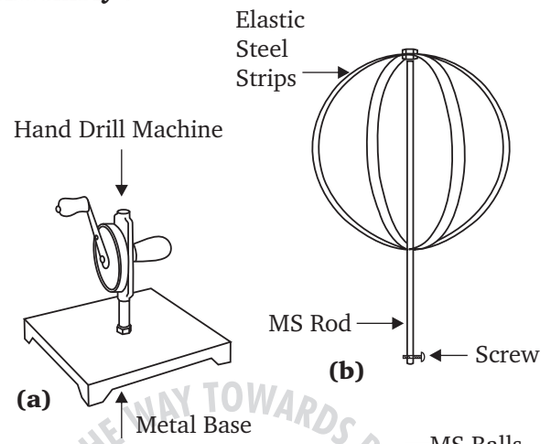
CENTRIFUGAL FORCE - KIT II

Assembly :

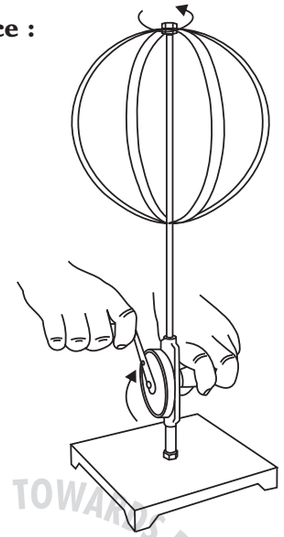


a. Consists of a hand drill machine fixed firmly on metal plate (180 x 180 mm)

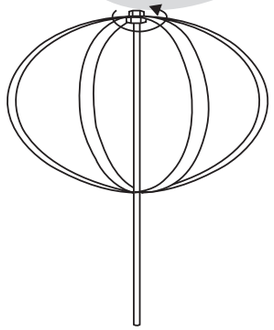
b. Consists of two elastic steel strips of length 813 mm, width 13 mm and 0.5mm thick. These two strips are fixed to a MS rod of dia 7.5 mm and length 382 mm with nuts firmly such that they form a circular loop of diameter 255 mm.

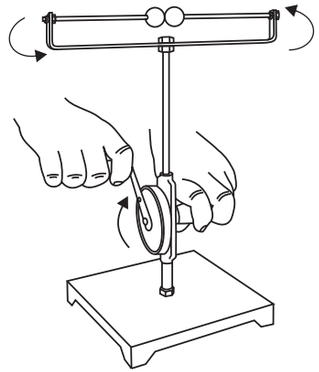
c. Consists of MS patti bent in C shape. A 4mm rod of length 240 mm is fixed between end to end of C shaped MS patti with two MS ball inserted in it. This arrangement is fixed to vertical MS rod (of length 180 mm and dia 7.5 mm) with nuts.

To do and Notice :



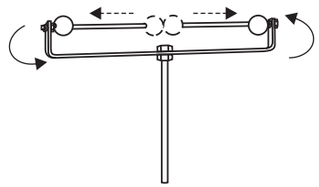
Step 1 : Insert assembly 'b' in the drilling machine of assembly 'a'. Fix it with screw provided at the end of assembly 'b'. Now rotate the drill machine by using its handle as fast as possible. Simultaneously notice the change in the shape of the circular loops of elastic steel strips. They take a elliptical shape as they execute circular motion.





Step 2 : Now remove the assembly 'b' from the assembly 'a' and insert assembly 'c' in the drilling machine of assembly 'a'. Again fix this one with screw provided at the end of the rod of the assembly 'c'.

Adjust the two MS balls at the centre of the assembly as shown in diagram. Now rotate the drill machine using handle, so that the assembly C execute circular motion. You will notice that as you rotate the machine, the balls will move away from the centre.



What is going on :

In both cases, when you rotate the drill machine, the respective assemblies will execute uniform circular motion. In uniform circular motion there is centripetal force, which acts towards the centre along the radius. Its magnitude is given by

$$f = \frac{mv^2}{r}$$

where m = mass of rotating body

v = velocity

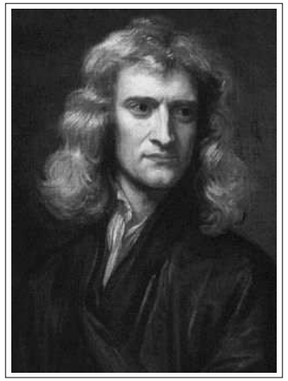
r = radius

as we rotate a body, `v' the tangential velocity increases, hence the radius of the mass element tries to increase. Since the strips are elastic mass distribution changes from circular shape of constant radius to elliptic shape of increasing radius.

In second case since the balls can go away, they go away. (Centrifugal force is fictitious force in vocabulary it is said that it balances centripetal force, hence the title.)

Additional :

Why earth is flattened at the North and South poles?



Sir Issac Newton

Born : 4 January 1643 (1643-01-04) Woolsthorpe-by-Colsterworth, Lincolnshire, England

Died : 31 March 1727 (aged 84) Kensington, London, England Residence: England Nationality English

Field : Theology, Physics, Mathematics, Astronomy, Natural philosophy, Alchemy

Institutions: University of Cambridge Royal Society Alma mater Trinity College, Cambridge Academic advisor Isaac Barrow

Known for : Newtonian mechanics Universal gravitation Infinitesimal calculus Classical optics

Sir Isaac Newton

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