON STREET STATION, NEW YORK

consists of three stub tracks 359 ft. in length, two of which have separate inbound and outbound platforms.

Two other typical stations are illustrated. One is that at the corner of Hudson and Christopher Streets, which is the first station in New York City after leaving Hoboken. A plan and longitudinal section of this station is given in Fig. 9, and a cross section in Fig. 10. As will be seen, this station has an island platform 350 ft. in length, with an entrance through private property on Christopher Street.

A typical Sixth Avenue station is that at Nineteenth Street and Sixth Avenue, which has separate eastbound and west-bound platforms, each 350 ft. in length. In this case also the exits and entrances have been provided through private property.

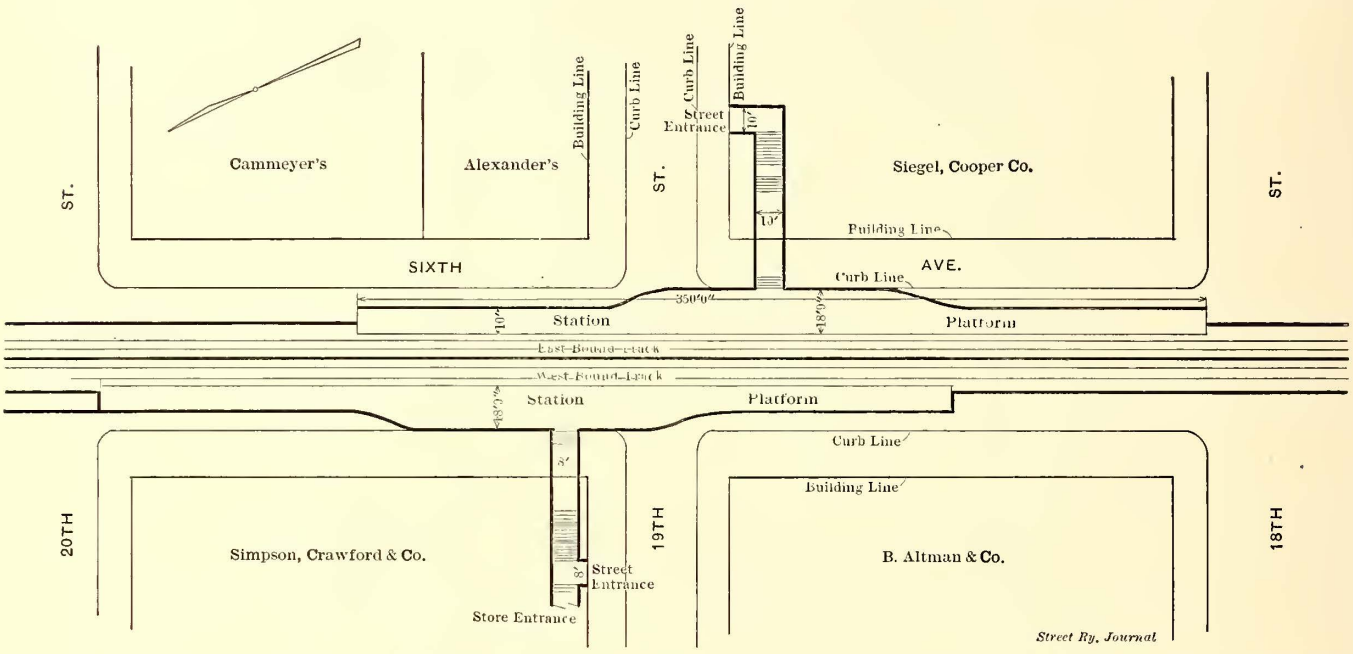


FIG. 11.—STATION ON THE SIXTH AVENUE EXTENSION OF THE NEW YORK & JERSEY RAILROAD, AT NINETEENTH ST.

FIRE INSURANCE RESERVE FUND IN MILWAUKEE

As is generally known, the Milwaukee Electric Railway & Light Company has made a practice for a number of years of charging off a certain amount of its gross receipts for different reserve accounts, and the president of the company, John I. Beggs, has always been an advocate of this policy. Among the funds thus provided for is one known as the fire insurance reserve fund. In view of the general interest now taken in fire insurance questions, particulars of the method of handling this fund and its amount at present will be of interest.

Up to within a year or two the company transferred 1½ per cent of its gross receipts to this fund. Out of it all fire insurance premiums were paid, also any small losses which were too small to make claim for, or which were not covered by the policies of the company. The balance was accumulated and was invested to build up a fire insurance reserve fund which now consists of $400,000 par value of 5 per cent bonds. For a year or two past the company has found it possible to reduce the percentage charged off for this purpose, and now carries only 1 per cent of its gross receipts to the fund. The fund is of course also credited with the interest received on the investments to the credit of the fund, and at present is increasing at the rate of about $25,000 to $30,000 per annum. The property of the Milwaukee Electric Railway & Light Company is quite fully covered by insurance, as it has been Mr. Beggs' policy not to assume the risk until there is at least $500,000 of invested securities in the company's fire insurance reserve fund. What may be done at that time would depend upon how low a rate of insurance the company was able to obtain from the companies.

The company pursues practically the same course with its injuries and damage account, charging a percentage of its gross receipts monthly to a fund. As this credit has always exceeded the amount paid out on this account the company has now in the fund $350,000 of 5 per cent bonds.

It requires a patient and persistent policy to build up reserve funds on this method, but the policy of the Milwaukee company since it has been under the management of Mr. Beggs has been that such a plan is the cheapest method possible for protecting railway property against fire loss. There is no cost of administering the fund or of maintaining a field organization such as is necessary in any mutual company, even though that may be very small, as it has been with the New England Mutuals.

ELECTRIC FREIGHT SERVICE TO BE ESTABLISHED BETWEEN ZANESVILLE, COLUMBUS AND INDIANAPOLIS

The Indiana, Columbus & Eastern Traction Company has ordered a number of freight and express trailers, and when these arrive the through freight service between Zanesville, Columbus and Indianapolis will be established. This service has not been put on heretofore on account of the lack of necessary equipment. The through trailers, when put on, will be locked on leaving Zanesville, and en route will be unlocked in Columbus, Springfield, Dayton and Richmond to receive through freight to Indianapolis. In like manner they will bring through freight to Columbus and Zanesville on the return trip.

SHOP KINKS AND PRACTICE AT MUSKOGEE, INDIAN TERRITORY

In those regions where electric railway properties are at considerable distances apart and the opportunities for the men of different systems to mingle with each other are limited, it is a very noticeable fact that there is more originality in operating features in general and shop practice in particular than is to be found in those sections where the men of different systems have frequent opportunities to exchange ideas.

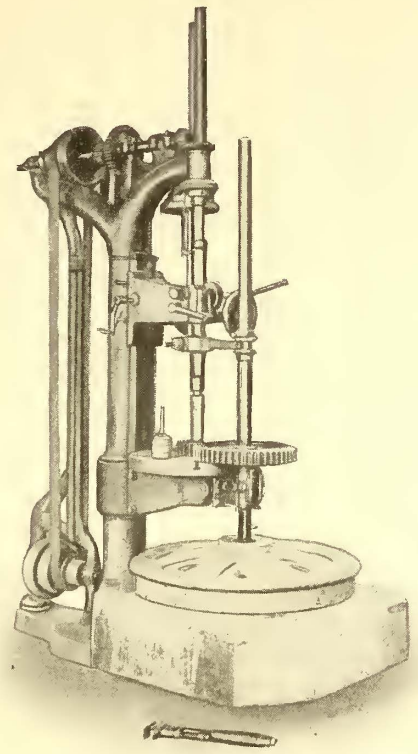
Practice in the shops of the Muskogee Electric Traction Company, of Muskogee, Indian Territory, bears out this statement. Several interesting devices have been made, and in several features practice is radically different from that found in the shops of Eastern companies. The different devices have practically all been gotten up by R. D. Long, manager of the system, and it is through his courtesy that this publication is able to give an account of them.

The shops for the system are located at the east limits of the city. One brick building measuring 36 ft. x 120 ft. contains an inspection shed in the front portion, a machine and paint shop immediately behind this shed, and a store room and office in the rear. The machine shop is equipped with an 18-in. lathe having a 12-ft. bed, an 18-in. drill press, and an emery grinder, all driven by a 5-hp motor. There is also a hand-operated wheel press. These few tools, together with several original devices, are all that are required to maintain the equipment in good condition.

By means of a rather ingenious attachment the 18-in. drill press is made to serve as a wheel lathe. The attachment consists of an additional spindle, or boring bar, operated by means of a gear and pinion from the main spindle.

A PRACTICAL FORGE MADE FROM OLD BOILER IRON AND OTHER SCRAP

The wheel rests on a concrete slab, the surface of which is at right angles to the axis of the boring bar. It was of course essential that this surface be at right angles to the boring bar, for otherwise the bores would not be true. To get this surface true the boring bar was first put in place, and then while the concrete was soft it was surfaced by swinging around the bar a board placed at right angles to it. The boring bar extends through the concrete block and an adjustable bearing in the block keeps it in position. Expansion bolts are employed to hold the wheel in place. An extending arm from the feeding mechanism of the drill press, which works between collars on the boring bar, enables the boring bar to be fed by the feeding mechanism of the drill press. The wheels are obtained from the foundry with a rough cut already made. Usually a wheel is placed on the block, fastened in position, and two cuts are made in about twenty minutes. The accuracy of the machine may be judged from the fact that the wheels always go on the axles at a pressure between 35 tons and 40 tons.



ADAPTATION OF A DRILL PRESS MADE TO SERVE AS A WHEEL LATHE

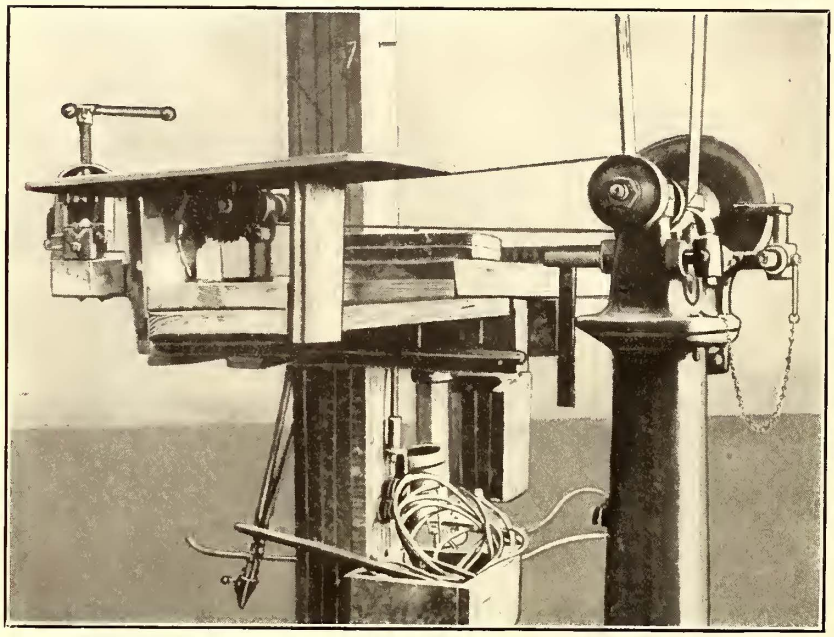
A 3-GAL. CAN FOR OILING TRACK

Before this method of boring wheels was devised the work was done on the 18-in. lathe. The tail stock of the lathe was removed. A frame extending over the end of the bed carried the wheel in such a position that when the carrier was moved the wheel was fed up against a tool wedged in a long shaft which extended from the head stock, and held in position by the steady rest placed near the end of the bed.

Chilled cast-iron wheels with flanges 1-in. high and treads with a 3-in. tread are employed. Practically no trouble at all is experienced with breaking of flanges and rims. This is due largely to the fact that T-rail is used exclusively in track construction. For a time, however, more or less wheel trouble was caused by the grease used on the track curves getting hard and filling special work. Crude oil has since been substituted for grease, and this is not only found much more satisfactory but it is obtained at a much less initial cost and is much easier applied.

The can shown in one of the illustrations is employed in oiling the track. It holds about three gallons, and the spout is provided with a spring valve, opened by pressing with the thumb a small lever near the handle of the can. The end of the spout is provided with a guide which fits against the side of the rail. The idea of such a can was originally obtained from one used in Oklahoma City.

The forge used in the shop for heating axles or heavy parts is a suggestion that might be of benefit to others. It is made of a section of an old boiler that was obtained at a very low cost. The boiler shell extends about 4 ft. under ground and is left unfilled up to the fireplace. The brick forming this are held up by cross bars supported from the rim of the forge. The grate is formed of the perforated plate of a Providence fender. A motor-driven blower placed overhead and originally used in a cotton gin supplies air to the forge through a square wood pipe.



HOME-MADE CIRCULAR SAW BUILT FOR SAWING OUT ARMATURE STICKS

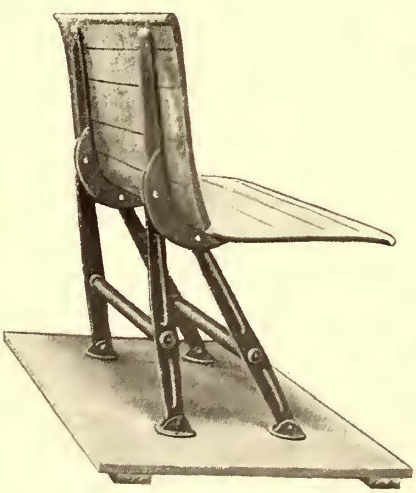
Another illustration shows a small circular saw belted to an emery wheel. The shop contains no wood-working tools, and this saw was built especially for the purpose of sawing out the armature sticks for the G. E.-800 armatures. It was filed out of a portion of an old hand saw, and has been found well suited for the use for which it was constructed.

Armatures and field coils are wound in the shop but the armature coils are purchased. One peculiar practice in the winding of armatures is that the leads are not soldered into the commutator bars; instead they are simply driven in tightly. This practice has been followed by Mr. Long for about three years, and practically no trouble at all has been experienced by leads coming out. The argument for the practice is that the time consumed in soldering the leads is wasted. Little armature trouble has been experienced, in fact but one armature has been lost in the last year. This is largely due to the rigid inspection of bearings and care in oiling.

