of braces, being but little over half as great with the long, as with the short horizontal reach, may be sustained by the timber of the chord, thus obviating the necessity of tubes extending through the chord from the cast iron skewback; and furthermore, may enable the iron shoe to be dispensed with altogether, in many cases. Hence would result a still further saving in expense, as well as in weight of structure.

Take, for example a brace 10" square, capable of resisting a thrust of 50,000 lbs. in the direction of its length, and a vertical pressure of 35,000 lbs. when inclined at 45°. Whether the end be cut as at d, e, or f (Fig. 64), it covers a horizontal area of 141 square inches, giving a square inch for every 250 lbs. of vertical pressure. This does not much, if any, exceed the capacity of timber for resisting transverse crushing, as estimated in section cxxiii, when acting upon a portion of surface so limited with respect to the whole.

Perhaps, however, the propriety of dispensing with the iron shoe, should not be too strenuously urged. But there seems to be little excuse for incurring the sacrifice of iron required in suspension bolts in case of the steep braces, over what is required with the greater inclination. The interference of bolts with braces, when the latter reach across two panels, is perhaps the greatest obstacle in the way of adopting the latter arrangement; and this may be managed by either passing the bolts through the intervening braces (which does not materially impair their strength, when supported at intervals by counter-braces), or between main and counter braces, as may seem most favorable in respective cases.

In view of the above considerations, the author cannot avoid regarding the usual practice in the construction of Howe Bridges, as decidedly faulty.