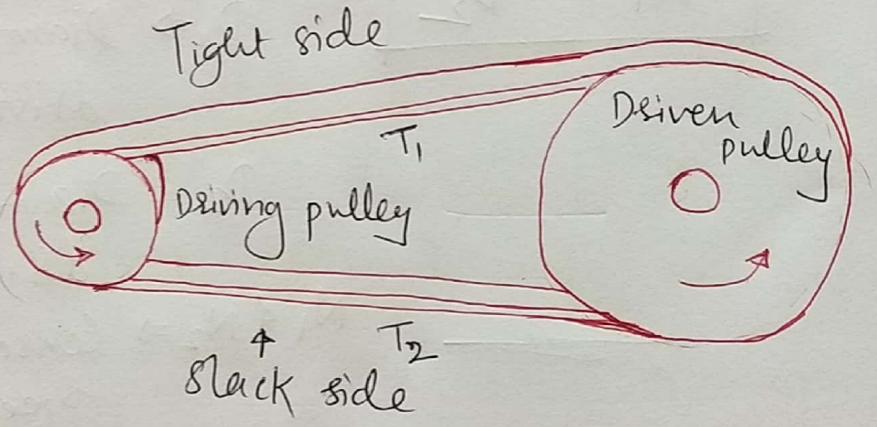
* Belt drive :-

> When the motion is transmitted from one shaft to another by using belt as a connection between them it is known as belt drive.

> There is relative velocity between shaft and belt ~~which is~~ due to slip.

> Generally, belt, rope drives are used when the distance between shafts is large.



> In belt drive, belt is mounted on pulley.

> Pulley which is ~~drives~~ used to drive the other pulley using belt is known as driving pulley. ~~and~~

> In belt drive, the velocity of two shafts can be varied by variation in diameter of pulley.

> Outer and inner faces of belt are subjected to tension and compression respectively.

> There are two types of cross sections of belts i.e. (a) Flat belt (b) V-belt.

> Velocity ratio is the ratio of speed of the driven pulley to that of the driving pulley.

$$\boxed{\frac{N_2}{N_1} = \frac{D_1}{D_2}}$$

where -

$D_1 \Rightarrow$ Diameter of driving pulley.

$D_2 =$ Diameter of driven pulley.

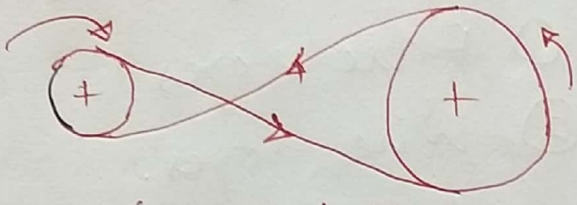
N_1 & $N_2 \Rightarrow$ Corresponding speeds.

~~* Creep :~~

~~When belt passes from~~

> Open-belt drive is used to provide same direction of rotation to driven shaft as the direction of rotation of driving shaft.

> Crossed-belt drive is used to provide reverse direction of rotation to driven shaft as the direction of rotation of driving shaft as shown in figure.



Crossed-belt drive

Creep:-

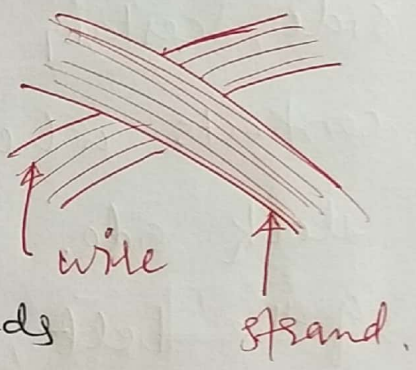
> When belt passes from slack to tight-side, certain portion of belt extends and again contracts when belt passes through tight to slack side. Due to fluctuation in length of the belt, there is relative motion between belt and pulley surface.
This relative motion is known as creep.

Rope drive :-

Rope drive is very similar to belt drive.
It is classified as —

1. Fibre ropes
2. Wire ropes.

> Fiber ropes are made of manilas or cotton.
> Wire ropes are made of steel wires.
> A number of wires make a strand and strands make a rope
> Each strand is twisted with other strands.



> Rope may have three strands or nine strands and each strand may have 7-19 wires, depending on its application.

Coupling :-

> Coupling is a device used to connect two shafts together at their ends for transmitting the power.

> There are two general types of couplings -

1. Rigid
2. Flexible.

1 Rigid Coupling :-

> Rigid coupling keeps two shafts together tightly to prevent relative motion between them.

> It is used where precise alignment ~~is required~~ between two shafts is required.

> If misalignment occurs during operation, it leads to failure due to fatigue.

