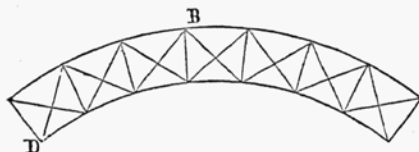


BRIDGE ACROSS THE PORTSMOUTH RIVER.

Span 250 feet.

FIG. 83.



This plan is given on Plate 16 of Tredgold's Carpentry, as a specimen of an American bridge. It is composed of three concentric arcs, connected by radial pieces without either braces or counter-braces.

Were the problem given us to arrange a given quantity of timber in the most unskilful manner possible, it would be difficult to select a plan which would much better fulfil the required conditions. By separating the timbers into three arches, and placing them at a distance apart, the whole of the strain, or by far the greater part, is thrown upon the points *A* and *C*, and only one-third of the material is so disposed as to resist it. Again, the stiffness of such a system would be little more than one-third that of a single arch containing the same material, for the stiffness being as the square of the depth in a beam whose depth is 3, it will be represented by 9, and in a beam whose depth is 1, it will be 1. Hence 3 beams of the depth 1 will only give one-third the stiffness of a single beam whose depth was equal to the sum of the three.

Colonel Douglass, who gives a description of this work, observes that the arch is extremely flexible. This result would necessarily follow from the absence of counter-bracing.

The quantity of timber must have been very great to enable it to stand at all, if heavy variable loads were drawn over it.