NEW HIGH SERVICE PUMP, BOSTON WATER WORKS.

One of the last additions to the water supply system of the city of Boston, Mass., Pumping Engine No. 3, of the Chestnut Hill High Service Pumping Station, is herewith illustrated. In many respects it is novel, and represents, it is believed, an advance on previous practice.

The station is situated on the east side of the carriage road that winds around the base of the Chestnut Hill Reservoir. The reservoir is surrounded by a beautiful park and the building of the station is on the margin of the park between the carriage road and the tracks of the railroad that here run parallel with the drive. The station includes two pumps other than the one we illustrate and a boiler plant. The buildings of the station harmonize with the beautiful surroundings, one of the pleasure grounds of the city.

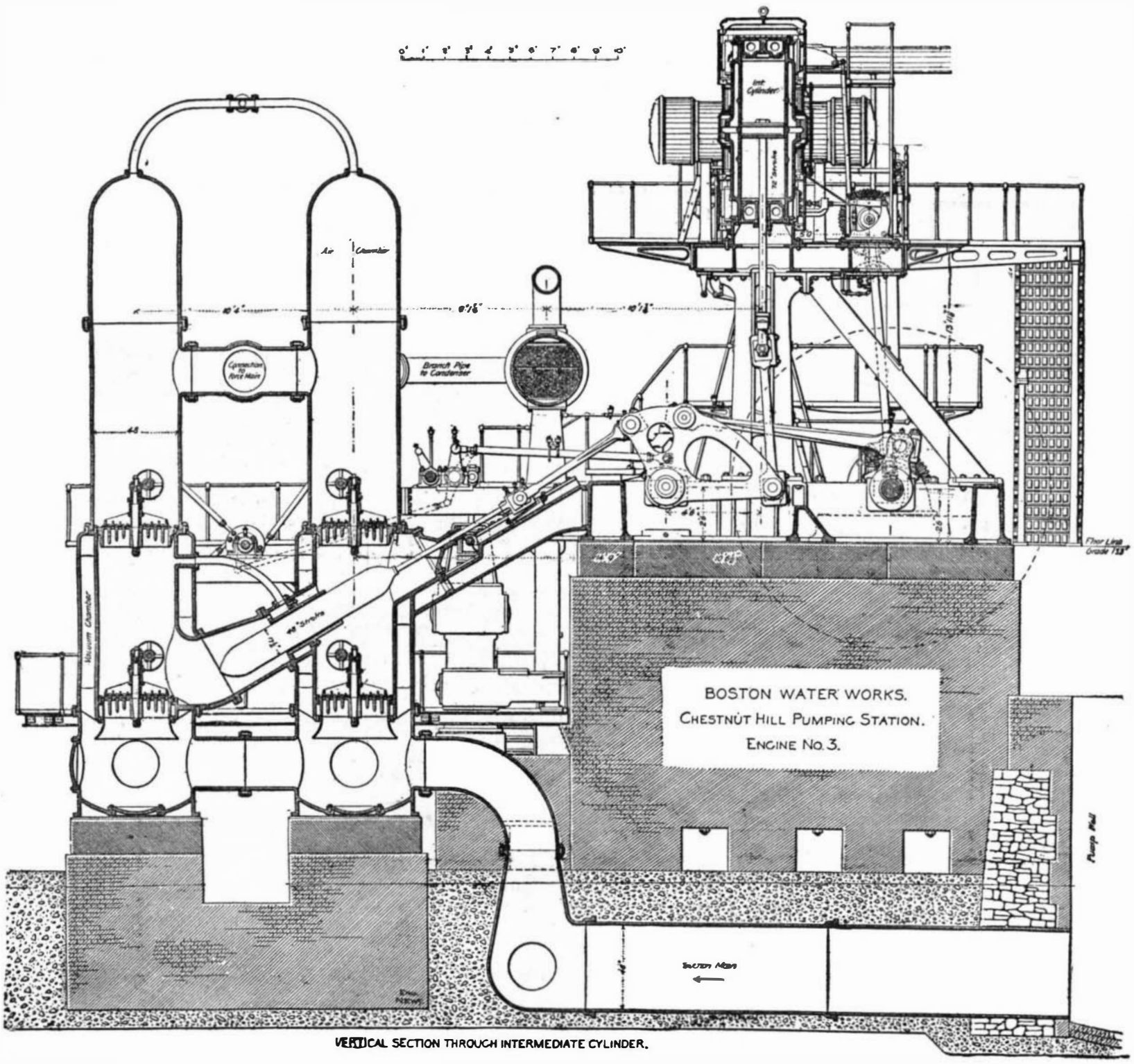
The great pump is a triple expansion engine of the three-crank rocker type. The cylinders are respectively 13·7, 24·375 and 39 in. in diameter; the pistons have six feet stroke. The cylinders are carried on platforms supported by diagonal and vertical columns rising from the base plate. The perspective view shows very well the disposition of these columns; the gallery surrounding the cylinders, with its numerous electric lights, is also shown, being one of the really striking features of the installation. Referring now more particularly to the sectional view, it will be seen that the pitmen of the engine act upon rockers somewhat of the bell-crank type. From each rocker two connecting rods run, one to the shaft of the flywheel, this one being nearly approximately horizontal when the crank is at its highest point. The other connecting rod runs in the other direction, at an angle of about 30° from the horizontal, to the plunger rod of the pump proper. Recurring to the steam end of the engine, the steam and exhaust valves are gridiron slides, worked by cams on a horizontal shaft, rotated by gearing from the crank shaft, the gearing being shown on the right of the sectional view. The high pressure cylinder cut-off is regulated by a hydraulic cylinder; the cut-offs of the other cylinders are invariable. The reheating principle is applied to the steam. The high pressure steam, passing through a separator which dries it, acts upon the high pressure piston. On leaving the cylinder it passes through a tubular reheater, the peculiarity being that the working steam goes outside of the tubes, while live steam from the boiler, at a pressure of 185 pounds to the square inch, passes through the interior of the tubes. The reheaters for the intermediate and low pressure cylinders are identical. The cylinders are steam jacketed, 100 pounds of steam being used for the low pressure cylinder jacket and for the others 185 pounds. The drainage from the high pressure heaters and jackets returns to the boiler, while the drainage from the low pressure jacket and the water separated from the working steam by the separators is automatically drained back into the feed water heater.

