

FLUID COUPLING

(L-Type)

CHAPTER M1

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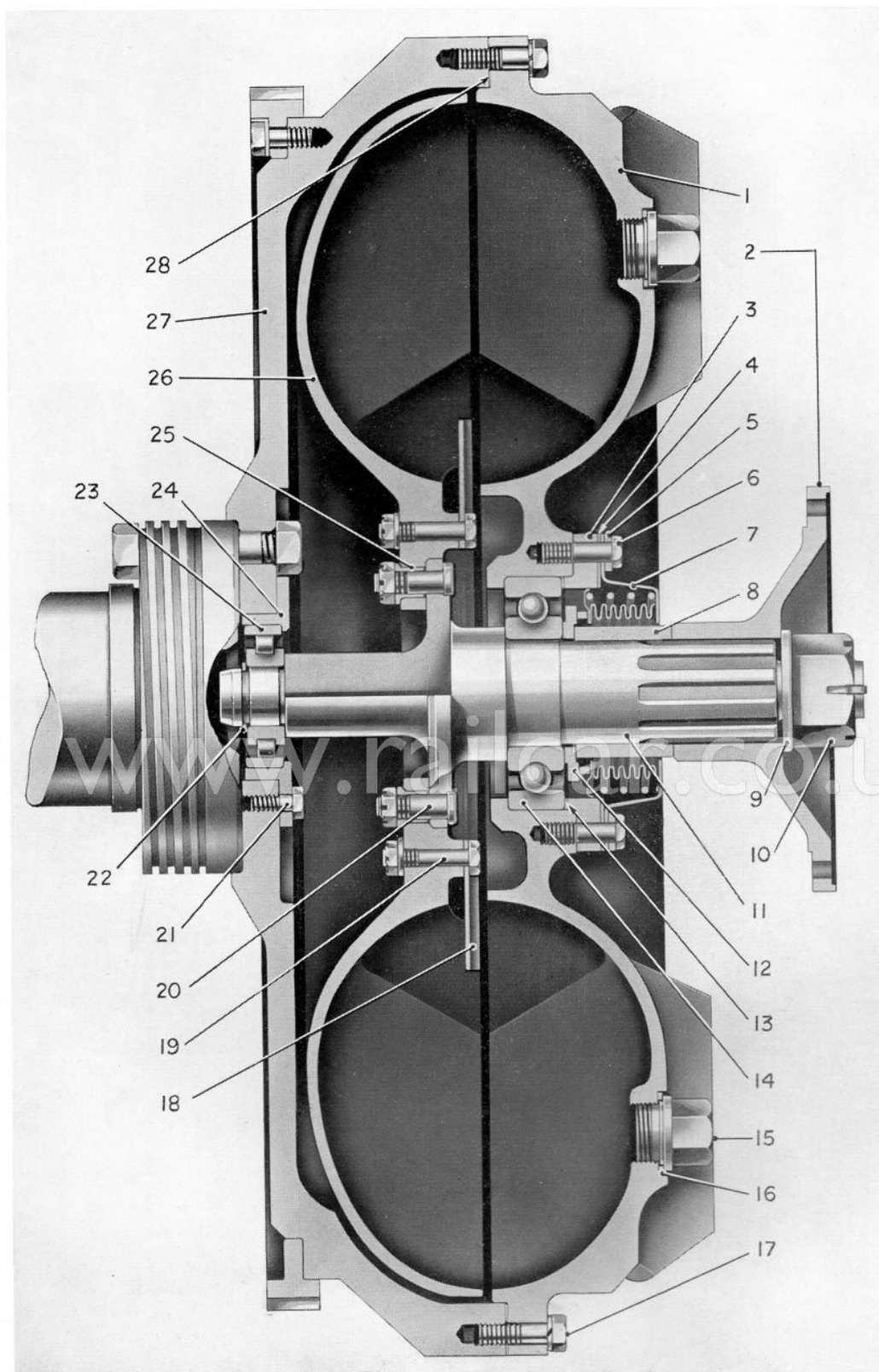


Fig. 1. Section through fluid coupling (L-type).

