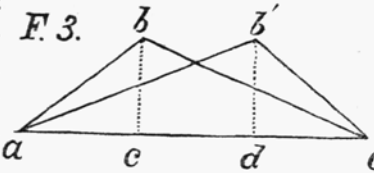
Whether the horizontal thrust may be more economically sustained by the abutments or otherwise, will depend on circumstances, and can more easily be determined in a subsequent part of the investigation.

VIII. In structures exceeding about 25 feet, or probably 30 feet at most, the length of joist from the centre to the ends, would require so great a size to give them the requisite stiffness, that their weight and cost would be quite objectionable. It becomes expedient, then, in such cases, to provide support for more than one principal point, or transverse bearer. A superstructure of from 30 to 40 feet, may be constructed with two cross bearers, sustained by two trusses, with two pairs of braces each, as may be seen in Fig. 3, and it will probably be best, in such short spans, at least, to provide connecting ties between the feet $a.a'$, of the braces. The cross bearers may be at $b.b'$ or suspended below at $c.d$.

F. 3.



The thrust upon each brace, will be as the length of the brace divided by the perpendicular bc or $b'd$, and the stress upon the tie aa', inversely as bc. Hence the propriety of giving the trusses a considerable elevation. Unless connected over the top, however, they become top-heavy, if carried too high, and are with difficulty sustained in an erect position. They should, therefore, usually be connected across the top, and secured by lateral bracing when designed for heavy loads.

IX. The above is the simplest form for a truss to sustain two cross bearers. It is not, however, the most economical. A better, as well as a more common form of a truss for two bearers is that shewn in Fig. 4.

To compare this form with that in Fig. 3, suppose a weight, w, placed at each of the points $b.b'$. In virtue of those two weights, there will be a vertical pressure equal to w, exerted at a, through the medium of the brace