

THIRD RAIL ELECTRICAL EQUIPMENT OF THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD.
(Continued from SCIENTIFIC AMERICAN of June 12, 1897.)

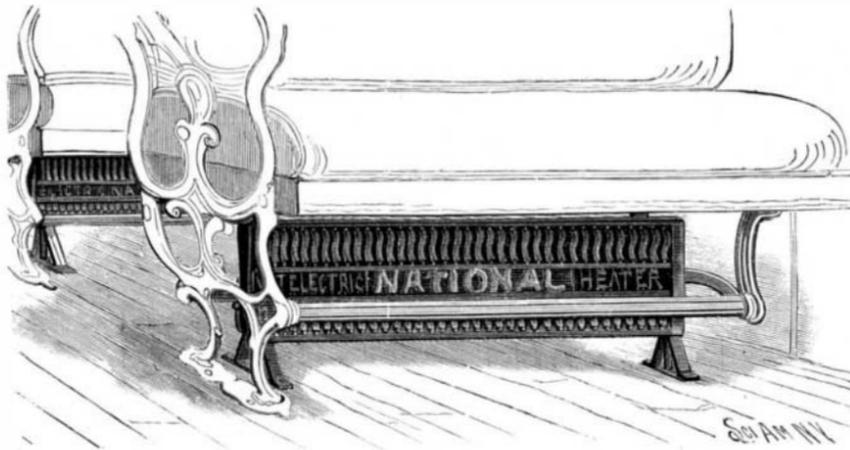
In our previous notice of the electrical equipment of a portion of the lines of the New York, New Haven and Hartford Railroad we stated that the power house at Berlin was a plain rectangular structure 106 feet in width by 117 feet long, the sides and one end being of brick, the other end being temporarily boarded up until the building shall be extended and completed. The building is divided longitudinally by a brick partition wall; the front portion, or that facing the tracks, is two stories in height, the engines and dynamos being installed in the upper story and the heaters and various accessories in the basement. The rear half constitutes the boiler room. Interior views of these rooms will be found on the front page of this issue.

At present the engine room contains a 1,200 horse power engine of the cross compound type, with a 28 inch by 48 inch high pressure cylinder and a 48 inch by 48 inch low pressure cylinder. The flywheel is 18 feet in diameter and weighs over 52 tons. The engine dynamo shaft is of hollow steel, and the engine is direct connected to a General Electric Company's standard 10 pole, 850 kilowatt generator of the ironclad type.

The switchboard shown in the accompanying illustration is set in a bay built out on the front of the building. It is of the standard panel type of the General Electric Company and contains seven panels, of which three only are at present equipped. Two of these are generating panels and the third is a totalizing panel. Upon the former are automatic circuit breakers of extra large size, with magnetic blowout and the usual generator panel equipment; the totalizing panel carries a Form G Thompson 5,000 ampere recording wattmeter and an 8,000 ampere station ammeter. Four cables, each of 850,000 circular mils cross section, run from the switchboard to the third rail.

The boiler room contains ten horizontal tubular boilers, which type has been selected on account of its "simplicity, high economy, and general reliability." In setting the boilers, care has been taken to provide for absolutely free expansion in all directions, and especially in a direction transverse to the axis of the boilers. It will be seen from the illustration that the boilers are suspended from two pairs of I beams, which rest upon the brick partition walls, the suspension rods being linked to straps which are riveted to the shell of the boiler. The great height (48 inches) from the fire bars to the boiler is a noticeable feature, and it was adopted in order to secure a more thorough combustion and a slower passage of the gases to the uptake. It is claimed that with judicious firing the uptake temperature has been kept considerably below the normal for this type of boiler. The grates are designed for burning the half burned coal known as "sparks," which is recovered from the fire boxes of the locomotives of the New Haven road. As there are several hundred tons of this material produced every month, it can be understood that it is an extremely cheap fuel as delivered in the bins at the power house. The pipes which lead down through the partition walls and below the grate are for introducing a mixture of steam and air to supply the necessary oxygen for combustion. Each pipe is slightly flaring at the top, and contains an annular steam pipe perforated on its under side. The gases pass from the boiler tubes to a rectangular flue, which extends the full length of the nest of boilers, and delivers into a cross flue 5½ feet wide by 8 feet deep, which leads to a chimney 125 feet in height on the outside of the building. The "sparks" is deliv-

