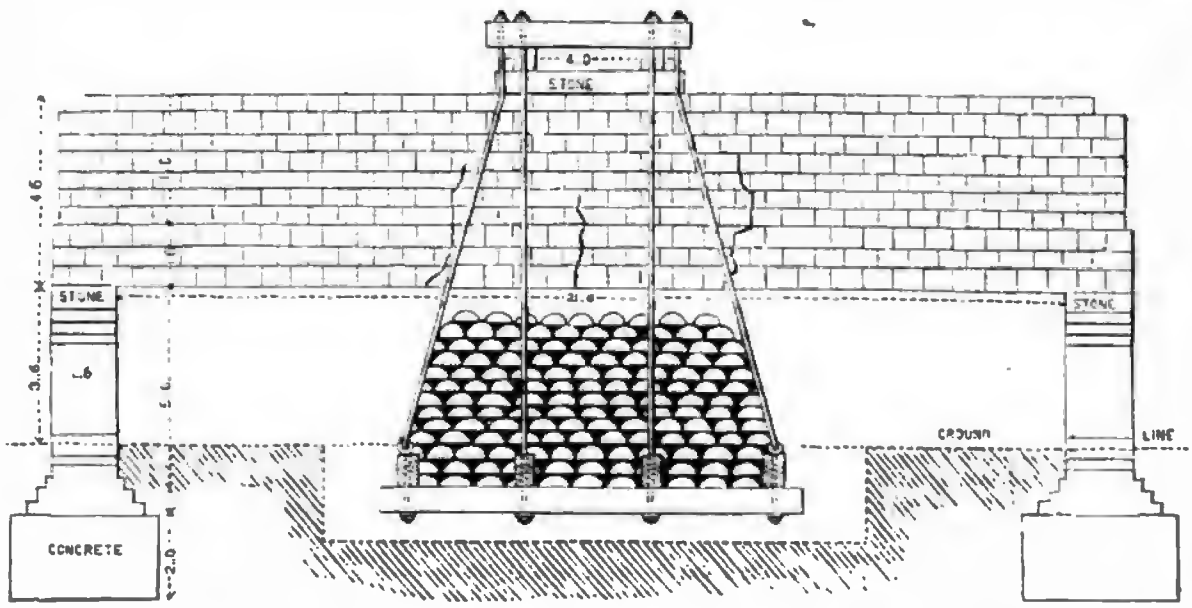
Brick Beam of Hollow Bricks and Portland Cement erected at the Exhibition Building May 1851, by J. B. White and Sons.



DIMENSIONS.

Neat length .... 24 ft. 4 in.
" length .... 21 ft. 4 in. in clear of piers.
" depth .. 4 ft. 6 in.
" thickness 2 ft. 3 in. bottom, and 1 ft. 6 in. upper part.

Built of equal parts cement and sand; completed, 12th April; centres struck, 22nd April.

CONSUMED:

1,200 hollow bricks, weight ..	10,750 lbs.	
32 bushels cement	6,400 ..	
32 ditto sand		
		17,150 lbs.

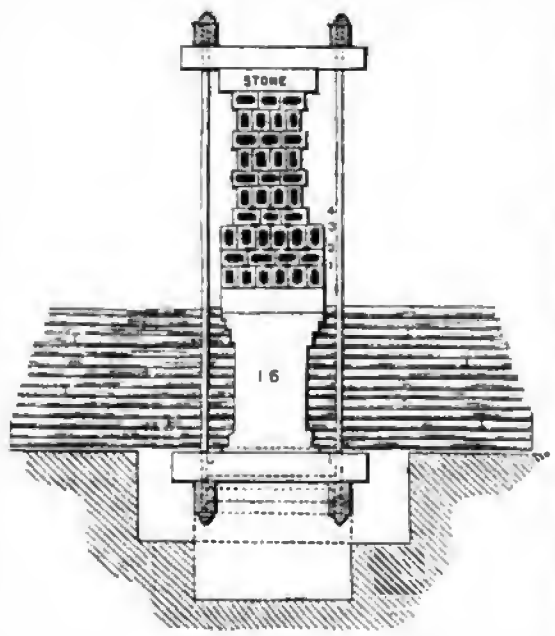
If built in common bricks would require—

2,700 stock bricks, weight ..	13,420	
50 bushels cement (Roman)*	8 000	21,420
50 ditto sand		
	difference	4,270 lbs.

Weight of scale and iron work .	1,792 lbs.	
" of stone	672 "	
" of beam in suspension between piers	15,000 ..	
		17,464 lbs.

In common bricks:

Scale and stone	2,464	
Net weight of beam	18,743	21,207 lbs.
difference	3,743 lbs.	= 1 13 1 19
		ton. cwt. qr. lbs.



Roman cement in the ratio of 2.12½ to 1, or, in round numbers, 2¼ to 1. This reasoning, however, is scarcely correct, since it does not take sufficiently into consideration the strength dependent on *disposition* of the material.

From some experiments made upon Portland and Roman cement, where solid bricks were used with each, the superiority of Portland cement was found to be much greater than this is shewn by experiment, — but when we consider the nature of the structure, and take into account the circumstance of the *Roman* cement beam having been built *seventeen months* before the breaking weight was applied, whereas the *Portland* cement beam had been only erected *five months*, we are not surprised that the experiment with the hollow bricks did not exhibit the full strength of the Portland cement. It is to be regretted that hollow bricks were used, as it would have been better to have rested the comparison upon two beams as strictly analogous as possible, instead of complicating the subject with conditions that are extraneous to the immediate inquiry.*

The important part played by the iron bond in this experiment must not be overlooked. Sir Charles Pasley, in his work on cements, describes two beams constructed by him for the purpose of ascertaining, how much of the extraordinary resistance of brick beams built with cement might be owing to the hoop iron bond. These were precisely similar, with the exception that one of them had five pieces of hoop iron bond, and the other none. The latter cracked when the centering was removed, and was broken by a weight of 490 lbs., while the first sustained a weight of 4,523 lbs. before it yielded. "The mutual adhesion of the cement and the iron," says that author, "is so perfect, that no force can separate them without producing the complete fracture of the brickwork, which is thus resisted by all the tenacity of the iron."

The tensile strength of wrought iron per square inch of section, may be called 27 tons. The mean of Mr. Telford's experiments gave 29 tons, as did some conducted under our own superintendence. Mr. G. Rennie says 24.93, and Capt. Brown 25 tons.*

In the hollow-brick beam there were fifteen pieces of hoop iron bond, one-and-a-half inch by one-sixteenth of an inch, nearly; namely, four in the first course, four in the second, three in the third, and two in each of the next.† The pieces of iron were all broken, except one in the bottom course, one in the second, and one in the top course.

This very interesting proceeding suggests many observations, but we must now pass on to the experiments, also on Portland cement, which were exhibited on the same occasion by Messrs. Robins and Aspdin, of Scotland-yard.

* Hollow bricks are usually better moulded and more thoroughly burnt than ordinary stocks.

* Eight or nine tons may be considered a safe load-strength.

† In the diagram, by mistake, only fourteen are shown.