

CHAPTER 4F

CLUTCH

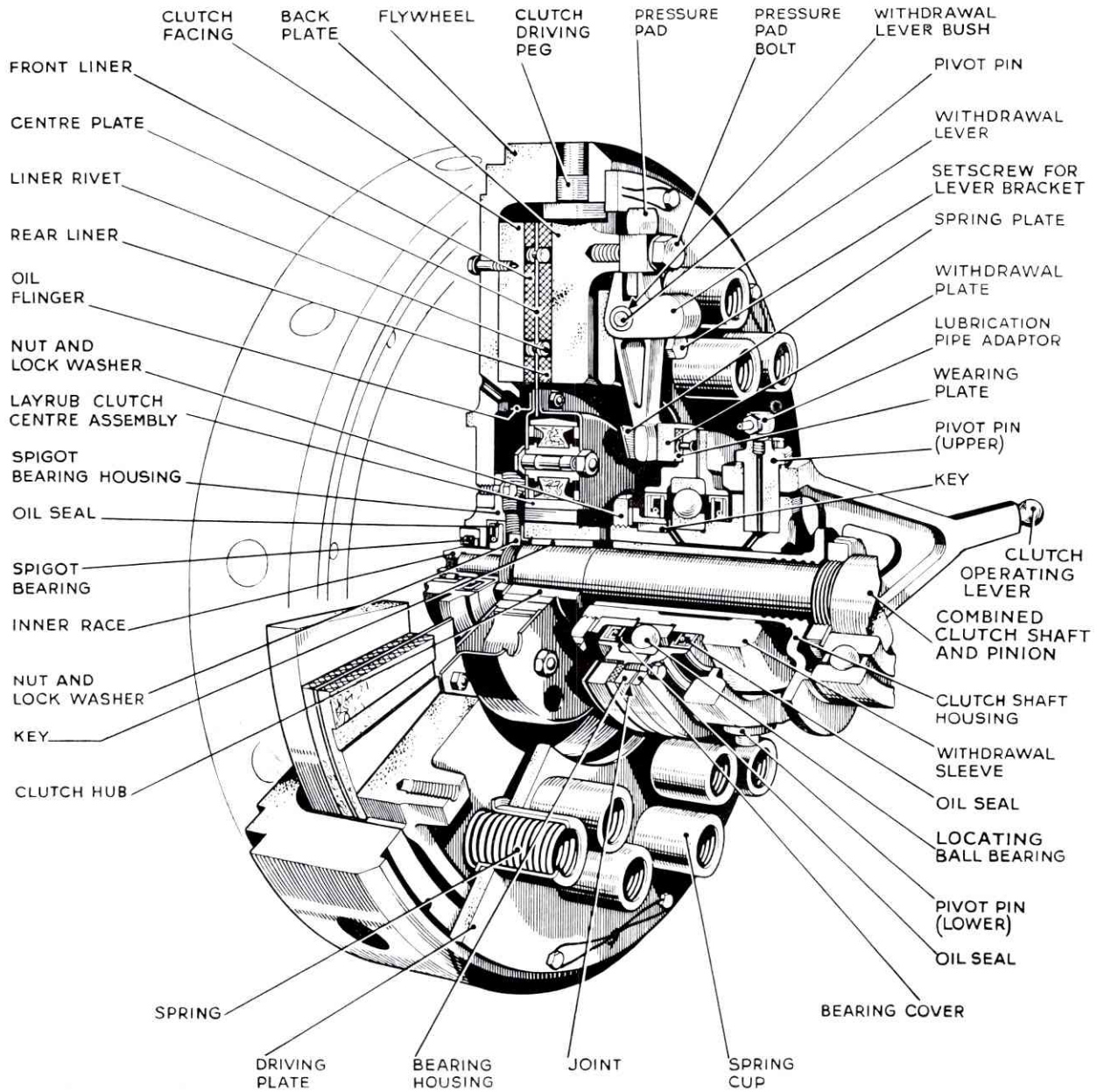


FIG. 1. CUT-AWAY VIEW OF THE CLUTCH ON THE PASSENGER VEHICLE

CLUTCH**DATA**

Type Leyland, single dry plate.

Liners

Outside diameter 16.25 in.

Thickness Engine side : $\frac{1}{4}$ in.
Gearbox side : $\frac{3}{8}$ in.

Material Ferodo M.R. or Small and Parkes B.S.5.

Rivets 40 tubular brass rivets, $\frac{3}{16}$ in. dia. \times .41 in. long.

Springs

Number 18.

Free length 5.25 in. \pm .10 in.

Length when loaded with 106 \pm 3 lb. 2.6 in.

Reject individual springs If overall length is 2.60 in. or less under a load of 98 lb.

Withdrawal bearing Ball location—120 mm. o/d \times 65 mm. i/d \times 23 mm. wide.

Withdrawal bearing seals " Superfect " No. 4003.

Withdrawal lever pivot bearings Early chassis : Hoffmann needle-rollers (48 rollers, 3 mm. dia. \times 19.8 mm. long).
Later chassis : Floating steel bush.

Clutch Centre and Hub

Gear tooth particulars 16 teeth, 6/8 D.P., 20° pressure angle.

Backlash between centre and hub003 in. to .006 in.

Withdrawal Wearing Plate

Thickness2 in.

Material Small and Parkes L.G.3.

Rivets 8 tubular brass rivets, $\frac{5}{32}$ in. dia. \times $\frac{1}{2}$ in. long.

Spigot Bearing

Bearing Hoffmann—R.M.8 (less inner race and to suit an inner track of 1.0622 in. to 1.0617 in. dia.).

Oil Seal " Superfect " No. 21912 (" Supertan " type).