ered into a row of bins located on the outside of the boiler house, and from these it is drawn off as required into small trucks, which run on a track parallel with the wall of the building. From this track it is switched on to another track, which runs at a convenient distance from the furnaces. The fuel is shoveled directly from the trucks into the furnace. Swinging trucks are also pro-



ELECTRIC HEATERS FOR CLOSED CARS.

vided for carrying away the ashes. Special care has been taken in designing the boiler fronts, which are held in place by clamps, and may be taken down separately in a few minutes by loosening the clamps—an arrangement which will commend itself to practical men at first sight.

Another point which has received special attention is the arrangement of the steam piping. Col. Heft does not believe that it is good policy to put in a costly duplicate system of piping, and he is of the opinion

connected with the header by a heavy seamless copper 9 inch pipe bent to a radius of 8½ feet. The throttle valves are placed at the junction of these pipes with the header, the valves being all of the balanced type. Steam is led to the engine by 12 inch wrought iron pipes with bends of large radius. The piping of the accessory steam plant is so arranged that the engines may be run as condensing or non-condensing. Each side of the engine can be run independently and the feed may or may not be heated, at the option of the engineer.

In the illustration showing the various car couplings will be noticed the electrical car coupling or connector-box. In the earlier experiments considerable trouble was experienced at the exposed point where the wires entered the motors, and the connector box was designed to overcome the difficulty. The connection consists of a hollow brass tube, split at the outer end to give it a tight grip of the motor wire, and incased in a wooden plug. There are two of these and they enter a connector box located beneath the front end of the platform, as shown in the engraving, the box being closed by a lid when it is not in use.

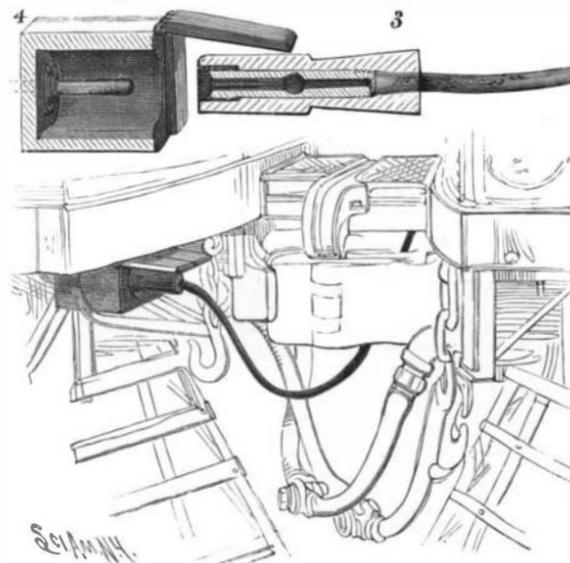
The closed cars are each provided with sixteen electrical heaters, which are placed beneath the seats as shown in the sketch. The degree of current and therefore the temperature is regulated by means of an electrical switch of special construction. There are four graduations on the dial: full, half, low, and off. The dial, which is movable, has the brushes attached to its inner face, and these move upon a series of contacts on the fixed plate. In order to reduce the spark on opening or closing the switch, the switch lever is formed separately from the knife, the former being hinged to

the latter near its junction with the switchboard. Normally the knife is held against the lever by the tension of a plate spring; but when the lever is pulled open the two are separated, the knife snapping suddenly against the lever as it leaves the contacts and reducing the duration of the spark.