1. REAR CASING.
2. FLANGE.
3. SPACER RING.
4. JOINT.
5. STIFFENER RING.
6. SETSCREW.
7. OIL SEAL.

8. DISTANCE PIECE.
9. WASHER.
10. NUT.
11. RUNNER SHAFT.
12. RUBBING WASHER.
13. JOINT.
14. BEARING.

15. PLUG.
16. WASHER.
17. SETSCREW.
18. BAFFLE PLATE.
19. BOLT.
20. BOLT.
21. SETSCREW.

22. CIRCLIP.
23. BEARING.
24. HOUSING.
25. FERRULE.
26. RUNNER.
27. ENGINE FLYWHEEL.
28. JOINT.

DESCRIPTION

The fluid coupling, shown in Fig. 1, consists of two main parts: the rear casing which is secured to the engine flywheel (which in turn is secured to the crankshaft); and the runner, which is free to rotate within the outer casing (formed by the flywheel and the rear casing) and is coupled to the joint flange of the freewheel unit.

The rear casing and the runner are each provided with a series of pockets separated by radial-webs formed on their inner surfaces. Cooling fins are secured to the outside surface of the rear casing.

The runner shaft which is bolted to the runner is located in two bearings, one of which is fitted in the flywheel and the other in the rear casing. The flywheel or spigot bearing is carried in its own housing which in turn is setscrewed to the flywheel.

A self-adjusting bellows-type packless gland oil seal is fitted to the outer side of the rear casing.

MAINTENANCE

For railway use check the following points at intervals quoted in **Railway Standing Instructions**.

1. Check the oil level in the fluid coupling and top-up if required.
2. Check the runner shaft bellows gland for oil leaks.

BELLOWS GLAND—TO RENEW

To Remove

If the bellows gland is found to be leaking it should be renewed as follows:

1. Drain the coupling.
2. Disconnect the freewheel unit from the coupling flange on the runner shaft.
3. Remove split-pin, nut and washer, and draw the coupling flange off the runner shaft with a suitable withdrawal tool.
4. Break locking wire and remove setscrews securing the oil seal to the rear casing.
5. Remove the stiffener ring, joint, bellows gland, adapter ring together with joint, distance piece and the rubbing ring.

Care must be taken when handling the bellows gland oil seal.

It is important that the bellows and the highly polished faces of the rubbing ring and the bellows gland seal ring are not damaged; the slightest scratch across these faces will destroy the efficiency of the seal.

To Fit

Reverse the procedure given for removal, noting the following points:

1. Smear with non-hardening jointing compound the abutting faces of the adapter ring and bearing, rubbing ring and coupling flange and the abutting faces of the rubbing ring, spacer and coupling flange. Also smear the splined end of the runner shaft and the abutting faces of the coupling retaining washer and nut.
2. Smear the polished joint face of the seal with clean engine oil.
3. Fit a new paper joint between the adapter ring and the flange of the oil seal and between the abutting faces of the adapter ring and bearing.

Note.—It is important that the rubbing ring be assembled with the polished face towards the splined end of the runner shaft, and on no account must jointing compound be allowed to come into contact with this polished face and its mating face.

4. Fit the coupling flange to the runner shaft and connect the freewheel.
5. Fill the fluid coupling with oil.

LUBRICATION

To Drain the Fluid Coupling

To drain the fluid coupling turn the engine with a suitable lever until one of the four plugs in the rear face of the coupling is at the bottom. Remove the plug and allow the oil to drain into a suitable receptacle. To allow the oil to drain away quickly the top plug may be removed. Replace this plug when draining has been completed.

To Fill or Top-up the Fluid Coupling

Turn the engine as previously described until the filler plug hole is at the top.

Using a suitable funnel, pour oil into the coupling up to the level of the filler plug hole, ensure that the copper washer is in position on the plug and then refit and tighten the filler plug.

The capacities of the fluid coupling is 34 pints (19.3 litres).

Use engine oil only.

TO REMOVE AND FIT

To Remove

1. Drain the fluid coupling.
2. Disconnect the freewheel unit at the joint flange at the rear of the coupling.
3. Remove setscrews from around the outer edge of the flywheel rim.
4. Withdraw the runner shaft together with the rear casing and runner. Holes, tapped $\frac{3}{8}$ in. B.S.F., are provided for jacking screws. The inner race and rollers of the spigot bearing will be withdrawn with the runner shaft and the bearing outer race will remain within the flywheel bore.

