



GOVERNMENT POLYTECHNIC, SONEPUR

Lecture Note On- Automobile Engg. and Hybrid Vehicles

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① Sliding mesh gear box

It is the simplest and oldest type of gear box. It is that gear box in which the gears on the splined main shaft are moved right or left for meshing them with appropriate gears on the lay shaft for obtaining different speed. This type of gearbox derives its name from the fact that the gears are meshed by sliding one on to the other.

The main components of sliding mesh gear box are -

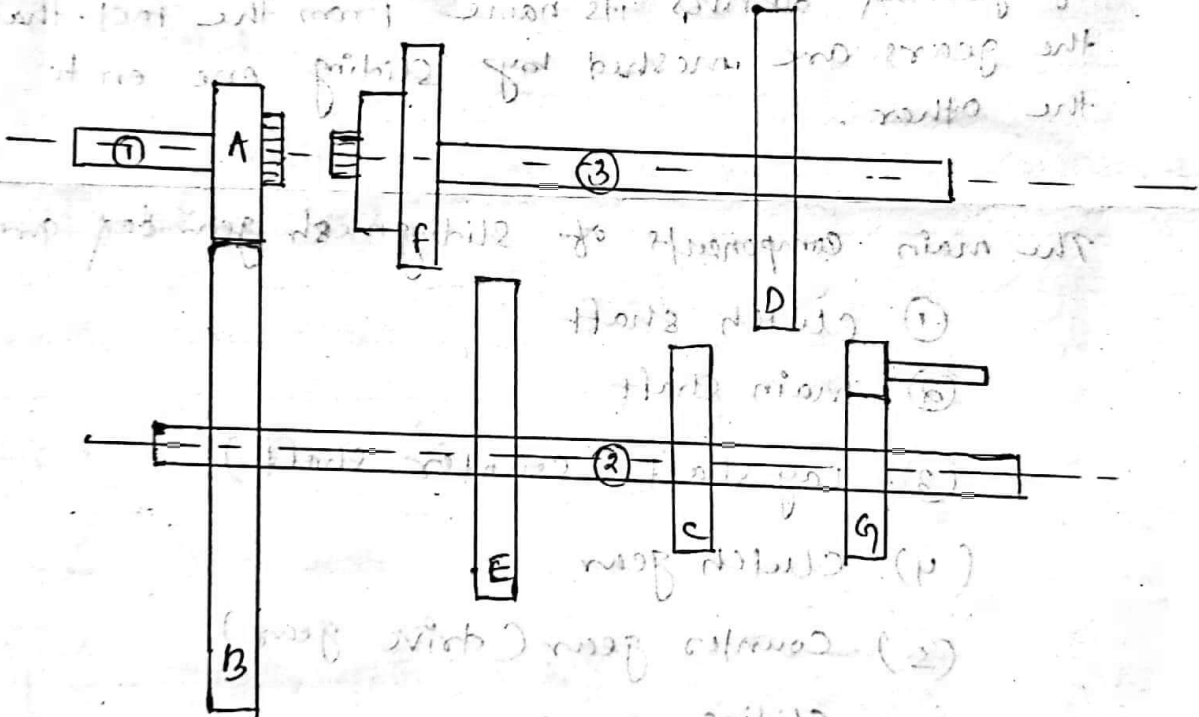
- ① Clutch shaft
- ② Main shaft
- ③ Lay shaft (Counter shaft)
- ④ Clutch gear
- ⑤ Counter gear (drive gear)
- ⑥ Sliding gears.
- ⑦ Idler gear.

→ The clutch gear is rigidly fixed to the clutch shaft.

→ The clutch gear always remains connected to the drive gear of counter shaft.

→ The other lay shaft gears are also rigidly fixed with the lay shaft.

- When the power from engine comes to clutch shaft, the clutch shaft started moving and it will also rotate the drive gear of lay shaft.
- As the all gears of lay shaft are rigidly fixed ~~then~~ so the lay shaft and all the gears of lay shaft are also rotate with the clutch gear.
- The two gears are mounted on the main shaft and can be sliding by shifter yoke when shifter is operated.
- A reverse idler gear is mounted on another shaft and always remains connected to reverse gear of counter shaft.



