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Useful Criticisms

Every street railway manager knows by experience what criticism is, and too frequently it comes in the shape of unreasonable "kicks" from passengers and others. The wise manager, however, is constantly on the alert for suggestions and criticisms from those not in any way connected with or informed as to the street railway business, because such outside criticism comes purely from the standpoint of the passenger rather than from the standpoint of a street railway man. Being more or less identified with the business the latter does not look at things through the same glasses as the average passenger. In fact, it is often difficult for the management to determine just how certain things appear to passengers until they can obtain some such criticism from those not connected with the business. This applies to thousands of details. Both

the management and employees are likely to get lax as regards the calling of streets, for example. The conductor, in passing over a route many times a day, becomes so accustomed to it that it is almost impossible for him to realize that all of his passengers are not equally familiar with it. The fact that nine-tenths of his passengers may be nearly as well acquainted with the route as the conductor himself further tends to laxity as regards the calling of streets. This is only one example out of hundreds that might be mentioned, and it is the wise manager who is constantly sounding public sentiment as regards the operation of the road. While nine-tenths of the suggestions received from passengers may not be practicable, the remaining tenth may call attention to some possible improvement in service that had not received attention, simply because it was so commonplace. A case of this kind recently came to our notice where the management had been living with and studying a certain problem for some time, but the casual suggestion of an outsider threw a light on the situation, from the average standpoint, that the close study of those connected with the undertaking had not revealed.

Terminal Loops

Recent issues of the STREET RAILWAY JOURNAL have given considerable space to terminal loops for handling large crowds, including the World's Fair terminals of the St. Louis street railway companies and the Coney Island terminals of the Brooklyn lines. Wherever large crowds are to be handled from one terminal loop at a pleasure resort, there is sure to come up the problem of preventing accidents to crowds of passengers who may be attempting to board incoming cars before they are stopped. The only way is to limit the crowd admitted to the cars. It is a notorious fact that large crowds are absolutely without sense or reason in many of their actions, and wherever there is a large crowd waiting for a car there is pretty sure to be an unreasoning rush to board it as soon as it nears a terminal, no matter how many cars there may be close at hand. The avoidance of such a panic-stricken and mob-like crush is sufficient inducement to many people to stay away from pleasure resorts where such a crush is likely to occur. At the World's Fair terminals in St. Louis only one terminal has been fenced about and equipped with turnstiles to limit the entrance of passengers and avoid too great a crowd near the terminal loop. As mentioned before, the management left the matter of final equipment of terminals somewhat open, awaiting developments and getting experience with the crowds, which gradually increase as the season advances. Arrangements are such that all loops can be enclosed if necessary, although, in one case, there is a loop where the enclosure of the loop might very likely be inadequate, because of the fact that the cars enter it directly from a much-frequented street. It is safe to say that by the time that the World's Fair crowds become great enough to necessitate unusual precautions at the terminals, the company, with the experience it is now gaining with like crowds, will have perfected the best possible system for each of the numerous terminals. As far as the street railway companies are

concerned, the World's Fair crowds are being handled with clock-work regularity that is gratifying to all concerned, and is receiving commendation from all sides.

Car Signs

There was a time, about ten years ago, when there was a great awakening among electric railway managers as to the importance of destination signs on electric cars, and especially as to the desirability of illuminated signs at night. The result is that very few street railways are now operated without having cars equipped with illuminated signs, which are an immense improvement over the colored lights or the simple painted signs of horse-car days. Nevertheless, it has been our observation, in visiting many different cities, that there is still room for decided improvement as regards destination signs. In some cases signs are fairly effective at night, but are extremely difficult to read in day time, and in other cases the reverse is true. Frequently an illuminated sign, which is very easily read by day and night when new, gets so filled with dust and dirt and in such a dilapidated condition that it is almost impossible to read it by day. An illuminated sign having a glass front, if not kept in good condition, sometimes becomes difficult to read, simply because the sheets of steel, celluloid, or what not, that contain the lettering may have slipped back from the glass front, with the result that there is a great deal of annoying reflection which makes it difficult to read the sign. To this difficulty is added that of dirt working in between the glass front and the lettering. This is simply a question of sign maintenance, and if there was as much attention given to the signs as to the rest of the car, there would be no trouble. Another mistake sometimes made in car signs is the selection of thick, heavy letters, which cannot be read at a distance, because, to the observer, one part of the letter appears to run into another part. This is a mistake which is also frequently made in electric signs of all kinds. In designing sign lettering for an illuminated sign, very clean-cut letters, with plenty of space around each part of the letter, can be most easily read at a distance, because there is no chance for letters to appear blurred and run together. Where very heavy faced letters are used, with little space between letters, no amount of light can make an illuminated sign easy to read at a distance. In fact, the more such a sign is lighted, the worse the blurring effect becomes. Taken altogether, the selection of a destination sign to go on the cars of a system should receive no little study before a sign is selected, and there is nothing like the actual trial of a sign on the street by night and day to determine just what gives the best results. There are a number of schemes for illuminated signs in use, all of which are good if the character of the lettering is right, but it should not be forgotten that, to make an illuminated sign which can be read at night at a distance sufficient to avoid the unnecessary stoppage of street railway cars by prospective passengers, is not so easy that it can be neglected. It goes without saying that there is sure to be much loss of time if cars with different destinations are operated over the same street without very clear destination signs, because passengers, if they cannot read the signs, will stop every car that comes along until they get the right car. One "horrible example" of this is to be found to-day on a line of very heavy traffic in a large city. Cars over this line are operated at high speed to different terminals, and are equipped with illuminated signs, but the illuminated signs do not indicate the route of the car. It is only shown by small letters on a dash-board sign, which can be read but a short distance. Even the dash-board signs are all alike in general appearance, so that the passengers cannot tell until he

can actually read the small lettering on the dash-board sign whether the car approaching him is the one he wishes or not.

The Street Railway Repair-Shop Problem

One of the most important problems confronting the street railway manager at the present time is the provision of adequate and efficient repair-shop facilities for the proper repair of their cars and electrical equipment. Too little attention has been given to this important subject by most of the roads in this country, due no doubt to the rapid and remarkable development of the street railway situation from horse-car conditions to that of electric traction, but with the heavy traffic conditions that are developing upon the street and interurban railway systems in all parts of the country, it is found that the repair shop demands far greater consideration than has usually been given it, for proper operation and maintenance of schedules.

Even upon systems where the repair shop has been more or less carefully developed, the strenuous conditions imposed by the past severe winter have developed the fact that at almost no place has ample provision been made for properly taking care of the running repairs under such emergency conditions. During the past winter, most of our roads were seriously hampered by lack of equipment, which was laid up in the shops awaiting repair work which could not be given them. It is, indeed, appalling to learn of the extent to which this condition of affairs interfered with the successful operation last winter of street railway lines, in the Northern States, at least. This is a state of affairs that requires the careful consideration of managers, inasmuch as efficient operating conditions depend upon the keeping of cars in condition for service, and anything which facilitates repair work and thus promotes the betterment of condition of the rolling stock, is necessarily of great advantage to the company.

While it is evident that the older practice of placing repair shops in any old building almost which will serve the purpose, and even in dimly-lighted basements or other undesirable and unhandy locations, has been practically done away with, still it is the opinion that a sufficiently definite tendency toward the installation of new and complete shop equipments and provisions for careful and efficient work at shop plants, are not to be found among the majority of our electric railway companies. For this reason, the description of the new repair shop installation at Portland, Me., which appears elsewhere in this issue, will be found of unusual interest. The history of the Portland Railroad Company is similar to that of most other street railway systems which have developed gradually from horse-car conditions to those of heavy electric traction, but the reluctance to attack this problem that has been evinced elsewhere is not to be found here. This company early observed the possibilities of a complete and efficient repair shop, and the new shop system which it is now installing gives evidence of a remarkable appreciation of these possibilities and a desire to attain the fullest benefits to be derived.

The careful attention that has been devoted to the arranging of the different departments for making easy the handling of material from the repair departments to the erecting shop, and also of the general arrangement of the paint shop, is remarkable and admirable, many of the ideas involved being characteristic of the best manufacturing shop conditions. Apparently as much study has been devoted to the shortening of all distances of handling repair parts as to that of proportioning the different areas of the different departments, and the latter

feature of this shop installation apparently cannot be excelled. In this connection a wise provision is to be noted in the devotion of a very large relative space to the blacksmith shop; with the greatly increased size of equipments and necessity of greater truck repairs, this growing importance of the blacksmith shop has been inevitable.

Another important feature of this shop installation is the brass foundry. In probably no line of work is there a greater use of small brass castings and parts than in electric railway repair work. On account of the number and variety of special fittings that are required, it is frequently very difficult to obtain castings from local brass foundries with sufficient despatch, and in this feature alone the saving due to the possibility of such emergency work here will frequently be found to pay for the entire installation. The use of the brass foundry also permits a great many standard repair parts to be cast for machining and placing in the stock room, ready for use whenever required; this will also be found a very valuable and economical procedure, as it will enable the provision in advance of many parts that might otherwise give trouble in purchasing under emergency conditions. It is not inferred by this that it will be found advisable to go into a general manufacturing business for the protection of all brass parts that are used in the repair work, but rather that the possibility of casting such parts as are not easily obtained upon the open market is one of great value to a company. Of course, for the general run of supplies, including a large range of standard brass castings and other parts, it will be found much cheaper to purchase the same upon the open market from the well-known manufacturers, but the real value of the brass foundry will be in the manufacture of such parts as are not available in the open market and special parts required in emergencies.

The Kingsbridge Power Plant

The engineering features of the new Kingsbridge power plant of the New York City Railway Company are of particular interest to all students of the recent large power plant development in this country and abroad. It is a notable fact that while power station design in this country has followed pretty closely certain general lines, so far as engine and boiler practice is concerned, there have been radical variations in details of auxiliary equipments. In this particular the Kingsbridge station is most interesting and establishes a precedent which can be studied to advantage.

This station was designed some six years ago and construction upon it was begun, but the financial vicissitudes of the Third Avenue Railroad Company, by which this plant was to be installed, caused a suspension of operations until recently, and it is only now being completed by the successor, the New York City Railway Company. It is a remarkable fact, however, that the original design of details and arrangement, that was prepared six or eight years ago, before the majority of the other large plants in this country were even planned, has been used in its construction with almost no changes—during the interval of suspension of work, moreover, while some of the other plants in New York City were being completed and placed in operation, the results of the various innovations that had been introduced in arrangement and design of auxiliaries were not sufficiently satisfactory to justify any material changes in the originally-designed Kingsbridge plans. This is a feature indeed remarkable, when the number of large plants that have been built in the past few years are considered, as well as the many radical departures from usual designs, and reflects unusual credit upon the original design.

The location of the Kingsbridge plant is perhaps one of the happiest results of the far-sightedness of the original Third Avenue Company's engineers. It was their opinion that the inevitable growth of the city would be in that direction, and that at some future time such a location would be central. This is exactly what the tendency has been, and furthermore the developments that have resulted in the present operating company have brought the center of power distribution very close to this point; this is due to the large amount of power delivered to the lines in the Borough of the Bronx. The location had the unusual advantages of proximity to the Harlem River for ease in receiving coal by boat, as well as an abundant supply of condensing water, combined with moderate real estate first cost.

The Kingsbridge plant embraces the multiple-unit idea of power plant design, which is so noticeable in later designs, and which has been universally found so satisfactory; yet few plants have taken advantage of this principle to this degree of completeness. The entire engine and boiler equipment is divided into four separate and distinct power plants, which may be independently operated as though separated by greater distance, and yet inter-connections are provided with great care, so that the various parts may relay each other as found desirable. The longitudinal and transverse aisles thus provided, also, are of great convenience to the operating engineers, as well as to the handling of parts in case of repairs.

One of the most important features of the auxiliary steam equipment is the use of steam-driven auxiliaries to the entire exclusion of the electrically-driven auxiliary idea. While the electrically-driven idea has many advantages in direction of economy, there are unfortunate features of lack of sufficient reliability, as the opening of a circuit-breaker, or other interruption, in the motor circuit, which are liable to place all apparatus dependent upon that particular auxiliary out of commission. The great advantage of the steam-driven auxiliary, over and above that of its greater reliability of operation, lies in the possibility of using all the exhaust steam from such steam-driven auxiliaries for the heating of feed water; in this way all such exhaust may be condensed and its entire heat of evaporation saved by turning into the feed-water. In this way, it does not matter as to how uneconomical the steam auxiliary engines are, as all their exhaust is saved at any rate. It is an easy matter to thus save the exhaust from all the ordinary auxiliary engines of a plant as the amount of steam required for this purpose does not usually exceed 10 per cent of that used by the engines, and the feed-water heaters can easily take care of that quantity in heating boiler feed-water.

The abandonment of the individual small condensers for each engine in favor of the large central condensing plant is another feature of importance to be noted at Kingsbridge. It is also interesting to note that this is the original idea which was carried out in the early design of the plant; in other important plants which have differentiated from this principle it has been found necessary to return to it, even in case of discarding large equipments of the individual design. The exhaust connections are here so made as to permit all engines to be handled by any grouping desired of the four large barometric condensers. The novel and yet very successful method of starting engines under vacuum is also provided for, and is found very satisfactory. The connections are such as to permit starting either condensing or non-condensing, as desired. This has been found an important provision for the ease of handling the large 3000-kw units.

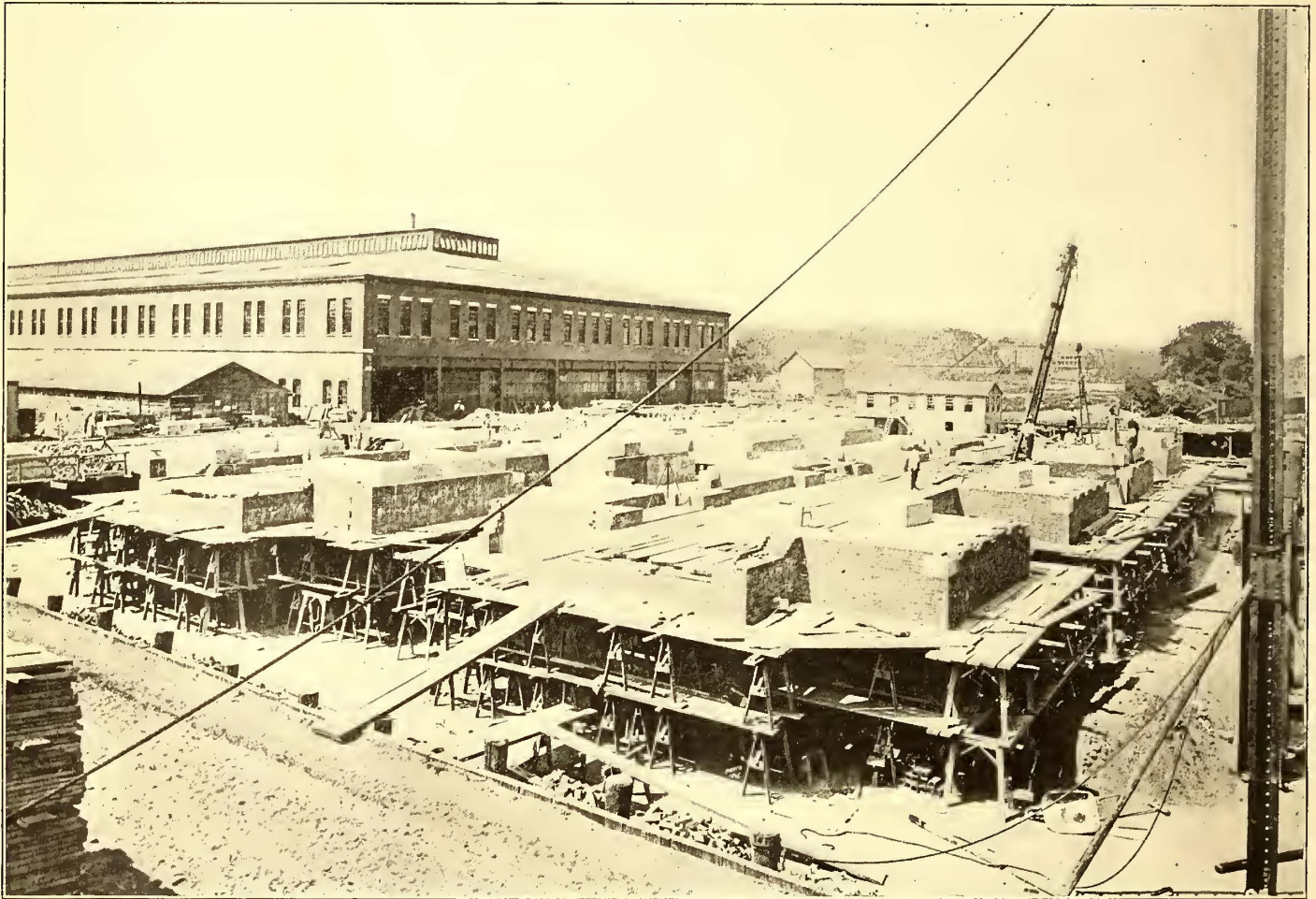
KINGSBRIDGE POWER STATION OF THE NEW YORK CITY RAILWAY COMPANY

The art of building and housing a large power plant has developed in recent years with rapid strides, and to gain experience through knowledge of each property created it is necessary to view it from the standpoint of the motives underlying its design and the conditions which have shaped its type rather than the detail of apparatus and appliances which it contains.

In 1898, when the Kingsbridge plant was projected, the only other large power station was that of the Metropolitan Street Railway Company, at Ninety-Sixth Street, then building, and its quality, therefore, not determined. The Third Avenue Railroad Company was about to electrify its system, and after due

facturing Company, upon the consulting engineer's original requirement specifications and in accordance with the detailed plans and specifications which accompanied the bid, and which were not changed after their first presentation. The Westinghouse Electric & Manufacturing Company then sub-contracted the power plant, exclusive of electric apparatus, to Westinghouse, Church, Kerr & Company, engineers.

The fact has been commented upon that Kingsbridge is the only one of the large power houses the contract for the complete design and construction of which has been let to a large electric manufacturing company. It should be borne in mind, however, that at the time this work was projected, in 1898, the art of providing electric service for a large system was by no means as far advanced as it is to-day, and the projectors were probably justified in the feeling that as the success of the



VIEW OF ENGINE FOUNDATIONS, LOOKING NORTHWEST, ON JULY 1, 1901

consideration of the power problem concluded to take bids from the principal electric companies for a plant complete delivered in operative condition.

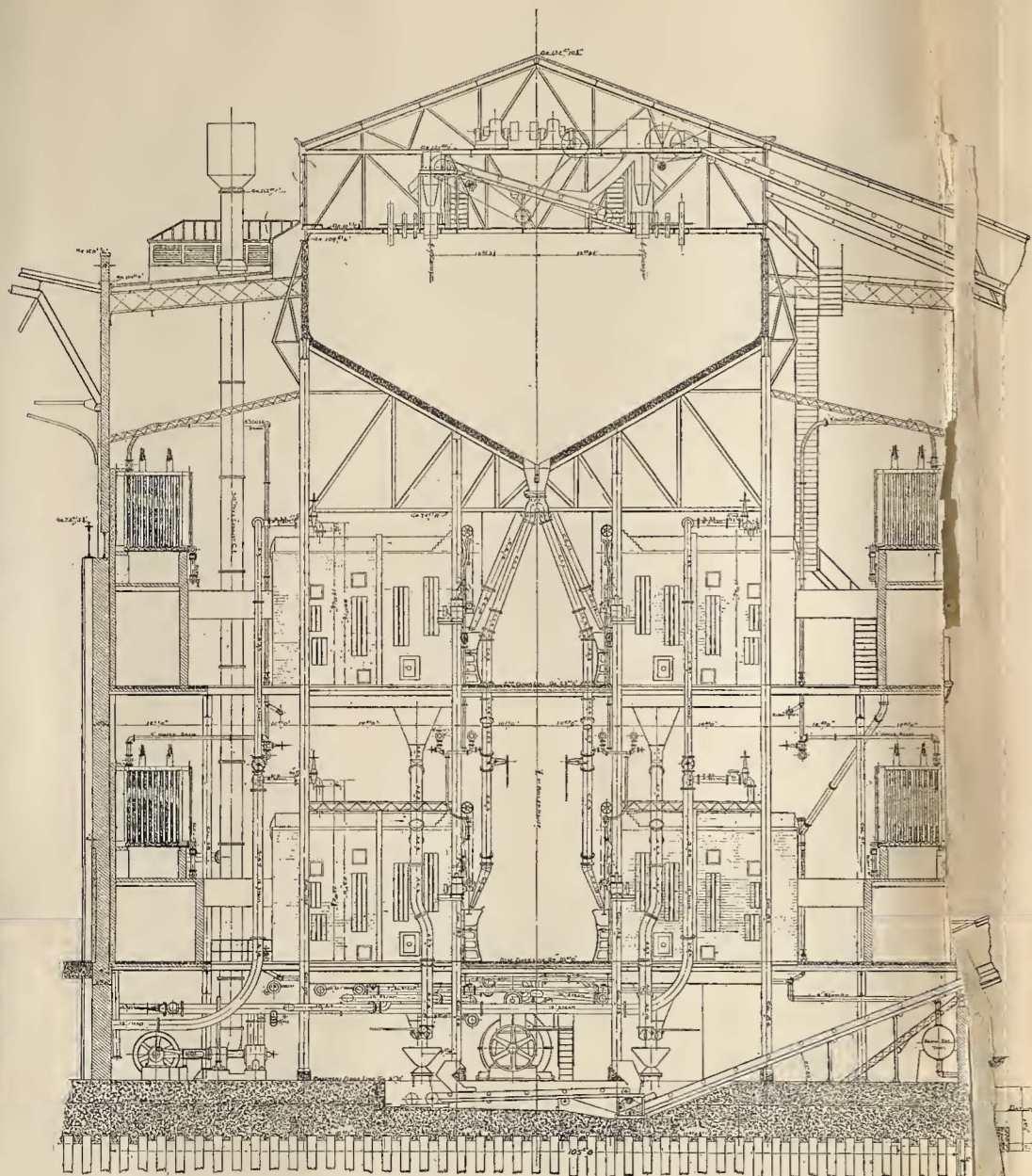
Dr. Louis Duncan was appointed consulting engineer, and issued requirement specifications, upon which bids were asked from the several electric companies. These specifications covered an alternating-current system of generation and distribution, involving a large central power house and a number of sub-stations, some months being allowed bidders for a study of the requirements and the preparation of detailed plans and specifications. The Westinghouse Electric & Manufacturing Company presented a tender upon the complete system, including a steam plant, designed by Westinghouse, Church, Kerr & Company, engineers, who also designed the building which contains it.

After further months of consideration and opportunity granted for revision of plans, specifications and estimates, the contract was awarded to the Westinghouse Electric & Manu-

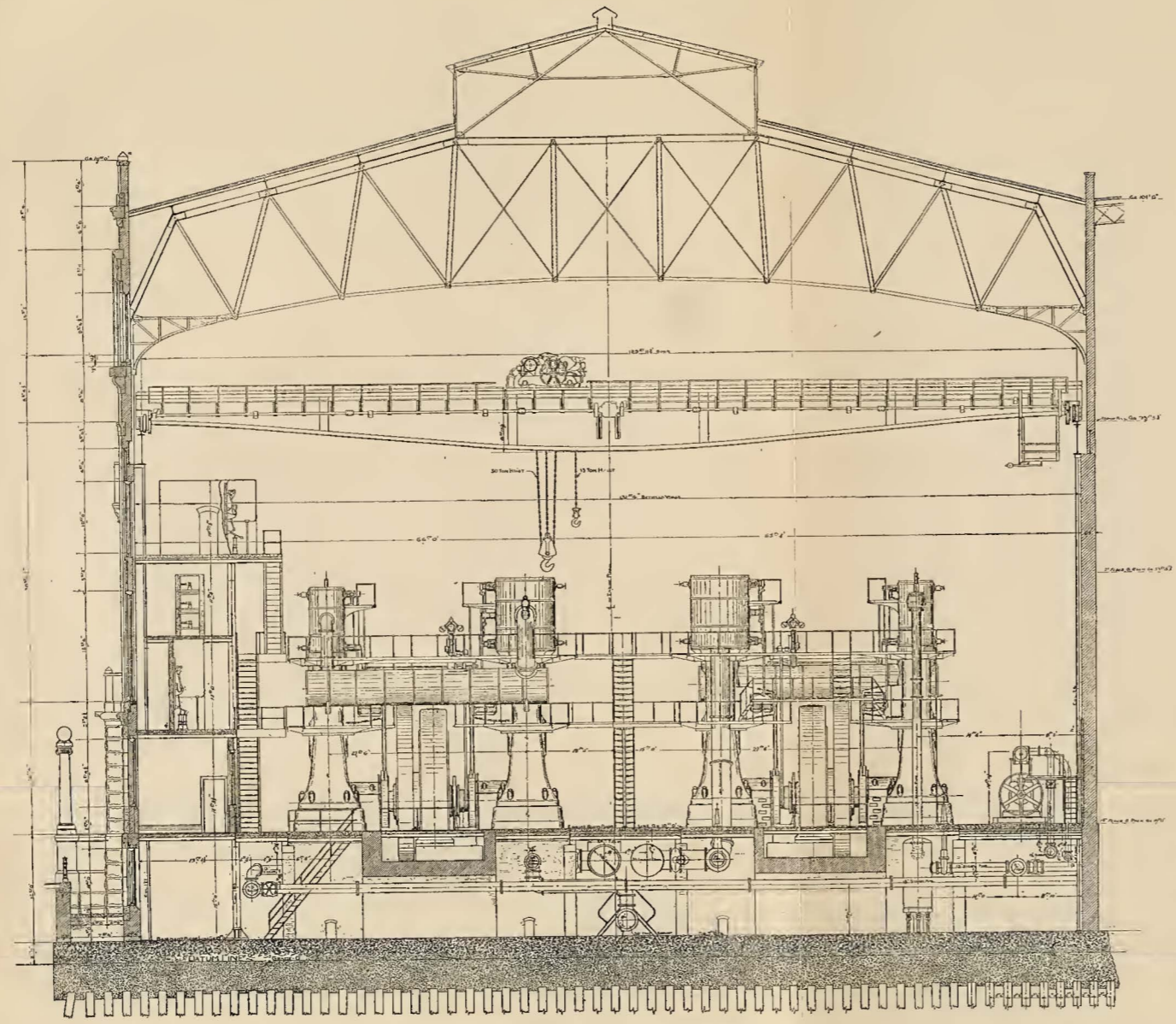
installation depended chiefly upon the electrical features their interests would be best safeguarded by placing the responsibility for the operation of the entire system upon a competent electric company rather than to call upon engineers or engineering contractors, as is usual in other lines of engineering work, and as is now the custom in electrical installations.

After the detailed designs and specifications were worked out and the sub-structure, consisting of some 18,000 piles and a heavy monolithic slab of concrete, was completed, financial conditions brought the Third Avenue Railroad into the control of the Metropolitan Street Railway Company, with M. G. Starrett as chief engineer, and the various changes consequent thereon delayed further construction for more than a year.

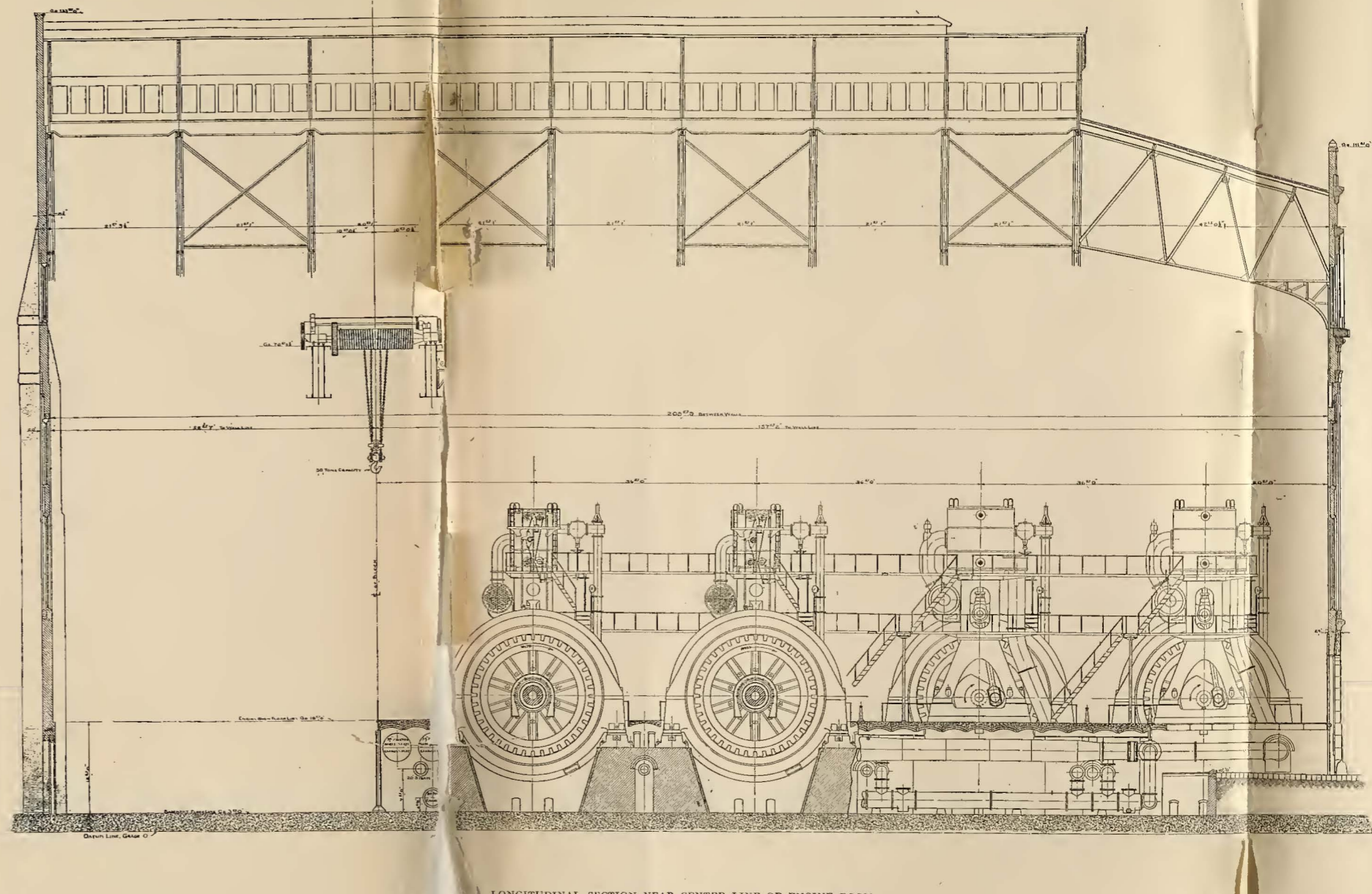
The plant, as originally designed, contains sixteen units of 3000 kw each, supplying current to twenty-five 1000-kw rotaries distributed throughout the city in several sub-stations, and in the rearrangement of the Third Avenue Railroad requirements, with due relation to the Metropolitan Street Railway Com-



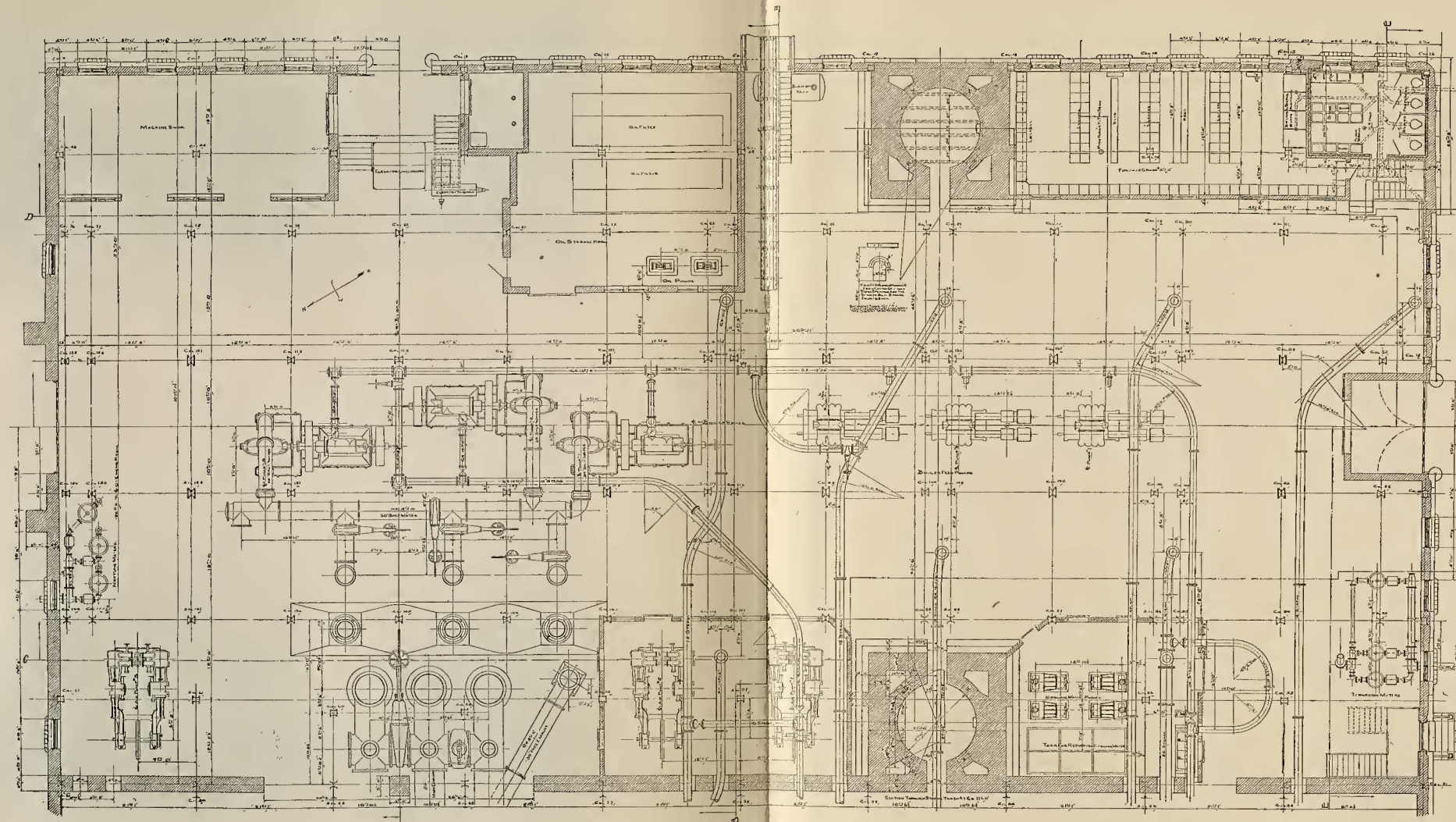
Scale, 1/16 in. = 1 ft. CROSS SECTION OF BOILER HOUSE.



SECTION OF ENGINE ROOM ON LINE BB

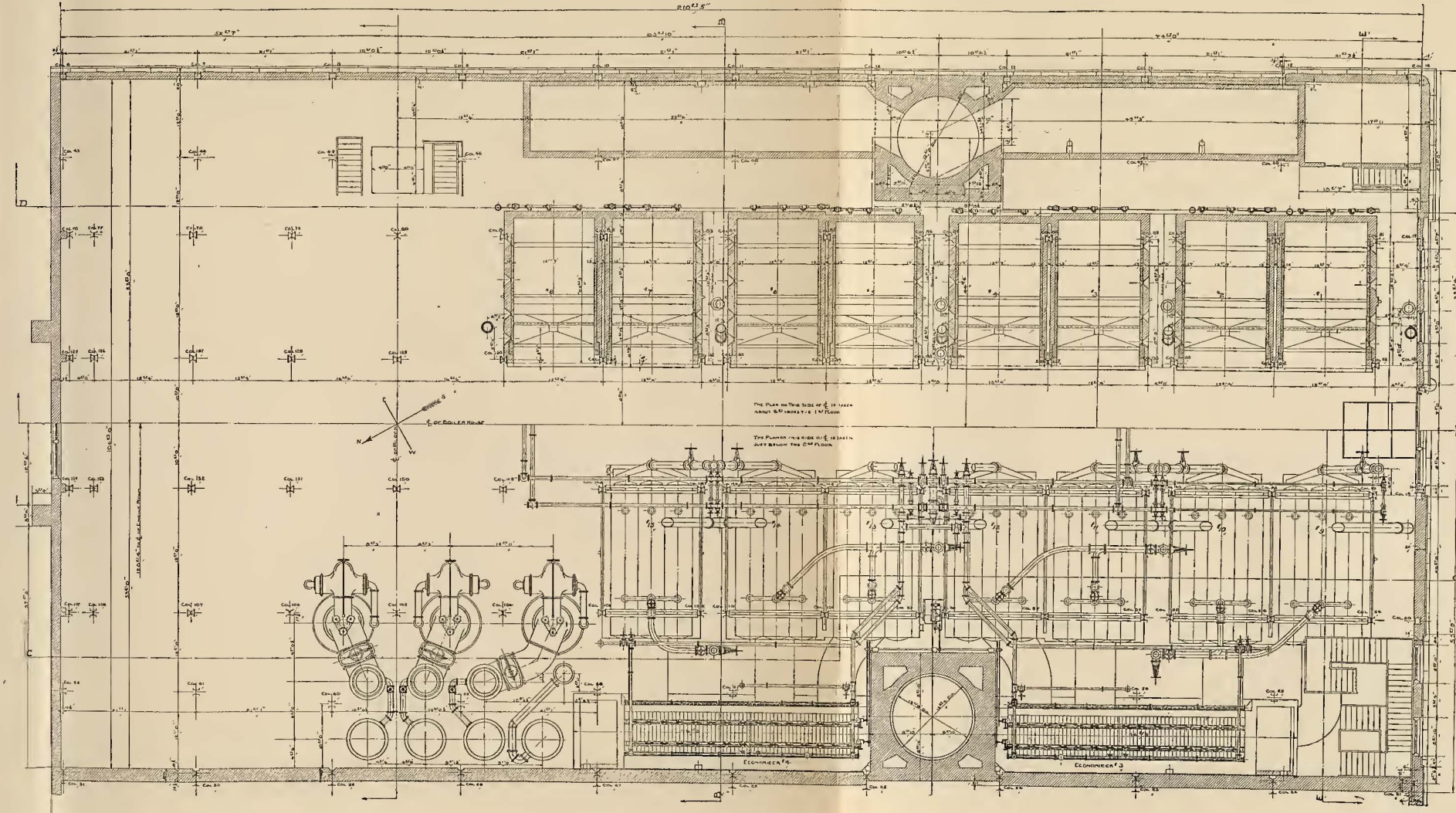


LONGITUDINAL SECTION NEAR CENTER LINE OF ENGINE ROOM



Scale, 1/16 in. = 1 ft.

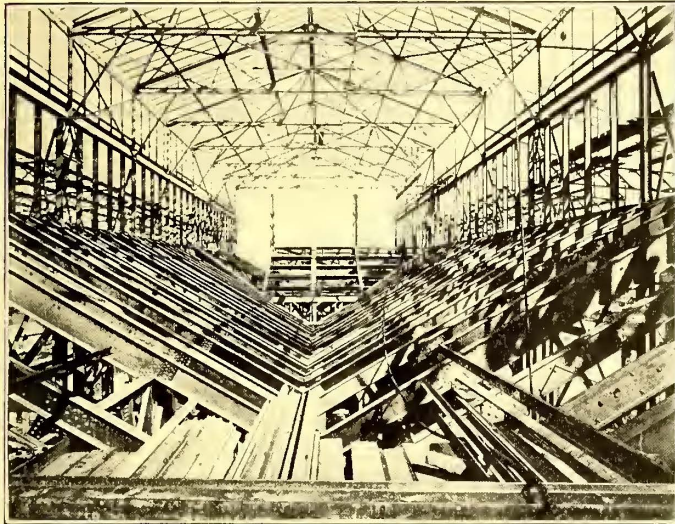
GENERAL PLAN OF BOILER HOUSE BASEMENT



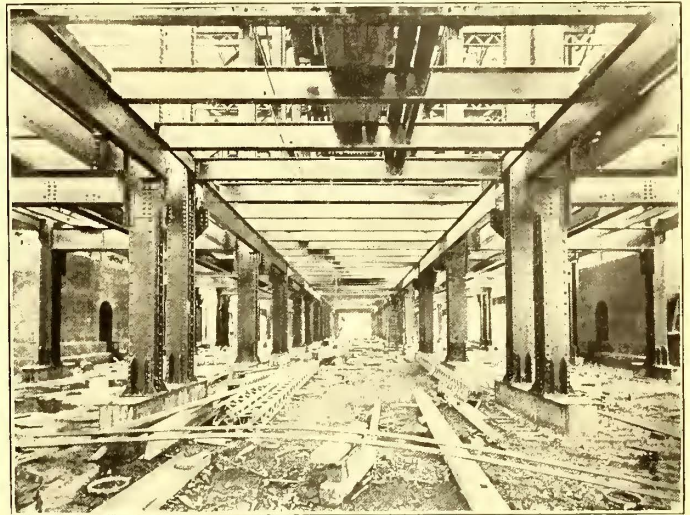
BOILER HOUSE, PLAN OF FIRST FLOOR

pany's facilities and necessities, it was concluded to first install eight units and thirteen rotaries, being one-half of the plant; to change the generated e. m. f. to 6600 volts, to correspond with the Metropolitan practice, and to change the switchboard arrangements, as desired by Mr. Starrett, to secure practically

bridge has a central barometric condensing plant to which the exhaust of all engines is led, whereas Ninety-Sixth Street has independent surface condensers for each engine. At Kingsbridge especial attention has been paid to the design and construction of the pipe system throughout, with a view to giving



STEEL FRAMING FOR COAL POCKET



BOILER ROOM BASEMENT, AUG. 27, 1901

the same operative method as is used at Ninety-Sixth Street, yet availing of the advance in the art.

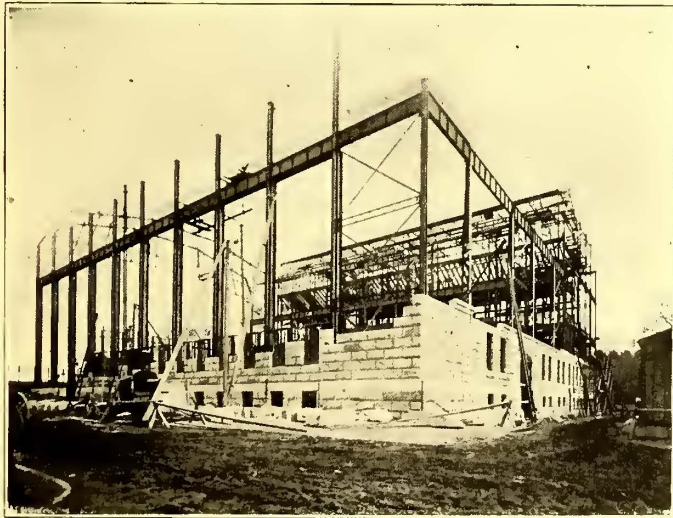
The work then proceeded more leisurely than would have been the case had it been built as originally intended for the Third Avenue Railroad alone; this being permissible because of the ability of the Metropolitan Street Railway Company to supply the power needed for a few years from its own then existing stations and the constant growth by added units in its Ninety-Sixth Street station.

While the engineers used their best skill to make the Kingsbridge plant a step in advance of best practice, this was done

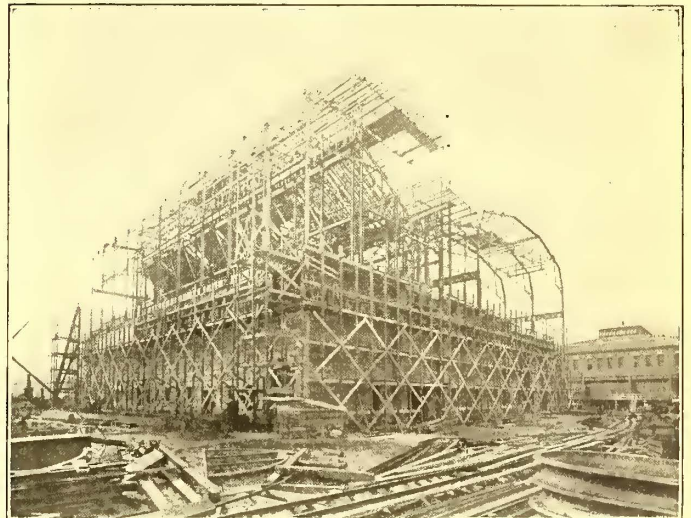
it much higher character than any similar work previously designed or constructed, and which has been faithfully carried out with the most satisfactory results.

Kingsbridge also involves a feature of general design not quite apparent in the drawings and specifications nor otherwise apparent until the entire plant shall be completed. This feature is a division of the plant into quarters, with a wide aisle crosswise of the house. The design includes sixteen units in two rows of eight each, which the transverse aisle again divides into groups of four.

The boilers through the two decks are similarly divided by



VIEW, LOOKING NORTHEAST, NOV. 6, 1901



VIEW, LOOKING SOUTHWEST, NOV. 19, 1901

with due reference to a fair degree of uniformity with the Ninety-Sixth Street plant, with the result that these stations possess a number of good features in common. The main points of difference lie in the fact that Kingsbridge was given a more substantial building, especially as to the rigidity of the steel structure. The combustion is handled with the aid of natural draft, supplemented by mechanical draft, the completed plant having four stacks, whereas Ninety-Sixth Street depends upon natural draft from one large stack. Economizers are used at Kingsbridge, but not at Ninety-Sixth Street. Kings-

the longitudinal firing and transverse aisle into four groups of two stories each, each group having a stack, a set of economizers, an auxiliary mechanical draft and suitable piping connections to a group of four engines. The barometric jet condensers stand in the aisle space of the boiler room next to the engine room wall, and are four in number, each serving a quarter of the plant.

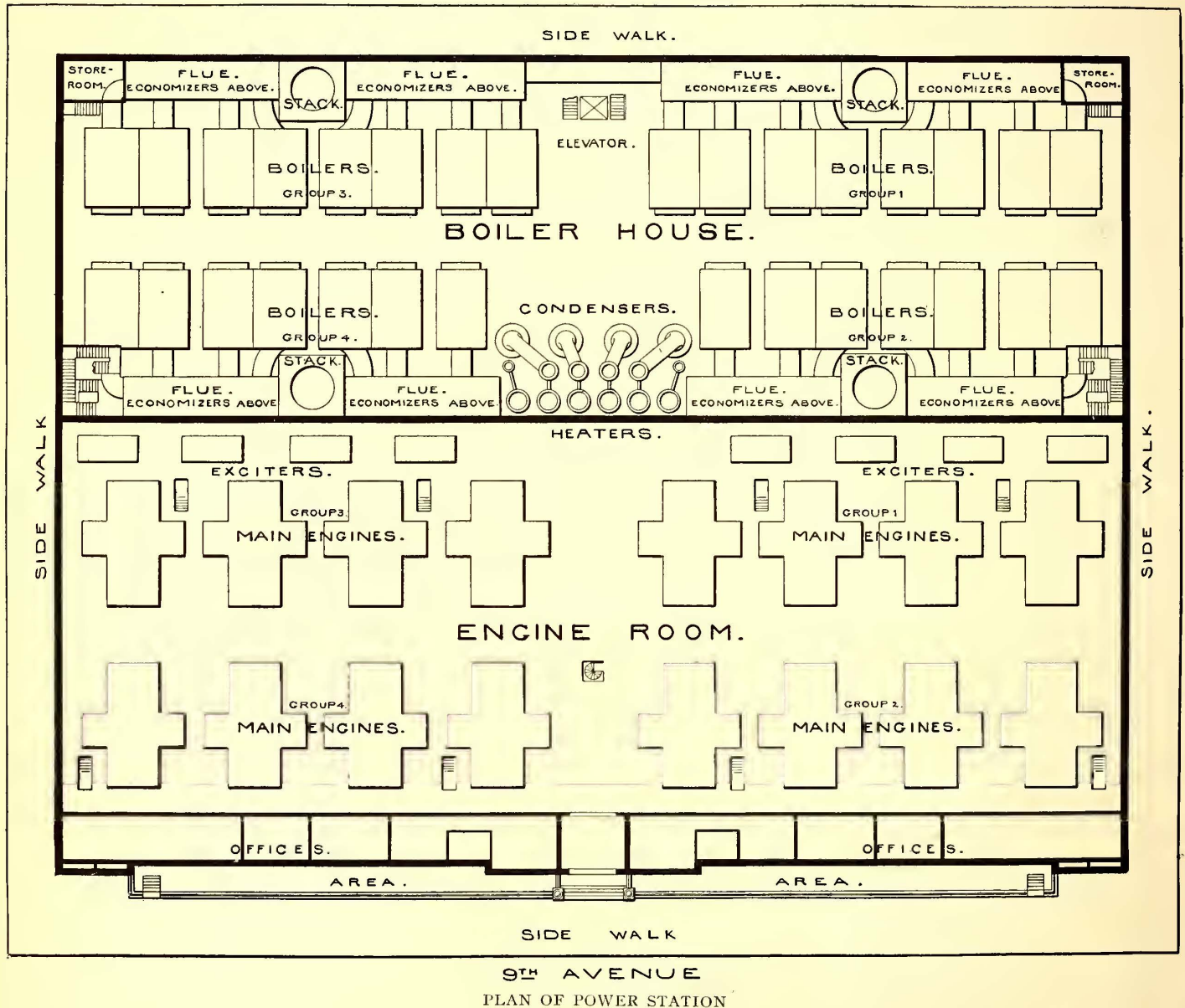
It will thus be apparent that there are four plants in one, or one plant with four independent divisions, each operative alone, yet tied together to operate as one. Detail examination will

show how the piping is connected between the four sections and how the condensers can relay each other, and, in fact, how all of the appropriate and reasonable exchange of service between the quarters extends from the smoke flues and stacks through to piping, condensers and switchboard. The merit or desirability of this grouping can only be proved by long experience, but it has the advantage that no adverse results can follow its adoption, it being rather in the nature of a permissive division in manipulation. The wide transverse aisle follows, partly from the character of the condensing plant and largely from the observed tendency for auxiliary and other apparatus

Since Kingsbridge, no large New York plant has been designed without multiple stacks.

