

Gearbox - Power Shuttle

A . Removing and refitting the front clutch

Preliminary operations

1. Split the tractor between the engine and the gearbox (see section 2B01).
2. Drain the gearbox and the centre housing.
3. Remove the clutch cover plate from the gearbox (see section 3C02).
4. Remove the flange from each end of the pipe (78) and remove it (Fig. 3).
5. Remove pipes (31) (74) (86) (87) and (94).

Removal

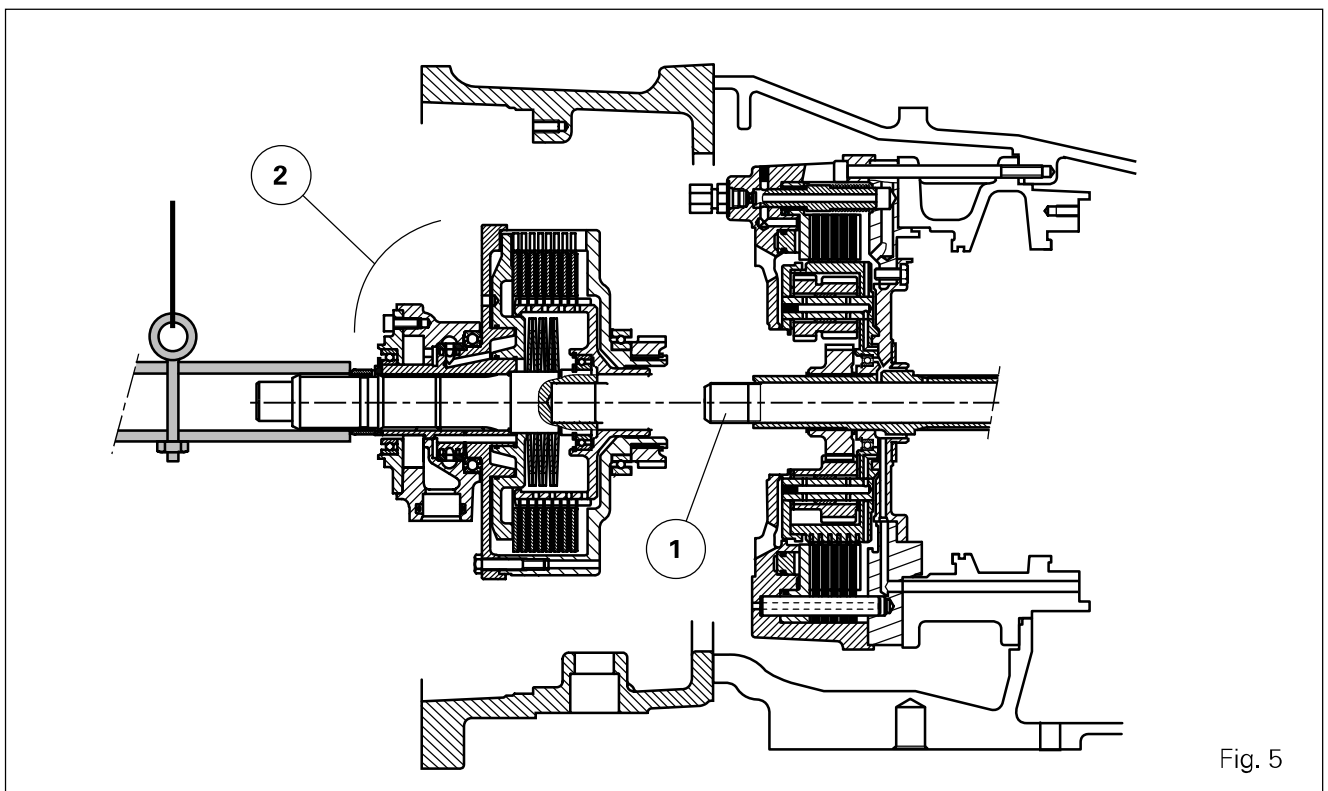
6. Remove the front clutch (2) (Fig. 5) and pull it from the housing using a locally made tool (see § F).

Refitting

7. Clean the parts. Replace any defective ones.
Remark: If front clutch shimming is necessary, refer to §C.
8. Check that PTO shaft (1) is installed (Fig. 5).
9. Refit the clutch using the tool used for removal.

Final operations

10. Replace the pipe seals (74) (94).
11. Refit the pipes, carry out operation 5 in reverse order.
12. Replace the pipe seals (78) and refit them the pipe. Tighten the flange holding screw at each end of the pipe to a torque of 25 Nm - 35 Nm.
13. Refit the gearbox clutch cover plate (see section 3C02).
14. Top up the housing oil level and check it with the sight glass located at the rear left of the centre housing.
15. Couple the tractor between the engine and the gearbox (see section 2B01).
16. Carry out a road test using the power shuttle and using ratios A, B, C and D of the Dynashift.
17. Check oil tightness of the mating faces and hydraulic unions.





