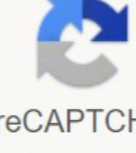
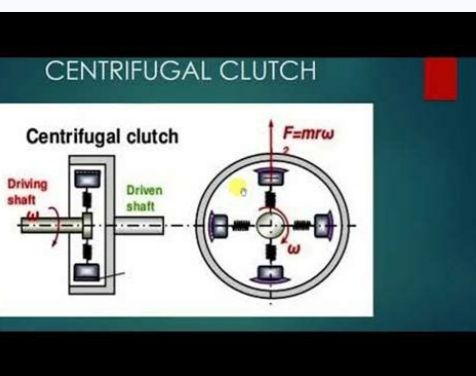


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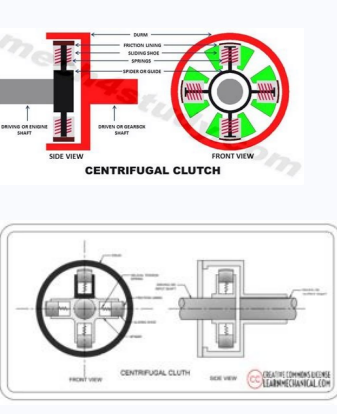
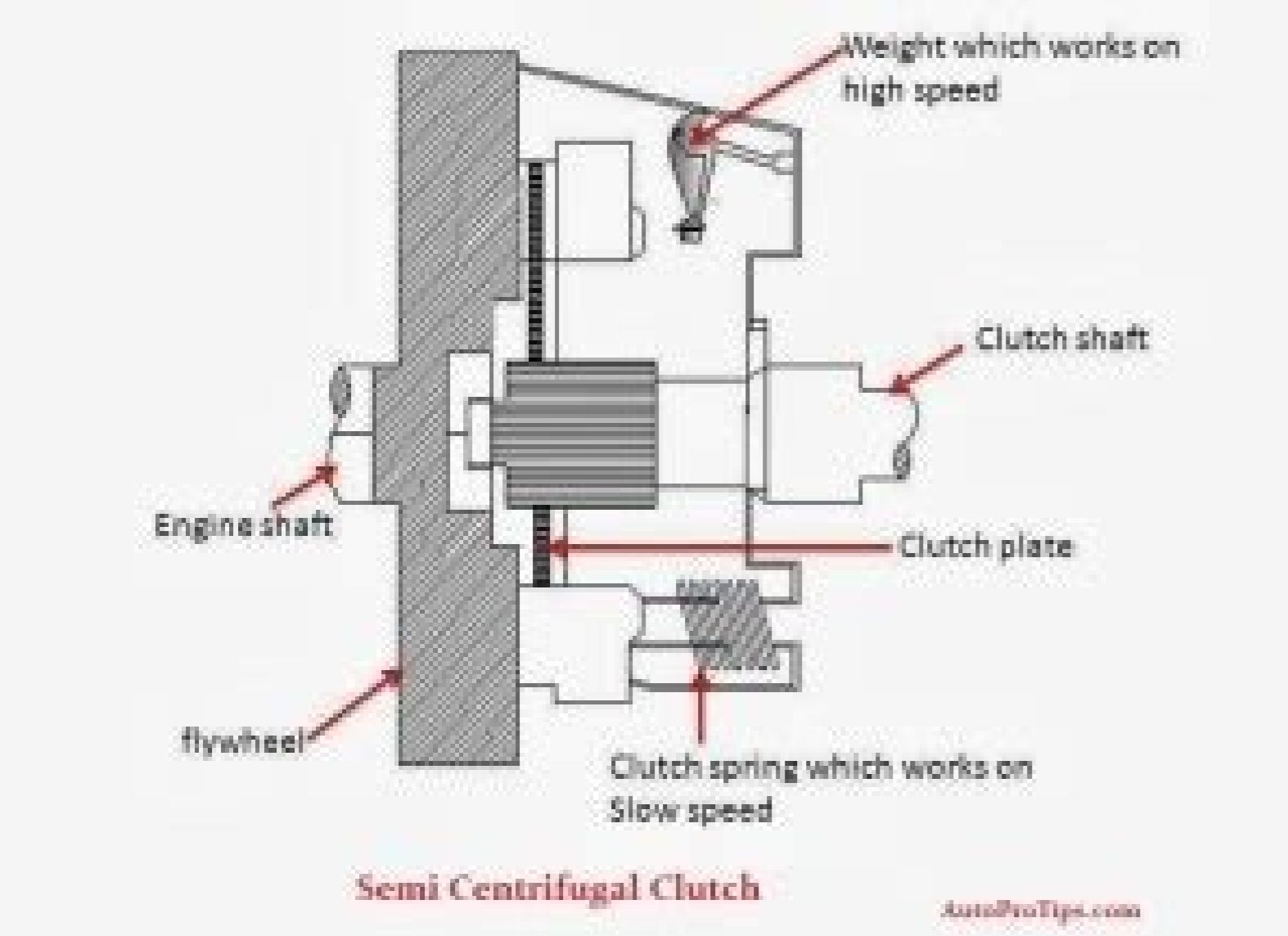


Centrifugal clutch

The torque transmitting capacity of the clutch is given by

$$T = n F R$$

where R = radius of the drum,
n = number of shoes



15. 2) CENTRIFUGAL CLUTCH Working of Centrifugal clutch This makes the clutch engaged. 5) POSITIVE CLUTCH Dog and spline clutch Both shafts are designed in such a way that one will rotate another one at the same speed and will never slip. The vacuum clutch consists of a reservoir, non-return valve, vacuum cylinder with piston, and solenoid valve. In these types of clutches, the clutch is operated automatically depending upon the engine speed. Thus the outer race moves independent of the hub and the unit acts as a roller bearing. In these types of clutches, the engine power is transmitted from crankshaft to flywheel. 3) SEMI - CENTRIFUGAL CLUTCH The semi-centrifugal clutch uses centrifugal force as well as spring force for keeping it in the engaged position. Single plate clutch is one of the main components of the clutch. 5) POSITIVE CLUTCH The positive clutches are used when positive (no slip) drives are required. The electromagnetic clutches are most suitable for a remote operation that means you can operate the clutch at distance. At this stage, the atmospheric pressure acts on both the side of the piston of the vacuum cylinder, because the vacuum cylinder is open to the atmosphere through the vent. By doing this the pressure on plate removes and the clutch will get disengaged. This piston movement is transferred by a linkage to the clutch, causing it to disengage. FRICTION CLUTCH i) Single plate clutch Working: This makes flywheel to rotate as long as the engine is running and the clutch shaft speed reduces slowly and then it stops rotating. 10. 32. There are some differences in the details of the linkage as well as in the pressure plate assemblies. 4) DIAPHRAGM CLUTCH Advantages: This types of clutches have no release levers because the spring acts as a series of levers. The solenoid is operated from the battery and the circuit has a switch which is attached on the gear lever. 14. 11. 47. Over the year, now its become an electromagnetic clutch. 1 shows a jaw clutch; that is the simplest form of a positive clutch. FRICTION CLUTCH ii) Multi plate clutch : They are pressed by coil springs and assembled in a drum. FRICTION CLUTCH i) Single plate clutch : Single plate clutches are one of the most commonly used types of clutches used in most modern light vehicles. 44. 6) HYDRULIC CLUTCH 39. When vehicle speed decreases the weights fall and the lever does not apply any pressure on the pressure plate. When the electricity passes through winding it produces the electromagnetic field which causes it to attract the pressure plate to get engaged. 53. Similarly, you can start the vehicle in any gear by pressing the accelerator pedal. A pressure plate is bolted to flywheel through clutch spring, which provides the axial force to keep the clutch engaged position, and is free to slide on the clutch shaft when the clutch pedal is operated. 5) POSITIVE CLUTCH Spiral jaw clutches (Fig. 22. 