whence it suffers compression equal to \(\frac{6k}{3v}w\), \(= \frac{3h^2}{v}w\), \(= 3\sqrt{\frac{h^2}{v} + \frac{3}{4}v^2}w\), and requires material equal to \(\left(\frac{3h^2}{v} + \frac{3}{4}v\right)m\), while its horizontal thrust equals \(\frac{h}{3}w\), \(= \frac{3h^2}{v}w\), \(=\) compression of \(ki\), by which it is contracted. The material required for \(ki\), therefore, \(= \frac{3h^2}{v}m\). Material for \(ij\) and \(gf\), is the same as above found for \(al\) and \(lk\), and, doubling those quantities, and adding amount just found for \(ki\), we obtain \(\frac{15h^2}{v} + 3\frac{1}{4}v\) \(m\), \(=\) material in the whole arch.

The tension of the chord \(cf\) (Fig. 8), has been seen to be equal to \(\frac{3h^2}{v}w\), whence, multiplying by the length, \(5h\), and changing \(w\) to \(m\), we have \(\frac{15h^2}{v}m\), \(=\) material for chord.

The 4 verticals sustain each, weight \(= w\), and the aggregate length being \(3\frac{1}{2}v\), ... material \(= 3\frac{1}{2}vm\). This, added to amount in chord, gives \(\frac{15h^2}{v} + 3\frac{1}{4}v\) \(m\), \(=\) tension material required to support a full uniform load, as above assumed. But since any number of the points \(o, c, d, e\), are liable to be loaded while the others are unloaded, it is obvious that in such case, the arch will not be in equilibrio, the loaded points tending to be depressed, while the unloaded, tend to be thrust upward. Hence the arch requires the action of the obliques, or diagonals, in the three quadrangular panels, to counteract such tendency; and, as will appear further on, these members will require material equal to about one-third of the amount required in the chord, thus increasing the amount of tension material for the truss to about \(\frac{20h^2}{v} + 4\frac{1}{2}v\) \(m\).