In the ordinary lattice the braces and ties being 3 inches thick, if they were placed upon each other in the same direction, and pinned at short intervals, the stiffness would be nearly in proportion to the square of 6; but as they cannot be so arranged, and in fact cross each other nearly at right angles, the flexure of one system is not affected by contact with the other, and the lateral stiffness would only be in the proportion to the square of 3. In the improved plan the braces are made 2 inches by 10, the amount of timber is the same as in the common lattice, but the stiffness would be nearly in the proportion of the square of 7, or five times that of the common lattice.

It is evident, too, that upon the removal of any tie or brace the weight would be sufficiently sustained by the adjacent ones, and repairs could therefore be made without difficulty, an advantage which is not peculiar to this plan, but is possessed also by several others.

In addition to this it may be observed, that the truss does not require to be extended back any considerable distance from the face of the abutment; there are no short ties as in the common lattice.

The mode of construction which has been designated as the improved lattice, admits of extension to any span to which an arch-braced system is applicable, but is exceeded in the length to which it might be extended by the simple counter-braced arch. In very large spans, whatever be the general arrangement of the timbers of the truss, the whole dependence for the support of the structure and its load should be placed upon the arch-braces and the straining-beams which join the extremities. This system may be connected with a truss on the principle of the improved lattice, by which it will be effectually counter-braced and the parts properly connected; such an arrangement is represented in the accompanying figure, and could be employed for long spans.

Fig. 92.