20. Each of the alternate plates slides in grooves on the flywheel and the other slides on splines on the pressure plate. The major difference between these two is that the hydraulic clutch is operated by oil pressure whereas the vacuum clutch is operated by vacuum. When we press the clutch pedal the outside bearing moves towards the flywheel pressing the diaphragm spring which pushes the pressure plate backwards. It separates the reservoir and manifold thus the vacuum exists all the time in the reservoir. The stop H limits the movement of the weights due to the centrifugal. 1) FRICTIONSL CLUTCH i) Single plate clutch 8. When the clutch pedal is pressed, the male cone slides towards the spring force and the clutch is disengaged. The two parts of the clutch are one is dog clutch which has external teeth and another one is a sliding sleeve which has internal teeth. The dog and splined clutch are mostly used in manual transmission vehicles to lock different gears. The dry single-plate type of friction clutch is almost used in American passenger cars. When the driver holds the gear lever to change the gears, the switch opens the control valve allows the oil under pressure to the cylinder. It has a friction surface on the conical portion. Spline Clutch 6) Hydraulic clutch 6. THERE ARE 9 TYPES OF CLUTCHES, FOLLOWING ARE THE DIFFERENT TYPES OF CLUTCHES: 1) Friction clutch i. 3) SEMI - CENTRIFUGAL CLUTCH 25. FRICTION CLUTCH iii) Cone clutch : 18. It consists of a clutch plate, friction lining, pressure plate, flywheel, bearings, clutch spring and nut-bolts arrangement. A flywheel unit has a hub and an outer race. 50. When the throttle is opened the pressure increases in the inlet manifold due to this the valve of the non-return valve closes. The transmission of power is in one direction similar to bicycles. 33. The clutch plate is simply thin metallic disc which has both side friction surfaces. Thus freewheel unit can transmit power only from the main shaft to the output shaft. To disengage the clutch, the sliding sleeve moves back on the splined shaft to have no contact with the driving shaft. Due to this now the clutch is getting disengaged and able to shift the gear. This action opens the passage between the vacuum cylinder and the reservoir. 38. The wet clutches are commonly used in connection with, or as a part of the automatic transmission. This type of clutches uses the existing vacuum in the engine manifold to operate the clutch. The clutch helps to transmit torque from the engine to the transmission input shaft. The multiple clutches are used in heavy commercial vehicles, racing cars, and motorcycles for transmitting high torque. MECHANICAL ENGINEERING BRANCH - 2020-21 2. 48. 1. Then springs get compressed and the pressure plate moves backwards. The pump is operated by the engine itself. 37. When the driver is not operating the gear lever, the switch is open the clutch remains engaged due to the force of springs. It can freely slide axially on the shaft, but cannot turn due to feather key. In the normal operation, the solenoid valve rod is in the bottom position of the valve as shown in the figure and the switch in the gear lever remains open. It consists of friction surfaces in the form of cones. When the two shafts are connected then you can say the clutch is engaged. THERE ARE 9 TYPES OF CLUTCHES, FOLLOWING ARE THE DIFFERENT TYPES OF CLUTCHES: 4) Diaphragm clutch OR Conical spring clutch 5) Positive clutch I. Now the clutch plate becomes free between the pressure plate and flywheel. It consists of an accumulator, control valve, cylinder with piston, pump and a reservoir. The outer race is splined to the overdrive outer shaft. The solenoid energizes and pulls the valve up this connects one side of the vacuum cylinder to the reservoir. It has fewer parts than other clutches. The flywheel has friction