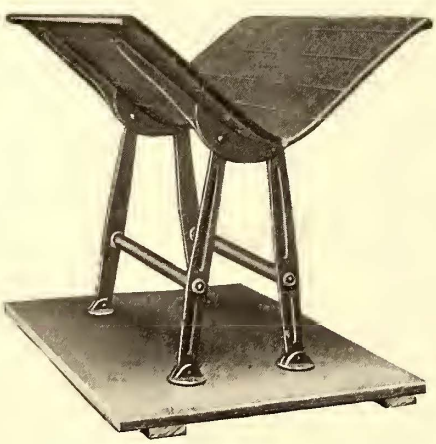
The efficiency of choke coils on the cars and a proper installation of lightning arresters was rather effectively demonstrated on this system. With lightning arresters every twenty poles and no choke coils on the cars, burn-outs from lightning were frequent sources of inconvenience. On one occasion a generator in the power house and five cars were burned out. This incident resulted in placing arresters all over the system at intervals of five poles, or ten arresters to the mile. In addition choke coils 4 ins. in diameter and 4 ft. long were placed on the cars. An arrester consisting of a number of cotton-covered wires lying across a ground and a trolley terminal was also placed in the power house. Since these installations have been made not an armature has been lost by lightning. At the present time all of the arresters are given a thorough inspection at intervals of a few months and also after storms.

Inspection of motors on most of the cars is very much facilitated by lamps installed permanently over the motors. When arc headlights were substituted for incandescent lamps the cars were rewired so as to place the extra incandescent lamps in an extra circuit and over the motors.

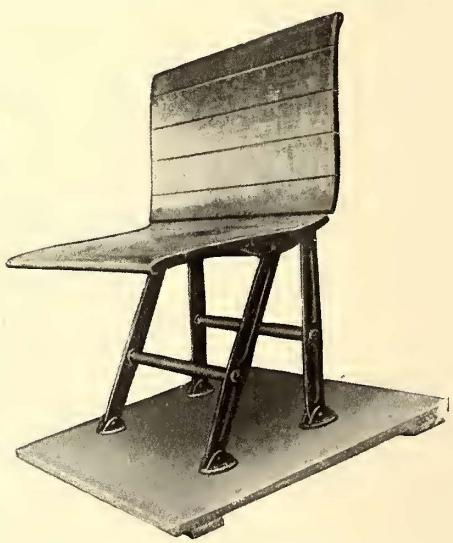
Wood pins substituted for the steel dowel pins in the feet of the controller have been the means of preventing many controller backs being broken. As these pins simply hold the controller in position and take no side strain under ordinary conditions wood pins answer very well. In the event of a collision or undue stress on the controller back the wood pins break and relieve the stress before the back



FIRST SEATING POSITION OF REVERSIBLE SEAT



INTERMEDIATE POSITION OF REVERSIBLE CAR SEAT



SECOND SEATING POSITION OF REVERSIBLE SEAT

is fractured. The controller is of course always held up by the angle on the back near the top.

No sand is carried on the cars and at only one place on the line is sand used on the track. This is at a viaduct over the yards of the Missouri, Kansas & Texas Railway system.

The final three illustrations show a reversible car seat gotten up by and patented by Mr. Long. How the seat is reversed may be gathered from the three illustrations, which show it in the two positions and also in an intermediate position when being reversed. The seat and back are constructed similar, and that which is the seat in one position serves as the back in the other. The design is such that the only way the seat can be reversed is by pulling up on the lower portion. Pushing on the rear will not cause it to move. As the weight of the body holds the lower portion down there is no tendency for the seat to tip. The seat has the desirable qualities of simplicity, of being comfortable, and of taking up very little room. There is plenty of space under it for a broom to be inserted in order to sweep the floor.

By reference to the illustrations it may be seen that the top of the back is lowered in almost a straight line when the seat is reversed. Two seats can therefore be thrown facing each other without their being uncomfortably close. A car provided with seats of this design has more the appearance of roominess than one with seats having thick backs. The seat has been in service for several years and no objections to its use have developed.

The consideration which determines whether or not shop practice is good or bad or whether the many original devices in a shop really save time is of course the amount of work necessary to maintain the cars. In this connection it might be stated that all the cars of the system are kept up by the personal work of A. G. Corey, master mechanic, during the day, and by one night man, who also cleans and inspects the cars. This of course does not include the painting or the carpenter work. In the summer season eight passenger cars and one freight car are regularly operated, and in winter five passenger cars and a freight car are kept in service. During the entire year, however, extra cars are frequently put on for special runs.

NOTES ON EUROPEAN TRACK CONSTRUCTION

At the 1906 meeting of the Internationaler Strassenbahn-und-Kleinbahn-Verein (International Street and Interurban Railway Association) a voluminous report on track construction was presented by Arthur Busse, Oberingenieur of the Grosse Berliner Strassenbahn. While Mr. Busse's report was confined almost entirely to Continental practice, he made several suggestions which should prove of interest to American companies.

One well-known obstacle to rapid tramway service abroad is the preponderance of narrow and crooked streets in the older portions of the cities. Mr. Busse proposes that this handicap be minimized by having the authorities permit the location of the track on a reservation either close to the curb or else in the middle of the modern wider streets, with which most of the suburbs are provided. This would confine the slow schedule to the business sections. This arrangement, of course, has other advantages besides speed, such as freedom from collision with trucks, lessened danger to passengers and pedestrians, lower paving costs, etc. Mr. Busse's company already has such routes in the Berlin suburbs, Friedenau, Steglitz, Tempelhof and Mariendorf, where a single-track right of way runs along each curb and the vehicle traffic is confined to a center road 10 m (32 ft. 10 ins.) wide. In Charlottenburg, another Berlin suburb, such a right of way was reserved for the company in widening an old street.

The report contains the interesting statement that experiments are now under way in Germany to manufacture rails weighing 120 lbs. per yard of two compositions—hard steel for the head and softer ingot steel for the web and base. While these rails are intended primarily for steam railroad service, they may find application on electric railways with heavy traffic.

In discussing the subject of rail joints, Mr. Busse describes almost every type of mechanical and welded joint now in use. It is interesting to note that of joints of American origin the Falk cast-weld is still used quite extensively in Europe. Mr. Busse says that it is giving excellent results in Antwerp, Bologna, Bordeaux and Brussels, and that the companies in those cities report few breaks and commend the high conductivity given to the return circuit. In Vienna, where the Falk weld was applied to old rails, good results were secured, but it is more difficult to keep in good condition the pavement around the joints. The Falk joint has not been so successful in Berlin, where 10,000 welds were made on old grooved rails. Mr. Busse also speaks favorably about the Lorain electric welding system, but calls attention to the complex equipment required; the same criticism is applied to the Nichols zinc joint developed in Philadelphia.

It would appear that the thermit joint has been successful in most of the Continental cities where it has been applied. The breaks in Berlin which came under the author's personal attention are ascribed more to careless application than to the thermit welding principle. Through the ignorance of workmen the rails may be heated too high, the clamps may be badly applied, or poor tools may be used. On the other hand the joints have been installed on some of the busiest lines in Berlin with excellent results. The convenient application of the thermit method has resulted in its rapid adoption abroad, over 80,000 joints having been installed on the Continent between the time that it was introduced in 1899 and the end of 1905.

The report mentions a new acetylene welding method brought out by the Società Anonima per Imprese de Illuminacione of Rome, described briefly in the paper by Mr. de Burlet on page 434 of the STREET RAILWAY JOURNAL for Sept. 22, 1906. This joint has not yet been applied to rails in practice, but experiments made by the Royal Technical School in Rome have shown favorable results. The gas is applied at a pressure of 1½ atmospheres and gives a welding temperature of about 2550 degs. C., or 450 degs. less than thermit.

The Bolivia Railway Company, of Hartford, Conn., has filed articles of incorporation and organization. It has broad powers, including operating railroad lines, telephones, telegraph lines, vessels, maintaining water powers, running gas or electric plants, and many others, but these do not apply to Connecticut. The capital is $10,000,000 and the company paid a fee of $300 to the State. Business is to be begun on $3,500. The incorporators are Edward W. Burdick, of Englewood, N. J.; Aloysius C. Gahan, of New York; Jacob G. Metcalfe, of Lakewood, N. J.; Arthur Starke, of New York; Frank L. Sullivan, of New York. Mr. Metcalfe is president, Mr. Burdick is vice-president and H. Starr Giddings, of New York, is secretary and treasurer. The incorporators are the directors.

CAR EQUIPMENT RECORDS AT BUFFALO

In the Street Railway Journal for July 7, 1906, an article was published on the constructional features and equipment of the new car house and rebuilt shops at Cold Spring of the International Railway Company, at Buffalo, N. Y. This depot is the most important one of the company for, in addition to car storage and inspection, it is used for almost every class of surface railway work, including the rebuilding of cars and the manufacture of supplies. Yet in spite of the large number (about 1200) of cars handled there, the record system is so simple that only one man is required to keep track of all the data filed in addition

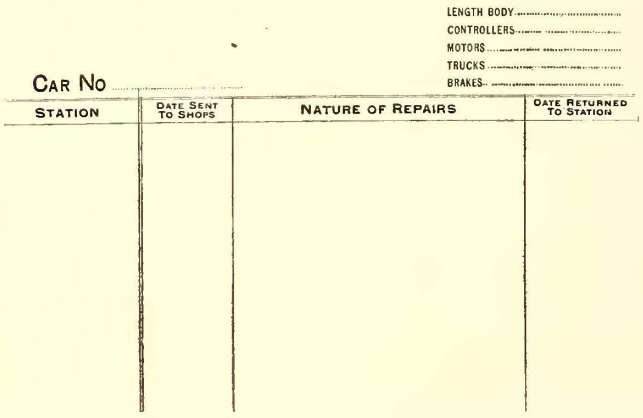


FIG. 1.—FAC-SIMILE OF CARD USED IN CAR LOCATION RECORD SYSTEM

to other work. The idea in mind is that the forms should contain only the essential facts regarding the behavior of equipment, thus imposing little clerical labor on the employee filling them out. It will be noted later, however,

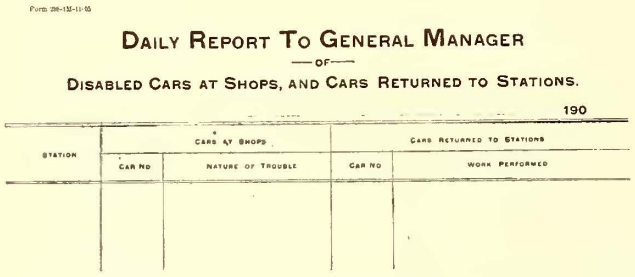


FIG. 3.—DAILY REPORT TO GENERAL MANAGER ON CONDITION OF ROLLING STOCK

that when taken together they contain enough information to enable the auditing department to work out life records, costs, etc.

Perhaps one of the most interesting methods used is the car location record system. Cards 6 ins. x 4 ins. of the type illustrated in Fig. 1 are filed numerically in the several

drawers of a cabinet, one drawer for each operating division of the company. Every card contains the name of the station or car house, when it was sent to the shops, for what purpose and when returned. The upper right-hand corner of the card briefly mentions the length of the car body, together with the type of the electrical equipment, trucks and brakes. The data given in the upper part of the card are practically permanent, but a new line is added to the card every time the car returns for repairs. Thus this system makes it very easy to compare the service given by a number of cars operating under like conditions.

The records upon which these cards are based are made up from the form shown in Fig. 2. This is filled out by the station foreman, who must forward it to the shops with every car sent in for repairs. On the back of this form the inspector reports when the car was returned for service. These slips are kept on file in the master mechanic's office where they are examined the next morning and the data transferred later to the cards mentioned. As long as a car is in the shop undergoing repairs, the corresponding record card is kept in a special drawer of the cabinet. This enables the master mechanic or his assistant to look over

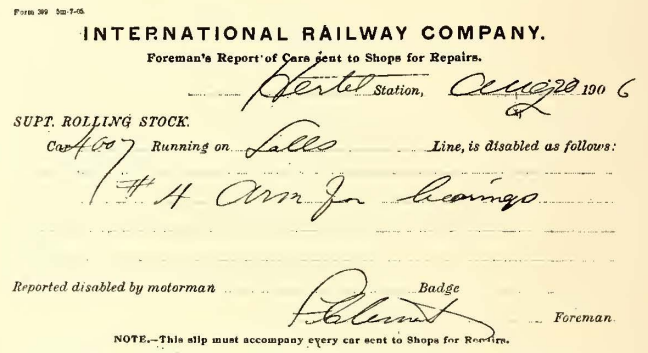


FIG. 2.—STATION FOREMAN'S REPORT OF CARS SENT TO SHOPS FOR REPAIRS

the records of disabled cars in a few minutes to see if such cars are remaining in the shops for any unusual time. The card is not returned to its station drawer until the inspector

Class 700.....	0	1	2	3	4	5	6	7	8	9
0.....										
1.....										
2.....										
3.....										
4.....										
5.....										
6.....										
7.....										
8.....										
9.....										

FIG. 4.—CAR INDEX

advises that the car is ready for service. Fig. 3 is a facsimile of the report sent every day to the general manager, to show briefly the number and origin of disabled cars re-

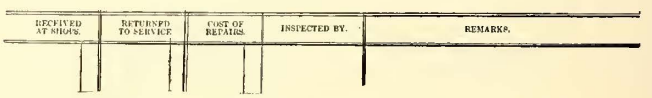


FIG. 5.—HEADINGS OF LEFT AND RIGHT-HAND PAGES OF CAR MAINTENANCE RECORD BOOKS

ceived, repaired and when returned, as well as a statement regarding the character of the work done.

On the International Railway Company's system, as on many others, the cars are numbered in groups according to type, such as "700" class, "4000" class, etc. Since any one station is sure to have several different classes of cars, some other method of filing must be used in addition to the

Date Applied	New	Car No.	Wheel No.	Axle No.	Date Removed	Cause	Miles	Date Applied	Rgd. or Old	Car No.	Axle No.	Date Removed	Cause	Miles	Date Applied	Rgd. or Old

Car No	Axle No.	Date Removed	Cause	Miles	Date Applied	Rge. or Old	Car No.	Axle No.	Date Removed	Cause	Miles	Total Mileage	REMARKS

FIG. 7.—HEADINGS OF LEFT AND RIGHT-HAND PAGES OF WHEEL AND AXLE RECORD BOOK

Form 713 3m. 3-06.

INTERNATIONAL RAILWAY COMPANY

SHOP ORDER

Req. No. .....