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B . Disassembling and reassembling the front clutch

Disassembly

18. Separate cover (33) from unit (18). Remove the discs (29) and the intermediate plates (30).
19. Remove the front snap ring (9). Remove the splined ring (6), the anti-extrusion rings (8) and seal (7).
20. Remove circlip (11), take off cover (2) from the pump (14) complete with bearing (12).
21. Pull the lubricating pump out of the pump unit (1) and take it apart from the clutch housing (18).
22. Remove seal rings (15). If necessary, extract ring (16) and remove the 1.5 bar valve (73).
23. Place the partially disassembled clutch on a suitable locally made fixture (Fig. 6) (see § F).
24. Compress the Belleville washers (25) and remove the rear snap ring (9) (Fig. 6).
25. Remove locking ring (5). Gradually release the Belleville washers.
26. Split unit (18) fitted with piston (28) from shaft (19).

27. Remove the Belleville washers.

28. Remove snap ring (23). Pull out the shaft (19) complete with bearing (22) from hub (27).

29. Remove the circlip (21). Extract the bearing (22) from shaft (19).

30. Remove the piston. Remove seals (24) (69) and discard them. If necessary, extract the bearing (68) from unit (18).

31. If necessary, remove snap ring (54) and remove the input sun gear (53). Remove snap ring (65). Extract bearing (32).

Reassembly

32. Make sure that pin (20) is fitted.

33. If removed, fit the bearing (32) on cover (33), using a press and a suitable tool. Install snap ring (65).

34. If disassembled, refit bearing (68).

40. Lubricate the new seals (24) (69) and fit them on the piston.

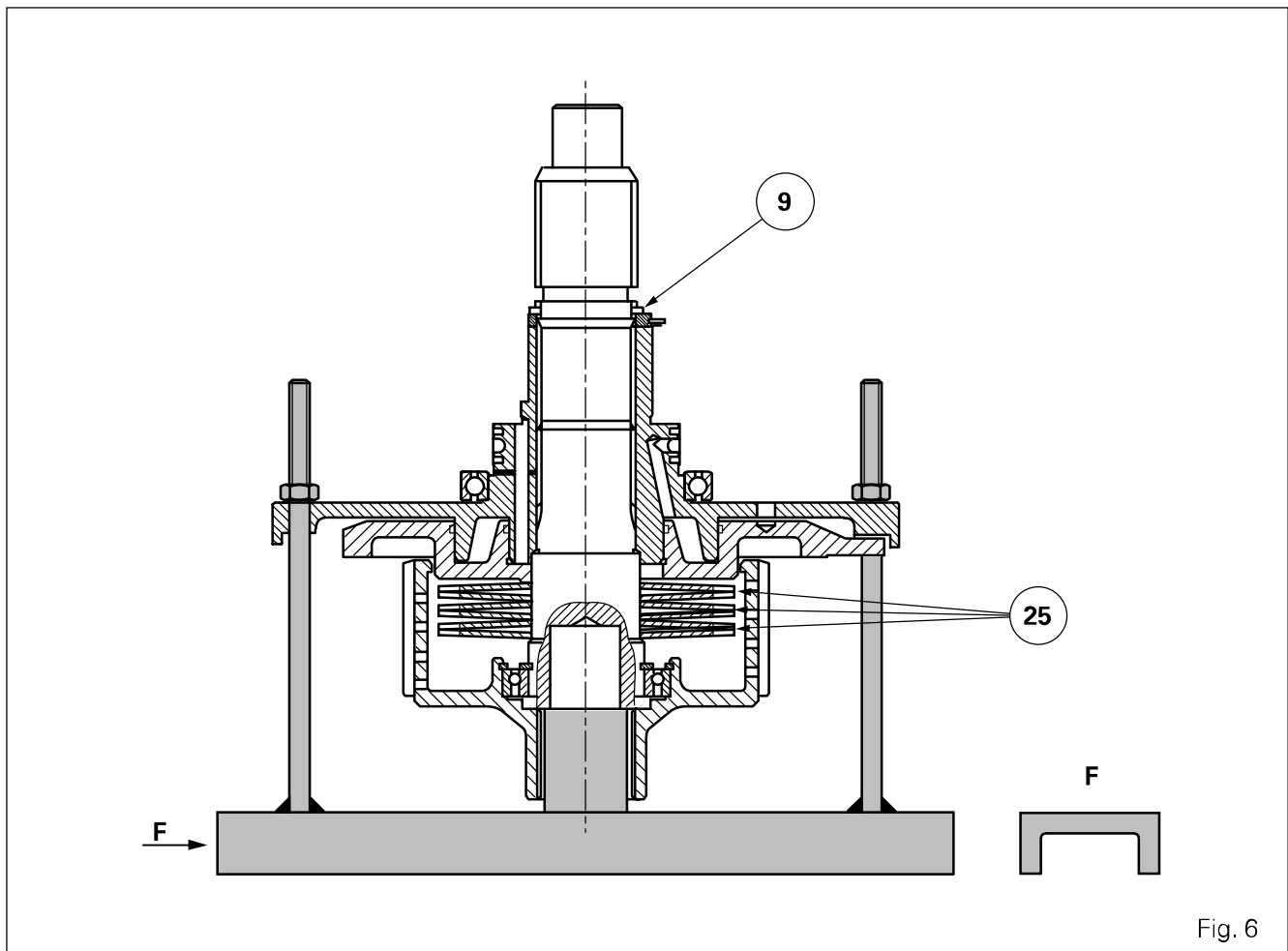


Fig. 6

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36. Fitting piston (28).