The three pump plungers are each of four foot stroke and of 17·5 inches diameter. Their foundation is established below the floor of the engine room. By the reduction of stroke from that of the engine an increased capacity for pressure is obtained, as well as by the relation of diameters.

In the lower right hand corner of the perspective view, two diagonal rods can be seen running upward somewhat similar to the valve rods in a Corliss engine. This is part of a system which forms one of the characteristic features of the engine, the valves being worked by the invention of Prof. Riedler, of the Royal Polytechnic School of Berlin, Germany. The engine has been designed to run easily at sixty revolutions, pumping against a head of 128 feet. This exceedingly high speed is made possible by the use of the Riedler valve gear, here for the first time introduced into this country, although it has been extensively used abroad, in some cases for engines running at a speed of seventy-five revolutions per minute. The pump valves consist of a number of rigidly connected rings, each ring closing an annular opening in the valve seat, as the section shows. The upper valves are delivery valves and the lower are suction valves. The diagonal rods running from the center cam, Corliss engine fashion, and moved by the connecting rods leading from the main rockers, operate to close each valve positively at the exact moment of the reversal of the stroke. As soon as the valves are closed the mechanism moves out of the way, leaving the valves free to open automatically. This feature makes possible the high velocity.

The dome-like structures seen on the right of the first page view are the air chambers, from which, by a horizontal pipe branching into them, the water is taken for the force main. From these also water is taken to the condenser, which is of surface type, with 410 square feet of surface, the water passing through the tubes and condensing the steam, which circulates about the outside. After passing through the condenser and doing its work, the water is delivered into the force main. The quantity is regulated by a special valve. Directly below the condenser, which is seen in the cut, is placed the air-pump, which, with a 12 inch stroke and 24 inches diameter of cylinder, is worked by an arm from one of the rocker shafts operating the valve gear of the pumps.

The steam plant includes a Belpaire firebox boiler, with two separate furnaces leading into a common combustion chamber. It is shown in one of our views on the strong, specially built truck on which it arrived at the station. The boiler is 34 feet 4 inches long, with a minimum internal diameter of shell of 90 inches. There are 201 three-inch tubes, each 16 feet long. This boiler is for the new pump, being placed in a special addition made at the rear of the boiler house.