Order No. ..... Date .....

Foreman .....

Do the following work .....

Ordered by ..... Approved by .....

Charge to .....

To be completed .....

SUPT. SHOPS.

Completed .....

MATERIAL USED	TIME HOURS	RATE

FOREMAN

THIS ORDER MUST BE RETURNED TO OFFICE ON COMPLETION OF WORK

FIG. 9.—ORDER FOR SUPPLIES WANTED FROM COLD SPRING SHOPS

Form 381-1 M-1-06

INTERNATIONAL RAILWAY COMPANY.

WHEELS CHANGED MONTH ENDING 190

Car No.	Wheel Nos.	Axle No.	Applied	Removed	Cause of Removal	Maker	Miles	Remarks

FIG. 8.—MONTHLY REPORT COVERING WHEELS CHANGED

Form 458 1M.

INTERNATIONAL RAILWAY COMPANY

WHEEL CHANGER'S REPORT

Buffalo, N. Y.

REMOVED								APPLIED					
Date	Wheel No.	Axle No.	Car No.	Maker	Maker's Date	Maker's No.	Cause of Removal	Date	Wheel No.	Axle No.	Maker	Maker's Date	Maker's No.

Foreman.

FIG. 6.—WHEEL CHANGER'S REPORT

Form 325. 10M-8-06.

INTERNATIONAL RAILWAY COMPANY

..... 190 .....

Name .....

Occupation .....

CLASSIFICATION OF SERVICES	RATE	HOURS
TOTAL		

FIG. 10.—FRONT OF EMPLOYEES' TIME SLIP

Employes to charge the hours worked to account numbers as heretofore, with the addition of the letter, showing proper sub-division of accounts 6, 7, 20 and 21. These accounts are sub divided as follows:—

% 6 A—AXLES—Includes cost of labor and material in making ready for use.
" 6 B—BRAKE SHOES—Material only
" 6 C—JOURNAL BEARINGS—Cost of making ready for use.
" 6 D—PAINTING—Cost of labor and material
" 6 E—CAR SIGNS—Making ready for use.
" 6 F—CAST WHEELS—Labor and material ready for use.
" 6 G—GRINDING CAST WHEELS—Labor only ready for use.
" 6 H—STEEL WHEELS—Labor and material ready for use.
" 6 I—TURNING STEEL WHEELS—Labor ready for installation.
" 6 J—DAMAGED CARS—Labor and material.
" 6 K—Car Body repairs, except damaged work and painting.

% 7 A—ARMATURES—Labor and material per type of armature, armature shop charge only.
" 7 B—FIELD COILS—Labor and material per type of field, armature shop charge only.
" 7 C—COMMUTATORS—Material only.
" 7 D—BRUSHES—Material only.
" 7 E—BRUSH HOLDERS—Labor and material ready for use.
" 7 F—ARMATURE BEARINGS—Labor and material ready for use.
" 7 G—MOTOR AXLE BEARINGS—Labor and material ready for use.
" 7 H—TOTAL MOTOR REPAIRS—Charge all labor and material not specified in list.
" 7 I—CONTROLLERS—Labor and material per type, armature shop only.
" 7 J—GEARS—Material cost only.
" 7 K—PINIONS—Material cost only.
" 7 L—TROLLEY WHEELS—Material cost only.

% 20 and 21.
Material for car cleaning.
Labor of car cleaning.
Lubrication.
Car Inspection, including minor repairs in Car Houses. All labor and material excepting oils etc.

FIG. 11.—BACK OF EMPLOYEES' TIME SLIP, SHOWING CLASSIFICATION OF SERVICES

car location record when it is desirable to look up a car without knowing its station. This is accomplished by using a book record with the ingenious type of index shown in Fig. 4.

It will be noted on inspecting this index that it is divided into ten intervals down and across, the vertical column representing the tens and the horizontal column the units. In the squares thus formed are written the page numbers of the cars corresponding to them. Thus, to find the data relative to any car, say 723, it is only necessary to go down to 2 in the vertical column and then move along horizontally until column 3 is searched, where the reference page number or numbers will be found. Similar indexes, of course, are constructed for other group numbers. The data referred to in this fashion are illustrated by the reproductions from book headings in Fig. 5.

The International Railway Company uses cast-iron wheels generally on all of its city divisions, and as they are purchased on a 40,000-mile guarantee, careful records are kept of their performance. The company in buying its wheels simply pays a certain price for their manufacture, guaranteeing to return the same weight in scrap or the difference in money. The company employs self-truing brake-shoes for easy flats—but for this a mileage allowance must be made to the car wheel manufacturer of 2900 miles. Similarly, an allowance of 5000 miles is made every time a wheel is ground. Data regarding wheels changed are first given on the wheel changers' report, Fig. 6, and then transferred to a book, the cross-page headings of which are given in Fig. 7. This gives a continuous record of the wheels (and axles) from the time installed until scrapped. The exact mileage records can be deduced from the conductors' trip sheets. A monthly report on wheels changed is made up on the form reproduced in Fig. 8.

Fig. 9 illustrates the form of order for material from the shop. The upper part of the form covers the work wanted; name of party ordering; by whom approved; the account number (put on by foreman receiving order); desired date of completion, and actual date of completion. This form is made out in duplicate, the original going to the foreman who does the work and the copy being placed on file. On completion of the work, the foreman returns the requisition to the office after noting the cost of labor and material. All of these orders are numbered consecutively as received. Telephone rush orders must be confirmed in writing.

Figs. 10 and 11 illustrate the two sides of a shop employee's time slip. The front shows the class of service and the time spent, while the back gives the proper account numbers for use in making up costs.

CORRESPONDENCE

THE BOW TROLLEY IN GERMANY

Schenectady, N. Y., March 1, 1907.

Editors Street Railway Journal:

I believe that "German Engineer" in his letter in your issue of Feb. 9 overlooked the three essential points which caused me to write my first letter. They were to bring out the limited current-carrying capacity of the bow; that it possessed fewer advantages than the trolley wheel for heavy electric street railway service, and the fact that the most common form of lightning arresters in Germany is the magnetic blow-out type. I still consider the Charlottenburg road an exception to "German Engineer's" statement that no company in Germany has changed from the bow to the trolley wheel. As an example in Switzerland I might cite the St. Gallen municipal railway, which has also changed from the bow to the trolley wheel. None of the roads mentioned by him in his letter of Feb. 9, as using horn lightning arresters, is a Thomson-Houston road, but all of them were built by other concerns, particularly by the Schuckert Company. His statement that the government of Saxony demands the use of the bow collector on all the roads in that kingdom also requires explanation. There is no law to this effect in Saxony, but since the bow collector was developed for practical use in Dresden, and since it gives satisfaction on low-speed, small-power railways, the commissioner for street railways in Saxony, who has the right to decide in each case what kind of collector shall be used by a street railway applying for a franchise, has so far given the preference to the child of local ingenuity.

As regards wear of the conductor, I beg to refer to the reference list and pamphlet on its railways issued by the Schuckert Company prior to its merger with Siemens & Halske. This pamphlet states that in one installation a trolley wire 8 mm in diameter was worn 0.8 mm with the bow after nine months of service, and that a wear of 1.9 mm was noticed on places where heavy current had to be collected. The trolley wire must be staggered when using the bow collector, as otherwise the saw effect of the sharp trolley wire cuts the bow collector apart within a short time. The wire must be installed with special care on curves and on long spans with heavy sag, in order to avoid side slipping of the wire around the side of the bow collector frame. The soft aluminum bow has in addition a very disagreeable tendency to be melted apart if a heavy short-circuit takes place within the car equipment, and its wear is very heavy if the distance from the trolley wire to the head of the rail is frequently changing.

The references in "Elektrische Bahnen und Betriebe," quoted in my letter, were given to prove that the collecting capacity of one bow is practically limited to 50 amps. when running free and 150 amps at starting.

The following are some statistics of the number of bow collectors required for various car equipments and of the life of the bow and wheel collectors on various roads in Germany and the United States:

Railway.	Number and Type of Collector.	Total H.P. of Motors on Cars.	Maximum Speed, m.p.hr.	Average Mileage of One Collector.
Freiburg	One bow.	24	7.5	10,300
Dresden	One bow.	26	13.6	8,000–12,400
Filder (adhesion)	Two bows.	84	18.6	12,000*
Schenectady	One wheel.	80	30	12,000
Filder (rack)	Two double bows.	300	6.2–7.4	13,640
Toledo & Indiana	One wheel.	300	65	10,000–12,000
Rochester & Eastern.	One wheel.	300	55-55	5,000–6,000

* Conservative assumption.

Owing to the size of current to which the bow collector is limited, it is easy to see that on the ordinary American street railway cars, and to a still greater extent on the high-speed lines mentioned, several bows would have been required if that system of collection had been used.

Eugen Eichel.

Six large cars have been purchased by the Everett-Moore syndicate for through service between Cleveland and Ashtabula over the Cleveland & Eastern and the Cleveland, Painesville & Ashtabula lines. The cars that were first put in use in this service were found to be too light and were taken off. They will be used in local service after the heavy cars are delivered.

ELECTRIC CAR TESTING

Prof. A. S. Richey, of the electric railway engineering department of the Worcester Polytechnic Institute, was the speaker at the regular meeting of the New England Street Railway Club in Boston on Feb. 28. The subject was "Electric Car Testing," and the paper was illustrated by views of car-testing equipment used on the Boston & Worcester, diagrams of test results on that road and views of the new electrical engineering laboratories at Worcester, which will contain when completed the most extensive and flexible arrangements for car testing in the world. The results of the car tests on the Boston & Worcester were printed in the STREET RAILWAY JOURNAL of July 28, 1906.

Two classes of car tests exist; tests on individual pieces of apparatus before assembly, for insulation and efficiency, including heating, torque and economy runs on motors on the stand in the works of the manufacturers, and tests on completed cars. In the case of tests to determine the heating characteristics of the motor, and hence its capacity, the stand tests cannot of themselves give a true knowledge of the later performance of the same motor in actual service, unless allowance is made for the difference in conditions arising from the variations in load in service and the larger freedom of ventilation. Some attempt has been made to reproduce these variable loads in the shop by gearing the motors to a shaft carrying friction brakes and fly-wheels. The fly-wheels are so proportioned as to imitate the inertia of the car, the brakes furnishing an imitation of train, curve and grade resistance. Starts and stops are made as in actual service, proper allowance being made for ventilation. The value of this test lies in the proper assumptions having been made as to train resistance and ventilation.

Car tests may be made to determine the proper constants for use in figuring the results of motor tests, for determining certain values pertaining to a given stretch of track, or to the shape, size and weight of the car or train under consideration. They may be made for the purpose of determining the relative value of locomotive train, multiple-unit train or single car operation, of double or quadruple motor equipments for a given service, rates of acceleration, coasting, braking, heating values or train resistance. If train resistance and the heating characteristics of the motors are known, speed-time-current-distance curves can be plotted, which will enable the engineer accurately to predetermine the speed and current consumption at any point along the line, to determine whether or not a certain motor equipment and train arrangement will make the required schedule without undue heating and with what consumption of power. The proper value for train resistance has not yet been satisfactorily determined in a manner which will enable it to be applied with certainty unless backed by experience or tests with the particular class of road under consideration. It is a value which varies with the size, shape, weight and number of cars composing the train, as well as with the speed. It is made up of the friction of bearings, the rolling friction between the car wheels and the rail, and the air resistance. A large number of formulæ have been proposed, giving results which, when several are applied to a particular case, especially at higher speeds, vary widely. Herein lies one of the uses of car testing—to determine the values of train resistance for a particular class of equipment under consideration, that they may be used in plotting speed-time-current-distance curves, useful in solving many if not most of the problems of electric railway design. It may be necessary to resort to the car test in order to determine the heating capacity of the motors.

Car tests are also made for the purpose of determining the relative efficiency or operating costs of the various parts of the car equipment, such as controlling or braking apparatus, brake-shoes, wheels of various materials, trolley apparatus, different designs of trucks, springs, etc. Prof. Richey referred to the Berlin-Zossen tests, the extensive investigations of the electric railway test commission at St. Louis in 1904, the Boston & Worcester tests previously mentioned, and the tests made in 1902 on the lines of the Indiana Union Traction Company by the Westinghouse engineers and the students of Purdue University. The latter tests were made for the purpose of giving the Westinghouse Company general data upon the performance and requirements of motors for modern high-speed interurban service, by the Purdue men for thesis work, and by the railway company in order to secure information on train resistance and motor performance for use in specifying motors for a hundred-mile extension then in contemplation, and also to aid in a decision as to the adoption of two or four-motor equipments for that extension. Prof. Richey discussed at some length the importance of using autographic or semi-autographic instruments in car tests, urging the elimination as far as possible of long series of tedious observations made at intervals of two to ten seconds, with their resulting labor of transcription, plotting and interpretation. He described the Keiley method of following the variations of instrument needles by a pivoted disc and attached pen system. This method was fully described in the STREET RAILWAY JOURNAL of Dec. 27, 1902, and Sept. 8, 1906, as well as in an article on the "Car Test Recorder of the Boston Elevated Railway Company" in the issue of Jan. 14, 1905. Speed values are generally obtained by measuring the voltage of a small magneto generator, belted or geared to the car axle. All quantities should be plotted as ordinates against time. Recording wattmeters are generally provided for the total power input of the car, for one motor, and possibly for the control circuit or compressor motor circuit. The rise in temperature of the motors is usually measured both by the resistance method and by the thermometer. The time of passing certain landmarks and where possible the beginning and end of grades and curves are marked on the moving paper by a push button and magnet system. In some cases a specially calibrated wattmeter is used to give the square root mean square current per motor.

On some tests difficulty has occurred by the calibration of speed instruments changing during the run, but as the area under the speed-time curve equals distance, the scale may be readily calculated at any point on the record by this method. The rate of acceleration may be easily arrived at by measuring the slope of the speed-time curve.

In the new laboratories at Worcester a special car for tests will be a part of the equipment. The car body, being built by the Cincinnati Car Company, is 40 ft. in length, and externally closely resembles the interurban types of car, with baggage compartment. The interior will be devoid of the usual car furniture, leaving all space clear for testing apparatus and observers. The car will be carried on Baldwin M. C. B. trucks and will be equipped with four GE-80 motors, K-28 control and G. E. straight air brakes. All of the car wiring will be focussed on a slate panel board inside the car so that instruments may be included in any portion of the car circuit.