The Kingsbridge piping is well worth an inspection of any one desiring to look into this extremely difficult and by no means inexpensive portion of such a property. It is of the very highest character, and in both design and construction will stand critical comparison with any of the prior or later work, some of which is well known in engineering circles to have proved vulnerably inferior.

Other features might be mentioned but the above will sufficiently illustrate that this plant fairly represents certain steps



to group toward the center of a large power house of this type, at which point it has seemed desirable to concentrate such surplus room as can be gained within the property limits.

It will be observed that this plant was designed quite early in the history of large power development in New York City. It, nevertheless, contains quite as many characteristic features as those of later design, and it remains for time to determine which of the various methods adopted in the different plants will prove the best to perpetuate. Already some lessons have been learned; among them the fact that this plant, in even its early months of operation, has shown its capacity to give a very low coal rate, even lower than some of the newer designs. The condensing plant of at least one power house since designed has been removed and replaced by apparatus of type similar to that used at Kingsbridge.

Prior to Kingsbridge the practice was to use one large stack.

in advance, many of which have become characteristic of power plant construction.

In the foregoing there is no attempt to claim strict originality in any of the features mentioned. There has been no attempt to introduce new arts, but the combination of various features, as aggregated in the Kingsbridge design, form fair material for study on the part of engineers who desire to look carefully into the relative features of plants of this larger class upon which the responsibilities for operativeness and economy are great.

ARCHITECTURE

The necessity of creating power house structures in large cities has given architects an opportunity to interpret what such architecture should be. We, therefore, have in the various New York power houses different styles of architecture, which, in the main, are called agreeable, but none of which, on close

analysis, would probably be regarded as entirely suitable for the purpose. The problem is a difficult one.

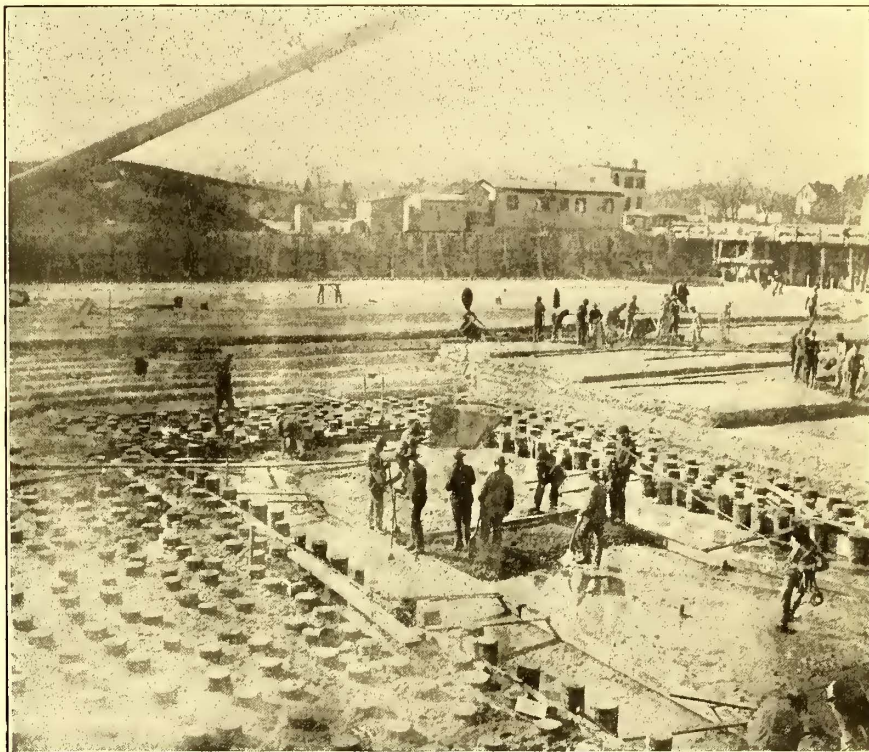
The lines of such buildings are essentially shaped by the plant itself. The openings are fixed by closely limiting conditions, and in most respects the architectural treatment must be subservient to the engineering requirements.

Rigid adherence to purpose would probably result in an extremely plain exterior, which, in a structure so large, might be considered by many to offend the eye, especially when the unarchitectural features, such as smoke-stacks and coal-handling devices, assume an uncontrollable prominence.

The architecture of a given house, therefore, results from the point of view assumed by the architect, which includes his individual taste. There seems to have been, by common consent, an attempt to introduce in the elevations of these buildings certain proportions, treatment of openings, ornamental string courses, cornices, terra-cotta work, etc., to produce a pleasing effect without inconsistency. Just how inconsistent such an attempt may be is open to opinion, and about all that can be said of the architecture of these various power houses is that they are as they are, and time will decide through the building of future plants, with these as examples, what will finally come to be considered good art and appropriate architecture for such structures.

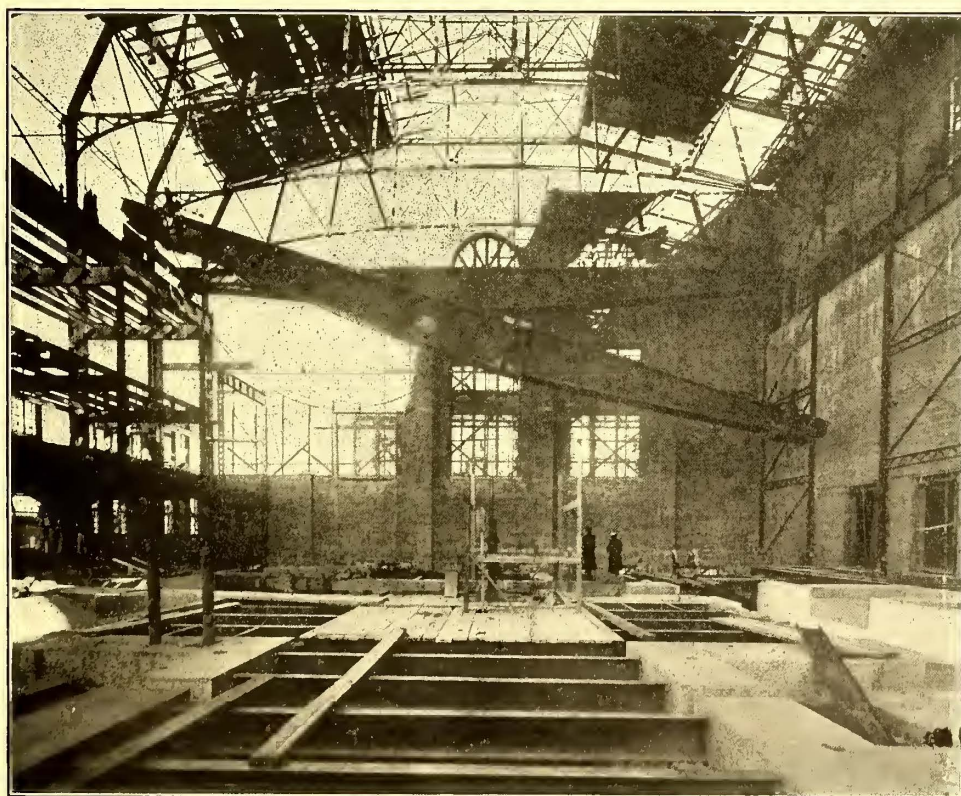
When the Kingsbridge power house was designed no other large example existed except the Metropolitan, at the foot of East Ninety-Sixth Street. The architectural department of Westinghouse, Church, Kerr & Company de-

It is difficult to judge it now, because it is single-ended and exhibits a degree of blankness, due to the apparent stopping off at a point beyond the middle, thus not having the merit of



LAYING THE CONCRETE FOUNDATIONS

being even exactly one-half of the completed design. Nevertheless, it has been favorably commented upon, and is believed to be good of its kind and consistently carried out.



RAISING THE TRAVELING CRANE INTO POSITION

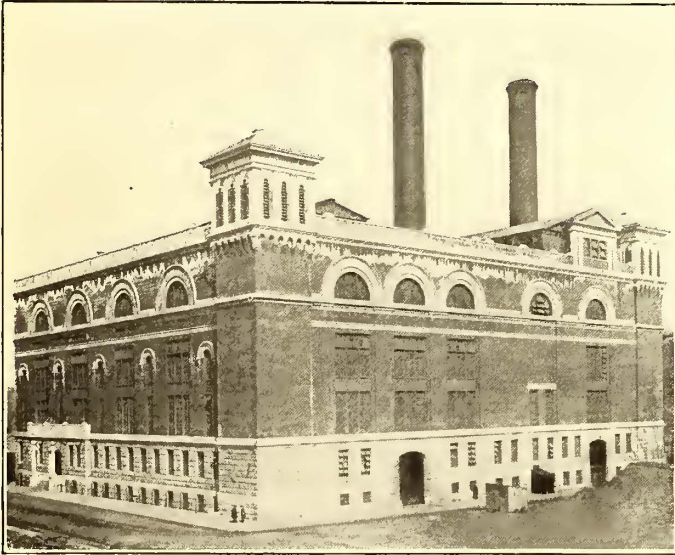
signed the elevations of the Kingsbridge building for a certain effect, which has been well carried out in construction, and were the whole of the building completed it would truly represent the motive.

Inasmuch as none of the present power house designs would probably stand critical analysis as to suitability for their purpose, and are designed largely with reference to pleasing effect upon the eye, or at least to avoid an unpleasant effect, the only way to judge a given design is to compare the five larger power houses now erected in Manhattan and draw such deductions as may be warranted. Several close comparisons which have been thus drawn for the purpose of designing new structures indicate that the Kingsbridge architecture compares favorably with others, the general criticism having been that all of the others, except Ninety-Sixth Street, have overdone the attempt for architectural effect, carrying this beyond appropriateness to purpose. New structures under way seem to go even farther in the direction of ornateness, and as a reaction from this it is understood that the power houses for the Pennsylvania Railroad terminal service are to be given much plainer exteriors, the architectural effects to be produced by the

proportions of mass following more closely than previous examples the suitability to purpose and reflection of interior, thereby resulting in very much plainer structures. This will later give further opportunity for comparisons to be drawn with

the previous types, and only time will determine, through these various designs, what type of architecture is really suitable for massive buildings for such purpose along the borders of the city.

Believing, therefore, that the architectural treatment of a large power station should be characterized by a dignity and simplicity of design, typifying in some measure the majestic purpose of the building, and expressive of a structural strength



VIEW OF STATION, LOOKING NORTHEAST

and solidity in keeping with the idea of power generation, it was attempted to express something of this creed in the design of the Kingsbridge station.

The first condition of simplicity, even more than a due regard for structural economy, so important in commercial enterprises, dictated the use of an ordinary grade of brick for external treatment, giving an obviously solid and homogeneous construction, free from the suggestion of veneer adhering to the use of face brick. The details of the cornices and mouldings throughout are of the simplest character; the inspiration of the design being drawn from the early, or Roman, period of Romanesque art, but freely modified to conform with modern taste and practice. Characteristic of this style are the arcades of deeply voussoired semi-circular arches springing from a cornice belt (a survival of Roman entablature), in this case serving the purpose of a horizontal band coincident with the principal girt of the steel frame.

While the building is throughout entirely of skeleton steel construction, no adequate exterior expression of this fact is possible in such materials as brick and stone. It was, therefore, determined to design a shell which should be obviously constructive in itself with the substantial appearance appropriate to a large power plant, avoiding the tendency to architectural necromancy so commonly exhibited in steel frame buildings. This it was that dictated the grouping of the windows in large arched openings, separated by broad wall spaces, visibly able to receive and transmit the thrusts of the heavy arches, and caused the introduction of the flanking towers at the abutments of the arcades, which will form the four sides of the completed structure.

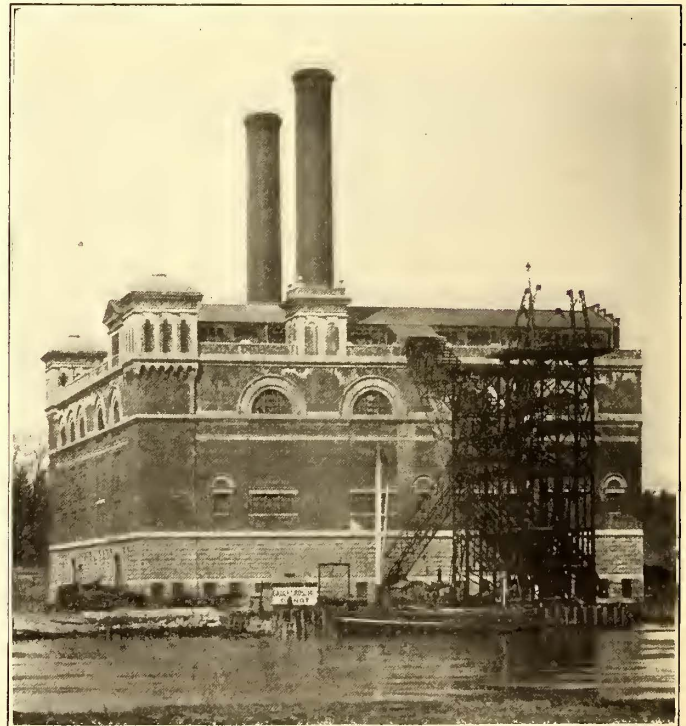
The foundations, or sub-structure, of such building are, of necessity, extremely massive and important, and an expression of this fact was sought in the rugged basement of rock-faced granite masonry.

POWER UNITS

These consist of 46-in. and 86-in. x 60-in. Corliss engines with centrally located generators, the design being of characteristic type and not involving any special features. Extreme care, however, was given to the workmanship and detail of these engines

by the Westinghouse Machine Company, with a view to installing units which could quickly and assuredly be brought into practical operation with less change and refitting than has been customary in large engine plants. This was successfully accomplished, and it is probable that no large engines have even been installed upon which so little was required to be done after erection as in this plant. Perhaps, the most noteworthy feature connected with the engines is the provision for handling them in starting, synchronizing and stopping. While this plant was under construction, Westinghouse, Church, Kerr & Company gave special and continuous attention to determining how large engines were best handled in practice in the service of large stations. To this end their engineers, from time to time, studied the operations in such large plants as were available, and much information was accumulated as to the best ways and means of quickly and safely handling these units into and out of service. There has been a tradition in engineering that large engines should be started non-condensing and the condensers then cut in. Practical observation of operating plants, however, has shown that some engineers consider that their best results are obtained by starting under vacuum, and that, while the practice in various stations differs more or less, according to facilities offered, the use of many large engine units has clearly demonstrated that certain processes are safer and better suited to operative control than others. To accomplish all that is possible under the present state of the art, these units at Kingsbridge were, therefore, arranged for convenient starting, either with vacuum or without, at the will of the engineer by the following arrangement:

The exhaust from each group of four engines connects through a vacuum trunk to a condenser, each engine exhaust pipe being provided with an electrically-operated gate valve



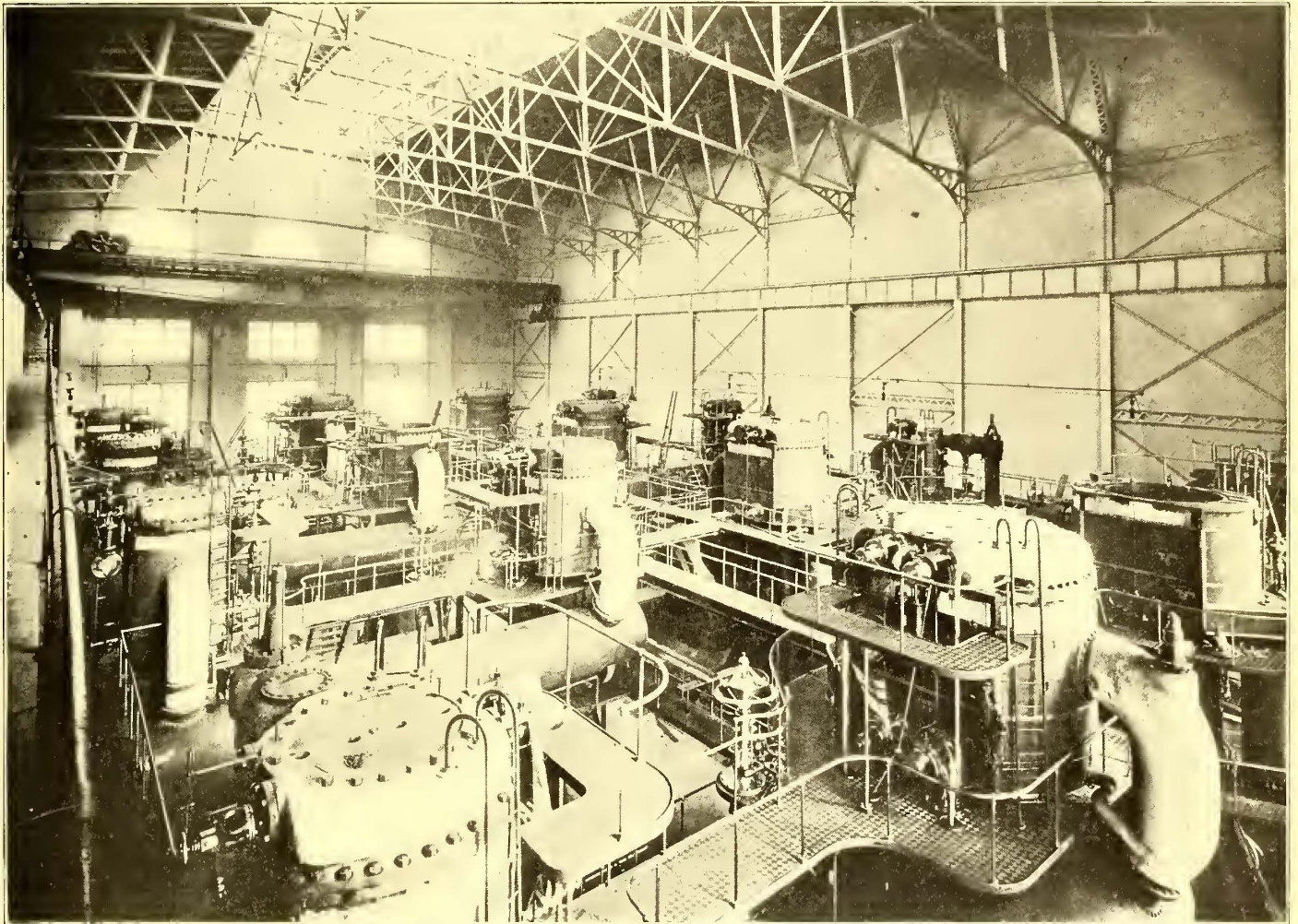
POWER STATION, FROM RIVER SIDE, SHOWING STEEL FRAMING OF COAL CONVEYOR

and an auxiliary free exhaust pipe between this valve and the engine connecting to a main free exhaust and to the atmosphere. Each auxiliary exhaust contains an automatic relief valve arranged for hydraulic control if required. Electric wires from the gate valve and hydraulic piping from the relief valve are carried to controls upon the engine platform convenient to the throttle valve, and these, with a synchronizing lamp, pressure and vacuum gages, also near the throttle, provide the

engineer with the best means to easily start, synchronize, put into service or stop one of the main units with or without the use of vacuum.

The generators are of the well-known Westinghouse revolving field type, substantially constructed and operating at 6600 volts, three-phase, 25 cycles per second. This is one of the first installations where the Westinghouse laminated steel construction was adopted for revolving fields of alternating-current generators. In this construction the entire magnetic circuit of the field is of sheet steel, built up in overlapping layers to form a circuit of low magnetic resistance and likewise a fly-wheel rim of exceptional strength. The wisdom of this selection has been demonstrated by the extent to which this

rounding surface condensers and the possible saving of feed water. The art of applying condensers for large service is one of the most difficult about which to make decisions in large power plants. On the one hand, there is the possibility of saving feed water through surface condensers to the extent of \$50,000 to \$100,000 per annum, with which goes the necessity for maintenance of condensers of this type, together with special provisions for keeping oil out of the condensed water. Had all those interested in the construction of this power house been willing to undertake all that goes with this construction and operation, the engineers would have been willing to provide the ways and means. Had this been done it would have been along lines involving much more thorough application of methods for



VIEW IN ENGINE ROOM, SHOWING TRAVELING CRANE AND ROOF GIRDERS

type of construction has since been adopted. A much mooted point in alternating-current station design is that of the best method of securing the easy and rapid synchronizing of generators and the maintenance of a proper division of work among several of them during wide changes of load on the stations. This problem was formerly, and still is to a considerable extent, regarded as one of engine design, but the Westinghouse Electric & Manufacturing Company incorporated into the design of the Kingsbridge generators a feature of electrical design which renders the synchronizing problem far simpler. The ease with which single machines are added to the service at Kingsbridge leaves little to be desired in this direction. Inasmuch as this description applies to the power house only, the design of the sub-station apparatus, which involves many interesting and valuable features, will be left for a future article.

CONDENSERS

In this plant it was concluded to install barometric jet condensers after due consideration of all of the problems sur-

effecting the total results economically than have heretofore been used. The original design contemplated this service with its consequent saving, but was finally abandoned in favor of jet condensers, but without adverse decision upon the other and more economical method.

The use of individual low-lift jet condensers was never even considered in this plant, the engineering limitations of this type, both as to operativeness and efficiency, excluding them absolutely.

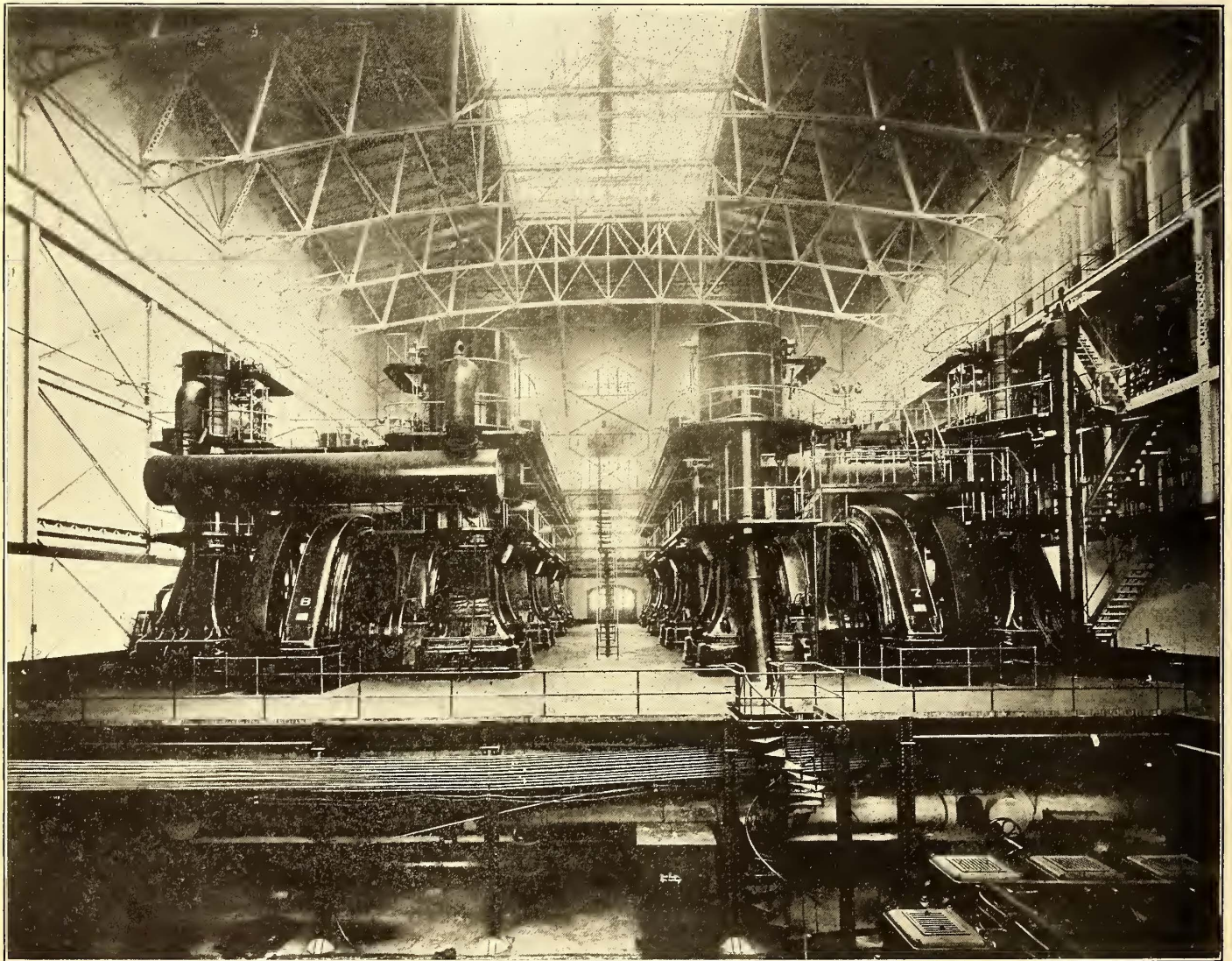
This might scarcely be of interest except for the fact that in some large subsequent installations such condensers have been used, but with such unfortunate results that they have been supplanted by the barometric type. A lesson in this worth learning is the necessity for the comprehension of engineers regarding the degree to which requirements, especially of large installations, outgrow conventional practice.

The final decision to install a plant of centrally located barometric condensers, four in number, handling sixteen 3000-kw units, was reached after a careful consideration of

such similar work as had been done elsewhere in this country and abroad, none of which, however, were on so large a scale as the Kingsbridge plant. Aside from any detailed consideration of designs, efficiency and engineering arrangement, a factor in this decision was parallel with the reason why a large central power house should be built as distinct from a number of small plants. The common custom of locating a condenser for each engine runs into a multiplicity of valves and connections and many operative functions, including distribution of condenser water supply over a considerable area. A point of view may be obtained by assuming that near a large power station there is such a thing as a vacuum factory, where vacuum is produced economically on a large scale, and a proposition is

The tail pipes are 28 ins. in diameter, and the water supply 30 ins., entering the condenser head as usual through suitable air coolers, from which coolers cold dry air is exhausted by close-clearance, compound steam-driven fly-wheel vacuum pumps. Each of these condensers is capable of handling the exhaust steam for about 25,000 hp, thus allowing one condenser as spare or relay, the connections being so made that the exhaust can enter the several condensers individually or multiple into them as a connected group. Any one, therefore, may be cut into and out of service, thus providing the requisite elasticity of operation.

It would be quite impossible to dwell upon the advantages or disadvantages of this type of condensing plant in a description



GENERAL VIEW OF ENGINE ROOM, LOOKING DOWN CENTER AISLE

made to a power plant for vacuum service just as any large central station supplies public service. It would then be fair to ask why it would not be feasible to purchase this commodity instead of operating numerous small plants for the same purpose. The individual units of the power plant would thus, in a way, become customers of a vacuum factory. It, therefore, may be good engineering to consider the creation of a special vacuum plant serving the numerous units within easy transmission distance, and, therefore, it may be worth while in designing an important property to consider the supply of vacuum as a separate department of engineering and service, rather than as a detailed adjunct of each unit.

A study of this problem led to the adoption of four very large barometric condensers, connected to the engines by 54-in. exhaust pipes, each main receiving the exhaust from four units.

of this nature. It has been constructed and is in successful operation. It is the only very large plant of this type in service, and time will determine its relative advantage. Thus far its performance has been eminently satisfactory, and it has merits which would give it preference over individual condensers for each engine. The same general plan can be adapted to central surface condensers, with their feed-water saving possibilities, which now promise to appear more prominently in station design, due to the use of steam turbines, thereby relieving the surface condenser situation of the former difficulties of oil-contaminated exhaust.

STEAM GENERATION

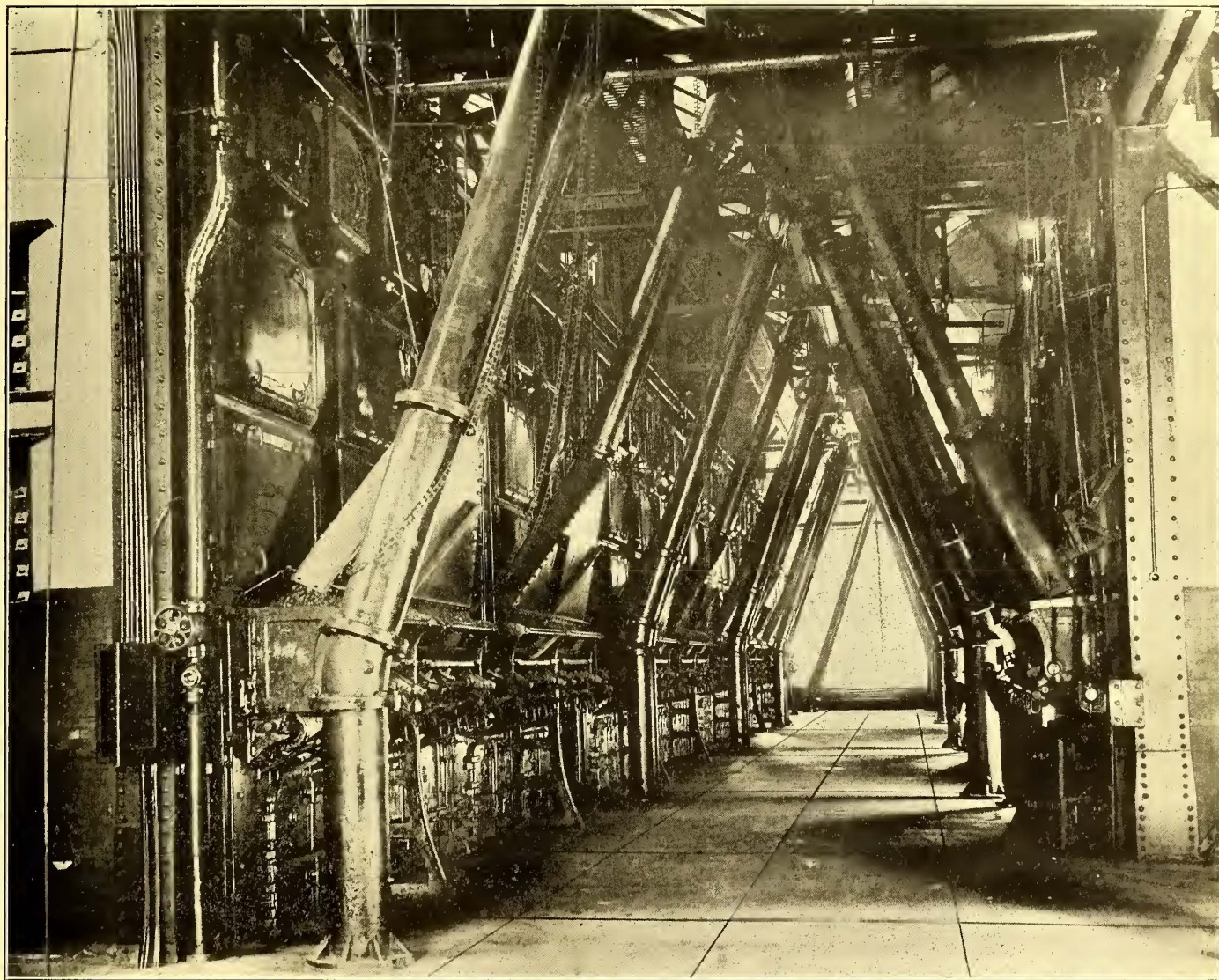
The design and construction of the steam generating plant do not appear to materially differ from many others of like kind. It consists of suitable coal-handling machinery of the

belt-conveyor type, supplying generous and well constructed coal bunkers fitted with fire protection. The ash handling through hopper bottoms and chutes into cars introduces no special features beyond careful detail design. Water-tube boilers are used, in which the heating surface is not made excessive with reference to grate surface; recognizing that the boiler is essentially the size of its fire, mechanical stokers of approved type and usual construction are utilized with the largest grate surface admissible.

All apparatus is adapted for the use of hard or soft coal, as required. The products of combustion pass through generous economizers, with ample draft space, to stacks 200 ft. high, sufficient for normal draft under most conditions of service.

the dry-air pumps are steam-driven, close clearance, fly-wheel type. The stokers are driven by small, simple engines, while the mechanical draft fans are operated by plain slide-valve engine of heavy construction, operating at slow speeds and of a comparatively uneconomical type.

The exciters are driven by compound steam engines. The exhaust from all of these auxiliaries is led to feed-water heaters, in which it is completely condensed. The feed water, after leaving the pre-heaters in the main exhaust near the condenser, is raised to 210 degs. in the feed-water heaters, fed with the auxiliary exhaust, whence it passes to the economizers for an extra 100 degs. or more, absorbed from waste gases before it enters the boilers. The electrically-driven auxiliaries are the



SECOND FLOOR OF BOILER ROOM

This draft is supplemented by mechanical draft between the economizers and stacks, with suitable arrangements for bypassing, so that on short notice the draft may be made equivalent to stacks 400 ft. or more in height. These appliances, carefully arranged with reference to each other as to proportion and detail, and with an ample system for feed water, blow off, etc., together produce a steam generating plant of high character, and probably as efficient as the present state of the various arts involved will admit. Throughout its design sufficiency and due provision for convenience in operation are noticeable.

AUXILIARIES

The auxiliaries of the station are in the main steam driven. The boiler feed pumps are of the compound, duplex type, the centrifugal pumps for elevating the condensed water for the barometric condensers are driven by compound steam engines,

air compressors which operate the pneumatically-operated switches; the 30-in. gate valves in the exhaust branches from the main engines to the main exhaust pipes, the coal and ash conveyors, the freight elevators and the traveling crane.

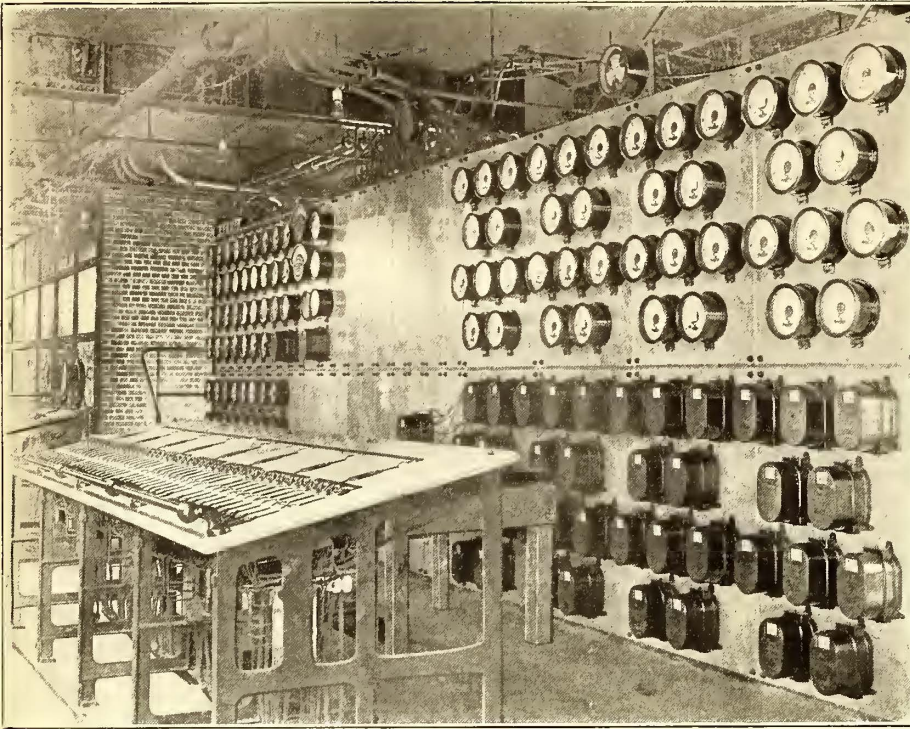
It will be noted that steam-driven auxiliaries predominate in this station, and while, consistently, some might be equally well handled electrically, the feed-water requirements, prior to passing into the economizers, are such as to readily absorb all of the heat yielded by the auxiliary exhausts, thus preserving the efficiency of the total heat cycle.

PIPING

In this plant special care has been given to the design and construction of the piping system, and which could be at best but poorly described. It needs to be seen and judged comparatively with the piping of other large plants to establish its

merits. The high-pressure piping is of the welded flange type, all valves and fittings being extra heavy. The large exhaust

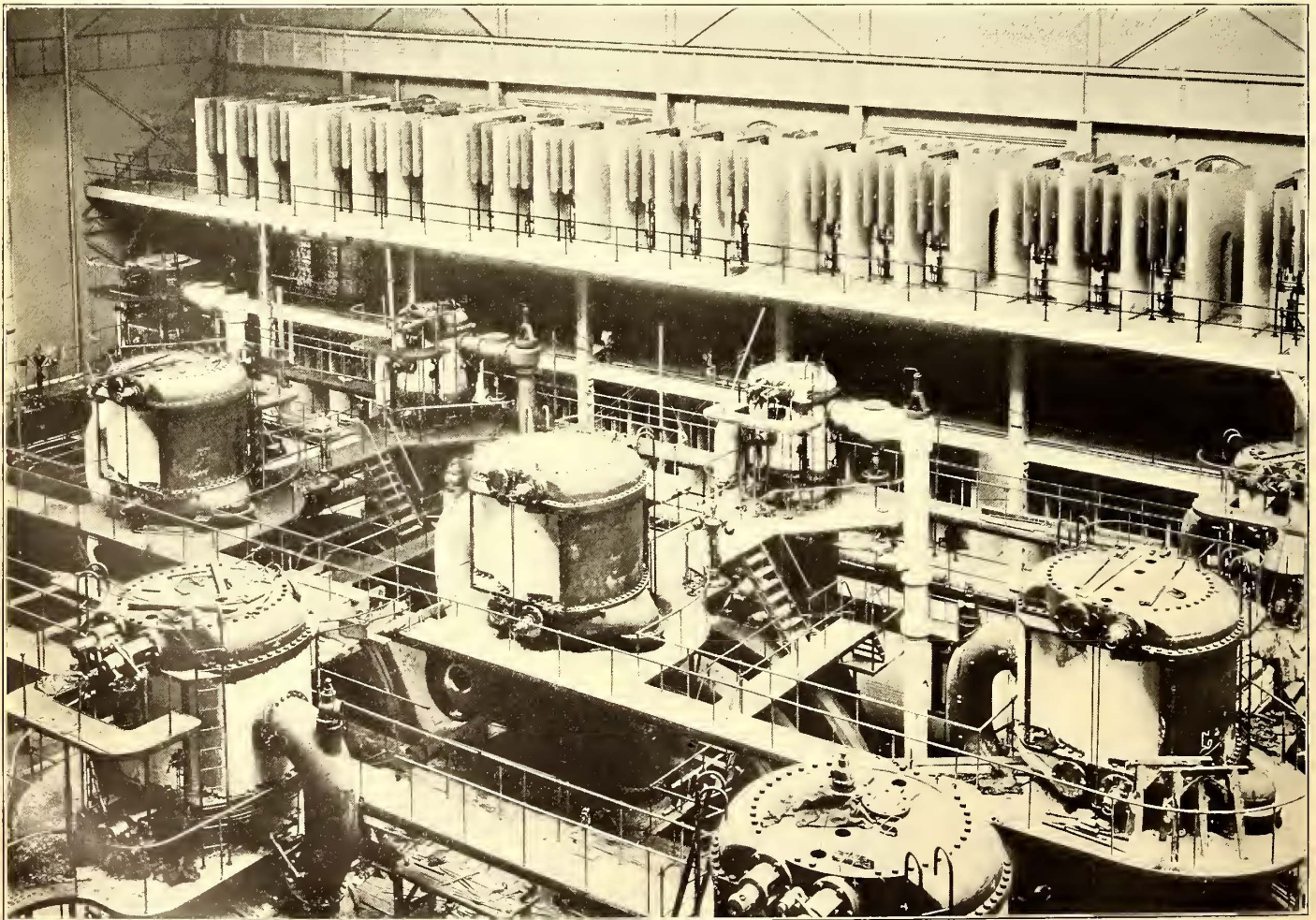
cold, with initial tension for the relief of strain under heat expansion and various other improved means of securing the best results, are carried out with great fullness, yet along simple lines in this work.



FRONT OF BOARDS MOUNTING INSTRUMENTS FOR ELECTRIC CONTROL AND MEASUREMENT

ELECTRICAL SWITCHING EQUIPMENT

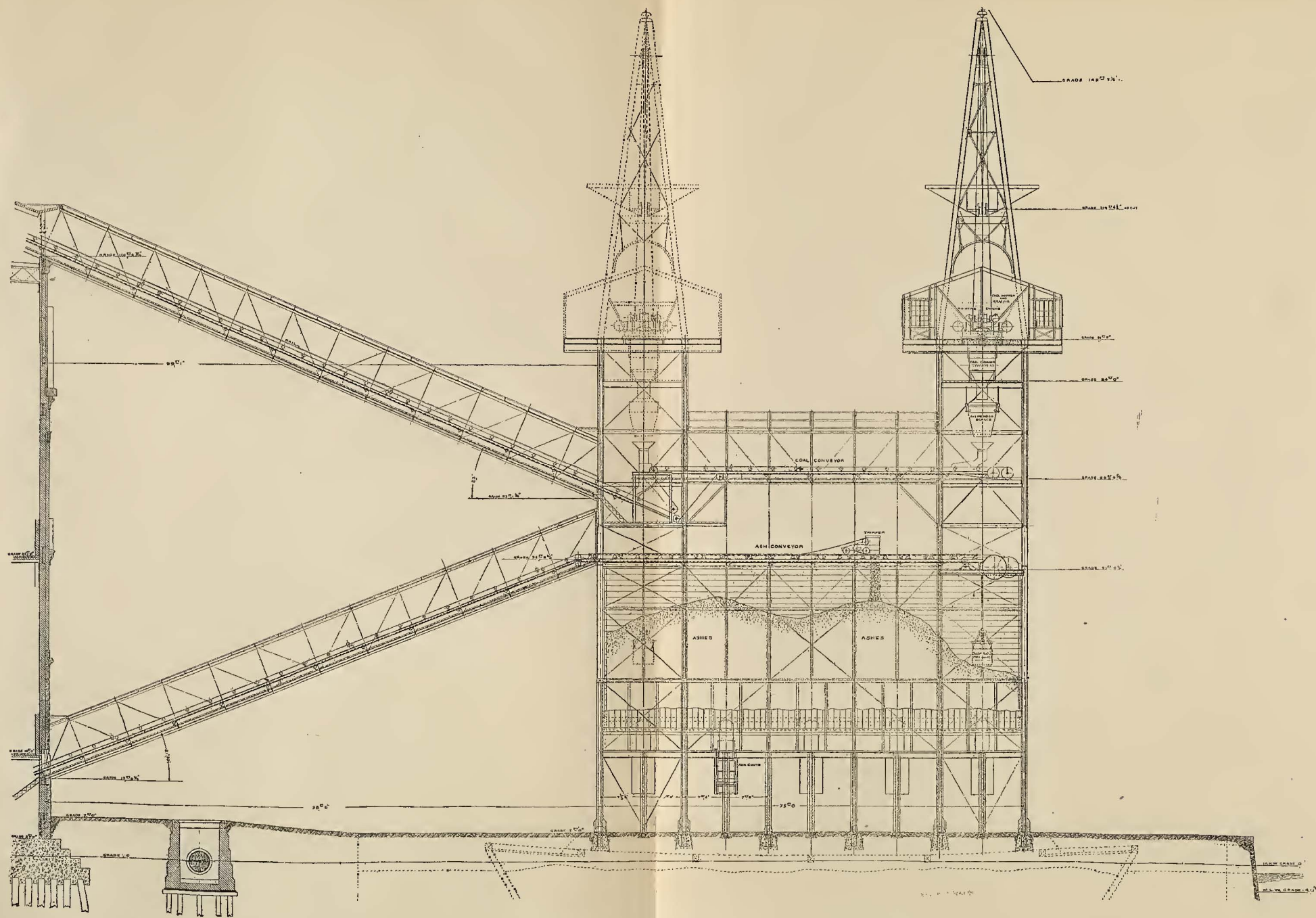
One of the most important developments in the design of electrical installations of large power stations operating at high voltage has been in the methods of isolating the electrical circuits. In the design of the switching equipment for this station the same care was exercised in the provision of masonry construction and soapstone barriers as was followed at Ninety-Sixth Street power station, but the isolation is more complete, without sacrificing anything in accessibility. Each main busbar is completely enclosed in a separate masonry compartment, and each pole of each individual circuit breaker is separated from its neighbor by a marble barrier. A characteristic feature of the plant in this particular is the grouping of the feeder circuit breakers into masonry cubicles, each cubicle forming a distinct unit, having in the interior of the cubicle a group bus connected to the main bus through a group circuit



VIEW IN ENGINE ROOM, SHOWING SWITCHBOARD GALLERY

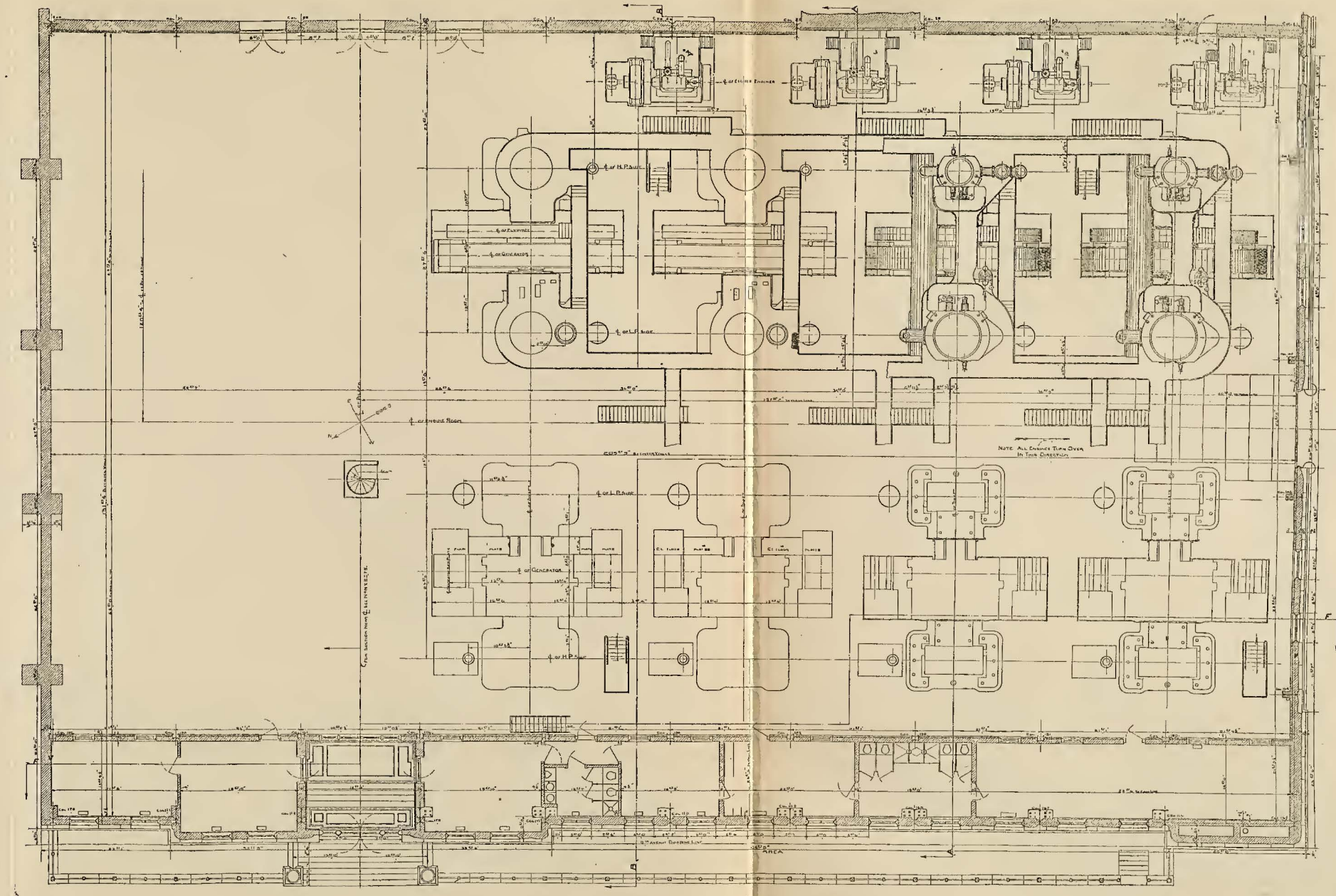
pipes running to central condensers, are of boiler plate, caulked tight, and auxiliary free exhausts are of cast-iron. The methods adopted for expansion and joining of certain sections,

breaker. The feeders are brought up to their respective circuit breakers in small groups, so that trouble cannot spread to a serious extent, as has occurred a number of times in other

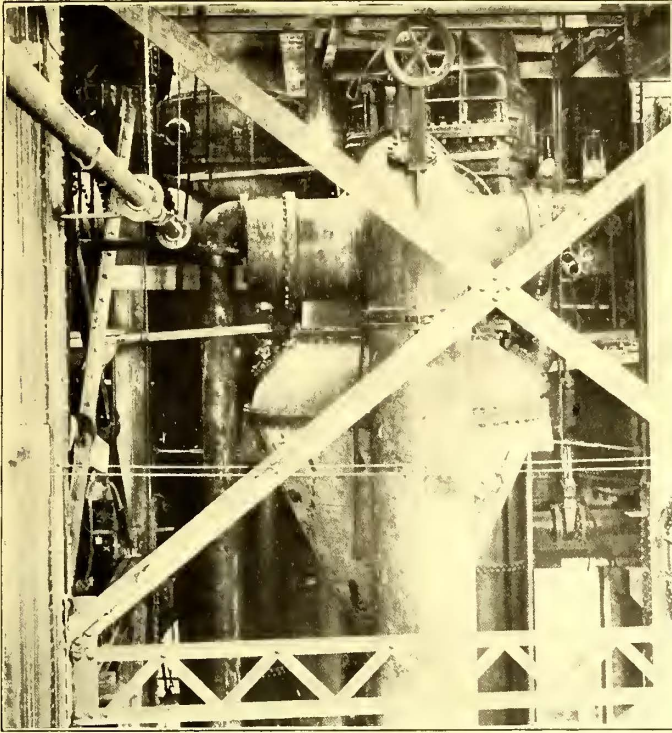


Scale, 1/16 in. = 1 ft.

