pulsion of the lower part *cb*, tend to resist rotation. Now, to determine the amount of this resistance, we will first consider the upper portion; and it is obvious that at every part of the cross section, the resistance to rotation is as the resistance to extension, multiplied by the distance of the part above the neutral plane. But the resistance to extension is, by the law of elasticity, as the degree or amount of extension, which is determined by the distance from the neutral plane. The parts at two inches from this plane, or the centre of motion, are extended twice as much as those at one inch, and resist twice as much. Then, denoting this distance from *c* by the variable quantity x, the resistance to extension for each part may be denoted by sx, and the resistance to rotation about *c*, by sx^2.

Again, representing the horizontal breadth of the beam by t, $t.dx$ will represent the differential of the section, and $s.t.x^2 dx$ the differential of resistance. Then integrating and making $x=cd=h$, we have the whole resistance to rotation, of the part above the neutral plane $= \frac{1}{3}\, s.t.h^3$. But $s.h$ becomes equal to the positive strength of the material when $x=cd=h$, and $t.h =$ area of the section above the neutral plane. Therefore, the power of this part to resist rotation is equal to $\frac{1}{3}$ the area multiplied by the half depth of the beam, and the absolute positive strength of the material, in case the negative strength exceed the positive.

Now, it is manifest that the part below the neutral plane exerts exactly the same amount of resistance to rotation as the part above. Therefore the total resistance to rotation about *c*, in other words, the resistance to rupture, is equal to $\frac{1}{3}$ the whole cross section multiplied by $\frac{1}{2}$ the depth of the beam, and by the cohesive strength of the metal; that is, equal to $\frac{1}{3}\ CtD \times \frac{1}{2}D = \frac{1}{6}CtD^2$, making $D=db$, and $C=$cohesion, or positive strength of the material.