An important feature of the laboratory is the car testing stand, which is in some respects a similar arrangement to

the steam locomotive testing stand at Purdue University. A concrete foundation at the bottom of the car pit serves as a support for the bed plates of the apparatus, which are I-beams. Four bearing stands, which may be moved along the I-beams and fastened to them at any points, serve the wheel and truck base of any car. Each stand carries a shaft upon which is mounted a pair of supporting wheels, the periphery of which is of the shape of the head of a standard T-rail, the two wheels being mounted on the shaft just track gage distance apart. The shafts also carry fly-wheels built up of various thicknesses of boiler plates, so that the weight may be easily changed over a wide range. There is also mounted on each shaft a GE-57 railway motor arranged as a separately excited generator. A traveling crane serves the entire laboratory.

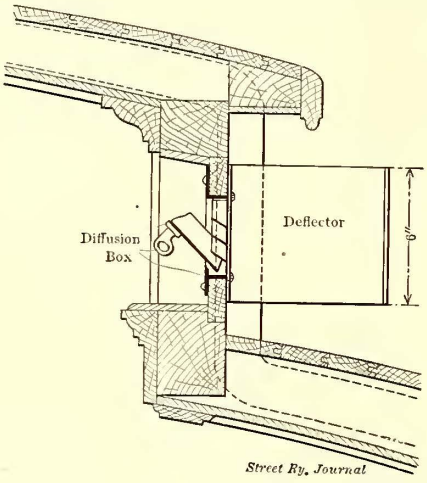
Any car may be run over the stand and let down upon the supporting wheels, each pair of car wheels resting upon a pair of supporting wheels. The car is kept from moving endwise by being fastened at one end to an anchor post. If the car be started it will as a whole and relative to the building stand still, but its motors and wheels will drive the supporting wheels, shafts and generators. This motion will be retarded by the inertia of the fly-wheels, which are of the proper weight to imitate correctly the inertia of the car itself, were it moving on a stationary track. The motion is also retarded by the expenditure of energy in the generators mounted on the supporting shafts, the amount of this energy being regulated by varying the load on the generators either through the field strength or the resistance of the rheostatic load. As the four generator armatures are in parallel, and their fields separately excited in series with one another, they also act to keep the speed of the four supporting shafts uniform with each other at all times.

Having the inertia of the car imitated by the fly-wheels and the train resistance and grade resistance imitated by the loading of the generator brakes, the car can be operated on the stand with the same energy consumption as regular operating conditions require, and the draw-bar pull can be measured with a traction dynamometer at any speed and current. Two complete systems of multiple-unit control apparatus, one a Westinghouse and the other a General Electric, are mounted on one side of the testing stand, and either may be connected with the panel board of the car to replace its K-28 control. Provision is also made for air brake testing, and the equipment includes, besides, a pair of G. E.-52 motors mounted for the regular factory floor test, and two motor generators.

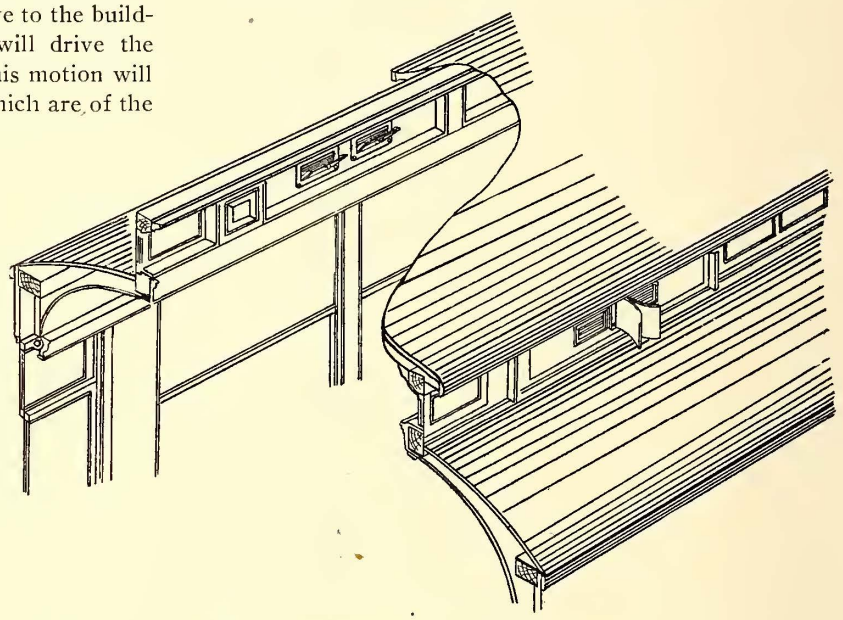
AUTOMATIC VENTILATOR FOR ELECTRIC CARS

Several articles in recent issues of this paper have called attention to the difficulty of ventilating railway cars, both steam and electric, and to the various methods which have been tried to introduce fresh air and remove foul air. As the subject is a live one at present, some particulars of the system of the Automatic Ventilator Company, of New York, would be of interest.

These ventilators have been applied quite extensively to steam railroad cars during the last few years, but the steam railroad business has proven so large that the company has, until recently, been unable to give due attention to the extension of its business on electric roads. Several hundred cars, however, have been equipped with the system, and among the companies using these ventilators are the Philadelphia Rapid Transit Company, Pittsburg Railways Company, Portland (Ore.) Railway, Grand Rapids Railway, and the forty new cars for the Hudson Companies, as well as the new electrical equipment, consisting of 180 cars, of the New York Central Lines.



SECTION THROUGH VENTILATOR



ISOMETRIC DRAWING, SHOWING CONSTRUCTION OF VENTILATOR

In the view of the Portland car published herewith the ventilating deflectors have been made more prominent than they really are. Actually an observer would hardly notice them unless his attention was called to them.

The system differs from most others from the fact that both inlets and outlets are in the monitor, where they are easily installed, being so compact that a set of ventilators can be placed in the space taken by an ordinary deck-sash panel. From four to eight sets are required, the number varying with the size and arrangement of the car. Deck-sash not occupied by the ventilators are permanently closed. The ventilator consists essentially of a deflector and is composed of two strips of sheet brass, bent outwardly, and located midway between openings into the car, which are protected by louvres and by an interior movable shutter, by means of which the air currents are controlled and deflected. All parts of this diffusion box are firmly held by surrounding frame, the whole equipment being substantially made of brass.

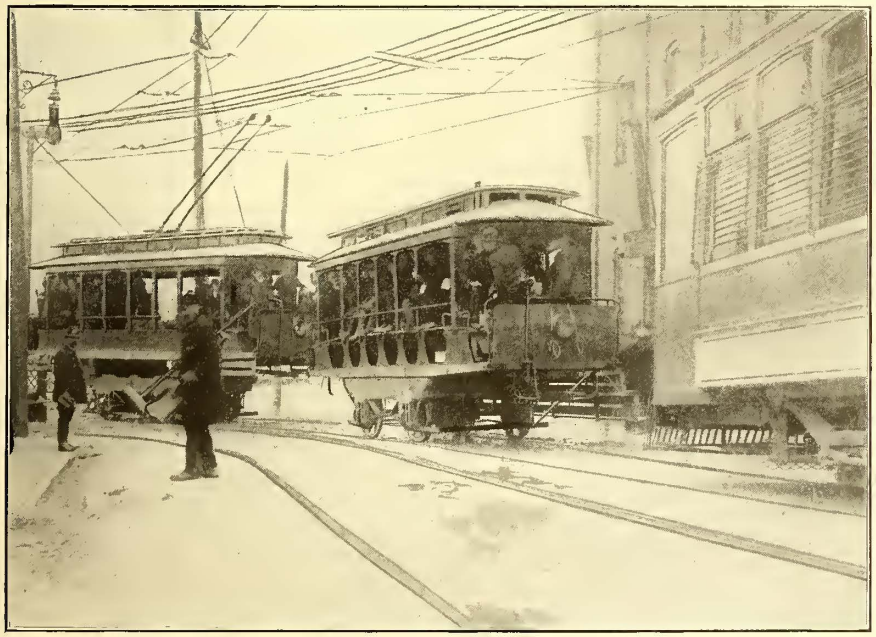
The progress of the car creates a pressure on the deflector by which the fresh air is forced through the forward openings of each set and, as shown, deflected against the ceiling,

from which it descends by gravity into the body of the car. This action is continuous and so gradual that the fresh, descending air has opportunity to absorb heat from the vitiated air through which it passes, in this manner renewing the air without loss of heat in the car in cold weather. At the same time the suction created in the rear of the deflector withdraws the foul air through the rear opening.

As the fresh air comes in from above its descent is so gradual that there is no perceptible draught on the passengers. At first thought it might appear that there would be an interference between the incoming and outgoing currents through openings placed so near together, but practically it can be easily demonstrated that such is not the case, temperature tests and laboratory analysis demonstrating the fact that while the incoming air is fresh air from outwise, the air that is discharged from the car is the breathed and vitiated air.

THE CINCINNATI TRACTION COMPANY'S FLOOD CAR

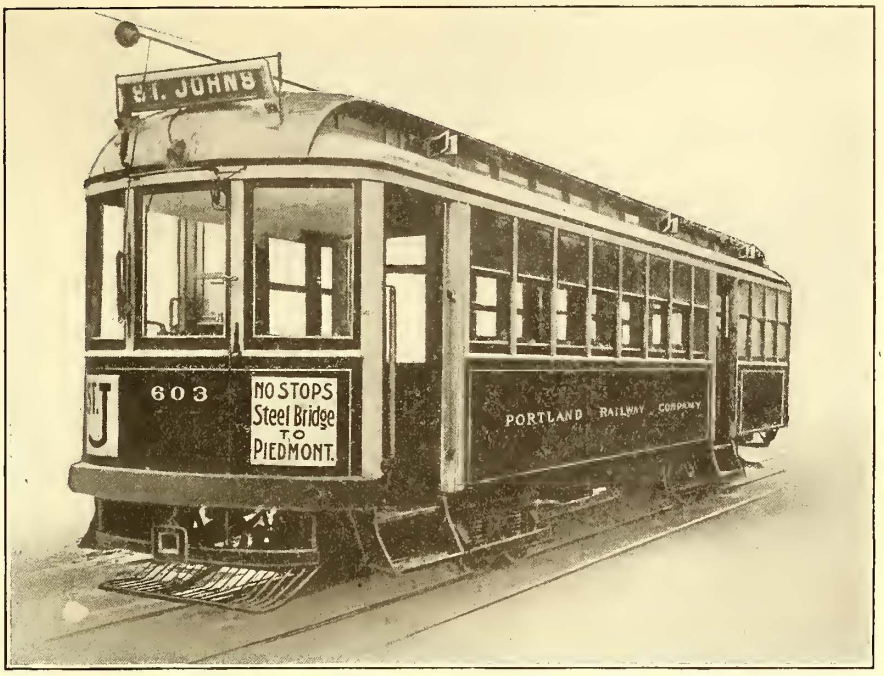
The cars operated by the Cincinnati Traction Company during the recent flood, to which reference has been made before in the STREET RAILWAY JOURNAL, were built especially for the purpose. They were all single-truck, with the framing of the body raised 6 ft. from the rail by means of blocking. There were, however, six bolts in each side of the car, through the sills to the truck frame, sprocket chains being used from the motor pinions to the axle gears. Attached to this car was a trailer, which was raised the same height. The company successfully operated through 6 ft. of water, and by this method was enabled to prevent the section of the city which was affected from being isolated. It was required to operate the cars a distance of three blocks. The accompanying photograph of the cars was made available by the courtesy of the "Cincinnati Enquirer."



CARS RAISED FOR OPERATING THROUGH FLOODED STREETS

OPENING OF THE PHILADELPHIA ELEVATED RAILWAY

On March 2 the Philadelphia Rapid Transit Company officially opened its elevated division extending from the present western terminus of the subway at the Schuylkill River to the magnificent terminal station located at about Seventieth Street. For the greater part of the distance the line extends out Market Street, but at about Sixty-Third Street branches off to its own right of way until it reaches the new union terminal station for the elevated cars and for the cars of the Philadelphia & West Chester Railway, and also for those of the Philadelphia & Western Railway, described in the STREET RAILWAY JOURNAL for Feb. 16.



PORTLAND RAILWAY CAR EQUIPPED WITH VENTILATORS

About one thousand guests, including persons prominent in railroad, business, political and financial life, were present and made the tour of inspection. Trains of special cars were taken at the subway station at the corner of Fifteenth and Market Streets and were run without stop to the terminal station. President John B. Parsons, First Vice-President Geo. D. Widener, Second Vice-President Geo. O. Kruger, Chief Engineer William S. Twining, Assistant General Manager F. H. Lincoln, and other representatives of the Philadelphia Rapid Transit Company were present to receive the guests, and received many congratulations over the completion of the line. Great interest was taken in the arrangements for transferring passengers at the terminal station between the elevated trains and the two suburban lines which connect with the elevated system at that point. An elaborate luncheon was served on the second floor of the terminal building, where a large room has been provided, as in all of the Philadelphia Rapid Transit depots, for motormen and conductors. Among the guests present were Mayor Weaver, James F. Sullivan, William F. Har-

rity, George A. Huhn, J. J. Sullivan, William H. Shelmerdine, W. E. Harrington, C. L. S. Tingley and H. J. Crowley.

The line was opened to the public at 5 a. m. on March 4, but as several of the way stations are not entirely completed no cars will be run after 7:30 p. m. for several months. Transfers will be given between the surface cars and the elevated. An account of the construction of the line was published in the issue of this paper for Feb. 16.

NEW CARS FOR INTERURBAN AND LOCAL SERVICE IN DU BOIS, PA.

Among the shipments made last week by the J. G. Brill Company to Du Bois, Pa., were cars of the combination passenger and baggage type and single-truck cars. The former will, in conjunction with duplicate cars of this type shipped by the same builders about a year ago, be run over the interurban portion of the Du Bois Traction Company's system, which connects Du Bois with Falls Creek and Sykesville. These three towns have a combined population of about 12,000, to take care of which the company operates nineteen cars. The straight passenger type of car will be reserved for local service.