VERTICAL SECTION THROUGH INTERMEDIATE CYLINDER.

HIGH SERVICE PUMP, BOSTON WATER WORKS—SECTIONAL VIEW.

Caoutchouc Cement for Cycle Tires.

Bisulphide of carbon, 160 parts; guttapercha, 20 parts; caoutchouc, 40 parts; isinglass, 10 parts. This cement is dropped into the crevices after they have been properly cleaned. If the rent is very big, apply the cement in layers. Bind up the rubber tire lightly with thread, let dry for twenty-four to thirty-six hours, cut off the thread, and remove the protruding cement with a sharp knife, which must previously have been dipped in water.—Zeitschrift.

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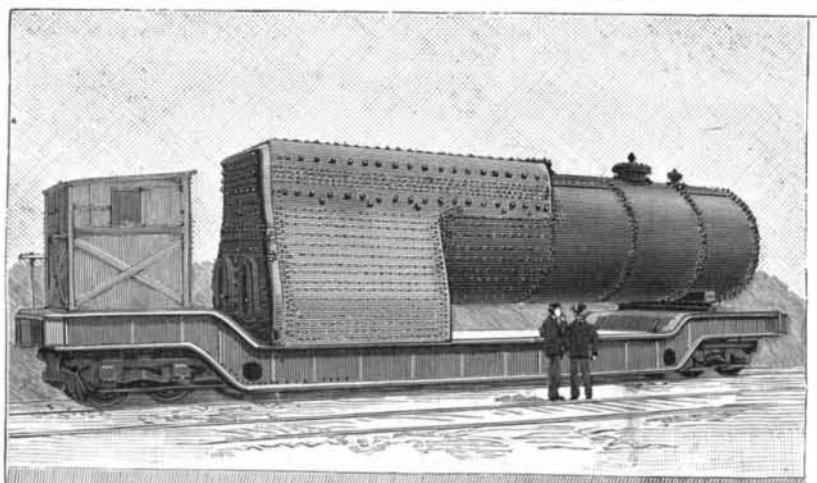