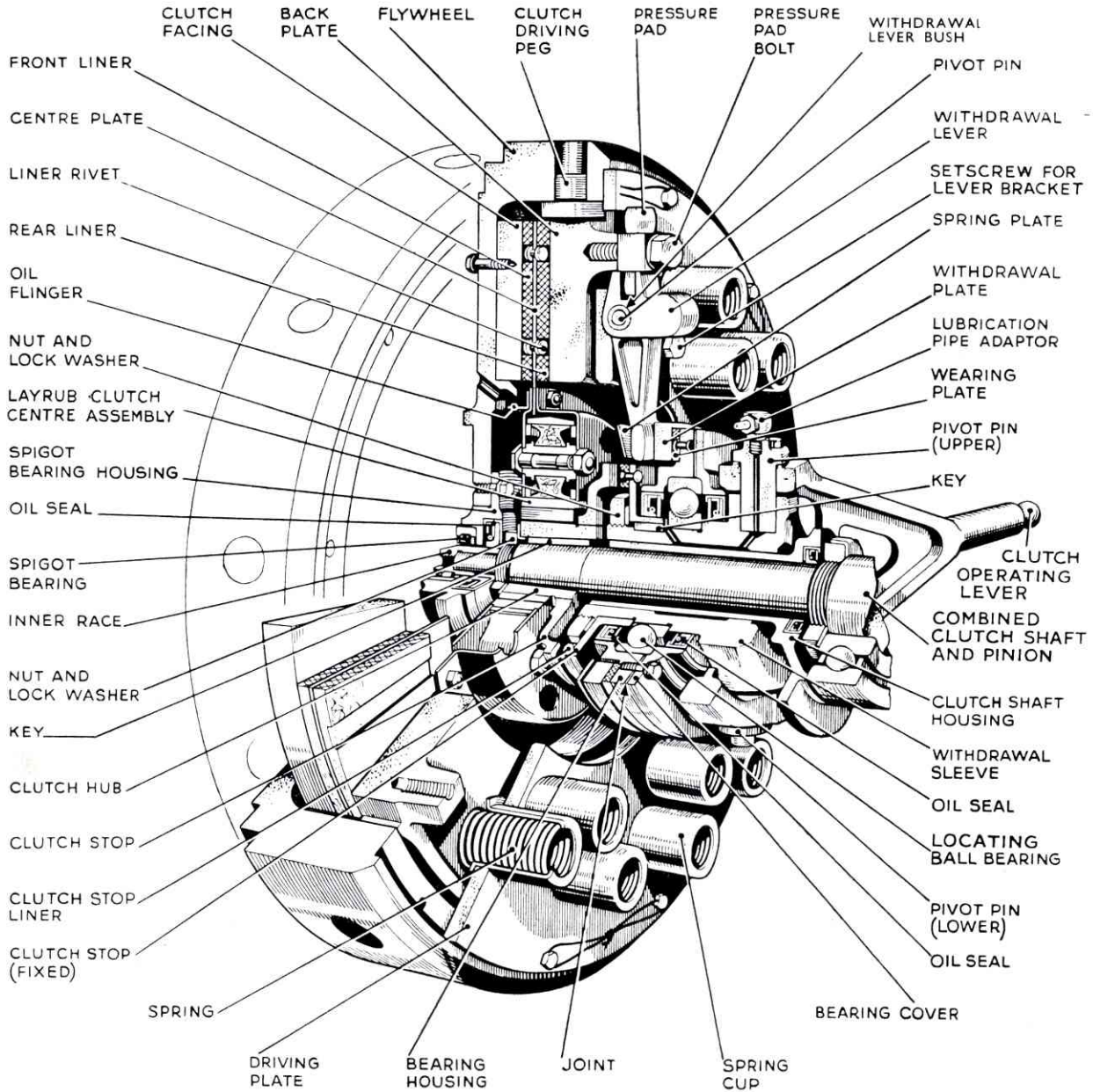


FIG. 2. THE CLUTCH ON THE HEAVY GOODS VEHICLE
(Fitted with a clutch stop)

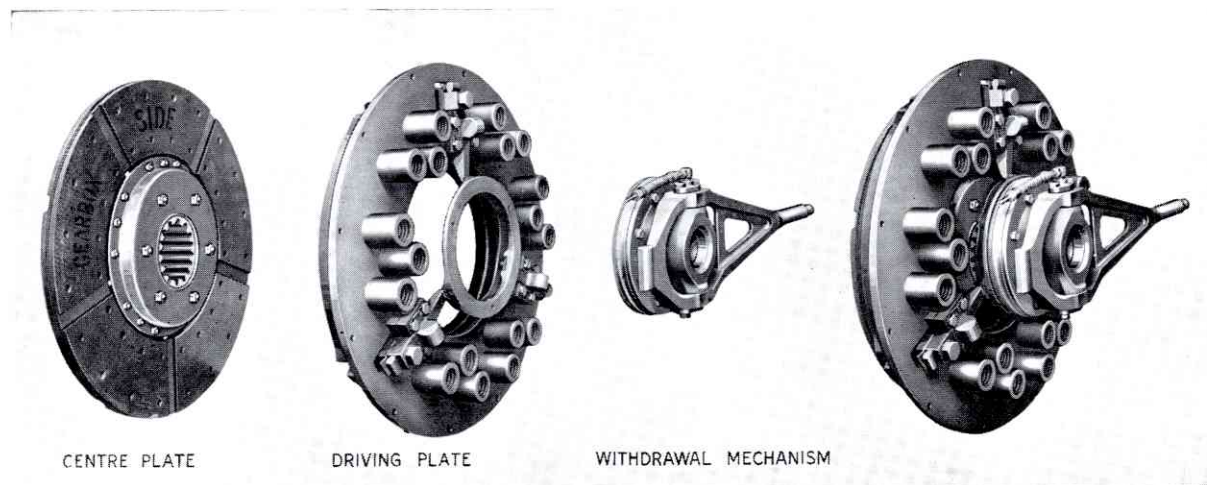


FIG. 3. CLUTCH SUB-UNITS VIEWED FROM GEARBOX SIDE

DESCRIPTION

Essentially the clutch consists of three sub-units, as shown in Fig. 3. The centre plate and liners and the driving plate with springs, withdrawal levers and back plate are on the engine. The withdrawal mechanism is mounted on the gearbox clutch-shaft housing.

The complete assembly is shown in Figs. 1 and 2.

The clutch facing is spigoted in to the flywheel and secured by setscrews. It is readily detachable for skimming-up or renewal.

The liners are riveted to a centre plate bolted to the housing enclosing the flexible clutch centre. The centre is shown in Fig. 6 and comprises six resilient blocks pressed into the clutch centre and housing.

The liners are unequal in thickness, the thicker one always on the gearbox side of the clutch where most wear takes place. Both liners are slotted radially to ventilate the friction faces.

