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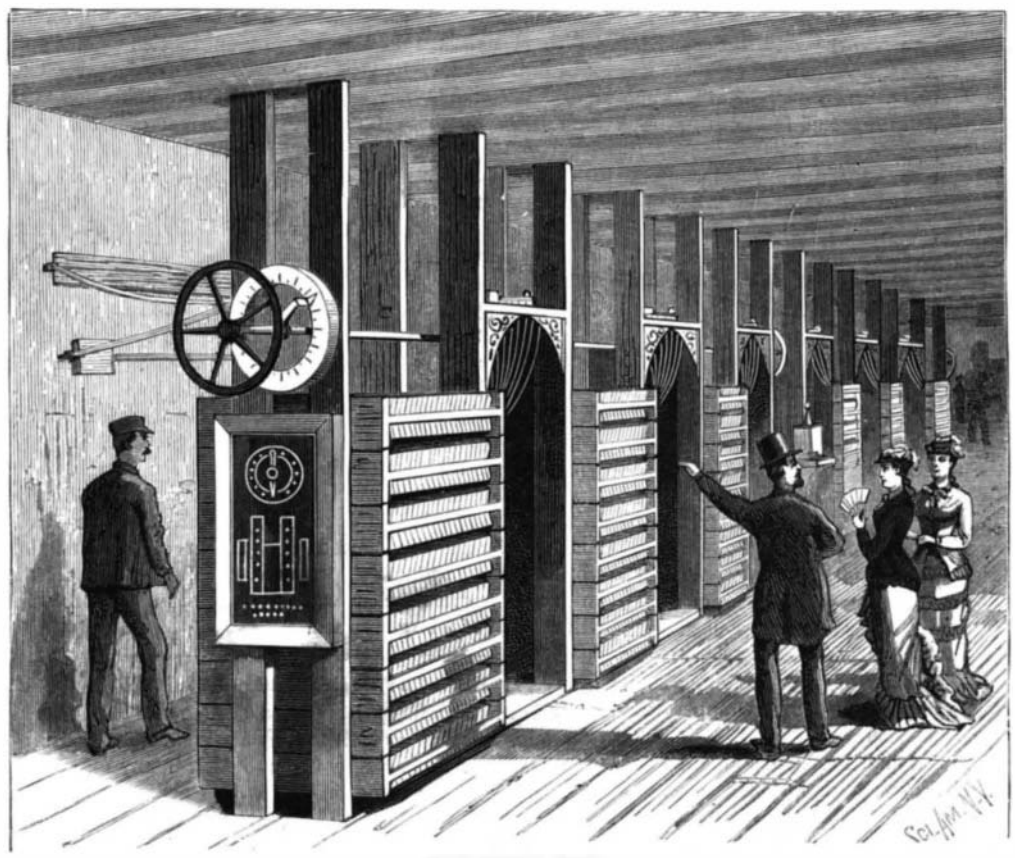
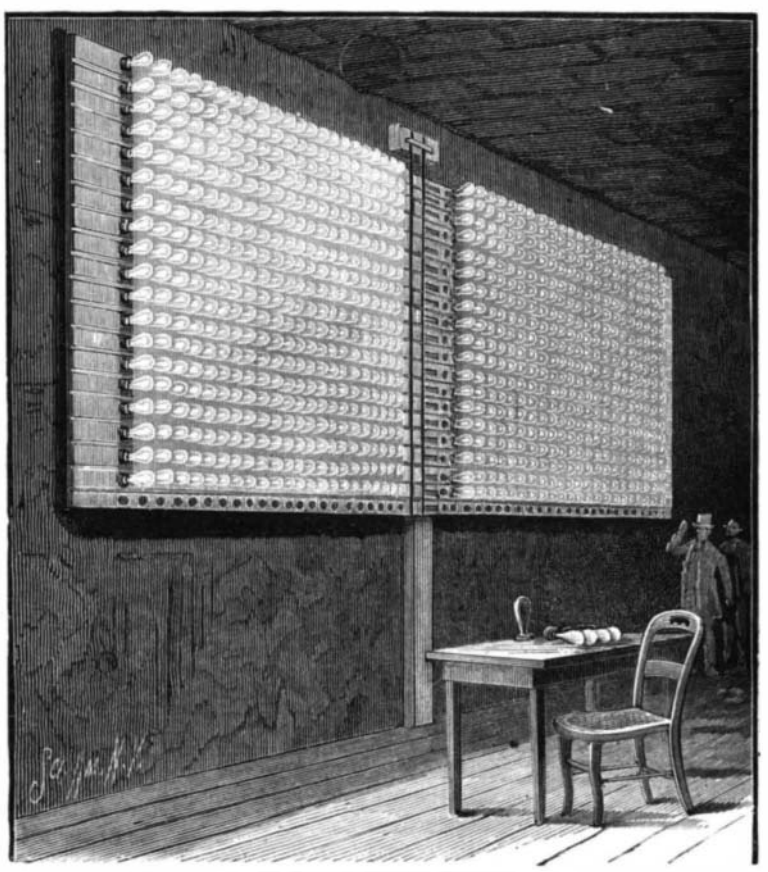
## THE EDISON ELECTRIC LIGHTING STATION.