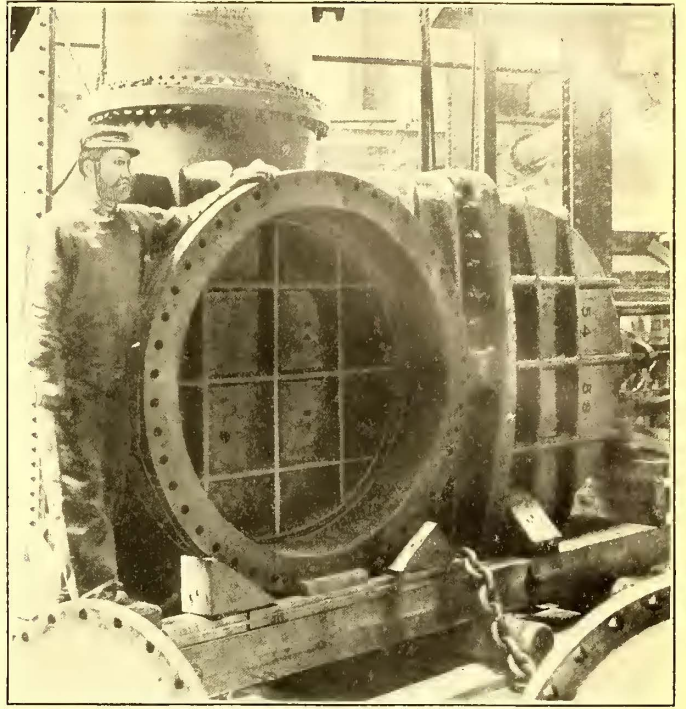
SECTION ASH STORAGE BUNKER, COAL-HOISTING TOWERS AND CONVEYING MACHINERY



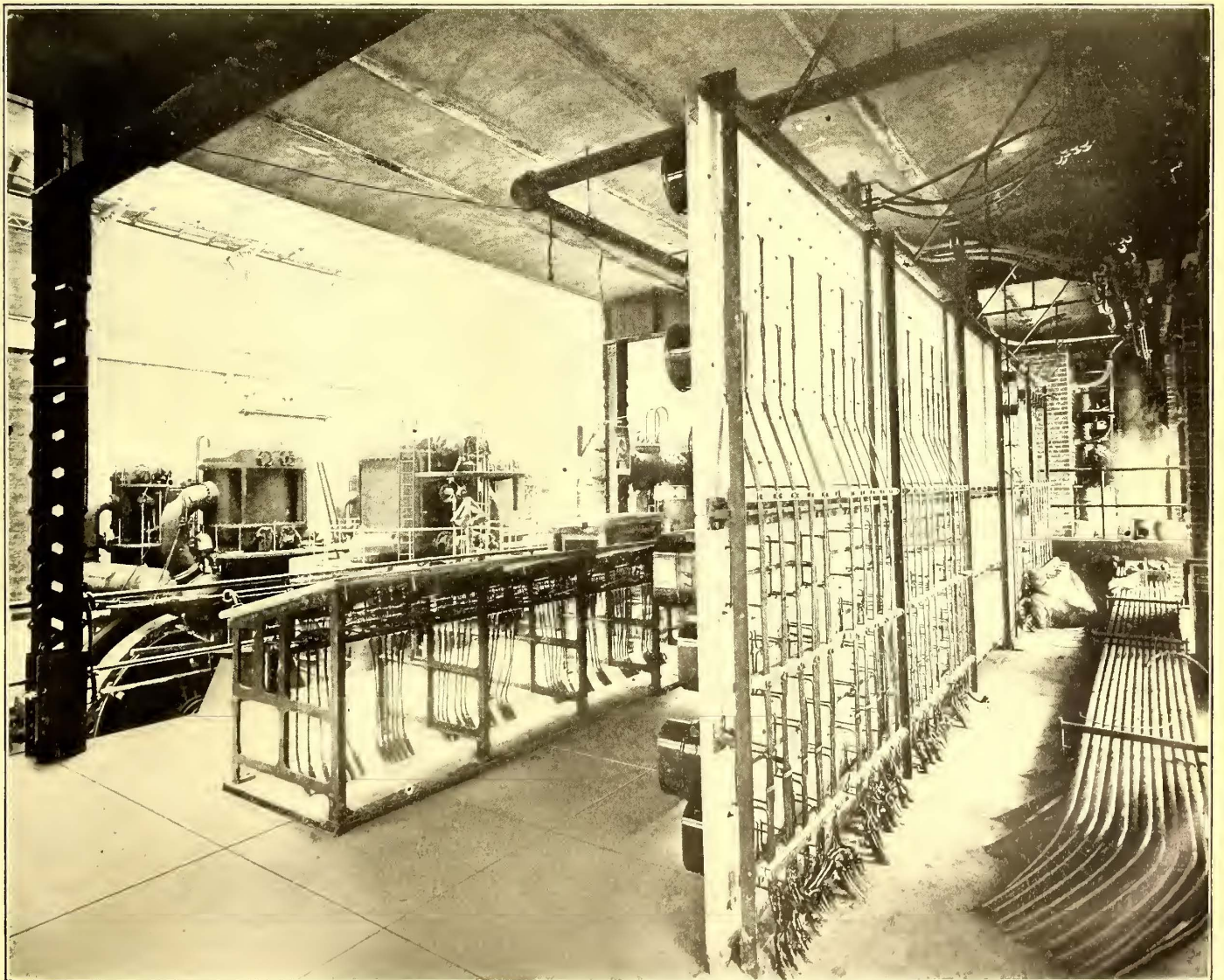
GENERAL PLAN OF ENGINE ROOM



CONDENSERS



54-IN. VACUUM VALVE



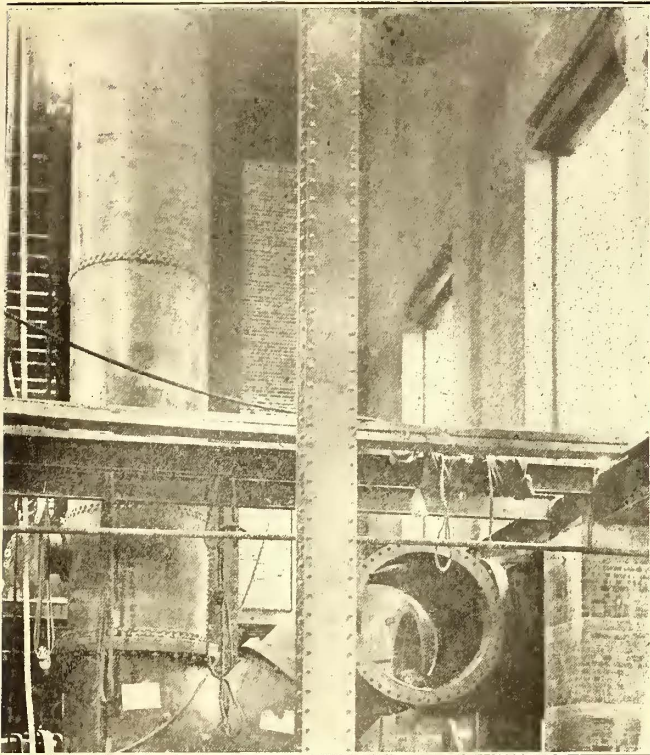
BACK OF BOARDS MOUNTING INSTRUMENTS FOR ELECTRICAL CONTROL AND MEASUREMENT

nts. The Metropolitan power stations differ from other power stations in the general scheme of the electrical circuits. A single sectional bus is used, to which the generators and feeders

erators. At Kingsbridge each feeder group is dependent on one group of generators, being connected through the group switch to one section of the main or generator bus. Emergency conditions are provided for by serving each sub-station with a number of feeders, each of which is brought to a different cubicle in the power station. In case one section of the power station is shut down, each sub-station will, therefore, be served from the other sections. The main or generator bus of the ultimate installation is divided into four sections corresponding with the four divisions of the plant previously mentioned. These sections are coupled together by bus junction circuit breakers.

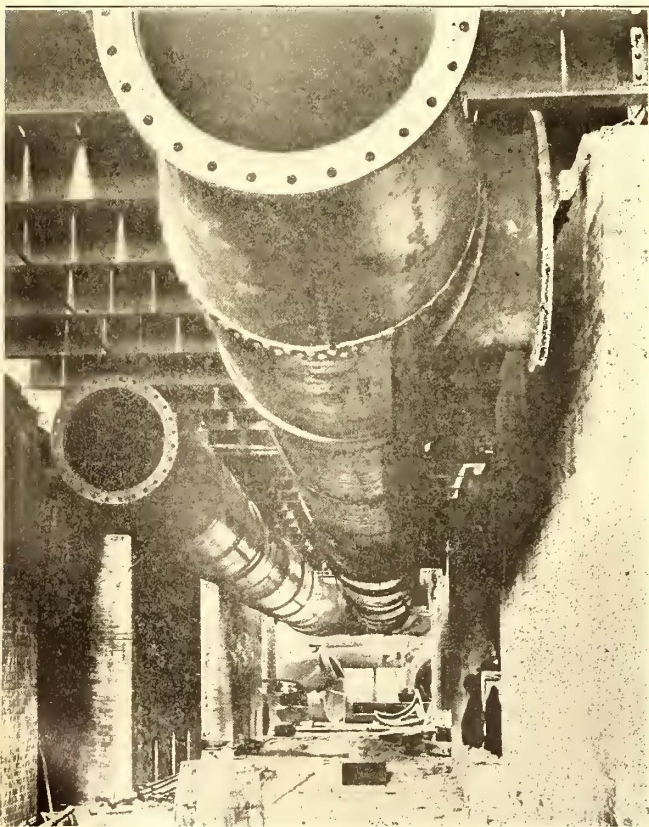
The switching equipment is arranged on three galleries along one side of the engine room. The generator circuit breakers are placed on the lower gallery, the bus structure on the second gallery, and the feeder cubicles on the third gallery, thus making the arrangement progressive from generators to feeders without crossing of circuits.

Air-type circuit breakers are used for all high-tension circuits, operated from an electro-pneumatic controller system. The operating platform, containing the controlling desks and instruments for the various alternating circuits, are on the second gallery in a location which is central with reference to the ultimate equipment of power units, and from which there is a comprehensive view of the engine room. Below this platform, on the second gallery, is the exciter switchboard, containing panels for the control of the exciters and panels for the direct-current feeder circuits for lights and power house auxiliaries; also the field rheostat switchboard and the field resistances. All switching apparatus and all instruments are of standard Westinghouse make.

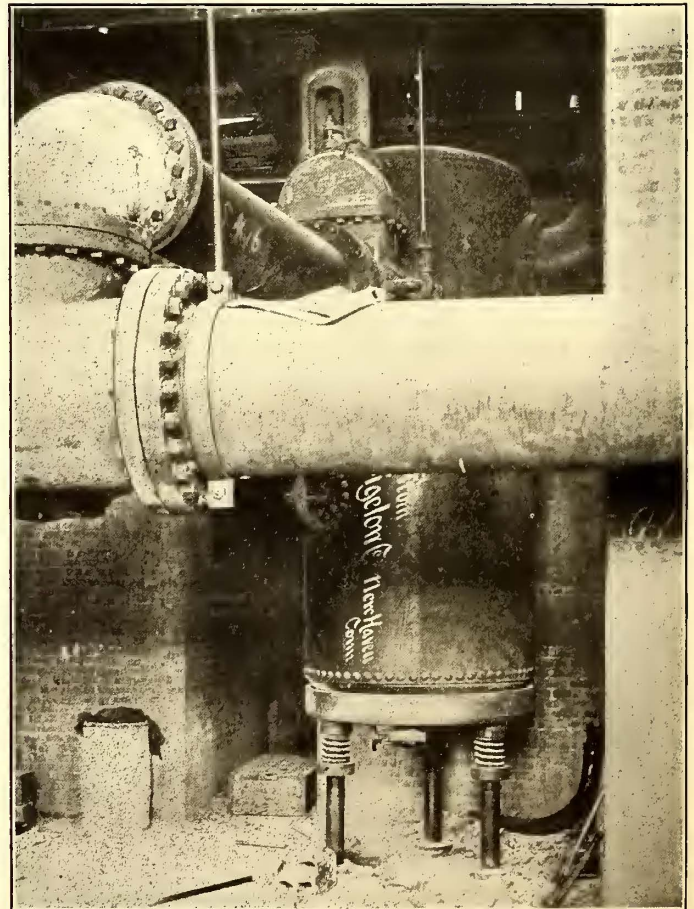


VACUUM CONNECTION TO CONDENSER

are connected, instead of the usual double bus construction, the theory being that for the particular service of the Metro-



54-IN. AND 42-IN. RIVETED VACUUM LINES



STEAM SEPARATOR

politan system the flexibility of the double bus construction is not essential. At Ninety-Sixth Street the bus is divided into feeder sections and generator sections, so connected that a feeder section may be served by more than one group of gen-

erators. Among the minor things, attention might be called to various features of passing interest to any one inspecting the plant, which are of little importance in a printed description. Among

MISCELLANEOUS

these might be mentioned the design of the traveling crane which spans the distance of 130 ft. between track centers, the convenient arrangement of stairways and galleries around the main units, the adequate provision by way of air cleaning and water cooling, the oiling and oil filter and cooling systems, provided to handle four kinds of oil, the amount of available working space in engine room, basement and around the various auxiliaries, notwithstanding this plant is so compact as to utilize only 1.1 sq. ft. per horse-power. Comparison with other plants will show this to be much more compact than those of later design, with possibly one exception, in which the machinery is obviously crowded and working space inconveniently contracted. This ample working room at Kingsbridge, with the smaller floor space per horse-power, is due to the available free space being so distributed that it is all useful, whereas, some of the later designs provide more space than required for practical operation, thus running up the floor area per horse-power without compensating advantage.

Suitable office lockers, rooms, shower baths, and all necessary facilities for the accommodation of employees are amply provided.

OPERATION

The portion of the plant now completed, containing eight units, is in full operation, and if, as reported, it has succeeded in thus operating with fewer difficulties in its earlier history than others, it is because of the attention paid to the details of design and construction. It is scarcely too much to say that it has had no troubles whatever, each feature alone and in conjunction with others having worked exactly as predetermined with no necessity for changes. The same condition practically existed throughout the construction, there being no interferences, and, consequently, no changes required. The plant is marked throughout by sufficiency of materials and methods, and is believed will show an operative efficiency of the highest grade. This is already indicated by its early months of operation, in which the coal rate per kilowatt substantially equals the best records. It is yet too early to draw final conclusions upon the relative operation and economy, but time will develop records of whatever superiority, if any, follows from the care which has been exercised in refinement of construction of the main engines, the careful proportioning of all of the factors which enter into a steam generating plant, and the engineering economies which are introduced in the various auxiliaries and in the general integrity of the construction as a whole, for the purpose of aiding the economy by preventing minor wastes, minimizing repairs and avoiding the sacrifice of economy which results from frequently having to meet emergency conditions because of disarrangements and break-downs.

This power plant exemplifies a well-carried out and consistent design of a certain date. It would be too much to hope that it would excel plants now projected, which will have the advantage of steam turbines and various new appliances which are now at the command of engineers. It, however, is prepared to take its place and make its record among the four or five large stations of somewhat similar type now built, or under way, in or near the city of New York, and as such it is open to full inspection to those who, through their engineering interests, are entitled to inspect its construction and operation.

ANNIVERSARY OF FIRST MOUNTAIN RAILWAY

The fiftieth anniversary of the opening of the first mountain railway has recently been celebrated in Vienna and in the neighboring mountain resort, Semmering. The line over the Semmering, 3300 ft. high, was projected and carried out just a half century ago by Karl Ghega, an Austrian engineer, in the face of technical criticism and public opposition. Ghega, however, accomplished the work and a monument has been erected to his honor at the top station.

PROGRAMME OF THE VIENNA MEETING OF THE INTERNATIONAL STREET RAILWAY ASSOCIATION

The programme of the Vienna convention of the International Street Railway Association has just been announced. The date of the meeting has been changed from Sept. 12-15 to Sept. 5-8, in order to permit the attendance at the St. Louis Exposition of a number of the members of the association who expect to visit the exposition after the Vienna convention. The programme at Vienna, as announced by the secretary, is as follows:

On Sunday, Sept. 4, at 8 o'clock in the evening, a reception will be given to the delegates in the festival hall in the city park. Attendants are requested to register, so far as possible, at that time.

On the morning of Monday, Sept. 5, there will be a session from 10 to 1, to be held in the hall of the Austrian Society of Engineers and Architects, at which all the business sessions of the association will be held. Addresses of welcome will be delivered by the Austrian Minister of Railroads, and by the Mayor of the city of Vienna. In the afternoon a visit will be made by carriages to the City Hall, to the Imperial Theater and to the works of the Siemens-Schuckert Company. In the evening, at 6 o'clock, the delegates will attend a performance at the Imperial Opera House of "Die Opernprobe," at which the celebrated ballet "Rund um Wien" will be rendered.

On Tuesday morning, Sept. 6, a business session of the association will be held from 9 until 1. In the afternoon a trip will be made to the car houses and repair shops of the municipal tramways, after which the delegates will be driven to the imperial park at Schönbrunn. In the evening a banquet, tendered to the association by the Austrian Minister of Railroads, will be held at Hietzing. The return to Vienna will be made by special trains on the Metropolitan Railway.

On Wednesday, Sept. 7, a business session will be held from 9 until 1. In the afternoon there will be an excursion on the Danube River, during which the principal electric power stations will be visited. The afternoon trip will terminate with an excursion to Kahlenberg by the cable inclined railway. In the evening there will be a reception at Kahlenberg, tendered by the Austrian Tramway & Light Railway Association. The return to Vienna will be made at 10 o'clock by special train.

On Thursday, Sept. 8, a session will be held as usual from 9 until 1. In the afternoon, if time permits, a visit will be made to the Electrochemical Institute. In the evening, at 6 o'clock, the delegates will attend the official banquet tendered to the association by the municipality, which will be held in the City Hall.

During the business sessions of the association, trips have been arranged by the local committee for the ladies in attendance, at which various interesting points in the city will be visited. There will be a subscription of 20 kröner (\$4) for the gentlemen and 10 kröner (\$2) for the ladies in attendance, to cover part of the cost of the entertainments.

Two series of excursions are planned for the days following the convention, viz., Sept. 9-11, for those who wish to participate. One of these, extending over two days, will be to Schneeberg and to Semmering and then to Trieste; the other will be to Linz and the Postlinberg, then to Innsbrück and the valley of the Stubai, where a single-phase electric railway is in operation.

In view of the large number of members of the association who will probably attend, and to facilitate the work of the local committee, the executive committee requests that all members who expect to attend the convention at Vienna will send a notice to this effect to Mr. Ziffer, of the executive committee, stating, at the same time the number of ladies, if any, who will be in their party, also whether they expect to go to the opera on the evening of Sept. 5, also whether they wish to join any of the excursions after the close of the convention.

The executive committee also announces that owing to the vacancy in the executive committee occasioned by the death of the late Mr. Roehl, nominations for another member of the executive committee will be in order at the Vienna meeting. Messrs. Kochler, of Berlin, and Ziffer, of Vienna, both of whom are at present members of the executive committee, have been designated by the executive committee as vice-presidents of the association, and their nominations will be submitted to the association for ratification at the Vienna meeting.

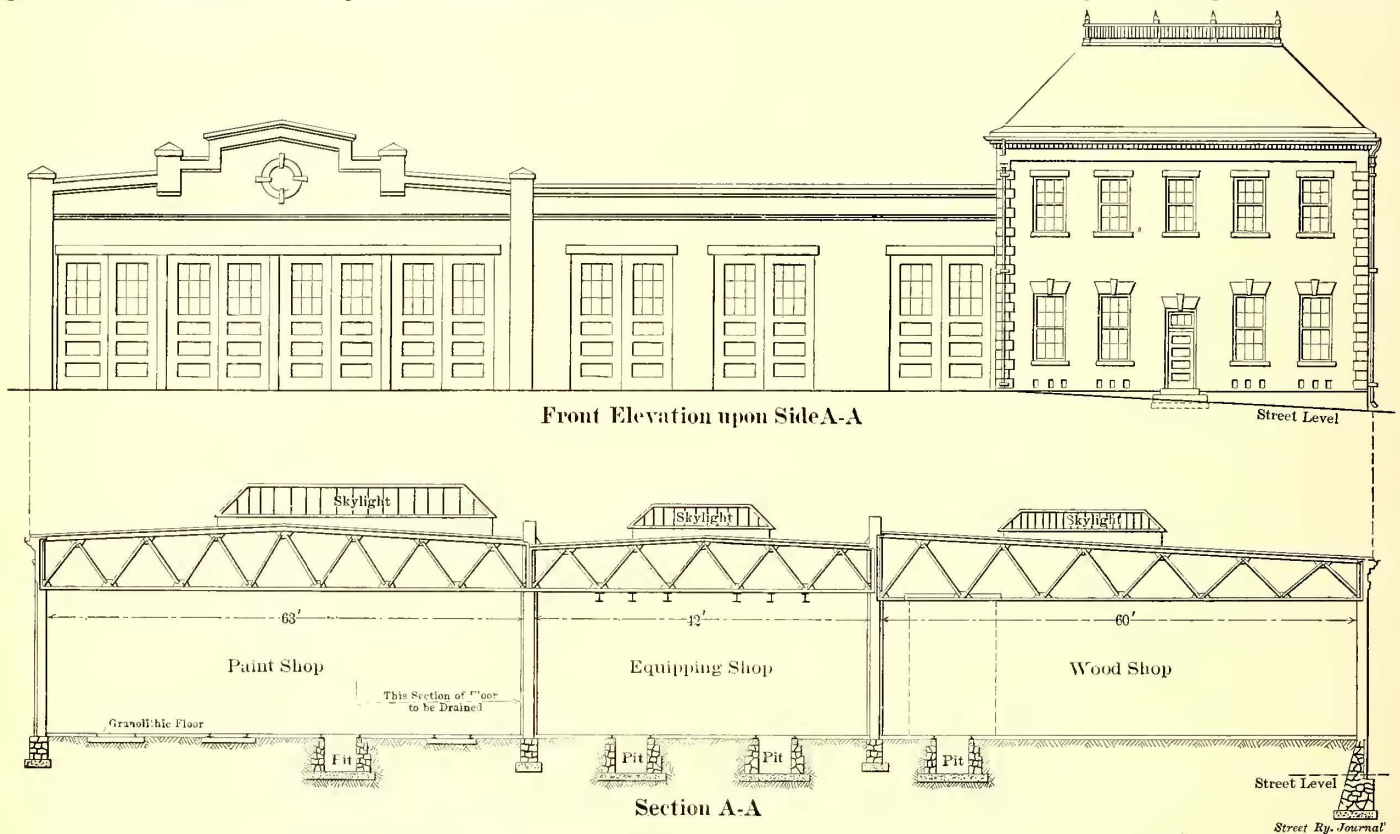
H. Parry, general agent of the New York Central Railroad at Buffalo, is quoted as saying that the company is planning to equip its Auburn and Falls line with electric power.

AN IMPORTANT NEW STREET RAILWAY REPAIR SHOP AT PORTLAND, ME.

The Portland Railway Company, Portland, Maine, has for some time thoroughly realized the growing importance of the repair shop problem, resulting from the more difficult conditions of heavy traffic that have developed and that naturally resulting from the use of the heavier and more powerful equipments than was formerly the practice. The proper care of its cars and electrical equipment has been found, as is the very general experience of other street railway companies, to greatly overtax present facilities. As a result of the important relation which the repair work bears to the operating efficiency of the road as a whole, the officials of this company have been devoting careful study to the shop question, and have recently completed plans for a new shop installation, which will not only provide for the magnitude of the present conditions of car repairs, but will also take care of a considerable margin of growth. On account of the important features that have been

that this company operates 94 miles of line, and now has 221 cars, the maintenance of which has become a question of considerable magnitude. The shop building occupies a tract 171 ft. x 204 ft., located near the Union Railroad Station, in Portland, and so connected with the car tracks that the cars of all lines of the city have easy access to it. The various departments are located adjacent to each other, without intervening spaces, the side lighting thus forfeited being substituted by a very thorough system of skylighting, so that the shop will have sufficient light to be very convenient to work in. The general arrangement of the various departments may be seen from the accompanying plan drawing of the shop building as a whole, while the other features of the building construction, as well as also the exterior architecture, may be seen from the additional sectional drawings and exterior elevations.

The paint shop, the equipping or crecting shop, the wood-working shop, the blacksmith shop and brass foundry are all one-story buildings, and are provided with profuse skylighting. The stock room and machine shop sections upon the two street



FRONT ELEVATION AND SECTION OF THE NEW PORTLAND REPAIR SHOP

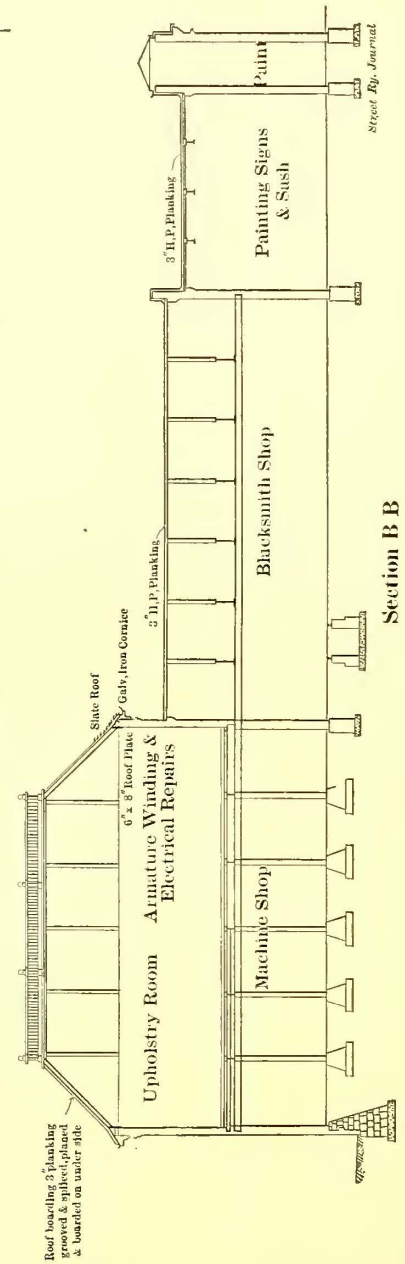
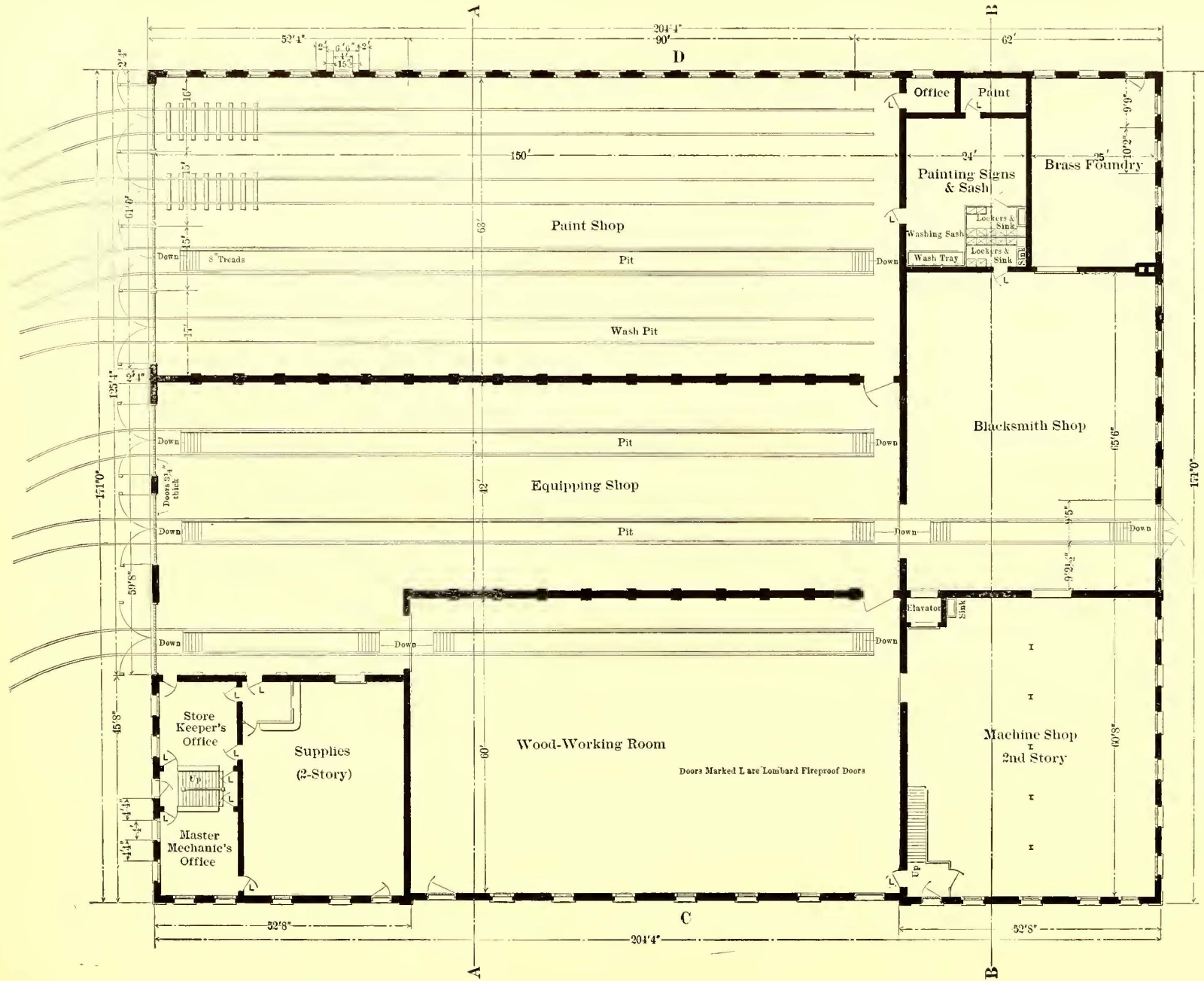
incorporated, the general plans of this, its new St. Johns Street shop, will be found of unusual interest.

This new shop installation, as being built, will embrace one of the best arranged layouts and most complete systems of handling the peculiar repair conditions met in street railway repair work that have up to this time been developed for a road of this size. The officials are to be congratulated for the excellent and broad-minded character of this design, particularly as there has been so little work of similar nature upon as extensive a scale as this, and the design work necessarily required to be very largely original owing to the lack of precedent to go by. The principal idea borne out in this design has been that of simplicity and convenience of arrangement of the different departments, and the repair work in the shop plant will be greatly simplified by the freedom of access between the different departments and the short distances for handling the material; this last feature alone is sufficient to very strongly commend this design to those who are considering similar problems.

An idea of the size of the problem which was coped with in the design of this shop installation may be had from the fact

corners of the building are of two-story construction, the floor above the stock room being arranged for offices, while that above the machine shop will take care of the upholstering work and also the armature and field winding and other electrical repairs. As may be seen from the plans, the various departments are separated by extra heavy 16-in. fire-walls, and all doors are of the self-closing, tin-covered, rolling type, for isolation of any department in case of fire. In all cases the division walls extend for some distance above the roofs, 24 ins. being the minimum projection, while in the case of the paint store room, the most dangerous fire hazard of the entire shop, the side walls are carried some 4 ft. above the surrounding roof. Thus, in case of fire in that room, the side walls, projecting up as they do above the roof, would act as a chimney and carry the flames up to a point where they might be easily taken care of, and not come in contact with the rest of the building; this is a very valuable and effective arrangement for the paint stores, and should be made use of in other shops where large paint stocks are carried.

Another important fireproofing feature of the building con-



GENERAL PLAN OF ST. JOHNS STREET REPAIR SHOP OF THE PORTLAND RAILWAY COMPANY

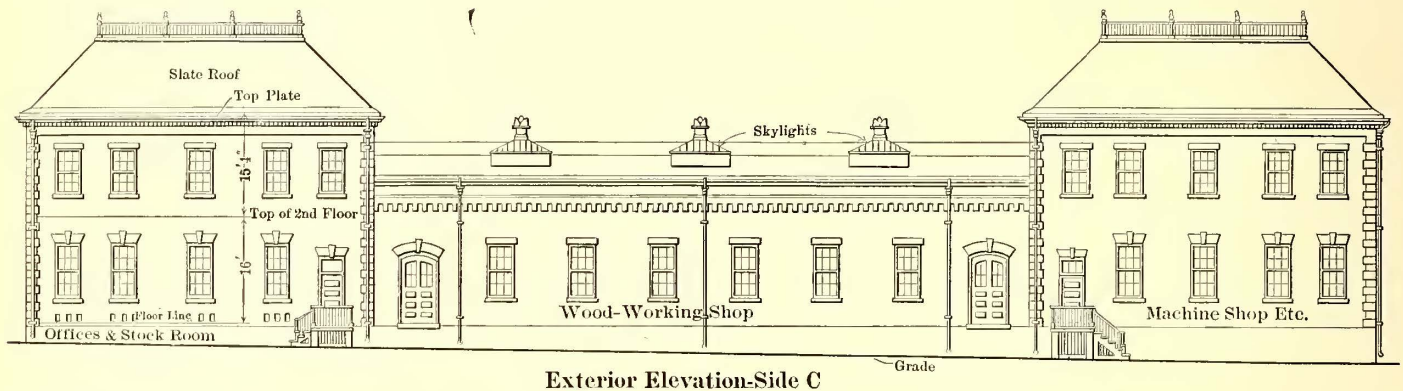
struction lies in the use of granolithic floors throughout upon the ground-level floors; the upper floors in the two-story sections are of strong, slow-burning wood construction, and are faced with $\frac{7}{8}$ -in. matched birch. The roof construction in all parts of the building is of steel frame work, covered with 3-in. roof planking, over which is laid tar and gravel, according to the usual method of gravel roof construction. The mansard roofs of the two-story sections are both covered with slate. Other interesting features of the shop building may be observed from the accompanying plans.

The general procedure in the handling of car repairs will be that of bringing cars first to the equipping or erecting shop, for dismantling, where they will be taken down and all parts stripped ready for the work of repairs. This department has two pit tracks leading in from the street throughout the length of the room, and a third, which extends through the L-shape section of this room, for access to the woodworking shop. The car body parts, including window sash, doors, etc., may be de-

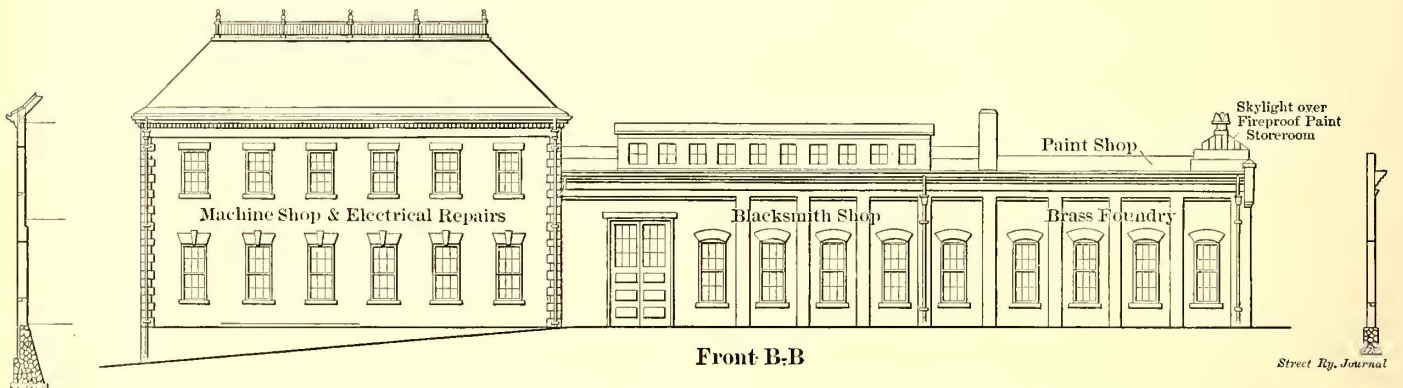
of this character, including the usual number of forges, a power hammer and a babbiting equipment for taking care of motor and axle bearings. The woodworking department will be equipped with the usual woodworking tools, including planers, matchers, saw benches, band-saws, etc.

An important feature of this shop, and one which cannot be recommended too highly, is that of the use of the brass foundry. So many small brass parts are used in electric railway repair work, and many of them special, that shops are often greatly inconvenienced in obtaining same. Here, by the use of the brass foundry, all such standard parts may be made easily and rapidly and kept in stock in advance, while special pieces may be cast upon short notice for emergency repairs—this feature alone is often of sufficient value to warrant its installation.

After the work of repairs, cars will be transferred to the paint shop, adjacent to the erecting shop, entering preferably upon the first track, when washing is necessary, this track being drained to sewer connections so as to permit the use of



Exterior Elevation-Side C



Front B.B.

SIDE AND END ELEVATIONS OF THE NEW PORTLAND REPAIR SHOP BUILDING

livered to the wood shop on the one side for repairs, or to the paint shop on the other for washing and painting or varnishing. The electrical equipment is easily distributed from here to the machine shop and electrical repair departments (by elevator), while truck repairs will be handled directly upon the pit tracks, or trucks may be rolled directly into the smith shop for heavy repairs. It will be at once seen that the close proximity of this department to the woodworking and blacksmith shop, as well as to the stock room, will greatly facilitate rapid repair work.

It will be noticed that an extra large space is devoted to the blacksmith work, which is probably due to the growing importance of this department on account of the large sizes of trucks and motor equipments that are now coming into use, and also the increased maintenance of brake riggings. This is probably the first instance where a blacksmith shop is provided with a greater space than that of the machine shop, but it will surely be found advantageous and very desirable. The blacksmith shop also has a pit track connected with one of the erecting shop tracks, so that the trucks may be rolled through into the smith shop for convenience in making heavy repairs. The equipment of the blacksmith shop will be that found in shops

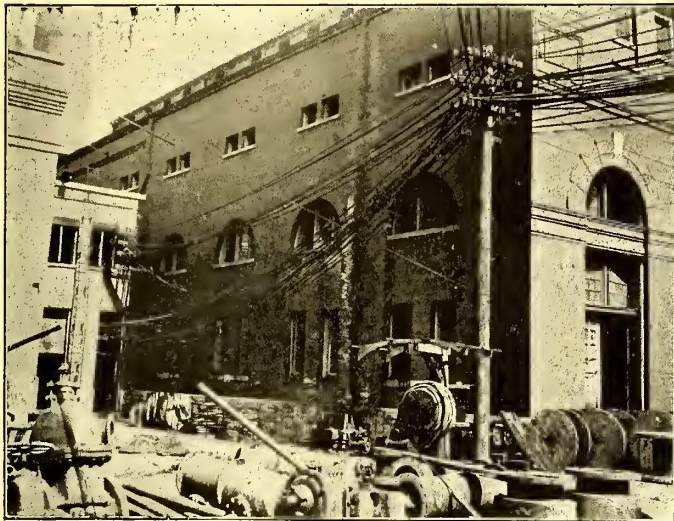
the hose in washing. This shop is provided with four tracks, the track adjacent to the washing track being provided with a pit for access in painting trucks and work beneath the car. The two farther tracks are surfaced level, without pits, and will be used for general car-paint work. At the rear of the paint shop will be noticed an interesting arrangement of the auxiliary rooms, including the master car painter's office, a separate room for the painting of car signs, sashes and doors, as well as the paint stock room. This room also contains a washing tray for the washing of window sash and doors, and in one corner is provided the workmen's lockers. This room is provided with ample skylighting, and will be found one of the most valuable departments of the entire shop. Inasmuch as it is set off from the remainder of the shop by 16-in. fire-walls, a very heavy paint stock may be carried and handled without serious fire hazard to the rest of the shop.

The design of this shop installation is throughout one of the most complete and best arranged of its kind known, and the result reflects great credit upon the officials who have devoted careful attention to the work. Acknowledgment is due to E. A. Newman, general manager of the company.

BURN-OUT OF CABLE CONDUIT AT ST. LOUIS

In the STREET RAILWAY JOURNAL of June 11, an account was given of the burning out of the cables in a large cable conduit which conducted all the power from the St. Louis Transit Company's central station to overhead lines. As sufficient time

in the general wreck of the cables and conduit, which has been noted. The destruction of cables was so general that along



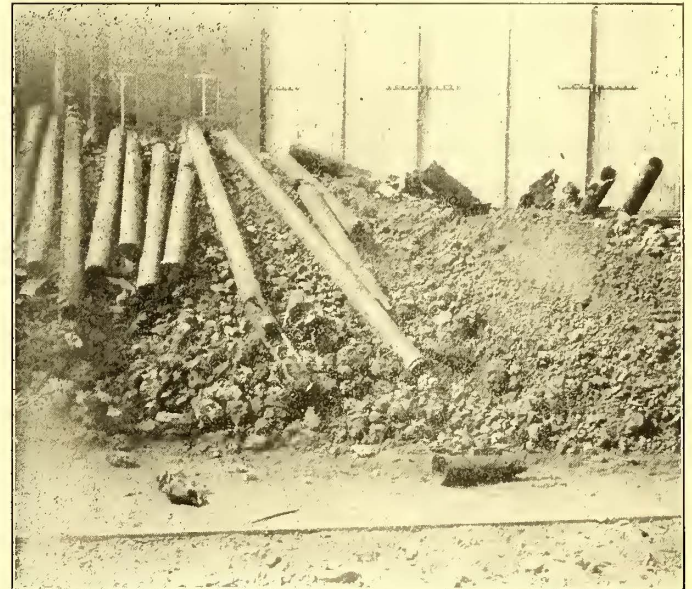
TEMPORARY OVERHEAD CABLES LEAVING POWER STATION

has elapsed since the accident so that the conduit has been partially dug up, it is possible to reproduce here some photographs of the burned-out cables and conduit, and also some additional notes regarding the accident.

As explained in the previous issues the trouble probably arose from the short circuiting of one or two cables in the conduit. As many of the cables were solidly fastened together at the terminal boxes where they were connected to the overhead feeders, and as circuit breakers between adjacent trolley sections were plugged up, it was not possible either automatically or by hand to cut out a short-circuited cable. The consequence was that the entire capacity of the power house fed the short-

CABLE SHEATH MELTED WITHOUT DESTROYING INSULATION

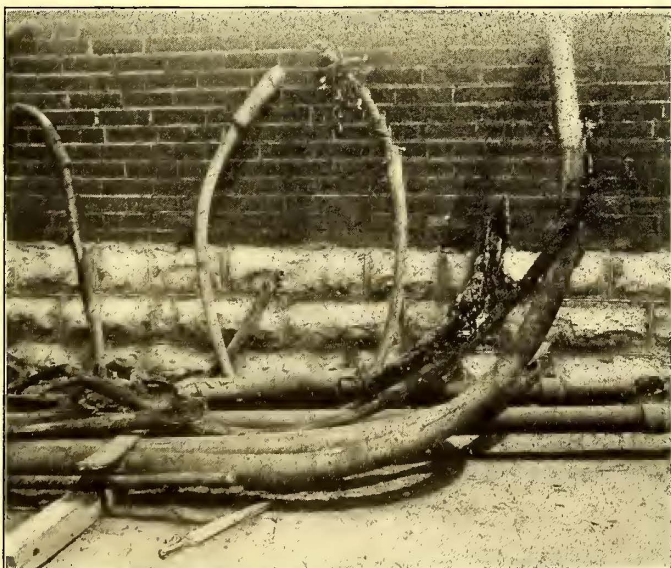
the main line of conduit, which consists of forty ducts of cement-lined iron pipe laid in concrete, it was impossible to pull the cables out from the manholes, and the company had



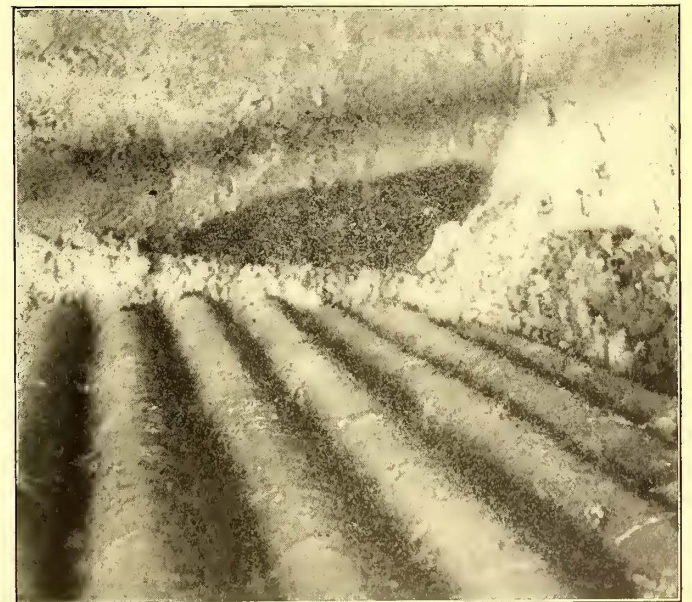
CONDUIT DUCTS AFTER THE BURNOUT

to dig up this conduit with pick and shovel. The appearance of conduit ducts and cables when removed is shown in the accompanying engraving

On many of the cables there are spots where the lead cover-



PIPE BENDS NEAR BOTTOM OF HOLE

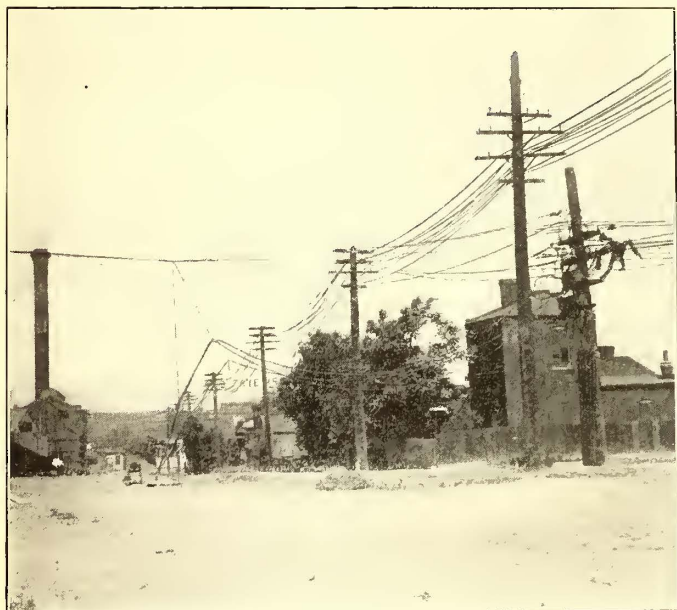


CONDUIT BEING DUG UP

circuit cable, and caused the continuance of a very destructive arc, while at the same time the cables became so overloaded that the insulation was burned through in many other places along the conduit line, with the result that the short circuit became general. The first signs of trouble appeared about 10 o'clock in the morning of June 3, when several cables became short circuited and were cut out. At 6 o'clock the same evening another short circuit occurred, which resulted

ing has been melted off, and yet there are no signs that the insulation has given away or that there has been any arcing from the conductors to the lead sheath. The defects in many of the cables, whether caused by arcing or simply by melting of the sheath, occur at regular intervals. This is thought to be due to the fact that steel bands were placed around the conduit ducts at the joints, and the duct joints were not staggered but were all placed at one point. The result

was that these bands caused a concentration of the flow of current at that point as they acted like bonds, and this melted the cable sheath, in some cases without fully breaking down the insulation of the cable. Where once a thorough arc was started between the cable and its lead sheath the destruction of cable and conduit was complete, the whole being melted together into a mass of copper, lead and iron. Some of the worst destruction took place in the iron pipe bends at the bottom of the



AT SPRING AND VISTA STREETS—TEMPORARY LINES AND THREE CONNECTIONS TO UNINJURED UNDERGROUND CABLES

poles, through which the cable was lead from the conduit to the pole. Just how complete the wreck of the conduit may be is not known at present writing, but the present appearances are that about one block of 40 ducts conduit will have to be dug up bodily. This is the conduit nearest the power house, which takes the entire output of the power house. The accompanying engravings also show some of the temporary rush work which the company did in stringing overhead cables as a substitute for the underground cables.

NOTES ON GERMAN AXLE, WHEEL AND RAIL PRACTICE

BY A GERMAN ENGINEER

At the recent meeting of the Rheinisch-Westfälische Strassenbach-Betriebsleiter-Vereinigung (Street Railway Managers' Association), held in Essen, the members witnessed at the Krupp Works a series of remarkable tests of Martin crucible steel and nickel steel street railway car axles. An equal number of finished axles, made of the two materials named, all 110 mm (4.33 ins.) in diameter, were subjected to several cold bending tests under a pressure of 5000 tons. In the first trial one axle of each material was bent around a core of 120 mm (4.72 ins.) radius. The nickel steel axle assumed the shape of the letter U, but failed to show the slightest evidence of rupture, whereas, the Martin steel axle showed a break about an inch deep on its outer surface. Another set of axles was taken for the second trial, but before bending each axle was notched in the center with a heavy chisel. The nickel-steel axle again took the shape of a U without any apparent increase in the depth of the notch, but the other axle broke in two before one-fourth of the bending process had been completed, despite the fact that it was made of the best Martin steel. It is well known that most axle breakages occur at a sharp edge, as at the corner of the gear seat, and accidents of this kind, it is thought, will be avoided by the use of nickel-steel axles.

