Let Fig. 43 represent a truss 15' high and 100' long; or, in the proportion of 1 to $6\frac{2}{3}$. Also, let $w$ represent the maximum variable load for each of the points $c$, $d$, $e$, &c.; and $w'$ (say, = $\frac{1}{3}w$,) the permanent weight of one panel of Superstructure, supposed to be constantly bearing at each of said points. Then, making $W = w + w'$, we have $\frac{7}{8}W = \text{weight sustained by } ac$. Now, we have seen, P. 124, (Note 1,) that the stress upon an oblique, in such cases, equals the weight sustained, multiplied by the length, and divided by the vertical reach of such oblique; and moreover, as we assume, for the present, that the part 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 $\frac{7}{8}W \times ac^2$. Then, diminishing $bc$ till $ac$ coincides with $ab$, $W \times ac^2$ becomes $W$, which is still proportional to the material required in $ac$, 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