be multiplied by $a$, the diameter must be multiplied by $a^3$, and the cross section by $a^4$, a factor greater than $a$.

Moreover, that part of the stress produced by the weight directly upon the vertical, amounting to about $\frac{1}{2}$ the aggregate maximum stress, manifestly requires an increase in the cube of the diameter proportional to the increase in the square of the length, with an addition for increase of weight supposed proportioned to the diminution of number. Therefore if the height of truss be multiplied by $a$, the diameter must be multiplied by $a^3$, which requires the amount of material to be multiplied by $(a^3)^2 \times a = a^7$, a factor greater than the square of $a$.

Hence, since the verticals, when they act by thrust, require an increase of material greater than the simple increase of the height, for one-half, and greater than the increase in the square of the height for the other half, we may fairly assume an average increase for those parts, about as the increase in the square of the height of the truss.

It will be seen, moreover, that the diagonals at the ends always act by thrust, and that their aggregate thrust is equal to the whole weight of load and structure, divided by the natural sine of the angle those parts make with the horizon, and when they incline at $45^\circ$ the above named sine $= 1 - \sqrt{2}$. Hence the thrust of the parts in question is the whole weight multiplied by $\sqrt{2}$. Therefore, the height being multiplied by $a$, the amount of material in the endmost braces, will be multiplied by $a^4$, besides what is compensated by the increased horizontal reach. It will, therefore, probably, not be too much to assume, both for verticals and diagonals throughout, an increase in weight