The Crystal Palace Exhibition Building in Hyde Park, using prefabricated parts, took only some 17 weeks to erect, opening in 1851 with a plan area about 6 times that of St Paul’s Cathedral. The top drawing shows the boilerhouse (foreground) which supplied steam to power the exhibits in the Machinery Hall (bottom drawing). Being a temporary building it was unheated. (“Crystal Palace,” John McKeen, 1994)
To minimize overheating due to solar effects on the large areas of glazing the building was partially fitted with blinds and with an elaborate system of ventilation louvres (shown above) with a hand-operated mechanism for opening and closing (McKean)
Another view of the Machinery Hall (McKean)
Ceramic Stove designed by A W N Pugin for the Medieval Court, 1851
(“The Decorative Tile,” Tony Herbert & Kathryn Huggins, 1995)
Painting “Looking over the Dam”  
The Crystal Palace at Sydenham having been dismantled in Hyde Park, re-erected and enlarged. Towers were added at each end of the building (Beaver)

As with many of Paxton’s building some of the most interesting features were hidden from normal view, but not thereby lacking in importance. Ventilation had been important for the Great Exhibition, and to this was now added the need for heating. This Paxton patterned on his successful experiments in low-pressure hot water heating at Chatsworth. An access roadway ran through the basement storey of the building, and here no less than twenty-two boilers were arranged in pairs, each holding 11,000 gallons of water; one extra boiler was added at the north end for a display of tropical plants, two in the lower storeys in each wing, and two small ones for the fountain basins at each end of the building containing Victoria regias and other tropical aquatics. Four pipes of 9 in. diameter were attached to each boiler, two flow and two return, and each boiler heated a certain transverse section of the Crystal Palace: the length of one flow and return was a mile and three-quarters, and the total length of heating pipes of all kinds was nearly fifty miles. The control of this intricate system was said to be by an unspecified new device invented by Paxton and Henderson.

The heating system ("The Works of Sir Joseph Paxton," George F Chadwick 1961)
One of the two water towers by Brunel (Beaver)
One further prominent feature was to be added to the Crystal Palace after its opening in 1854: the high towers necessary for part of the waterworks which were designed by I. K. Brunel. The original intention was that the blocks at the end of the north and south wings were to carry tanks for this purpose, but this idea was abandoned, no doubt because they did not give enough head for Paxton’s ambitious proposals for water display, but also because of structural difficulties. Early views of the Palace show these blocks to have been five storeys high, but the south block was reduced in height in 1860: in February 1861 a great gale completely demolished the north wing before it had been reduced in height,\(^2\) an event which would seem to cast doubts on the practicability of an earlier scheme to make a great tower 1000 ft. high from the components of the 1851 Building;\(^2\) the difficulty of bracing adequately such a structure against wind pressure would have been considerable at this time.

The new towers, 282 ft. high, performed the dual function of chimney shafts and water-towers, the flues from the heating system and from the steam engines used to raise the water to the top of the towers being grouped together. The footings of the towers were of cement concrete with brickwork supporting an iron baseplate carrying iron columns grouped around the shaft and supporting the water tank above. These columns were in pairs, joined by a continuous iron web three feet wide, and twelve such compound columns were necessary to support the 1,400 tons of water carried in each tank (300,000 gall.); an annular cast iron diaphragm connected all the columns together every 20 ft., stiffened by tie rods. The tanks were dome-shaped, 38 ft. deep, and roofed with ridge and furrow glazing. The tower shaft, 47 ft. in diameter, was clad with glazing in an iron framework, similar to the standard external bays of the main building; a spiral stair ran outside the central shaft, with wooden landings above each annular diaphragm.

The water towers (Chadwick)
A view of the Crystal Palace remains after its destruction by fire in 1936. The water towers, which survived the fire, were later demolished to avoid them serving as a landmark for German bombers in WWII (Beaver)