lining and it is connected to the clutch as shown in the figure. Jaw clutch consists of two halves; one of them permanently fastened to the driver shaft. FRICTION CLUTCH i) Single plate clutch Working: In a vehicle, we operate the clutch by pressing the clutch to peddle for disengagement of gears. The movement of plate C presses the spring E, Which ultimately presses the clutch plate D on the flywheel against the spring G. FRICTION CLUTCH The figure shows the diagram of a cone clutch. Due to the oil pressure, the piston moves forward and backwards this causes the clutch to get disengaged. 9. The friction lining is provided on both sides of the clutch plate. If the clutch is operated dry without oil, it is known as a dry clutch. 49. This made so easy for the driver to stop the vehicle in any gear without stalling the engine. This clutch uses two conical surfaces to transmit torque by friction. 8) VACUUM CLUTCH Construction and working: As the figure shows the reservoir is connected to the inlet manifold through a non-return valve. CLUTCH In clutch one shaft is usually connected to an engine or another power unit (driving member), while the other shaft (driven member) provides output power for the work. When we release pressure on the clutch peddle the pressure plate and diaphragm spring will come back to its normal position and clutch will get engaged. The hub has internal splines to connect it to the transmission main shaft. 3) SEMI - CENTRIFUGAL CLUTCH Construction of semi-centrifugal clutch: Only the spring pressure is applied to the pressure plate which is enough to keep the clutch engaged. 3. As long as the clutch peddle is pressed, the clutch is said to be disengaged, otherwise, it remains engaged due to the spring forces. To keep the clutches in the engaged position centrifugal clutch uses centrifugal force, instead of spring force. 1. The electricity is supplied by the battery. 26. WORKING PRINCIPLE OF CLUTCH The clutch works on the principles of friction, when two friction surfaces are brought in contact with each other and pressed they are united due to the friction between them. 27. When the electricity supply is cut off the clutch is disengaged. FRICTION CLUTCH iii) Cone clutch : 16. They are used when engaging and disengaging while in motion is necessary. The accumulator is connected to the cylinder through the control valve. 12. While the centrifugal force helps in torque transmission at higher engine speed. The piston is connected to the clutch by a linkage mechanism. Multiplate clutch iii. 9) OVERRUNNING CLUTCH OR FREEWHEEL UNIT 51. 45. FRICTION CLUTCH iii) Cone clutch : The main advantage of using a cone clutch is that the normal force acting on the friction surface is greater than the axial force, as compared to the single-plate clutch. 24. A friction plate which is fixed between the flywheel and pressure plate. 52. 7) ELECTROMAGNETIC CLUTCH This types of clutches are operated by electrically but the torque is transmitted mechanically. The switch is operated when the driver changes the gear by holding the gear lever. If the clutch is operated in an oil bath, it is known as a wet clutch. The figure shows a semi-centrifugal clutch. 1) Let's consider the angle of the cone is made smaller than 20°, the male cone tends to bind in the female cone and it becomes difficult to disengage the clutch. The power is transmitted from the main shaft to the output shaft from driving the planetary gears are in overdrive. FRICTION CLUTCH iii) Cone clutch : The cone clutches are basically becoming old because of some disadvantages. Thus the outer race moves in the same direction and at the same speed as the hub. 8) VACUUM CLUTCH Let's see how it works. A vacuum cylinder is connected to a reservoir through a solenoid-operated valve. 