All the new cars have the Brill grooveless-post semi-convertible window system. The combination car has transverse seats of cane, but the single-truck car is provided

NEW CAR FOR DU BOIS

with longitudinal seats, an unusual feature for a car of this construction. The trucks under the combination car are the No. 27-G1 with a wheel base of 4 ft. 6 ins.; the single-truck car on the straight passenger type is the Brill No. 21-E with a wheel base of 7 ft.; all the cars are equipped with motors of 40 hp each. The combination cars, which have the usual baggage compartments with folding seats, measure 29 ft. over the end panels; over crown pieces and vestibules, 38 ft. 5 ins.; width over sills, including sheathing, 8 ft. 2 ins.; side sills, 4 ins. x 7¾ ins.; end sills, 5¼ ins. x 6⅞ ins.; sill plates, ⅜ in. x 12 ins. The chief dimensions of the single-truck cars are: Length over end panels, 20 ft.; over crown pieces and vestibules, 29 ft. 5 ins.; width over sills, including sheathing, 6 ft. 2 ins.; over posts at belt, 7 ft. 6 ins.; side sills, 3¾ ins. x 5¾ ins.; end sills, 4½ ins. x 5½ ins.

METHODS OF CREOSOTE ANALYSIS

The growing scarcity of lumber, with the consequent high prices, is making it imperative that more attention be paid to preservative processes whereby the time of service of timber may be lengthened. Coal-tar creosote is generally regarded as the most efficient of the wood preservatives. This product is very variable in composition, owing to differences in the coals used and in the methods employed in their distillation. Creosotes of different compositions are believed to have different values as wood preservatives, and an analysis of the oil used is, therefore, important. No very large amount of study has been directed to perfecting the methods of creosote analysis, and the Forest Service, believing the matter vitally important to the progress of wood preservation, is now carrying on an investigation of these methods.

The most important part of a creosote analysis is the fractional distillation, since by this operation an approximate determination is made of the relative proportions of the most important substances in tar oil. There has been considerable divergence of opinion as to the best way of carrying out the fractionation of tar oils, some recommending a retort as a distilling vessel and certain temperatures for taking fractions, others recommending a distilling flask and a different set of temperatures. Laboratory experiments carried on by the Service have shown that the difference in the weights of the fractions obtained when using different sorts of distilling vessels are not large, but that the composition of the fractions indicate a little better separation by the flask than by the retort. As regards the influence of the rate of distillation, variations of from one to three drops per second have but slight influence on the weights of the fractions, though the slower rate is more satisfactory.

It is commonly believed that the relative amounts of light oil, napthalene, and anthracene oil are the most important factors determining the value of creosote for wood preservation. A number of creosotes was very carefully fractioned and determinations made of the amounts of napthalene and solid anthracene oil distilling between various temperatures. The average of the results shows that at least 25 per cent of napthalene was present in the distillate between 205 degs. and 250 degs. C., and that over 25 per cent of anthracene oil solids are present in the distillate above 300 degs. C. Work on the specific gravity and the index of refraction of the distillates between different temperatures is now being carried on.

The desirability of getting the criticisms and suggestions of users of creosote has led to the publication of a detailed account of the methods employed in the experiments and the results which have been obtained. Those who desire the publication should ask for Circular 80, Fractional Distillation of Coal Tar Creosote. Request should be made to the Forester, Forest Service, Washington, D. C.

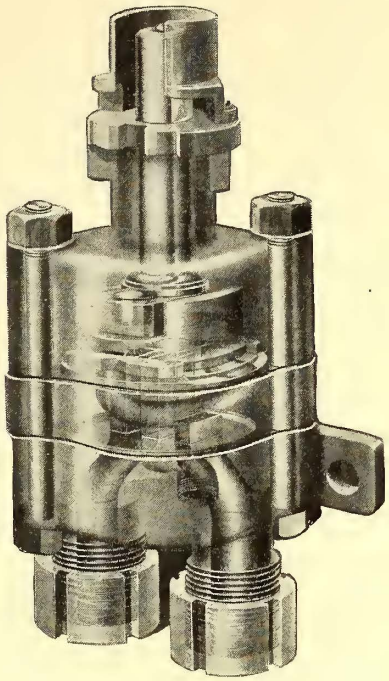
RAILWAY THESES AT UNIVERSITY OF ILLINOIS

The importance with which electric railway engineering work is regarded at the University of Illinois may be judged from the fact that out of twenty theses of the electrical engineering class of 1907, six of them are definitely concerned with electric railway problems. These are "Testing of Electric Railway Bonds," "Determination of Plate and Truck Friction in Railway Trucks," "Effect of Track Curvature in the Operation of Electric Cars," "Telephonic Communication over the Power House Circuit with an Electric Car," "Design, Construction and Operation of a Gradeomometer for Electric Test Cars," and "Induction Motors in Concatenation."

The Columbus Railway & Light Company has distributed over 600 dividend checks to its employees in accordance with its policy, adopted several years ago, of paying the employees dividends at the same rate paid the stockholders. The dividends are based upon the wages paid the men and the average amount received by each man this year is $75.

AN IMPROVED MOTORMAN'S VALVE

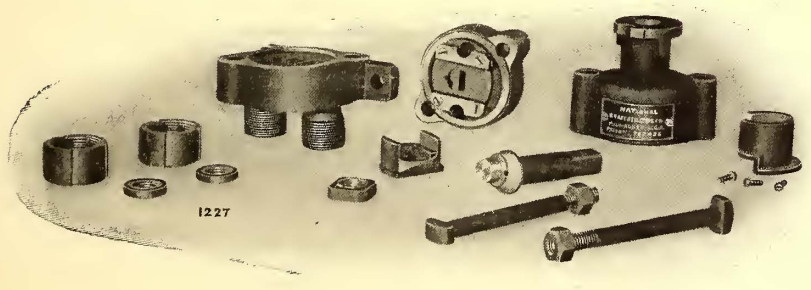
About two years ago the slide valve type of engineers' valve was substituted for the rotary type by the National Brake & Electric Company. The later type of valve has since given such satisfactory service that no improvements embodying changes in its general design have been deemed advisable. However, service has shown where minor improvements could be made, and such improvements are now embodied in the valves put out by the company. The improvements consist mainly in better oiling facilities and provision whereby the valve seat may be surfaced without difficulty if it should become necessary.



PHANTOM VIEW OF MOTORMAN'S VALVE

The design, it is stated, is such that over 150,000 applications of the valve can be made with one oiling. The slide valve is made with an oil reservoir in the upper side. Four small holes lead down from this reservoir to the valve face. These holes are located so that they are never uncovered by the ports, with the result that the oil is fed down from the reservoir only in a quantity sufficient to keep the valve seat well covered. To fill the reservoir a small hole is drilled through the entire length of the valve stem. Oil poured in at the top of the stem drops directly into the reservoir. The stem itself is oiled through an opening in the side of the casting enclosing it.

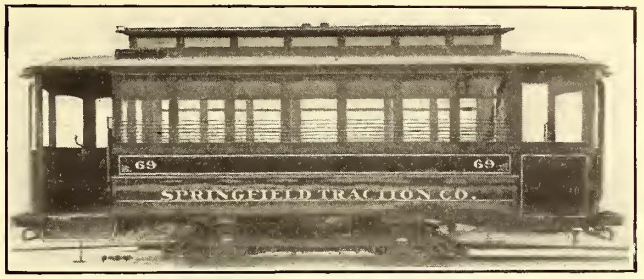
The difficulties of regrinding the seat, should it become necessary, are removed by screwing the guides to the seat casting instead of having them an integral part of this casting. On removing these guides the valve seat extends out beyond any other part of the casting and this permits the seat to be surfaced in a lathe. To prevent the valve being placed on the seat in a reverse position one of the guides is made slightly higher than the other so that the valve will not seat properly unless placed in the right position.



THE VALVE DISSEMBLED

IMPROVEMENTS AT SPRINGFIELD—NEW CARS

The Springfield Railway & Light Company, which operates about 20 miles of line in and about Springfield, Mo. has under way extensions and improvements extending to a number of branches of the service. Perhaps the most important work under way, however, is the extension of the power house by the installation of a 1000-hp engine and a 600-kw direct-connected alternator. Two motor-generator sets of 200-kw and 400-kw capacity respectively have been purchased, and also steam-driven exciters direct connected to marine engines. Other improvements to the plant consist of two 350-hp boilers and the erection of a reinforced concrete chimney, 8 ft. in diameter by 150 ft. high. Another innovation is a system of exhaust steam heating installation which runs to the business part of the town. When the new machinery is put in the company will remodel the entire power house, putting in reinforced concrete floors and generally improving the entire plant.



NEW CAR FOR SPRINGFIELD

The rolling stock has also been improved by the addition of new cars. The cars just purchased are of a standard character throughout. They have stationary round end vestibules closed at diagonal opposite corners. The window system provides for the top sash to be stationary; lower to drop into pockets. The interiors, which are of cherry, are provided with push-buttons. The truck is the Brill No. 21-E. Chief dimensions are: Length over end panels, 18 ft. 3 ins.; over crown pieces, 28 ft. 3 ins.; width over sills, including sheathing, 7 ft. 2½ ins.; the sills and sill plates are of standard dimensions.

SYRACUSE & SOUTH BAY ROAD SOLD

Clifford D. Beebe, acting for a Syracuse syndicate, purchased the Syracuse & South Bay Railway property at mortgage foreclosure sale, Feb. 21, for $251,000. Mr. Beebe states that the road will be pushed to completion and it is expected that it can be operated some time this summer. The property sold to Mr. Beebe includes the whole of the railway already built from north of the city to South Bay, about 13 miles, and the real estate constituting the right of way. It is said that the Beebe syndicate has received assurances that the Rapid Transit Company would renew the traffic agreement which expired Jan. 1 and which provided for running South Bay cars into the city on Rapid Transit tracks.

The Worcester Consolidated Street Railway Company is replacing the cast-iron wheels of its cars operated on suburban lines with steel-tired wheels.

FINANCIAL INTELLIGENCE

Wall Street, March 6, 1907.

The Stock Market

The stock market during the past week has been under heavy selling pressure, and at times this approached the point of demoralization, with prices declining in a sensational manner, a number of the active issues selling at the lowest levels recorded for over a year. Considerable pressure was directed against the so-called Hill stocks, and the large decline in Great Northern preferred and Northern Pacific was one of the most unfavorable features, and tended to increase the almost general pessimism. The weakness in the Pacific stocks and the copper shares was the basis for the impression that a certain very important interest was antagonistic to the market and disposed to bring about an average lower level of prices for the entire list. All favorable features were ignored. The passage of the Aldrich financial bill, and its approval by the President, would ordinarily have had a stimulating influence, as this measure goes a long way in the direction of currency reform, and later on this should be reflected favorably in the money market. The adjournment of Congress removes an element of uncertainty, and with the assurance that we will have no bad news from Washington, the temper of speculation is likely to improve. The really bad feature of the situation, and the one most influential in the direction of lower prices, has been the investigation by the Interstate Commerce Commission of the charges against the Pacific railroads controlled by the Harriman interests, and by the disclosures made during the investigation. The iron and steel situation continues highly satisfactory. There is also complaint by railroads of a shortage of equipment to handle the business, and the greatest difficulty apears to be in the inadequacy of terminal facilities, while the high cost of labor and materials is now being reflected in smaller net earnings. The speculation in the copper stocks is perhaps the most general of that in the entire market, and it is not confined to the shares listed on the New York Stock Exchange, but embraces some of the outside issues of the better class, especially those having an active market in Boston. The mere fact that Amalgamated Copper has not moved in sympathy with other copper shares does not possess any particular significance, for the reason that the copper metal position is now stronger than ever before, and only recently one of the largest producers closed a contract for an enormous amount of copper for July delivery upon the basis of 26½ cents a pound. The monetary situation remains practically unchanged, except that a somewhat firmer tone prevails, especially in the matter of time loans.

The traction stocks have been demoralized, and prices for all of them have declined very sharply, the weakness in Interborough-Metropolitan having been influenced by rumors that the dividend on the preferred might be reduced or passed. These adverse rumors were authoritatively denied. The break in Brooklyn Rapid Transit to the lowest price for years, was the result of the appearance of the Public Utility reform bills.

The Money Market

A decidedly firmer tendency developed in the local money market during the past week, rates for all class of accommodation ruling somewhat higher than those heretofore prevailing, despite the heavy liquidation in the stock market. Money on call loaned at from 2 to 6 per cent, the latter rate being maintained for three consecutive days, which is a very unusual occurrence. In the time loan department asking rates rule fully ¼ to ½ per cent higher, at 6 per cent for sixty days and 5¾ per cent for three to six months. Borrowers generally have confined their operations to day-to-day money, rather than to pay the prevailing rates for time accommodation, but despite this fact the banks and other large lenders are not disposed to make any concessions in rates or to offer with any degree of freedom. The present firmness is accounted for by the heavy March 1 disbursements, which were estimated at upwards of $70,000,000, and which have not yet been redeposited in the banks. Corporate borrowings continue, but upon a somewhat smaller scale, and indications are that the bulk of this demand has been about satisfied, at least for the present. During the week announcement was made that the Atlantic Coast Line had disposed of $5,000,000 three-year 5 per cent notes and also of the placing by the same company of $5,000,000 4 per cent equipment trust bonds. The Louisville & Nashville also placed $6,500,000 three-year 5 per cent notes. Rumors were current that the Lehigh Valley contemplated the issuance of short time notes, but these reports were emphatically denied. The local banks again suffered losses in cash as a result of their operations with the Sub-Treasury, and it is expected that a further loss will be sustained during the present week. The enactment of the Aldrich Financial bill into a law was regarded very favorably by the financial community, as it will enable the Secretary of the Treasury to deposit customs collections in the national banks the same as internal revenue collections, and will also permit the splitting up of currency into bills of small denominations. Heretofore the banks have been hampered at the crop moving period by the scarcity of small bills, and the measure just enacted will do away with this inconvenience. So far, however, the new law has not had any effect upon the market. Foreign exchange has ruled at the gold import point, but our bankers have refrained from disturbing the foreign money markets by withdrawing gold from the principal European centers. The Bank of England has absorbed practically all of the gold arriving from South Africa, but these gains have been partly offset by heavy shipments of the yellow metal to Egypt and South America. At the close of the week the London market showed firmness, and there was renewed fear at that center that the present firmness of money at New York will result in a liberal movement of gold to this side. It is expected that the Japanese Government will announce a new loan within the next few days. The amount of the loan will be $115,000,000, bearing 5 per cent interest, and probably will be issued at around par. These bonds will be used to redeem $110,000,000 6 per cent bonds now outstanding, and will be taken in London, Paris and New York. This operation will, it is expected, greatly benefit the local money situation.