On Pearl street, near Fulton, under the shadow of the Third Avenue Elevated Railroad, and but a minute's walk from Fulton Ferry, is an iron front building, originally put up for commercial purposes, but which for a year or more has been in process of preparation for a central electric lighting station under the Edison system. The beginning of this great work was indicated by the laying of underground conductors around every block in that portion of the city bounded on the east by the East River, on the west by Nassau street, on the north by Spruce and Ferry streets and Peck Slip, and on the south by Wall street. This district includes 946 consumers, whose premises are already wired. The number of lamps to be used in connection with these wires is 14,311. From the basement of the building referred to radiate large semicylindrical copper conductors, insulated from each other and arranged in pairs, each pair

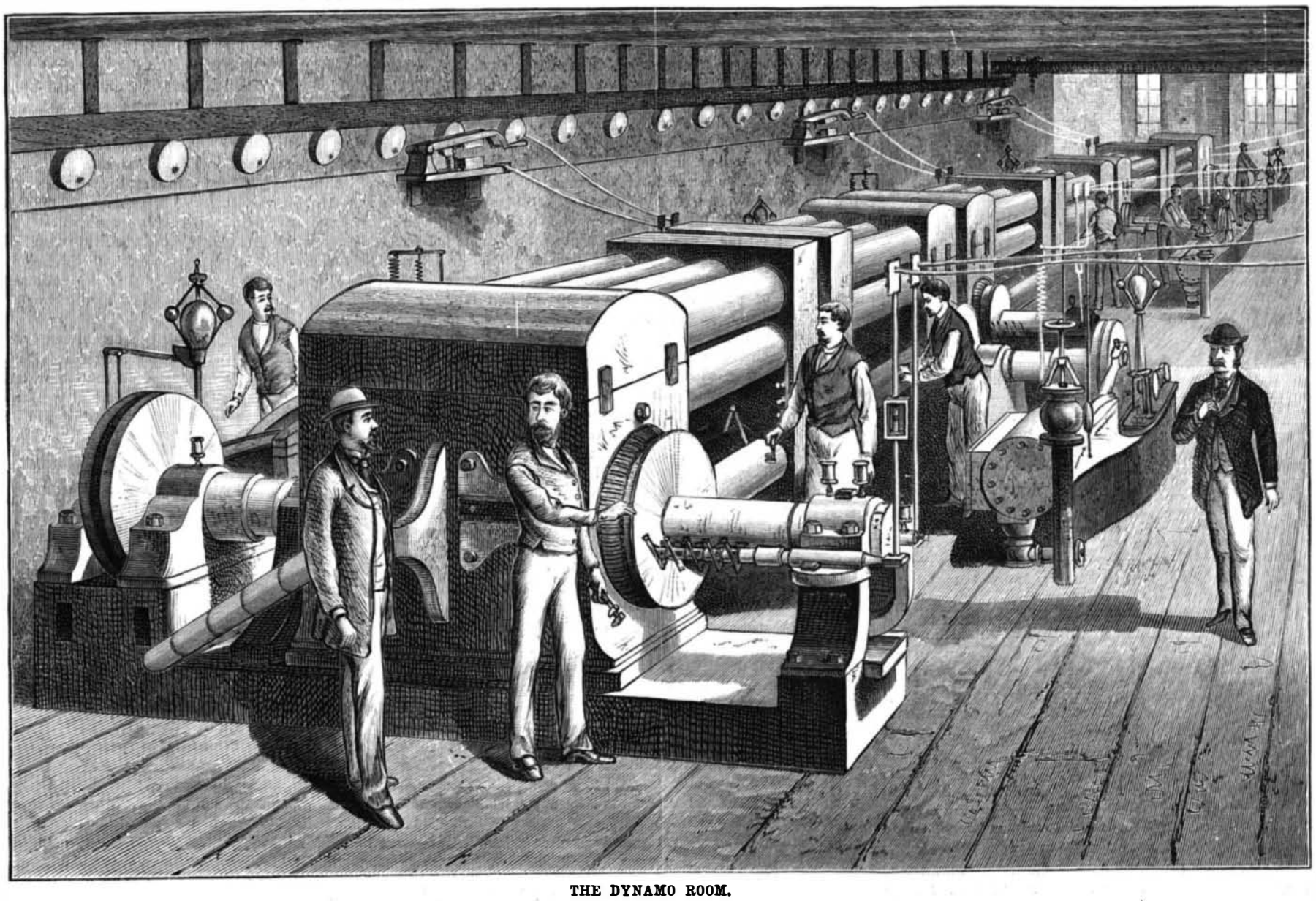
[*Continued on page* 130.]



THE REGULATOR.



TEST BATTERY OF 1,000 LAMPS.



THE DYNAMO ROOM.

**FIRST EDISON ELECTRIC LIGHTING STATION IN NEW YORK.**

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## THE EDISON ELECTRIC LIGHTING STATION.

(*Continued from first page.*)

being inclosed in an iron pipe. At the adjacent ends of these sections of double conductors there are boxes which perform the double function of expansion joints to permit of the free expansion of the individual lengths of conductor, and of service boxes from which to take the electric current to the premises of the consumer.

While the blocks in this district were being encircled with these bands of copper, the buildings of the district, with scarcely an exception, were being fitted with wires leading to the sockets intended finally to receive the "electroliers" and single lamps, and to such localities as are to be supplied with the electric current for motive power. Simultaneously with all these preparations, the machine works of the Edison Electric Light Company in Goerck street were completing as rapidly as possible the gigantic dynamos to be used in supplying this district with the current, while the Porter-Allan Engine Company of Philadelphia was building the high-speed 120 horse-power engines to be used in driving the dynamos.