6) HYDRULIC CLUTCH When the driver leaves the gear lever the switch is open which closes the control valve and the clutch will be engaged. 41. 4) DIAPHRAGM CLUTCH 30. If one is revolved, the other will also revolve. 19. 28. The driver does not need to apply such heavy pedal pressure to hold the clutch disengaged as with the coil spring type in which the spring pressure increases more when the pedal is depressed to disengage the clutch. The spring G keeps the clutch disengaged at low speeds at about 500rpm. The other half is movable and is attached to the driven shaft. They are rarely used as compared to friction clutch. Hence, each different plate has an inner and outer spline. Tapered finger type spring is shown in the figure. These clutches transmit power from the drive shaft to the driven shaft by the interlocking of jaws or teeth. It consists of levers, clutch springs, pressure plate, Friction lining, flywheel and clutch plate. When the engine speed increases the weights fly off due to the centrifugal force, operating the bell crank levels, which press the plate C. At normal engine speeds, when the power transmission is low, the springs keep the clutch engaged, the weighted levers do not have any pressure on the pressure plate. This is why the normal force acting on the friction surface is equal to the axial force. That's why the driver may not get any strain while operating the clutch. The controlled valve is controlled by a switch that is attached to the gear lever. Fig. 2) CENTRIFUGAL CLUTCH 21. 8) VACUUM CLUTCH 46. 2) CENTRIFUGAL CLUTCH Working of Centrifugal clutch It consists of weights A pivoted at B. 31. The roller rides up the cams, and by their wedging action, they force the outer race to follow the hub. 2) CENTRIFUGAL CLUTCH The below figure shows a centrifugal clutch. The spring may be finger or crown type attached on the pressure plate. CONE CLUTCH ii) Multi plate clutch : The multiple clutches have two characters dry and wet. An adjusting screw is fitted at the end of the lever, by means of which the centrifugal force on the pressure plate can be adjuste 29. 9) OVERRUNNING CLUTCH OR FREEWHEEL UNIT The transmission main shaft is connected to the hub and the output shaft is connected to the outer race. The engine shaft consists of a female cone and a male cone. Due to the force of spring when the clutch is engaged the friction surfaces of the male cone are in contact with the female cone. 36. Dog Clutch II. Cone clutch 2) Centrifugal Clutch 3) Semi-centrifugal clutch 5. It is the most important part of every overdrive. 9) OVERRUNNING CLUTCH OR FREEWHEEL UNIT Working: When the hub is driven in the clockwise direction, as shown in the figure. After releasing the clutch pedal the pressure plate comes back to its original position and clutch is again engaged. 6) HYDRULIC CLUTCH Working of hydraulic clutch: The oil reservoir pumps the oil into the accumulator through a pump. The freewheeling unit is often mounted behind the gearbox. 42. 5) POSITIVE CLUTCH Dog and spline clutch A dog is a type of clutch it is used to lock two shafts together or to connect a gear and a shaft. 7) ELECTROMAGNETIC CLUTCH 43. 4) DIAPHRAGM CLUTCH In diaphragm clutch, the diaphragm is a conical shape of the spring. 2) are used when it needs to transmit power only in one direction; it may be left handed or right handed. The clutches used in a motor vehicle are almost very similar in construction and operation. 