An epicyclic-train dynamometer, as shown in Fig. , consists of a simple epicyclic train of gears, i.e. a spur gear, an annular gear (a gear having internal teeth) and a pinion.

The spur gear iskeyed to the engine shaft (i.e. driving shaft) and rotates in anticlockwise direction. The annular gear is also keyed to the driving shaft and rotates in clockwise direction.

The pinion or the intermediate gear meshes with both the spur and annular gears. The pinion revolves freely on a lever which is pivoted to the common axis of the driving and driven shafts.

A weight wis placed at the smaller end of the lever in order to keep it in position. A little consideration will show that if the friction of the pin on which the pinion rotates is neglected, then the tangential effort P exerted by the spur gear on the pinion and the tangential reaction of the annular gear on the pinion are equal.

Since these efforts act in the upward direction as shown, therefore total upward force on the lever acting through the axis of the pinion is 2P.

This force tends to rotate the lever about its fulcrum and it is balanced by a dead weight W at the end of the lever. The stops S, S are provided to control the movement of the lever.

For equilibrium of the lever, taking moments about the fulcrum F,

$$2P \times a = W.L \quad \text{or} \quad P = W.L/2a$$

Let R = Pitch circle radius of the spur gear in metres, and

N = Speed of the engine shaft in r.p.m.

$\therefore$ Torque transmitted, $T = P.R$

Belt Transmission Dynamometer-Froude or Throney croft Transmission Dynamometer

When the belt is transmitting power from one pulley to another, the tangential effort on the driven pulley is equal to the difference between the tensions in the tight and slack sides of the belt. A belt dynamometer is introduced to measure directly the difference between the tensions of the belt, while it is running.

A belt transmission dynamometer, as shown in Fig., is called a Froude or Throney croft transmission dynamometer.

It consists of a pulley A(called driving pulley) which is rigidly fixed to the shaft of an engine whose power is required to be measured.

There is another pulley B (called driven pulley) mounted on another shaft to which the power from pulley A is transmitted.

RAMA UNIVERSITY

www.ramauniversity.ac.in

FACULTY OF ENGINEERING & TECHNOLOGY

For equilibrium of the lever, taking moments about the fulcrum F,

$$2P \times a = W.L \quad \text{or} \quad P = W.L/2a$$

Let R = Pitch circle radius of the spur gear in metres, and

N = Speed of the engine shaft in r.p.m.

$\therefore$ Torque transmitted, $T = P.R$

Belt Transmission Dynamometer-Froude or Throney croft Transmission Dynamometer

When the belt is transmitting power from one pulley to another, the tangential effort on the driven pulley is equal to the difference between the tensions in the tight and slack sides of the belt. A belt dynamometer is introduced to measure directly the difference between the tensions of the belt, while it is running.

A belt transmission dynamometer, as shown in Fig., is called a Froude or Throney croft transmission dynamometer.

It consists of a pulley A(called driving pulley) which is rigidly fixed to the shaft of an engine whose power is required to be measured.

There is another pulley B (called driven pulley) mounted on another shaft to which the power from pulley A is transmitted.