Although these axles cost 40 per cent more than those of ordinary steel, they are largely used in Germany.

Nickel steel is also being used for street railway wheel tires. Both chilled iron and steel-tired wheels are used in Germany. Nickel steel-tired wheels, with a tensile strength of 90 kg per square millimeter (132,300 lbs. per square inch), will run 120,000 km to 150,000 km (72,000 miles to 90,000 miles), and do not need to be machined until they have run 50,000 km to 60,000 km (30,000 miles to 36,000 miles). A particularly good feature claimed for nickel steel is that flat wheels are very rare. Assuming, under average German conditions, that a motor car runs 40,000 km to 60,000 km per year, the wheel would have a life of from two to three years. All railways, however, cannot use such hard wheels, as, unless the rails are also of certain degree of hardness, they wear out rapidly. The experience in Germany on this point is as follows:

For many years the authorities have required the exclusive use on street railways of grooved rails. In the early days such rails could be purchased only when made of Thomas (or basic Bessemer) steel, which at that time when used in rails was soft and not very homogeneous. In those days the importance of high carbon rails was not appreciated, since the tendency was to follow horse car practice rather than that of the steam railroads. After the severe conditions of electric railway service had brought about the use of harder metal in the wheels, it was found that these wheels, in running over the softer rails, rolled out the rail heads. To overcome this a successful attempt was made to combine the Bessemer and Thomas processes, and the weight per linear yard of the rail was increased. Very little attention is paid to the tensile strength of the rails, as a break in rails, when laid in paved streets, is not considered a serious matter.

Owing probably to this use of soft rails, German railways have been large sufferers through the wear of rails in waves or ridges, which was noticed and created considerable comment in America before high carbon rails became so common in that country. This kind of wear shows itself in the development, in the head of the rail, of a series of ruts and ridges, the ridges or crests being equidistant and about 5 cm (1.96 ins.) apart. In wet weather these ridges can be seen with the naked eye, and on polished rails when looked at in the direction opposite to the rays of the sun. The difference in elevation between the heights and depressions is barely 5 mm (.196 ins.), but more than enough to change quiet, easy running into heavy pounding. At first these ridges are formed for only a trifling distance, but once begun the waves are propagated very rapidly and always in the direction in which the cars run. A number of explanations have been offered for this formation, but the most plausible is that the wheel rolls the rail material before it until the latter has reached a certain height. The wheels then rise over the obstruction, and the process begins again. Grinding the rail heads down with emery has been tried with good results, but in some cases the old trouble soon started anew.

The investigations which were made regarding this subject brought to light the fact that the life of rails for electric railway service had been greatly over-estimated. The early figures were based on the life of rails in steam road service, and it was thought that if rails could be used for five years on high-speed steam railroad tracks under wheel pressures of 7 tons, and for fifteen years on branch lines under pressures of 2.5 tons, and with speeds not exceeding 25 km (15 miles) an hour, equally heavy rail in street railway service should last twenty years. It should be remembered that even at the beginning of the electrical period the usual street railway rail in Germany weighed 33 kg per meter (66 lbs. per yard), and within a few years their weight was increased to 42 kg per meter (84 lbs. per yard).

In making this assumption the following important factors

were entirely overlooked: On steam railroads the rails rest on cross-ties, and usually are laid on a high-class, well drained roadbed, whereas German street railways never use cross-ties, and the track is often laid on poorly drained ground. Again, steam railroad tracks are always so exposed that they can easily be inspected and repairs can be made, while such work is very difficult on street railways, especially in asphalt-paved streets and when the rails are laid in concrete. Again, on street railways, owing to frequent braking, there is a great deal of wheel sliding. Another factor tending to shorten rail life in Germany is the excessive number of curves which sometimes equal 25 per cent of the entire line. The result is that under present conditions ten to twelve years comprises the useful life of modern heavy rails, and under very heavy traffic the track must be replaced every three years. Another point to be considered is that the rails cannot always be taken up just when they are worn out without involving a great deal of pavement expense, so that the railway company often prefers to take up the rails when the municipality repaves the street. In such cases the rails may have to be removed when they still have several years of useful life, although to the railway company they will have only the value of scrap iron unless they can be used in places where traffic is very light. Those who have followed carefully the financial reports of the German roads will have noted the growing tendency to pay larger sums to the sinking funds rather than increasing dividends. It is true that stockholders generally do not favor this policy, but it certainly tends to give electric railway investments greater stability.

Recently a steady increase in the popularity of open-hearth (or Siemens-Martin) steel for rails is becoming noticeable. This is probably due to the poor quality of the early Thomas steel, as shown by its rapid wear, and in some cases even by flaking off of layers from the rail heads. This disadvantage of Thomas steel has now been eradicated, and assuming like care in manufacturing both varieties are considered equally good for rail construction. Although the chemical composition may be different it is possible to get the same hardness (which determines the amount of wear and tear) with the basic as well as with the acid process in steel manufacture.

In rail specifications on the method of making the steel the German roads have found it necessary to specify the tensile strength which serves as a measure for the hardness, since there is no suitable method of determining the hardness itself. Tensile strength is a measure of the hardness, however, only for the same kind of steel. Thus, if we do not take into consideration any of the other elements, the phosphorus content in Bessemer steel yields at a lower content of carbon the same hardness which is obtained in the basic Bessemer steel (which is poor in phosphorus) with a higher content of carbon. It is the content of carbon which mainly affects the tensile strength. It is necessary, therefore, to treat each kind of steel separately in the specifications.

As the result of this demand for harder rails recent railway specifications call for a considerably lower drop test, for the reason that it is very difficult to get the required hardness of the rails if the former tensile strength is maintained, and because in tramway service tensile strength is really of less importance than hardness.

For testing the homogeneous condition of the rails, the etching test has recently been largely used. As a substitute for breaking tests certain companies are now beginning to prescribe rolling pressure tests.

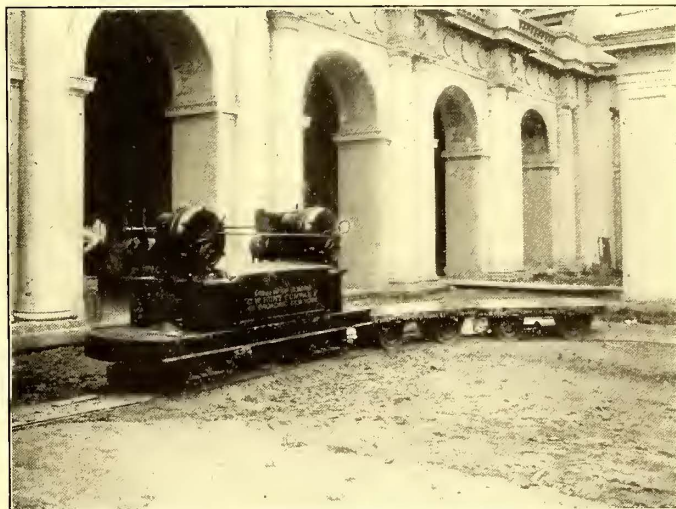
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The Indianapolis & Northwestern Traction Company recently made a departure in interurban railroading by running Sunday excursions. It has arranged that until Sept. 1 the fare to Lafayette and return shall be \$1. This rate will also apply to all other towns where the rate of fare one way exceeds one dollar. Occasional midweek excursions will also be run during the summer.

STREET RAILWAY EXHIBITS AT ST. LOUIS

In continuation of the series of views of prominent street railway exhibits at St. Louis, commenced in the issue of June 11, a number of additional illustrations are presented in this number.

THE C. W. HUNT COMPANY

The electric storage battery locomotive built by the C. W. Hunt Company will be found operating on an industrial railway of that company's construction in the court of the Electricity Building. This electric locomotive has a 75-volt storage battery, mounted midway between trucks and covered with canvas lids, one for each half of the battery. On each end of the locomotive there is a small electric motor and a large gear case for the reduction gears, by which motion is transmitted to a sprocket



NARROW-GAGE ELECTRIC LOCOMOTIVE AND FLAT CARS EXHIBITED BY THE C. W. HUNT COMPANY

wheel driving a silent chain, which chain drives a sprocket wheel located midway between the axles of the truck. From this middle axle the power is transmitted through other similar chains to the car axles. The motors, controllers and gears of each end of the locomotive are in duplicate, and all controlling handles are connected together with rods, so that the locomotives can be operated from either end. Cars, trucks and rails for narrow-gage industrial railways are also shown.

THE WESTERN WHEELED SCRAPER COMPANY

A short description of the exhibit of the Western Wheeled Scraper Company in the Transportation Building was published in the issue of this paper for June 11, but all of the apparatus shown by this company was not described. This company builds light dump cars for railway use, and, perhaps, the most interesting type of cars, from a street railway standpoint, shown in the exhibit is the bottom-dump car. This car, as its name implies, is arranged to dump its load through the bottom of the car, and this makes it extremely useful for ballasting traction lines.

THE DUFF MANUFACTURING COMPANY

The Barrett lifting jacks of the Duff Manufacturing Company, of Allegheny, Pa., are shown in the exhibit of the agents, Fairbanks, Morse & Company, in Transportation Building. There is also an exhibit in Machinery Building and in the Western Gas Association's exhibit in Liberal Arts Building. A large number of styles are shown. The new 30-ton geared ratchet lever jack is shown for the first time. The exhibit includes the Barrett armature lift, track jacks, car jacks, car-house jacks, journal jacks and bridge jacks.

ATLAS RAILWAY SUPPLY COMPANY

A short description of this company was published in the issue of June 11, but by means of the accompanying illustra-

tion presented herewith a better idea of the extent of the exhibit can be obtained. The space of this company is located in the Transportation Building, and, as shown in the illustration, a principal feature of it is the well-known rail-joints which bear the name of the company. In addition, however,

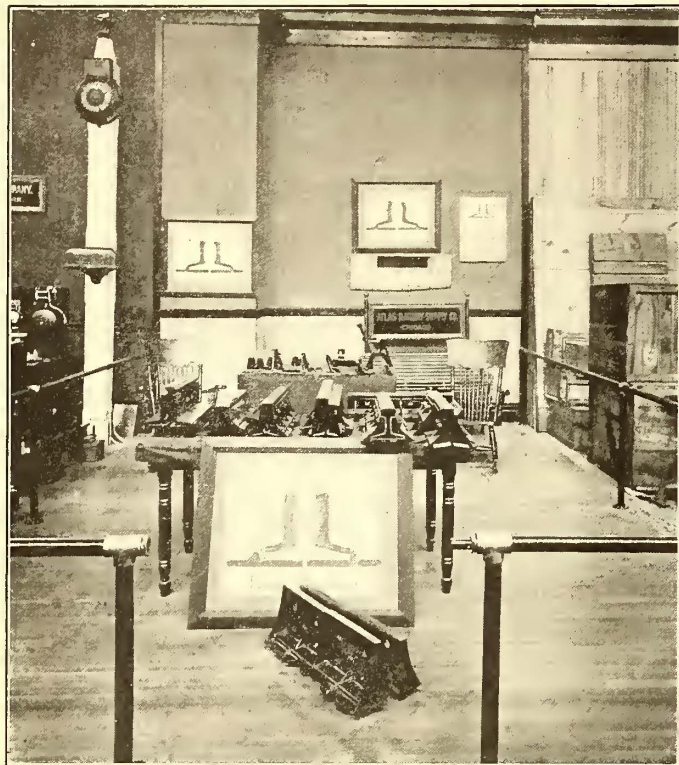


EXHIBIT OF THE ATLAS RAILWAY SUPPLY COMPANY

the company is also making a feature of its primer and surfacer for painting cars. To demonstrate the value of this material a board has been taken from an old car body and a portion of it has been repainted by the Atlas primer and surfacer. The rest of the board is left in its original condition, showing that even upon this old wood the material of the Atlas Company can be employed to give a very satisfactory finish.

THE RICHARDSON SCALE COMPANY AND
ROBINS CONVEYING BELT COMPANY.

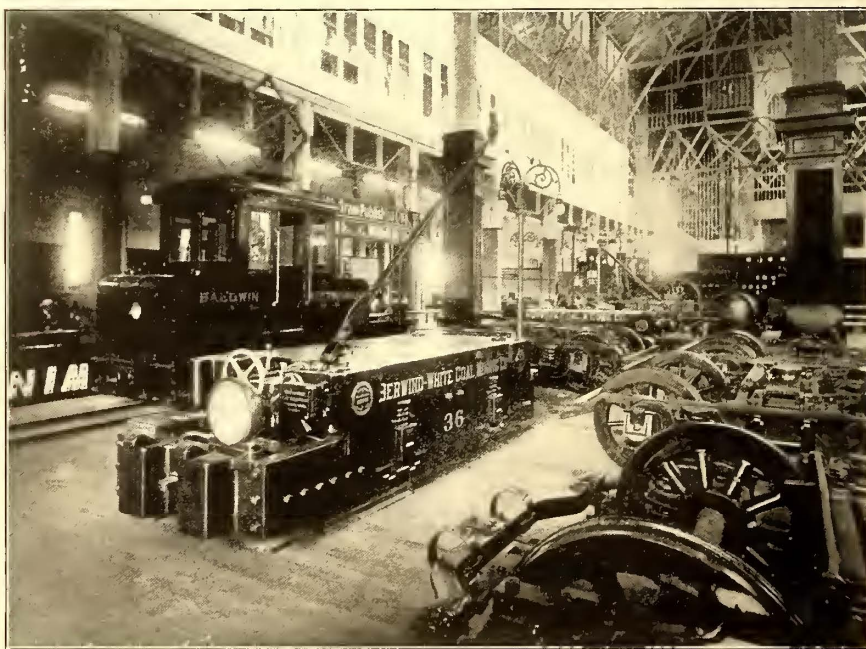
The Richardson Scale Company, of New York, and the Robins Conveying Belt Company, of the same city, exhibit in conjunction an automatic coal scale and belt conveyers. The coal is delivered by the Robins belt conveyor to the weighing hopper of the scale. The material is admitted into the weighing hopper by a double swinging gate. This gate is wide open at first, so that the coal runs through at maximum flow; when nearly the full weight of the charge is run through, a cut-off is operated automatically by the increasing weight of the weighing hopper. This reduces the stream of coal very much, so that the balancing point of the weighing hopper is approached slowly, and there is no over-running in weight. When the right weigh has been reached in the weighing hopper, the second cut-off is closed. A lever, actuated by the cut-off, operates a lever attached to the hopper which opens the bottom of the hopper to dump it as soon as the correct weight is reached. After the charge is dumped the hopper is automatically closed and locked. The closing of the bottom of the hopper operates a lever connected with the cut-off gates, causing them to reopen,

and so letting a new charge run into the weighing hopper, thus completing the cycle of operations, which cycle is repeated as long as the scale and conveyor are in operation. The action is entirely automatic, except that where bituminous coal is used a little power is needed to drive the feeding apparatus to ensure a flow of coal from the storage hopper into the weighing hopper. The weighing hopper is fitted with a self-registering device which records and totalizes the weighing.

The Robins conveyor illustrates the method of conveying and storing coal in large power plants by the use of the Robins conveying belt. There are three 16-in. belt conveyers equipped with the company's patent automatic distributing tripper. The belts of this conveyor are perfectly smooth, and are kept hollow on top for coal conveying purposes by pulleys, which keep the edges turned up.

BALDWIN LOCOMOTIVE WORKS

Baldwin-Westinghouse electric locomotives are exhibited in the Electricity Building. There are three electric locomotives and also four electric motor trucks. One of the electric motor trucks is the heavy type, built for the Interborough Rapid Transit Company, of New York. This truck weighs 12,500 lbs. without motors, and is designed to carry a load of 25,000 lbs. This represents the extreme in heavy electric motor truck construction exhibited, and in view of the great interest in the New York Subway and its rolling stock, this truck will attract general attention. A truck suited to average interurban work is shown, which weighs 11,000 lbs. without motors, and is of the type built for the Central Illinois Traction Company. This truck is designed to carry a weight of 26,500 lbs. A still lighter truck exhibited is one of a type supplied to the Twin City Rapid Transit Company, of Minneapolis and St. Paul, for city and interurban service. This truck weighs 6300 lbs., and is designed to carry a weight of 18,000 lbs. A street railway truck weighing 5300 lbs., and designed to carry a weight of 14,000 lbs., completes the truck exhibit. This latter is not of the so-called M. C. B. type, but has swing bolster and equalizer springs placed just outside the journal boxes. The electric locomotives comprise two mine locomotives and one for surface

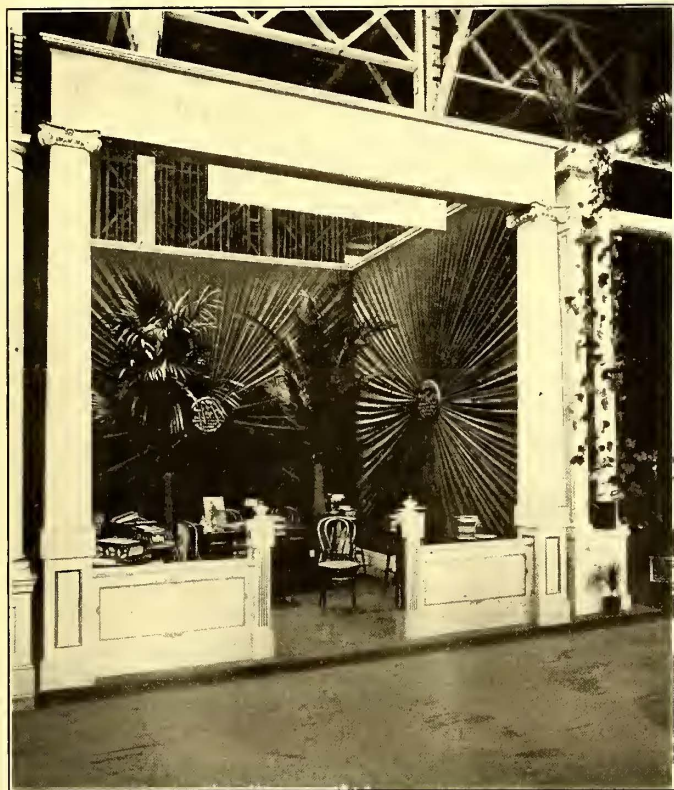


PART OF THE BALDWIN LOCOMOTIVE WORKS' EXHIBIT, SHOWING MINING AND DIAMOND BOW LOCOMOTIVES AND TRUCKS

haulage. The space occupied is in Block 3, Aisles A, B and S, and adjoins that of the Westinghouse Electric & Manufacturing Company. In addition, the company has an exhibit in the Palace of Transportation in which thirteen late types of steam locomotives are shown.

THE EGRY AUTOMATIC REGISTER COMPANY

The Egrý Automatic Register Company, which, in addition to the manufacture of registers for mercantile houses, also makes a register for receiving triplicate train orders on inter-urban roads, has an exhibit in the Varied Industries Building. By the use of this register the trainmen of an interurban car



THE DISPLAY QUARTERS OF THE EGRY AUTOMATIC REGISTER COMPANY

can write the orders they receive from the dispatcher in triplicate, without any bother with carbon sheets. Two of these orders, by the turning of a crank, are released for the use of the motorman and conductor, and a third is run into a locked receptacle. The only work necessary to operate the register after the writing of an order is to turn a crank which reels out the motorman's and conductor's orders, leaving the third copy in the register, as explained. This system is used on the inter-urban railway lines of Des Moines and elsewhere.

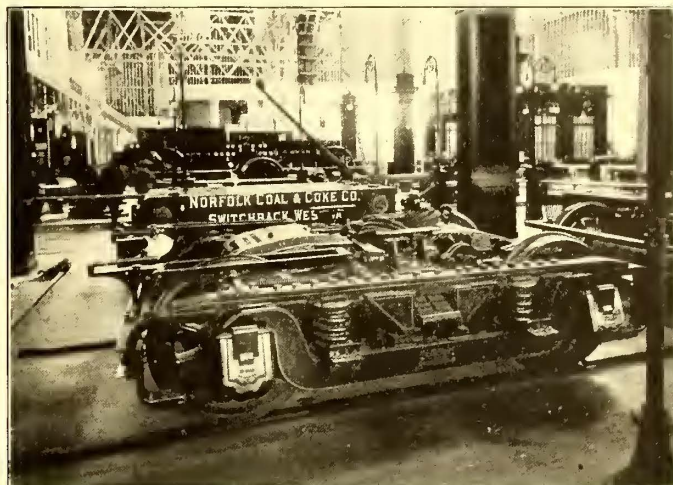
BUCKEYE ENGINE COMPANY

A Buckeye engine, massive in its construction and beautifully smooth in its operation, forms one of the units of the Intramural Railway power plant in the Machinery Building. This engine drives a 900-kw direct-current generator. The engine is one of the company's standard construction. The cylinder dimensions are 26½-in. and 50-in. x 48-in. stroke. The speed is 100 r. p. m. Both high and low-pressure cylinders have tail guides to take the weight of the piston head from the cylinder walls. The valves are the regular Buckeye piston valves, which give a very sharp, quick cut-off. The massiveness of this engine can be understood when the following weights of some of the parts are given: Low-pressure cylinder, 38,800 lbs.; low-pressure guide block, 13,000 lbs.; high-pressure guide block, 11,000 lbs.; bed-plate (each), 22,500 lbs.; two cranks and shaft, 56,775 lbs.; fly-wheel, 39,000 lbs. The governor is the regular Buckeye shaft governor, which varies the cut-off by revolving the eccentric on the shaft. A small model with valve gear exposed shows the action of the Buckeye piston valves and shaft governor.

THE SIMPLEX RAILWAY APPLIANCE COMPANY

The Simplex Railway Appliance Company, of Chicago, has

an exhibit in the Transportation Building devoted to bolsters, springs and truck parts. The chief items of interest to electric

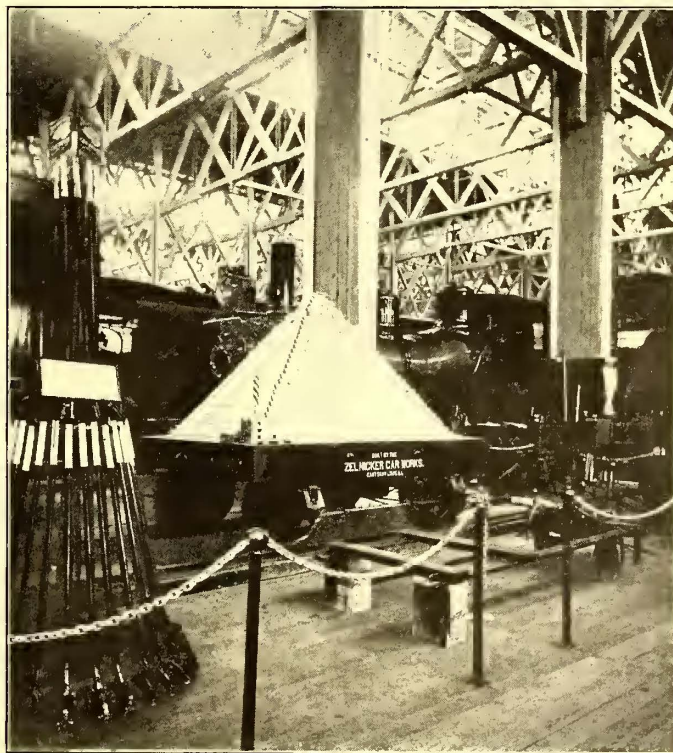


ANOTHER VIEW OF THE EXHIBIT OF THE BALDWIN LOCOMOTIVE WORKS

railway men will be found in the parts of the exhibit showing bolster construction.

WALTER A. ZELNICKER SUPPLY COMPANY

The Walter A. Zelnicker Supply Company, of St. Louis, has in the Transportation Building an exhibit of two devices of interest to electric railway master mechanics. One of these



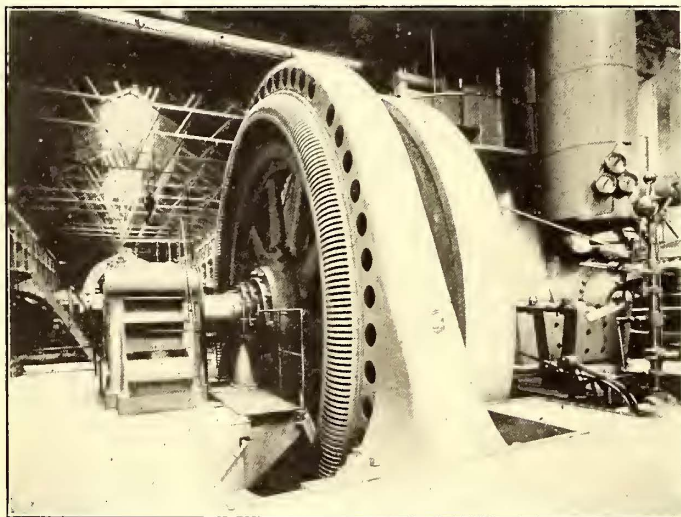
HEADQUARTERS OF THE WALTER H. ZELNICKER SUPPLY COMPANY

is what is called a "car mover," this being a device which is a good substitute for a crowbar in moving dead cars. Although it has heretofore been used mainly by manufacturing companies in shifting steam railroad cars short distances on factory sidings, it should be used to very good advantage in many electric railway car shops where it is desired to move motor trucks short distances without making electric connection, or where, for various reasons, the electric motor on the car cannot be used to move it. In moving trucks from under car bodies such car

movers ought to be time savers. Another device exhibited by this company is a hydraulic wheel press of a rated capacity of 60 tons. This is a light press weighing only 1250 lbs., all surplus metal having been eliminated. The hydraulic pump is operated by hand. The press is mounted on truck wheels so that it can be moved anywhere in the shop and taken to the work if necessary. This company also makes rail benders and track tools.

ALLIS-CHALMERS COMPANY

The largest unit in the Machinery Building is the 3500-kw Bullock three-phase generator, direct connected to an Allis-Chalmers combined vertical and horizontal compound condensing engine. This engine is of the same type as installed in the Manhattan Railway power station in New York, with the exception that one pair of cylinders has been omitted. This engine has a horizontal high-pressure and vertical low-pressure cylinder. The high-pressure cylinder is 44 ins., and the low-pressure cylinder 94 ins. The stroke is 60 ins., and 75 r. p. m. The electric part of this company's exhibit was described under the head of "Bullock Electric Manufacturing Company." It is



3500-KW ALLIS-CHALMERS ENGINE AND BULLOCK GENERATOR

unnecessary to say that this large unit attracts attention proportionate to its size, and there is a fitness in the fact that the largest Corliss engine builder should be represented by the largest Corliss engine at the Exposition. Machinery Hall, unlike the other buildings at the fair, is not closed in the evening. It is open until 11 p. m., and visitors in the evening will, consequently, find the Allis-Chalmers exhibit at work, producing current for lighting the grounds.

LOS ANGELES RAILWAY CAR KINKS

The accompanying diagrams illustrate some interesting features of the cars of the Los Angeles Railway Company, as worked out by the company's master car builder, E. L. Stephens. The general design of the standard car operated by this company was illustrated and described in the STREET RAILWAY JOURNAL of April 9, 1904.

Fig. 1 shows a guard rail that has been adopted for the four entrances of the standard California-type car. It is used to close the passages on the left-hand side of the car. It consists of a 3/4-in. iron pipe, 3 ft. long, threaded into a brass swivel that is fastened to the inside of the vestibule frame, about 3 ft. above the car floor. The free end of the pipe is given a double bend, and is drawn down to a thickness of 3/8 in., as shown. It fits into a 7-16-in. socket, and is held by a spring catch that is easily released by the finger. When the rail is not in use it

is swung up and held in a vertical position against the vestibule by another spring catch. The rail and catches are all neatly nickel-plated, to correspond with the finish of the standard hand rails on the cars.

On some of the company's older type of open-seat cars wooden guard rails the length of the car are used, and Fig. 2

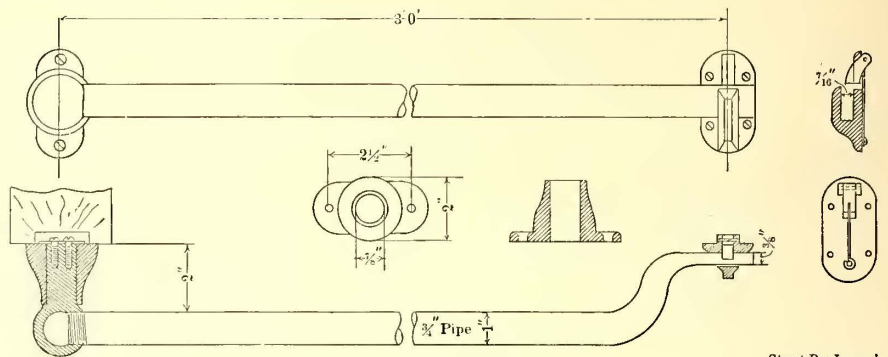


FIG. 1.—GUARD RAIL

shows the spring catch and end socket employed for this rail. The views are self-explanatory.

Fig. 3 illustrates the design of a sand-box that has been installed on the cars operated on heavy grades. The box is built

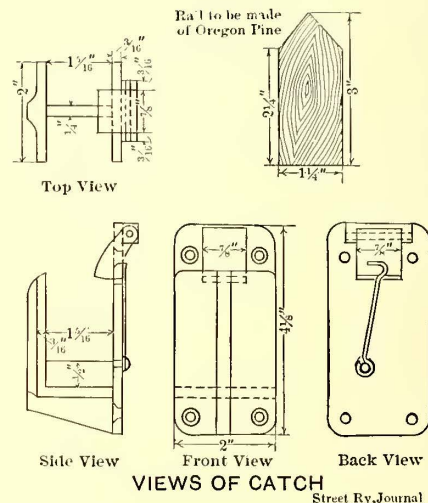


FIG. 2.—GUARD-RAIL BRACKETS

of No. 16 galvanized iron, and is mounted on the end sill of the truck and on the fender top. The sand is discharged through a brass Y, which has a partition, so as to equalize the flow of the two branches. The sand pipes proper are made out of gas

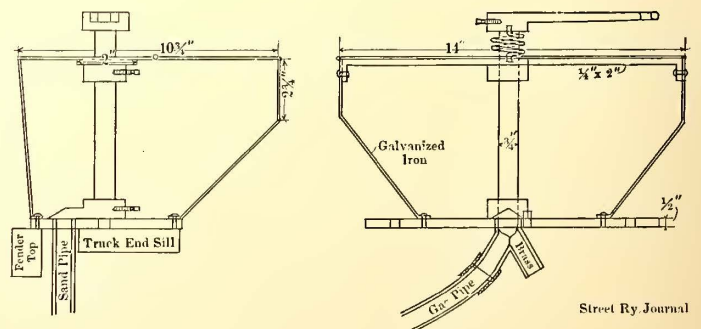


FIG. 3.—SAND BOX

piping, and one is carried to each front wheel of the truck. The opening to the pipes in the bottom of the box is covered normally by means of a triangular-shaped piece, shown in detail in the drawing, which is keyed to the vertical spring shaft. Rigidity is given to the top of the box by a 1/4-in. x 2-in. angle-iron. This truck has been very satisfactory, and as it is

mounted on the truck the sand is always well distributed on curves.

One or two of the lines in Los Angeles have grades of 5 per cent to 11 per cent, and the cars used are equipped with the magnetic traction brake. As the air brakes had to be taken off the car the ordinary hand-brake gear was also necessarily

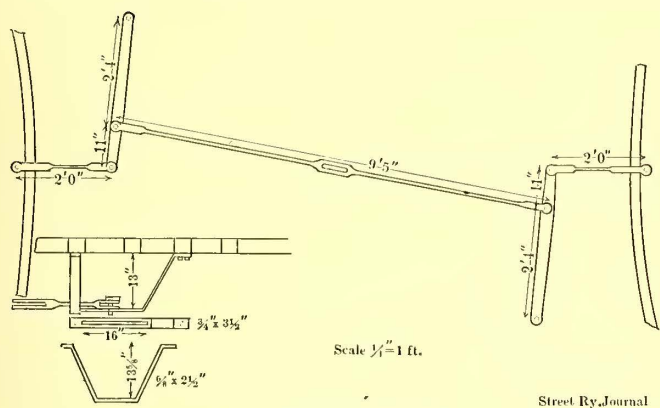


FIG. 4.—HAND-BRAKE

abandoned, and in its place Mr. Stephens designed the form of hand brake shown in Fig. 4. This brake is very simple, and has, as a special feature, the mounting of the end of the equalizer bar on a bracket, which gives it opportunity to slip back and forth in a slot as the position of the truck is changed.

◆◆◆
“THE ACCOUNTING DEPARTMENT IS NOT A REVENUE-PRODUCING DEPARTMENT”

BY W. B. BROCKWAY

At the beginning of the steam railroad, it is easy to believe, judging by the experience of the electric railways in their infancy, that in the small way in which they had their rise, various duties, which are now carried on by different departments, could be, and were, performed by one person, the general manager being, no doubt, held responsible for the active and detail work of the office as well as the operation of the road. In time, the freight and passenger departments were added, or rather their work was taken from the active duties of the manager, and the accounting department also received an official head and became a definite department. These results are most natural, because there is a limit to the amount of detail work a man can do, and as the size of the roads increased it had to follow that the work should be specialized. It is very common to-day for the executive officer to understand the detail of all departments, but he certainly cannot have the time or the strength to be in immediate contact with all the details. His duties are large, and he deals with principles and results.

As the steam roads grew, the natural result was competition, which meant that greater efforts had to be put forth to obtain what was considered by each road to be its full share, or more, of the business tributary to it.

In the course of events, with competition becoming stronger yearly, there came the time of reconstruction. Many of the roads were not provided for this additional strain. Whether their unprepared condition was caused by lax accounting methods or by high operating cost would make a very interesting study. Be the cause what it may, the roads had to meet the problem, in part, by rigid economy. The line of reasoning followed at that time gave the basis that whatever department produced revenue should not be restricted in its efforts, for upon those efforts everything was supposed to depend. However, as the accounting department not only did not produce revenue, but seemed to be expense only, it at that time and since has felt the first effects of reducing expenses. It is curious

that office clerical work has always been considered almost as a luxury.

It was a long time before the period of economy was over, and all this time the accounting department was running short handed, or with a force of cheaper priced (which is usually another term for poorer quality) clerks. This meant little at the time except that it was so much money saved, but what it meant later is another story, for the reduced information from the accounting department helped toward a misconception of actual conditions, so that the results caused partially by a “cheap” accounting department and its consequent weak system, are found everywhere in the later history of American railroading, and in the Federal courts.

The above is a preliminary sketch of causes and effects to show how an idea, once taking root, may spread to conditions not originally contemplated.

Many features of electric transportation, in operation and finance, have been adopted from the steam railroad practices passing current at the time. This applies principally to the methods of organization, the financial plans, and the operation of interurban properties. This is natural, as steam railroads had had nearly sixty years of experience when electricity commenced to revolutionize urban travel. Conditions not being similar in all details, changes have been made to conform to the new environment.

It is not strange, then, that at the same time some of the axioms of the old should be brought over to the new system. But it is to be regretted that the trite saying, “The accounting department is not a revenue producing department,” should have been adopted with the old meaning, and not adapted to the new conditions, for as it reads, it contains, by the interpretation of custom, a sort of criticism which should not exist. For instance, the claim that “bookkeeping” is necessary but should be made as cheap as possible, carries a meaning to the word “accounting” quite at variance to its true meaning as distinguishable from the word “bookkeeping.” The statement, as it stands, is true. It is not a revenue-producing department, but it occupies a position unique in its importance, because the whole organization other than the accounting department may be considered as the manufacture and sales departments, and they cannot know the producing costs or the actual profit without careful accounting. Estimations are not to be thought of as finalities.

It follows, then, that accounting is of prime importance, and should be thorough and accurate, that the results of carefully executed plans of the operating departments, for the increase of revenue and decrease of cost, may be given promptly and be dependable.

Statements of the accounting department are the basis for changes in operating plans, and frequently affect market values of the securities of the company; presidents, managers and investors are placing their reputations and profits in the balance with operating results. It is important, therefore, that the department which brings out the statements should be as carefully organized as any other part of the whole, and not be in the hands of an auditor who is “small,” “narrow” and “cheap,” and with all that cheap usually means—with clerks under him costing less and worth less. It is economy in initial outlay, but it is not warranted in the results.

It is proper to include the work of the treasury department as a part of the subject under discussion, because, at the present time, few companies are large enough to separate the two; therefore, the matter assumes new importance, or rather, its importance is accentuated. It is folly not to surround the handling of money with all possible system and safeguards. This is held to be true the world over, yet the most essential part of any system is the human part, and too great care cannot be devoted to it.

While conceding that the department is not revenue produc-

ing, the writer wants to point out wherein that does not destroy its importance, and to show its functions in their true light. Experience has brought out certain headings, under which are gathered the different items comprising income and disbursements of the company. The dollars and cents shown under these heads mean to the management that certain things have been done. Shrewd experience transforms these figures into the things done, and from this experience plans are made for the immediate present and the future. If, in the accounting department, inexperience, being cheaper, is substituted for experience, which is more expensive, the result to the operating and financial statement, which is of so much importance, is not difficult to imagine. Indeed, receiverships have resulted from misstated and misunderstood statements.

In view of the analysis that is possible when statements are intelligently prepared, there is much evidence that electric, if not steam, railway interests are recognizing the truth of the substitute axiom, "The accounting department is a revenue saving department," which is more fair to the department and not easily misunderstood.

The next important step which the modern organization must take sooner or later, and it has already begun, is to so separate the accounting department from the rest of the organization, by having its head report direct to the president, that it will be relieved of the restraint that has often neutralized its efficiency when controlled by a "record-making" administration. Accounting is so vital that nothing should be allowed to divert its accuracy.

One thing may be thoroughly relied upon, accurate accounting, as the work of an experienced railway accountant, will always provide the opportunity for intelligent operation and for financial security, so far as it depends upon the story of conditions.

TERMINALS IN ELECTRIC TRANSPORTATION

BY H. S. KNOWLTON.

One of the most important problems now under consideration in the transportation world is the question of securing adequate terminal facilities in large centers of population. With the steam roads the problem is being worked out to-day on a larger scale than ever before. The projects of the Pennsylvania Railroad in New York and Washington; those of the New York Central for its metropolitan suburban service; the new Lake Shore and Rock Island station in Chicago; the improvements at Seattle and Omaha; the Union Station at St. Louis, and, going a little farther back, the North and South terminals in Boston, together show that many millions of dollars have been invested in terminal construction during the past decade. Electric railways have, until recently, not felt the need of terminal stations in the handling of their traffic, except in the largest cities. Their evolution from horse-car lines insured a long period of immunity from embarrassment in disposing of passengers at the ends of routes, and the freight business—small to-day—amounted to practically nothing. As city systems increased in size, however, some form of terminal became necessary in congested districts, and this need found expression in the building of such structures as the Union Loop in Chicago, the improvement of the trackage at the New York end of the Brooklyn Bridge, and the establishment of the Park Street loop station in the Tremont Street subway at Boston. Probably the most famous electric railway terminal thus far in operation is the Charlestown station of the Boston Elevated Railway Company, at Sullivan Square, placed in service in 1901. Even this superb building is a way station, strictly speaking, with a transfer business between elevated and surface lines that far exceeds any purely terminal traffic which it handles.

Important as these terminals are as distributing and transfer points, they suffer in the matter of approaches to an extent seldom encountered in steam railway practice. It is a great advantage for the steam road to be able to carry its passengers over a private right of way to the terminal station in the heart of the city, at speeds of at least 10 m. p. h. to 20 m. p. h.—something which the electric line cannot do, because of its street occupation. Often a quarter of the running time between two cities connected by an electric interurban railway is eaten up in city running. The remedy is seldom the purchase of private rights of way in the cities, for this is pretty sure to be an absolutely prohibitive expense to an electric road. It lies rather in high speed outside the towns and in entering them by less congested routes.

As electric railways have expanded, from purely local to suburban, and, finally, high speed interurban lines, there has grown up the need of establishing stations for passengers at various points along the routes. Unfortunately, but little attention has thus far been paid to city accommodations, with a few exceptions in the Middle West. While it is evident that anything like the elaborate stations of steam roads is utterly beyond the requirements of electric systems, the need will be admitted of some sort of terminal station on lines which do an extensive interurban business. An operating system must have offices somewhere, which should contain posted information as to time-tables, fares, transfers, etc., and especially a place of shelter for passengers who are obliged to wait for the cars. It is not necessary that this terminal be located upon the most crowded thoroughfare; in fact, the placing of such a station a little to one side of the heart of the business district means much in convenience to both the railway and its passengers.

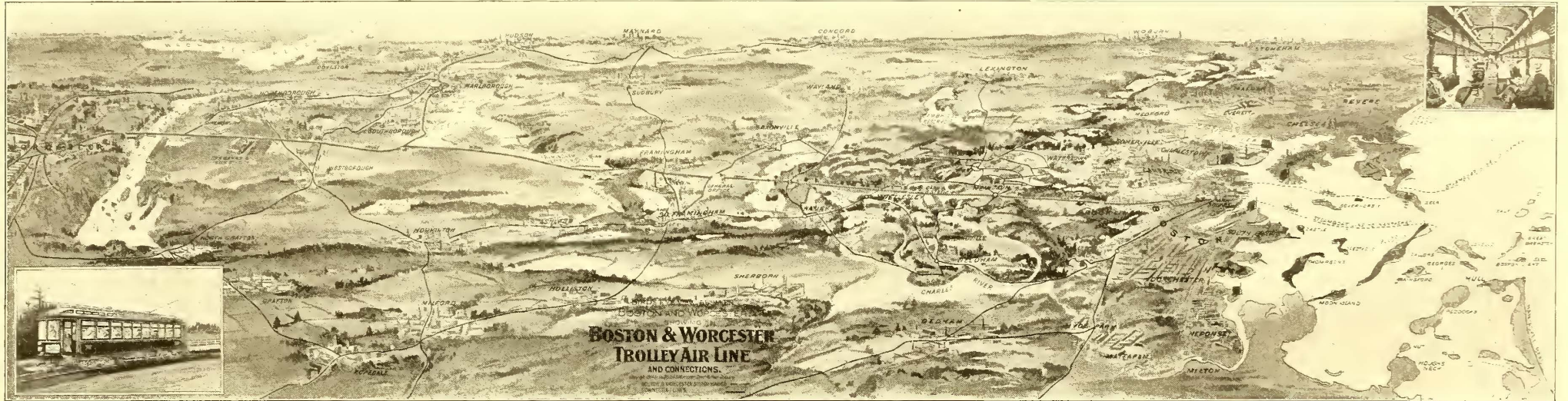
The track layout is entirely dependent upon the area at hand and the volume of traffic to be handled in rush-hours. Short headways demand loops if the most efficient service is to be secured, while stub tracks answer the purpose if the traffic is light and space limited. The loop is the more flexible, permitting the use of "single-ended" cars, which always face the same way, and in enabling more business to be handled in a given time. In Denver, even a cemetery line terminates in a loop, which greatly facilitates the operation of cars upon their arrival at the grounds. The question of convenient transfer to city lines is likewise important.

The electric railway terminal is soon to receive the consideration which it deserves from the traffic standpoint, and the next few years will doubtless record the construction of many such aids to transportation.

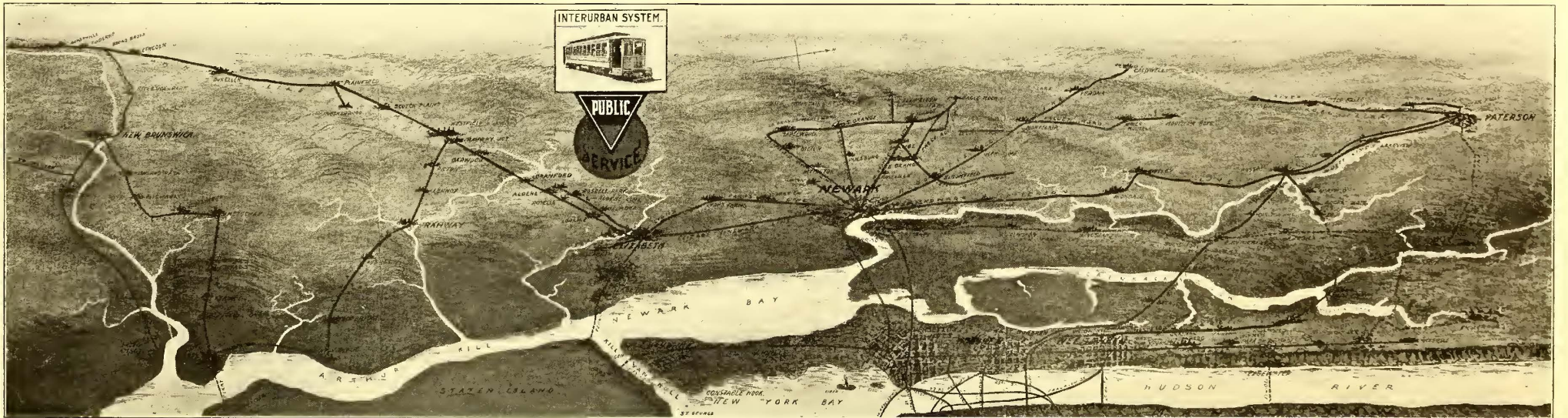
AN INTERESTING FORM OF STREET RAILWAY ADVERTISING

It cannot be said that the practice of advertising is prevalent in street railway operation, but the belief that it is a profitable plan is gaining ground and its importance is coming to be felt. Even where there is no competition, additional travel may be induced by careful and judicious advertising of a line and its advantages, and upon any road the attractive features of the suburban or park runs should be kept before the public. Especially is the latter true of interurban lines.

On the opposite page are shown two interesting advertising placards that have been issued this spring—one by the Boston & Worcester Street Railway Company and the other by the Public Service Corporation, of New Jersey—to illustrate the character of the country passed through and also show the various towns reached by the system, directly and by connections. The cards are designed to resemble bird's-eye views, and in both cases, the original is beautifully colored; the various cities and towns are shown in red, the farming lands and country in green, and the numerous lakes and rivers are in light blue. In the Boston & Worcester map typical views of the exterior and interior of one of the standard high-speed



BIRD'S-EYE VIEW OF ROUTE OF BOSTON & WORCESTER ELECTRIC RAILWAY, FROM FOLDER ISSUED BY THE COMPANY



BIRD'S-EYE VIEW OF THE STREET RAILWAY SYSTEM IN NORTHERN NEW JERSEY OF THE PUBLIC SERVICE CORPORATION, WITH CONNECTIONS TO NEW YORK, FROM FOLDER ISSUED BY THE COMPANY

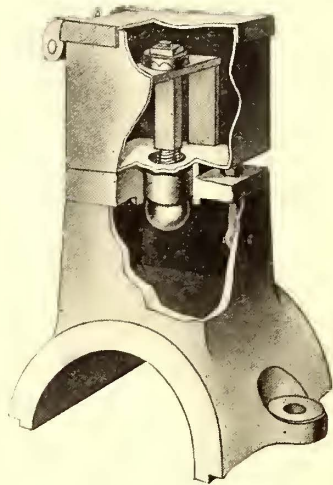
closed cars of the system are shown in the small views in the corner, while the Public Service map bears the imprint of the company.

Both circulars are issued in folder form for general distribution, and in the case of the Boston & Worcester, also in placard form, upon heavy cardboard for hanging up in local stores, barber shops, etc. The inside of the Public Service folder contains information of the routes. In both folders the original size is 8 x 30½ inches.

AUTOMATIC LUBRICATOR FOR MOTORS AND AXLES

The important problem of efficient and economical lubrication of railway apparatus has been given careful study by the Standard Automatic Lubricator Company, of Philadelphia, Pa., the result being the production of an automatic lubricator for motors and axles which enjoys considerable popularity on a number of electric railways. In the accompanying cut this lubricator is shown in position on a grease box of an armature cap. The application to the motor is very quickly and easily made by means of an expanding washer, the proper size of washer being supplied when the number and make of motor is known.

The feeding is caused wholly by the action of the motor, no oil being fed when the motor is not running. The ball is held to an upset valve by a rigid spring with an adjustable tension. When properly set the vibration of the motor causes the ball to leave its seat sufficiently to allow minute quantities of oil to exude. The flow is slow and continuous, and can easily be regulated by the tension taker when necessary. It is stated that this lubricator has effected immense savings in lubricant and in the life of bearings and axles, and that it will prevent armatures from going down for the want of proper lubrication. No attention is required other than the refilling, which is not oftener than twice a month on a car averaging 200 miles a day.



AUTOMATIC LUBRICATOR

THE ANNUAL CONVENTIONS OF THE RAILWAY MECHANICAL ASSOCIATIONS

The two important and well-known railway mechanical associations, the Master Car Builders' and the American Railway Master Mechanics' Association, have recently closed their annual conventions, in which important work was accomplished in the reports of committees of investigation, adoption of standards, and individual expressions of opinion by the members. The combined conventions were again held at Saratoga Springs, N. Y., with headquarters at the Grand Union Hotel, as has been the case for the past six or seven years. The meetings of the Master Car Builders' Association were held from June 22 to 24, inclusive, while those of the Master Mechanics' Association took place from June 27 to 29, inclusive.