A - Clutch Gear

B, C, E, F - drive gear (counter gear)

F - Second, & high speed gear

D - first and reverse gear

1 - Clutch shaft

2 - Lay shaft (Counter shaft)

3 - Main shaft

(i) First Gear

- By operating gearshift lever, the large gear (i.e. gear - D) on main shaft is made to slide and mesh with the first gear (Gear - C) of counter shaft.
- The main shaft turns in the same direction as clutch shaft.

(ii) Second Gear

- By operating gear shift lever, the smaller gear on the main shaft is made to slide and mesh with second gear (Gear E) of counter shaft. Then the main shaft turns due to the meshing of gear E and Gear F.

(iii) Top Gear

- By operating gearshift lever, the combined gear F on the main shaft is made slide and mesh with the clutch gear. So the total power will be transmitted from clutch shaft to main shaft. and we get the high speed.

(iv) Reverse Gear

- By operating gearshift lever, the large gear of main shaft is meshed with reverse idler gear.
- The reverse idler gear is always on the mesh with counter shaft reverse gear.
- Interposing the idler gear, between reverse and main shaft gear, the main shaft turns in a direction opposite to clutch shaft.

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Single Plate clutch

A single plate clutch is defined as a type of friction clutch, which is made of only one clutch plate. The amount of frictional force that generates within the clutch plate due to the contact that takes place between the friction lining which is mounted on the clutch plate.

Parts of a single plate clutch.

(i) flywheel :- flywheel is the heaviest part among all the parts of clutch. flywheel is attached with the crankshaft and another side of the flywheel made contact with the grasp-plate.

(ii) pressure plate :- The main frictional force controlling part is the pressure plate. The pressure plate is usually attached to the plate of solid metal. It takes the help of weight to maintain contact.

(iii) friction lining :- It is the main part of the contact from which the frictional force produces. friction lining creates contact with the flywheel and thus creates a frictional force at the time of rotation.

(iv) Clutch Plate: The clutch plate is the most important part of a clutch. It consists of frictional lining on both sides of it. A clutch plate also known as Clutch Disk.

(v) Spring: Springs are connected with the pressure plate with the help of the bolts. These springs usually help the clutch plate to make contact with the flywheel to produce friction and as well as torque.

(vi) Thrust Ball Bearing: It is made of some small bearing balls in a circular ring. It helps to produce the rotation between two parts to maintain the low axial loads as low thrust is used.

Working Principle

The entire working principle of a single plate clutch depends upon two distinct areas those are disengagement and engagement.

① Engage

⇒ At first, the clutch plate is placed in its proper position, between the flywheel and the pressure plate.

⇒ The springs are connected with the pressure plate. In this case the pressure plate puts the weight on the springs according to the necessity.

⇒ Spring can control the contact of the friction lining of the clutch plate and the flywheel.

⇒ The friction surface or friction lining turns to rotate with the contact of the flywheel and thus friction can be produced.

⇒ The clutch becomes engaged.

⇒ The clutch plate is attached to the clutch shaft which is in contact with the gear-box of a vehicle.

⇒ Hence, the power transfer to the gearbox from the shaft.

(b) ~~Dis~~ Disengage :-

⇒ At first, the pressure plate remove its contact pressure from the springs. As a result, the springs removed backward from the clutch plate.

→ The Flywheel also comes back from the clutch plate.

→ Hence, the clutch plate becomes free from the pressure plate and the flywheel.

→ Hence, the clutch plate becomes free from the pressure

→ The friction surface are not in contact now with the flywheel and pressure plate.

→ In this case, the clutch shaft reduces its speed or rotation as the weight reduced.

→ At last, the rotation of the clutch shaft is stopped.

→ Therefore the clutch is disengaged.

→ The pressure plate rotates with the flywheel and it presses against the friction plate.

→ This forces the clutch plate and clutch shaft as well.

→ When the clutch plate pedal is pressed the clutch plates are released and flywheel still rotating because they are not fully pressed by the pressure plate.

→ Thus clutch shaft also stops rotating.