The bank statement published on last Saturday was rather better than expected. Loans decreased $4,274,800. Cash decreased $2,098,400, or $1,000,000 less than was indicated by the preliminary estimate. Deposits were smaller by $6,589,900, thus reducing the reserve required by $1,647,475. The surplus reserve decreased only $450,925. The surplus now stands at $3,858,650, as against $5,008,750 in the corresponding week of 1906; $8,389,700 in 1905, $29,943,300 in 1904, $666,975 in 1903, $2,958,425 in 1902, $10,717,275 in 1901 and $13,641,550 in 1900.

Philadelphia

The local market for traction issues reflected to a great extent the conditions prevailing in the general securities markets. Trading was comparatively light and prices generally were inclined to a lower level. Philadelphia Rapid Transit was about the only stock to display animation, upwards of 11,000 shares changing hands. In the early dealings there was some good buying, which advanced the price from 20½ to 21¼, but in the late trading all of the early improvement was lost. Union Traction advanced on light purchases from 56¼ to 57½ and then reacted to 57. Consolidated Traction was a shade firmer, with sales at 74 and 74¼, and Philadelphia Traction held steady at 94. United Companies of New Jersey lost 2¼ points from 253 to 250¾. Other sales included United Traction of Pittsburg preferred at 47½ and 47; American Railways at 50⅛ and 49¾, ex-dividend; Lehigh Valley Transportation preferred at 21½; Philadelphia Company common at 46 and 45½; Philadelphia Company preferred at 47.

Baltimore

Trading in the tractions at Baltimore was extremely quiet during the past week and prices generally ruled somewhat below those prevailing at the close of last week. United Railway income bonds declined from 90 to 87¾, on light sales, and the

incomes ran off from 56 to 55¼. Norfolk Railway & Light 5s were steady at 98. City & Suburban 5s brought 108¼ for a small amount, and Charleston Consolidated Electric 5s sold at 91½.

Other Traction Securities

Very little activity developed in the market for traction issues at Boston, but prices displayed decided irregularity. Boston & Worcester common, after declining from 26½ to 25, recovered practically all of the loss, and the preferred sold at 77. Massachusetts Electric common and preferred lost a point each, the first named declining from 19 to 18 and the latter from 68 to 67. West end stocks showed greater activity than for some time past. The common, after selling at 93, advanced to 94⅝, but subsequently reacted a point, while the preferred after rising from 109 to 110, ran off to 109¼. Boston Elevated was very quiet, with sales at 149 and 148½. Trading in the Chicago market was practically at a standstill, there being a general disposition to await the result of the election to be held on April 2. Metropolitan Elevated preferred sold at 65¼, and South Side Elevated 4½s sold at 99½ for $73,000, a decline of ¼.

Security Quotations

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

	Feb. 27	Mch. 6
American Railways	50⅞	49¾
Boston Elevated	148¼	148½
Brooklyn Rapid Transit	69½	58¾
Chicago City	160	150
Chicago Union Traction (common)	4¾	4⅝
Chicago Union Traction (preferred)	15	14¾
Cleveland Electric	—	—
Consolidated Traction of New Jersey	—	74½
Detroit United	75	75¾
Interborough-Metropolitan	33½	27⅝
Interborough-Metropolitan (preferred)	69⅞	64¾
International Traction (common)	—	54
International Traction (preferred), 4s	—	79
Manhattan Railway	142	139¼
Massachusetts Elec. Cos. (common)	18	18
Massachusetts Electric Cos. (preferred)	67	66
Metropolitan Elevated, Chicago (common)	25	24¼
Metropolitan Elevated, Chicago (preferred)	67	65
Metropolitan Street	104	—
North American	80	79
North Jersey Street Railway	40	40
Philadelphia Company (common)	45½	44½
Philadelphia Rapid Transit	20½	20
Philadelphia Traction	93¾	92¾
Public Service Corporation certificates	68	66
Public Service Corporation 5 per cent notes	96½	95
South Side Elevated (Chicago)	80	a80
Third Avenue	115	109
Twin City, Minneapolis (common)	101¼	97
Union Traction (Philadelphia)	56¼	56½

a Asked.

Metals

The "Iron Age" says there is continued activity in nearly all the branches of finished iron and steel, and some reports are almost buoyant. The orders for iron and steel bars during February were very heavy, and in the wire industry the spring trade is just opening up with much promise. Not very much has been done lately in steel rails. There has been some cancellation of railroad rolling stock, the Gould system countermanding a total of 4000 cars and 100 locomotives. The Steel Corporation has purchased between 5000 and 6000 tons Bessemer pig iron, for delivery next month. The reputed price is $22 valley furnace. It is well known that in spite of having all the furnaces, except two small stacks, in operation, the Steel Corporation is short of iron, but there have been no purchases for many months, and it is not clear that the latest transaction forehadows any systematic buying campaign.

Copper metal rules strong, but spot prices show no change. Lake is quoted at 25¼ and 25½, electrolytic at 24⅞ and 25⅛, and castings at 24½ and 24¾ cents a pound.

CONTRACT LET FOR PENNSYLVANIA ROAD

Contract for grading, concrete work and steel bridges for the connecting link of the Boyertown & Pottstown Railway Company between the power house at Pottstown and Swamp, Pa., was let to Fine & Harris, of Philadelphia, on March 2. There are to be two 70-ft. plate girder bridges and one 460-ft. plate girder steel tower viaduct, besides other small bridges on the line. The McClintic-Marshall Construction Company received the contract for the steel work through Fine & Harris. This line forms the connecting link between the Reading and Schuylkill Valley lines of the Interstate Railways Company, and will give a through line from Reading to Philadelphia when completed. The construction of the road is to be of the most improved type. The rails are to be of 75-lb. A. S. C. E., and the track will be stone ballasted throughout. The contracts for all materials for this road have been let, and in fact the Boyertown end of the line is laid nearly to Swamp at this time. The Pottstown end of the line is completed up to the borough line. It is expected that the line will be completed and ready for operation about July 1. The construction work is under the supervision of T. K. Bell as chief engineer, and directly in charge of Claude Bryan as division engineer.

B. R. T. OPERATING CHANGES

For convenience in operating its various properties the Brooklyn Rapid Transit Company has changed the scheme of its organization somewhat. The significance of the new order is best conveyed by the official announcement of the change, which says:

> In order that the supply of electrical power and the maintenance of track, overhead work and structures of the railroads embraced in the Brooklyn Rapid Transit system may be under a concentrated management, and therefore more economically administered for each of the railroad companies, those companies have contracted with the Transit Development Company (which already owns some of the principal power houses of the system) to furnish power and to take charge of the maintenance and repair of the railway properties, including their equipment.
>
> The Transit Development Company is incorporated under the Business Corporation law, and is authorized to manufacture and sell power and to do general contracting work. All the stock of this company is owned by the Brooklyn Rapid Transit Company.
>
> Inasmuch as the Court of Appeals, in its recent opinion sustaining the right of the Brooklyn Heights Railroad Company to charge a fare of 10 cents to Coney Island, has decided that Article IV. of the Railroad law relates only to street surface railroad corporations, and that different provisions of the railroad law govern elevated railroad corporations and steam surface railroad corporations, it has been decided hereafter to limit the functions of each railroad corporation embraced in the system to the operation of its own character of railroad.
>
> Under this plan, hereafter the Brooklyn Union Elevated Railroad Company (an elevated railroad corporation) will operate the elevated railroads, the steam surface railroad corporations will operate railroads of that character, and the street surface railroad corporations will operate street surface railroads only. In order to accomplish this re-classification the leases of the Brooklyn Union Elevated Railroad Company, the Sea Beach Railway Company and the South Brooklyn Railway Company to the Brooklyn Heights Railroad Company have been terminated, and the lease of the Prospect Park & Coney Island Railway Company has been assigned to the South Brooklyn Railway Company. This arrangement will in no way interfere with the through operation of trains and cars as heretofore wherever thereby the convenience of the public will be subserved.

Under the new conditions President Winter, of the Brooklyn Rapid Transit system, continues as head of the Brooklyn Heights Company; John F. Calderwood, vice-president and general manager of the Brooklyn Rapid Transit system, is president of the Transit Development Company; Henry Seibert, a director of the Brooklyn Rapid Transit Company, is president of the Brooklyn Union Elevated Railroad Company; David E. Valentine, another director of the Brooklyn Rapid Transit Company, is president of the South Brooklyn Railway Company; Horace C. Du Val, vice-president of the Brooklyn Rapid Transit Company, is president of the Coney Island & Gravesend Railroad Company and also of the Brooklyn, Queens County & Suburban Railroad Company; John E. Borne is president of the Nassau Electric Railroad Company, and J. C. Jenkins is president of the Sea Beach Railroad Company.

NEW YORK CENTRAL ACCIDENT

The hearings on the causes of the New York Central accident have been continued during the past week. That before the Coroner's Jury was concluded March 4; that before the Railroad Commission is still under way. The conclusions rendered by the Coroner's Jury were as follows:

That said train, made up as it was shown to have been, was running at a speed in excess of what has proved to be safe for such a train on a track laid at the existing curvature at this point, the rails of which were fastened on in the way they have proved to have been fastened, and the super-elevation, such as it was proved to have been, of 4½ ins.

That the running of said train at an unsafe speed over said track exerted sufficient lateral pressure on the outer or easterly rail to cut off or shear the heads of the spikes holding said rails to the ties, thus permitting the displacement and the resultant accident.

Our conclusion is that the New York Central & Hudson River Railroad Company did not take safe and proper precautions to guard its passengers at this point, and consequently were culpably negligent, and that the responsibility for the existing conditions seems to be divided between the construction and the operating departments.

In its recommendations the jury said:

We recommend that the New York Central & Hudson River Railroad Company and others operating railroad lines in this State be compelled to reinforce the fastenings of the outer rails on all curves on their lines constructed as the one in question has been proved to have been, by additional spikes, rail braces and increased superelevation, as from the testimony given we feel that unless such precaution is taken similar accidents may be expected.

We further recommend that until the above strengthening has been completed over curves not so reinforced, the New York Central & Hudson River Railroad and other operating railroad lines be required to lower the speed of trains over such curves to so-called equilibrium speed, or one that is absolutely safe, to protect the lives of passengers and employees, and that instructions to this effect be given those in charge of trains.

Owing to the lack of information of employees and representatives of the New York Central & Hudson River Railroad as to the determination or exactness of the speed of the electric trains, we recommend that they be compelled to install such recording instruments or make such tests to determine the speed as will enable their motormen to know with reasonable exactness the speed at which their trains are traveling. This information should cover speeds at the three different positions of the controlling lever handle, and be properly tabulated and placed in a prominent position in the cab of each electric locomotive.

Frank J. Sprague and B. J. Arnold, of the Electric Railway Commission of the New York Central Railroad, sent the following joint letter on March 4 to Assistant District Attorney Nathan A. Sprague, who has charge of the investigation for the District Attorney:

For some days you have been conducting an inquiry before Coroner Schwannecke to ascertain the causes of the disaster of Feb. 16 on the New York Central Road, and to place, if possible, the responsibility therefor. From remarks made at the hearing of last Saturday we infer that it is now nearing a close.

In the course of this investigation it has been suggested that there was some remissness on the part of the Electric Traction Commission, which had general charge of preparing the plans for the change from steam to electrical operation. The undersigned were members of that commission, which was in existence for the four years ending last December, and are therefore familiar with the details of its work.

The duties and responsibilities of that commission, while numerous, were not universal. Its outside members were neither officers of the road, nor in charge of any of its departments; in fact, during the latter part of its existence its duties were almost nominal, as but few meetings were called during a period of several months. At this time the immediate active work of installation in the electric zone was carried out under the supervision of another body known as the construction committee, of which we were not members, but which was composed exclusively of heads of departments and others in the continuous employ of the railroad, who were presumably in daily touch with the work.

Furthermore, no matter who designed or installed the electrical equipment, its upkeep and operation, as well as the maintenance of the tracks, the determination of schedules and the discipline of the operating forces were matters belonging solely to other hands than ours, with whom we were not in touch, and over whom, in our capacity as advisory engineers, we had no control whatever.

During the investigations, both by the State Board of Railway Commissioners and the Coroner's Jury, we have been in New York, subject to call at any time; in fact, one of us came voluntarily from Chicago to be available if wanted. We are conscious of no neglect of our duties, defect in plans or equipment, or lack of precautionary tests on our part. We stand ready to assume to its full measure any responsibility properly belonging to us as members of the Electric Traction Commission, but, in the absence of any request for our evidence, we protest against the possibility of being charged with responsibilities which we believe belong specifically to others, or which are the result of an accident, the causes of which are not yet fully determined.

We have no desire to force ourselves upon your attention, but if it is your wish to arrive at facts in regard to the responsibility of this commission, we suggest that that desire can best be obtained by calling all who are familiar with those facts.

If, however, it is now your judgment that any measure of responsibility rests upon this commission, then we demand the right to be heard.

Further particulars of the hearing will be published next week.

MR. SHONTS DISCUSSES THE TRACTION SITUATION IN NEW YORK

Theodore P. Shonts, the newly-elected president of the Interborough-Metropolitan Company, operating the surface, elevated and subway lines in the boroughs of Manhattan and the Bronx, New York City, formally entered upon his duties on Monday March 4. On Friday, March 1, however, Mr. Shonts consented to be interviewed regarding the transportation situation in New York in general. He said that for some days he had been devoting himself conscientiously to studying traffic conditions, and that as a result of his observations had decided on a number of important changes. Perhaps the most important of the new work outlined by him is the third-tracking of the East Side elevated lines and the operation of more cars in the subway. Mr. Shonts says he is firmly convinced that the morning and evening rush transportation problem on the lines north and south can be solved by third-tracking the Second and Third Avenue L lines, which work can be completed in a year, if the consent of the city is obtained. Plans have already been drawn up by the company for this work, and are in abeyance pending the consent of the city. These plans have been outlined before in the Street Railway Journal, having been somewhat extensively dealt with in the issues of Dec. 29, 1906, and Jan. 5, 1907.

As far as the surface roads are concerned, Mr. Shonts thinks little can be done to better transportation facilities without the intelligent co-operation of the city authorities. In his opinion the operating companies do not get a reasonable use of the facilities that they have furnished for trolley transportation, and to correct this he would have the companies given something like exclusive use all day of certain streets. He believes heavy traffic could in many instances be diverted to streets on which there are no car lines, thus giving the companies greater opportunity to operate their cars.