Remark: The angular position of the piston depends on the position of unit (18) lubricating ports. Align the indexing holes drilled in the unit and the piston (Fig. 7). To align, use a pin of a suitable diameter. Complete the installation of the piston by gradually and alternately striking around its top rim with a plastic mallet. Check that there are no fragments of the seal after assembly.

37. Using a suitable tool, force fit bearing (22) on shaft (19), the seal side facing towards the rear clutch. Fit circlip (21).

38. Put the assembly (shaft, bearing, circlip) in the hub (27). Fit the snap ring (23).

39. Refit the Belleville washers as shown in Fig. 8.

Remark: 8200 series tractors are fitted with six Belleville washers.

40. Assemble unit (18) fitted with the piston (28) on shaft (19).

41. Compress the Belleville washers using the tool used in operation 23. Position ring (5), aligning two of the flats with the flats on unit (18). Replace the rear snap ring (9) and correctly position it in the bottom of the groove.

42. Remove the fixture.

43. Check that the seal rings (15) turn freely in their grooves. Fit the seal rings, lightly coated with miscible grease, making sure that they do not protrude beyond the rim of unit (18).

44. If necessary, fit the 1.5 bar valve (73) and tighten to a torque of 47 - 54 Nm. Insert ring (16) using a suitable fixture, with the chamfer "C" in the direction shown in Fig. 9.

45. Lubricate the bush. Assemble pump unit (1) on unit (18).

46. Lubricate pump (14) with transmission oil and position it aligning the flats of the rotor with those on the unit (18).

47. Manually check the angular movement of the rotor on the flats of unit (18).

48. Fit bearing (12) on cover (2) of the pump. Fit the cover. Install circlip (11) and screws (13) and tighten to a torque of 36 - 46 Nm.

49. Lubricate and install a new assembly (O'ring (7) and anti-extrusion ring (8)). Slide on the splined bush (6). Fit a new front snap ring (9).

50. Soak the discs (29) in a transmission oil bath for approximately 1 hour. Check that they are correctly saturated.

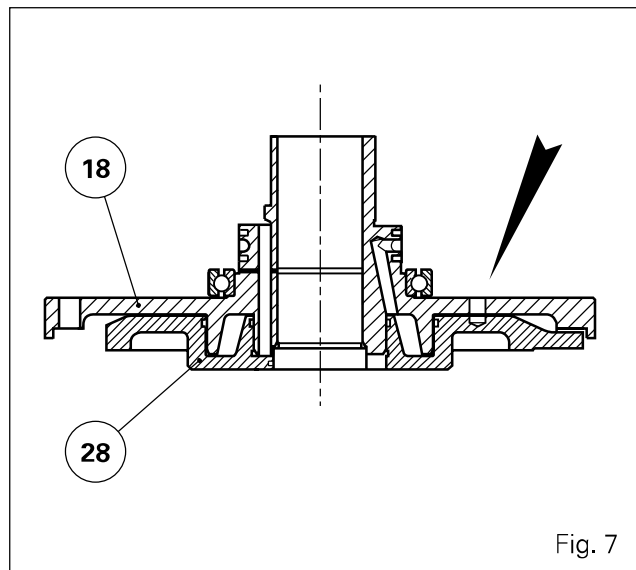


Fig. 7

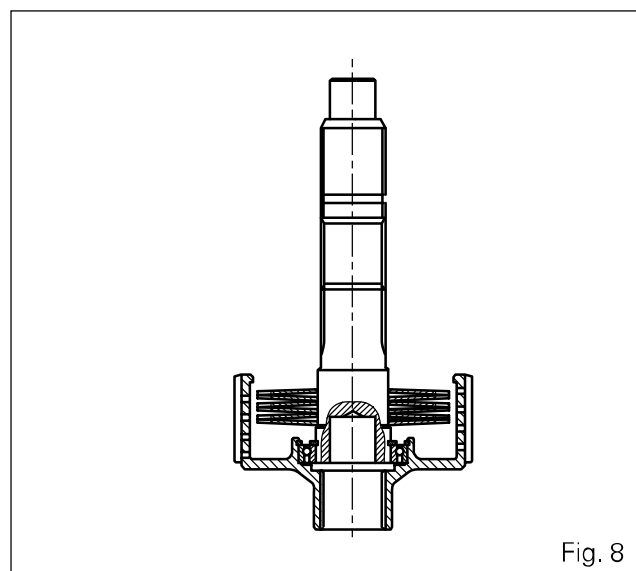


Fig. 8

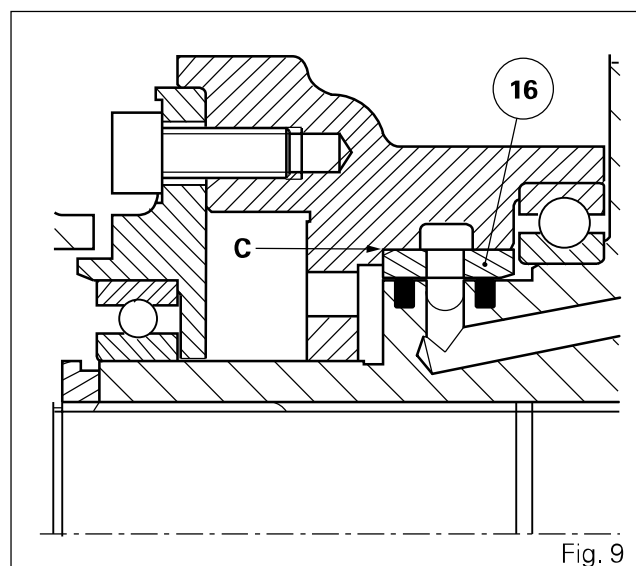


Fig. 9



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51. Position the intermediate plates (30), aligning the tabs and the discs (29) on hub (27) according to the type of tractor (see remark and Fig. 10).