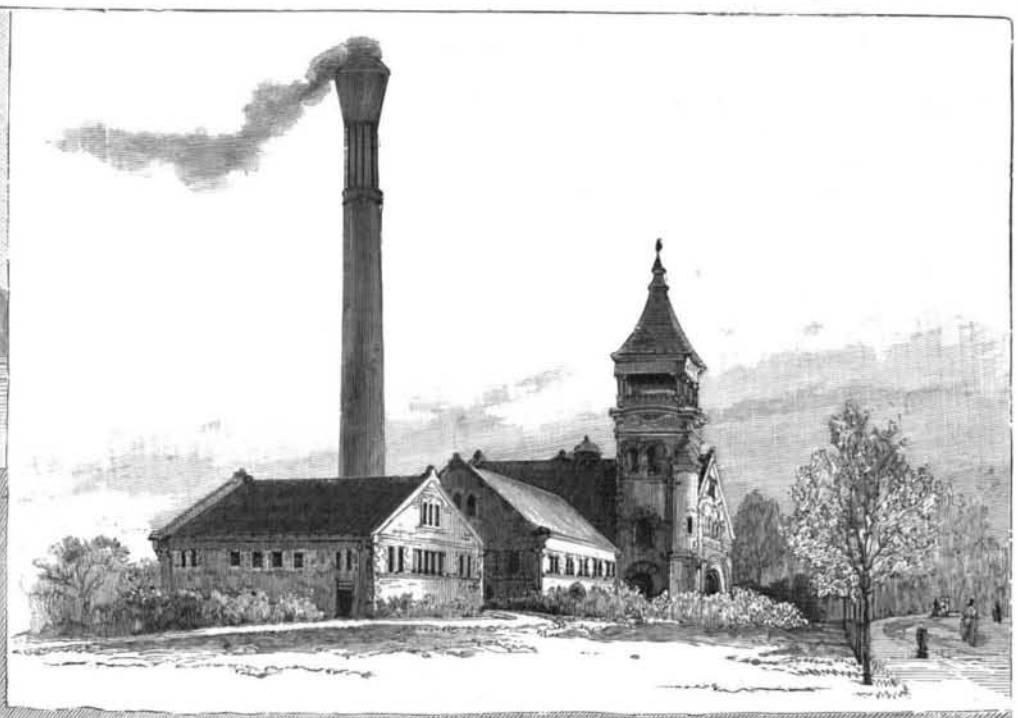

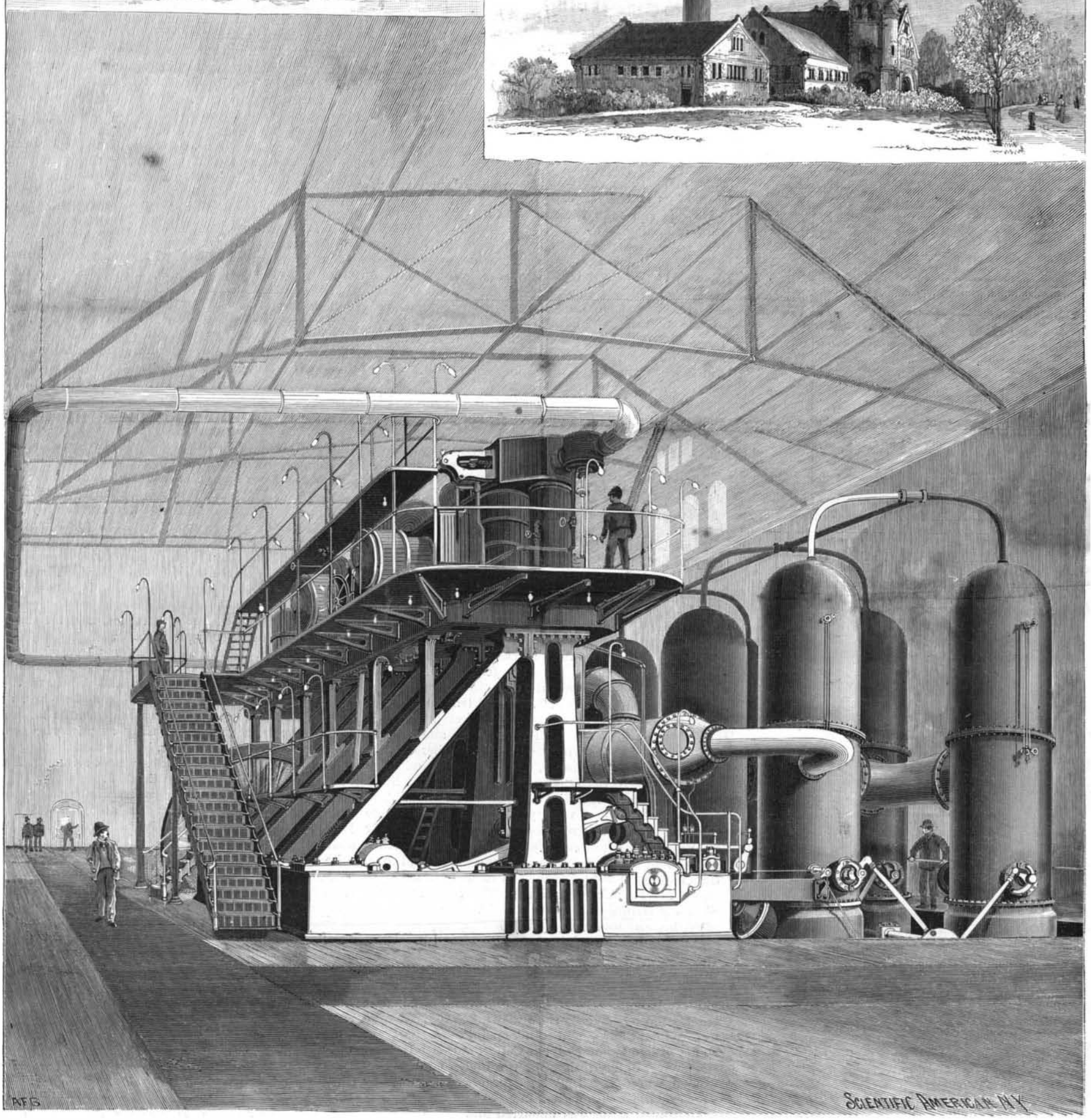

IMPROVED PUMPING ENGINE OF THE BOSTON WATER WORKS SYSTEM.—[See page 166.]