Now the street conductors are laid, the service conductors are put in, the buildings are wired, the dynamos with their attached engines are in place, and the district and central station are fully equipped, and we have no doubt that before this paper meets the eye of the reader the district will have been illuminated.

Although we have many times given the various steps of progress made in this great enterprise, it will, doubtless, be of interest to enter somewhat into detail in describing the appointments of this illuminating station. The building, as we have said, was originally erected for commercial purposes, and, as might naturally be supposed, it was found to be totally insufficient in strength to sustain the great weight of the dynamos and their attached engines. Consequently a separate structure was erected within the walls of the building. It consisted of iron pillars planted on heavy plates resting on three feet of solid concrete, and supporting iron trestle work, carrying the heavy iron girders on which the machines were placed. The building is 50x100 feet, four stories high, and divided by a median wall into two equal parts. It is in one of these parts that the machinery is placed. The other part is soon to be fitted up as a duplicate of the one already completed. Beginning with the basement, the area in front, underneath the sidewalk, is used for the reception of coal and the discharging of ashes from the boiler furnaces. In this place there is a special engine of about twenty horse power for driving the screw conveyers that carry the coal up over the boilers and deliver it to the stoke-hole between the boilers, and the screw conveyers that take the ashes and deliver them to barrels under the sidewalk in Pearl street. This engine also drives the fan blower which supplies air to the boiler furnaces, and also to the stoke-hole to keep it cool and well ventilated. Pipes also lead from the main air trunk of this blower to the dynamos on the floor above.