Remarks:

- 8210 to 8220 tractors: 6 discs and 6 intermediate plates.
 - 8240 tractors: 7 discs and 7 intermediate plates.
 - 8250 tractors: 8 discs and 8 intermediate plates.
52. Lightly smear the mating face of the clutch cover (33) on the unit (18) with Loctite 549 or its equivalent. Place the cover on the unit, the tabs of the intermediate plates lodged in the cut out notches on the clutch cover.
- Fit and tighten screws (66) to 25.5 - 34.5 Nm.
53. Manually check the rotation of the hub (27).
54. If necessary, refit the input sun gear (53) and fit snap ring (54).

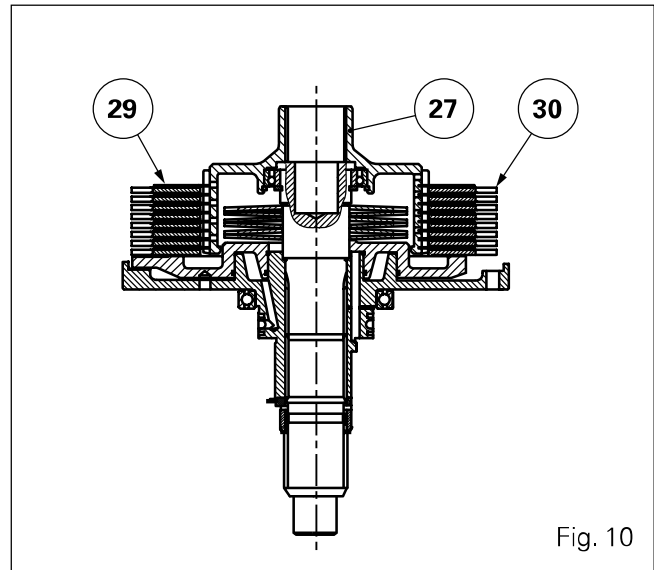


Fig. 10

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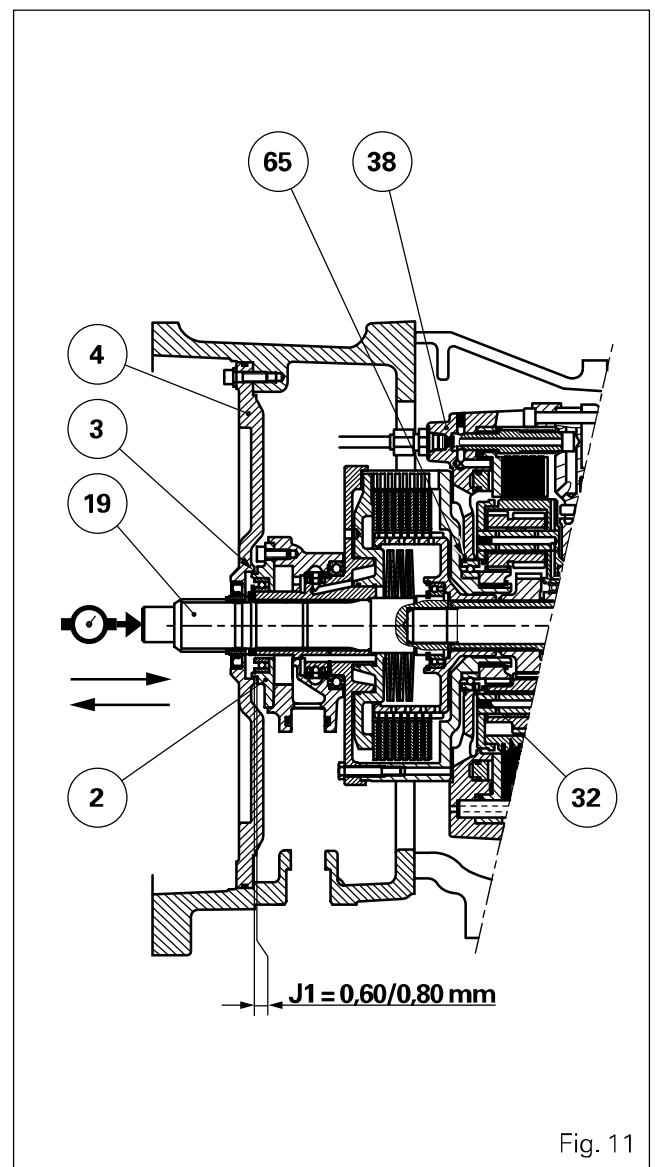
C . Shimming the front clutch

This operation consists in obtaining an axial clearance **J1** of 0.60 to 0.80 mm between the pump cover (2) and clutch cover plate (4) (Fig. 11).

