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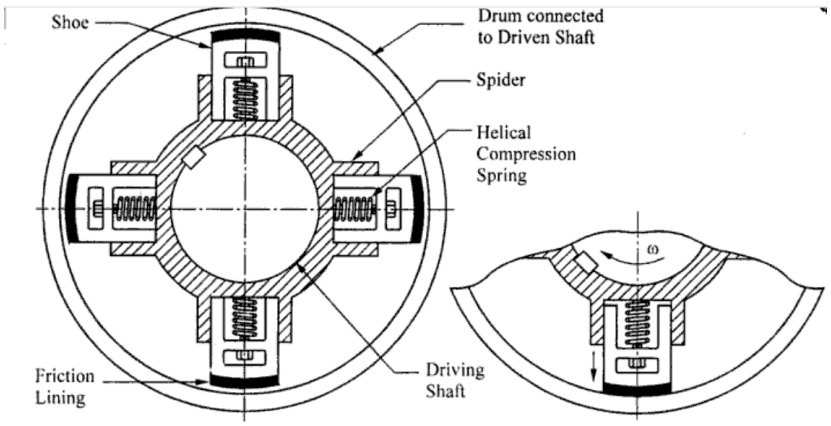
Centrifugal Clutch

Question:
Explain the working of centrifugal clutch with neat sketch.

Answer:

Centrifugal Clutch

Centrifugal clutch is a clutch that uses centrifugal force to connect two concentric shafts, with the driving shaft nested inside the driven shaft.



• A centrifugal clutch is a clutch that uses centrifugal force to connect two concentric shafts, with the driving shaft nested inside the driven shaft.

• It consists of number of shoe on the inside of a rim of pulley.

The outer surface of pulley is covered with friction material.

• These shoes move radially in guides.

• As the speed of the shaft increase, the centrifugal force on the shoes increases.

• When the centrifugal force is less than the spring force, the shoes remain in the same position as when the driving shaft was stationary, but when the centrifugal force is equal to the spring force, the shoes are just floating.

• When the centrifugal force exceeds the spring force, the shoes move outward and come into contact with the driven member presses against it.

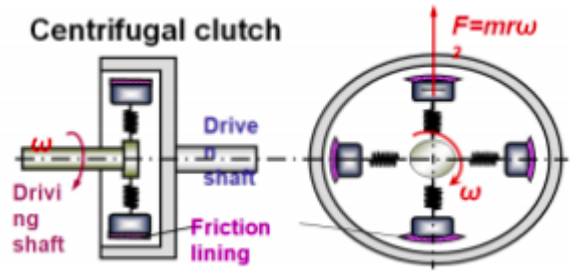
• The force with which the shoe presses against the driven member is the difference of the centrifugal force and the spring force.

• The increase of speed causes the shoe to press harder and enable more torque to be transmitted.

Alternate diagram and description

It consists of a number of shoes on the outside of a rim of the pulley. The outer surface of the shoes are covered with friction material. These shoes can move radially in guides and are held together against the boss or spider on the driving shaft, by means

of a spring. The springs exert a radially inward force on shoe. Under rotation, the shoe experiences a centrifugal force acting outward. This centrifugal force is directly related (Proportional to) speed of rotation. At a particular speed, the centrifugal force overcomes the force of the spring and the shoe moves outwards and comes in contact with the driven member and presses against it. The net force due to the effect of centrifugal force and spring force causes power to be transmitted.



Videos explaining Centrifugal clutch working

If you watch carefully animation. As the speed increases the shoes move out. Causing the contact with the external wheel and thus transmitting motion.

Advantages and Limitations of Centrifugal-clutch

Advantages:

1. Automatic operation: A centrifugal clutch automatically

engages and disengages without human intervention

2.Low Maintenance requirements : A centrifugal clutch is very cost effective as compared to other clutches for maintenance requirement.

3. Low initial cost : Because of less components and simple construction it is very less in price.

4. More life span: Due to gradual engament and disengagement it has more life span.

Limitations

1. Limited power transmission due to slippage of shoe.

2. Issue of overheating due to friction between shoe and drum.

3. It can not transmit high torque.

4. Acceleration is very slow, means it takes some time for the driven shaft to attain the required speed.

Link to other topics of Theory of machines

- Unit-1-Fundamentals and type of mechanisms
- Unit-2-Velocity and Acceleration in Mechanisms

- Unit-3-Cams and Followers
- Unit-4-Belt,Chain and Gear Drives
- Unit-5-Brakes and Clutches
- Unit-6-Flywheel,Governor and Balancing