The heaters in each coach are connected in series with each other and form a complete circuit extending down on one side of the car and up on the other, in which all of the sixteen heaters are included. This circuit, known as the series wire, has no connection with the heat-regulating switch, neither is the positive (trolley) nor the negative (ground) side of the current supply permanently connected to any portion of this circuit. A variable ground and trolley connection is carried by means of tap wires to one or more points of the series wire or circuit, according to the amount of heat required. As the heat generated is directly proportionate to the amount of current flowing through the wires of each heater, and as this flow of current is governed by the combined resistance of the heaters through which the current must flow, it is but necessary to vary the number of heaters between a point where the current enters and where it leaves again in order to regulate the temperature to any desired degree.



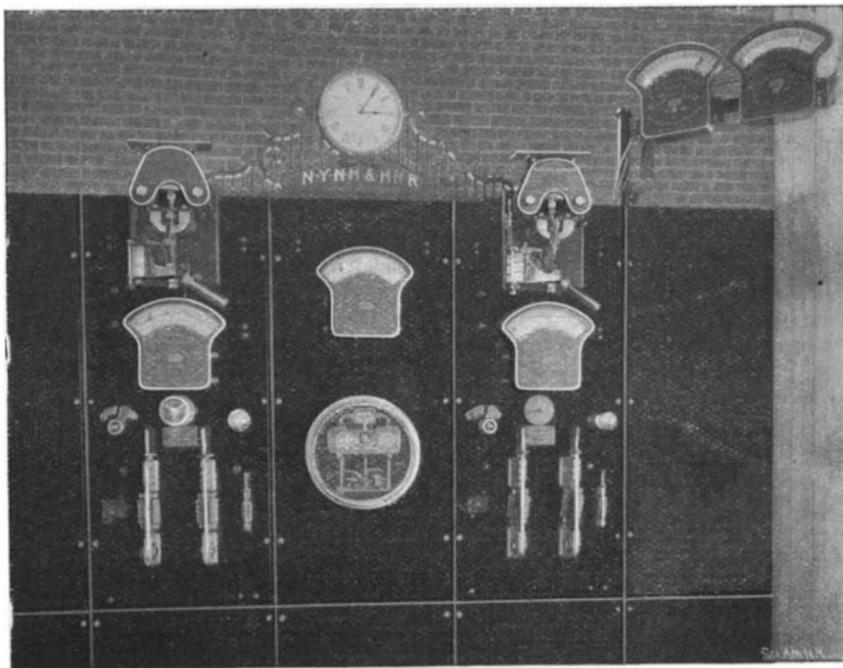
SWITCH FOR ELECTRIC HEATERS.



ELECTRIC CAR COUPLING.

that satisfactory results may be obtained by exercising care and good judgment in the design and erection of a single system. Accordingly, every provision has been made for free movement of the piping under expansion and contraction. In the first place, a 20 inch wrought iron header runs the entire length of the boiler room, at a height of eight feet above the boilers. It has a free longitudinal movement upon rollers, which are carried upon brackets attached to the central partition wall of the building. Each boiler is con-

ected with the header by a heavy seamless copper 9 inch pipe bent to a radius of 8½ feet. The throttle valves are placed at the junction of these pipes with the header, the valves being all of the balanced type. Steam is led to the engine by 12 inch wrought iron pipes with bends of large radius. The piping of the accessory steam plant is so arranged that the engines may be run as condensing or non-condensing. Each side of the engine can be run independently and the feed may or may not be heated, at the option of the engineer.



SWITCHBOARD, BERLIN POWER STATION.

India's Severe Earthquake.

Dispatches from Calcutta, dated June 14, state the gravity of the earthquake shocks of June 12. An extensive area was affected and much misery was caused among many of the poorer Europeans and natives. The shocks were felt over a large territory and traffic on the Eastern Bengal Railroad was interrupted. Bridges have been damaged and a train was overturned on the Assam-Bengal line. The heat prevailing is the highest on record, 126 degrees in the shade having been registered at the Jacobabad, on the frontier of Belochistan.