Remark

To carry out this operation, remove the PTO shaft so as to remove the effect of the spring fitted at the rear end of the shaft to allow the clutch assembly to move.

55. Refit the clutch on cover (38) of the rear clutch, using a locally made tool as in Fig. 5, § A.
56. Place a approx. thick 2 mm shim (3) on cover (2) (Fig. 11).
57. Lubricate the lip of the cover plate seal . Protect the lip of the seal by fitting a protective material (see section 3C02) over the splines of the shaft (19). Fit two guide studs on opposite sides of the gearbox housing and temporarily install the clutch cover plate (4) **without using Loctite**. Gradually tighten several screws.
58. Place a dial gauge at the end of shaft (19) and check the clearance by moving the shaft sideways (Fig. 11).
Note: Check that the snap ring (65) of bearing (32) is correctly in contact with cover (38) (Fig. 11) by pushing the shaft (19) back as far as possible.
59. Remove clutch cover plate (4). Depending on the reading previously obtained with the dial gauge, define a new thickness for shim(s) (3) in order to obtain a **J1 clearance of between 0.60 mm and 0.80 mm** (Fig. 11).





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D . Disassembling and reassembling the rear clutch

Preliminary operations

- 60. Remove the front clutch (see § A).
- 61. Remove the input unit (see section 5B02).

- 64. Remove the thick springs (62) and the pins (71).
- 65. On cover (38), remove:
 - the plate (43)
 - the seal (42) and discard it
 - the piston (39)
 - the seals (36) (41) and discard them
 - the unions (72), the 13 bar valve (77) (Fig. 17) and seal (75) on the 17 bar supply port (Fig. 3).

Disassembly (Fig. 12)

- 62. Remove the screws (70) and remove the cover (38).
- 63. Recover the spools (44) and the springs (45).