The pressure on the clutch facings is supplied by eighteen springs in six groups of three springs, so disposed to give even pressure without distortion. The back plate, located in the flywheel by four driving pegs, has three bosses for the pressure pads. The driving plate is secured to the flywheel by setscrews, one of which is out of pitch so that the four driving pegs in the flywheel are matched with the four slots in the back plate. The

withdrawal levers are bushed on eccentric pivot pins in the split lever brackets setscrewed to the driving plate. The pressure pads engage in the levers and can be reversed and/or turned to give three adjustments to the levers as the liners wear.

The withdrawal plate is centralised on the withdrawal levers by a spring plate and faces up to a fabric wearing plate on the withdrawal mechanism.

The withdrawal mechanism is a sleeve carrying a ball bearing, fully housed and protected by oil seals. The fabric wearing plate is riveted to the bearing housing, and the whole assembly is secured to the withdrawal sleeve by a nut and lockwasher. The clutch hub is keyed on the taper of the combined clutch-shaft and pinion and secured by a nut and lockwasher. The operating lever pivots in the withdrawal sleeve on the upper and lower pivot pins setscrewed into the lever, and hinges in a retaining block and plate, shown in Fig. 10.

Lubricant is fed through the upper pin from a flexible pipe to the inside of the withdrawal sleeve and to the bearing.

Note : The clutch fitted to the Heavy Goods vehicle is equipped with a fixed clutch stop. This comprises a flange mounted on the withdrawal sleeve and faced with a liner. When the clutch is operated this comes in contact with a flange fixed to the clutch hub, shown in Figs. 2 and 11.

