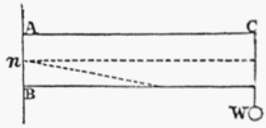
FIG. 1.



Let A C represent a beam fixed at A and loaded at C with a weight (w), the weight of the beam itself being for the present disregarded—

The substance of the beam is supposed to be entirely uniform throughout, and composed of an assemblage of parallel fibres, all being equally strong.

The effect of the weight w is to stretch the fibres at A and compress those at B. From these points to the interior of the beam the forces gradually diminish, and there must exist some point of the line A B, at which no horizontal force is exerted, and at which the fibres suffer neither extension or compression.

To that line of the longitudinal section which passes through this point, parallel to the direction of the beam A C, has been given the name of the neutral axis, a term which will hereafter be very frequently employed.

The position of the neutral axis will vary with the form of the beam, with the degree of uniformity which it possesses, and with the amount of flexure caused by the load; but in a beam that is straight-grained, rectangular, without knots or flaws of any kind, and not subjected to the action of a weight sufficient to impair its elasticity, it is practically correct to assume the position of the neutral axis in the middle of the section.

Admitting, then, that within the usual practical limits, it is sufficiently correct to assume the position of the neutral axis in the middle of the beam, it is evident that from this line in the direction n A and n B the pressures on the fibres will increase directly as the distance, and if the pressure upon any fibre at the distance $\frac{d}{2}$ be designated by R, the pressure upon any other fibre may be determined from a simple proportion. The total pressure upon the line n B can then be directly determined; for since the pressure upon any individual fibre is as the distance