It is advisable to place a suitable receptacle beneath the fluid coupling before carrying out the above instruction, as a quantity of oil still remains in the coupling after draining.

5. Remove the circlip from the end of the runner shaft and withdraw the inner race and rollers of the spigot bearing using suitable pliers and extractor.
6. Remove the nuts from the bolts securing the flywheel to the crankshaft flange and lift off the flywheel.

To Fit

Reverse the procedure for removal, noting the following points:

1. Ensure that a paper joint and sufficient non-hardening compound is used on the joint between the rear casing and the flywheel so that a perfectly oil-tight seal is obtained.
2. Refill the fluid coupling with oil.

TO DISMANTLE AND ASSEMBLE

To Dismantle

1. Remove the fluid coupling.
2. Remove the bellows gland.
3. To remove the rear casing from the runner shaft use a lead hammer on the splined end of the shaft. The bearing can then be removed if required.
4. Remove the bolts securing the baffle plate to the runner and remove the baffle plate.
5. Remove the bolts securing the runner shaft to the runner and separate the parts.

To Assemble

Reverse the procedure for dismantling.

FLUID COUPLING

(Vulcan Sinclair Step Circuit
Size 550)

CHAPTER M2

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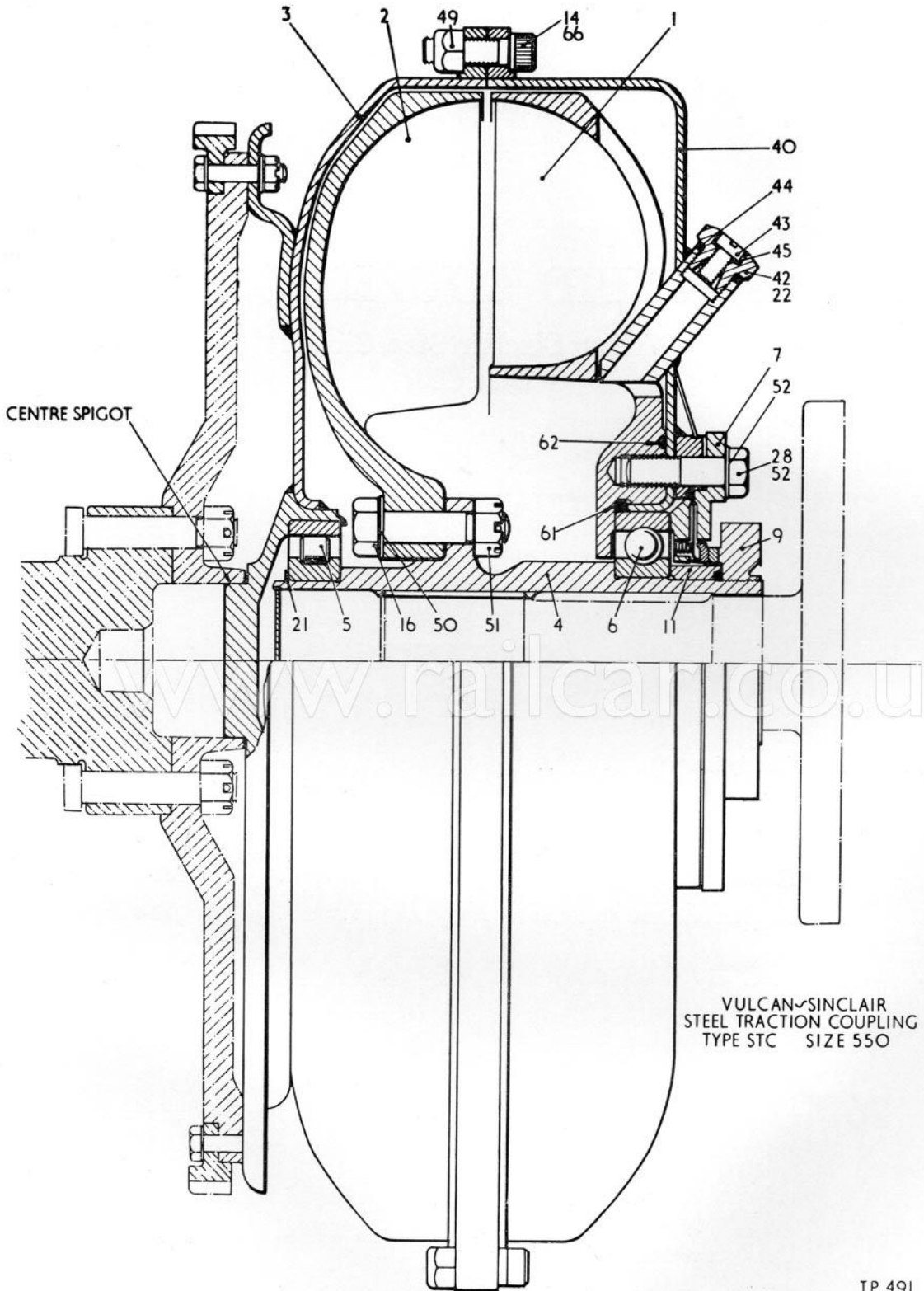