The boilers—of the Babcock and Wilcox style—four in number, are 250 horse power each. They all feed into a single 8-inch supply pipe, from which steam is taken through vertical 5 inch pipes to the engines above.

A gallery extends over the boilers and stoke-hole, from which the visitor may gaze into the depths below.

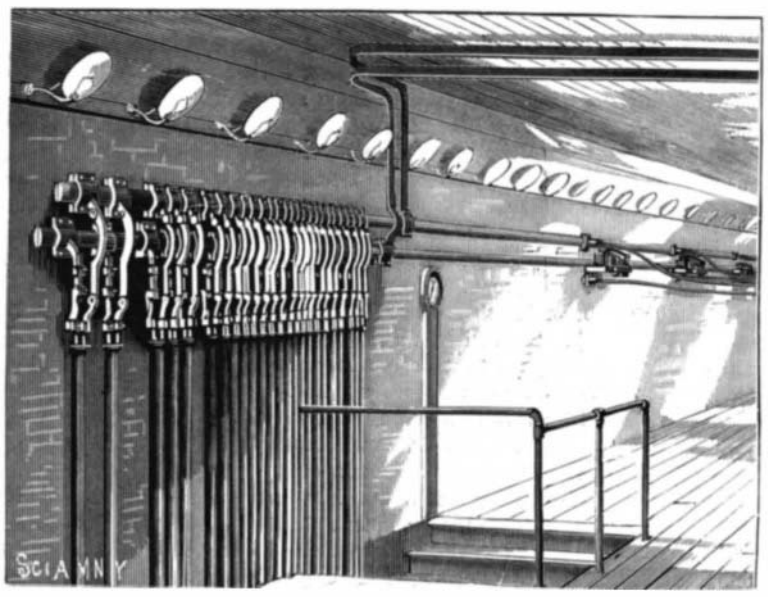
Each boiler is provided with an injector, and a steam pump is provided with connections for each boiler, so that any or all of the boilers may be fed by it. Water is supplied to the boiler at a temperature above 212°, being forced into a heater that receives the exhaust of all of the engines. By heating the water to this temperature before admitting it to the boilers the impurities are deposited, and the boilers are supplied with pure water.

Over the boilers is supported the dynamo floor by the trestlework, entirely disconnected from the main building or its foundations. On this floor are six of the largest Edison dynamos. The gigantic proportions of these machines will be appreciated by reference to our engraving, although one can scarcely realize their immense solidity and weight without personal inspection. Each machine complete, with engine, dynamo, and base, weighs 62 000 pounds. The field magnet weighs 33,000 pounds. The armature at its shaft alone weighs 9,800 pounds. The length of the armature is 61 inches; its diameter, 27·8 inches. The height of the machine from the floor to the top of the field magnet is 6 feet 4 inches.

The engine whose shaft is coupled directly with the dynamo shaft is upon a base which is common to both engine and dynamo. The cylinder of the engine is 11 $\frac{3}{16}$ inches in diameter, and the stroke is 16 inches. The cut-off of the valve is variable by the governor.

