Now, as the cross-section of a piece, or member, exposed to tension (or to thrust, when pieces are similar in figure), should be as the stress, it follows that the weight of each such member should respectively, be as the stress sustained, multiplied by the length, + an additional amount taken up in forming connections; which latter, for purposes of comparing the general economy of different plans, may be neglected.

X. Then, representing by $m$, the amount of material required to sustain a stress equal to $w$, with a length equal to $bd$, = 1, we have only to multiply the stress of a member in terms of $w$, by the length in terms of $bd$, or $v$, and change $w$ to $m$, to obtain the amount of material required for the member in question, omitting the extra amount in the connections. Hence, the length of the vertical tie $bd$, being equal to 1, and having a stress equal to $w$, requires an amount of material equal to $1m$.

For the horizontal tie, or chord, length = 4, and stress (as seen above), = $w$, whence material = $4m$. This added to $1m$, required for the vertical, makes a total of $5m$, for material exposed to tension in truss 8.

The two thrust braces, as already seen, sustain compression equal to $\frac{1}{2}w\sqrt{5}$, which multiplied by length, $\sqrt{5}$, and $w$ changed to $m$, give material = $\frac{5}{2}m$, for each, or $5m$, for the two.

XI. In the case of truss Fig. 4, the oblique manifestly sustain a weight = $\frac{1}{2}w$, by tension, giving stress = $\frac{1}{2}w\sqrt{5}$, which multiplied by length, = $\sqrt{5}$, gives $\frac{5}{2}m$, material for each, and $5m$, for the two. The compression of $k$, equals $\frac{1}{2}w \times h = \frac{1}{2}w \times 2 = w$, while the length = 4, whence, material = $4m$; and, each end post sustain-