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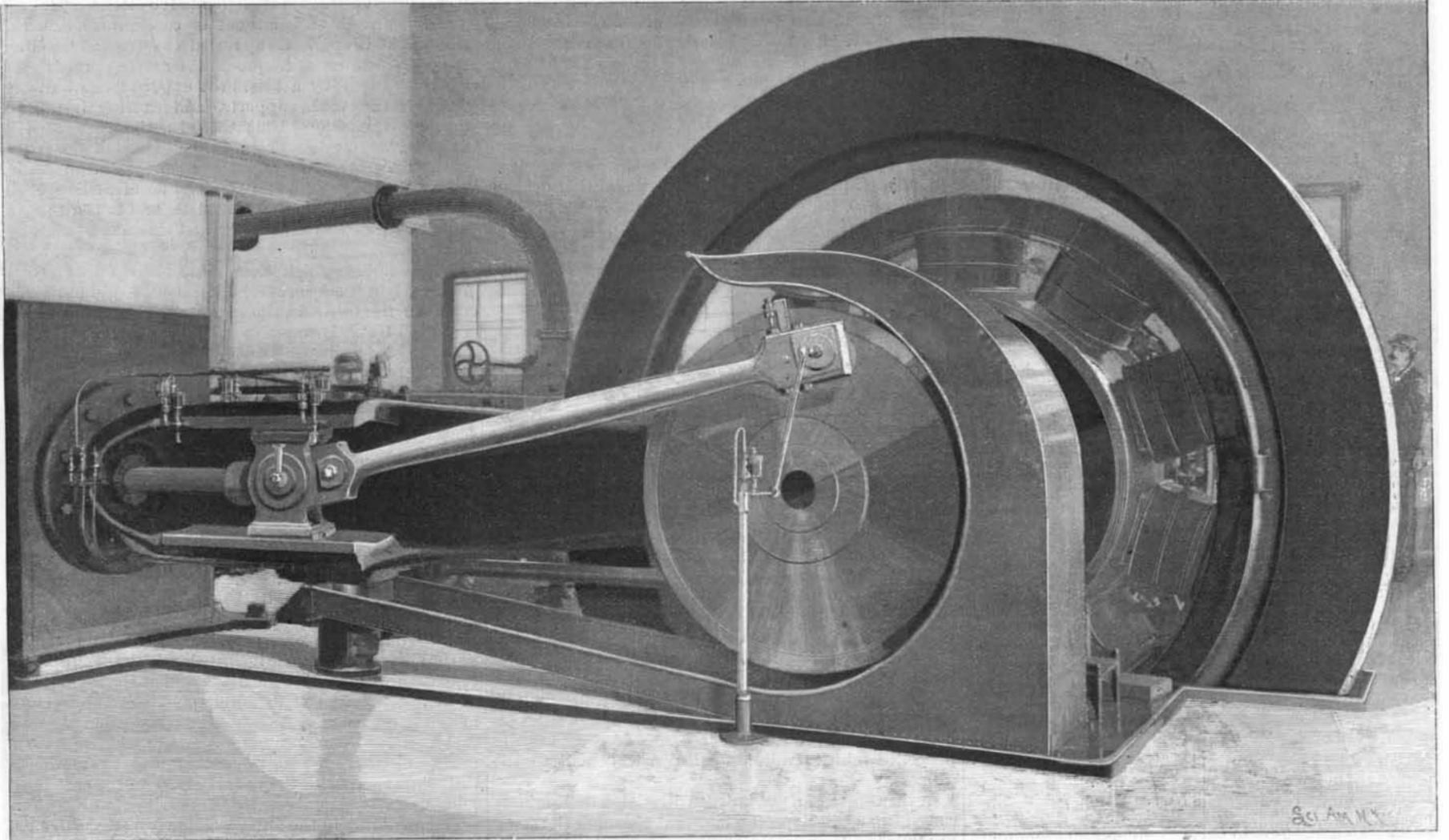
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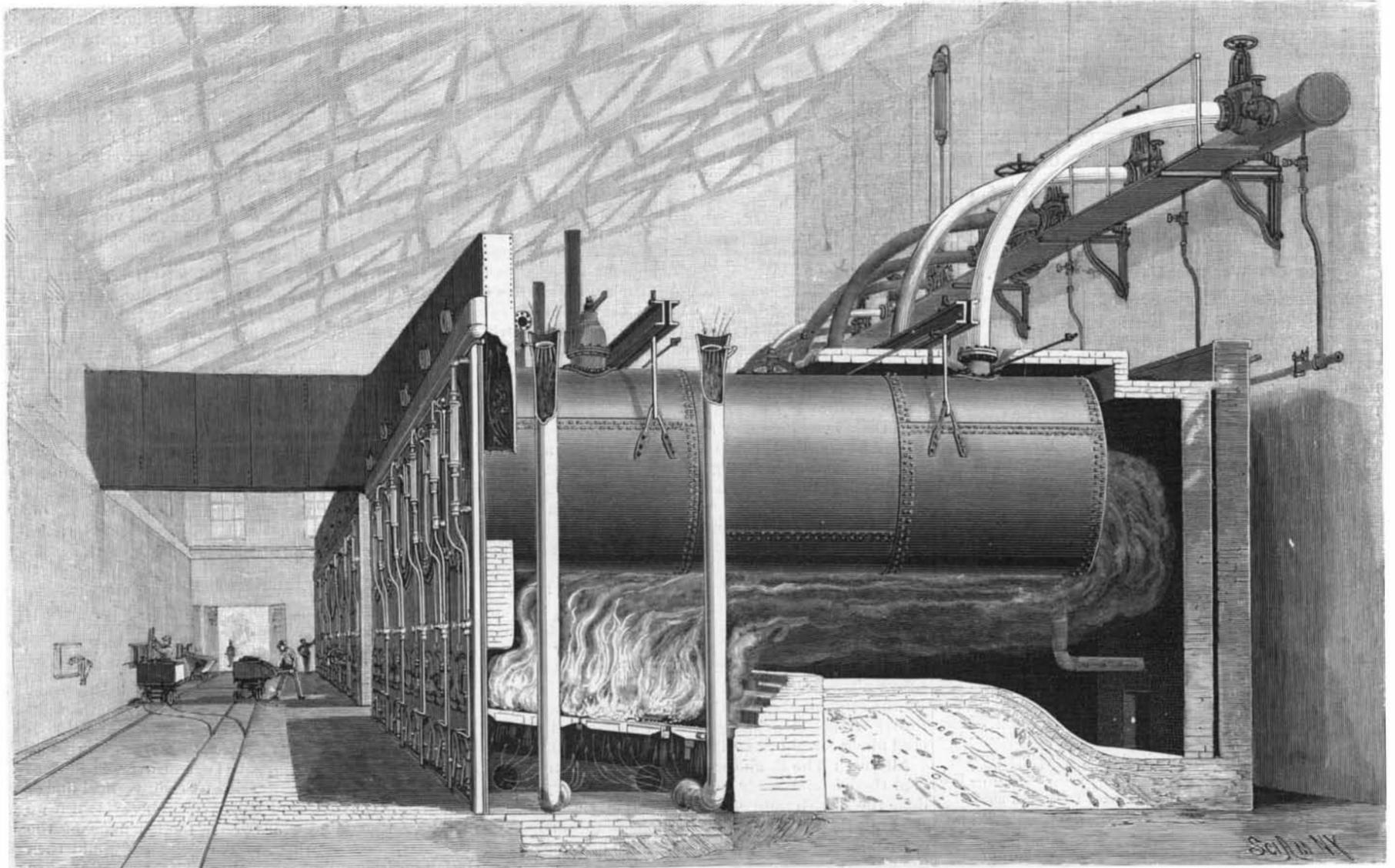
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TWELVE HUNDRED HORSE POWER CROSS COMPOUND ENGINE—BERLIN POWER HOUSE.



THIRD RAIL ELECTRICAL EQUIPMENT N. Y. N. H. & H. RR.—BERLIN POWER HOUSE SHOWING BOILER SETTING.—[See page 408.]