the capacity of the material, and of course, will be directly as the cross section and the horizontal reach, and inversely as the rate of strain.

Then, if we make p=the height, and h=the horizontal reach, $\sqrt{(h^2+p^2)}$ will be equal to the length of the diagonal, and the amount of material being given, the cross section will be as $\frac{1}{\sqrt{(h^2+p^2)}}$. Moreover, the rate of strain will be, manifestly, as $\frac{\sqrt{(h^2+p^2)}}{p}$ or (p being constant,) as $\sqrt{(h^2+p^2)}$

Hence we have the capacity as $\frac{h}{\sqrt{(h^2+p^2)}} \div \sqrt{(h^2+p^2)}$ or as $\frac{h}{(h^2+p^2)}$, and that value of h which gives the maximum value of this expression, is the most advantageous. This is found to be when $h=p$, as in the case above.

Therefore this is the most economical position for the diagonals in all cases where they act by tension, as far as depends on those pieces alone.

XXVI. B. For the case of diagonals acting by thrust, the use of the diagonal or brace, being to carry or transfer the vertical action of certain weights towards the ends of the truss from the intermediate points, and the amount of weights sustained by each diagonal being, in general, proportioned to the distance of its upper end from the centre of the truss, it is obvious that the weight sustained by the brace is essentially the same, according to its distance from the centre, whatever be the number and inclination of the braces. The economy, then, in the use of material for braces, or diagonals acting by thrust, is directly as the horizontal reach of the brace (which determines the number,) and inversely as the amount of material in each brace, necessary to sustain the given weight.

Now the amount of material (m) is directly as the acting force or stress, and inversely as the power of resis-