3) SEMI - CENTRIFUGAL CLUTCH Construction of semi-centrifugal clutch: At high engine speed when the power transmission is high, the weights fly off and the levers also exert pressure on the plate, keeping the clutch firmly engaged. 3) SEMI - CENTRIFUGAL CLUTCH Construction of semi-centrifugal clutch: A semi-centrifugal clutch has levers and clutch springs which are arranged equally on the pressure plate. 2) A small amount of wear on the cone surfaces has a considerable amount of axial movement of male cones, for which it will be difficult to allow it. The figure shows the mechanism of a hydraulic clutch. 5) POSITIVE CLUTCH 34. 35. CLUTCHES ROLL NO- FD20ME007 NAME- BHANDARGE VISHNU SHNAKAR GOVERNMENT POLYTECHNIC MUMBAI. 40. The clutch is operated by pressing the clutch pedal. 4. As the name states it has only one clutch plate. In this clutch system, the gear lever has a clutch release switch that means when the driver operates the gear lever to change gears the switch is operated cutting off the current supply to the winding which causes the clutch to disengage. The single-plate clutch has only one plate which is attached on splines of the clutch plate. The male cone is mounted on the splined clutch shaft to slide on it. This is why this type of clutch is known as electro-mechanical clutches. FRICTION CLUTCH ii) Multi plate clutch : 13. The springs of the clutch are designed to transmit the torque at normal engine speed. Some clutches are operated by hydraulic means. iii) Cone clutch : 17. FRICTION CLUTCH i) Single plate clutch The flywheel is attached on the engine crankshaft and rotates with it. They can transmit power in both directions; they are used when it is not necessary to engage or disengage under load. 4) DIAPHRAGM CLUTCH The diaphragm clutch consists of a diaphragm on conical spring which produces pressure on the pressure plate for engaging the clutch. THERE ARE 9 TYPES OF CLUTCHES, FOLLOWING ARE THE DIFFERENT TYPES OF CLUTCHES: 7) Electromagnetic clutch 8) Vacuum clutch 9) Overrunning clutch or freewheel unit 7. Single plate clutch ii. The pressure plate is provided behind the clutch plate because the pressure plate applies the pressure on the clutch plate. That's why no clutch pedal is required to operate the clutch. 6) HYDRULIC CLUTCH The hydraulic clutch working operation is the same as the vacuum clutch. In addition, some clutches for heavy-duty applications has a two friction plate and an intermediate pressure plate. When the hub speed slows down, and the outer race is still moving faster than the hub, the rollers move down the cams, releasing the outer race from the hub. 23. 8) VACUUM CLUTCH The figure shows the vacuum clutch mechanism. Due to the difference in the pressure, the vacuum cylinder piston moves forward and backwards. The outer surface of the hub contains 12 cams so designed to hold 12 rollers in a cage between them and the outer race. 9) OVERRUNNING CLUTCH OR FREEWHEEL UNIT The freewheeling unit clutches also known as spring clutch, overrunning clutch, or one-way clutch. 7) ELECTROMAGNETIC CLUTCH The clutch has flywheel consists of winding. These clutches have no mechanical linkage to control their engagement that's why it provides fast and smooth operation. 8) VACUUM CLUTCH When the driver changes the gear by holding gear lever the switch gets closed. The working principle of multiple clutches is the same as the working of the single-plate clutch.

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