In spite of the fact that the work of these associations relates specifically to steam railroad operating conditions, several important topics were taken up which will be of special interest to street railway operating officials. The report of a special committee of the M. C. B. Association upon "Standard Location of Third-Rail for Electrical Operation" is of importance in providing for a location of the third-rail which may be re-

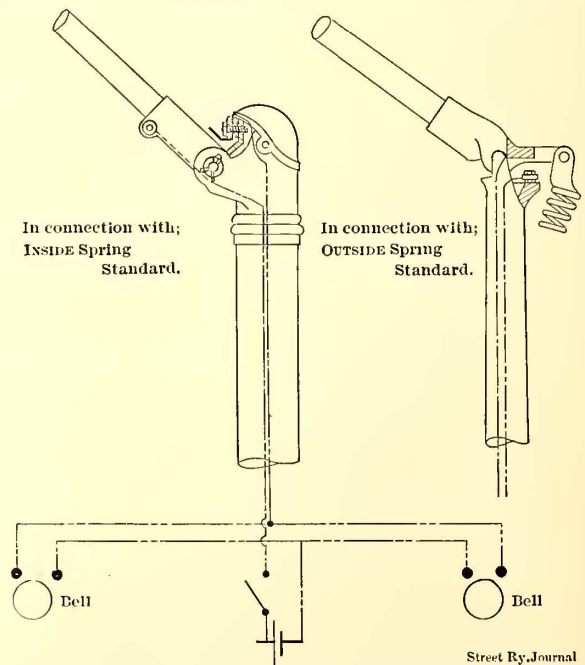
garded as a summation of the best practice of to-day; recommendations were made for what may be considered a standard in future work. This report was based upon the investigations of the engineers of the New York Central and Pennsylvania steam railroads, which are preparing to install electric traction upon the New York City terminals.

A feature of the opening of the conventions was an address to the members by H. H. Vreeland, president of the New York City Railway Company. His remarks, which were presented in abstract in last week's issue, were very timely, and were very favorably received by the steam railroad officials, in view of the early application of electric traction to so many of the branch lines and to some terminals of important steam railroads. Mr. Vreeland referred to his extensive and valuable experiences in the development of the electric traction problem in New York City, and his remarks were of particular interest, as he, being a former steam railroad man, viewed the problem from the practical operating standpoint, which is there found so essential for a successful development of such problems.

Important tests upon brake shoes and couplers were reported upon, and the important subject of draft rigging came up for further investigation and study. Many standards in car building were considered; an important paper along this line was presented by William Forsyth upon "The Use of Steel in Passenger Car Construction."

AUTOMATIC TROLLEY-ESCAPE ALARM

The accompanying diagram shows the operating details of an automatic trolley-escape apparatus, manufactured by Henry Kremnitz, of Leeds, England. This arrangement is extremely simple and can be fitted by a mechanic to any standard. An

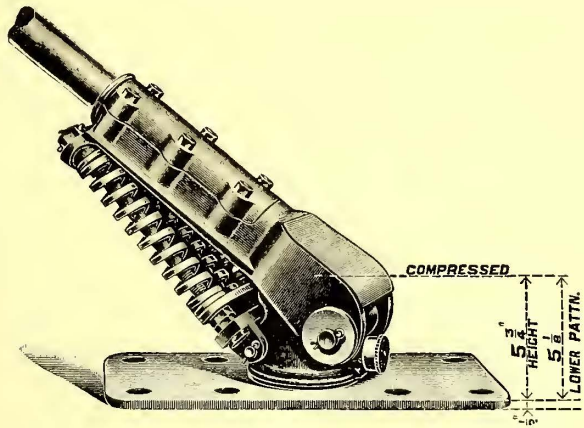


electric bell is installed at each end of the car. Wiring from these bells passes through the head of the standard, and as soon as the wheel leaves the wire a contact is made which rings the bells, thus giving the alarm to both motorman and conductor.

Although trolley catchers and retrievers are used very extensively to avoid accidents of this nature, Mr. Kremnitz believes that such devices are not absolutely reliable, especially on rough roads, where the trolley wire is not always at the same height above the roadbed; again, if the car should be going down a grade the motorman would have no means of knowing immediately that the wheel had left the wire unless the car is fitted with an automatic alarm, such as the type described.

NEW FORM OF TROLLEY BASE

The accompanying illustration shows a new form of trolley base for double and single-deck cars, which is being manufactured and sold by Harper, Phillips & Company, Ltd., of the Albion Foundry, Eastgate, Grimsby, England. This device is of cast-steel throughout, and all the parts are interchangeable. The total height, when compressed, is 5¾ ins., though this firm also manufactures another design of trolley base which has a total height of only 4 ins. from the underside of the base plate.



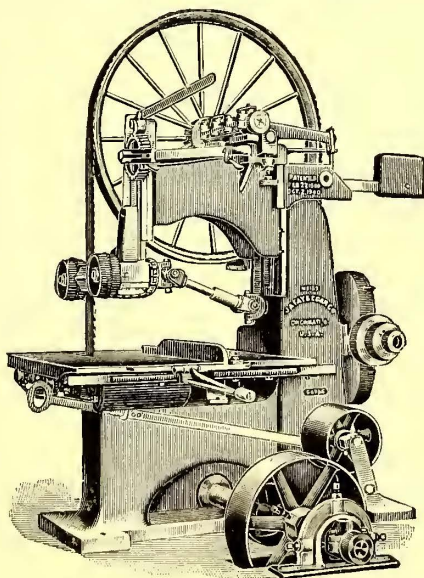
TROLLEY BASE FOR SINGLE AND DOUBLE-DECK CARS

By an ingenious arrangement of the support centers an equal pressure on the trolley wire at all working angles is secured, and it is claimed that with the springs acting directly under the trolley pole it is much more sensitive than is the case where the pressure is conveyed through bearings. Ball bearings are used at both the top and bottom of the vertical sleeve, and a ready adjustment of the tension can be made. Only one lubricator is necessary to oil all of the bearings, and the design in general allows of a most perfect insulation.

AUTOMATIC BAND RIP-SAW

The automatic band rip-saw shown in the accompanying illustration has been designed by the J. A. Fay & Egan Company, of Cincinnati, Ohio, who particularly recommend it to

car builders, mill owners and other woodworkers who have stock that requires heavy framing. It is safe to operate, a very small kerf is removed, wide or thick material easily ripped, and but little power is required to accomplish the work, the table is always at standard height, and its rolls are close together, allowing short pieces to be easily fed. The adjustment of fences and rolls can be made quickly. The machine is admirably adapted to reducing large timbers to smaller dimensions, ripping wide lumber into strips of varying widths, resawing from the side of a timber and other light work.



AUTOMATIC BAND RIP-SAW

The straining device, which controls the upper wheel and the path of the saw blade on the face of the wheels, is very sensi-

tive. No matter what the vibrations are the strain takes up the slack in the blade instantly, thus adding wonderfully to the perfect working of the machine, and lengthening the life of the saw blades.

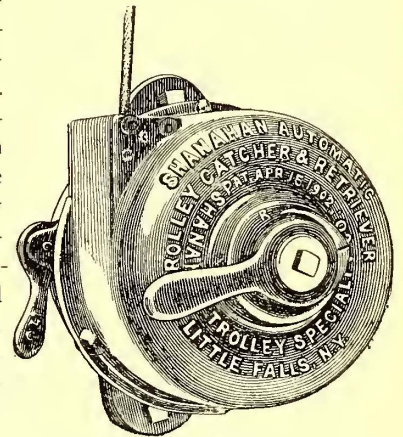
The lower wheel is solid, lessening the circulation of dust and giving itself increased momentum so that its speed governs the upper wheel and prevents it from overrunning the lower. The machine has three feeds, and powerfully-driven feed rolls in and above the table, and by a single movement of a lever convenient to operator the machine can be instantly changed to a hand-fed rip-saw, or instantly stop the feed.

AUTOMATIC TROLLEY CATCHER AND RETRIEVER

The high value of trolley catchers and retrievers in eliminating some of the causes of expensive accidents, injury to overhead equipment and the numerous annoying stops due to the pole leaving the wire, has long been recognized by practical railway men, the only problem being the selection of the best type of such apparatus. An efficient catcher and retriever must be of simple, compact and rugged construction, light in weight and easily detachable for transferring from one end of the car to the other, and must be absolutely reliable under the most severe operating conditions.

In compliance with these conditions an automatic trolley catcher and retriever has been perfected by Thomas B. Shanahan, president of the Shanahan Trolley Specialty Company, of Little Falls, N. Y., and for the past ten years master mechanic of the electrical department of the Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y.

In this position the necessity for some mechanism that would control the trolley pole became very apparent to Mr. Shanahan, and after much experimenting he invented the mechanism shown herewith. The device is entirely automatic in action. The instant the trolley leaves the wire it is pulled down from 2 ft. to 6 ft., as may be desired, and held there until released. It is stated that it invariably performs its work regardless of speed or weather conditions. The trolley is easily replaced on the wire by pulling out sufficient rope and resetting the machine. The motive power of the retriever is a large spring, which can be adjusted for any desired tension.



AUTOMATIC TROLLEY CATCHER AND RETRIEVER

Only one catcher and retriever is needed for a car. Two bases are furnished with each retriever. These are attached to the car ends, and by using a small locking lever the retriever can be taken from one end of the car to the other without the use of tools.

Agreements have been entered into by the St. Louis, St. Charles & Western Railroad, of St. Louis, and the American Car Telephone Company, of Grand Rapids, whereby the line of the former company is to be equipped with a telephone system so constructed that passengers aboard any car may, while traveling, be in direct communication with persons in St. Louis. The St. Louis, St. Charles & Western Railroad is the first line to be so equipped. In each car will be installed a telephone connected by means of a patent trolley wheel, with a telephone wire above the car leading to the St. Louis Exchange.

THE WESTINGHOUSE NO. 200 RAILWAY MOTOR

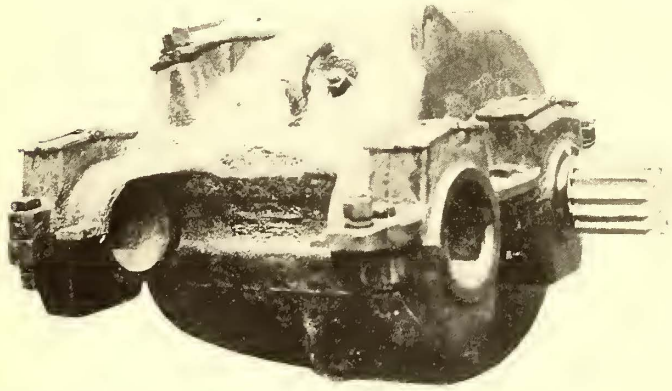
The Westinghouse No. 200 railway motor has been designed to meet the demand for a motor of thoroughly sound construction and medium power, for service on cars of moderate speed and seating capacity. It embodies all the advantages of the most modern practice, and is the outcome of long experience in electric traction. The salient points of the No. 200 motor are outlined in the following description:

The magnetic yoke of the field magnets is formed by a cast-steel casing, which further serves to protect the vital parts from

to the cable leads. This method dispenses entirely with the making of connections inside the motor casing.

The armature is of the drum-wound type with slotted core. The core and windings are so spaced as to afford ample ventilation when the armature is revolving. A constant circulation of air is kept up, and the temperature of the whole material of the motor is thereby equalized. The armature coils are of copper strap, formed to exact shape and size on the metal moulds, and then insulated and grouped in sets of three. Each set is encased in a stout insulating cell of fullerboard and mica, and the whole is then taped and varnished. The complete coils are so shaped as to slip easily into the slots, without using undue force. Thus the insulation remains uninjured during winding. Three steel wire bands serve to retain the coils in their places in the slots. These band wires are wound in grooves in the core, of such depth that the wires do not project above the surface. The maximum clearance is thus available to allow for eccentricity of the armature in the field caused by wear of the bearings. Moreover, should undue wear allow the core to touch the pole faces in revolving, the band wires, being sunk in grooves, are protected, and will not break and allow the armature coils to be thrown out. The ends of the coils, clear of the field poles, are further secured by two bands of steel wire, which prevent coil spreading in case an excessive speed should be attained. The complete armature weighs 396 lbs.

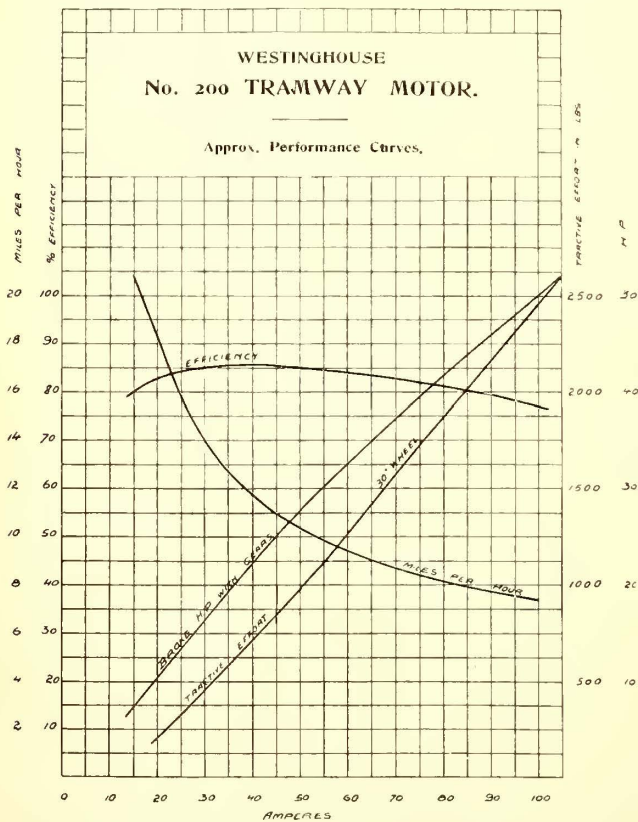
The brush holders are securely bolted to the upper half of the field casing, and thoroughly insulated from it. They can be readily withdrawn at any time after the removal of one nut. The commutator is built of 111 segments of hard-drawn copper, insulated from each other by mica sheets. The large diameter gives ample cooling surface, while the generous depth of the segments permits of a wide margin for wear. Further, the great number of segments lowers the potential drop between adjacent bars, thus favoring sparkless commutation.



MOTOR, VIEWED FROM AXLE END

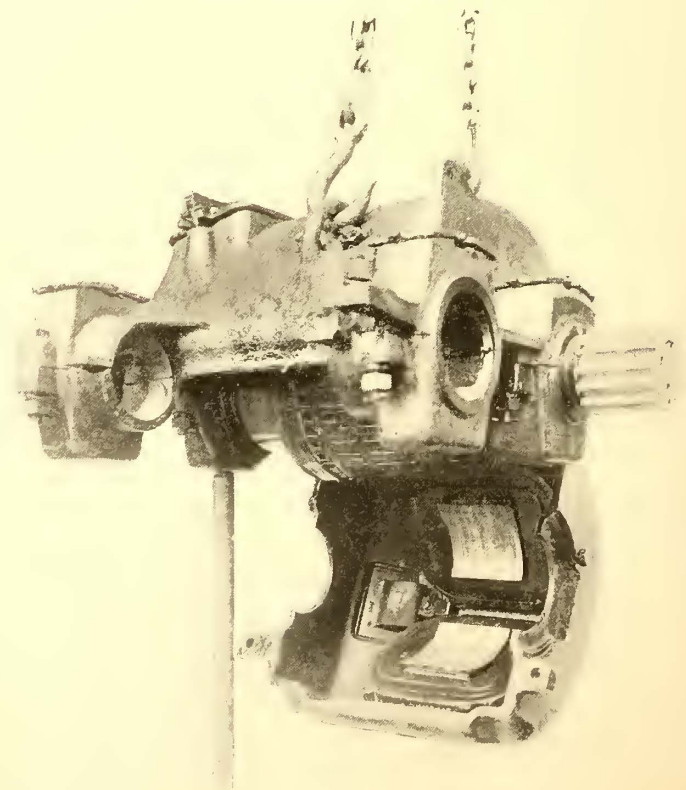
mechanical injury. The four pole-pieces, built up of steel laminations, are each fastened to the yoke by two bolts, and rest on machined surfaces inside the case, ensuring an efficient magnetic circuit. The nuts for the pole-piece bolts are sunk in recesses in the casing.

The field coils are of high conductivity copper, wound on



SOME CHARACTERISTIC PERFORMANCE CURVES

moulds, and thoroughly insulated with fullerboard and mica, taped and varnished. The external connections are made by long flexible conductors passing through the case in insulated bushes, which prevent chafing of the insulation. A terminal sweated on with a special clip contact provides for connection



RAILWAY MOTOR, OPEN

A large rectangular opening in the upper half of the motor casing provides access to the commutator and brushes. This aperture is closed with an iron lid secured by two bolts; a close fit being ensured by a thick felt insertion. Just beneath the commutator a hand-hole is also provided, which allows access

to the lower casing, and permits the removal of anything which may have dropped into the case. Inspection of the armature clearance is allowed for by the provision of two small holes, one at each end of the field yoke. The casing being in halves, hinged together along the side remote from the car axle, the armature or any part can be examined by dropping the lower half of the casing, thus completely opening up the motor.

The armature bearings are placed directly in the motor casing, and a long bearing surface is secured without unduly increasing the width of the motor by a special design of wiper ring, which projects well inside the case. The method of lubrication adopted allows the use of either oil or grease, or both, at will. The large size of the wiper rings entirely prevents the grease finding its way along the shaft onto the armature and commutator.

The gear case is divided horizontally and bolted securely to the motor case, so that the lower half can be removed without disturbing the upper half. The gears are of cast-steel, and can be lubricated through a small opening in the upper half covered by a spring lid. The pinion is of forged steel, taper bored to fit the armature shaft, to which it is also keyed. The pinion and gear have a 5-in. face, and the standard gear ratio, used with the No. 200 motor, consist of a fourteen-tooth pinion and a sixty-eight-tooth gear.

The total weight of the motor, complete with gear and gear case, is 2080 lbs. Its principal dimensions are: Commutator length, 2¾ ins.; diameter, 8½ ins.; armature diameter, 13 ins.; bearings, pinion end, 8 ins. x 3 ins.; commutator end, 6 ins. x 3 ins.; axle bearings, adapted to any axle, from ¾-in. to 4½-in. diameter.

Fig. 3 shows approximate performance curves for the No. 200 motor at 500 volts. Should a motor of power slightly different to that indicated be required, the capacity can be varied to meet the requirements.

DELTABESTON MAGNET WIRE

As so many serious accidents in electrical work are due to defective insulation, any notable improvement in insulating material is worthy of careful attention. While asbestos is one of the most reliable insulators known, its extended use is impracticable, because it is too bulky. Insulation manufacturers have endeavored, therefore, to find a product that would possess the good qualities of asbestos and yet require little space. Among others, the D. & W. Fuse Company, of Providence,

degs. C., cotton-covered wire will in time char to an extent that will break down its insulation. It was further ascertained that at 199 degs. C. cotton-covered wire began to smoke in 20 seconds. At 239 degs. C. it was distinctly discolored in 50 seconds, and complete carbonization had taken place at 245 degs. C. in 2 minutes and 15 seconds. These temperatures are, of course, excessive, yet they show how little time is required to ruin the field or armature windings on a railway motor, when subjected, as they are, to frequent overloads. Deltabeston wire,

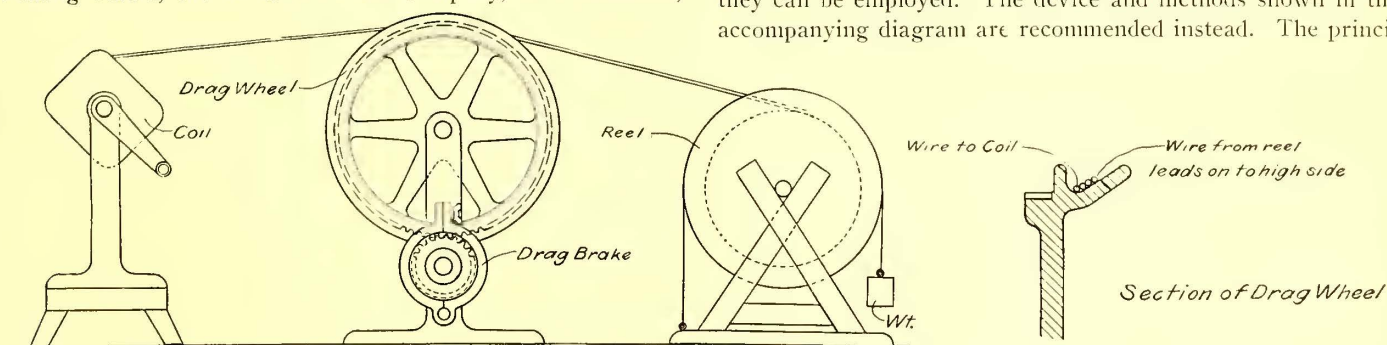


COIL OF DELTABESTON WIRE

tested under the same conditions and current, is said to be absolutely unaffected. An interesting comparative test of the properties of the two wires is shown by coupling two pieces together and subjecting them to the same current, resulting in the complete destruction of the cotton insulation without affecting the Deltabeston wire in the slightest. Further, the latter wire has been run at a dull red heat representing a temperature of about 600 degs C. without its insulation being destroyed. From this it will be seen that this abnormal temperature rise will not affect its insulation disastrously, and since the temperature rise in any motor or dynamo is limited by the sparking limit of the commutator, it will at once be seen that under no operating conditions can the temperature be brought to a point sufficiently high to cause the break-down of this remarkable insulation.

This wire has been given the most exhaustive tests, and it is used in a large number of railway motors with very satisfactory results. At the present time it is made in any size from No. 4 to No. 18 B. & S. gage.

The manufacturer would caution those who attempt to wind coils with this wire that ordinary methods of clamping in order to secure tension do not give very satisfactory results, although they can be employed. The device and methods shown in the accompanying diagram are recommended instead. The princi-



SPECIAL APPARATUS FOR WINDING COILS OF INSULATED WIRE

R. I., conducted numerous experiments and finally succeeded in producing its "Deltabeston" magnet wire.

This wire is insulated with practically pure asbestos, treated in such a manner that its insulating properties are exceptionally good, and, at the same time, its remarkable resistance to heat saves it from any injury due to temperatures likely to occur in commercial service. The thickness of this insulation is said to compare very favorably with that of double-cotton insulation. The following comparison of the heat-resisting properties of cotton-covered and Deltabeston wire will be of interest.

Investigation showed that at a temperature of about 147

ple involved is that of coiling the wire three or more times about the periphery of a geared wheel, the surface of which is higher on one side than on the other, taking special pains to feed the wire from the reel on the high side and draw it off the wheel from the low side, then letting it pass to the former on which it is being wound. A special brake attachment is also provided, by which the tension can be adjusted through a wide range without injuring or marring the insulation. For trial purposes it is, of course, unnecessary to procure this device, but those who purpose using this wire to some extent will find it very satisfactory.

THE OECHELHAUSER GAS ENGINE

The large gas engines at present in use may be divided into two classes. First, those in which the working cylinder itself serves as a charging pump, i. e., the so-called four-cycle engines, and, second, those which are provided with separate pumps for charging the working cylinders, i. e., the so-called two-cycle engines. Engines of the latter class again may be sub-divided into two groups: (a), those in which the charge is admitted to the working cylinder by means of valves, and (b) those in which the admission of the charge is controlled by a second piston. The engine of the last group, which has found the most general use in Germany, is that built under the von Oechelhäuser patents, and which is generally known outside of Germany as the Borsig gas engine. Many of these engines have already been in use for a number of years, and have been found suitable for all purposes, whether as blowing engines, rolling mill engines, or for electrical generation.

By the employment of a pair of pistons, working in opposite directions as in the Oechelhäuser motor, it is claimed important advantages are attained. Chief among these is the perfect balancing of all reciprocating parts, in consequence of which the foundations and foundation bolts and plates of the engine can be kept comparatively light, such as is not the case with a gas engine having only a single system of reciprocating parts,

the latter has sunk to that of the atmosphere, the piston K_2 opens the ports Cl , through which pure air enters the cylinder and sweeps out the waste gases. Hereupon the piston K_2 opens the ports Cg , allowing gas to enter the cylinder and mix with the air likewise streaming in, whereby the explosive mixture required for a new working stroke is formed. This mixture is compressed during the return strokes of the two pistons, and on the cranks reaching their inner dead points it is fired by means of several electric igniters. Thus a working stroke is obtained at every revolution of the crank shaft.

The so-called charging spaces, Rl and Rg , for air and gas, respectively, are refilled during the compression and working strokes by means of a charging pump, L , located behind the cylinder, so that on change of direction of the stroke there is always a fresh charge under a low pressure (about 0.3 to 0.4 atmospheres, or 4 lbs. to 6 lbs.) ready to enter the cylinder.

In order to prevent gas from entering the exhaust ports, the motor is so constructed that while air can enter the charging space for gas, no gas can enter the charging space for air. The front piston acts directly upon the middle crank-pin of the three-throw crank shaft, while the rear piston acts upon the two outside crank pins by means of a cross-head and connecting rods.

It may be here remarked that in the Oechelhäuser motor there are no valves located in the firing chamber, so that

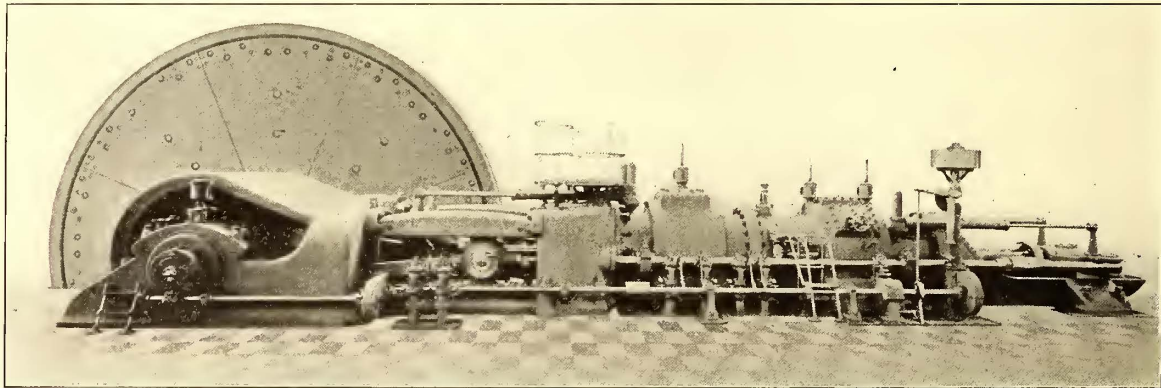


FIG. 1.—VIEW OF EXTERIOR OF OECHELHAUSER GAS ENGINE

where there is always danger of the engine, especially if of large dimensions, working loose and jumping.

A further result of the good balancing secured in an engine provided with pistons working in opposite directions, is a favorable tangential pressure diagram, whereby the moment for the fly-wheel required is comparatively small, and can be reduced to a minimum by constructing the motor as a twin tandem engine. Owing to the doubled stroke of the pistons, the diameters of the cylinders are also very small. For instance, the largest single-acting four-cycle gas engine as usually constructed, having a cylinder diameter of 1300 mm (51 ins.) and a piston stroke of 1200 mm (47 ins.), will develop 700 hp at a speed of 90 r. p. m., while an Oechelhäuser motor of the same size would develop four times this power, viz., 2800 hp, i. e., double the power of a double-acting 4-cycle engine of the same size.

The cylinders are very easily accessible. After the withdrawal of the rear piston the cylinder can be entered at once and cleaned, should this prove necessary on any occasion.

The method of working of the engine is as follows: As is shown in Fig. 2, two pistons, K_1 and K_2 , work in opposite directions in a long cylinder open at both ends, and provided with ports Ca , Cl and Cg . During their travel in the outward direction the pistons uncover the ports consecutively, whereby the different phases of the cycle are effected. The piston K_1 first opens the longer ports Ca , and allows the still compressed products of combustion to escape. As soon as the pressure of

choking is not to be feared, and safe working is ensured even in cases where, through the entry of dust and dirt, motors of other types would be likely to get out of order. The three-throw crank offers no difficulties, and is at least as safe as any other multiple crank shaft. Several of these shafts have been examined and calculated by Professor Meyer, of the Royal Technical Institution, at Charlottenburg, Berlin, and his calculations show that they are fully equal to all requirements.

The accompanying illustrations show the engine originally built for the World's Fair at St. Louis by A. Borsig, of Tegel, Germany, who, however, for certain reasons, has felt compelled to withdraw the machine from exhibition. For constant service the horse-power of this engine is 1500 average and 1800 maximum, at 90 r. p. m.; during limited runs the horse-power developed may be as high as 2200. The cylinder is 1100-mm (43 ins.) diameter and of 1350-mm (53 ins.) stroke. The length of the engine over all is 21.7 m (71 ft.) net, and the width over all, without the dynamo, 8.5 m (28 ft.). The weight of the engine, including fly-wheel, amounts to 325,000 kg (147,730 lbs.). The degree of irregularity of the fly-wheel is 1/90. The number of revolutions of the engine per minute can be increased or decreased by 5 per cent, with the aid of a spring balance.

As will be seen from the illustrations, the engine is very rigid in all its parts. The position of the cylinder is centered into and secured to the main frame, which is built of heavy parts, thus a good alignment is effected. At the other side the

cylinder rests freely on the base plates, just as is ordinarily the case with steam engines; in this manner the engine is rendered more easy to inspect, and the engineer can get access to all parts. Stair-cases and galleries are arranged wherever desirable.

All the wearing surfaces are very ample in size, and for the sake of safety, all the cross-head guides and main bearings are provided with water-cooling devices. The pins of the crank shaft are bored longitudinally and tubes led in for power lubrication, besides which the usual centrifugal lubricators are employed. All the other parts are, as far as possible, lubricated from central places. The main bearings are oiled on the circulation system. Drip cups, oil catchers and splash guards are provided wherever necessary.

The charging pumps are arranged under the engine house floor, one behind the other, on one side of the fly-wheel. In designing these pumps special care has been taken to reduce the driving power required to a minimum, by employing valves of ample area, so as to affect

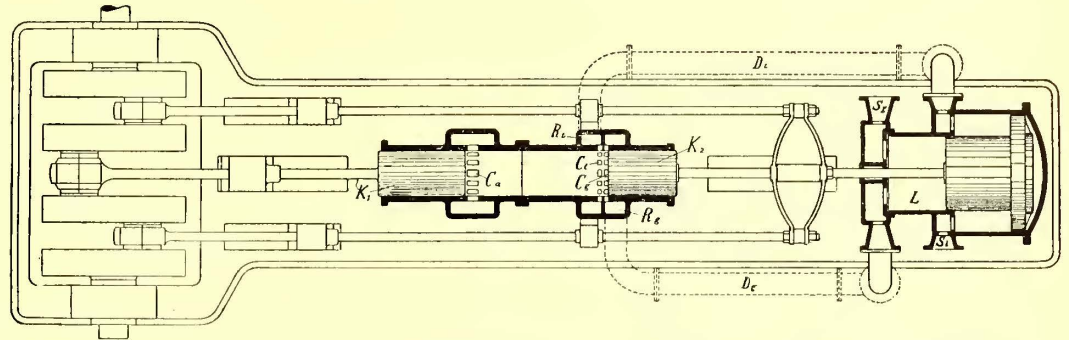


FIG. 2.—SEMI-SECTIONAL PLAN VIEW, SHOWING PISTONS WORKING IN OPPOSITE DIRECTIONS

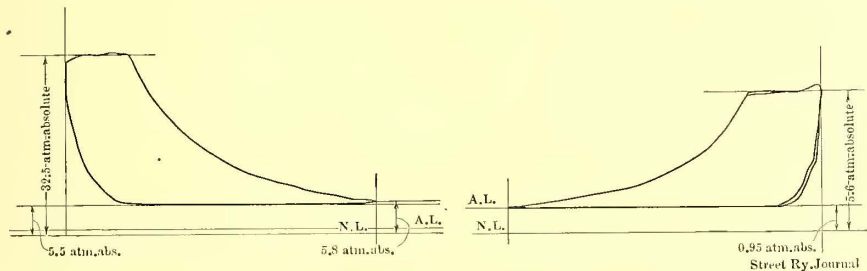


FIG. 3.—INDICATOR DIAGRAM FROM BORSIG GAS ENGINE

the efficiency in the least possible manner. The method of arranging the charging pumps immediately below the cylinders has been adopted, owing to its having been found that the charges can be admitted to the cylinders much more smoothly

the admission of the gas, the quantity of air flowing in through the air openings is in proportion to the volume of gas, so that the explosive mixture formed is such as can always be easily ignited. For this reason a return valve is also provided in the air pipe, so that the pressure of the air may be somewhat varied also the same as with the gas supply.

In the case of an engine running with a light load, the mix-

ture at the igniting device might be too poor, since, owing to the arrangement of the inlet slots in the circumference of the cylinder, the gas might be too much distributed within the cylinder. For this reason an annular sliding valve, controlled by the governor, is provided above the inlet slots. This slide moves very easily and cannot get rusted down, as during working of the charging pump, a small quantity of oil is continually being carried over, and settles on the wearing surface of the slide, thus keeping the latter well lubricated. This annular slide is so adjusted as gradually to close the slots opposite to the igniting device, as the load on the engine decreases, so that only a few small openings are left for the admission of gas when the engine is running without load. The gas in the latter case thus enters the cylinder very slowly, and mixes only with the nearest particles of air, without becoming distributed over the large cylinder space. The pistons drive this explosive mixture to the igniting device, whereby safe and regular com-

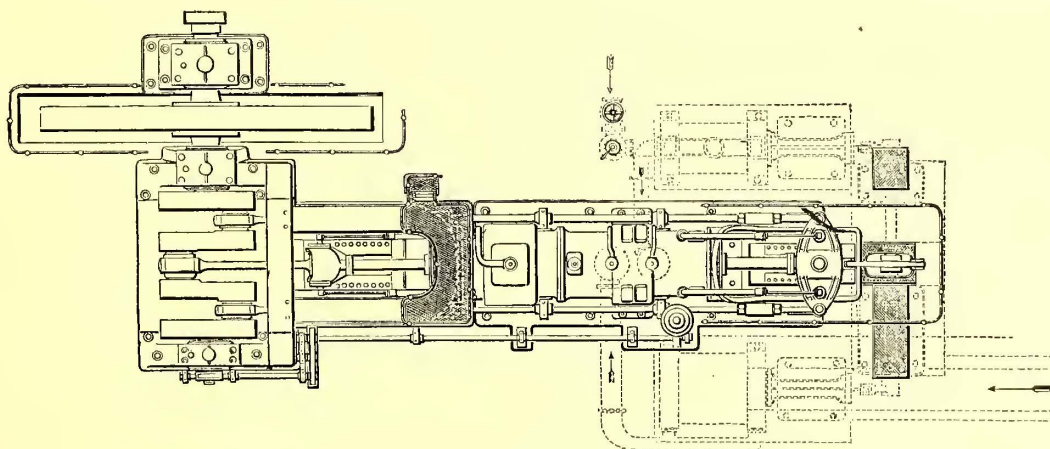


FIG. 4.—PLAN OF OECHELHAUSER GAS ENGINE

and reliably, if both the air and the gas are stored up in the immediate proximity of the cylinders.

The motor is governed by the quantity of gas admitted, being regulated by the pressure in the so-called charging space in front of the cylinder. This is effected with the aid of a return valve, controlled by the governor, the excess of the gas drawn in by the pump being returned to the suction pipe before the beginning of the compression in the pump, whereby no useful work is wasted. It is only necessary to see that during

combustion is ensured. To prevent in-rush of air, after the gas slots have been closed, whereby the explosive mixture would be impaired, the air inlets, which are of ample size, are provided with an annular slide, which is so adjusted by hand that at the moment when the gas slots are closed by the piston the air inlet is completed also. As regards the regulation of the motor it should be noted, as above mentioned, that all the valves are placed outside the engine proper, so that they do not come into contact with the fire.

The motor is started in the usual manner, with the aid of compressed air. The gear of the starting valve is so connected with that of the igniter that the starting valve can only be opened when ignition takes place at the dead point, so that premature ignition and consequent recoil of the motor on starting is avoided. This device will be described below.

In October, 1903, Professor Meyer, at the request of the manufacturer, A. Borsig, of Tegel, conducted some careful tests with a 500-hp, single-cylinder gas-blowing engine for blast furnaces. The motor was worked with coke-oven gases, containing on the average 3300 calories per cubic meter. Originally the motor was destined to be driven with blast furnace gas, and in view of the richer coke-oven gas being used, had to be reconstructed as far as possible. Thus, a special gas pump was added, and the original charging pump, designed to pump gas on one side and air on the other, was modified for the air supply exclusively.

These alterations, however, rendered the quantity delivered excessive, so that a not inconsiderable amount of air had to be blown off through a valve. Thus more power was spent in driving the pumps than would otherwise have been necessary. In spite of this fact, however, the results in respect to the amount of gas consumed were most favorable. The average consumption of heat per hour 1 hp developed in the working cylinder amounted for both trials to 1660 calories, that is to say, 38 per cent of the heat was utilized. The pump work amounted to 10.3 per cent of the indicated work. It is probable that in the case of a pump properly constructed from the first, the power consumed would still more favorably compare with that developed, and would be reduced to about 8 per cent. The consumption of cooling water was equally favorable, only amounting to 27 liters (7 gals.) per electrical horse-power.

The engine comprises several interesting constructional details, which it may be worth while to describe here. In the first place there is the automatic suction and discharge valve, which is employed for the charging pumps. This valve consists essentially of a very thin sheet-iron disc, about one-half 1 mm thick, weighing about 40 grammes, and so cut as to form two spiral arms, secured at the center of the disc by means of two screws, a little clearance being left in order that the arms may be at liberty to move without jamming. Above the disc, a valve catcher is provided, in which several small helical springs are fastened. These springs serve for loading the valve and press the disc firmly on its seat. The point of support of the spiral arms is located in the middle of the valve lift, so that the disc is bent upwards. The purpose of this arrangement is to render the stress on the arms as favorable as possible, the strain of the material varying between half the negative maximum stress and half the positive maximum stress. Owing to the exceedingly small mass of the valves its resistance is insignificant. A further notable feature lies in the return valves and their gear. These valves are exactly the same as the inlet valves in the steam engines built by the manufacturer already mentioned. This new valve gear (Neuhaus-Hochwald system) has been fitted with success on many steam engines, and has been found to work silently and safely. The action of the governor upon this valve gear is as follows:

The lever, *o*, secured to the shaft, *n*, is actuated by the gov-

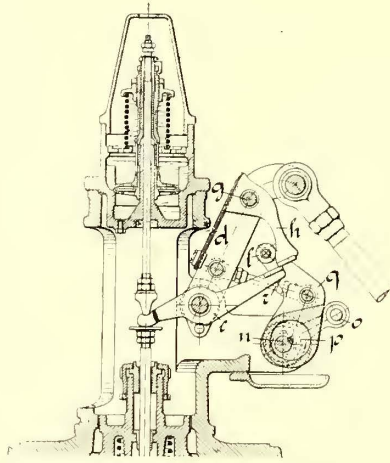


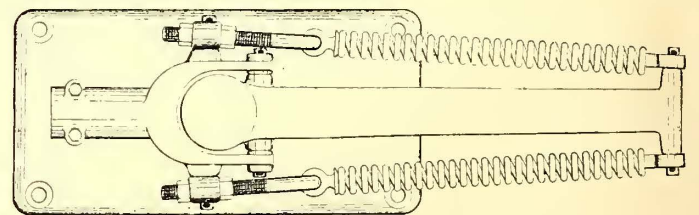
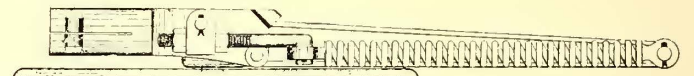
FIG. 5.—DETAILS OF GOVERNING APPARATUS

ernor. The small eccentric, *p*, keyed upon the same shaft, will thus be turned, and the roller, *l*, carried by the eccentric rod, *q*, caused to take up a new position, whereby the catch on *h* is sooner or later pushed off the valve lever *e*. The eccentric rod, *q*, between its fulcrum and the roller, is engaged by a rod, *r*, on the rocking lever, *d*, and is thus obliged to partake of the motion of the latter. By reason of this peculiar connection of the governor gear with the active gear rod, the catch bears with a wide surface against the passive tail even for high degrees of expansion, and when the engine is running without load, and, furthermore, for all degrees of expansion, is rapidly pushed off the tail at the last moment when admission has been completed. Thus, premature knocking off of the catch and consequent irregular running of the engine are completely avoided.

A further detail may be pointed out, which hitherto has never, or scarcely ever, been employed in gas engines, but which is, nevertheless, desirable. As is well known, on starting a gas engine the ignition must take place much later than in the normal running of the engine, say at the dead point, whereas, normally, the sparks must pass some 30 degs. to 40 degs. before the dead point. There is thus the danger that on starting the engine the igniting device is not properly adjusted so that premature ignition may occur, whereby the engine is turned in the opposite direction. This sudden change of direction in the revolution of the fly-wheel may, however, cause very dangerous strains on the rods, especially in large power gas engines. This is rendered quite impossible by the special construction by which one device is made to lock the other one, and vice versa: Thus the starting device cannot be engaged unless a specially marked disc is so adjusted that ignition takes place in the dead point position. Only when the disc is in this position can the starting lever be moved round.

TROLLEY BASE FOR DOUBLE DECK CARS

The general introduction of covers over top-seat cars in England has given rise to many problems in connection with electric equipment which did not exist before, and none more important than the manufacture of a satisfactory trolley stand-



TROLLEY STANDARD FOR CANOPY TOP CARS

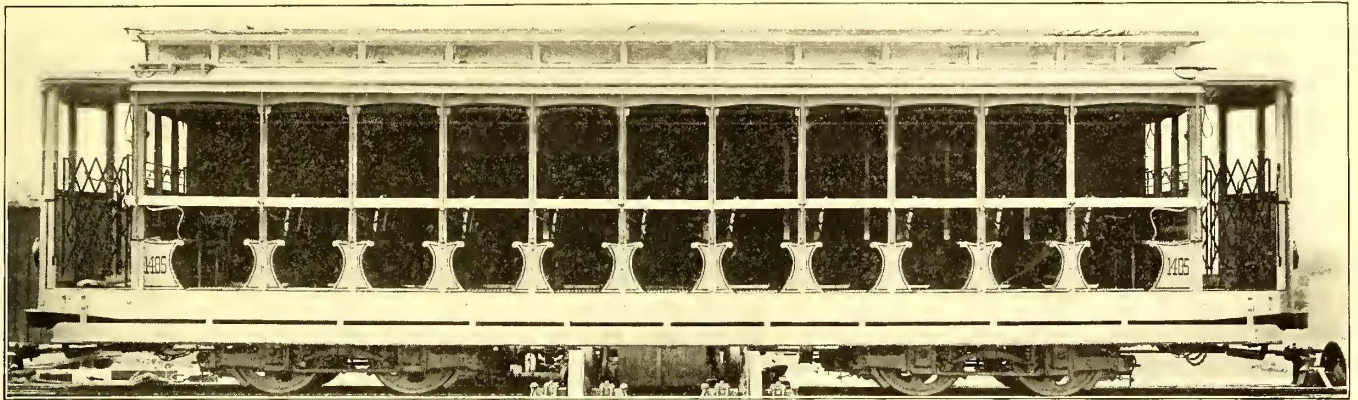
ard for installation on cars equipped with canopy tops. At first the usual trolley standard was used, the vertical portion being extended somewhat so as to pierce the cover, but now standards are being put on the market which are attached directly to the top of the canopy. The one illustrated herewith is made by S. Dixon & Son, Ltd., of Leeds. It has been installed with very marked success in that city, and other cities are rapidly becoming interested in it.

The construction of this trolley standard gives the greatest amount of strength and rigidity between the ball races, within what are stated to be the smallest overall dimensions of any other standard used. Double ball bearings are provided to ensure ease in following the curves of the trolley wire. The trolley pole can be swung completely round either way. All parts are made to gage and standardized, and are, therefore, interchangeable.

OPEN CARS FOR THE PUBLIC SERVICE CORPORATION OF NEW JERSEY

The accompanying illustration shows one of the forty open cars which the John Stephenson Company has built recently for the Public Service Corporation of New Jersey. This car

The bottom framing is very substantially constructed. Long-leaf yellow pine side sills, 6 ins. x 8 ins., are plated with steel 7 ins. x $\frac{5}{8}$ in. The intermediate sills are composed of 5-in. I-beams. Heavy upper and lower trusses and double-trussed needle beams are included, and the body bolsters are of the open steel type. The platform timbers are reinforced with



OPEN CAR FOR THE PUBLIC SERVICE CORPORATION OF NEW JERSEY

is very strong and substantial, the $4\frac{1}{2}$ -in. x $7\frac{7}{8}$ -in. side sills being plated with 10-in. x $\frac{3}{4}$ -in. steel plates, the standard size used by the company on all of its double-truck open cars.

Among the features of this type is the placing of all seats inside the bulkhead, and the addition of a vestibule at each end, thereby protecting the motorman, conductor and apparatus in rainy weather.

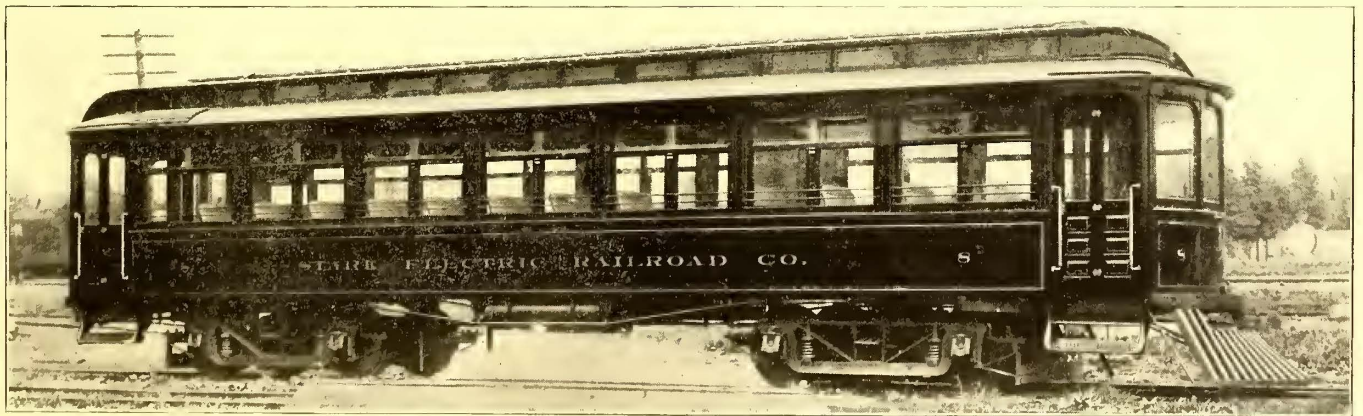
The length over all is 39 ft. $3\frac{3}{4}$ ins., the length of the platforms 3 ft. 6 ins., and the total weight of car without trucks is 17,000 lbs. Each car is equipped with four Westinghouse No. 68-E motors and Christensen air brakes.



INTERIOR OF CAR FOR STARK ELECTRIC RAILROAD

INTERURBAN CARS FOR THE STARK ELECTRIC RAILROAD OF OHIO

The Stark Electric Railroad Company, of Alliance, Ohio, which operates a high-speed road between Canton, Alliance and Sebring, has recently added to its rolling stock four fine combination passenger and smoker interurban cars, built by the G. C. Kuhlman Car Company, of Cleveland. The road extends through a populous country for the distance of 35 miles, and does considerable freight business. A popular amusement park near Alliance, which is owned by the company, attracts large



HIGH-SPEED COMBINATION INTERURBAN CARS USED BY THE STARK ELECTRIC RAILROAD COMPANY

numbers during the season from towns along the line. An extension of the road has lately been completed, and it is expected with the new cars that the traffic will be largely increased. The car company has furnished many of the large interurban cars for lines in this State, and this lot is an excellent example of its work.

angle-iron, and Brill angle-iron bumpers strengthen and protect the ends. The thickness of corner posts is 4 ins., and of side posts 2 ins.

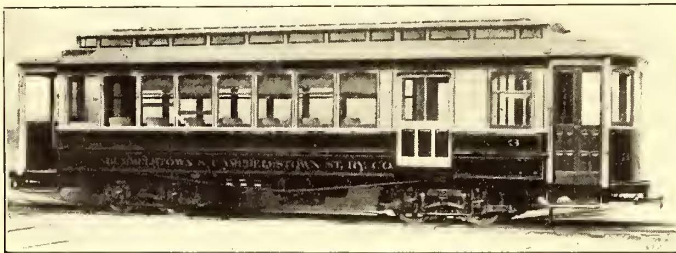
The interiors are finished in cherry, handsomely inlaid, and the ceilings are semi-empire to correspond with the arched twin windows. The ceilings are painted light green with gold

striping. A toilet room of standard steam-car character is placed against the partition in the passenger compartment. A single sliding door, with glass in the upper part, separates this compartment from the smoker. The partition opposite the toilet room has glass in the upper portion. The window sashes of the body and vestibules are arranged to drop into wall pockets. Semi-accelerator doors are provided in the ends, on account of the vestibule entrances being at one side only. This arrangement facilitates ingress and egress, and allows seats for three passengers to be placed against the ends. With the exception of these end seats the seats are 35 ins. long, have high corrugated backs of the walk-over type, and are provided with arm-rests. The seating capacity of each car is fifty-six. The trim throughout is solid bronze of very substantial character, and includes continuous parcel racks.

The weight of the car and trucks, without motors, is 47,000 lbs. The general dimensions of the cars are as follows: Length over end panels, 40 ft., and over crown pieces 50 ft.; from end panels over crown pieces, 5 ft.; width over rails, 8 ft. 8 ins. The height from rail to tread of lower steps is 18 ins.; from rail to underside of sills, 38 ins., and from underside of sills over trolley board, 9 ft. 4 ins.; centers of posts, 2 ft. 9 ins.