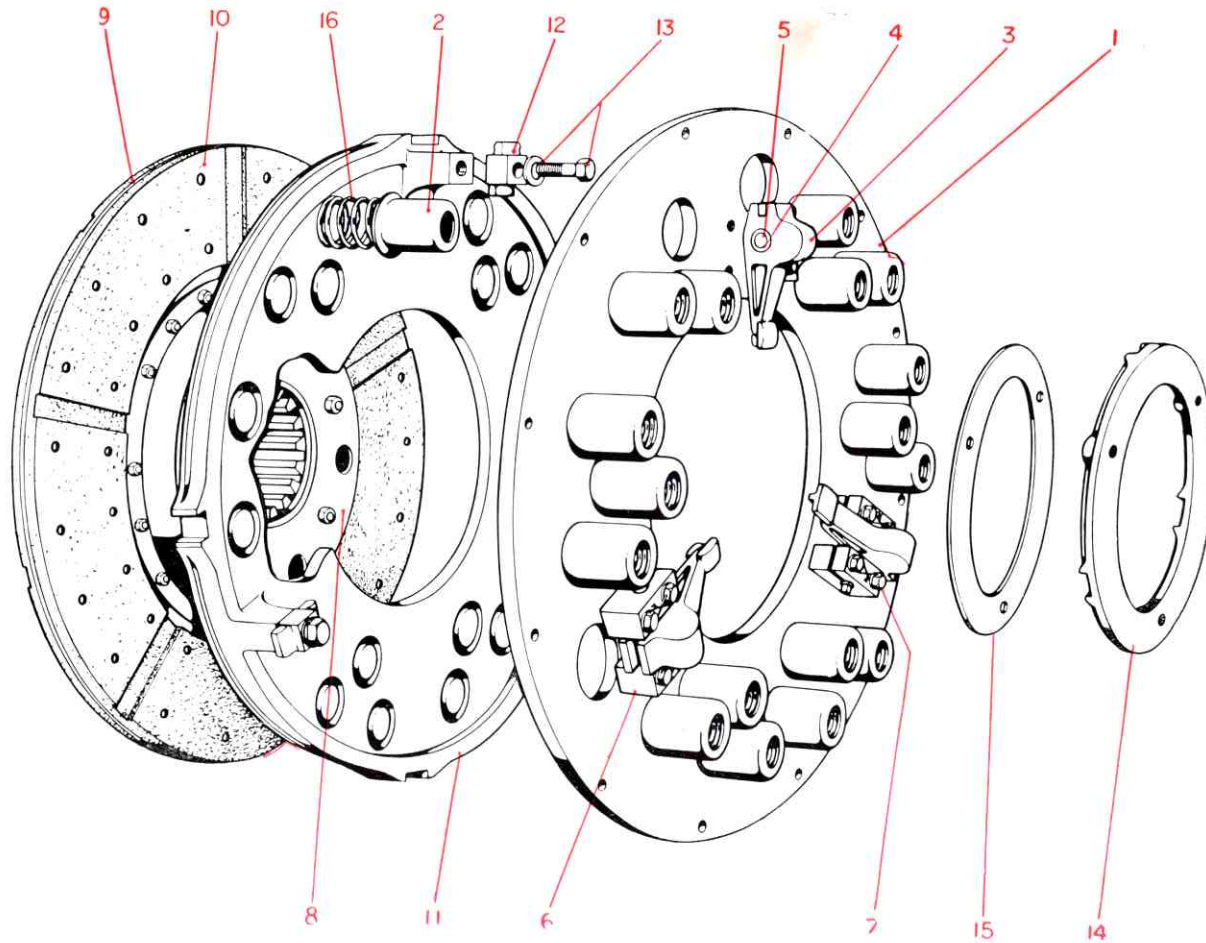


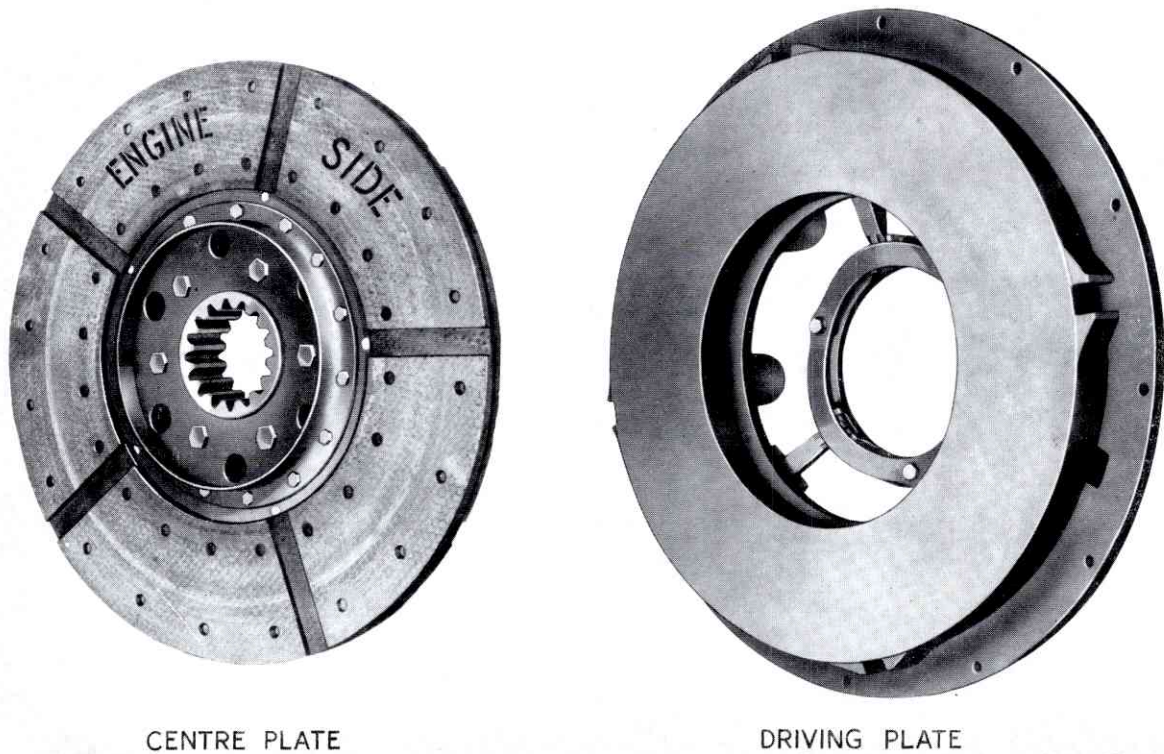
FIG. 4. EXPLODED VIEW OF THE CLUTCH

1. Driving Plate.
2. Spring Cup.
3. Lever.
4. Pin.

5. Bush.
6. Bracket.
7. Bolt.
8. Clutch Centre.

9. Front Liner.
10. Rear Liner.
11. Back Plate.
12. Pressure Pad.

13. Bolt and Washer.
14. Withdrawal Plate.
15. Spring Plate.
16. Spring.



CENTRE PLATE

DRIVING PLATE

FIG. 5. CLUTCH SUB-UNITS VIEWED FROM ENGINE SIDE

The clutch shaft spigot bearing is mounted in a housing secured to the flywheel. An oil seal, pressed in the same housing, prevents leakage of lubricant. Any lubricant leaking past the seal is directed by the oil flinger to the holes in the flywheel and so to the outside of the clutch.

The inner race for the spigot bearing is pressed on the clutch shaft and is easily replaceable.

LUBRICATION

The withdrawal ball bearing and operating lever pivot pins are lubricated weekly, or every 1,000 miles, with oil by a lubricator on the left-hand of the clutch housing, see **Lubrication Chart**. One stroke of the oil-gun is sufficient, but a limited supply plug in the clutch housing prevents any over-lubrication.

The withdrawal ball bearing is packed with grease on assembly. Clean and repack at overhaul.

The spigot bearing is packed with high-melting-point (H.M.P.) grease on assembly. Clean and repack at overhaul.

The specifications of the above lubricants are given in the **Lubrication** chapter.

MAINTENANCE

Check the tightness of all bolts, setscrews and nuts after the first 5,000 miles' service of a new vehicle or replacement clutch.

If the clutch slips, check for :

1. The withdrawal levers not correctly adjusted, shown by excessive free pedal travel.
2. Worn out liners.
3. Weak springs, or some broken.
4. The withdrawal sleeve sticking.

If the clutch grabs, check for :

1. Oily liners or pressure facings.
2. Cracked liners or pressure facings.

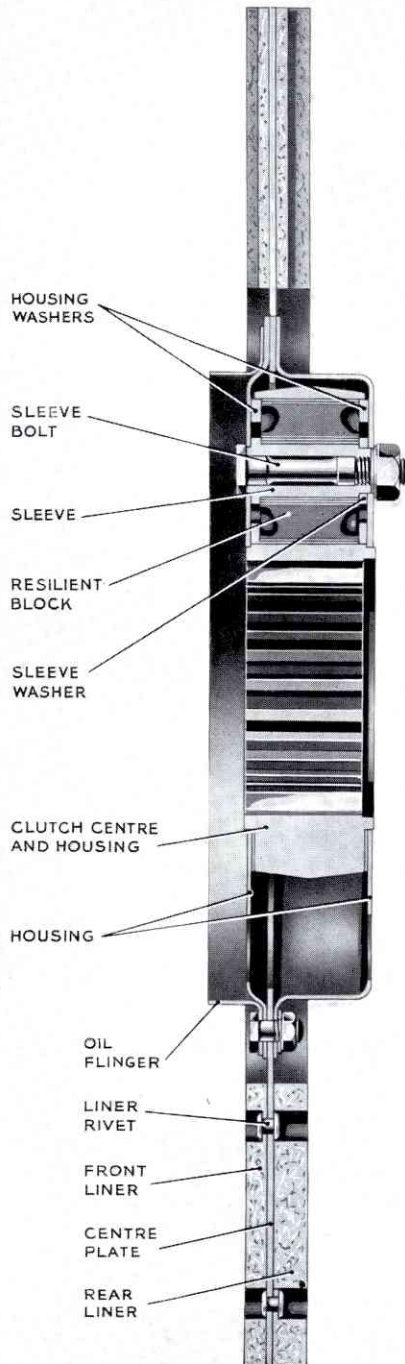


FIG. 6. LAYRUB FLEXIBLE CLUTCH CENTRE

3. Binding withdrawal mechanism.
4. Worn out withdrawal fabric wearing plate.

If the clutch drags, check for :

1. The withdrawal levers not correctly adjusted, shown by excessive free pedal travel.
2. Loose liners.
3. Dry or seized spigot bearing.
4. Warped centre plate or liners.
5. Dry or seized withdrawal ball bearing.

If the clutch is noisy, remember :

1. Squealing is caused by the clutch slipping.
2. Grating or clicking when the pedal is depressed indicates a damaged, worn or dry withdrawal bearing.
3. Rattling when the clutch is disengaged indicates loose or cracked liners or excessive backlash on the clutch centre and hub.
4. The clutch and gearbox may be misaligned.

To Adjust the Withdrawal Levers

One initial and three service adjustments of the pressure pads ensure that maximum wear is obtained from the liners. The adjustments are made by turning and/or reversing the pads, as shown in Fig. 9.