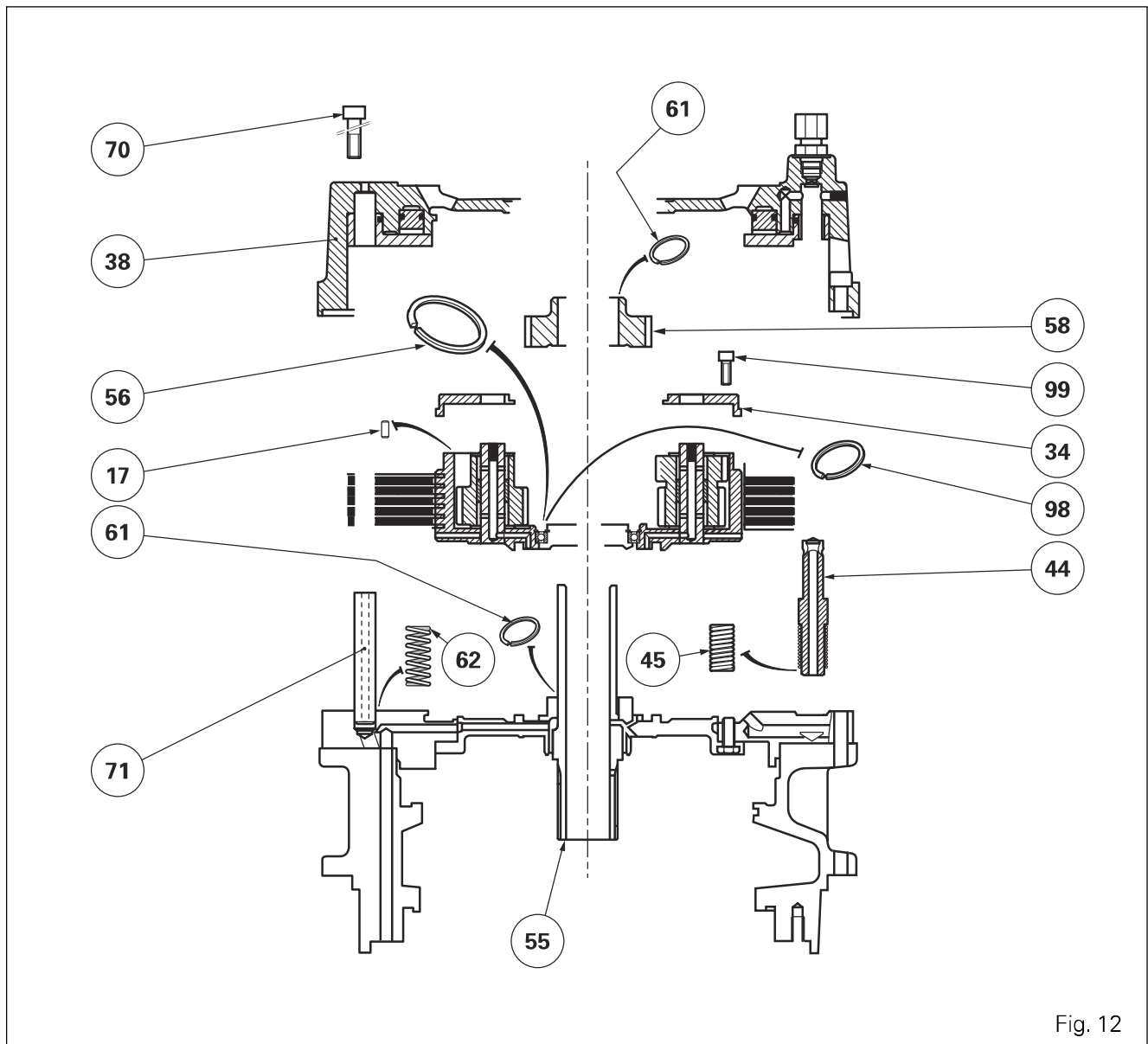


Fig. 12

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66. Immobilise planet carrier (49) with tool ref. 3378240M1 (see fig. 12A and § F).
67. Remove screws (99) securing the cover (34) (Fig. 12 -12A) and remove it.
68. Remove the discs (47) and the intermediate plates (46).
69. Separate the output sun gear (58), held by the snap rings (61), from the primary shaft (55) (Fig. 12).
70. Remove snap ring (98) (Fig. 12).
71. Remove the planet carrier (49) with the double and single pinion gears (52) (59).
72. **On the planet carrier (49), remove:**
 - the plates (63)
 - the double pinion gears (52) and the pins (50). Note and mark their location.
 - the single pinion gears (59) and pins (50). Note and mark their location.
 - the snap ring (56) and bearing (57).

Remarks:

- **rotation of pinion gears around the pins (50) is on two rows of needle bearings (60), joined and separated by a spacer (51).**

Important:

- **if the pinion gears and the pins are to be removed, check that no unwanted needle or spacer remains in the planet carrier after refitting.**

Reassembly

73. Clean and check all parts. Replace any defective ones.
74. Check that the ports in the pinion gear pins and the channels in the planet carriers are not clogged.
75. Where necessary, fit the pinion gears with two rows of needle bearings coated with miscible grease and separated by a spacer.
76. **On the planet carrier, refit:**
 - bearing (57) and position snap ring (56-),
 - the double and single pinion gears (52) (59) positioned as shown in Fig. 13,
 - pins (50), with the lubricating ports placed facing those in the planet carrier (49).

Special points

Each end of the pins (50) contains:

- a port, one of which is closed off by a rivet (35) while the other is used for pinion gear lubrication,
- a flat and a shoulder that stop any pin rotation or any side movement.

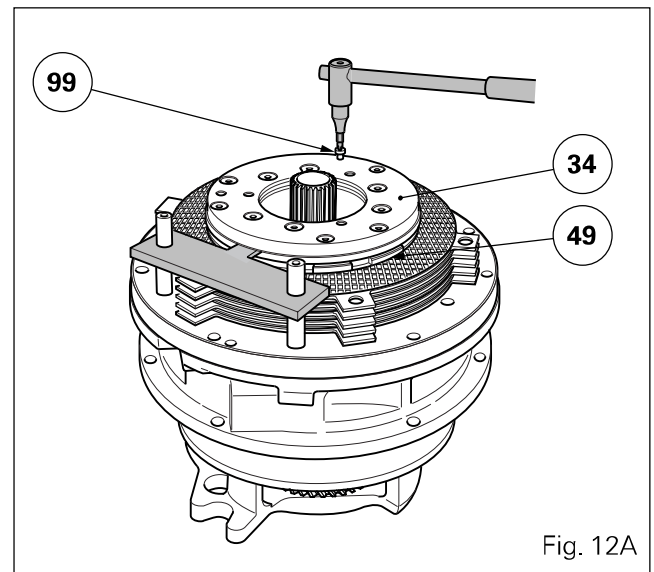


Fig. 12A

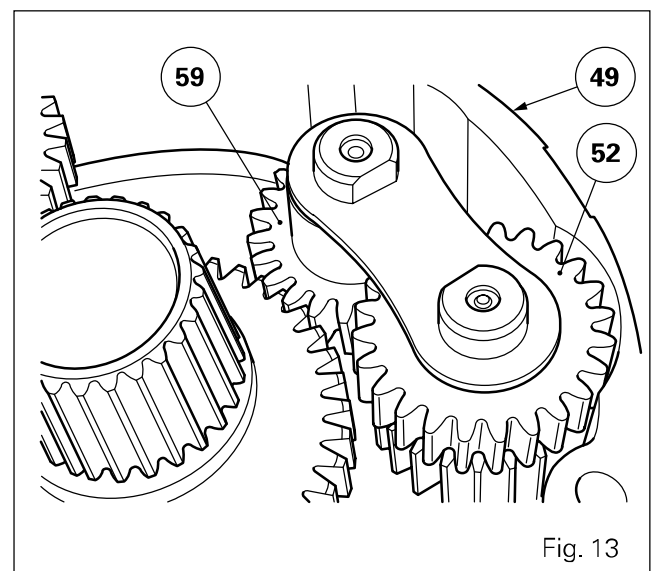


Fig. 13



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77. Install the partially assembled planet carrier. Fit the snap ring (98) and the rear snap ring (61) on the output sun gear (58).

78. Position marks "R" (punch marks) on the double pinion gears (52) (Fig. 14) so that they pass through a centerline meeting at "O" (Fig. 14).