EQUIPMENT FOR NEW PENNSYLVANIA RAILWAY BETWEEN HUMMELSTOWN AND DERRY CHURCH

The handsome combination passenger and baggage car shown in the accompanying illustration is one of a number re-



PASSENGER AND BAGGAGE CAR FOR PENNSYLVANIA INTERURBAN RAILWAY

cently completed by the J. G. Brill Company for the new road between Hummelstown and Derry Church, Pa., built and operated by M. F. Hershey, the well-known chocolate manufacturer. The road is about 12 miles long, and traverses a rich



INTERIOR OF HUMMELSTOWN CAR

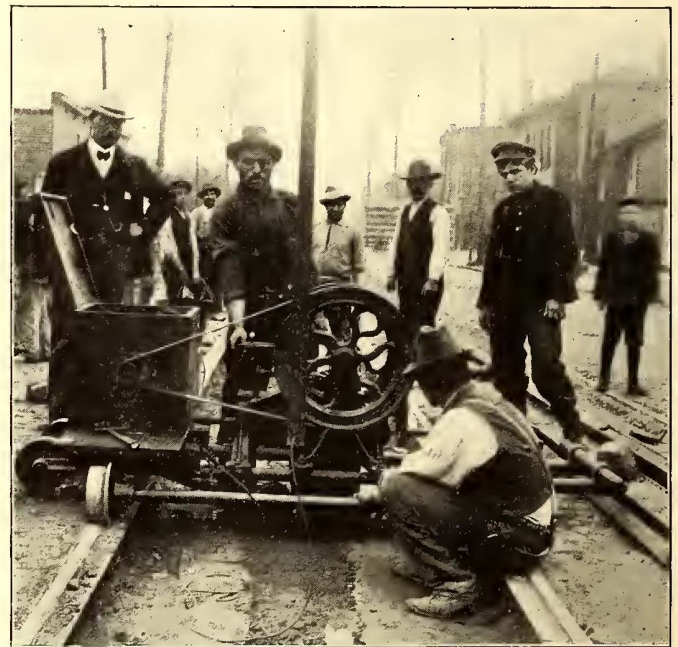
dairy farming district, from which the large supply of milk required in chocolate manufacture is obtained. The numerous employees of the factory live in the district through which the line passes, and it is chiefly on their account and for the trans-

portation of milk, that the road has been built. There is, however, a large and increasing population, and the district promises much for present and future development.

The cars are the well-known semi-convertible type of the builder, with roof pockets for the large double-sash windows. The cars are 31 ft. 8 ins. over the end panels, and 41 ft. 1 in. over vestibules, with 4-ft. 8½-in. platforms; width over sills, 8 ft. 2½ ins., and over posts at belt, 8 ft. 6 ins.; sweep of posts, 3¾ ins., and side posts, 3¼ ins. thick.; size of side sills, 4¾ ins. x 7¾ ins., and end sills, 5¼ ins. x 6⅞ ins. The interior of the passenger compartment is finished in cherry, with a partition between the compartments of the same wood. Seats which fold against the walls are provided in the baggage compartment for the use of smokers. This compartment has a 40-in. sliding door on either side. The baggage compartment is 9 ft. 2 ins. long, and the entrance to the platform is by a single sliding door. The cars are equipped with several of the builder's specialties, including sand-boxes, angle-iron bumpers, platform gongs, conductors' bells, radial draw-bars and ratchet brake handles. The trucks are Brill 27-G, with 4-ft. wheel base, 33-in. wheels and 4-in. axles. The track gage is 5 ft. 2½ ins.

TRACK-DRILLING MACHINE USED BY THE CLEVELAND ELECTRIC RAILWAY COMPANY

The Cleveland Electric Railway Company, of Cleveland, is removing the old cable slots on the Payne Avenue and Superior Street lines, which were electrified some years ago. The



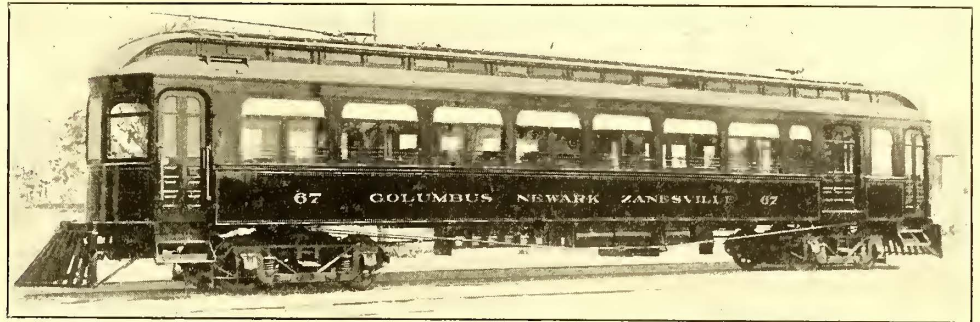
TRACK-DRILLING MACHINE AT WORK

old rails are to be retained, but they are being straightened up and the joints electrically welded. This work must be done very rapidly, as it is being carried out on the main lines which handle the traffic to the baseball grounds and parks. To facilitate the work of drilling for tie rods, it was decided to install an electric track-drilling machine of the type manufactured by the Ludlow Supply Company, of Cleveland. A view of the drill performing this work is illustrated herewith. The machine drills holes on both sides, and it has averaged a 1-inch hole every two minutes, including the moving of the machine from hole to hole. It has taken the place of twelve men with hand ratchets, and is saving the company over \$15 per day. But one man is required to operate the machine. It is provided with a roller at one side so that it can be wheeled off from the track by two men.

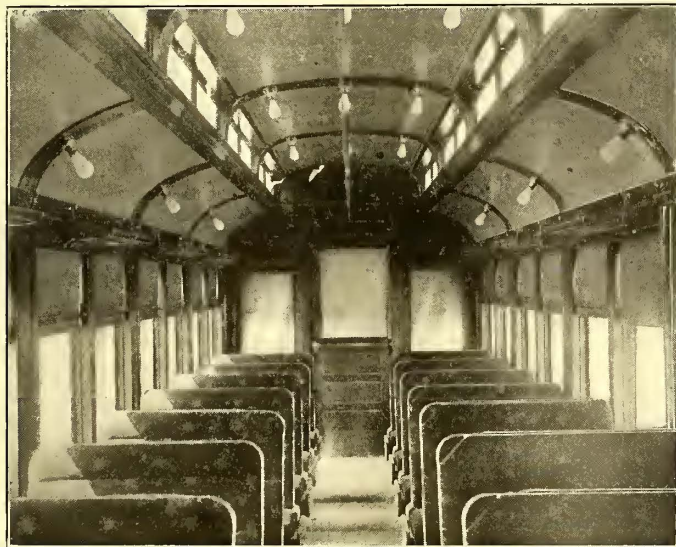
COMBINATION INTERURBAN CARS FOR THE COLUMBUS, NEWARK & ZANESVILLE ELECTRIC RAILWAY

Several combination interurban cars of the type illustrated in the accompanying cuts have just been shipped to the Columbus, Newark & Zanesville Electric Railway Company by the Jewett Car Company, of Newark, Ohio. This railway runs from Newark to Zanesville, and is an extension of the Columbus, Buckeye Lake & Newark Traction Company, now operating between Columbus and Newark. The Columbus, Newark & Zanesville Electric Railway also embraces the Newark City lines, including a line to Granville, Ohio, and with the Columbus, Buckeye Lake & Newark Traction Company has a total length of 84 miles. These lines are controlled by the Tucker-Anthony Company, of Boston, and J. R. Harrigan, of Newark (Ohio), is the general manager.

These cars are of the latest design and construction, and are equipped with all modern conveniences. As will be seen from



COMBINATION INTERURBAN CAR FOR OHIO HIGH-SPEED RAILWAY



INTERIOR OF CAR FOR THE COLUMBUS, NEWARK & ZANESVILLE ELECTRIC RAILWAY

the floor plan the cars are unusually long, the total length over buffers being 60 ft. 8 ins. The other principal dimensions are: Width over posts, 8 ft. 4 ins.; width over all, 8 ft. 8 ins.; total height from rail to top of roof, 12 ft. 9 ins.; distance centers of trucks, 40 ft. 7½ ins. The bottom framing consists of six

struction. The body framing throughout is made of white oak, and the construction is of the steam-coach type. The vestibules are of the Jewett wide-vestibule type, with double folding doors at each side. As shown in the floor plan the cars are divided into three compartments, main compartment, smoking compartment and baggage room. The main and smoking compartments

are finished in mahogany, and the baggage room is white ash, natural finish. The finish in the main and smoking compartments is inlaid with neat marqueterie. The ceiling is of the semi-Empire type, and is painted green with gold decorations. The seats in main compartment are of the walkover type, with high, roll-top backs, and are finished with green plush. The seats in the smoking compartment are longitudinal, and are finished with rattan. They were manufactured by Hale & Kilburn. Polished plate-glass is used throughout the car, except the gothics and deck lights, which are of white Florentine ornamental glass. All trimmings are of solid bronze; curtains are of pantasote, of the Keeler type.

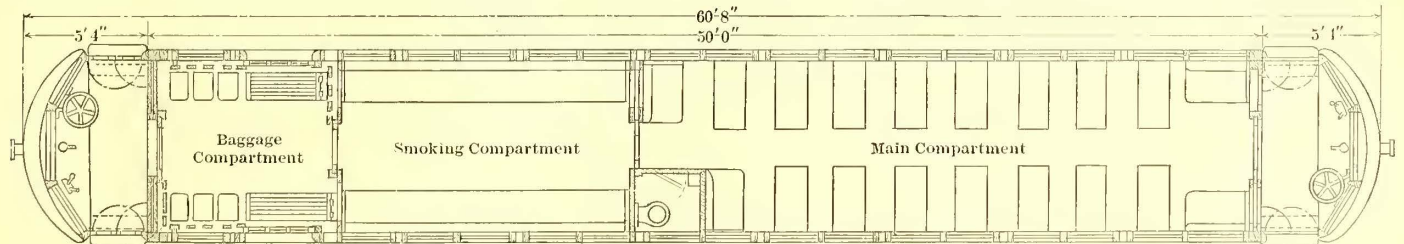
The cars are lighted by forty incandescent lamps, which are so placed that they form arches of five across the ceiling. This gives a beautiful effect and also distributes the light equally through the car. The lamps are of the frosted type.

The cars are mounted on Peckham M. C. B. No. 36-A double trucks, 5¼-in. axles, 4¼-in. x 8-in. journals, with locomotive-type steel-tired wheels. The motor equipment consists of four G. E. No. 73, 75-hp motors, geared for 60 m. p. h., operated by the General Electric multiple-unit control system.

The cars are heated by Peter Smith's hot-water heaters, and are equipped with Christensen air brakes, as well as hand brakes, Van Dorn draw-bars, Crane type of pilots, Wagenhals arc headlights, Knutson trolley retrievers, toilet room, water cooler and De France air blast sanders.

REGISTERS FORWARD

A street railway company should make it a rule that whenever it is possible to do so the register should be in the forward



PLAN OF COLUMBUS, NEWARK & ZANESVILLE CAR

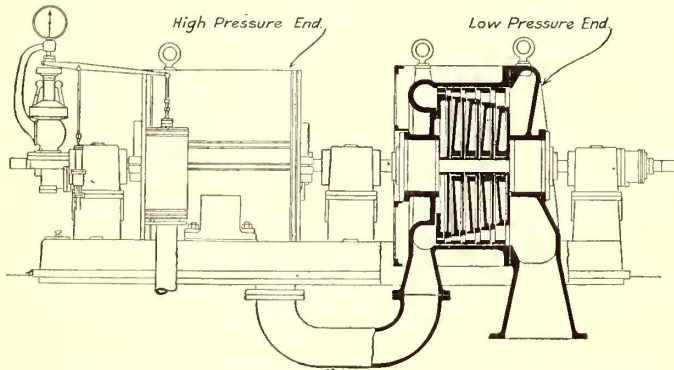
yellow pine sills of compound construction, composed of one piece 5 ins. x 8 ins., and one piece 2 ins. x 6 ins., with a 7-in. x ½-in. steel plate sandwiched between. The end sills, cross timbers, buffers, etc., are made of white oak, and strengthened by steel plates and angles wherever necessary. The under-truss is made of 1⅜-in. round iron, with a 1½-in. turnbuckle in the center and M. C. B. anchors over the bolsters. The bolsters are made of steel plates and cast fillers, M. C. B. style of con-

struction. Where a car runs on a straight track, of course, the position of the register alternates. But where there is a loop at each terminal, and the register is on one end of the car all day long, orders should be issued to the starters that cars should be run out in the morning with reference to getting register in this position. By this means an inspector boarding a car always has the register in front of him, and it also helps the conductor.

THE ZOELLY STEAM TURBINE

The Zoelly steam turbine, which is manufactured in Switzerland, by Escher, Wyss & Company, of Zurich, and which will soon be put on the German market by the Siemens-Schuckert interests, is of the multiple-impulse type, that is, the expansion takes place in the passages in the stationary part of the apparatus. The principal feature of the machine is, that although of the multi-stage type, no great attempt has been made to keep down the speed, so that the turbine has high peripheral velocities and a comparatively low number of stages.

As shown in the accompanying illustration, the turbine is divided into a high and a low-pressure part, each of which has a separate housing, though both are mounted on the same base plate. The shaft is carried in three bearings, which are also

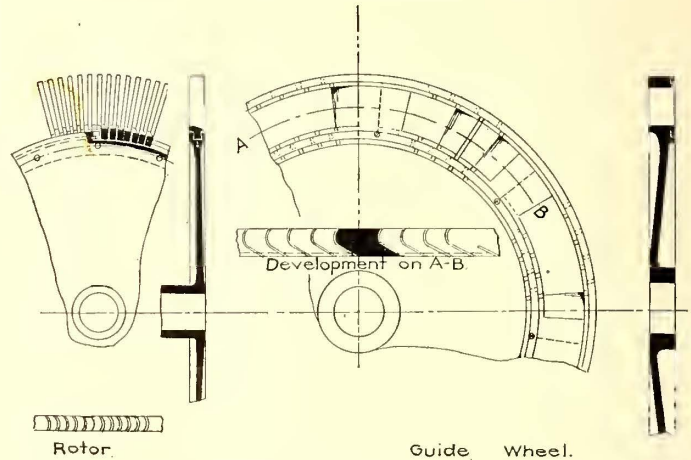


LONGITUDINAL ELEVATION OF HIGH AND LOW-PRESSURE HOUSINGS

independent of the housings, so that no heat can be transmitted to them by the latter. The shafts of the smaller turbines are made in one piece, while those of the larger machines are in two parts, and have four bearings.

The discs of the rotors are of Siemens-Martin steel, and are keyed to the shaft. The buckets are of nickel steel, and are dove-tailed, with their distance pieces, into a T-slot, machined out of the circumference of the disc. They are then held in place by a retaining ring, as shown. The cross section of the

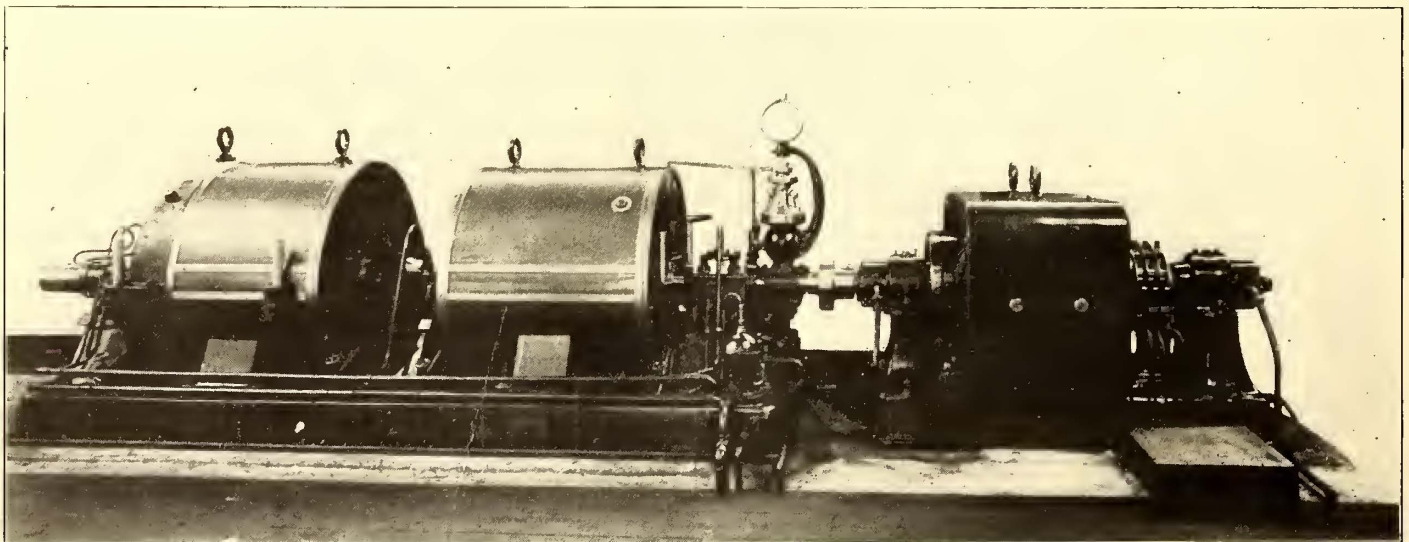
enough to resist the one-sided pressure. Cast-steel is used, and the guide blades are arranged in groups in the rim, as shown in the illustrations. Between the groups are thick projecting pieces, to which a wrought-iron ring or tire is attached. The diaphragms are placed close together, the rims touching, and in this way the pressure is transmitted to the end wall of the housing. The hubs of the bucket wheels fit with slight play in holes in the bosses of the diaphragms, the construction being evident from the cuts. The blades have small ears which slip into slots in both the rim of the diaphragm and the outside tire. When they have been slipped into place they are held there by two rings screwed on the low-pressure face, as illus-



ARRANGEMENT OF GUIDE BLADES AND OTHER DETAILS

trated. These diaphragms are made in halves, with tight-fitting surfaces, and the upper halves are screwed to the top part of the housing so as to be lifted with it. The shaft passes into and from the housing in stuffing boxes with metal packing.

The governor is a slight modification of the well-known Escher-Wyss regulator used in many water turbine installations. It consists of a ball governor which operates a pilot valve controlling the motion of a plunger directly over the



500-HP ZOELLY TURBO-GENERATOR SET

bucket blades decreases from their inner to their outer ends to reduce the centrifugal force, and thus permits a high peripheral speed.

Between each rotor there is a guide wheel or diaphragm in which the guide blades are held. Since the expansion of the steam takes place in these diaphragms between the blades, and there is a corresponding excess of pressure on one side of them, each must be steam tight in the housing as well as strong

main steam valve and mounted on the same rod. The pilot valve and the chamber of the plunger are connected by two small pipes, and the various operations are produced by the discharge of water under pressure through one or the other of the pipes. The pressure water, or oil, in the case of the steam turbine, is furnished by a rotary pump driven from the main shaft by worm gearing. Regulation by throttling the steam was chosen as being the simplest method for the purpose. In ad-

dition it has the great advantage of not influencing the steam consumption unfavorably at different loads.

If it becomes necessary to furnish more than the rated power of the turbine, the governor operates a valve which admits a part of the steam at the throttle pressure directly into the second and third stages. There is also a safety governor, which shuts off the steam in case the number of revolutions rises above the normal to a predetermined limit, such as 10 per cent.

In impulse wheels the play of the rotating parts in the casing can be made as great as seems desirable, and for the same reason the axial play between the rotors and diaphragms may be made very large without affecting the working of the turbine. Hence, there need be no fear that in consequence of temperature changes or wear the running and stationary parts may rub against each other. It should be stated that a corrugated bearing like a thrust bearing is employed to keep this free play unchanged.

A 500-hp, 3000-r. p. m., ten-stage turbine of this type was tested at the Escher-Wyss works last winter, and with dry, saturated steam, at 149 pounds pressure and 27.7 ins. of vacuum gave a kilowatt-hour at from 21.45 lbs. to 22.2 lbs. of steam at approximately full load, 25.6 lbs. of steam at half load, and 33 lbs. at quarter load.

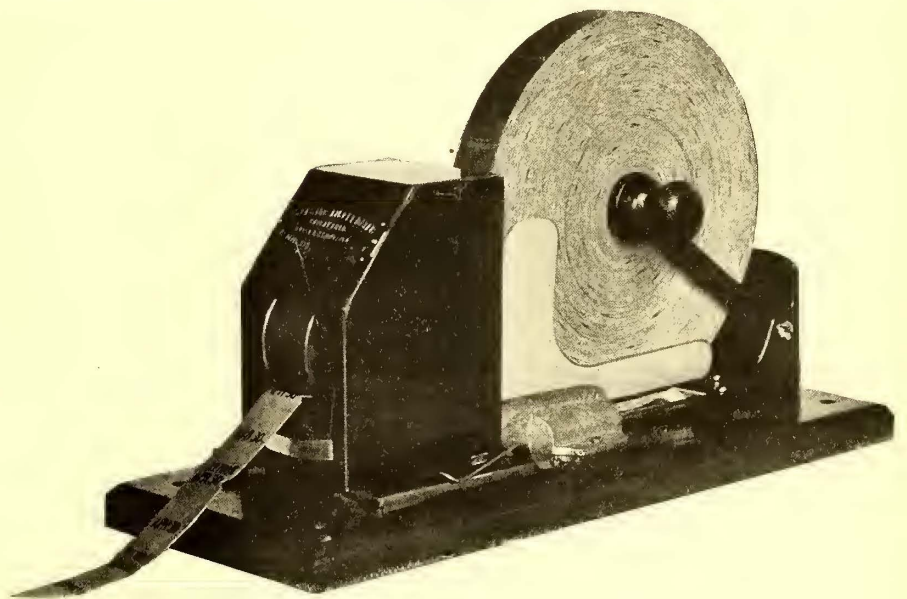


TICKET-SELLING AT THE OLIVE STREET WORLD'S FAIR TERMINAL OF THE ST. LOUIS TRANSIT COMPANY

Plans have already been published in the STREET RAILWAY JOURNAL of the Olive Street terminal of the St. Louis Transit Company, near the main entrance of the Louisiana Purchase Exposition grounds. This is the loop handling the greatest number of World's Fair visitors, as it is the World's Fair terminal for the most direct line to the city. The terminal is enclosed with a high board fence, and the entrance to it can only be obtained after the passenger has purchased a ticket at one of the ticket windows. The terminal is provided with ten turnstiles, through which passengers are admitted to board the cars. Distributed among these ten turnstiles are eleven ticket-selling booths. The loop has never yet been worked anywhere near its capacity. At the present time the company has five ticket sellers, afternoons and evenings, with hours as follows: No. 1, on 2 o'clock, off 10:30 p. m.; No. 2, on 2:30, off 11; No. 3, on 3:30, off 12; No. 4, on 4:15, off 12:15; No. 5, on 5:15, off 11. Four turnstile men take care of the ordinary business, but this is sometimes increased if there is extra heavy travel. The ticket sellers sell approximately 20,000 tickets per day, some of the men handling as high as 8000 tickets during one watch.

On the opening day of the Exposition 52,000 adult passengers were handled through this loop. The ticket sellers also

tickets are shown the holder is admitted to the loop. They are not taken up by the turnstile keeper, but are taken up by the conductor and rung up as any other ticket. This company has two registers, one for cash fare and the other labeled, "All Other Fares," tickets being rung up on the latter. The conductor can handle this load to much better advantage when the passengers are all provided with tickets, as it eliminates change making, and, furthermore, there is the advantage to the company that there is no loss through the missing of fares, because only ticket holders are admitted to the loop, and tickets are good only on the date of sale. The color of the ticket is changed every day, and the date is stamped plainly upon the face of the ticket. The tickets are dated automatically, as they are pulled off the reel, by the ticket seller. The dating machine is the invention of J. Boyle Price, purchasing agent of the St. Louis Transit Company, and Charles K. Schweizer, of St. Louis. The realization of the necessity for a machine of this kind was forced upon Mr. Price by a consideration of the loss which would occur if the company had to provide for each day enough tickets printed for a certain date to meet all possible demands. If enough tickets were printed with the date upon them for each day, an immensely greater stock would have to be carried than would be needed, and a large stock would be thrown away nearly every day. The dating machine, with a roll of tickets in the machine, is shown in the accompanying engraving. The dating is done by the cylindrical rubber stamp which stamps the date on each ticket as it is rolled under the cylinder of the machine. The inking of the stamp cylinder is done by two ink rollers. The dating is done as fast as the ticket seller can pull the ticket out of the machine. Some ticket



TICKET DATING MACHINE USED AT ST. LOUIS

sellers sell direct from the machine, and others prefer to pull out tickets considerably in advance of the sales.

With the present force at this loop, the company, it is believed, can handle, without difficulty, 40,000 per day. The ob-



A SET OF DATED TICKETS AS ISSUED FROM THE MACHINE

sell children's half-fare tickets, which are the same as those sold by the conductors. The tickets for adults sold here are special World's Fair terminal tickets, and are furnished in rolls of 2000, numbered serially. These tickets, half-fare tickets and passes are honored by the turnstile keepers, and when these

ject of an enclosed terminal loop and a ticket system of this kind is, of course, two-fold. It can be made to prevent accidents due to the attempt of a great crowd to board a car while it is rounding the loop, to prevent loss of fares to the company and to aid the conductors in handling large crowds.

LEGAL DEPARTMENT*

— DANGEROUS PREMISES—VISITORS SUBJECTED TO ASSAULT —

The Appellate Court of Indiana recently made a decision which is of special interest and importance at the present season of the year. It is the custom of street railway companies to maintain, or to have an interest in the maintenance of public parks or places of resort convenient to their lines, with a view of promoting and increasing passenger traffic during the summer. The case referred to was Indianapolis St. Ry. Co. vs. Dawson (68 N. E., 909), and it was held that where a street railway owning a park reached by its lines, and maintaining attractions for the public there, has knowledge that there is a conspiracy on the part of certain persons to assault any colored person visiting the park, and knows of acts of violence committed pursuant to such design, and it, nevertheless, transports colored persons there without warning them of the danger, and they are assaulted pursuant to such conspiracy, the company's employees making no attempt to interfere, the railroad company is liable for such injuries. This decision may be supported on several grounds. In the first place there is the consideration of the general liability of common carriers. It has been held, for instance, that a common carrier is bound to warn both passengers and employees against danger to be incurred from striking employees and their adherents; it being, however, conceded that if a person becomes a passenger or enters into employment upon a railroad car with full knowledge of the risk to be run, the company is not under obligation of advising him thereof. (Hewings vs. Mendenhall [Minn.], 93 N. W., 127; Holshouser vs. D. G. & E. Co. [Col.], 72 Pac., 289). It is the general duty of common carriers to protect passengers from assaults either by other passengers or employees. One of the most recent common carrier cases is Penny vs. A. C. L. R. R. in the Supreme Court of North Carolina (45 S. E., 563).

Even if it be argued that the strict relation of common carrier and passenger does not exist after the passenger has left the car and entered the park or other place of entertainment, another principle arises that one who induces another to go upon dangerous premises without warning of the danger or taking precautions to avert the same, is liable for the injuries which the guest may sustain. This rule is administered in cases where a person visits a shop or other place of business upon express invitation, or implied general invitation to the public, and falls into an unguarded and unlighted hatchway without contributory negligence, the proprietor of the establishment being held responsible. The doctrine is applied generally to places of public resort or entertainment. In Thornton vs. Maine State Agricultural Society, for example, in the Supreme Judicial Court of Maine (Dec., 1892, 53 Atl., 979), which was rather an extreme case, it appeared that the defendant society was giving a fair, and that it had let space upon its grounds for a shooting gallery. It was satisfactorily shown that a bullet fired by a patron of the shooting gallery, while at target practice, missed the target, passed through the fence enclosing the exhibition grounds, and struck and killed the plaintiff's intestate, who was standing upon a railroad platform outside. It was shown that, although the platform was neither owned nor controlled by the defendant, it was one of the usual approaches to the defendant's grounds, and, in the opinion of the Court, "there was sufficient evidence to justify the jury in finding that the deceased, at the time when and place where he was killed, was within the scope of the defendant's invitation to the public to attend the fair, and therefore, the defendant owed him the duty of using reasonable care for his safety."

The Appellate Court of Indiana cites several cases in support of this present decision. The following is an extract from the opinion:

No case has been cited or found where the premises upon which the injury complained of occurred, and to which the complainant came by invitation, were made unsafe through a conspiracy

of the nature set up herein. Danger usually has been attributed to some defect in the premises themselves. But as a matter of principle it is quite as reprehensible to invite one knowing that an enemy is awaiting him with intent to assault and beat him as it would be to invite him without having made the floor or the stairway secure. One attending an agricultural fair in response to a general invitation extended to the public has been awarded damages against the association where his horse was killed by target shooting upon a part of the ground allowed for such purpose (Conrad vs. Clauve, 93 Ind., 476, 47 Am. Rep., 388). Judgments have also been sustained: When spectators rushed upon a race track, causing a collision between horses being driven thereon (North Manchester, &c., vs. Wilcox, 4 Ind. App., 141, 30 N. E., 202). When an opening was left in a fence surrounding a race track, through which one of the horses running went among the spectators (Windeler vs. Rush Co. Association, 27 Ind. App., 92, 59 N. E., 209, 60 N. E., 954). Where horses were started on a race track in opposite directions at the same time, causing collision (Fairmount vs. Downey, 146 Ind., 503, 45 N. E., 696). Where a horse with a vicious habit of track bolting was permitted to run in a race, such horse bolting the track, causing injury (Lane vs. Minn. St. Ag. Society, Minn., 64 N. W., 382, 29 L. R. A., 708). Recognizing the rule of reasonable care to make the premises safe, a recovery was denied in the absence of any evidence of the immediate cause of a horse running through the crowds (Hart vs. Washington Park Club, 157 Ill., 9, 41 N. E., 620, 29 L. R. A., 492, 48 Am. St. Rep., 298). Where a street car company maintained a park as a place of attraction for passengers over its line, and the falling of a pole used by one making a balloon ascension under a contract injured a bystander, recovery was allowed, the rule being announced that the company must use proper care to protect its patrons from danger while on its grounds (Richmond Railway vs. Moore's Adm'r, Va., 27 S. E., 70, L. R. A., 258). Where a street car company maintained a large stage for exhibitions, in a pleasure resort owned by it, and made a written contract with a manager, by which the latter furnished various entertainments, among which was target shooting, one injured by a split bullet was allowed to recover, it being held that he might safely rely on those who provided the exhibition and invited his attendance to take due care to make the place safe from such injury as he received; the question of due care being one for the jury (Thompson vs. Lowell, 170 Mass., 577, 49 N. E., 913, 40 L. R. A., 345, 64 Am. St. Rep., 323; Curtis vs. Kiley, 153 Mass., 123, 26 N. E., 421).

There is no doubt that the doctrine of these cases is good law, and they may well admonish street railway companies conducting places of resort or entertainment of the duty of warning guests and protecting them from danger.

— LIABILITY FOR NEGLIGENCE. —

ALABAMA.—Street Car Passenger—Assault and Battery by Conductor—Company's Liability—Action for Damages—Evidence—Instructions.

1. In an action against a street railroad company for an assault and battery committed by a conductor, evidence of profane language used by the conductor in an altercation with one of plaintiff's companions, passengers on the same car, whereby the trouble was started, was material, as a part of the *res geste*.
2. In an action against a street railroad company for an assault and battery by a conductor, it was competent to show the ages and relative sizes of the plaintiff and the conductor.
3. In an action against a street railway company for an assault and battery committed by a conductor, a witness called by plaintiff in rebuttal was asked as to whether he had said that the conductor was such a d—n fool that he could not run a train, and the question was objected to as not being in rebuttal. Held, that it was within the discretion of the court to allow it.
4. In an action against a street railway company for an assault and battery committed by a conductor, a witness for plaintiff in rebuttal testified that he was present; and, in relation to an attempt by defendant to show that plaintiff had said the conductor was such a d—n fool that he did not know how to run a train, he was asked whether, if plaintiff made the remark, he could have heard it, or was close enough to have heard it. Held, that, as against a general objection, it was competent for the witness to answer the question.
5. Abusive language or opprobrious epithets alone are insufficient to justify the commission of an assault by a conductor on a passenger.
6. Where a conductor strikes a passenger, the company is liable, unless it is done in self-defense, or to save himself from bodily harm.
7. In an action against a street railway company for an assault and battery committed by a conductor, a charge that if the jury

* Conducted by Wilbur Larremore, of the New York Bar, 32 Nassau Street, New York, to whom all correspondence concerning this department should be addressed.

"believe from the evidence that the plaintiff is entitled to damages, but believe that nominal damages would be all the plaintiff should have, because of mitigating circumstances," they were authorized to award him only such damages, was properly refused, as assuming that there were mitigating circumstances.

8. Where the tendencies of the evidence to show a disputed fact were strong, as compared with evidence to the contrary, it is for the jury to determine; and hence charges seeming to assume such fact, and instructing the jury accordingly, were properly refused.

9. The fact that a conductor who assaulted a passenger honestly and mistakenly supposed that he was justified would not exempt the company from liability where such was not the case.

10. The fact that plaintiff said to defendant's conductor, when he threatened to put plaintiff's companion off the car, that, if he did so, he would have to put plaintiff off also, did not justify mitigation of the damages for assault and battery committed on plaintiff by the conductor.—(Birmingham Railway, Light & Power Company vs. Mullen, 35 Southern Rep., 702.)

CALIFORNIA.—Carriers—Street Cars—Injury to Passengers—Negligence of Driver—Question for Jury—Evidence—Damages—Instructions—Requests—Modification—Misconduct of Jury—Objections at Trial—Review.

1. In an action for injuries to a passenger on a street car by the car being thrown over an embankment by the horses suddenly swerving to one side on being frightened, evidence held to justify the submission of the question of the driver's negligence to the jury.

2. Where, in an action for injuries to a passenger on a street car, the court charged that plaintiff could recover for such injuries as she received in that accident, and the cause was submitted on the theory that plaintiff must prove her injury in the accident alleged, it was not error to refuse to charge that, after plaintiff had proved that there was an accident to the car on which she was a passenger, she was bound to prove by a preponderance of the evidence that she was injured in that accident.

3. Where a complaint in an action for injuries to a passenger charged that by reason of her injuries, plaintiff became sick, sore, lame and disordered, and that her spine, brain and nervous system were seriously injured, and evidence that plaintiff's musical abilities had been impaired was admitted without objection, an instruction, authorizing the jury, in considering plaintiff's damages, to consider the impairment of her accomplishments, if any, and her ability to play musical instruments and sing, by reason of the accident, was not error.

4. Where, in an action for injuries to a passenger on a street car, defendant requested an instruction that a street car has the right of way over that portion of the street on which it alone can travel, and if, therefore, a private vehicle, in traveling on the public highway, meets with the street car, the vehicle must yield the right of way to the car, a modification of the instruction so as to read, "If, therefore, a private vehicle traveling on the public highway meets with a street car, and there is no special reason to the contrary, the private vehicle must yield the right of way to the street car," was not prejudicial.

5. Where no objection or exception to the conduct of a juror was taken at the trial, such misconduct cannot be considered on appeal.—(Doolin et ux. vs. Omnibus Cable Company, S. F. 2770; 73 Pacific Rep., 1060.)

DELAWARE.—Street Railway—Collision with Team—Negligence—Pleading.

1. The declaration in an action against a street railway company, alleging that defendant so negligently operated its car that it ran into plaintiff's wagon on the street, sufficiently pleads the negligence.—(Donohoc vs. Wilmington City Railway Company, 55 Atlantic Rep., 1011.)

GEORGIA.—Street Railways—Collision with Traveler—Instructions.

1. The evidence as to negligence was conflicting, but where there was testimony from which the jury could have found that both parties were in the exercise of ordinary care, and that the injury was the result of a casualty, it was error not to charge that the defendant could relieve itself of the statutory presumption by showing that neither party was to blame, and that the damage was the result of a pure accident.—(Atlanta Railway & Power Company, vs. Gaston, 45 S. E. Rep., 508.)

ILLINOIS.—Street Railways—Personal Injuries—Operation of Car—Measure of Care—Instructions.

1. In an action against a street car company for injuries to a child on the track, an instruction that it is the duty of the company's servants, in operating its cars, to take reasonable measures to avoid injuries to persons on the street, is not objectionable as calculated to give the jury to understand that the rights of the injured person in the street were superior to those of the street

car company, or as requiring the gripman to look in any particular direction.—(North Chicago Street Railway Company vs. Johnson, 68 N. E. Rep., 463.)

ILLINOIS.—Street Railways—Injury in a Collision—Evidence—Instructions.

1. A street railway company is not guilty of actionable negligence because of the failure of the motorman in charge of a car to stop or slacken its speed on seeing a horse and wagon near the track, but sufficiently distant to permit the car to pass in safety, and is therefore not liable for the injury occasioned by the horse being suddenly driven on the track so near the car that it cannot be stopped before striking the horse and wagon.

2. In an action against a street railway company for injuries sustained in a collision, the witnesses of defendant testified that a horse and wagon were near the curb and sufficiently distant to enable the car to pass in safety; that the horse was facing the same way the car was going; that, when the car was about 40 ft. from the wagon, plaintiff suddenly drove the horse toward the track; that the motorman rang the bell, and that he commenced to apply the brake on seeing the horse going toward the track, but was unable to stop the car before striking the wagon and injuring plaintiff. Held, sufficient to require an instruction that, if plaintiff unexpectedly drove his wagon on the track and defendant's servants did all they could in the exercise of ordinary care to stop the car, there could be no recovery.

3. Where a party's evidence on an issue presented by him is sufficient to require the submission thereof to the jury, the court is not warranted in refusing to submit it because the evidence is conflicting.—(Chicago Union Traction Company vs. Browdy, 69 Northeastern Rep., 570.)

ILLINOIS.—Highways—Law of the Road—Bicycles—Collisions—Passing Vehicles—Duties of Parties—Injuries—Proximate Cause—Contributory Negligence—Instructions.

1. In an action for injuries, where the damage sought to be recovered are speculative and not susceptible of direct proof, and the judgment appealed from is for \$1,000 or more, an appeal lies from the judgment of the Appellate Court to the Supreme Court without a certificate of importance.

2. In an action for injuries to plaintiff while riding a bicycle along a city street, evidence reviewed, and held, that plaintiff's failure to turn out a sufficient distance from a street car to permit her to pass the conductor in safety was the proximate cause of the injury, and that she was, therefore, not entitled to recover.

3. In an action for injuries, an instruction that by ordinary care is meant such a degree of care under the circumstances and in the situation in which the plaintiff was placed, so far as they may be shown by the evidence, as an ordinarily prudent and cautious man would exercise under like circumstances and in the same situation for his own safety to avoid apparent danger, was objectionable as authorizing the jury to infer therefrom that, if plaintiff was in the exercise of due care at the instant the accident occurred, she might recover, though she was guilty of negligence in having placed herself in the position she was at the time of the collision.

4. A bicycle is a vehicle subject to the rules of law governing other vehicles, and its rider is required to use the same degree of care to avoid injury as the driver of a team.

5. When a bicycle rider attempted to pass the conductor of a standing street car, who had alighted to assist a passenger to the ground, such bicycle rider was bound at her peril to turn out a sufficient distance to avoid a collision with the conductor.—(North Chicago Street Railway Company vs. Cossar, 68 N. E. Rep., 88.)

MAINE.—Injury to Employee—Negligence—Defective Appliances.

1. During a crowded condition of a trolley car, by custom and under verbal instructions to the conductor, passengers were received and permitted to ride on the platform and running boards.

In collecting the fares the conductor was obliged to pass along the running board and step around the passengers, relying on the handle bars for support.

While thus engaged in taking fares, the plaintiff, a conductor in the employ of the defendant corporation operating the road, was struck by an inclining trolley supporting pole, which, at the height of plaintiff's head, was 19 ins. from a point vertically above the outer edge of the running board on the easterly side of the track.

The accident pole was 22 ins. nearer the rail than the average distance of the 381 poles on the entire line, and inclined toward the track 6¼ ins. in a height of 6 ft.

The plaintiff had been in the employ of the road for four years on its cars, and had been previously engaged in setting trolley poles. But he had not noticed the proximity or inclination of the

accident pole. Held, that the defendant company was negligent in making an improper location of the pole.

2. Held, also, that there was no such want of preponderance of evidence as would justify setting aside the verdict in plaintiff's favor, rendered by a jury who heard the testimony and viewed the place of the accident, either on the ground of contributory negligence or assumption of risk.—(Withee vs. Somerset Traction Company, 56 Atlantic Rep., 204.)

MASSACHUSETTS—Street Railways—Injuries—Person on Track—Contributory Negligence—Burden of Proof.

1. In an action against a street railway for injuries sustained by one not a passenger, plaintiff cannot recover without evidence that he was in the exercise of ordinary care, even though defendant's servants were guilty of gross negligence.

2. In an action against a street railway for injuries received by one on its tracks, if from the evidence the inference of ordinary care on plaintiff's part can be only conjectural, there is no question for the jury.

3. Where one who was working in a ditch in a street beside a street railway track was killed by being run over by a car while standing on the track beside the ditch, he having stepped onto the track within 8 ft. or 10 ft. of the car, and in an action for the death there was evidence that he had been looking toward the approaching car just before going on the track, a verdict for defendant was properly directed because of insufficient evidence that decreased exercised care.—(Gleason vs. Worcester Consolidated Street Railway Company, 68 N. E. Rep., 225.)

NEW YORK.—Street Railway—Killing Child on Track—Contributory Negligence of Parent—Contributory Negligence of Child.

1. The parent of a child killed by a street car was not guilty of contributory negligence in letting the child go on the street unattended, he having been in the habit of going to school unattended for a year, and being at the time on his return from school.

2. Whether a child seven years and eight months old, who, running after boys who had his cap, followed toward a street car track, without looking for a car, and was struck by a car, was guilty of contributory negligence is a question for the jury.—(Sullivan vs. Union Railway Company, of New York City, 81 N. Y. Suppl., 449.)

NEW YORK.—Street Railways—Attempt to Board Car—Injuries—Weight of Evidence.

In an action against a street railway company for injuries received in boarding a car, where the evidence of all the witnesses except that of the plaintiff was that he was injured in attempting to get on the car while moving around a curve, a verdict for plaintiff was set aside, as against the weight of the evidence.—(Wolf vs. Metropolitan Street Railway Company, 81 N. Y. Suppl., 257.)

NEW YORK.—Carriers—Injury to Passengers—Variance—Motion to Conform Pleadings to Proof.

Where a passenger alleges that he started to alight from a street car after it had stopped, and was thrown by a sudden starting of the car, and the testimony of one of his witnesses is that the car had not quite stopped, but was slowly moving, when its sudden lunge forward threw the passenger, a motion to conform the pleadings to the proof was improperly overruled, as the variance affects only the passenger's contributory negligence, and not his cause of action.—(Scarry vs. Metropolitan Street Railway Company, 81 N. Y. Suppl., 284.)

NEW YORK.—Street Railways—Persons on Track—Contributory Negligence—Complaint—Specific Injuries—Evidence—Instructions—Negligence—Due Care.

1. Where one crossing a street in the night time was run over by a street car, which was lighted and had been in sight from the time he started to cross the street, he was guilty of contributory negligence.

2. Where, in an action against a street railway company for injuries, the complaint alleged that the car ran over plaintiff, cutting off an arm and mutilating a foot, and "otherwise dangerously and permanently injuring him," evidence as to injury to plaintiff's nerves was admissible.

3. In an action against a street railway company for injuries from being run over by a street car, it was error to refuse to charge that if the motorman, while operating his car with ordinary care, stopped his car as soon as he discovered that plaintiff was about to step in front of the car, plaintiff could not recover.—(Kappus vs. Metropolitan Street Railway Company, 81 N. Y. Suppl., 442.)

NEW YORK.—Street Railway—Injuries to Passenger—Measure of Damages—Instruction—Reversible Error.

Where, in an action for negligent injuries, there was no evidence as to plaintiff's earnings from his business as a commission merchant and importer, and no proof of facts on which to base a finding that his inability to attend to his business had caused him any loss, it was reversible error to instruct the jury that, in awarding plaintiff's damages, they were to take into consideration how long

he was incapacitated from attending to his business, or any other business a man of intelligence and experience could probably devote himself to, and what were the probable physical earnings of a man in his business.—(Metz vs. Metropolitan Street Railway Company, 81 N. Y. Suppl., 725.)

NEW YORK.—Injury to Passenger—Contributory Negligence—Imputed Negligence—Question for Jury.

1. Where a street car conductor, without any warning, starts the car while a young girl is trying to board it, he is guilty of negligence.

2. Where a young girl is boarding a street car, and has hold of the hand rail when it starts, it is not contributory negligence for her to hold onto the rail, even though it causes her to be dragged half a block.

3. A young girl was boarding a street car when it started, and she was dragged by holding on to the hand rail. Her escort, running after the car, caught up with it and drew her from the steps. Held, that, though he may not have exercised the best judgment in the emergency, his negligence, if any, was not to be imputed to the passenger.

4. The question whether a person attempting to assist a passenger injured while boarding a street car was guilty of negligence was a question for the jury, and not for the court.—(Schoenfeld vs. Metropolitan Street Railway Company, 81 N. Y. Suppl., 644.)

NEW YORK.—Sufficiency—Inferences—Crossing Street Railway Tracks—Due Care—Street Railways—Rules of Company—Violation.

1. It is not enough that the facts proven permit an inference of a certain other fact sought to be established, but the inference must be the only one which can fairly and reasonably be drawn from the facts.

2. It cannot be inferred from the mere fact that one could have looked for cars before crossing street railway tracks that he did look.

3. The inference of freedom from contributory negligence cannot be drawn from the presumption that one will exercise care and prudence in regard to his own life and safety.

4. The rules of a street railway company required its cars to stop before crossing the tracks of another company, and there was evidence that the car which killed deceased violated the rule. It did not appear that deceased knew of the rule, or that he knew there were cross-tracks at the particular point, so that it was in force there. Held, not sufficient to establish freedom from contributory negligence on deceased's part.—(O'Reilly vs. Brooklyn Heights Railway Company, 81 N. Y. Suppl., 572.)

NEW YORK.—Street Railroads—Injuries to Pedestrians—Standing Car—Negligence—Evidence—Res Ipsa Loquitur—Instructions—Curing Error.

1. Plaintiff alighted from a street car at night on a ferry landing, and started to pass around a standing car, which was unlighted and unguarded by a motorman. Plaintiff saw the car, but failing to see the fender attached to the same, by reason of the darkness, fell over the same, and was injured. There was no evidence to show how long the car had been so standing. Held, that the evidence was not sufficient to show negligence on the part of defendant.

2. Where plaintiff was injured by falling over a fender attached to a standing car at night, by reason of the fact that the car was unlighted or unguarded by a motorman, such fact did not constitute prima facie evidence of defendant's negligence, under the doctrine of res ipsa loquitur, so as to render it incumbent on defendant to show absence of negligence in permitting the car to remain in such condition.

3. In an action for injuries sustained by plaintiff's falling over a fender of an unlighted street car at night, a requested instruction that defendant was entitled to have its cars stand on the tracks for a reasonable length of time, without being charged with a breach of duty or an obstruction of the highway, was improperly refused.

4. Error in refusing such instruction was not cured by an instruction that defendant had such right if its cars were lighted, and not otherwise.—(Adams vs. Metropolitan Street Railway Company, 81 N. Y. Suppl., 553.)

NEW YORK.—Street Railways—Striking Person Near Track—Contributory Negligence—Negligence.

1. One cannot be held guilty of contributory negligence as matter of law because she stood with her back so near a street car track that she was struck by a projecting rail on the side of a street car, for which she was waiting, she having known that previously the cars stopped just before reaching that point, and went no further, and not knowing of the change made a month or six weeks before.

2. Whether the rail on the side of a street car, by which plaintiff, standing back of the track, was struck, projected further than the front of the car, which passed without striking her, so that the

motorman was negligent in not warning her, or she got nearer to the track after the front of the car passed her, is a question for the jury; a conductor having testified that the rail did not project farther than the dashboard, and other witnesses having testified that plaintiff did not change her position.—(Loder vs. Metropolitan Street Railway Company, 82 N. Y. Suppl., 957.)

NEW YORK.—Street Railways—Personal Injuries—Instructions.

In an action against a railway company, in which there was evidence that plaintiff was injured by being thrown from a car by the conductor, and no evidence that the conductor was at any time not engaged in the running and management of the car, the giving of a charge that if the conductor threw plaintiff from the car, but the act was done willfully and maliciously, and not in the management and running of the car, defendant would not be liable, was prejudicial error.—(Schwartzman vs. Brooklyn Height Railway Company, 82 N. Y. Suppl.)

NEW YORK.—Collision Between Fire Department Truck and Street Car—Death of Fireman—Negligence—Proximate Cause—Instruction—Imputing Negligence.

1. Greater New York Charter, Laws 1897, p. 260, chap. 378, Sec. 748, giving vehicles of the fire department in answering a fire alarm the right of way over other vehicles, is material on the question of negligence and contributory negligence in a collision between a hook and ladder truck and a street car, wherein a fireman riding on the truck is killed.

2. A requested instruction in an action for death of a fireman occasioned by collision of the fire truck on which he was riding and a street car, that, if the proximate cause of the collision was the negligence of the driver of the truck, and the collision would not have occurred had he exercised reasonable care, plaintiff could not recover, is bad—any contributory negligence of the driver not being imputable to deceased—because there may be more than one proximate cause of an accident.

3. Contributory negligence of the driver of a fire truck which collided with a street car is not imputable to a fireman on the truck, killed by collision, he neither having control over the driver nor being under his authority.—(Geary vs. Metropolitan Street Railway Company, 82 N. Y. Suppl., 1016.)