To get full advantage from these adjustments, the pressure pads must be turned and/or reversed when the free pedal travel is reduced to about $\frac{1}{2}$ in. To adjust the pads too soon is as bad as adjusting them too late ; the purpose of the pads being to give progressive adjustment of the withdrawal levers at definite stages of liner wear.

To carry out the resetting operation :

1. Remove the ventilation cover from the clutch housing, Fig. 8.

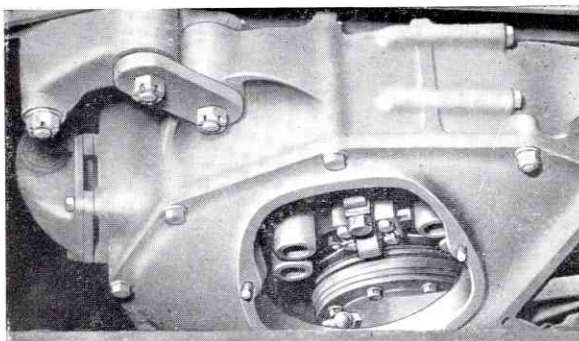


FIG. 7. ACCESS TO PRESSURE PADS
(Under-floor Engine Passenger Vehicles)

2. Slacken or remove each pressure pad bolt one at a time and turn and/or reverse the pads, as the case may be. Fig. 9 shows the appropriate change-round of the pads for whichever of the three adjustments is being made at the time.
3. Replace and/or tighten each bolt securely. When the third adjustment has been made and the free pedal travel is lost for the last time, then the clutch must be relined.

On Passenger Vehicles there is approximately 2½ in. free pedal travel when the clutch is correctly adjusted. When the free travel is reduced to about ½ in., the withdrawal levers have to be reset to regain the 2½ in. free travel.

The effective travel of the clutch pedal is not sufficient to allow the full free travel available on the withdrawal sleeve to be utilised. Therefore when setting the withdrawal levers with the pressure pads, adjust the turnbuckle shown in Fig. 8 until the free-travel is reduced sufficiently to allow the clutch to disengage fully when the pedal is nearly fully depressed. As the clutch wears and the free travel at the pedal is reduced to about ½ in., adjust the clutch operating rod by the turnbuckle until the free travel is regained. When the free travel is reduced again, reset the pressure pads.

Therefore the sequence is, set the pressure pads initially, then on first loss of free-travel adjust the clutch rod to regain the free-travel. On the next loss of free-travel reset the pressure-pads. Repeat this sequence until the liners are worn down to replacement thickness.

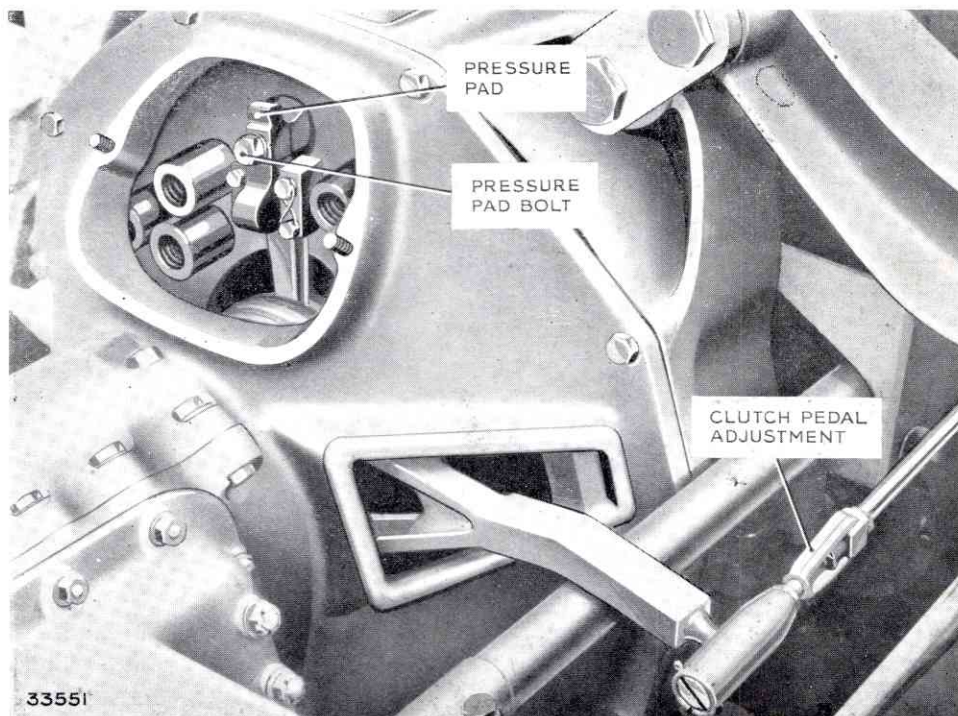


FIG. 8. ACCESS TO THE PRESSURE PADS
(Vertical Engine Passenger Vehicles)

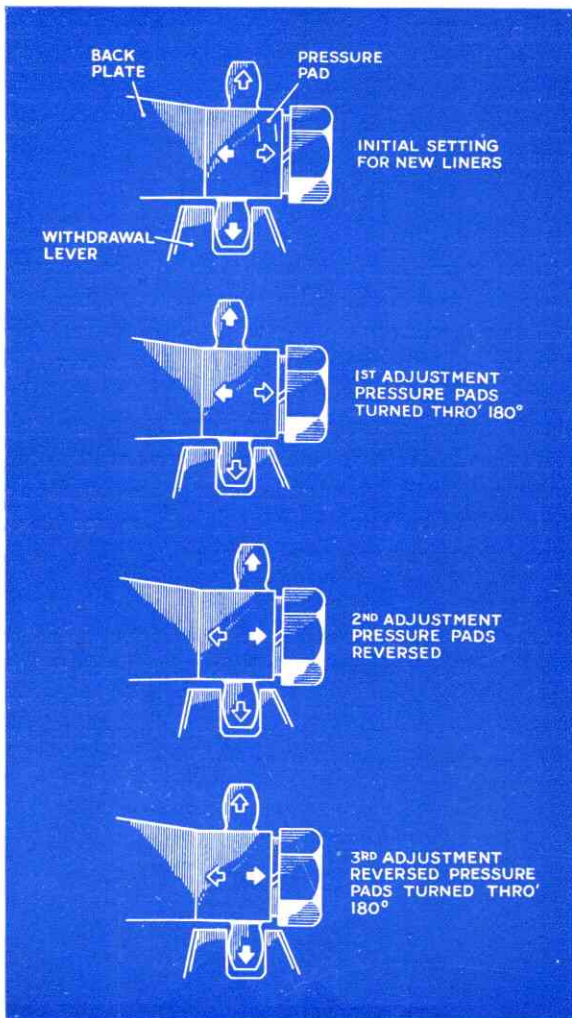


FIG. 9. WITHDRAWAL LEVER ADJUSTMENT

On Heavy Goods Vehicles there is approximately $3\frac{1}{2}$ in. free pedal travel when the clutch is correctly adjusted. When the free travel is reduced to about $\frac{1}{2}$ in., the withdrawal levers have to be reset to regain the $3\frac{1}{2}$ in. free travel. **On no account must the length of the clutch operating rod be altered to regain this free travel**; the rod is set to the correct length on assembly and need not be touched until overhaul.