Remark : The mark on the front side of the planet carrier corresponds to the alignment of the two splines. It is mandatory to respect these positions of the punch marks during assembly of the output sun gear (58).

79. Slide the output sun gear (58), correctly oriented as shown in Fig. 2, on to the primary shaft (55), making sure that the punch marks of each pinion gear remain in the required position.

80. Fit the front snap ring (61).

81. Soak the discs (47) in a transmission oil bath for approximately 1 hour. Check that they are correctly saturated.

82. Fit the discs (47) and the intermediate plates (46) depending on the type of tractor (see Remark and Fig. 15).

Remark:

- 8210 - 8220 tractors: 5 discs - 4 intermediate plates

- 8240 and 8250 tractors: 6 discs - 5 intermediate plates.

83. Check that the centering pin (17) is fitted (Fig. 12).

84. Refit cover (34). Check that it is correctly positioned on the pins (50) of the pinion gears and in the centering pin (Fig. 12).

85. Immobilise the planet carrier, using the same method as used during disassembly.

86. Fit and tighten screws (99) (Fig. 12) to a torque of 36 - 46 Nm with the threads previously lightly smeared with Loctite 242 or equivalent.

87. On cover (38), check for the presence of rivets (40) at the end of the channels and refit:

- piston (39) with new lubricated seals (36) (41), gradually and alternately striking around the piston rim with a plastic mallet. Check that no fragments of the seal remain after assembly,

- plate (43) with a new lubricated seal (42), aligning the holes of the plate with those in the cover (38). Insert the plate using the same method as used for piston (39).

Remark : The thickness of the plate (43) differs according to the number of discs and intermediate plates.

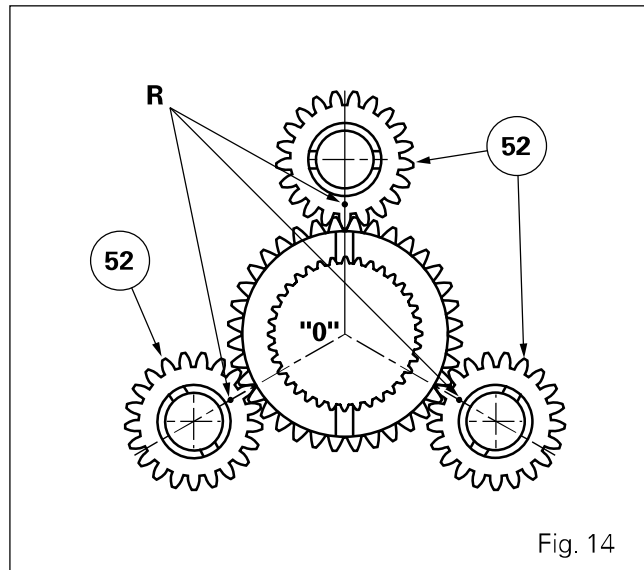


Fig. 14

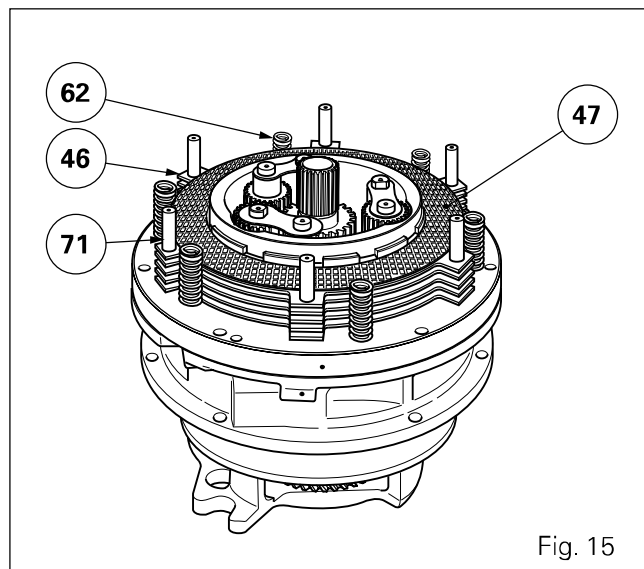


Fig. 15

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88. Refit pins (71) and springs (62) (Figs. 15-16) in their respective locations on the input unit.
89. Coat the spools (44) and the springs (45) with miscible grease. Fit and stick the spools in each compartment of cover (38), with the points towards the unions (72) (Fig. 2). Slide and stick a spring (45) in each spool.
90. On the outside face of the cover (38), place three sufficiently long and equally spaced studs in the holes provided for screws (64).
91. Fit and position the cover, with the 13 bar valve port (77) turned upwards (Fig. 17).

Important: Before fitting screws (70), check that the spools (44) slide freely in each compartment of the front cover on the input unit.

To do this, compress the springs (45), using a screwdriver passed through the tapped holes of the unions (72).

Remark: If the springs cannot be compressed, it is important to find the reason.