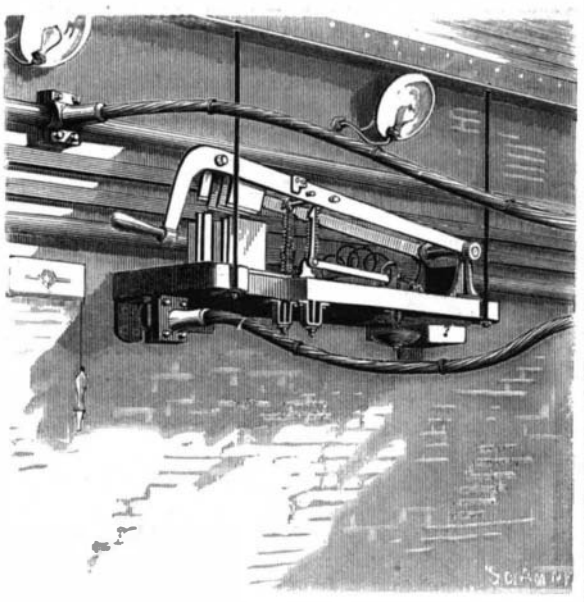
The normal speed of the engine is 350 revolutions per minute, steam pressure 120 pounds. With this great velocity it is found that both engines and dynamos are so perfectly balanced as to scarcely create a tremor in the trestle work upon which they rest.

The nominal capacity of each of these dynamos is 1,200 lights of 16 candle power each, but the maximum capacity is about fifty per cent in excess of this. The resistance of the armature is 0·0038 ohm, and the current generated by the machine is of such low intensity that one may grasp both conductors leading away from the machine without danger and without serious inconvenience.



STREET CONNECTIONS.

The dynamos are arranged alternate in position with each other so as to economize room, three of them being connected by heavy copper conductors with the large copper bars extending along the sides of the room. The bars of like name from opposite sides of the room are connected together at the front of the building, where the entire current from all of the machines is centered in two large horizontal copper bars, with which the several street conductors are connected, as shown above, one of the parallel street conductors being connected with each of the dynamo mains. In the conductor extending from the dynamos to the rods along the walls there is a huge switch (shown in detail in one of the smaller engravings), having three contact surfaces about four inches broad which wedge between three pairs of fixed contacts. By means of this switch the circuit of any dynamo may be instantly broken. The size of the various conductors vary with the requirements. The street conductors are equal to a copper rod of one-half inch diameter, and the service conductors vary, some of them being equal to two and others to ten No. 10 wires. Of the street conductors there are something over fourteen miles altogether. The field magnets of the dynamos are placed in a shunt circuit derived from the main circuit, and including a switch and a number of rheostatic coils, one or more of which may be thrown into the shunt circuit, so as to add to the resistance of the shunt circuit from a small fraction of an ohm to seven and a half ohms, which is the greatest resistance necessary to control the current exciting the field magnets, and thus control the current in the main circuit. This regulating apparatus is shown in one of the views on our title page.



THE SWITCH.

There is a set of resistance coils for each dynamo, each set being provided with a circular switch, operated by a horizontal shaft through sets of miter gearing. An attendant is stationed at the wheel at the end of the horizontal shaft, and turns the switches one way or the other, according to the requirements. He is able to judge of the amount of current required by watching an indicator above the regulator. This indicator is provided with two lamps, one red and one blue, and with a device for throwing one or the other of them into the circuit, according as the current is strong or weak; and neither lamp is illuminated when the current is normal. When the blue lamp is lit more resistance is required in the shunt circuit to reduce the amount of current passing through the wires of the field magnets, consequently the attendant turns the switch, throwing in one coil after another until the blue lamp ceases to shine. When the red lamp shines, the switch must be turned in the opposite direction to increase the power of the field magnet and to strengthen the current in the main circuit.

