Applying $\Sigma M_A = 0$ $\quad P \times OB = W \times BA$

BC is very small $\quad OB$ = radius of wheel = r.

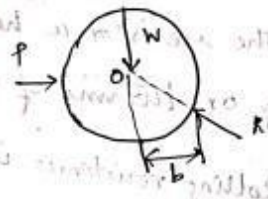
$$P \times r = W \times b$$

$$\boxed{b = \frac{Pr}{W}}$$

$b \rightarrow$ Horizontal distance of pt of resistance measured from centre of wheel known as "Co-efficient of Rolling resistance".

$R\cos\alpha \Rightarrow$ Rolling resistance.

(P) A wheel of weight 1000 N and dia 600 mm is required to move on a horizontal surface. If the co-efficient of rolling resistance is 15 mm. Calculate the force required to roll the wheel without slipping.



Given $W = 1000\,N$

$b = 15\,mm$

$r = \frac{600}{2} = 300\,mm$

$$b = \frac{Pr}{W}$$

$$P = \frac{bW}{r} = \frac{1000 \times 15}{300}$$

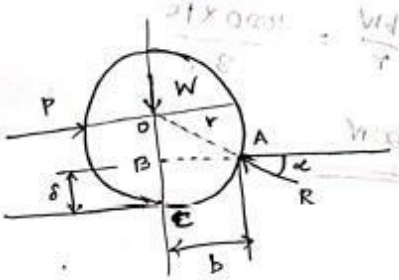
$$P = 50\,N$$

Rolling Resistance:

When one body is made to roll freely over an another body, a resistance is developed in opposite direction known as Rolling resistance.

→ The resistance helps to roll the body without any slipping or turning of the body.

→ Rolling resistance is developed due to deformation made by rolling body over an another body.



Wheel rolls without slipping with constant velocity the equilibrium condt are satisfied.

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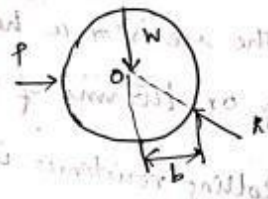

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