PHILADELPHIA RAPID TRANSIT COMPANY'S PLAN FOR INCREASING ITS EFFICIENCY

After having carefully considered the plans for improving the street railway facilities submitted by the Retail Merchants' Association and the Trades League, the directors of the Philadelphia Rapid Transit Company have decided not to accept either proposition as a whole, but to present to the stockholders a plan of their own, embodying part of each of the two considered.

With but few exceptions the suggestions made by the Retail Merchants met with approval; but as several directors had ideas of their own to embody in the finished plan counsel was instructed to prepare a new one. On the other hand, the propositions submited by the Trades League nearly all proved objectionable to the directors, they practically agreeing to but one section of the plan, the section to which they did not take exception being the one demanding the surrender of the franchises for the Broad Street Subway and of the Frankford line.

Declaring the merchants' plan to be honest and business-like, President Parsons said that the repeal of the ordinance of 1857 would remove a menace which has caused the company much inconvenience in that it has frightened away capital; that the plan was a good one because of the mutual concessions made by the city and by the traction company, but that the company only agreed to the great sacrifices asked because of an anxiety on the part of the traction officials to secure the good will of the people. He said, further, that the agreement to surrender the franchises to the city at the end of fifty years for their actual cost was a great concession on the part of his company, and that the plan to be submitted by the directors themselves would forever put an end to the evils of the over-capitalization of franchises granted by the city.

LEGISLATION IN PENNSYLVANIA

Steam and electric railway legislation continues to engage especial attention at Harrisburg, with every prospect that bills affecting these interests will be the chief topics the balance of the session. The electric railway interests fortunately, this time, have every reason to expect better treatment than they have received hitherto. Former Attorney-Generals Hampton L. Carson and William Uhler Hensel, representing the organized electric railway interests, appeared before the House corporations committee Tuesday evening, March 5, in support of the Homsher bill granting trolley lines the right to carry freight. Mr. Hensel, with William Pepper, of Philadelphia, drafted this bill. Many of the electric railway operators are more concerned about the passage of the eminent domain measure than the trolley freight bill. The building of not a few lines is now in abeyance owing to the obstinacy of certain property owners along the proposed routes in coming to satisfactory terms with the companies, and at least one of these lines will not be built at the present time if the bill giving trolley companies the right of eminent domain is not passed at this session. That the steam railroad interests will vigorously oppose these two bills is pretty certain.

The House committee on electrical railways had a public hearing Tuesday evening, March 5, on the McNichol-Fahey bills. These bills, which are identical, provide:

"That it shall and may be lawful for any city, borough or township and any street passenger railway company or motor power company, to enter into contracts with each other affecting, fixing and regulating the franchises, powers, duties and liabilities of such companies and the relations and respective rights of the contracting parties.

"Such contracts may, inter alia, provide for payments by the companies to the local authorities in lieu of the performance of certain duties or the payment of license fees or charges imposed in favor of such municipality by the charters of the respective companies or by any general law or ordinance; for the appointment by the local authorities of a certain number of persons to act as directors of such company in conjunction with the directors elected by the stockholders, and further to provide for the ultimate acquisition by the local authorities upon terms mutually satisfactory of the leaseholds, property and franchises of the contracting companies."

Senator McNichol also introduced a second bill affecting trolley lines. It provides that articles of association of proposed trolley concerns shall not be recorded by the secretary of the Commonwealth nor letters patent issued thereon until the incorporators produce a certified copy of ordinances of all cities, boroughs and townships through which the route of the company extends, authorizing the construction of the lines.

To obtain State permission for extensions, similar copies of enabling ordinances must be filed.

The first of these measures is of vital importance to the city of Philadelphia, and embodies the plan proposed by the Retail Merchants' Association for settling the transportation difficulties with the Philadelphia Rapid Transit Company. Under its provision the city of Philadelphia may become a power in the conduct of existing companies, have a voice in the directory of the same and arrange for the taking over of the properties after a term of years.

Regarding the eminent domain bill, the trolley interests favor a restrictive clause providing that the right of eminent domain can only be secured when 51 per cent or more of the property owners along the right of way assent. Electric railway interests want a clause inserted in the freight-carrying bill regulating the class of freight electric railways may carry. On account of grades and equipment they would consider it unfair to be required to transport all classes of freight.

Senator Langfitt, of Allegheny, has introduced a bill of prime interest to electric railway corporations. It is as follows:

"That whenever the municipalities of this Commonwealth shall deem it proper to organize corporations under the laws of this Commonwealth for municipal purposes, they shall be and are hereby authorized to contract with the purchasers of such securities as may be issued by said corporations for the payment semi-annually of the interest thereon and sinking funds to redeem the same at maturity, and to levy and collect such tax as may be necessary therefor; provided, however, that the holders of the stock of such corporations shall hold the same as trustees for the said municipalities, and all revenues earned by said corporations shall be deposited in the proper treasuries to the credit of said municipalities as against the payments made on account of said interest and sinking funds as aforesaid."

Other measures introduced include the following:

SENATE

Providing that the stockholders of corporations, except those which are not chartered and conducted for profit, who shall be entitled to vote at a corporate meeting or election shall have all the right and power to vote by proxy and that one person may be constituted and act as proxy for any number of stockholders and providing the proxies dated more than two months prior to any meeting or election shall not confer the right to veto.

Requiring street railway companies to report to the Secretary of Internal Affairs the number of miles they operate.

To revoke exclusive rights of corporations which have been doing business twenty-five years.

HOUSE

Requiring electric railway companies operating suburban lines to equip their cars with toilets.

Giving traction companies the right to condemn lands on which to build their lines.

At a meeting of the House electric railways committee, March 5, the two bills endorsed by the Temporary Street Railway Association of Pennsylvania, comprising within its membership sixty-seven of the electric railway companies of the State, were favorably acted upon after a hearing had been given to former Attorney-General Hampton L. Carson, counsel for the association, and H. E. Reynolds, of Scranton, an advocate of the measures. Among the electric railway representatives at the hearing were W. E. Harrington, chairman of the association, who is also president of the Pottsville Union Traction Company and manager of the Eastern Pennsylvania Railways Company, of Schuylkill County; A. Merritt Taylor, president of the Philadelphia & West Chester Electric Railway Company; H. C. Reynolds, a director of the Northern Street Railway Company, of Scranton; Thomas A. H. Hay, president of the Northampton Traction Company, of Easton, and Frank H. Musser, president of the Central Pennsylvania Traction Company, of Harrisburg.

The bills favorably recommended for passage to the House of Representatives are the light freight act and the act conferring the right of eminent domain upon street railway companies, both of which have been previously referred to.

The eminent domain act provides, briefly, that street railway companies shall have the right of eminent domain, and in virtue of such right may take so much land or material as may be necessary for the construction of their railway, either as an extension of an existing line or as a new line not exceeding 45 ft. in width except where a greater amount shall be required for the slopes of cuts and embankments and such easements in lands lying within or without the limits of any street, road, lane, alley or other highway as may be necessary for the accomplishment of the objects of said company. In cases where agreement cannot be reached as to the value of the property taken it is provided that the Court of Common Pleas in the county in which the land is situated shall appoint five freeholders, finally to settle the question of compensation. It is also provided that either party shall have the right of appeal from the report of said viewers to the said Court of Common Pleas within thirty days after confirmation of the report, and the appeal shall be tried by a jury as in similar cases, but the costs of the appeal shall be paid by the losing party.

REPORT OF BUILDING OF PENNSYLVANIA RAILROAD TROLLEY LINES IN NEW JERSEY

The reported intention of the Pennsylvania Railroad is to connect all of the shore resorts on the New Jersey coast by a system of trolley lines extending from Sandy Hook to Cape May. Although the Pennsylvania has a network of lines throughout the whole of New Jersey, it has no good direct line north and south along or near the coast, and the new trolley system for which plans are being prepared is intended to correct this deficiency. The system will be built entirely for operation as trolley lines, because the traffic they will serve will be largely limited to the summer season.

GOVERNOR HUGHES ON TRANSIT EVILS

Governor Hughes has made two important statements in regard to the transit problem in New York City, one that relief from present intolerable conditions can be had only through the creation of a State public utilities commission, as recommended in his annual message, and the other that the responsibility for this relief is with the Legislature. The Governor will send to both Houses a special message on the subject of transit reform as soon as the public utilities bills are introduced.

GENERATING EQUIPMENT WANTED FOR AUSTRALIA

The commissioners of the New South Wales Government Railways at Sydney are calling locally for tenders for a 3000-kw turbo-generator for the Ultimo power house, which furnishes current for the Sydney tramways. The specification provides for turbo-alternator, condenser and air pump. The present equipment at the power house consists of 48 Babcock & Wilcox boilers of 250-hp nominal rating, 4 850-kw Allis-General Electric direct-current units, 3 1500-kw Allis-General Electric engine-driven alternate current units, and 1 1875-kw Parsons turbo-alternator. It may be mentioned that the system now comprises nearly 800 motor cars, and the output of the power house for the financial year ending June 30, 1906, was more than 35,000,000 kw-hours.

ELECTRICITY AND THE CASCADE TUNNEL

The rumor has been revived in New York of the substitution of electricity for steam in the operation of trains through the Cascade tunnel. According to the latest report officials of the company have completed all the plans for the work. The power for the electric plant will be obtained about 35 miles from the tunnel, where large water-power can be developed. By the construction of about 2½ miles of waterway it will be possible to obtain a head of 140 ft., which will supply all the power that can possibly be needed.

The Great Northern tunnel through the Cascade Mountains is built through solid granite, in which scarcely a crevice can be found in the whole length of the tunnel. From portal to portal the tunnel is 14,400 ft. long, or between 2½ and 3 miles. The grade is about 1.7 per cent, one end being 240 ft. higher than the other. It is possible for trains running down grade through the tunnel to drift most of the way.

THE MAYORALTY CAMPAIGN IN CHICAGO

Fred. A. Busse, present postmaster of Chicago, has been nominated by the Republican party for Mayor on a platform that gives unqualified indorsement to the traction settlement ordinances. As announced in the Street Railway Journal last week, Mayor Dunne, the Democratic nominee, stands on a platform condemning the ordinances and upholding municipal ownership. The traction clause in the platform adopted by the Republicans reads in part as follows:

For ten years street car patrons have risked health and life in overcrowded, unsanitary cars, and suffered injury to their business and property through lack of sufficient and continuous service, awaiting the time when a settlement could be made with the companies that would properly safeguard the interests of the city. Such a settlement is at last possible through the adoption of ordinances in support of which all disinterested and intelligent citizens who have the interests of Chicago at heart can unite without regard to differences of honest opinion as to the public or private ownership or operation of municipal utilities. On Feb. 4, 1907, the City Council passed two ordinances, subject to referendum, which have for their purpose the immediate reconstruction and practical unification of the street railway systems. We believe these ordinances represent a great advance in municipal legislation, and, if ratified by the people, will settle in an equitable and satisfactory manner the question which has done so much to retard the city's growth and prosperity. We commend these ordinances to the support of the voters of Chicago, and pledge the Republican party, if they are adopted by the people, to enforce all their terms and conditions, to the end that the street railways of Chicago shall be operated for the benefit of the people.

The Citizens Non-Partisan Traction Settlement Association, which was organized recently in the interests of the traction ordinances, is now affiliated with a dozen or more other clubs favoring the ordinances. The club now has an aggregate membership of about 30,000 registered voters. The only requirement for membership is that the applicant favor the adoption of the traction ordinances.

STRIKE AT PORTSMOUTH, OHIO

Employees of the Portsmouth Street Railway Company, of Portsmouth, Ohio, struck last week for a straight 10-hour day and since then more or less violence has been displayed. To prevent men being brought from Huntington and Cincinnati to operate the cars, an obstruction was placed upon the tracks near Millbrook Park lake, where there is a high embankment, but it was discovered in time to prevent a wreck. Traffic was resumed on Thursday, but threatened riots on the part of the strikers and their friends have continually interrupted the work since. Friday night a car was burned and another derailed, while one of the strike breakers was badly beaten. It is claimed that the strikers have not taken part in any of the acts of violence. President York and other company officials claim that the city authorities did not give the company proper protection, and there is talk of asking for troops. The company operates the local lines and a suburban line to Sciotoville and other points up the river. No cars have run on this line for some days.

THE INDIANA, COLUMBUS & EASTERN COMPANY'S PROPOSED IMPROVEMENTS

Practically all of the improvement plans of the Indiana, Columbus & Eastern Traction Company and other lines of the Morgan-Dolan-Schoepf syndicate are being held up until after the new holding company has been organized and all the lines of the syndicate have been merged into one system. None of the plans of the company for through service between Columbus and Indianapolis, Columbus and Cincinnati and other points can be put into effect until all the lines are under one management. One of the drawbacks to the through service now is the lack of equipment, but none will be purchased until the consolidation of the lines is effected, for the reason that it is intended to adopt a general standard.

ANSWER TO LOW-FARE SUIT IN MEMPHIS

The Memphis Street Railway Company has filed a lengthy demurrer to the declaration filed in the suit of William G. Byrne, brought against that company some months ago to test the validity of the ordinance passed for the purpose of regulating the sale of street car tickets. The ordinance provides, among other things, for the sale of six tickets for 25 cents. The plaintiff, William G. Byrne, boarded a car and offered a quarter, requesting that he be given six tickets. The conductor informed him that he had no tickets for sale and the suit for damages was commenced.

The demurrer to the declaration recites that the ordinance purports to amend an ordinance passed Nov. 20, 1895, by eliminating the portion of the former ordinance requiring the sale of eleven tickets for 50 cents and substituting therefor a provision requiring the sale of six tickets for 25 cents. Continuing, the demurrer alleges that section 2 of the last ordinance contains a provision that the Memphis Street Railway Company shall accept the provisions of the ordinance so passed within ten days. The attack on this provision is made in the recital, "and the declaration on its face does not show that the street railway company did accept the provisions of the ordinance within ten days after its passage but, on the contrary, it did not and has not accepted the provisions of this ordinance up to the time of the filing of said declaration and the bringing of said suit." For the reason above set out, it is stated the ordinance is of no binding effect on the company.