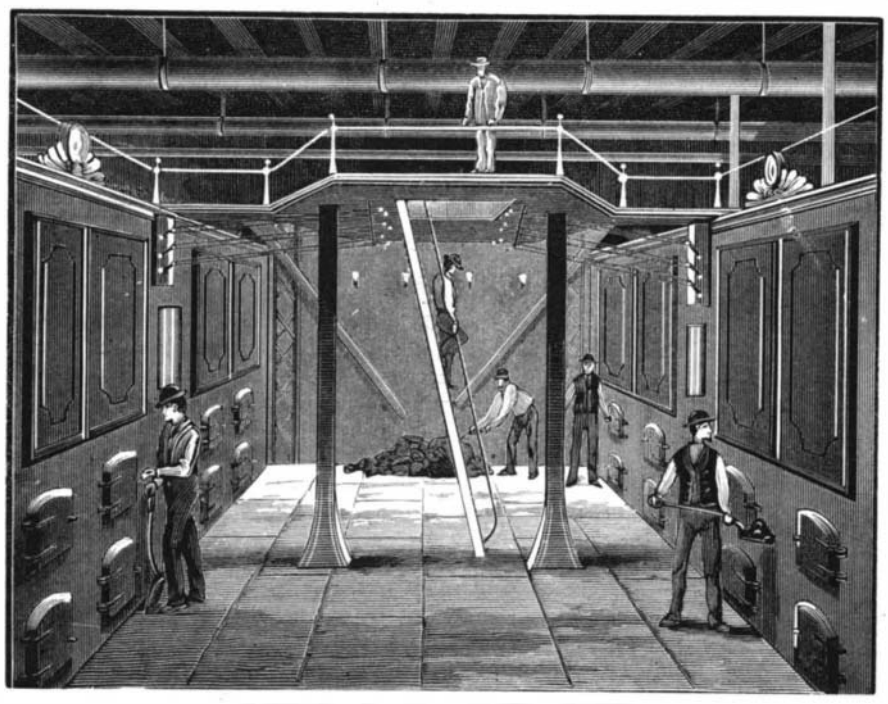
As before mentioned all of the dynamos work in the same circuit when everything is normal, but if from any cause it is supposed that one of them is not doing its work properly it is immediately disconnected from the main circuit by letting go the huge switch by which it is connected with the main conductors. The switch is provided with a strong spring that opens it instantly as soon as it is released. The isolated machine is now connected with a battery of a thousand 16 candle lamps arranged in two rectangular groups in one of the upper rooms of the building, as shown in one of our engravings. If the machine brings these lamps to brilliant incandescence, it is in usable condition, and if any trouble exist it must be looked for elsewhere.

On one of the upper floors of this building is a room for testing the meters employed in registering the amount of current used by the consumer, and for taking a record of the meters, the amount of current used being determined by the amount of copper deposited by the meter in a given time on one of its plates.

This electric lighting station is very complete in all of its appointments. Every imaginable emergency has been provided for: coal bunkers in the top of the building to hold a reserve of coal, water tanks to supply water in case of any deficiency or cessation of supply, thorough protection against fire, and thorough workmanship everywhere.

For convenience in handling the heavy parts of the machines, the dynamo room is provided with a traveling hoist capable of running the entire length and breadth of the room, and having power enough to easily lift the heaviest part of any machine and of holding or carrying it as may be required.

The projectors of this gigantic enterprise have met with no adverse experiences, all the tests thus far made proving entirely satisfactory.



BOILER ROOM.—STOKE HOLE.

### Glass Coating on Metals.

The following method has been suggested for coating metal surfaces with glass, which may be found to answer various purposes: Take about 125 parts (by weight) of ordinary flint glass fragments, 20 parts of carbonate of soda, and 12 parts of boracic acid, and melt. Pour the fused mass out on some cold surface, as of stone or metal, and pulverize when cooled off. Make a mixture of this powder with silicate of soda (water glass) of 50° B. With this coat the metal to be glazed, and heat in a muffle or other furnace until it has fused. This coating is said to adhere very firmly to steel or iron.

THE Willimantic (Conn.) Linen Company has posted the following notice in its mills: "No person now in the employ of the Willimantic Linen Company will be continued in their service after July 4, 1883, unless they can both read and write. And on and after this no person will be hired by the company who cannot both read and write."

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