OVERHAUL

To Remove and Dismantle the Driving and Centre Plate Assemblies

1. Remove the gearbox, see **Gearbox** chapter. The withdrawal mechanism will come away on the gearbox, see **To Dismantle the Withdrawal Mechanism**.

2. Remove the setscrews securing the driving plate assembly to the flywheel, unscrewing them a little at a time. Lift out the centre plate and liners.
3. Before proceeding any further, clearly mark the driving plate, back plate, pressure pads and withdrawal levers, to ensure that they are re-assembled in the same relative positions, should replacements be unnecessary.
4. Remove the withdrawal and spring plates from the withdrawal levers.
5. Place the assembly, driving plate uppermost, on the bed of a screw press. Put a triangular wood block on the face of the driving plate clear of the withdrawal levers.
6. Apply the press to the block and compress the springs. While under compression remove the pressure pads. Relieve the pressure gradually to prevent the springs from flying out.
7. Lift the driving plate clear of the back plate. Inspect and test each individual spring for weakness or breakage. Replace any which do not come up to the required rating.
8. Remove the withdrawal levers and brackets. Inspect the pivot pins and lever bores for any signs of indentation from the rollers when fitted. Clean and inspect the needle rollers. If bushes are fitted inspect for excessive clearance.
9. Inspect the clutch facing and the back plate for wear or cracks. If cracks are detected in either part, replacement must be made. If either face is scored or unevenly worn, they must be reground to restore the smooth finish. Up to a maximum of $\frac{1}{8}$ in. can be ground off the face of either part.
10. To separate the clutch facing from the flywheel, remove the flywheel from the crankshaft, see **Engine** chapter. Unscrew the setscrews securing the facing to the flywheel and remove it from the spigot. Regrind and replace the facing on the flywheel, tightening the setscrews down hard, replace the flywheel, noting that one of the six fixing bolts is out of pitch, which ensures that the flywheel is replaced on the crankshaft in the correctly timed and balanced position.

11. Remove the spigot bearing housing. Clean and inspect the bearing and oil seal, see **General Notes on Overhauling** in **General Instructions**. Do not remove the bearing or seal from the housing unless replacement is required. Inspect the inner race for wear and scuffing. To draw off the inner race for replacement, screw a $\frac{1}{2}$ in. dia. B.S.F. jacking bolt into the tapped end.
12. Inspect the centre plate assembly for liner wear, and the fit of the splined centre on the clutch hub.

Relining the Centre Plate

1. Remove the flexible clutch centre.
2. Drill out the old rivets with a $\frac{3}{8}$ in. dia. drill.
3. Check that the centre plate is perfectly flat and true.
4. Rivet the new liners to the centre plate. Always use liners supplied by a Leyland service depot. The liners should be fitted as evenly as possible with the radial slots on the outside. Tubular brass rivets of the correct diameter and length **must** be used. The liners and plate should be flat to within $\frac{1}{32}$ in. when riveted up.
5. Replace the flexible centre with the oil flinger on the engine side of the assembly, as shown in Fig. 6.

To Re-assemble and Replace the Clutch

1. Pack the spigot bearing with high-melting-point (H.M.P.) grease and replace on the flywheel.
2. Assemble withdrawal levers and brackets with the needle rollers or bushes on the pivot pins. Pack the rollers with grease on assembly. Replace the levers and brackets on the driving plate in their previously marked positions. Do not tighten the setscrews at this stage.
3. Lay the back plate, pressure face down, in the press and place the springs vertically in the small recesses in the plate.
4. Lay the driving plate on the tops of the springs, making sure the identification marks made before dismantling, line up.
5. Compress the assembly slowly and watch that the springs seat properly. Hold the assembly compressed and replace the pressure pads and bolts.

Tighten the bolts hard down at this stage. A bolt coming loose in service will cause serious damage.

The pressure pads must be fitted in the initial setting position as shown in Fig. 9, if new liners have been fitted, or one of the other settings marked before dismantling, if the liners have not been renewed.

6. Release the press and fit the withdrawal and spring plates.
7. Check the fit of the clutch centre on the hub. Place the centre plate assembly in position on the flywheel, centralising it with a dummy clutch shaft obtainable from a Leyland service depot.
8. With the centre plate still centralised by the dummy shaft, fit the driving plate assembly to the flywheel. There are thirteen setscrews, one of which is out of pitch to ensure that the clutch driving pegs in the flywheel enter the slots in the back plate. Tighten the setscrews evenly and wire the heads together in pairs, care being taken not to have any loose ends of wire. Remove the dummy shaft.
8. Check that the face of the withdrawal plate is at right angles to the clutch shaft axis all the way round. This ensures that all three withdrawal levers operate simultaneously. If the withdrawal plate shows that the levers are not lined up, turn the eccentric pivot pin by the square shank until the withdrawal lever in question is correctly aligned. When finally adjusted, tighten down the bracket setscrews and wire together in pairs.

Check that the withdrawal levers are clear of the driving plate when the clutch is fully disengaged.

10. Replace the gearbox, see **Gearbox** chapter, after overhauling and re-assembling the withdrawal mechanism, see **To Re-assemble the Withdrawal Mechanism**.

To Dismantle and Re-assemble the Withdrawal Mechanism

1. Disconnect the flexible lubrication pipe shown in Figs. 10 and 11.
2. Remove the upper and lower pivot pins from the clutch operating lever.
3. Remove the retaining plate and block shown in Fig. 10, to release the clutch operating lever.