The second ground of demurrer is that the city of Memphis has not sought to enforce the ordinance and that the suit of a private individual cannot be maintained before the city seeks to in some wise enforce the said ordinance. Thirdly, it is set out in the demurrer that the ordinance of Nov. 20, 1895, requiring the sale of eleven tickets for 50 cents, was a contract with the city, and that the passage of the ordinance requiring the sale of six tickets for 25 cents abrogates, invalidates, alters and impairs a subsisting contract. Further, it is asserted that the ordinance is a violation of section 10 article I. of the Constitution of the United States respecting the obligation of contracts, and that it is invalid and void in that it violates by its provisions article II., section 2, of the Constitution of the State of Tennessee.

OFFICIAL TERMS OF CONNECTICUT DEAL

According to an official statement, the Connecticut Railway & Lighting Company's property has been leased to the Consolidated Railway Company for 999 years from Aug. 1, 1906. The payment of the rental has been guaranteed by the New York, New Haven & Hartford Railroad Company. The lessee pays taxes and a cash rental amounting to $975,000 for the year 1906-07, increasing gradually to $1,400,000 for the year 1914-15 and for every year thereafter. Out of this amount must be paid fixed charges, consisting of bond interest and sinking fund amounting to $673,882 annually. Under the lease no further bonds are to be issued by the Connecticut Railway & Lighting Company. The holders of the stock of the company have ratified the execution of this lease. The common shareholders have agreed to pay to the Colonial Trust Company, trustee, $10 per share on their stock; while the preferred shareholders have agreed hereafter, and during the term of the lease, to accept 4 per cent dividends per annum in place of 5 per cent. The above payment of $10 per share on common stock, added to the surplus rentals received under the lease, will provide a fund sufficient to pay dividends at the rate of 4 per cent on the preferred stock from Aug. 1, 1906, and dividends at the rate of 4 per cent on the common stock from Aug. 1, 1907, which the agreement provides shall be so applied. The present certificates are to be exchanged for new certificates on which will be endorsed the above stipulations.

THE SITUATION IN CLEVELAND

A conclusion on the values of the Cleveland Electric Railway Company for holding company purposes was expected in a few days, but it seems that Presidents Andrews and Du Pont are having some difficulty in fixing the franchise values. They are proceeding upon a rule agreed upon before they began their work, but their attorneys have found that their ideas of the expiration of some of the franchises do not coincide. Although it was supposed this matter was settled by the late decision of the United States Supreme Court, the attorneys for the Cleveland Electric claim that some of the franchises were granted under different conditions and that the decision does not apply to them. Then there is some difficulty in arriving at the value of the franchises in the villages about the city. They were given on condition that the company carry people to the business portion of the city, but in case franchises on the city streets used for this purpose expire before the village franchises do and are not renewed, it would be a physical impossibility to do this. It is understood that there is a mutual understanding regarding the physical valuation of the properties and that there will be no trouble regarding this. If the franchise question were out of the way it is possible the report would be ready in a few days.

Last week the Low Fare Railway Company received a shipment of rails and hauled them to its proposed line on East Seventy-First Street, between Woodland and Quincy Avenues. Secretary Colver was asked what he intended to do, but declined to talk further than to say that his company was not bound by the truce between the Cleveland Electric and the Municipal Traction Company. He said that as soon as the weather would permit the company expected to proceed with track laying. The Cleveland Electric officials inquired into the matter, but whether any action will be taken remains to be seen. The rails were strung along the proposed route of the Low Fare Company on a permit issued by the street department.

REPORTED DEAL INVOLVING TERRE HAUTE PROPERTIES

By the filing of articles of incorporation with the Secretary of State for the Terre Haute, Indianapolis & Eastern Traction Company March 1, plans are said to have been completed for merging another group of interurban properties by the syndicate represented in Indiana by Hugh J. McGowan. It was reported some days ago that the Stone-Webster syndicate's holdings in and about Terre Haute were about to be taken over, and Mr. McGowan admitted that the attempt was being made to gain entrance to Terre Haute in order that connection might be made with the traction lines recently secured in Southern Indiana. Mr. McGowan is even quoted as saying that the interests he represents had considered the question of taking over the Terre Haute lines. The filing of articles for the new company, which declares its purpose to be the building of lines to fill up gaps, the leasing, purchasing, taking over, etc., of interurban lines, is therefore regarded as indicating the consummation of the Terre Haute deal. The properties to be absorbed by the new company and operated in connection with the Indianapolis & Western, now running from Indianapolis to Danville, embrace the Terre Haute & Brazil interurban line, the Terre Haute & Sullivan interurban line and the Terre Haute City lines. The gaps to be built are between Green Castle and Brazil, Sullivan and Vincennes and Vincennes and Princeton. When these are completed, through service between Indianapolis and Evansville will be possible. The new company is capitalized at $100,000, and its officers are: R. I. Todd, president; T. B. McMath, vice-president; W. S. Milholland, secretary and treasurer.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED FEB. 19, 1907

844,352. Controller for Electric Motors; Harry U. Hart, LeHavre, France. App. filed June 12, 1905. Provides a controller in which one or more of the braking notches will be serviceable when the reverse switch occupies either the forward or reverse position, regardless of the direction of motion of the vehicle.

844,465. Brake Staff for Railway Cars; Edward Posson, Chicago, Ill. App. filed Sept. 27, 1906. A tilting brake staff which may be operated in the usual vertical position or turned down to be operated in an approximately horizontal position.

844,500. Railway Chair; John Crozier, Ste. Agathe, Quebec, Canada. App. filed Sept. 11, 1905. The base and one fish-plate are integral and the other fish-plate has an interlocking connection with the base. The fish-plates are bolted as usual through the web of the rail.

844,622. Rail Chair and Tie; Abraham P. Sells, Searcy, Ark. App. filed Dec. 11, 1906. The rail rests upon a base plate which has flanges embracing the base of the rail and depending flanges embracing a hollow metallic tie. The ends of the tie are filled with blocks of wood into which spikes are driven through holes in the metal, said spikes further securing the base plate.

844,641. Lineman's Chair; George P. Yeakel and Whorton C. L. Ireland, Norristown, Pa. App. filed Sept. 14, 1906. Details of construction of a telpher chair.

844,660. Guard Rail Fastener; Frank Cleary and John Garrity, Rugby, N. D. App. filed Dec. 5, 1906. A body having upwardly and inwardly turned lugs adapted to receive the flanges of the track and guard rails, and also having an intermediate lug for the reception of the opposite flange of the guard rail.

844,692. Fare Registering Actuating Mechanism; Adolph O. Schmolinski, St. Louis, Mo. App. filed July 16, 1906. Details of construction.

844,720. Amusement Apparatus; August L. N. Fleming, Allegheny, Pa. App. filed Jan. 9, 1907. A revoluble sphere supported upon an inclined axial support and having a spiral track supported outside thereof. The wheels of the cars have double tread divided by a central peripheral flange.

844,762. Switch-Throwing Device; William H. Vaughn and James E. Tiffany, Johnstown, Pa. App. filed Dec. 31, 1906. By moving a segmental plate in the roadbed to the right or left, the switch is correspondingly thrown through suitable bell-crank and rod connections.

844,777. Control System for Connecting Motors as Braking Generators; Frank E. Case, Schenectady, N. Y. App. filed June 6, 1906. A control system for train motor having contactors and a reversing switch and circuits by which the motor is connected to excite magnetic braking effect when desired.

844,790. Support for Railway Motor Cables; Frank W. Garrett, Norwood, Ohio. App. filed March 6, 1905. The cable leads from the car body to the motors as nearly as possible in vertical alinement with the king-bolt or center of the truck to lessen the play thereof.

844,792. Mechanical Ear for Trolley Wires; Edward E. Gilmore, Philadelphia, Pa. App. filed Jan. 13, 1906. The conductor is longitudinally grooved on both sides and these grooves are engaged by depending plates with projecting ribs thereon which are clamped into the grooves by a conical wedge.

844,794. Step-Up Rail Joint; George L. Hall, New York, N. Y. App. filed Dec. 21, 1906. A joint for a new and an old, badly worn rail.

844,797. Block Signal System; Laurence A. Hawkins, Schenectady, N. Y. App. filed July 31, 1905. Sections of the track are charged with direct current. A single semaphore arm movable into danger and caution positions and track rails having circuits so engaged as to secure an overlap feature.

844,896. Semi-Convertible Car; Edward T. Robinson, St. Louis, Mo. App. filed Oct. 11, 1906. Relates to means for storing away the windows of a winter car between the ceiling and roof of the car.

844,918. Car Magnet Support; William M. Brown, Johnstown, Pa. App. filed Jan. 25, 1906. Relates to that class of railways in which the track sections are temporarily electrified during the passage of the train by depending electromagnets thereon. The present invention relates to a method of supporting these electromagnets between the trucks of different cars so that their action will be continuous during the passage of the whole train.

845,001. Railway Wheel; Alexander S. Henry, New York, N. Y. App. filed Sept. 14, 1906. Has independent hub and rim portions and an intervening non-conducting body portion in combination with an inwardly projecting annular flange on the rim portion provided with holes, insulating bushings to line said holes, said plates facing the body portion of the wheel provided with holes registering with the holes in the flange on the rim and securing-bolts passing through said registering holes.

PERSONAL MENTION

MR. THOMAS ROBINSON, president and general manager of the Florence Electric Street Railway Company, of Florence, Col., is dead.

MR. F. L. MORSE has resigned as assistant to President W. H. Bancroft, of the Utah Light & Railway Company, of Salt Lake City, and will return to New York, where he has other business interests.

MR. THERON A. ATWOOD, former railroad commissioner of Michican, has accepted the position of general manager of the Michigan United Railway system, with headquarters at Lansing, Mich.

MR. CLARK PRATHER has resigned as foreman of the Paterson car house of the Public Service Corporation of New Jersey, to become master mechanic of the Roanoke Railway & Electric Company, of Roanoke, Va.

MR. M. O. CHADBOURNE has resumed the management of the lines of the Albuquerque Traction Company, of Albuquerque, N. M., after acting for some time as superintendent of construction of the American Lumber Company.

MR. W. GILLETTE, of Buffalo, has been appointed general manager of the Fort Smith Light & Traction Company, of Fort Smith, Ark., to succeed Mr. R. S. Rand, who returns to the service of H. M. Byllesly & Company, of Chicago.

MR. P. P. CRAFTS has resigned as general manager of the Iowa & Illinois Railway Company, of Clinton, Ia., to become general manager of the Ft. Dodge, Des Moines & Southern Railroad, now under construction. Mr. Crafts will assume his new duties April 1.

MR. FRANK COOLEY has been appointed superintendent of inspection and employment of the Brooklyn Rapid Transit Company, to succeed the late Mr. F. D. Valentine. Mr. Cooley formerly was chief of police of the Brooklyn Rapid Transit system and has been connected with the company for ten years.

MR. J. C. MADIGAN has been appointed general superintendent of the Grand Rapids Railway Company. His former position was superintendent of transportation, but this change puts him also in charge of the shops. Mr. R. B. Savage, the assistant superintendent, has assumed many of the duties of the superintendent.

MR. FERRIS A. OVERFIELD, who recently resigned as general foreman of the eastern division elevated shops of the Brooklyn Rapid Transit system, to undertake a machine shop business, has been presented with a solid gold watch-chain, with diamond-mounted Masonic charm, from his employees and associates as a token of their esteem.

MR. W. H. ZIMMERMAN has resigned as general manager of the DeKalb-Sycamore Electric Company to accept a similar position with the Michigan Power Company, at Lansing, Mich., which expects to enlarge the present property by constructing a new auxiliary steam plant and further developing the water power on the Grand River.

MR. C. E. THOMAS has resigned as master mechanic of the Berkshire & Hoosac Valley Railway, of Pittsfield, Mass., to re-enter the service of the New York City Railway, by which he was employed for several years as foreman. Mr. Thomas is now located at 146th Street and Lenox Avenue as foreman of the New York City Company's general repair and new equipment shop.

MR. F. E. FITZPATRICK has resigned as general manager of the Sacramento Electric, Gas & Railway Company, of Sacramento, Cal., to become general manager of the Bay Counties Power Company, with headquarters in San Francisco, and Mr. C. W. McKillip, who has acted as supervisor of the Sacramento Company, has been appointed by the company to succeed to the position of general manager.

MR. D. H. ROBINSON, formerly superintendent of the Indianapolis & Eastern Railway, is now engaged in general contracting. Mr. Robinson was with the Indianapolis & Eastern Company more than three years, and resigned June 1, 1905, to become general superintendent of construction of the Indianapolis & Western Railway, from which company he resigned a year later. Mr. Robinson now has the contract for installing the overhead materials on the Indianapolis & Western Railway between Indianapolis and Danville, Ind., and between Plainfield and Greencastle, also the installing of a transmission line between Avon and Plainfield. The line will be in operation about June 1, 1907. The Indianapolis & Danville, Ind., division is in operation.

MR. R. ROSCOE ANDERSON has been appointed superintendent of transportation of the Rhode Island Company, of Providence, R. I., to succeed Mr. Samuel Riddell, whose appointment as general manager of the Chicago, South Bend & Indiana Traction Company is announced elsewhere in this issue. Mr. Anderson, who is thirty-four years old, was born in Utica, N. Y., but has lived in Providence since he was a boy. He entered the service of the Rhode Island Company March 1, 1894, as a clerk to Mr. A. T. Potter, who, at that time, was general manager, and who now is vice-president of the company. Mr. Anderson, in fact, remained as assistant to Mr. Potter until the latter's appointment to the vice-presidency, when he became chief clerk in the office of the superintendent of transportation, in which capacity he has served ever since.

MR. SAMUEL RIDDELL assumed on March 1 the duties of general manager of the Chicago, South Bend & Northern Indiana Traction Company, of South Bend, Ind., a new company recently organized to take over the Northern Indiana Railway. Mr. Riddell formerly was superintendent of transportation of the Rhode Island Company, succeeding in that position Mr. A. E. Potter, who, upon the resignation of Mr. R. I. Todd as general manager of the company to become connected with the Indianapolis Traction & Terminal Company, assumed the management of the Rhode Island properties. Mr. Riddell was born in Glen Ridge, Pa., 1878, and graduated from Swarthmore College in 1897. From that time until 1904 he was connected with various engineering companies. The period between 1904 and 1906 he spent familiarizing himself with the various departments of the Rhode Island Company, spending part of his time in the transportation department, the duties of which devolved upon him, when in January, 1906, he was appointed superintendent of transportation.