It has been shown in treating of the resistance of solids, that the fibres on the upper side will be compressed, and on the lower side extended; that within the elastic limits the resistances to these forces are equal; that the intensity of the strain varies directly as the distance of any fibre from the neutral axis, and that at the axis itself the strain is nothing.

There exists, also, a force called, by Dr. Young, detrusion, the effect of which is to crush across the fibres close to a fixed point, and the resistance to which is directly proportional to the area of the cross section.

This force, as has been shown, modifies the form of a beam of equal strength, which, instead of being the apex of a conic section at its extremity, must be enlarged sufficiently to resist this force of detrusion.

The existence of this vertical force, and its effects at other points, have not been considered by writers on the resistance of solids, probably because it diminishes rapidly in approaching the centre of a beam, whilst the area of the section generally increases. That a vertical strain upon the fibres exists at other points can be shown by the following considerations.

Let $A B$ represent a beam supported at $A$ and $B$, and disregarding for the present its own weight, let it be loaded with a weight applied at the centre.

![Fig. 38.](image)

This force is directly transmitted to the points $A$ and $B$, each of which sustains one half the weight. The lines of direction of the forces are along $A W$ and $B W$.

By constructing the parallelograms of forces on the diagonals, we find $w o = \frac{1}{4} w n = \frac{1}{2} w$ for the vertical forces transmitted to $A$ and $B$, and $p o = \frac{1}{4} w$, the horizontal strain at $w$, which is determined by the proportion $\frac{1}{4} t : \frac{1}{4} l = \frac{1}{2} w : o p = \frac{w t}{4 l}$, (in