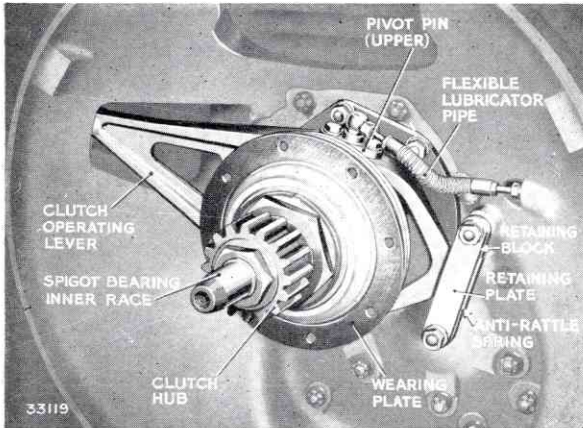


FIG. 10. THE WITHDRAWAL MECHANISM
(On the Passenger Vehicle)

4. Remove the nut and lock washer from the end of the clutch shaft, draw the clutch hub off the taper and remove key.
5. Slide the withdrawal sleeve assembly off the clutch shaft housing, as shown in Fig. 14.
6. To inspect the withdrawal ball bearing, unscrew the nut and lock washer on the sleeve and remove the distance piece and key. Press the ball bearing with housing and cover off the withdrawal sleeve, separate the housing and cover by removing the setscrews. Inspect the bearing and seals, see **General Notes on Overhauling in General Instructions.**
7. Inspect the fabric wearing plate, if the liner is worn down to the rivet heads, reline with a liner obtained from a Leyland depot.

Use a No. 19 drill to remove the old wearing plate rivets; new tubular brass rivets of the correct diameter and length **must** be used when relining.

8. To re-assemble the withdrawal mechanism, reverse the dismantling procedure. If a new clutch hub has been fitted, test that it is a free fit in the clutch centre before fitting it on the taper. The hub must be a perfect fit on the clutch shaft taper, see **General Notes on Overhauling in General Instructions.** The nut must be tightened up hammer tight and locked with the washer.

To Dismantle and Re-assemble Flexible Centre

1. Remove the bolts securing the two halves of the

pressed-steel housing and the oil flinger to the centre plate, see Fig. 6.

2. Remove the six sleeve bolts. Separate the two halves of the housing from the clutch centre and housing.
3. Inspect the resilient blocks for any signs of deterioration. If any signs are found, do not dismantle any further, but obtain a service replacement centre.
4. The centre must be re-assembled exactly as shown in Fig. 6.

SKIM PLATES

We are aware that it is the practice of operators to skim the clutch-facing and clutch back-plate when these faces have become worn or deformed.

In the case of this clutch, however, the effect of skimming would be to reduce to three, the number of adjustments obtained from the pressure pads.

To overcome this, a skim-plate (Part No. 265597) has been introduced, to be fitted between the clutch-facing and the flywheel. This skim-plate is 16 B.G. thick (.064 in.) and the maximum number of plates required for any particular clutch would be three.

