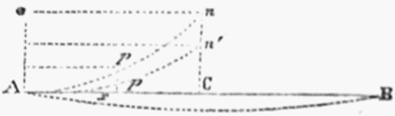
The area $B\,C\,n = \frac{1}{4}$ of rectangle $B\,C\,n\,s = \frac{1}{8}\,B\,C\,n'\,R =$ the deflection.

Hence, the deflection in the two cases will be as $\frac{1}{3}$ to $\frac{1}{8}$, or as 8 to 3.*

PROP. 12. *The deflection of a beam supported at the ends and uniformly loaded will be to the deflection of the same beam, when the whole weight is in the centre, as 5 to 8.*

FIG. 26.



When the whole weight is at the centre let w represent the weight upon one of the supports, the strain upon any section at the distance x will be represented by $w\,x$, and the deflection, as in the last proposition, by $w\,x^2$. It will, therefore, as in the last case, correspond to the abscissa of a common parabola, of which x is the ordinate. The sum of these deflections, or the whole deflection, will be proportional to the area $A\,p\,n\,c = \frac{1}{3}$ rectangle $A\,o\,n\,c$.

Let the beam be now supposed to be uniformly loaded, and let the deflection due to the extension of the fibres at the distance x be ascertained. It is evident that the weights upon the points of support will be the same as formerly.

The reaction of the point A may be represented by a force equal to w acting upwards, its leverage at the distance x will be $w\,x$, and, the deflection due to it, $w\,x^2$, as before; but the effect of the uniformly distributed load upon the part x diminishes this deflection, since it acts in the opposite direction; its effect

* Tredgold gives the proportion in this case as 4 to 3 (see treatise on cast iron, page 141). To test the question by direct experiment, a flexible strip of wood 7 feet long was suspended at the middle. Two uniform chains of the same length were laid upon the top, and the deflection found to be $\frac{4}{8}$ of an inch: one chain was then suspended at each end, and the deflection became $\frac{11}{8}$ of an inch; but, $4 : 11 :: 3 : 8\frac{1}{4}$, a result much nearer the calculated proportion than was expected with the apparatus used.