NEW YORK.—Street Railways—Collision with Pedestrian—Contributory Negligence.

Evidence in an action for injury to a pedestrian struck by a street car, as she stepped on the track from behind a car on the other track, held, insufficient to show freedom from contributory negligence.—(Casper vs. Metropolitan Street Railway Company, 82 N. Y. Suppl., 1036.)

NEW YORK.—Street Railways—Collision with Team—Intersection of Streets.

The rule that at an intersection of streets the rights of a street car and of a crossing vehicle are equal has no application, where the vehicle is proceeding along the same street as the car, and there is a mere attempt to cross to the other side, at the intersection, instead of at some other point; in such case the care required of the driver of the team is as though there were no intersection.—(Schmedding vs. New York & Queens County Railway Company, 82 N. Y. Suppl., 1034.)

NEW YORK.—Street Railroads—Injuries—Crossing Tracks—Evidence—Question for Jury—Failure to Look—New Trial—Newly Discovered Evidence—Diligence—Materiality of Evidence—Wrongful Death—Damages—Excessiveness.

1. In an action for injuries caused by collision with a street car, held, that whether deceased was guilty of contributory negligence in attempting to cross the track, under the circumstances, was for the jury.

2. In an action for death of the driver of a vehicle while crossing a street car track, plaintiff's failure to prove that the driver looked in the direction of the car by which he was struck before he attempted to cross the track was immaterial, where the car was approaching at such a distance as to warrant the assumption of safety.

3. Where defendant knew the name and address of a witness long before the trial, but answered, and elected to go to trial without her evidence, and her affidavit in support of a new trial for her alleged newly discovered evidence did not assert that she would testify on a new trial, and defendant did not assert that it intended to call her as a witness on such new trial, the application was properly denied.

4. Where, in an action against a street car company for killing deceased as he was driving across the tracks in company with a woman, all of the evidence showed that deceased, and not the woman, was driving, and that the horse was driven at a steady gait, and there was nothing to indicate that the accident occurred because of incompetent driving, an affidavit of the woman, in support of a motion for a new trial for newly discovered evidence, that she

was driving, and that deceased knew she could not drive, and that they were laughing and talking, neither of them thinking about the street car tracks, and that, just before the car struck the wagon, deceased seized the reins, but too late, was not of sufficient importance to justify a new trial.

5. Deceased, who had a life position as battalion chief in a fire department, at a salary of \$3,300 a year, was killed in a collision with a street car at a crossing. He was thirty-eight years of age, and his income was the sole support of his wife and two children, aged eight and twelve years, respectively. Held, that a verdict in favor of plaintiff for \$25,000 is not excessive.—(Lane vs. Brooklyn Heights Railway Company, 82 N. Y. Suppl., 1057.)

NEW YORK.—Witness—Impeachment.

Where, in an action by a passenger against a street railway company for personal injuries, defendant calls the conductor of the car on which plaintiff was riding, and he corroborates the testimony of the plaintiff, defendant cannot thereafter prove the hostility of the conductor to the defendant, and his prior inconsistent statements, for the purpose of impeaching him.—(Conklan vs. Metropolitan Street Railway Company, 83 N. Y. Suppl., 45.)

NEW YORK.—Municipal Courts—Jurisdiction—Actions for Injuries—Assault by Conductor.

In an action against a street railway for injuries to a passenger, plaintiff's evidence was that he asked the conductor to pull the bell, and the conductor ordered him to get off, and shoved him off, and then reached and got hold of his hand, disengaged it, and he fell into the street. Held, that while the conductor's actions constituted an assault, of which the court had no jurisdiction, they were also in violation of the duty owed by defendant to its passengers, rendering it liable, and the Municipal Court had jurisdiction of the action.—(Fallon vs. Interurban Street Railway Company, 83 N. Y. Suppl., 171.)

NEW YORK.—Street Railroads—Ejecting Prospective Passenger—Reasonable Time for Payment of Fare—Complaint—Allegations—Instructions—Effect of Injury—Expert Testimony.

1. On the issue whether plaintiff, boarding a street car as a passenger, was ejected before sufficient time was allowed him to pay his fare, evidence examined, and held insufficient to show, as a matter of law, that plaintiff was given a sufficient time.

2. Where the complaint in an action for injuries sustained by a passenger ejected from a street car alleged that plaintiff was unlawfully ejected by violence, but did not aver that unnecessary violence was used, an instruction that the company had no right to use unnecessary violence in removing him was erroneous, as allowing a verdict for plaintiff on the ground that he was lawfully ejected, but that unnecessary force was used.

3. In an action for personal injuries, expert testimony that the injuries sustained might be the cause of headaches suffered subsequent to the accident was speculative, and not proper in estimating the damages.—(Huba vs. Schenectady Railway Company, 83 N. Y. Suppl., 157.)

NEW YORK.—Damages—Injury to Personal Property—Measure.

In an action for injuries to a van, the amount paid to have it repaired was not the measure of damages, in the absence of proof that the repairs were necessary and reasonably worth the amount paid.—(Rock vs. Interurban Street Railway Company, 83 N. Y. Suppl., 114.)

NEW YORK.—Street Railroads—Personal Injuries—Negligence—Evidence—Sufficiency—Instructions—Contributory Negligence—Infants Sui Juris—Excessive Damages—Injuries to Child—Requested Instructions—Necessity.

1. In an action against a street railway for injuries to a six-year-old child crossing the track, the evidence examined, and held to justify the finding of negligence in the defendant.

2. In an action against a street railway for injuries to a six-year-old child crossing the track it was proper to refuse to charge that, if the mother of plaintiff did not exercise ordinary care in permitting her to go on the street unattended, or was guilty of any negligence which contributed to the accident, the verdict should be for defendant, where the question whether plaintiff was sui juris or non sui juris was an open one under the evidence, and where the court had already charged that, if plaintiff was non sui juris, and her parents were guilty of negligence, their negligence was imputable to her.

3. An infant sui juris is chargeable with contributory negligence, but in determining whether he is guilty of contributory negligence his acts are to be considered with reference to his age and the degree of care that may reasonably be expected to be exercised by one of his years.

4. An infant of sufficient age and intelligence to render it prudent for his parent to permit him to go on the public streets unaccompanied is sui juris, and it is only his own contributory negligence which will defeat a recovery for injuries negligently inflicted on him by another.

5. Injuries to a six-year-old girl necessitated the amputation of the left arm below the elbow. The scar had a tendency to make the nerves sensitive at that point, and there was a tender spot on the stump, and she experienced a feeling as if pins and needles were going through the left hand, which had been removed. The development of the left shoulder and side was markedly less than that of the right, leaving the left shoulder much lower. There was also evidence that the plaintiff's nerves had been disturbed down to the time of the trial, and that two or three years preceding the trial she had rested well, but before that her sleep was disturbed; that she had suffered pain from the time of the accident until she testified in the case, but not all the time. Held, that a verdict for \$12,000 was not excessive.

6. Defendant should have requested an instruction telling the jury not to consider certain evidence offered on the issue of damages; merely excepting to the court's allowing them to consider it was not sufficient.—(Lafferty vs. Third Avenue Railway Company, 83 N. Y. Suppl., 405.)

NEW YORK.—Carriers—Street Railways—Injury to Passenger—Negligence—Evidence—Sufficiency—Weight of Evidence.

1. In an action against a street railway for injuries to a passenger, evidence of plaintiff that the car came to a stop and she proceeded to alight, but before she could step firmly on the ground the car gave a jerk and she was thrown, was sufficient to make a case for the jury.

2. In an action against a street railway for injuries to a passenger sustained in alighting from the car, evidence considered, and held that a verdict for plaintiff based on her testimony alone was against the clear weight of the evidence.—(Koues vs. Metropolitan Street Railway Company, 83 N. Y. Suppl., 380.)

NEW YORK.—Street Railways—Collision with Team—Negligence—Credibility of Witness—Evidence of Speed—Competency of Witness.

1. The motorman of an electric car which runs into a wagon in a fog may be negligent in running at a high speed, though he discovers the peril as soon as possible, and does everything in his power to avert collision, as the peril, though not sooner discovered, might be averted but for the speed.

2. The credibility of the motorman of a car which runs into a wagon, and who testifies that he discovered the peril as soon as possible and did everything in his power to avert collision, is for the jury.

3. A passenger on an electric car, a civil engineer of eleven years' experience, once connected with the railroad business, and accustomed to time the speed of cars by the watch, is competent to testify to the speed of the car.—(Fisher vs. Union Railway Company of New York City., 83 N. Y. Suppl., 694.)

NEW YORK.—Street Railroad—Driving on Track—Contributory Negligence—Evidence—Inferences.

1. Though it is not negligence, as matter of law, for one driving at night on the track of a street car company to fail to look behind him to see whether a car is approaching, he must be on the alert in some manner, and by the exercise of some of his senses, as by listening, to discover if such is the case.

2. Mere proof that the hearing of one driving on a street car track was good, and that he did not hear a car approaching from behind, does not warrant the inference that he was listening for it.—(Belford vs. Brooklyn Heights Railway Company, 83 N. Y. Suppl., 836.)

NEW YORK.—Conduct of Counsel—Arguing Admissibility of Incompetent Evidence.

Though plaintiff's counsel, in arguing a question as to the admissibility of a certain letter, which was actually incompetent, and was, in fact, excluded, stated in the presence of the jury the substance of the letter, the judgment in plaintiff's favor would not be reversed; the trial court having directed the jury to disregard counsel's statement, and the verdict not being excessive, and there not being so great a weight of evidence in favor of defendant as to create a doubt as to the justice of the verdict.—(Connolly vs. Brooklyn Heights Railway Company, 83 N. Y. Suppl., 833.)

NEW YORK.—Street Railroads—Injury to Employee of Contractor—Degree of Care—Negligence—Evidence—Sufficiency—Instructions.

1. An electric railway company owes to the employee of a contractor employed by it to paint the supporting poles belonging to its trolley system the exercise of reasonable care to protect him against injury.

2. In an action against an electric railway company by an employee of a contractor engaged to paint the supporting poles of its trolley system to recover for injuries sustained by reason of his arm coming in contact with a feed wire on the system, evidence examined, and held sufficient to support a finding that the wire was defectively insulated at the time it was placed on the pole as a part of the original construction.

3. The refusal of the court to give an instruction requested by defendant that, if the jury were in doubt, if the evidence was equal on both sides, the verdict should be for defendant, was properly refused, the mere existence of a doubt not requiring a verdict for defendant.—(Kennealy vs. Westchester Electric Railway Co., 83 N. Y., Suppl. 823.)

NEW YORK.—Carriers—Glass Doors in Station—Injury to Passenger—Negligence—Question for Jury.

1. Plaintiff, in passing out of the station of defendant's elevated railroad to take his car, was obliged to pass through a doorway in which defendant maintained two swinging doors. A passenger preceded him, and permitted one of the doors to fly back in his face. To avoid injury, he threw up his arm, which passed through the glass panel on the door, cutting him seriously. The glass was double-thick window glass, and had been used by defendant in similar doors for a series of years without any one being hurt before. Held, insufficient proof of negligence to go to the jury.—(Fahner vs. Brooklyn Heights Railway Company, 83 N. Y. Suppl., 815.)

NORTH CAROLINA.—Malicious Prosecution—False Imprisonment—Warrant—Probable Cause—Malice—Exemplary Damages—Actual Damages—Agency—Authority—Admission of Evidence—Waiver of Exceptions.

1. In an action for false arrest and malicious prosecution of plaintiff for an attempt to defraud a street railway company of a fare, evidence as to admissions by other parties arrested at the same time that they had paid no fare, and were drunk at the time, was properly excluded, plaintiff not having been charged with conspiracy, nor arrested and tried for drunkenness.

2. Where, in an action against a street railway for false arrest and malicious prosecution, it was shown that defendant's conductor pointed out plaintiff on the car, and directed the officer to arrest him for refusing to pay his fare, and that the conductor had been advised by some one in the front of the car, where defendant's manager was standing, there was evidence tending to show that defendant caused the arrest.

3. Where an arrest is illegal, proof that defendant acted without malice is no defense to an action for false imprisonment and malicious prosecution.

4. Where, in an action for false arrest and malicious prosecution, the regularity of the warrant was not questioned, it was not necessary to offer the warrant in evidence.

5. In an action for false arrest and malicious prosecution it is not necessary to show who actually swore out the warrant for plaintiff's arrest, provided it is shown that the warrant was sworn out at the instigation or procurement of defendant.

6. In an action for malicious prosecution, circumstantial evidence is competent to prove that defendant instigated the prosecution.

7. Where a conductor of a street car, after an altercation with a passenger, in which he had repeatedly demanded a fare, refused to accept the fare when finally tendered, and ordered the passenger arrested for refusing to pay, the conductor's conduct tends to show malice.

8. Malice may be inferred from the want of probable cause for the prosecution.

9. Where an instruction given at a party's request contains every element of an instruction objected to, the party cannot be heard to except.

10. In an action for malicious prosecution plaintiff may recover exemplary damages.

11. Plaintiff in an action for false arrest is entitled to recover all actual damages suffered, but cannot recover punitive damages, unless the arrest is accompanied with gross negligence, malice, insult, oppression, or other circumstances of legal aggravation.—(Kelly vs. Durham Traction Company, 43 S. E. Rep., 923.)

NORTH CAROLINA.—Street Railways—Negligence—Operating Cars Without Fender—Violation of Statute—Suspension of Statute—Validity of Suspension.

1. Whether a street railway company was negligent in operating a car without a fender, as required by law, was a question for the jury.

2. Acts 1901, p. 968, c. 743, Sec. 2, requires all street railway companies to use fenders in front of passenger cars, but provides that the corporation commission may "make exemptions" from the provision of the statute. The commission exempted all street railway companies from the provisions of the statute until otherwise ordered. Held, that the order amounted, not to an exemption, but to a suspension of the statute, and hence was invalid, and the statute remained in force.—(Henderson vs. Durham Traction Company, 44 S. E. Rep., 598.)

OHIO.—Carriers—Injury to Passenger—Alighting from Street Car.

1. If a street car comes to a full stop for any purpose, and a

passenger is in the act of alighting, it is negligence for the conductor to start the car before such passenger has had a reasonable opportunity to get off safely.

2. But if the car does not stop, merely slacking speed sufficiently to permit a passenger to get on, the conductor, in the absence of notice of passenger's intention to alight, is not bound to know that any passenger will attempt to get off, or is in the act of getting off, while the car is in motion.

3. Where there is a conflict of evidence as to whether the car stopped, or whether it only slowed up enough to allow a man to get on, and also as to whether the conductor had notice of the plaintiff's intention to alight, it is error to charge the jury as follows: "If you find from the evidence in this case that the car stopped or slacked up, for the purpose, sufficiently to let a man onto the same, and at the same time the plaintiff attempted to alight, then we say to you that it became and was the duty of the conductor of the car before causing or permitting said car to go ahead, to use the highest degree of care, consistent with the proper running of said car, to see and ascertain what, if any, other person or persons might be getting on or off the car at the time other than said man."—(Ashtabula Rapid Transit Company vs. Holmes, 65 N. E. Rep., 877.)

OHIO.—Carriers—Negligence of Servant—Evidence of Relationship—Liability of Master.

1. Where, in an action brought by L. against a street railway company to recover damages for personal injuries sustained by her in consequence of the alleged negligent conduct of a servant of the defendant company, such company by its answer denies that the person whose act caused the injury complained of was at the time of such injury the servant of said company engaged in the prosecution of its business, and there is evidence tending to support such denial, held that, whether the person whose immediate negligence or misconduct caused the particular injury complained of was, at the time, the servant of and was then acting for the defendant company sought to be charged, is a question of fact to be submitted to the jury under proper instructions from the court.

2. The test of a master's liability is not whether a given act was done during the existence of the servant's employment, but whether such act was done by the servant while engaged in the service of and while acting for the master in the prosecution of the master's business.

3. A master is not liable for the negligent act of a servant or employee if, at the time of the doing of such act, the servant or employee is not then engaged in the service or duties of his employment, although the act be one which, if done by such servant or employee while on duty at a time when actually engaged in his master's service, would be clearly within the course and scope of the usual and ordinary duties of such servant or employee.—(Lima Railway Company vs. Little, 65 N. E. Rep., 861.)

OHIO.—Electric Railroad Classed as Street Railroad—Passenger Standing on Platform—Implied Agreement of Passenger—Rules of Carrier—Law of Negligence.

1. An interurban electric railroad is classed as a street railroad by the statutes of this state.

2. While such interurban railroad companies are subject to the same regulations and have all the powers of street railroad companies, so far as applicable, the law of negligence governing the standing on a platform of a moving street car in a municipality is not applicable to the case of standing on such platform of a moving interurban car in the open country.

3. The law of negligence governing the standing on a platform of a moving interurban car outside of a municipality is the same as in the case of steam cars; and where a rule of the company prohibits passengers from standing on the platform, and notice thereof is properly posted, or where the passengers, upon request, refuse to enter the car, there being in either case vacant seats, they remain on the platform at their peril.

4. In a contract for safe carriage, there is an implied agreement that the passenger will obey the reasonable rules of the carrier; and where the passenger purposely violates such rule, and is thereby injured, he cannot recover damages from the carrier in an action on the contract.—(Cincinnati, L. & A. Electric Street Railway Company vs. Lohe, 67 N. E. Rep., 161.)

OREGON.—Street Railway—Injury to Passenger—Riding on Footboard of Car—Contact with Bridge—Negligence—Contributory Negligence—Questions for Jury—Instructions.

1. One is not guilty of contributory negligence in riding on the footboard of an open car where all the seats are occupied.

2. A street railway company constructed its tracks so near the superstructure of a bridge as to leave only 18 ins. between the framework thereof and the outer edge of the foot-board of its open cars. A passenger riding on the footboard—the seats inside the car all being occupied—was injured by coming in contact with a strut of the bridge. There was evidence that the car was going

at an unlawful rate, and that no warning was given. Held, that the company's negligence was a question for the jury.

3. The fact that the street railway had been operated for over ten years, and that no accident had occurred from a like cause, did not show an absence of negligence, as matter of law.

4. One injured while riding on the footboard of an open car by coming in contact with the strut of a bridge over which the car was passing was not guilty of contributory negligence, though he leaned back in returning his money to his pocket, or in looking to see what a friend, also on the footboard, was doing.

5. It is not negligence per se for a street railway company to permit passengers to ride on the footboard of an open car where all the seats are occupied.

6. Refusal to charge that it was not negligence for a street railway company to permit a passenger to ride on the footboard of a crowded car was error, though the court charged that if the passenger voluntarily took his place there, and, by reasonable care, could have ridden safely, but did not use such care, the company was not liable, especially where the court also charged that, if the accident to the passenger was the direct result of the overcrowded condition of the car, the company would be liable, provided the passenger was not guilty of contributory negligence.—(Anderson vs. City & Suburban Railway Company, 71 Pacific Rep., 659.)

OREGON.—Street Railway—Negligence—Question for Jury—Contributory Negligence.

1. One who fails to look and listen for a car before crossing a public street in daylight at a place where his view is unobstructed is guilty of contributory negligence.

2. Under such circumstances, there can be no recovery for injuries, notwithstanding the defendant may have been negligent in running the car at a dangerous rate of speed.

3. Where one approaching a street railway track stops near the track, the motorman in charge of an approaching car has a right to assume that he intends to wait until the car passes, and is not guilty of negligence in releasing his brakes at the time.—(Wolf vs. City & Suburban Railway Company, 72 Pacific Rep., 329.)

PENNSYLVANIA.—Appeal—Review—Conflicting Evidence—Negligence—Infant—Question for Jury—Action by Mother.

1. A verdict on conflicting evidence will not be set aside because the appellate court would, on the same evidence, have reached a different conclusion.

2. The question whether a boy of twelve years of age had sufficient capacity to be sensible of danger and to avoid it is not a question of law, but one of fact for the jury.

3. Act June 26, 1895 (P. L. 316), giving a wife, under certain circumstances, equal authority with the father, and equal right to the custody and services of a minor child, gives no right of action for an injury to such minor child caused by the negligence of another, and not resulting in death.

4. Where a father sues in his own right for an injury to his minor son, and as next friend, to recover for injuries not resulting in death, and pending suit the father dies, and the mother is substituted, a judgment for her in her own right cannot be sustained.—(Kelly vs. Pittsburg & B. Traction Company, 54 Atlantic Rep., 482.)

PENNSYLVANIA.—Carriers—Overcrowded Cars—Injury to Passenger—Riding on Platform.

1. A carrier must exercise additional care and precaution where it allows its cars to be overcrowded.

2. Where a passenger is allowed to enter a street car where there is no vacant place except on the platform, and pays his fare, it is an assurance that the carrier will guard him against accident while standing on the platform, so far as circumstances permit.

3. In an action against a street railway company for injuries to passengers, it appeared that the plaintiff, the car being crowded, went on the front platform at the conductor's request; that the car was run very rapidly over the tracks of a steam railroad, and down a grade; that the conductor, who had preceded the car at the crossing, jumped on the front steps, and so pushed the other passengers on the platform that plaintiff lost his hold, and fell under the wheels. Held, that a verdict for plaintiff would be sustained.—(McCaw vs. Union Traction Company, 54 Atlantic Rep., 893.)

PENNSYLVANIA.—Street Railroads—Injury to Boy—Negligence of Motorman.

1. Evidence in action against a street car company, causing death of boy riding on the side steps of a freight car on a track parallel to the street car, considered, and held to show the motorman not guilty of negligence.

2. Where a motorman is confronted with a sudden danger, he is not liable for failure to follow what might appear on reflection to be the wiser course.—(Ackerman vs. Union Traction Company, 55 Atlantic Rep., 16.)

PENNSYLVANIA.—Street Railroads — Collision — Evidence—Negligence.

1. Evidence in action against a street railway to recover damages for a collision at a street crossing with plaintiff's horse and wagon examined, and held to justify the court in directing a verdict for defendant.

2. The failure to look for an approaching street car is negligence per se, and the duty is not performed by looking when first entering on a street, but continues until the track is reached.—(Moser vs. Union Traction Company, 55 Atlantic Rep., 15.)

PENNSYLVANIA.—Carriers—Injury to Passenger—Contributory Negligence.

1. The burden is on a person injured by stepping on or off a moving street car and receiving an injury thereby to show why the case should go to the jury.

2. Where plaintiff signals an electric car to stop at a crossing, and the signal is heeded, and the car is slackening its speed, and he attempts to get on while it is running three miles an hour, and is injured thereby, he cannot recover.—(Hunterson vs. Union Traction Company, 55 Atlantic Rep., 543.)

PENNSYLVANIA.—Witness — Cross-Examination — Extent—Discretion of Court—Personal Injuries—Damages.

1. The cross-examination of a witness is largely in the discretion of a trial court, and will not be reviewed unless that discretion has been abused.

2. The cross-examination of a witness should be limited to matters in regard to which he has testified in chief.

3. Where a witness has testified as to part of a conversation, he may be cross-examined as to the rest of it.

4. In an action by a woman against a street railway company for personal injuries, a physician, who examined plaintiff at her request, testified for defendant that, knowing that it was for the purposes of the trial, he concealed from plaintiff the fact that he was the physician of the company, and that thereafter, at his request, plaintiff called on him, and he told her he thought he could get something for her injuries from the company. Held, that it was proper to ask him on cross-examination if in such conversation he did not deny to plaintiff that he was the surgeon of the company.

5. Where, in an action for personal injuries, plaintiff testified that she was working for wages, and the amount thereof, and that she was obliged to lay off for a certain number of weeks, an instruction that she could recover for such wages was proper.—(Glenn vs. Philadelphia & W. C. Traction Company, 55 Atlantic Rep., 860.)

PENNSYLVANIA.—Appeal—Time of Taking—Filing Exceptions—Street Railways—Laches.

1. Where a case was heard on bill, answer, and proofs, and an opinion filed on Jan. 6, and no exceptions were filed, and after ten days, and before actual entry of a decree appellants moved for leave to file exceptions nunc pro tunc, and the exceptions were then filed, and the opinion of the court dismissing them was filed May 12, 1902, the time of the appeal ran from such latter date.

2. A judge sitting as a chancellor has a discretion to allow exceptions to be filed nunc pro tunc after the expiration of ten days from the decree nisi.

3. Where a street railway company lays a single track on a turnpike road so as to indicate plainly an intent to build a double track, and the road is operated for two years, and the company then proceeds to lay its second track; abutting owners, after a third of the track has been constructed, are estopped by laches from seeking to restrain the further construction of the road.

4. Act May 14, 1889, Sec. (P. L. 217), giving a street railway company the right to condemn a turnpike road on making compensation to the owner thereof, provides for compensation to the owner of the turnpike, but grants no right of the abutting property owners.—(Hinershitz et al. vs. United Traction Company et al, 55 Atlantic Rep., 841.)

PENNSYLVANIA.—Carriers—Injury to Passenger—Contributory Negligence.

1. Where evidence in an action for injuries to a passenger on an open electric street car showed that he left his seat, and stepped onto the running board of the car, holding on with his left hand, a bag of tools in the other hand, and was thrown off when the car stopped with a sudden jerk, his contributory negligence barred recovery for the injuries received.

2. A passenger on an electric street car, leaving his seat, and stepping onto the running board of the car while in motion, assumes the risk of his position.—(Bainbridge vs. Union Traction Company, 55 Atlantic Rep., 836.)

PENNSYLVANIA.—Street Railroad—Injury to Passenger—Contributory Negligence.

1. Where a passenger on an open electric car signals the conductor to stop at a crossing before and after it had reached it, and

the conductor does not heed the signal, and the passenger stands at the edge of the car with his face to the rear and an arm around a stanchion, and again signals the conductor when the car is in the middle of the block, and the car is then suddenly stopped with a jar, and the passenger is thrown out, he is guilty of contributory negligence barring recovery for the injuries received.—(Jennings vs. Union Traction Company, 55 Atlantic Rep., 765.)

RHODE ISLAND.—New Trial—Withdrawal of Petition—Effect—Amendments—Misfortune, Accident, or Mistake—Notice at time of Filing Petition.

1. After verdict for plaintiff in the common pleas division defendant filed its petition for a new trial under Gen. Laws, p. 862, c. 251, having taken all requisite preliminary steps. On the same day plaintiff, without taking any previous steps in that direction, also filed a petition for a new trial; and the papers were certified to the appellate division, where plaintiff filed a motion to amend his petition in conformity therewith. Thereupon defendant filed a withdrawal of its petition. Held, that, as the withdrawal of defendant's petition did not withdraw the other papers in the cause from the jurisdiction of the court, defendant might abandon its petition, as no injury to plaintiff would be caused thereby.

2. Plaintiff was entitled to a hearing on his petition on reimbursing defendant for the amount expended by it for the transcript of testimony and rulings filed in the case.

3. Plaintiff's proposed amendment to his petition for a new trial related to certain matters occurring in open court, and there was no claim made that they were omitted from the petition by reason of any accident or mistake. Held, that the amendment should be refused in accordance with the general rule that a petition for a new trial cannot be amended by adding new and additional assignments of error, of which the party had notice at the time of filing the petition.—(Gladding vs. Union Railway Company, 54 Atlantic Rep., 1060.)

RHODE ISLAND.—Carriers—Approaching Places of Danger—Care Required.

1. In approaching any place of danger—as in attempting to run its cars through a mob—it is the duty of a common carrier to use the utmost care to protect its passengers from injury.—(Bostworth vs. Union Railway Company, 55 Atlantic Rep., 490.)

RHODE ISLAND.—Carriers—Injuries to Passengers—Absence of Negligence—Evidence—Sufficiency.

1. In an action against a street railway for injuries to a passenger caused by the breaking of an appliance underneath the car, where defendant's evidence showed, not only that it purchased the appliance from a reputable dealer, but also that it had made daily inspection of the same by an expert employed for that purpose, and plaintiff offered no evidence in rebuttal, relying wholly on the doctrine of *res ipsa loquitur*, a verdict for defendant was supported.—(Murray vs. Pawtuxet Valley Street Railway Company, 55 Atlantic Rep., 491.)

RHODE ISLAND.—Street Railroads—Injury to Pedestrians—Previous Acts of Negligence—Admissibility of Evidence—Harmless Error.

1. Evidence in an action by a pedestrian against a street railway for injuries that defendant had failed to ring the bell on the car in question at the intersection of the other streets prior to the time of the accident is improper.

2. Where appellant's liability is established so conclusively as to make a new trial unavailing, the admission of improper evidence is not ground for reversal.—(Dyer vs. Union Railway Company, 55 Atlantic Rep., 688.)

TENNESSEE.—Street Railways—Injuries to Passenger—Negligence—Contributory Negligence—Duty to Aged Passengers—Instructions—Waiver of Error—Punitive Damages—Sufficiency of evidence.

1. Plaintiff's contention, in an action against a street railway for injuries, was that she was negligently carried beyond her destination on the trip out from the city to her home, and to the terminus of the road; that on the trip back she was wantonly carried beyond her stopping place again; that the conductor treated her rudely on the trip out and back; and that she was injured in attempting to get off at a place beyond her destination, where the car stopped on the return trip. Held, that evidence of what was said and done by the conductor and plaintiff was not only competent, but constituted the gist of the action.

2. Though the charge of the court, in an action against a street railway for injuries, to the effect that defendant would not be liable if plaintiff's negligence was the sole cause of the injury, was erroneous, defendant is not in a position to complain where it did not ask for any other or additional charge.

3. Where the record on appeal is an action against a street railway for injuries shows that defendant insisted that the facts adduced at the trial presented a case of sole negligence on the part of defendant, or sole negligence on the part of plaintiff, depending

on whether plaintiff's or defendant's theory of the facts be adopted, and that no charge of contributory negligence was requested, defendant cannot complain of the court's failure to charge that it would not be liable, though negligent, if plaintiff's negligence contributed to her injury.

4. It is the duty of a conductor in charge of a street car to see that no one is in the act of alighting when he starts his car after having stopped to discharge or take on passengers at a regular stopping place.

5. It is the duty of those in charge of a street car to give greater care and consideration to aged and infirm passengers, whose age or infirmities are apparent, than to other passengers, and, if necessary, to assist such passengers to alight from the car when they arrive at their destination.

6. Defendant in a civil action cannot complain of the trial court's action in stating plaintiff's theory in the charge, when a correct statement of defendant's theory was also given.

7. In an action by a passenger against a street railway for injuries, evidence, held, to justify punitive damages.—(Memphis Street Railway Company vs. Shaw, 75 S. W. Rep., 713.)

TENNESSEE.—Street Railway—Injury to Persons on Street—Failure to Look and Listen.

1. It is not negligence as a matter of law for a person driving on a street in a vehicle in the daytime, under ordinary circumstances, to fail to look and listen for the approach of street cars.—(Memphis Street Railway Company vs. Riddick et al., 75 S. W. Rep., 924.)

TEXAS.—Harmless Error.

1. Where the undisputed facts in an action for injuries to a passenger on a street car showed that he was entitled to recover in any event, judgment in his favor was not reversible for error in the submission of the cause.—(Houston Electric Street Railway Company vs. Elvis, 72 S. W. Rep., 216.)

TEXAS.—Street Railways—Collision With Vehicles—Excessive Speed—Ordinance—Contributory Negligence—Petition—Evidence.

1. In an action against a street railway company, the petition alleged that defendant negligently ran its car at a speed of 18 to 20 miles an hour, and in excess of the speed permitted by an ordinance, which was duly set out; that it negligently omitted to stop its car or give warning, and "by reason of said negligence of the defendant" plaintiff was injured, etc. Held, that recovery could be based either on the company's negligence in failing to stop the car or in running it at an excessive rate of speed.

2. The ordinance was competent evidence to prove that the speed was excessive.

3. In an action against a street railway company for injuries sustained in a collision, the evidence showed that plaintiff's vehicle was badly smashed and broken, and that plaintiff's bill for fixing it was \$26. Plaintiff was not cross-examined as to such damage, nor was any evidence in rebuttal offered by defendant. Held, that an instruction was authorized, permitting the jury to consider, in estimating damages, the amount, if any, expended by plaintiff in repairing the carriage.

4. Plaintiff injured, while attempting to drive across a street railway track, through a collision with a car, held, under the evidence, not to have been guilty of contributory negligence as a matter of law.—(San Antonio Traction Company vs. Upson, 71 S. W. Rep., 565.)

TEXAS.—Street Railroads—Injuries to Pedestrians—Children—Negligence—Instructions—Variance—Findings.

1. While defendant's street railway car was running slowly, plaintiff, a child four years of age, walking from the direction the car was coming, went obliquely on the track about 12 ft. ahead of the car. Persons shouted to the motorman, and he either looked towards them or was talking to another employee, and the child was struck and injured. Held, that the motorman was guilty of negligence.

2. Where, in an action for injuries to a child by collision with a street car, it was alleged that the motorman did not look in the direction the car was going, but looked in an opposite direction, and that he "well knew that plaintiff was on the track in front of the car, and well knew plaintiff's dangerous and hazardous position," such allegations justified an instruction, that if the motorman failed to use ordinary care to discover plaintiff on the track, or was guilty of negligence in failing to stop the car in time to avoid injury to plaintiff after having discovered her on the track, plaintiff was entitled to recover.

3. Where it was alleged that an injury to plaintiff by being struck by a street car occurred at the crossing of a particular street, and the evidence showed that the child was injured at a point perhaps 40 ft. from such street, the variance was immaterial; no objection having been interposed to the evidence and defendant having made no claim of surprise.

4. Where a witness testified that a street car was going very slow, about as fast as a man could walk, when it struck plaintiff, and another testified that it was not going fast, but was running at an ordinary speed, and a third testified that the car was going very slow, the evidence justified a finding that the car was moving slowly at the time plaintiff was struck.—(San Antonio Traction Company vs. Court, 71 S. W. Rep., 777.)

TEXAS.—Street Railways—Duty of Motormen—Failure to Listen for Bell—Failure to Stop Car—Pleadings—Evidence.

1. Failure of the motorman on a street car to exercise reasonable care in listening for signals to stop the car given by a passenger who desired to alight, in consequence of which he did not stop the car, and the passenger was injured in attempting to alight from it while in motion, was actionable negligence.

2. Where plaintiff alleged that while riding on defendant's street car he rang the bell, giving thereby the usual signal to stop, and that, though he did this repeatedly, the motorman negligently failed and refused to stop, whereupon plaintiff attempted to alight while the car was in motion, and was injured, the pleading was sufficient to raise the issue of negligence on the part of the motorman in failing to use ordinary care to hear the bell if it was rung.

3. In an action against a street railway for injuries sustained by plaintiff in attempting to alight from a car while it was in motion, in consequence of the motorman's failure to stop the car when signaled to do so, plaintiff offered evidence that before arriving at the point where he wished to alight he had a misunderstanding with the motorman, who also acted as conductor, as to the payment of plaintiff's fare, and that the motorman appeared angry. Plaintiff testified that when he got off, the car had passed the point at which he wished to alight; that he got off because he thought the motorman would carry him still further. Held, that the evidence was relevant as tending to show ground for plaintiff's belief that the motorman would carry him further unless he got off at the time he did.—(Fuller et al. vs. Denison & Southern Railway Company, 74 S. W. Rep., 940.)

TEXAS.—Street Railways—Negligence—Contributory Negligence—Evidence—Sufficiency—Appeal—Prejudicial Error.

1. Plaintiff's wife was struck by one of defendant's cars while driving across its tracks. The car was running on a down grade, and was some 250 ft. distant when plaintiff's wife started to cross the track. The motorman allowed the car to run of its own momentum, and did not have it under control, although he knew the street was crowded, and saw plaintiff's wife; and he made no effort to stop the car until it struck her carriage, which was hindered from crossing by a team passing immediately in front of it. Held, that the facts showed negligence on the part of defendant.

2. The facts failed to show negligence on the part of plaintiff's wife proximately contributory to her injury.

3. In an action against a street railway company for injuries from a collision, error, if it was such, in admitting in evidence a city ordinance requiring motormen to keep vigilant watch for vehicles and persons on foot, and in giving a charge in the language of the ordinance, when such ordinance was not pleaded, was not prejudicial where undisputed evidence showed that the motorman exercised the diligence required by the ordinance, and still failed to prevent the injury.—(Dallas Consolidated Electric Street Railway Company vs. Illo, 73 S. W. Rep., 1076.)

TEXAS.—Street Cars—Collision with Train—Contributory Negligence—Instructions.

1. Defendant, having specially pleaded the contributory negligence of plaintiff, whose hack was struck by its car, to be in not passing clear over the track, or far enough beyond it for the car to clear it, is not entitled to submission of the issue of contributory negligence on evidence that he drove clear over the track, stopped, and, as the car was about to pass, backed into it.

2. In the absence of a proper requested charge defendant cannot complain of the general charge that verdict should not be against it if it had exercised ordinary care to avoid the accident.

3. A requested charge, in an action for injury to a hack by a street car, that, if the hack was standing near the car track, and as the car approached the hack backed into it, plaintiff could not recover, is improper, as the hack may have stood so near the track that it would have been struck had it not been backed; or it might have been backed, and yet defendant have been negligent in not stopping the car before it injured the hack.—(El Paso Electric Street Railway Company vs. Ballinger & Longwell, 72 S. W. Rep., 612.)

TEXAS.—Actions—Parties—Misjoinder—Exceptions—Time for Filing—Prejudicial Error.

1. An action against a street railway for personal injuries sustained by plaintiff on account of the negligence of the company's employees, cannot be joined with an action against the company

and its president to recover for a libel published concerning the plaintiff.

2. In an action against a street railway to recover for injuries sustained on account of the negligence of its employees, the company's president is improperly joined as a defendant.

3. A misjoinder, either of actions or of parties, must be taken advantage of by a plea in abatement, or, where the misjoinder appears from the face of the petition by a special exception in the nature of such plea.

4. Pleas in abatement or exceptions to the petition, in the nature of such pleas, must, to be considered, be filed prior to an answer to the merits, whether such answer raises issue of law or of fact.

5. While it may not be reversible error to sustain a special exception to a misjoinder of actions or parties, though not filed in due order of pleading, in the absence of any showing that plaintiff was prejudiced thereby, where one of the causes of action was barred by limitations when the exception was filed and acted on, a judgment sustaining such exception will be reversed.—(Brooks vs. Galveston City Railway Company et al., 74 S. W. Rep., 330.)

TEXAS.—Municipal Corporations—Defective Streets—Liability of Street Railroad—Concurrent Negligence of Railroad—Effect—Instructions—Waiver.

1. Plaintiff alleged that the defendant negligently permitted its street car/track to project above the surface of the adjacent street, and permitted the street near its track to become scooped out and worn into holes, and that while endeavoring to cross the track the wheels of his wagon struck the projecting rails, dropped into said holes, and slid on and against the rails, jolting him from his seat. It appeared that the accident occurred where defendant's track crossed those of a railroad; that the tracks of both companies were in bad condition; that the wagon wheel slid along defendant's track until it struck the railroad track, whereon plaintiff fell off. Held, that defendant was not relieved from liability by reason of the concurrent negligence of the railroad.

2. Though the petition did not aver that the culminating force causing plaintiff's fall was the impact of the wheel with the railroad track, the mere appearance of such fact on the trial did not justify a charge relieving defendant from liability because of the concurring negligence of the railroad.

3. Error in so charging was not relieved by a charge that if defendant was guilty of negligence in failing to fill the holes, and the wheel dropped into one, and struck or slid against the rail, and plaintiff was injured by reason thereof, he should recover.

4. Plaintiff waived the bar of "privilege" to a communication testified to by defendant's counsel by failing to object to the testimony of another witness relative thereto, and by himself testifying with respect to the same.—(Shelton vs. Northern Texas Traction Company, 75 S. W. Rep., 338.)

VIRGINIA.—Trial—Instructions—Carriers—Injury to Passenger—Burden of Proof—Harmless Error.

1. Where there is any evidence tending to support an instruction, even though it be so slight as to be insufficient to support a verdict, it is error to refuse the instruction.

2. In an action by a passenger for injuries received in alighting from a street car, where the contributory negligence of plaintiff was established, the burden is on her of proving that defendant could, by reasonable care, have avoided the accident after the peril of the passenger was discovered.

3. An instruction without any evidence to sustain it is erroneous.

4. A verdict rendered on erroneous instructions will be sustained only when it clearly appears that no injury could have resulted from the error.—(Richmond Passenger & Power Company vs. Allen, 43 S. E. Rep., 356.)

VIRGINIA.—Street Railroads—Injury to Trespasser—Evidence.

1. Evidence is inadmissible, in an action against an electric railroad for injuries to a person on the track, to show the distance in which a car could be stopped, which is entirely different from that by which the injury was caused, and differently equipped.

2. No duty is owing by a railroad company to a trespasser on its track, except, after it knows of his danger and peril, to exercise reasonable care to avoid injuring him.—(Richmond Passenger & Power Company vs. Racks' Adm'r., 44 S. E. Rep., 709.)

VIRGINIA.—Trial—Reception of Evidence—Street Railways—Negligence—Conflicting Evidence.

1. The order in which the evidence is introduced is a matter largely in the discretion of the trial court, and its judgment will not be reversed because evidence proper in chief was introduced in rebuttal.

2. It is the duty of a street car company, when its cars are standing at a stopping place for the reception of passengers, to use the highest degree of care to see that all passengers lawfully entering its cars get to a place of safety thereon before starting its cars.

3. Where the jury is properly instructed, its verdict upon conflicting evidence will not be disturbed.—(Norfolk & A. Terminal Company vs. Morris, Adm'r., 44 S. E. Rep., 719.)

VIRGINIA.—Carriers—Injuries to Passengers—Contradictory Evidence—Verdict—Vacation—New Trial—Appeal—Review of Evidence.

1. Under the express provisions of Acts 1891-92, p. 962, where there have been two trials of an action at law, and the verdict on the first is set aside by the trial court, and a new trial granted, and proper exceptions taken, and on the second trial a jury is waived, and no testimony introduced, whereupon a judgment is rendered, and the evidence certified, the appellate court will examine the evidence on the first trial, and, if the court erred in setting aside the verdict, the subsequent proceedings will be annulled, and a judgment rendered thereon.

2. In an action for injuries received while boarding a street car, held that, plaintiff's evidence being contradictory, a verdict in her favor was properly set aside as unsupported by the evidence.—(Northington vs. Norfolk Railway & Light Company, 46 S. E. Rep., 476.)

VIRGINIA.—Street Railways—Passengers—Point of Stopping—Contributory Negligence—Instructions.

1. It is the duty of the street railway to use extraordinary care and caution to see that passengers are not injured in getting on or off its cars when stopped at a regular point for stopping.

2. If plaintiff undertook to get off a street car while in motion, she was guilty of contributory negligence; but if she retained her seat until the car stopped, and reached the platform before it started, and was thrown, while alighting, by the sudden starting of the car, she was not guilty of contributory negligence.

3. It is not error to refuse instructions when the propositions of law, although correctly stated therein, are sufficiently covered by other instructions which are granted.—(Richmond Traction Company vs. Williams, 46 S. E. Rep., 292.)

WASHINGTON.—Street Railroads—Personal Injuries—Condition of Tracks—Instructions—Conflict—Harmless Error—Damages—Mental Suffering for Disfigurement.

1. In an action against a street railroad, an instruction that a person injured on account of the negligent failure of defendant to comply with an ordinance in respect to the condition of the track could recover "unless you should further find from the evidence that some sufficiently efficacious method be applied to keep the streets in safe condition for public travel," was not objectionable as meaningless, as it would be understood to mean that defendant would not be liable if any efficacious method, other than the one prescribed by the ordinance, had been adopted.

2. In an action against a street railway, an instruction that if the rails projected above the surface of the street sufficiently to obstruct public travel, and there were no planks laid along the rails as required by ordinance, plaintiff should recover, was not objectionable as subjecting defendant to an absolute liability in case of a failure to use planks, especially in view of a further instruction that, if defendant by some other method protected the rails, the ordinance should not be considered.

3. Detached portions of an instruction cannot be considered on appeal, but all the instructions must be construed together.

4. An instruction that it was defendant's duty to construct its tracks in such a way as to be "safe" for travel was not prejudicial, as requiring absolute safety, where a subsequent instruction required them to be only "reasonably safe."

5. The instructions were not conflicting, as the latter, instead of contradicting the former, made definite and certain that which was before indefinite.

6. An appellate court will not be justified in reversing a judgment where an error has been committed if it further appears that such error was immaterial.

7. Compensation may be had for mental suffering and distress of mind because of disfigurement.—(Gray et ux. vs. Washington Water Power Company, 71 Pacific Rep., 206.)

WASHINGTON.—Carriers—Injuries—Defective Platform—Contributory Negligence—Trial—Permitting Witness to Change Testimony—Rebuttal—Cross-Examination.

1. Where, in an action for injuries to plaintiff's ankle, she testified on cross-examination that she had not had previous trouble with her ankles, and thereafter a witness for plaintiff on cross-examination testified that plaintiff told him that she suffered an injury to her ankle in getting off a railroad car when she was a little girl, it was not error for the court to permit plaintiff to be recalled, and to testify that her right ankle had been injured as stated, but that it was for injury to her left for which she sued.

2. Where, in an action for injuries, a witness on direct examination merely testified to the condition of a platform at the time of the accident, and the actual occurrence there, evidence elicited from him that plaintiff had told him that she had suffered an injury to her ankle when she was a child was not proper cross-examination.

3. In an action for injuries to a passenger by stepping on a rotten plank in a platform, a witness for defendant testified that the platform was made safe the day prior to the accident. Plaintiff, in rebuttal, called a witness who testified that no repairs were made to the platform until several days after the accident, and on cross-examination stated that he did not know that plaintiff had injured her foot prior to the injury complained of, and that he had never stated that he had so injured it. Defendant thereafter called a witness and asked him whether or not plaintiff's witness had not told him that plaintiff had injured her ankle when a girl, and that it was always weak. Held, that such question was properly excluded as not proper rebuttal or impeachment, since plaintiff could not be prejudiced by a statement made to her witness not in her presence.

4. In an action for injuries to a passenger by stepping on a defective plank in a platform, in the absence of a plea of contributory negligence, evidence tending to show that plaintiff stepped on the platform on a weak limb, and was careless in so doing, was inadmissible.—(Bailey vs. Seattle & R. Railway Company, 73 Pacific Rep., 679.)

WISCONSIN.—Carriers—Injury to Passenger—Proximate Cause—Instructions—Right to Alleged Error—Credibility of Plaintiff—Argument of Counsel—Failure to Except—Excessive Verdict.

1. An instruction in a personal injury action defining "proximate cause" as the "direct and natural" and the "direct and producing cause, without the existence of which such injury would not have occurred," is defective, as it is sufficient to constitute proximate cause if the effect follows naturally and probably, though not directly and immediately.

2. An instruction submitting the question of proximate cause to the jury is defective which tells them that, to find proximate cause, they must find that the injury resulting therefrom was such as a person of ordinary intelligence and prudence "would" have reasonably foreseen as a probably result, etc.; the idea of necessary foresight being too extreme a standard.

3. An instruction which employs the expressions "the injury" and "such injury" in such manner as to convey the impression that, to constitute proximate cause, an ordinarily intelligent and prudent man ought to have foreseen not alone some injury, but the very injury which in fact resulted, is defective.

4. The defendant in a personal injury action cannot complain of instructions which lay down too strict a rule for the determination of proximate cause.

5. A defendant cannot complain of an instruction referring the jury to other instructions for a definition of "proximate cause," where he has saved no exception to that portion of the instruction.

6. In an action against a street car company, where the defense was contributory negligence in attempting to board the car before it had stopped, the defendant cannot complain of instructions on the subject of contributory negligence where the jury has found that the car had stopped before the plaintiff attempted to board it.

7. A defendant cannot complain of an instruction on contributory negligence which refers the jury to other instructions for definition of "negligence," where he has failed to request the court to further define the word as used in that instruction.

8. Informing the jury that certain instructions are given at the request of a particular party is not reversible error, though the practice is bad.

9. Defendant's instructions that the jury, in determining the credibility of the plaintiff, may consider the motive he had to testify in his own favor, is properly modified by striking out the added clause, "And you should especially remember how far he is contradicted by disinterested witnesses upon the most material matters."

10. In an action by a passenger against a street car company the defendant cannot complain of the remarks of plaintiff's counsel as to his own experience and observation with reference to the frequency of and peril from prematurely starting cars, where no objection was made or opportunity given to counsel to withdraw the remarks, or to the court to rule thereon, nor any exceptions reserved.

11. Remarks of plaintiff's counsel on the question of damages, which, on objection, are promptly withdrawn, the jury being instructed to disregard them, and the verdict being reduced to an amount not excessive, will not constitute ground for a new trial.

12. Plaintiff was shown to be a skilled tinsmith, forty-five years of age. His injuries confined him some seven weeks and rendered him unable to fully perform the labors of his trade thenceforward. They consisted of bruises, dislocation of his shoulder, fracture in the shoulder joint, by which his arm was permanently disabled. Held, that a verdict of \$2,000 was not excessive.—(Meyer vs. Milwaukee Electric Railway & Light Company, 93 N. W. Rep., 7.)

WISCONSIN.—Carriers—Street Railway—Injury in Fall from Car—Riding on Platform—Negligence—Contributory Negligence—Special Verdict—Confusing Charge.

1. In an action against a street railway to recover for an injury sustained by plaintiff in falling from a car as it was going round a curve, the evidence examined, and held to sustain a finding that the accident was caused by defendant's negligence.

2. Evidence examined, and held to sustain a finding that plaintiff was not guilty of contributory negligence.

3. The special verdict prescribed by Rev. St. 1898, Section 858, was not designed to elicit from the jury a mere abstract of the evidence.

4. There was no error in refusing to submit requested questions to the jury which were covered fully or in substance in charging the jury under other questions submitted.

5. A passenger on a street car, required to ride on the platform because of its crowded condition, cannot be said as a matter of law not to have assumed any increased risk.