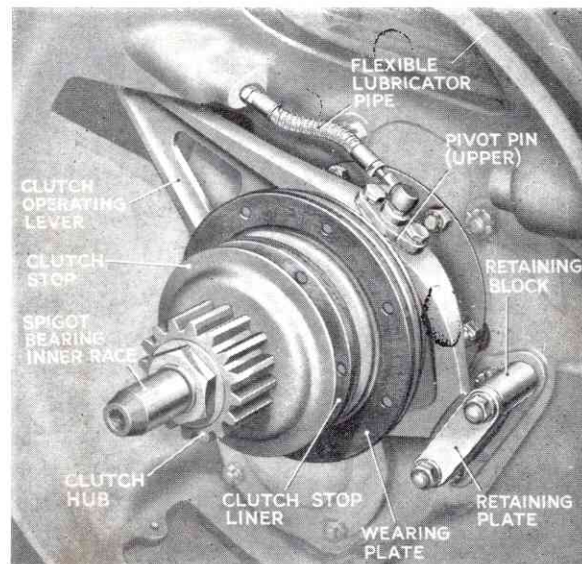


FIG. 11. THE WITHDRAWAL MECHANISM ON HEAVY GOODS VEHICLE SHOWING CLUTCH STOP

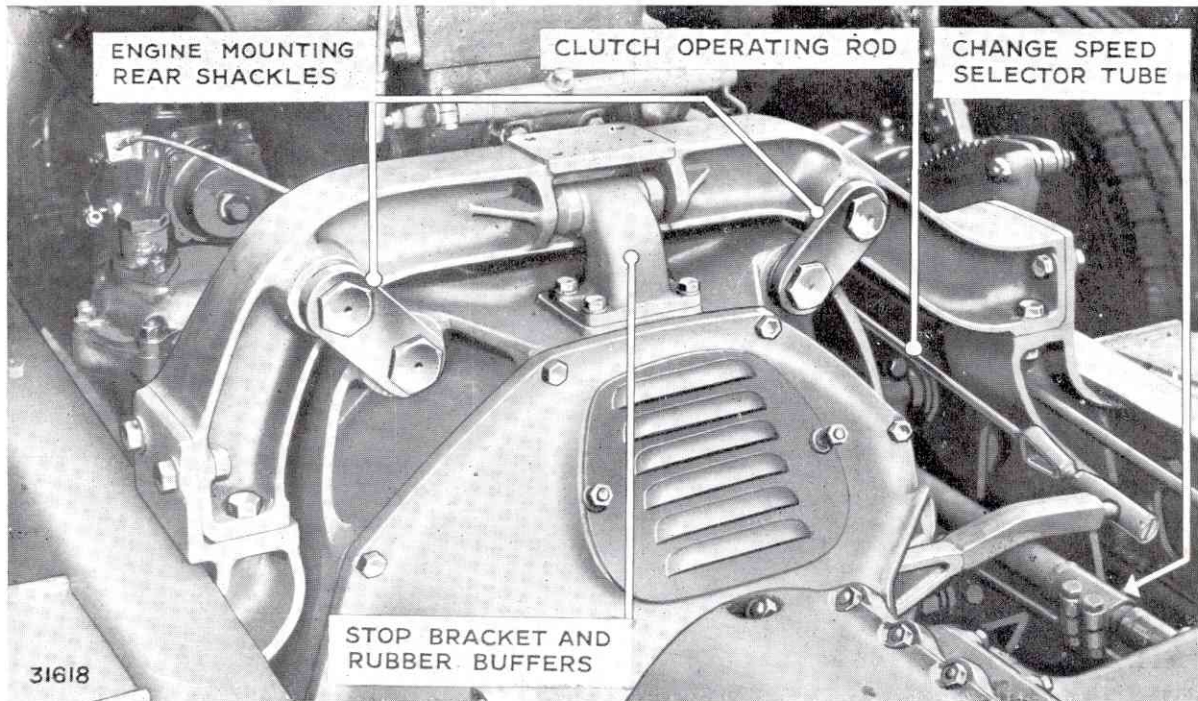


FIG. 12. THE CLUTCH HOUSING AND ENGINE REAR MOUNTING ON THE PASSENGER VEHICLE

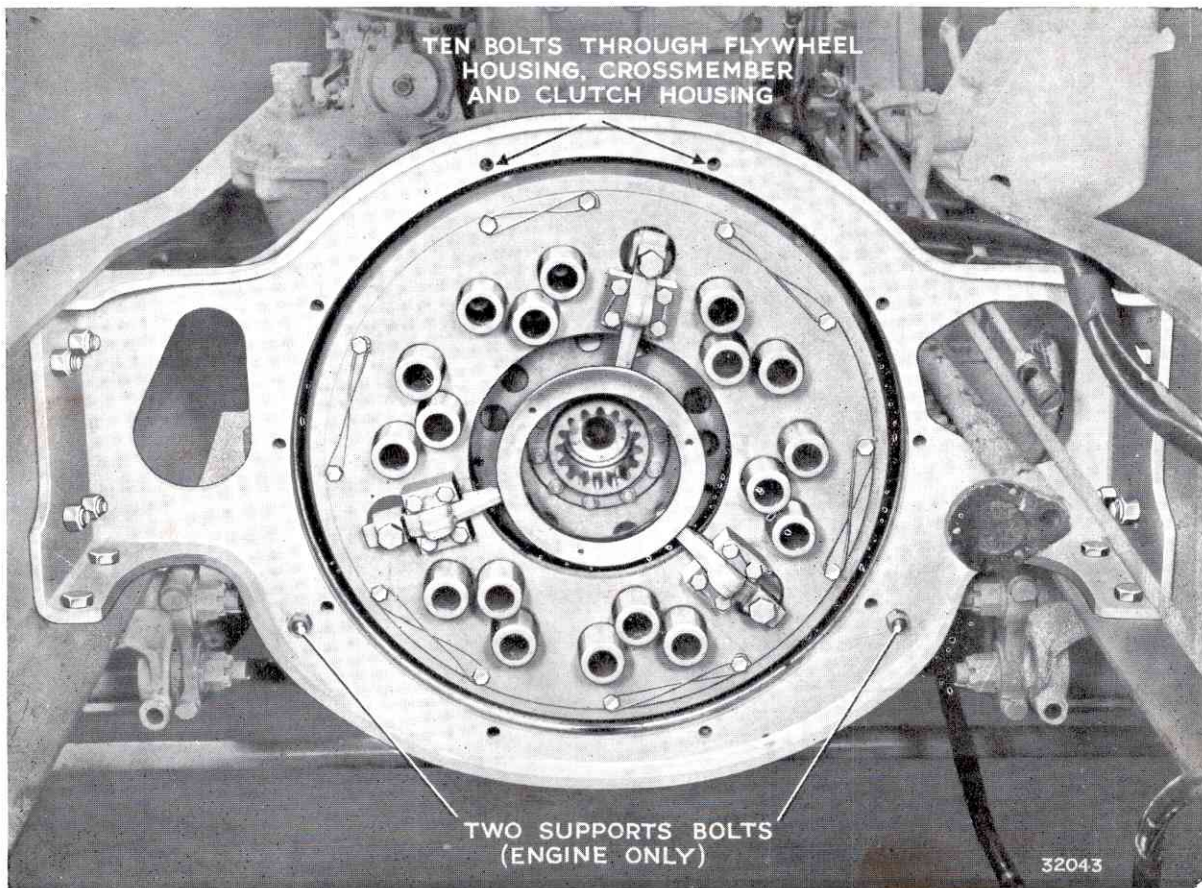


FIG. 13. THE CLUTCH WITH GEARBOX REMOVED ON THE HEAVY GOODS VEHICLE

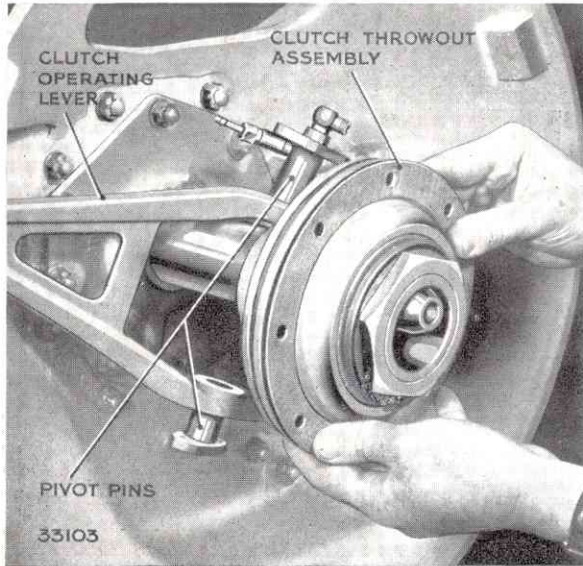


FIG. 14. REMOVING THE WITHDRAWAL ASSEMBLY

When two or more of these plates are fitted, it is recommended that retaining screws $\frac{1}{8}$ in. longer than standard should be fitted.

LOCKNUT ON CONTROL ROD

(The following remarks apply to vertical-engined Passenger vehicles only).

A plain locknut was originally fitted at the rear end of the clutch control-rod, between the turnbuckle and the ball-end socket ; see **Clutch Pedal Adjustment**, as Fig. 8.

This has been replaced by a special locknut with a collar formed at one end (Part No. 260196).

With the new locknut fitted with the hexagon against the ball-end socket and the collar towards the turnbuckle, it is impossible to lock the ball cages solid on the ball pin with consequent failure of the turnbuckle end.

It is recommended that where machines are fitted with the plain nut, these should be replaced by the collared nut, supplies of which are available from the Leyland Service Manager.