Fig. 1. Vulcan Sinclair step circuit fluid coupling, Size 550.

TP 491

DESCRIPTION

The fluid coupling (Fig. 1) is of the steel-cased 'traction' type, incorporating a stepped reservoir working circuit.

The main components on the input side are runner casing, impeller casing and impeller, and on the output side a runner and internally splined shaft.

The runner casing is secured to the engine flywheel, which in turn is bolted to the crankshaft. The runner is free to rotate within the casing, as its shaft is carried in a roller bearing mounted in the runner casing and a ball bearing supported in the impeller casing. There is no mechanical connection between the impeller and the runner.

The impeller and runner both have radial vanes. When running, power is transmitted from the impeller, through a vortex of oil, to the runner.

The hollow runner shaft is splined internally and also has a register to support the externally splined stubshaft with its companion flange.

The gland, fitted between the impeller casing and the runner shaft, comprises a steel diaphragm with a floating ring of sintered graphite bronze between hardened steel faces.

A fusible plug is incorporated in one of the filling plugs so that, in the event of a prolonged stall, the oil will be emptied from the coupling before a dangerous temperature is reached.

MAINTENANCE

The following points require attention at intervals as quoted in **Railway Standing Instructions**.

1. Check the oil level in the fluid coupling and top-up, if required.
2. Check the gland for oil leakage.

Gland Shim

Shim (71) is fitted to provide for taking up any wear of the gland parts which may occur over very long periods of service. Removal of the shim will restore the tension of the gland diaphragm after wear has taken place.

To remove the shim, the coupling should be removed from the engine flywheel and laid on the bench, resting on the input flange on the runner

casing (3). There is no need to drain the couplings of oil when carrying out this operation, but any pressure in the coupling should be released by taking out one of the filling plugs.

1. Carefully straighten the peened-over skirt of the shaft nut (9) and remove the nut and floating ring (72).
2. Remove 'O' ring (73), shaft distance piece (11) and shim (71).
3. During reassembly it is essential that the lapped gland faces are perfectly clean and a final wipe with dry newspaper will be found effective.
4. Reassemble, leaving out the shim and fitting a new 'O' ring (73). Make sure to lock shaft nut (9) again by peening over a part of the thin skirt into the slot in the shaft.

DRAINING AND FILLING

To Drain

The fluid coupling may be partially drained by turning the engine with a suitable lever until one of the two filling plugs is at the bottom. Remove both plugs and allow the oil to drain into a suitable receptacle.