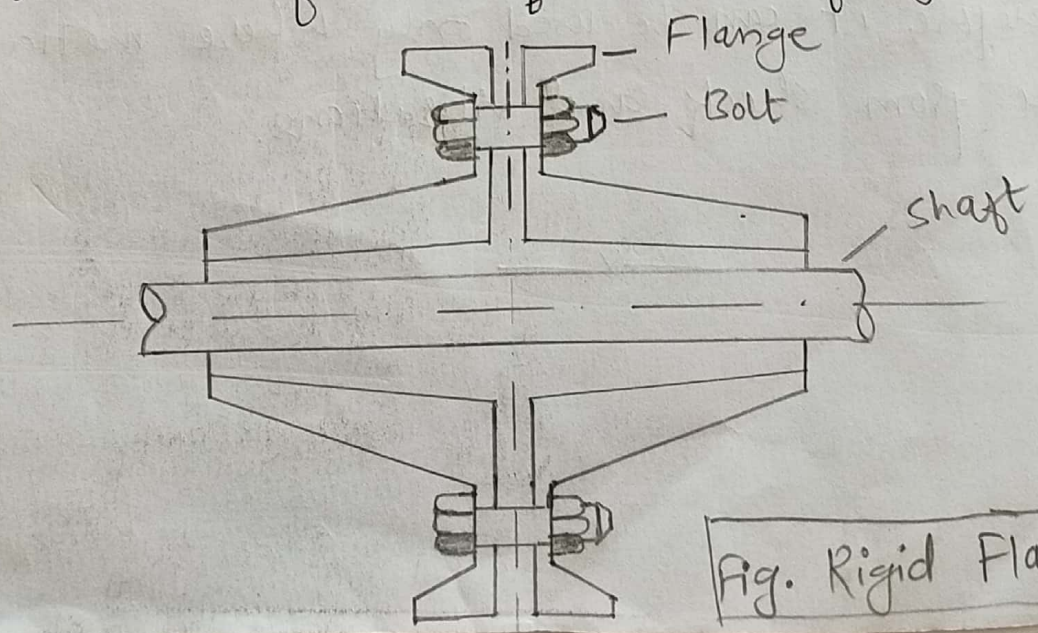


Fig. Rigid Flange Coupling

- It consists of two flanges which are keyed to the shafts.
- Flanges are attached together and bolted in annular space.
- Bolts are placed equispaced on bolt circle diameter, torque transmitted through bolts.
- Number of bolts depend on diameter of shafts.
- Advantages of rigid flange couplings are high torque transmission, easy to assemble and ~~dissamble~~ disassemble, simple design and these are easy to manufacture.
- Main disadvantages are, it requires more space, it can fail if misalignent between shafts occur, therefore it can be used only where motion is free from shock and vibrations.

—x—

② Flexible bushed coupling :-

> In bushed coupling the rubber bushings over pins are provided to accomodate some misalignment due to flexibility of bushings.

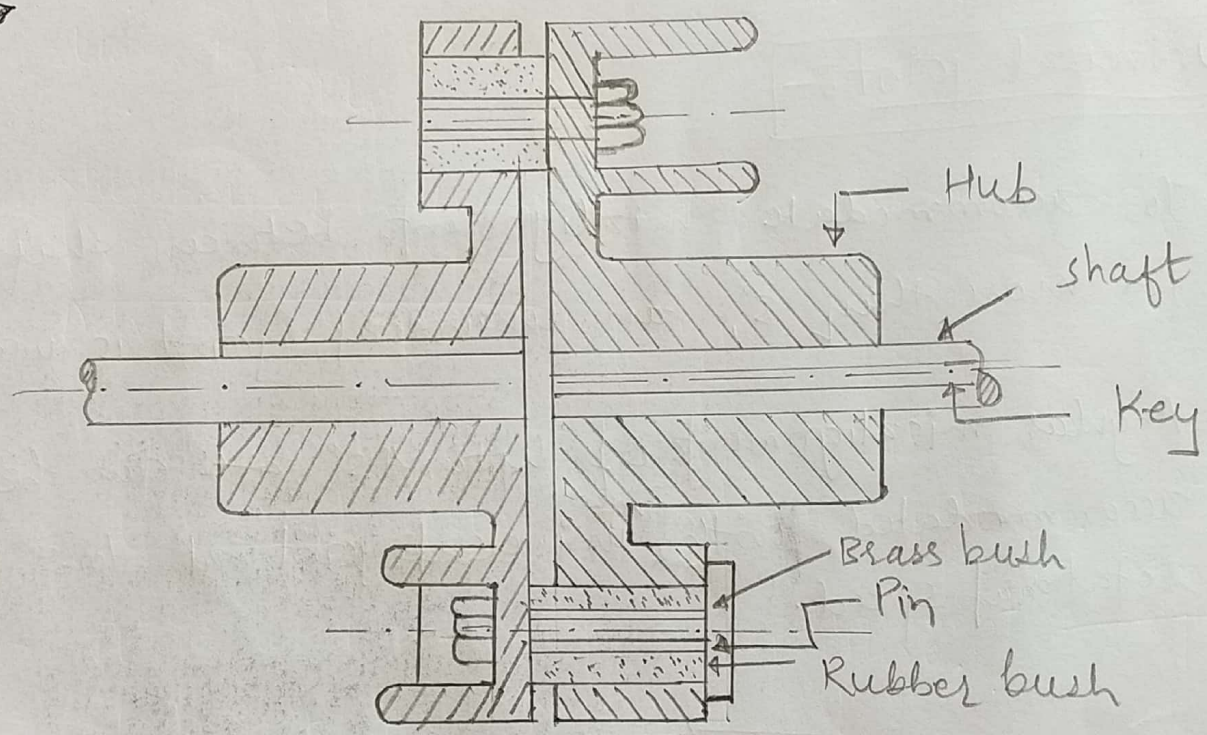


Fig. Flexible bushed coupling.

> It is similar to rigid flange coupling but the only difference is pins (bolts) are covered with rubber bush.

> Advantages of this coupling are that it can bear 0.5 mm and 1.5° lateral and angular misalignment.

> It absorbs shock and vibrations.

> It is used for transmission of high torque.

- It is easy to assemble and disassemble.
- Simple design
- It is costly and requires more space than rigid flange coupling.

3 Universal joint:-

- To accommodate misalignment between shafts for more than 3°, an universal joint is used.
- Angular misalignments of upto 45° ~~are~~ can be accommodated with single universal joint at low ~~spe~~ rotational speed.