6. A charge that, in order to determine that defendant's negligence was the proximate cause of plaintiff's injury, the jury must "find from the testimony that the circumstances and conditions were such that the defendant ought to have known that its conduct might produce the injury which the plaintiff sustained, or to any body else standing in the same relation he did," was vague, uncertain and calculated to confuse the jury.—(Zimmer vs. Fox River Valley Electric Railway Company, 95 N. W. Rep., 957.)

WISCONSIN.—Street Railroads—Crossings—Injuries to Fireman Driver of Hose Cart—Negligence—Contributory Negligence—Question for Jury—Evidence—Witnesses—Cross-Examination—Instructions—Damages—Excessiveness.

1. Where, in an action for injuries to the driver of a hose cart in collision with a street car at a crossing, it was proved that the car was traveling at a speed of from 20 to 25 miles an hour; that nothing was done to check the speed until the car was within some 20 ft. of collision, while plaintiff's team was in plain sight when the car was 100 ft. from the crossing, and the motorman neglected to keep any lookout ahead during a run of some 80 ft. of the approach to the crossing—a finding that the motorman was guilty of negligence was justified.

2. Whether plaintiff, the driver of a hose cart, injured in a collision with a street car at a crossing while driving to a fire, was guilty of contributory negligence in attempting to cross ahead of the car, was for the jury.

3. In an action for injuries to the driver of a hose cart in collision with a street car at a crossing, an instruction to find that the driver was guilty of contributory negligence if he did not have his horses under control at the time he attempted to cross the tracks, without reference to any other circumstances, was properly refused.

4. Where the driver of a hose cart was justified in assuming that a street car would stop or slacken its speed to permit him to cross the tracks in accordance with the uniform custom, an instruction, in an action for injuries to him in a collision with a car, that a person approaching a street railway track, and having a reasonable opportunity to judge of the speed of an approaching car, is bound to know such speed, and cannot assume that it is running at a speed consistent with ordinary care, and proceed on that assumption, was properly refused as inapplicable to the facts.

5. The instruction was also erroneous as requiring a person having a reasonable opportunity to judge of the speed of a car to "know its correct speed," he being only required to reach the conclusion of an ordinary prudent and intelligent man under the circumstances.

6. An instruction that a person approaching a street car track is bound to look and listen, and continue to look and listen up to the last moment, when his acts would have been of any virtue in preventing a collision with a car, was inapplicable to the driver of a hose cart approaching a street railway crossing.

7. An instruction that ordinary care is such care as a man of ordinary care and prudence would have exercised under circumstances like those disclosed by the testimony in the case, was not erroneous because it did not require that the care should be such as "the great mass or majority of mankind would have exercised under similar circumstances."

8. Where, in an action for injuries to the driver of a hose cart in collision with a street car, it was undisputed that it was the uniform custom of street cars to stop or slacken speed and give fire apparatus right of way, it was not error to charge that, inasmuch as such custom had been established by undisputed evidence, plaintiff was entitled to assume that defendants would comply therewith.

9. In an action for injuries to the driver of a hose cart in collision with a street car, evidence that witness, who was sitting on a sidewalk, had frequently heard the gong of a fire patrol wagon, which was similar to the gong on plaintiff's wagon, a distance of two blocks, was not objectionable on the ground that the conditions surrounding the witness and those surrounding the motorman were not identical.

10. Where, in an action for injuries by collision with a street car, the speed of the car was given by various witnesses at varying rates up to 25 miles an hour, and the motorman had testified that he had his power lever thrown the second highest notch, but that the speed of the car was only 7 or 8 miles an hour, it was not error for the court on cross-examination to permit him to be asked whether or not the car in question was not a specially rapid one, to which he answered that, while it was not the most rapid, there were only two others which excelled it.

11. In an action for injuries to the driver of a hose cart in a collision with a street car, evidence held to justify a finding of loss of future earning capacity.

12. Plaintiff, a fireman, thirty-seven years of age, who had attained the rank of captain, with a salary of \$100 per month, was injured in a collision with a street car. His knee joint was permanently loosened and enfeebled and his chest was crushed, certain of the ribs being broken in front and rear and penetrating both the outer membrane and the pericardium, leaving adhesions which would permanently and seriously impair any violent exertions. His expense for medical treatment had been about \$500, and he still continues to suffer two years after the injury. He retained his place in the fire department, but was unable to perform certain of the work necessary, by reason of his injuries. Held, that a verdict of \$4,000 was not excessive.—(Hanlon vs. Milwaukee Electric Railway & Light Company, 95 N. W. Rep., 100.)

WISCONSIN.—Guardian Ad Litem—Liability for Costs—Statutes—Constitutional Law—Imprisonment for Debt—Equal Protection of Laws—Legislative Classification—Judgment Against Infants—Enforcement.

1. Rev. St. 1898, section 2931, provides that, when costs are adjudged against an infant plaintiff, the guardian by whom he appeared in the action shall be responsible therefor, and payment may be enforced by attachment. Held, that the attachment there referred to was not a *causis ad satisfaciendum*, but was a mere order to show cause why the guardian should not be punished for contempt for failure to pay such costs, and hence the section was not in violation of Const. art. 1, section 16, prohibiting imprisonment for a debt arising out of or founded on contract, express or implied.

2. Rev. St. 1898, section 2932, provides that judgment for costs against executors, administrators and trustees shall be collected only out of the estate in their hands. Section 2931 declares that guardians ad litem for infant plaintiffs shall be responsible for costs. Held, that there was a substantial difference between guardians ad litem and administrators and trustees justifying a legislative classification, so that section 2931 was not objectionable as denying to guardians ad litem the equal protection of the laws.

3. Rev. St. 1898, section 2920, provides that costs shall be allowed to the defendant unless the plaintiff is entitled to costs; and section 2931 declares that when costs are adjudged against an infant plaintiff the guardian ad litem shall be responsible therefor. Held, that in an action by an infant in case he fails to recover the judgment for costs judgment should be rendered in favor of the defendant against the infant, which may be enforced against the guardian without the judgment expressly passing on the question of the guardian's liability.—(Burbach vs. Milwaukee Electric Railway & Light Company, 96 N. W. Rep., 229.)

WISCONSIN.—Carriers—Injuries to Passengers—Street Railways—Deraiment—Question for Jury—Evidence—Judgments—Vacation at Same Term—Jurisdiction.

1. In an action for injuries to a passenger on a street car, evidence that the accident occurred at a curve in the track; that crushed rock had been permitted to remain on the rails; and that the motorman operated the car which was derailed at a speed of from 12 to 20 miles an hour, regardless of such conditions—was sufficient to justify a jury in finding that the deraiment of the car was due to the motorman's negligence in running the same at too high a rate of speed, and to the negligence of the company in

permitting crushed rock to remain on the rails as alleged in the complaint.

2. The right of a trial court to set aside a judgment during the term of its own motion is not limited to judgments inadvertently entered, but extends to a final judgment which was the result of a series of erroneous rulings entered after deliberation.—(Smith vs. Milwaukee Electric Railway & Light Company, 96 N. W. Rep., 823.)

WISCONSIN.—Street Railroads—Use of Streets—Operation of Freight Cars—Want of Authority—Nuisance—Injuries to Pedestrians—Complaint—Averment of Negligence—Necessity.

1. Where a street railway company operated freight cars over its tracks without authority and in violation of law, the operation of such cars constituted a nuisance, for which a pedestrian injured thereby was entitled to recover without regard to the care exercised in operating such trains, and hence a complaint alleging such operation a special injury was not demurrable for failure to allege negligence in the operation of such cars.—(Daly vs. Milwaukee Electric Railway & Light Company, 95 N. W. Rep., 832.)

WISCONSIN.—Street Railroads—Killing Pedestrian at Street Crossing—Negligence of Motorman—Question for Jury.

1. A motorman in charge of an electric street car is chargeable with the duty of using ordinary care by keeping a lookout ahead so as to avoid colliding with persons on the track.

2. It is the duty of a motorman in charge of an electric street car as he approaches a street crossing to observe children near the track in such an attitude as to suggest the probability of their placing themselves in the way of the car, and to use all reasonable care to avoid injuring them.

3. In an action against a street railway company for the killing of a child at a crossing on a street where the company operated two tracks, the south track being for east-bound cars and the north one for the west-bound cars, by reason of the child crossing the south track immediately after a car thereon had passed, and entering on the north track, where it was struck by a west-bound car, evidence examined, and held, that the question whether defendant was guilty of actionable negligence was for the jury.—(Forrestal vs. Milwaukee Electric Railway & Light Company, 97 N. W. Rep., 182.)

CHARTERS, FRANCHISES AND ORDINANCES.

NEW YORK.—Eminent Domain—Elevated Roads—Action for Damages—Evidence—Admission of Incompetent Testimony.

1. In an action to recover damages caused by the construction and maintenance of an elevated road, evidence of sales and rentals of specific pieces of property, other than the property in suit, is inadmissible.

2. Where, in an action to recover damages for the construction of an elevated road, on cross-examination inquiry is made as to the effect on other property, plaintiff may on redirect examination make full inquiry with reference thereto, but he cannot give evidence as to additional property not embraced in such examination.

3. Error in admitting incompetent evidence is not cured by a statement by the trial judge in his decision and in the judgment entered thereon that in deciding the case he disregarded such error.—(Robinson et al. vs. New York Elevated Railroad Company et al., 67 N. E. Rep., 431.)

PENNSYLVANIA.—Traction Company—Lease of Street Railway—Rights Acquired—Injunction—Laches.

1. A traction company which leases the road of a street railway company which has the consent of the city to use its streets succeeds to the right to such use.

2. A street railway company obtained the right to use the streets of a borough under an agreement to use guard wires over the trolley wire. This condition was not enforced for a long time, when the borough filed a bill to restrain the operation of cars in the streets. Held, that a bill filed after some years, and without previous formal demand to enjoin the use of said streets because the guard wires had not been put up, would be dismissed if within a reasonable time the railway company put up the wires.—(Conshohocken Borough vs. Conshohocken Railway Company et al., 55 Atlantic Rep., 855.)

TENNESSEE.—Carriers of Passengers—Street Railways—Ejection of Passengers—Refusal of Transfer Ticket.

1. Where the conductor on a street railway car gave plaintiff a transfer, which was refused by the conductor of the car to which plaintiff properly changed, on the ground that the transfer was defective, and plaintiff, being without money, was forcibly expelled from the car, he can recover therefore against the railway. Negligence in the issuing of the transfer was that of the company, and plaintiff was not bound to examine it.—(Memphis Street Railway Company vs. Graves, 75 S. W. Rep., 729.)

LONDON LETTER

(From Our Regular Correspondent.)

Within the past few weeks the Board of Trade has given its official sanction to the Uxbridge and Hammersmith extension of the London United Electric Tramways Company. The service is now inaugurated between the town of Uxbridge and Shepherd's Bush and Hammersmith at intervals of five minutes, the fare for the thirteen miles being 5d. Mr. Clifton Robinson is to be congratulated upon the successful completion of this, the latest extension to the already extensive system of tramways in the west of London. This company is now working 36 route miles of tramways while 38 additional miles have been authorized, and 5 further miles passed by the committee of the House of Commons in the present session.

The Royal Commission on London Traffic has now concluded its labors so far as the taking of evidence is concerned, and the last day proved to be one of considerable interest. Mr. Edgar Speyer, whose banking firm has been largely identified with the financing of the tube railway and the Metropolitan District Railway Company, in which Mr. Yerkes is interested, was a witness on that day. Mr. Speyer took the opportunity of vigorously repudiating some unworthy allegations concerning the finances of the lines in which he is interested by the London County Council, and stated that the newly electrified district railway would be ready for service about the beginning of 1905. He computed that the underground company will be able to carry on the tube lines 327,000,000 passengers, and on the district railway 40,000,000 more passengers per year than at present. Mr. J. Clifton Robinson also gave evidence and stated that he favored the appointment of an impartial tribunal to deal with all questions relating to transportation in London. Such a tribunal would be able to overcome many of the difficulties such as existed to-day, particularly in tramway termini, which naturally caused blocks to the traffic. He also put himself on record as being favorable to the installation of tramways in the city which he claimed would help largely to relieve the extremely congested condition of the streets, the natural result of an efficient service of tram cars being materially to reduce the number of cabs and omnibuses which, with their horses take up a large part of the street accommodation. Mr. Robinson stated, however, that there were places in the city of London where even he would not venture to install a tramway, such as Cheapside or in the space in front of the Mansion House. Two schemes suggested themselves to his mind, one being a line from Shepherds Bush to St. Paul's, from which point he would suggest that an underground conduit be built for tramways under Cheapside, which would emerge again in Moorgate Street. The other scheme would be the formation of a tramway line from Hammersmith through Piccadilly to the Strand, which, with the great improvements in street-widening being made by the London County Council is becoming much more suitable for the installation of a tramway service. The Royal Commission will now proceed with the preparation of its report which will undoubtedly take a number of months in preparation.

Messrs. J. G. White & Company are certainly to be congratulated upon the marvellous speed with which they have completed the electrifying of the cable tramways from Kennington to Streatham commonly called the Brixton Hill tramways. We have referred to this installation before, stating how originally it was intended to have the electric cars use the cable up Brixton Hill, but how, after experimentation, it was decided that such a scheme was not practicable, and that, therefore, the whole system of cable tramways would have to be changed to electric tramways. Messrs. White & Company prepared themselves for the work, and not a stone was lifted until everything was absolutely ready to be put in place. The work was commenced on April 5, and by May 20 electric cars were running on the double track between Kennington Station and Brixton Station, while the Board of Trade inspectors had passed the section as far as Brixton Hill. The work has now been completed, and it is confidently thought it will stand as a record for fast work, not only in Great Britain, but also in America. Between 1500 and 1600 men have been constantly employed from the commencement, and nearly all of the work has been done in the daytime.

Aston is now in a position to commence its service of electric tramways trials having recently been made, among the first to ride from Aston Cross to the Birmingham boundary being the Mayor of Aston. The cars adopted by Aston are somewhat smaller than those of the Birmingham Corporation, and will accommodate 48 passengers. They are double-decked on single trucks with a 6-ft. wheel base. Arrangements for running regularly will not be settled until the question of running the cars on the Birmingham lines has been decided upon. Good progress is also being made

with the other lines, and it is hoped that in a few months the whole system will be completed.

The Corporation of Birmingham has now had presented to it a full report of the tramways committee, regarding the tramway situation on what is necessary to be done so as to equip the City of Birmingham with a perfect system of electric tramways, and the cost of same. As is well known, Birmingham, up to the present, has not had any tramways of its own, the various systems concentrating in the center of Birmingham being owned by different companies and operated by steam to a large extent. Since the Corporation decided to take over its own tramways it has laid out a most comprehensive scheme which will prevent, to a large extent, the "dead-end" termini which at present exists in the city, and will do away with the old square loop. This will be accomplished by arranging for through routes more than at present, and for certain of the lines forming a wide return loop through several streets on single lines so that termini will be avoided. As at present outlined the total cost involved in the construction of about 39 miles of new line will be about £295,000, though at present it is not intended to expend this amount at once. Parliamentary powers, however, will be sought for this service, which, knowing the extreme urgency of a good system in Birmingham, cannot be considered as excessive in any way.

It is also proposed to make a provisional agreement with the City of Birmingham Tramways Company for the immediate electrification of the Small Heath route, and for the future working of the line which is now owned by the British Electric Traction Company. Certain concessions have been made on each side, and running powers granted the entire route both to Corporation cars and City of Birmingham cars, and the Corporation three-fourths, the Corporation of Birmingham taking three-fourths of the receipts and the company one-fourth. The Corporation, however, has decided not to change crews at the boundary line as is done in Liverpool, the company not liking that arrangement and the Corporation seeing no real objection to the company's officials running its own cars all the way into the city rather than to change crews at the boundary.

A system of celluloid tramway checks has been introduced on the Leeds tramways with the object of baulking the dilatory errand boy. It is realized that the boy who is given money for the tramway car often spends it on sweets, and walks. The tradesman is not supplied with the tokens at a reduced rate, but, says the "Daily Dispatch," he is in the position of knowing that his errand boy will ride the journey and thus save time.

It looks as if we might, in the near future have another surface contact system in England, this time the Dolter system. The Torquay tramway bill has now passed both Houses of Parliament, a select committee of the House of Lords, presided over by Lord Hawkesbury, having confirmed the decision of a committee of the House of Commons that the preamble proved. The promoters are the Dolter Electric Traction Company, which proposes to construct a length of 9 route miles of tramways in the borough of Torquay. The cost of the scheme, including equipment, is estimated at £136,000, and has the support of the corporation of Torquay.

Opinion has been greatly divided in Dartford as to the advisability of the Council undertaking the construction and direct working of the proposed tramways, which will connect with the Bexley Heath system. A solution of the difficulty has been arrived at by arrangements with J. G. White & Company, Ltd., to construct the lines at a cost of £83,000. The contractors have offered to work the tramways for five years on a lease, under which they will pay the Council the amount of interest and sinking fund on capital, and also to pay in addition 20 per cent of any profits. The Council will have the option, at the end of five years, either of taking over the tramways themselves, or of calling upon the contractors to enter into a further lease of five years on similar conditions, and also a third lease of five years if the Council choose. The contractors will take the town's current at the price of 2d per unit for the first 100,000 per annum, at 1¾d. per unit for 100,000 to 150,000 units, and at 1½d. per unit for over 150,000. The company will pay all expenses of working, including rates, taxes, etc., and will maintain the track and cars at its own expense, and deliver up the whole undertaking to the Council at the expiration of the lease in good working order and condition.

The Council has agreed to these terms, and has also decided to apply to Parliament for power to continue the system to Swanscombe, so as to form a junction with the Gravesend tramways. This will mean a continuous line from Gravesend to London, and if the link is made between Gravesend and the Chatham systems, there are prospects of the day when those who choose will be able to travel all the way from Maidstone to London by tramcar.

Preliminary arrangements for the third Electric Tramway and Railway Exhibition, to be held in the Royal Agricultural Hall,

Islington, London, N., from July 3 to 14, 1905, are now practically completed. Although the first announcement of the date was not made until a few weeks ago, numerous applications have been received, and more than two thirds of the space in the main hall has already been allotted. Several important firms have applied for double the amount of space that they occupied in the last exhibition; and although there will be some change in the plan of the floor, it will be very similar to that in 1902. Several technical associations will, it is expected, hold meetings at the hall during the Exhibition, which will also be visited by official deputations from local authorities and companies, working electric tramways and railways throughout the country.

The Sunderland District Electric Tramways, Limited, will soon have in operation a line of tramways which will form a connecting link between a string of populous centers and join up the townships of Hetton-le-Hole, Houghton-le-Spring, the Herringtons, Silkesworth and Ryhope, with branches from Houghton-le-Spring to Fence Houses station on the North-Eastern Railway, and from New Herrington to Penshaw station on the same line. The new line, a third of which has already been completed, will serve a most important and populous coal mining district, the population along the route numbering 125,000, while within a 12-mile radius there is a populace of at least ten times that number. Involving an outlay of £227,000, the new line will join Sunderland Corporation system at Grangetown, and as a considerable portion of the district is not directly accommodated by any railway, the Sunderland and District Electric Tramways will supply a very welcome means of up-to-date locomotion, as well as lead to the further development of an already prosperous district. The company's contracts provide for the construction of permanent way, the erection and equipment of a generating station, the electric overhead accessories of the line, and the supply of thirty double-deck cars. The electrical machinery and rolling stock, for which Messrs. Bruce, Peebles, and Company, of Edinburgh, are the contractors, are also well advanced.

An important electric tramway scheme has just been sanctioned in the county of Middlesex by the Light Railway Commissioners. The tramways, which will run to a total length of 21 miles, include, among others: (1.) A line of about 3 miles, commencing in Green Lanes, and passing as far as Green Dragon Lane. (2.) A line of about 1¼ miles, from Turnpike Lane along High Street, Hornsey as far as the foot of Muswell Hill. (3.) A line about half a mile long beginning in Palace Gates Road, and ending in Lordship Lane. (4.) A line 4 miles long, commencing at the county boundary in Finchley Road, passing along Regent's Park Road, and Ballard's Lane, and ending in the Great North Road. (5.) A tramway of 7 furlongs commencing in the Edgware Road, and terminating in the Finchley Road. (6.) A line 2½ miles long commencing in the Harrow Road, and ending at Horn Lane. (7.) A tramway 1½ miles long, beginning at Green Lanes, and going to Edmonton and Enfield. (8.) A tramway 2½ miles long, from the Harrow Road, and terminating in the Edgware Road, at its intersection with Cricklewood Lane. Two of the schemes are interesting as giving access to the Alexandria Palace.

A. C. S.

PARIS LETTER

(From Our Regular Correspondent.)

In 1899 the Minister of Public Works granted concessions to several companies to build what were called "penetration" lines of tramway into the city, from outside districts. As we have several times pointed out, few of these enterprises have been commercial successes, notably the Est Parisien, the Ouest Parisien and finally the line Vanves-Champ-de-Mars, operating in the southwest district of the suburbs, which was obliged to consent to a seizure of its cars and machinery to satisfy the needs of its creditors. In this case, however, and at the last moment, the State intervened and declared that the seizure was illegal in view of the public character of the enterprise, and also that the tramway lines were no more liable to foreclosure by creditors than are the public roads over which they pass. The case will, of course, be brought before the highest tribunals and presents a lively interest to the companies holding the concessions granted in 1899.

The Paris Metropolitan Company, after having started the first few months of the present year with a large increase in traffic receipts, is not continuing the increase, and the receipts are, if anything, a little lower than those of the same months of 1903. The opening of the No. 3 line, towards the close of the summer, will of course have an immediate effect on the existing lines with which it forms a connection.

Some further details are at hand regarding the new power station at St. Ouen destined to supply power for the Metropolitan

lines (although owned by a private company). The boilers will be of the Babcock & Wilcox marine type, numbering in all twenty, with a heating surface of 420 sq. m. each. Mechanical stokers, superheaters and economizers will be installed. The station has been designed to supply current for the apparatus discharging coal from barges in the Seine close at hand, and transporting it to the doors of the furnaces.

There is to be held at Grenoble between Aug. 4 and 11 this year, an exposition of safety devices for the protection of overhead and other lines. Grenoble is the center of the favored district using mountain torrents and streams for the generation of energy, and the exposition is under the auspices of the "Houille Blanche" committee, which held the interesting congress in this city some two years ago. The exhibition will include all manner of safety devices for transmission and trolley lines, underground feeders, etc., with especial regard to atmospheric discharge and short circuits. The exposition is open to foreign as well as French exhibitors.

Apropos of this, some interesting experiments have recently been made at Evian-les-Bains on a series of protective apparatus invented by M. Giraud for overhead transmissions and trolley lines. At Evian-les-Bains there is installed in the private park of the Evian Water Establishments a transmission of 3000 volts, and a trolley line with two conductors, with a difference of potential of 200 volts, and presenting some sharp curves. The apparatus in question is in principle a device for short-circuiting the line at the moment of rupture of the trolley wire or other conductor. It is based on the action of the difference of mechanical tension caused at the insulator or trolley ear on the breaking of the conductor. The ear or insulator is mounted on a pivoted lever, the extension of which is arranged to make contact with the second conductor or the ground, as the case may be, whenever, after rupture, the pull exercised by the suspended end of the line causes the lever to rotate on its axis, and the opposite extension to make contact with the short-circuiting device which is, of course, mounted on the pole supporting the conductor.

The accumulator cars running for the past five years between Milan and Monza (Italy) have discontinued operations. The abandonment of this scheme was hastened by the installation of a trolley line between these two towns by the Milan-Edison Company.

On the other hand, the German town of Dresden (Saxony), after having been rather favorably impressed with the Dolter surface contact system of traction, has now installed accumulator cars in the town and district. The motor-car consists of two parts with a flexible coupling. The four motors are each of 27-hp, gear ratio 2.21, and the two motors of each part of the car are connected in series. The length of car is 18 m 90, and weight is 44 tons. The average speed is stated to be 45 km per hour. The car holds ninety-eight passengers. The battery contains 184 elements of a capacity of 430 ampere-hours, and the cells are beneath the car seats.

An important scheme has been promoted in Denmark for a 100-km line between Frederikssund and Nestved, crossing the Isle of Seeland. The service will be started in 1905. The cost of construction is estimated to be 3242 Cr. per km.

A few interesting figures can be quoted from German government publications regarding the standing of tramways in the kingdom of Prussia in 1903.

In April, 1903, there were 148 enterprises, with a total length of 2480 km. Berlin itself accounts for 304 km, but the average length of line is 16.7 km; of the 148 enterprises above mentioned, some 26 (279 km) are purely industrial or agricultural roads. Of the total length of 2480 km operated, there were 2215 km electric (102 companies) and 111 km (17 lines) steam operated. Horse traction is still represented by twenty-three lines with a length of 100 km; 49 km (two lines) are operated jointly by horses and electric power. The capital investment for these tramways is calculated to be 573,152,000 marks (or 231,250 marks per km narrow-gage track and 342,200 marks per km for standard gage track). Of the 124 companies in service which have published results of their operations, thirty-two have paid no dividends. Others have paid various dividends, 5 per cent on the capital in twenty-three instances, and 5 to 10 per cent for eighteen cases. In the case of three companies, the dividends exceeded 10 per cent.

The above results are purely those affecting tramways. Inter-urban railways, or railways of local interest, numbered, in 1903, some 226 (7330 km), of which one (Pomerania) figures for 1317 km and another (Brandebourg) for 700 km. Steam traction is generally employed, accounting for 6950 km out of the above total, and including 208 different lines. There were fifteen electric lines, with a length of 341 km, while three included a mixed system of traction, with a kilometrage of 35. The capital expenditure represented 383,040,700 marks, or an average of 52,270 marks per kilometer. Of the 160 companies giving regular service, fifty paid no dividend in 1903, 100 distributed 1 to 5 per cent, seven paid 5 to 10 per cent, and three paid over 10 per cent.

In view of the high cost of fuel (0.61 Frs. per train-kilometer) the St. Gothard Company has been studying the question of electric traction, with hope of reducing the expense per train-kilometer to 0.44 Frs., implying an economy of over 16 per cent. The figure of 0.44 Frs., includes interest and reserve fund as well as maintenance expenses of an electric installation. Mr. Huber, of the Oerlikon Works, estimates that the requisite capital would be about five millions of francs for the establishment of electric traction between Erstfeld and Bellinzona. It will be remembered that experiments with an Oerlikon locomotive have already been made on the trial length of 700 m., with a single-phase current of 12,000 volts, transformed on the locomotives.

The Metropolitan Railway Company, of Paris, states that it has on order 167 motor cars destined for the two lines in service, and also ninety for the No. 3 line soon to be opened. For the No. 3 line fifty-six trailers are also on order.

An important order has been placed in France for nearly 300 motor and trailer cars destined for the Underground Electric Railways of London. Four different companies are handling this order, three of which are on the outskirts of Paris. M. V.

AN OLD PAPER IN A NEW FORM

Commencing with the issue of June 17, the Railroad Gazette, which for a long time has been published with a large page, reduced the size of its page to 10 ins. x 13 ins., or practically the same size as most of the other technical papers. The change gives the paper a greatly improved appearance and will undoubtedly be welcomed by its many readers. The Railroad Gazette is one of the most highly esteemed of the exchanges which reach this office, and any change of this kind which makes the paper more easily read and afterwards more convenient to bind and place on the shelves, is one which will be generally welcomed.

DECISION IN BROOKLYN TRANSFER CASE

The Appellate Division of the Supreme Court, Second Department, in Brooklyn, has decided that the railroad law makes it obligatory for street railway corporations to give continuous passages over their lines and their leased lines for a single fare, or, in other words, to issue transfers between their own lines and their leased lines. The opinion, written by Justice Woodward, was handed down in an affirming decision of the First District Municipal Court in inflicting a fine of \$50 on the Brooklyn Heights Railroad Company for refusing to give a transfer from a Vanderbilt Avenue to a Crosstown car on Dec. 8, 1903. The contention of the company was that the Vanderbilt Avenue line, which is a part of the old Nassau system, was being operated under an entirely different lease from that under which the Crosstown line, part of the Brooklyn City Railroad system, was, and that therefore the law did not compel a continuous passage over the two lines for a single fare.

Justice Woodward, in his opinion, quotes the law of 1890 regarding leasing and leased lines as follows:

Every such corporation entering into such contract shall carry or permit any other party thereto to carry between any two points on the railroads or portions thereof embraced in such contract any passenger desiring to make one continuous trip between such points for one single fare, not higher than the fare lawfully chargeable by either of such corporations for an adult passenger; and every such corporation shall, upon demand and without extra charge, give to each passenger paying one single fare a transfer entitling such passenger to one continuous trip to any point or portion of any railroad embraced in such contract, to the end that public convenience may be promoted by the operation of the railroads embraced in such contract, substantially as a single railroad, with a single rate of fare. For every refusal to comply with the requirements of this section the corporation so refusing shall forfeit \$50 to the aggrieved party.

Speaking of the consolidation of the systems, the opinion says:

As the privilege was granted only in connection with the obligation to furnish transfers over all of the lines embraced in the contract, as the Brooklyn City Railroad Company was under contract, and in effect a part of the Brooklyn Heights Railroad Company's system, at the time that the Nassau Electric Railroad Company entered into its contract with the Brooklyn Heights Company, it is difficult to understand why the latter should be relieved from responsibility in the present case. As the operating company the Brooklyn Heights company has received the benefits of the privilege conferred by the statute; no good reason is suggested why it should not have discharged the obligation imposed by the statute as a condition of that privilege. * * * * It was the burden which was intended to go with the privilege, and this purpose ought not to be defeated because the plaintiff's initial trip was upon the Nassau Electric line, to be completed upon the Brooklyn City line, instead of upon the Brooklyn Heights line, to be completed upon one or the other of the lesser roads.

This would permit the defendant to enjoy the advantages of the statute without the reciprocal advantage to the public which was contemplated by the transfer provisions of the law.

JOINT PASSENGER ARRANGEMENTS OF NORTHWESTERN ELEVATED AND ST. PAUL

President Clarence Buckingham, of the Northwestern Elevated, of Chicago, is quoted as stating that negotiations are proceeding with excellent prospects of success between his company and Chicago, Milwaukee & St. Paul for joint passenger arrangements over the Elevated and St. Paul's Evanston division. Ordinance to permit the use of electricity on the St. Paul tracks and a connection with the Northwestern Elevated has been introduced in the City Council.

INTERNATIONAL ELECTRICAL CONGRESS AT ST. LOUIS

Indications point to a large attendance at the Electrical Congress, to be held in St. Louis, Sept. 12-17. The following bodies have already promised to hold simultaneous conventions and joint sessions: The American Institute of Electrical Engineers, the American Electrochemical Society, the American Physical Society, the International Association of Municipal Electricians, the American Electrotherapeutic Association. The following bodies have promised to send delegates to the Congress: The National Electric Light Association, the Association of Edison Illuminating Company, the Société Internationale des Electriciens and the Schweizerischer Elektrotechnischer Verein. It is also expected that the Institution of Electrical Engineers of Great Britain, and the Elektrotechnischer Verein, of Berlin, will send delegates.

The delegates accredited to the Congress from various co-operating bodies are not expected to be called upon to vote upon any questions of national importance. All matters concerning units, standards, etc., will lie within the province of the chamber of government delegates. All delegates of the co-operating bodies are invited to read papers before any session of the Congress they select. Such papers will be printed in the Congress transactions as being offered by the delegate on behalf of the co-operating body. The paper and discussion thereon will subsequently be offered by the Congress to the co-operating body for incorporation in its own transactions, if desired.

The delegates of the American Institute of Electrical Engineers and their papers to the Congress are as follows: Ralph D. Mershon, Section D., "The Maximum Distance to which Power can be Economically Transmitted." Prof. M. I. Pupin, Section A, "Electrical Impulses and Multiple Oscillators." Prof. C. P. Steinmetz, Section D., "The Theory of the Single-Phase Motor."

The delegates of the National Electric Light Association and their papers to the Congress are as follows: George Eastman, Section E., "Protection and Control of Large High-Tension Distributing Systems." G. Ross Green, Section E., "American Meter Practice." Dr. F. A. C. Perrine, Section D., "American Practice in High Tension Line Construction and Operation."

The delegates of the Association of Edison Illuminating Companies and their papers to the Congress are as follows: W. C. L. Eglin, Section E., "Rotary Converters and Motor Generators in Connection with the Transformation of High-Tension Alternating-Current to Low-Tension Direct Current." L. A. Ferguson, Section E., "Underground Electrical Construction." Gerhard Goettling, Section E., "Storage Batteries as an Adjunct to Station Equipment."

The following is the programme of papers promised for Section F., which is that on Electric Transportation:

Chairman, Dr. Louis Duncan; secretary, A. H. Armstrong. Ernst Danielson, "Theory of Compensated Repulsion Motor"; Philip Dawson, "Electrification of British Railways"; Herr. F. J. Eichberg, "Single-Phase Electric Railways"; Prof. Dr. F. Niethammer, "Alternating vs. Direct-Current Traction"; Prof. Dr. Rasch, "The Booster in Railway Service and its Most Suitable Control"; A. H. Armstrong, "The Electrification of Steam Lines"; B. J. Arnold, "Electric Railways"; Louis Duncan, "General Review of Railway Work"; J. B. Entz, "The Storage Battery in Electric Railway Service"; C. O. Mailloux, to be announced; E. H. McHenry, "Some Qualifications of Electric Railway Equipment for Trunk Lines"; R. A. Parke, "Braking High-Speed Trains"; W. B. Potter, "Electric Railways"; F. J. Sprague, "The History and Development of the Electric Railway"; L. B. Stillwell, "Notes on the Electrical Equipment of the Wilkesbarre & Hazleton Railway Company"; H. G. Scott, "Central Station Economics and Operation"; W. J. Wilgus, "Equipping the New York Central Railroad Terminal."

Up to June 23, 1776 adhesions to the Congress had been received, and over 150 papers promised. Twelve of these papers have already been delivered. Arrangements are now being completed for printing papers in advance of the Congress so that all that are received in sufficient time will be ready for circulation among the Congress members at St. Louis. Efforts are being made to secure as many of the promised papers as possible in advance.

THE PROPOSED LINE FROM NEWARK, N. J., TO LAKE HOPATCONG

Plans are now being drawn up for the construction and equipment of the proposed high-speed electric railway to run over private right of way from Newark, N. J., to Lake Hopatcong, with a branch to Boonton. The length of the system will be about 45 miles. There will be 30 miles of double track. The Northern Counties Electric Railway Company will operate the line. Mr. Cornelius C. Vermuele, of New York City, is the consulting engineer, and Mr. E. W. Hammer has been retained as electrical expert. A power plant will be built at tide water in close proximity to Newark. The capacity of the plant will be 4000 hp. Contracts for material, equipment, etc., are not expected to be let before December.

MORE EQUIPMENT FOR SAO PAULO

The Sao Paulo (Brazil) Tramway, Light & Power Company, Ltd., of which William Mackenzie, of Toronto, Can., is president; F. S. Pearson, 29 Broadway, New York, consulting engineer and W. P. Plummer, same address, purchasing agent, has just placed an interesting contract for additional equipment to be installed in the company's hydraulic plant on the Rio Tiete, located about 20 miles from Sao Paulo.

The General Electric Company secured the contract for the generator end, which calls for a 2500-kw machine. The water-turbine will be supplied by Escher-Wyss. The machinery now ordered, together with the existing plant, will be capable of developing upwards of 10,000 hp.

The company proposes to order further equipment in the near future. James Mitchell, formerly head of the now dissolved electrical engineering and contracting firm of James Mitchell & Company, of Rio de Janeiro, is now general manager of the Sao Paulo Company, with headquarters at Sao Paulo.

CANADIANS IN BRAZILIAN TRACTION PROJECT

Sir William Van Horne, Hon. Geo. A. Cox, William Mackenzie, E. R. Wood, Frederic Nicholls, of Montreal, Can., are primarily interested in a project to convert into electric traction 100 miles of mule-roads operating in and around Rio de Janeiro, Brazil.

The Rio de Janeiro Tramway Light & Power Company is being formed in Montreal in order to carry out the scheme. It is proposed to acquire the lines of the Companhia Carris Urbanis, the Companhia Ferrocarril Cariaco, the Companhia Ferrocarril Villa Isabel and the Companhia de Sao Christovoa, etc. The initial capital of the company will be \$25,000,000. Power will be derived from an hydraulic plant located 75 miles from Rio. F. S. Pearson is the consulting engineer.

ANNUAL OUTING OF NEW ENGLAND STREET RAILWAY CLUB

It is a delightful custom of the New England Street Railway Club to arrange for the June meeting of the association and excursion and outing trip which shall involve a complete departure from the usual business procedure and bring the members into a participation of friendly and pleasant recreation. It is a wise provision of the club, and serves to renew and extend the acquaintances of the members, as well as effect a beneficial diversion from the routine of their daily work. This year the annual outing consisted of an excursion to Salem Willows, the beautiful watering place of historic Salem, Mass. A more delightful spot could not have been selected, as measured by the pleasure derived by the members.

The outing was held Tuesday, June 21, the members leaving Boston by special train for Lynn, where special electric cars of the Boston & Northern Street Railway Company were in readiness to carry them to Salem and thence to "The Willows." Through the courtesy of the officials of the Boston & Northern the members were carried as guests of the road, and were permitted to examine the character of their lines and equipment. Upon arrival at the Willows a baseball game furnished much amusement, a strenuous battle being waged between the participants, The Railway Men vs. The Supply Men. Another feature of the day was a steamer trip to Baker's Island, an important island some 5 miles off Marblehead, which afforded a pleasant run upon the water.

The substantial provision for the outing consisted of a "shore dinner" at Chase's, which was greatly enjoyed. It is the opinion of the members that Chase's fish dinners, which have been popular in New England since 1874, are unexcelled, especially upon an outing day. The dinner was followed by an interesting and humor-

ous address from the Mayor of Salem, after which a brief business session of the club was held, before adjournment. The party returned by special cars over the same route by which they came, all agreeably impressed with the value of the annual outing.

MISSOULA LIGHT COMPANY TO BUILD ELECTRIC RAILWAY

The Missoula Light & Water Company, of Missoula, Mont., is considering the matter of installing an electric street railway in the city, and also an interurban extension of the same. Manufacturers should communicate with S. R. Inch, manager of the light department of the company.

ELECTRICITY ON THE NEW HAVEN BETWEEN FALL RIVER AND NEWPORT

The Newport "Herald" seems to know all about the electrical equipment of the New York, New Haven & Hartford Railroad between Newport and Fall River. In a statement in terms not at all uncertain, it says plans are completed for the change of motive power and that work has begun upon the equipment necessary for the change. The company has purchased a large tract of land in Fall River, close to the Ferry Street station, where the power house is to be erected. The company, so the "Herald" says, will continue to run special trains of steam cars between Newport and Fall River, as well as Boston, but the regular service will consist of trolley passenger and freight cars of the largest and most modern pattern. The service will give Newport additional trains and a cheaper fare to Fall River and Providence, direct to the latter city by trolley, changing at Fall River, while to other points the steam cars will connect at Fall River. Later another branch of trolley cars, operated from Fall River, will be inaugurated.

REPORT OF THE NEW YORK CITY RAILWAY COMPANY FOR THE QUARTER ENDING MARCH 31

The reports of the New York City Railway Company and the Third Avenue Railroad Company for the quarter ending March 31, 1904, filed with the Railroad Commissioners at Albany show as follows:

	NEW YORK CITY RAILWAY COMPANY	
	1904	1903
Gross earnings	\$3,262,844	\$3,573,469
Operating expenses	2,052,466	1,835,804
Net earnings	\$1,210,378	\$1,737,665
Other income	190,615	151,335
Total earnings	\$1,400,993	\$1,889,000
	THIRD AVENUE RAILWAY COMPANY.	
Gross earnings	\$475,992	\$511,530
Operating expenses	224,933	346,990
Net earnings	\$251,059	\$164,540
Other income	200,188	128,755
Total income	\$451,247	\$293,295

Concerning the decrease shown in the net earnings of the Metropolitan system for the winter quarter, comprising the months of January, February and March, as given above, President Vreeland makes the following statement: "For the two preceding quarters, which constitute the first half of the fiscal year, the gross income of the system showed an increase over the previous year of \$263,827, resulting in a surplus of \$59,085 over all fixed charges, including the 7 per cent dividend guaranteed on Metropolitan stock, but in the winter quarter the unusual amount of snow and the unfavorable weather conditions generally (nothing approaching which has been experienced in the previous history of the company), not only considerably reduced the gross earnings, but very materially increased the operating expenses. Furthermore, about 60 per cent more accident cases (principally for accidents which occurred more than three years ago) were disposed of than during the corresponding quarter of the previous year. As a result of these causes, the operating expenses for the quarter were forced up about 20 per cent above the normal rate.

"At the present time our operating expenses are down to the normal basis and the gross earnings of the system show a substantial increase over the corresponding period of last year. Notwithstanding the bad winter months and the fact that the elevated roads, with their improved electric service, have absorbed most of the new passenger business developed during the year, the receipts of our system of surface lines for the fiscal year ending June 30, will be only a few thousand dollars less than last year."

PERSONAL MENTION

MR. JOHN B. WHITE, of J. G. White & Company, and brother of Mr. J. G. White, was married June 9 at Stoke Poges Church, Buckinghamshire, England, to Miss Stevens.

MR. G. W. CHANCE, of G. W. Chance & Company, Philadelphia, will visit the principal European cities during July and August for a combined business and pleasure trip. He sails from New York July 2, on the Koenigin Luise.

MR. GEO. F. GREENWOOD, chief engineer and general manager of the Havana Electric Railway Company, is now on a visit to the States. He is making his headquarters at the New York offices of the Company at No. 52 Broadway.

MR. W. B. GRAY, resident secretary in Demerara, of the Demerara Electric Company, Ltd., which concern operate some 10 miles of electric traction system in Georgetown, Demerara, British West Indies, is now on a visit to the States. He may be found at the New York offices of the Elmer P. Morris Company.

MR. WILLIAM H. COLE, of New York, has just been appointed chief engineer for the Goldschmidt Thermit Company, of 43 Exchange Place, New York City, and will have charge of the introduction and installation in this country of the Goldschmidt joint which has been used so extensively abroad. Mr. Cole was one of the pioneers of the electrical business in this country, having been engineer for the Union Passenger Railway Company, of Richmond, at the time of the installation of the Sprague electric railway system in that city in 1888, and represented the owners through that historical work. During the past ten years he has spent most of his time abroad engaged in electric railway engineering. Among the electric railways in whose equipment he has taken an active part during this time are those in Buenos Ayres, Rio de Janeiro, the City of Mexico and Singapore. It was while in Singapore that Mr. Cole's attention was particularly attracted to the Thermit joint, as that process was used in that city, and under his direction about 5000 Thermit joints were cast and are now in successful use in Singapore.

MR. WALTER H. WHITESIDE, who, until within the past few days, has been the manager of the detail and supply department of the Westinghouse Electric & Manufacturing Company, of Pittsburg, and general manager of the Sawyer-Man Electric Company, of New York, has just been appointed general manager of the sales department of the Allis-Chalmers Company. Mr. Whiteside's first business connection dates back to 1881, when he entered the employment of the Hercules Powder Company, the high-explosive or dynamite branch of the Dupont Powder Company, of Wilmington, Del. Four years later he became associated with the Cleveland Electrical Manufacturing Company, of Cleveland, Ohio, and remained with that concern nearly twelve years, serving during the first two years in various capacities, and for the remainder of the time being the manager of that company's Chicago office. In 1896 Mr. Whiteside was appointed manager of engine sales for the Gates Iron Works, of Chicago. In 1898, the Westinghouse Electric & Manufacturing Company made him the manager of its Washington office. In that position he became associated not only with the largest electrical projects undertaken in the district which his office covered, but in other places farther afield; his engineering work in connection



WALTER H. WHITESIDE

with the installation of electrical power in the dry docks of the navy department, especially the docks at Portsmouth, League Island and Boston, having been widely recognized. To him was largely due the credit for effecting the change in voltage standardization from 80 to 125 volts in the electric lighting and power installations on board the vessels of the United States Navy.

But Mr. Whiteside's best work in the commercial sense was in connection with that immensely successful branch of the Westinghouse Electric organization known as the detail and supply department. Into this department he injected a new life and vigor of administration that brought an admirable reaping of profitable results and won him recognition for marked executive ability. About a year ago Mr. Westinghouse appointed him general manager of the Sawyer-Man Electric Company, of New York, thereby practically doubling his duties, for he continued the management of the detail and supply department of the parent company at Pittsburg. Mr. Whiteside's new position will be that of general

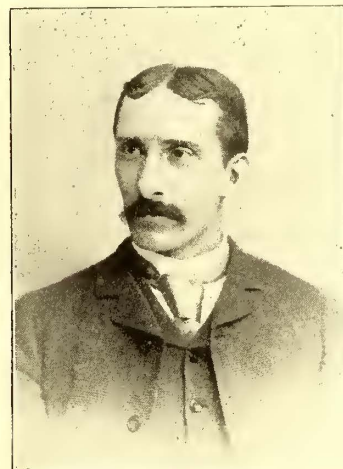
manager of sales for all departments of the Allis-Chalmers Company, including, of course, the Bullock Electric Manufacturing Company, which has become the electrical department of the Allis-Chalmers Company. His experience thoroughly qualifies him for this important duty, which he takes up with the good wishes of his very wide circle of business acquaintance. Mr. Whiteside enters upon his new duties about the middle of July.

MR. HENRY DEANE, engineer in chief of the New South Wales Government Railways & Tramways Department, which operates the extensive American equipped electric traction system in Sydney and suburbs, is now in the States seeking pointers on street railway construction and operation. At present he is in St. Louis. He is expected to be on this side for about three weeks, and may be addressed, care of R. W. Cameron & Company, 23 South William Street, New York.

MR. G. C. KUHLMAN, general manager of the G. C. Kuhlman Car Company, of Collinwood, Ohio, has resigned from that position, and is planning to take an extended vacation. Mr. Kuhlman is one of the best-known car builders in the country, and has been prominently identified with this industry for a long time. His plans for the immediate future include a pleasure trip with his family, probably to the Pacific Coast. Mr. Kuhlman has not taken a vacation for a long time, as he has given his concentrated attention to his car-building works, and this rest will be an agreeable one to him.

MR. RALPH H. BEACH, who, for the last seventeen years, has been prominently connected with the General Electric Company, has resigned his position in order to devote his attention to the Tula Iron Works Company of Tula, Mexico, in which he has the controlling interest. He will make his permanent home in the southern republic, for which country he and his family left last week. Prior to sailing he was presented by his comperes in the General Electric Company with a massive punch bowl. Mr. J. J. Malony, of the General Electric Company's railway department, made the presentation on behalf of the General Electric staff.

MR. H. S. COOPER, who is well known in the street railway field, has accepted the position of general manager of the Galveston City Railway, of Galveston, Texas. Mr. Cooper was born in Isle of Wight, England, in 1856.



H. S. COOPER

His first commercial connection was with a mercantile house in Philadelphia. In 1876 he became a manufacturer of agricultural machinery in the South. This connection brought him in touch with electrical enterprises, then just taking shape, and was the foundation of an experience that later made it possible for him successfully to reorganize and place many unstable properties on a revenue-paying basis. His record of achievements in this line secured for him in 1893 the appointment to the position of general manager of the Schenectady properties of the Electrical Development Company. These properties consisted of the entire

electric and gas-lighting and railway service of the city, and were in desperate shape, for the business depression of 1893 had necessitated the placing of them in the hands of a receiver. The receiver was changed in 1894, and in 1895 the properties were sold under foreclosure, and then reorganized. Under Mr. Cooper's management these properties were placed in excellent physical condition and brought to a paying basis. Mr. Cooper's next important work was with the Ithaca Railway Company, of Ithaca, N. Y. This property was rehabilitated under his management and placed on a paying basis. Mr. Cooper has recently been connected with the Development Company, of New York, which does a general engineering business. In his work with this company he made critical reports on all kinds of electrical propositions for clients, and so added to his already wide experience. At Galveston Mr. Cooper will be confronted by some difficult problems. One of these will be the rearrangement of the lines so as to meet the raise in the level of the city from two to twelve feet. The owners of the property, however, have in Mr. Cooper a man well fitted by previous experience for handling just such a problem as is presented. In fact, they have in him a man capable of carrying successfully to completion the most complex physical financial or commercial undertaking that it is possible for the city to present.

TABLE OF OPERATING STATISTICS

Notice.—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. * Including taxes. † Deficit. ‡ Decrease due to floods.

Main table with columns: COMPANY, Period, Total Gross Earnings, Operating Expenses, Net Earnings, Deductions From Income, Net Income, Amount Avail-able for Dividends. Includes entries for AKRON, O.; AURORA, ILL.; ELGIN, AURORA & SOUTHERN TRACTION CO.; BINGHAMTON, N. Y.; BUFFALO, N. Y.; CHICAGO, ILL.; CHICAGO UNION TRACTION CO.; METROPOLITAN WEST SIDE ELEVATED R. R. CO.; NORTHWESTERN ELEVATED R. R. CO.; SOUTH SIDE ELEVATED R. R. CO.; CINCINNATI, O.; DETROIT, MICH.; DULUTH, MINN.; FORT WORTH, TEX.; FINDLAY, O.; HANCOCK, MICH.; HOUSTON, TEX.; MILWAUKEE, WIS.; MINNEAPOLIS, MINN.; MONTREAL, QUE.; NEW YORK, N. Y.; PHILADELPHIA, PA.; ROCHESTER, N. Y.; ST. LOUIS, MO.; SAVANNAH, GA.; SEATTLE, WASH.; SYRACUSE, N. Y.; TAMPA, FLA.; TERRE HAUTE, IND.; TOLEDO, O.