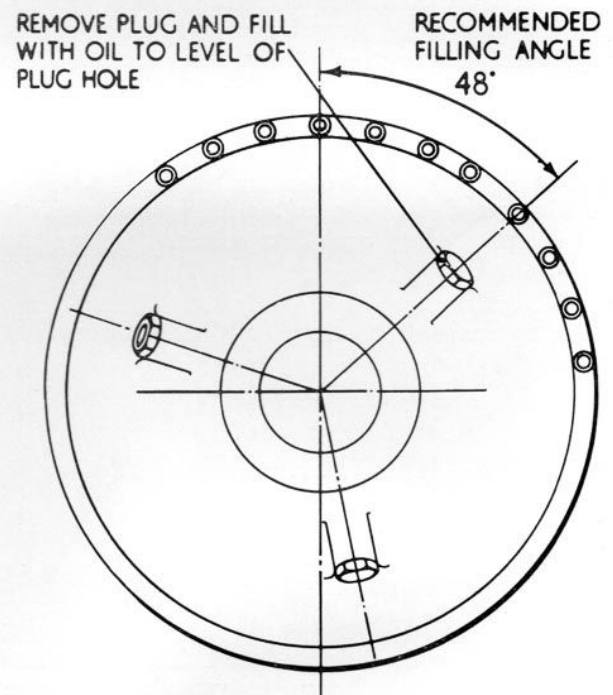


Fig. 2. Position of filler plug when filling coupling.

To drain the coupling further, it is necessary to remove it from the engine flywheel. Support the coupling on a bench with the input flange upwards. The filling plugs should then be taken out to allow the oil to drain into suitable containers.

The coupling should then be rocked through a right angle two or three times to allow the oil trapped in the impeller to drain out. Most of the oil can be removed in this way, but if the coupling has to be completely drained, it will, of course, be necessary to break the casing joint.

To Fill or Top-up

Turn the engine as previously described until one of the filling plugs lies at an angle of 48 deg. or four pitches of the bolts in the casing flange, away from top dead centre (Fig. 2).

The use of SHELL TELLUS OIL 29 is recommended and great care should be taken that oil of a different grade is never added to that already in the coupling and that a mixture of oils is never used.

Using a suitable funnel, fill the coupling with oil to the level of the filler plug hole.

Note that the plug hole should always be set to the filling angle **before** the oil is poured in. If the coupling is filled with the plug hole set on the vertical centre line, the excess oil will not overflow when the coupling is turned to the correct filling angle. If, inadvertently, this has been done, turn the engine about half a revolution, whereupon the oil will run out quickly. Turn the engine back to bring the filling plug on the coupling to the filling angle and add oil to fill up to the plug hole.

Make sure that the bonded seal is in good condition and is on the plug, and then refit and tighten the filling plug.

The approximate oil capacity of the coupling is 4 gallons (18 litres).

TO REMOVE AND FIT

To Remove

1. Unbolt the coupling flange at the rear of the fluid coupling.
2. After taking the weight of the fluid coupling and unbolting it from the engine flywheel, it should be moved away from the flywheel to disengage the centre spigot and then lifted clear.

3. Support the coupling on the bench to drain it.

To Fit

1. Put the starter ring in place on the engine flywheel and bolt the flywheel to the engine crankshaft. Make sure that the dowel which is to locate the flange of the fluid coupling is in place in the flywheel.
2. If a new coupling is being fitted, take off the light steel shroud which is bolted to the driving flange of the fluid coupling to protect it during transport.
3. Smear grease on the centre spigot of the fluid coupling. Lift the fluid coupling into position, enter the centre spigot into the register in the engine flywheel, and engage the dowel hole in the driving flange with the dowel in the flywheel. Put the driving bolts through the starter ring, flywheel and driving flange of the fluid coupling. Tighten up the slotted nuts securely and lock with split pins.
4. Check the truth and the mounting of the fluid coupling on the engine flywheel, by rigging up a clock gauge and setting its spindle to bear on the bore of the shaft (4) inside the shaft nut (9). When the engine is turned by hand, the clock gauge should read within plus or minus 0.002 in. (0.05 mm.) over a complete revolution.
5. The external splines and spigot diameter on the flanged stubshaft should be smeared with grease before the stubshaft is entered to engage the internal splines of the fluid coupling shaft.
6. Re-fill the fluid coupling with oil.

TO DISMANTLE AND ASSEMBLE

To Dismantle

1. Remove the fluid coupling.
2. After draining support the coupling on the bench, output end upwards.
3. Carefully straighten the peened-over skirt of shaft nut (9) and remove the nut and floating ring (72). Unscrew setbolts (28) and take off retaining plate (7), diaphragm assembly (8), 'O' ring (74), springs (75), bearing distance piece (10), 'O' ring (73), shaft distance piece (11) and shim (71).
4. Turn the coupling over and support it with packing under impeller casing (40).

