\[ \frac{f x y \, d y}{f x \, d y} = \text{distance of centre of gravity} = \frac{1}{2} y \]

\[ 2 \pi \cdot \left( \frac{1}{2} \right) y \cdot \frac{1}{4} x y = \frac{2}{2} \pi y \quad x = \frac{y}{2} \quad \text{(cylinder generated by revolution of } AC \text{)}.

**Prop. 10.** When a plate is supported at two edges, and a weight applied at the centre, the weight of the plate itself not being considered, the strength is constant whatever be the area.

Let the plate be rectangular.

**Fig. 23.**

Take the line \( pp \), passing through the centre, as the line of fracture. Call the sides \( a \) and \( b \). Let \( n b = \text{distance to centre of gravity of each half, regarding the point of application of the weight as a fulcrum.} \)

Then, \( \frac{w}{2} \cdot n b = a R, \) or \( R = \frac{w n}{2} \cdot \frac{b}{a} \), which is a constant as long as the ratio of \( b \) to \( a \) is constant.

The same is true, if the fracture be supposed to take place along any oblique line, for if the plate be increased or diminished, the lines \( wo \) and \( AB \), which express the leverage of the weight and the resistance, will always bear the same ratio. (Fig. 25.)

**Fig. 24.**

*When the weight is uniformly distributed,*

\[ w = \frac{1}{2} ab, \quad w \times n b = \frac{1}{2} n a b^2 = a R, \quad R = \frac{n}{2} b^2, \] or the