Now, we have seen [vii], that the stress upon an oblique in such case, equals the weight sustained, multiplied by the length, and divided by the vertical reach of the oblique; and, assuming that the member requires a cross-section proportional to the stress, it follows that (making $ab = 1$), the amount of material required in $ac$, will be as the weight it sustains, multiplied by the square of its length. Hence, the material required in $ac$ must be as $\frac{1}{8} W \times ac^2$. Then, diminishing $bc$ until $ac$ coincides with $ab$, $W \times ab^2$ becomes $W$, which is still proportional to the material required in $ac$ (which has now become $ab = 1$), and, being replaced by $M$, representing the actual material required to sustain the weight $W$, with a length equal to $ab$ (our unit of length), in a vertical position, we have only to substitute $M \times ac^2$ for $W \times ac^2$, to know the actual material necessary to sustain the weight $W$ (at a given stress per square inch of cross-section), with any length and position, retaining the same vertical reach, equal to unity.

It must be obvious, therefore, that $M$, with the coefficient used before $W$, to express the weights respectively sustained by the several oblique rods in truss 47, will, when multiplied by the squares of the respective lengths of those obliques, show the amount of material required in their construction, under the conditions above expressed.

Let $m = \frac{1}{8}M$, and $h = bc$. Then, we manifestly have, for material in the 14 obliques of the truss in question

\begin{align*}
7m(h^2+1) + 6m(4h^2+1) + 5m(9h^2+1) + 4m(16h^2+1) + 3m(25h^2+1) + 2m(36h^2+1) + 1m(49h^2+1) &= (336h^2 + 28)m, \\
&\text{for those meeting at } a, \text{ and a like amount for those meeting at } l; \text{ making a total of } (672h^2+56)m. \text{ But } h^2 = 0.694, \text{ which substituted in the last expression, gives } 522.368m, = 65.296M.
\end{align*}