Remove Nyloc nuts (49) and capscrews (14) from the casing flange and tap out the two dowels (66).

Break the joint and lift away runner casing (3).

5. Turn over the remaining assembly again and put supports under the flange of impeller casing (40) so that the end of the shaft carrying the roller bearing is 1 in. to 1½ in. (25 to 40 mm.) clear of the bench.
6. To remove the impeller, take out the four cap-screws (64). Note the two dowels (58) between the casing and the impeller.

To Assemble

Care must be taken that all parts are thoroughly clean before assembling and clean rag only should be used, not cotton waste.

1. Bolt runner (2) to the flange on shaft (4), using bolts (16) in the six equally spaced holes, with plain washers against the aluminium alloy runner. The other two holes, diametrically opposite to each other, are air vents. Lock the slotted nuts (60) with new split pins.
2. Support impeller (1), vanes downwards. Fit new 'O' rings (61) and (62) in the impeller. Lower the impeller casing over the impeller, put in the four capscrews (64) and pull down on these evenly to draw the impeller into the casing. Tap in the two dowels (58) and finally tighten screws (64).
3. Press ball bearing (6) into the bore of the impeller casing.
4. Assemble bearing distance piece (10), springs (75), new 'O' ring (74), diaphragm assembly (8) and retaining plate (7), in place in the bore of the impeller casing and secure with setbolts (28) with shakeproof washers (52) under their heads.
5. Turn over the impeller assembly to bring the vanes upwards.
6. Lower the runner and shaft assembly over the impeller and bring the shoulder on the shaft up to the inner race of the ball bearing. Then turn the assembly over.
7. Assemble the gland, with new 'O' rings (taking special note of instructions under MAINTENANCE).
8. Examine the casing joint ring to make sure that it is in good condition. If in doubt, fit a new one of Phiberoid 0.010 in. (0.25 mm.) in thickness.

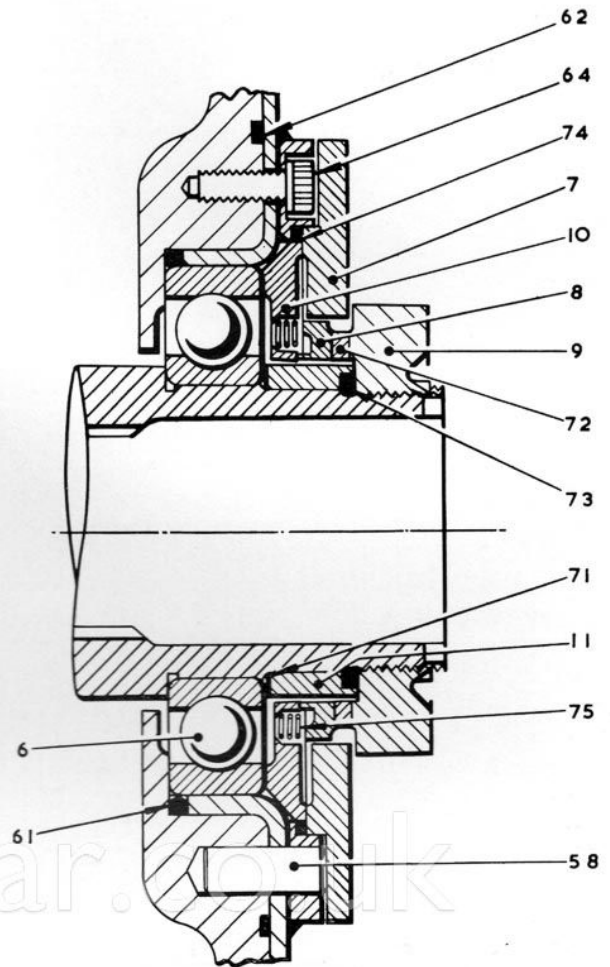


Fig. 1. Assembly of gland.

9. Again turn the assembly over. Lower the runner casing (3) over the runner, the outer race of bearing (6) passing over its rollers on the shaft, and bringing the dowel holes into line.
10. Tap in the two casing dowels (66) and bolt the casings together, tightening the bolts (14) down evenly. Nuts (49) are self-locking.
11. Screw in the two filling plugs (22) and (42), making sure that the bonded seals (44) are in good condition.