sion of the diagonal $= n$, admitting a degree of angular motion $= m$.

FIG. 15.

$2\,l\,e$ represents the arc described in feet, or $24\,l\,e =$ the arc in inches. But if $a =$ the number of degrees in an arc, and $\frac{d}{2}$ its radius, ·0174533 being the length of an arc of one degree when its radius is unity, we have $24\,l\,e = \frac{a\,d}{2} \times .0174533$, or $a = \frac{2750\,l\,e}{d}$.

That is, the angle of torsion (a) is as the length and extensibility of the body directly, and inversely as its diameter.

The value of e for cast iron is $\frac{1}{1204}$, hence $a = \frac{2{\cdot}284\,l}{d}$.

The value of e for malleable iron is $\frac{1}{1400}$, hence $a = \frac{1{\cdot}965\,l}{d}$.

Forms of equal strength for beams to resist cross strains.

Whatever may be the form of the beam, it is always necessary that the area of the section resting upon the points of support should be sufficient to resist the force of detrusion, or that which tends to crush the fibres in a direction perpendicular to their length. This resistance is directly proportioned to the area, and if w represent the weight at the point of support, R the resistance per square inch, $b' =$ breadth, and d' the depth; then, the dimensions at the end must never be less than will be given by the equation $w = R\,b'\,d'$.

The practice of other writers has been to omit the consideration of this force in determining the forms of equal strength.