breadth to its depth as $1 : \sqrt{3}$. In this case the breadth is equal to the radius.

The geometrical construction of the figure of the stiffest beam is extremely simple. From opposite extremities of any diameter with radii equal to the radius of the cylinder describe arcs cutting the circumference and join the points of intersection.

**FIG. 34.**

![Diagram](image)

The construction of the figure of the strongest beam is also very simple, for, since the sides are as $1 : \sqrt{2}$, the hypotenuse will be $\sqrt{3}$, and from the properties of right-angled triangles, $\sqrt{3} : 1 :: 1 : A C = \frac{1}{\sqrt{3}}$; but, $\frac{1}{\sqrt{3}} : \sqrt{3} :: 1 : 3$; hence, $A C = \frac{1}{3} A B$.

Lay off therefore one third of the diameter, and erect a perpendicular; its intersection with the circumference will determine the point $D$.

**Prop. 18.** To find the resistance of a beam lying horizontally upon an edge.

**FIG. 35.**

![Diagram](image)

Let $A B$ be a diagonal, $h =$ perpendicular $C P$ $R =$ strain upon $C$, the whole strain will be represented by the pyramid, whose base is $A B C$ and altitude $R$; its volume is