XL. The cause of lateral deflection by forces applied at the ends and tending to crush a long piece, is supposed to be a want of uniformity in the material, and a want of such an adjustment of the forces, that the line joining the centre of pressure at the two ends, may pass through the centre of resistance. These elements are liable to considerable variation, and can not be very closely estimated in any case. Therefore, the absolute power of resistance for a piece of considerable length, can not be deduced by calculation from the simple positive and negative strength of the material, but resort must be had to direct experiment upon the subject; and even considerable discrepancies should naturally be expected in the results of experiment, unless the lengths of pieces experimented on be very considerable.

In respect to pieces, however, having their lengths equal to twenty or more times their diameters, a considerable degree of uniformity is found in their powers of negative resistance, and the following formula, deduced theoretically, though not fully sustained by experiment, will sometimes be useful in determining the relative powers for pieces of similar cross sections, but different dimensions. The power of resistance is as the cube of the diameter directly, and as the square of the length inversely, i. e., R is as $\frac{d^3}{l^2}$.

The manner of obtaining this formula may be readily illustrated by Fig. B., Pl. 1, in which *adb* represents a post loaded at *a*, so as to bend it into a curve, of the half of which, *cd* is the versed sine. It is obvious that in this condition, the convex side of the post is exposed to tension, (or, at least, to less compression than the other,) and the concave side to compression, and that the effect of the load at *a*, towards breaking the post at *d*, is as the versed sine *cd*, which is as the square of *ab*. But the power of the post to resist rupture transversely, is manifestly as the cross section of the post, (i. e. as the square of the diame-