92. Pre-tighten screws (70).
 93. During pre-tightening, check that the spools (44) still slide freely. Also check that each end of the (thick section) springs (62) are correctly housed in their bases.
 94. Definitively tighten the screws (70) (Fig. 12) to a torque of 29 - 37 Nm. After completing the tightening, check the sliding movement again and return of each spool to its initial position.
- Remark:** A spool that is blocked open may limit or interrupt lubrication to the front clutch.
95. Install the 13 bar valve (77) with its seal on cover (38) and tighten to a torque of 12.5 Nm - 13.5 Nm **maximum**. (Fig. 17). Fit and tighten the unions (72).

Final operation

96. Install the input unit (see section 5B02) and the front clutch (see § A).

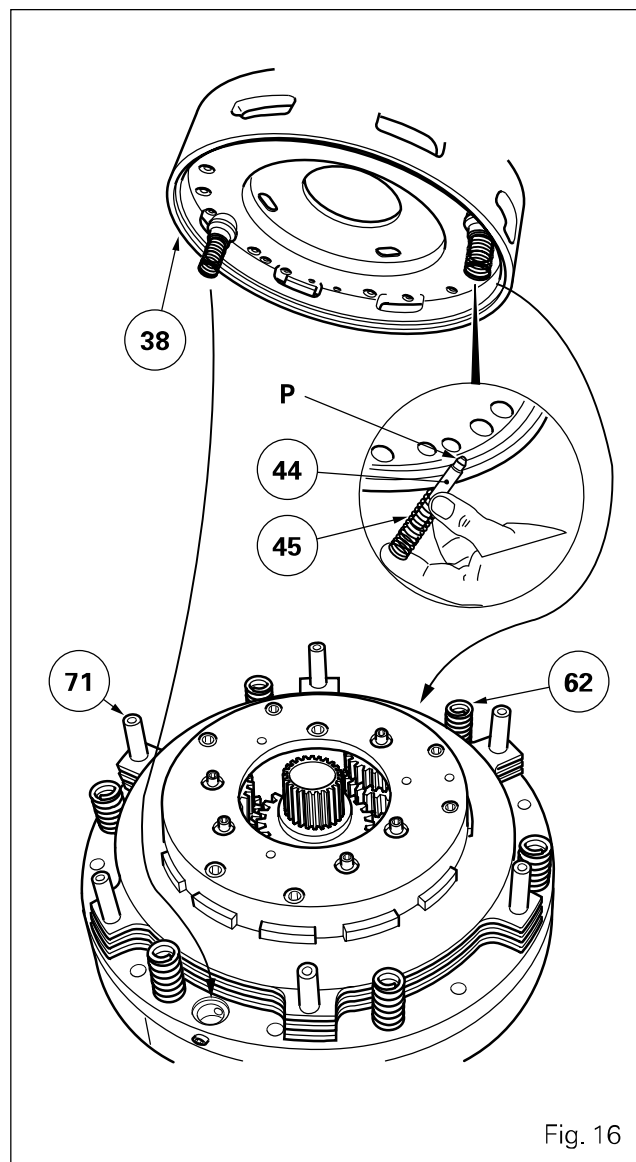


Fig. 16

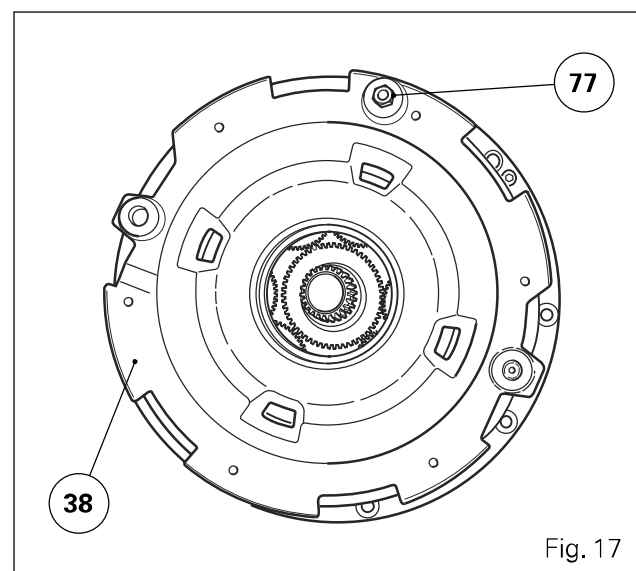


Fig. 17



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E . Disassembling and reassembling the driving pinion - Shimming the shaft

Special point

The rearward position of the Dynashift, caused by the presence of the rear shuttle clutch in the housing of the unit, limits the space available at the rear of the input unit. This is why the secondary shaft (1) and the pinion (2) are machined as a single component (Fig. 19).

Preliminary operations

97. Remove the front clutch (see § A).
98. Remove the input unit (see section 5B02).
99. Remove the rear clutch (see § D).
100. Remove the Dynashift device (see section 5B04).

Disassembly (Fig. 19)

Reminder:

- Pair bearing cones and bearing cups together if they are to be re-used.

101. Remove screws (13) and casing (5). Recover the locating pin (4).
102. Where necessary, remove bearing cup (16) and shims (3).
103. Take out the secondary shaft (1), pinion and bearing cones (7) (9) assembly from cover (14).
104. Remove bearing cup (8).
105. Where needed, separate the bearing cones from the shaft.
106. Drive out the roller bearing (1), the gearbox front intermediary shaft support (see section 5G01). Take off oil deflector (2) and discard it if necessary (Fig. 18).

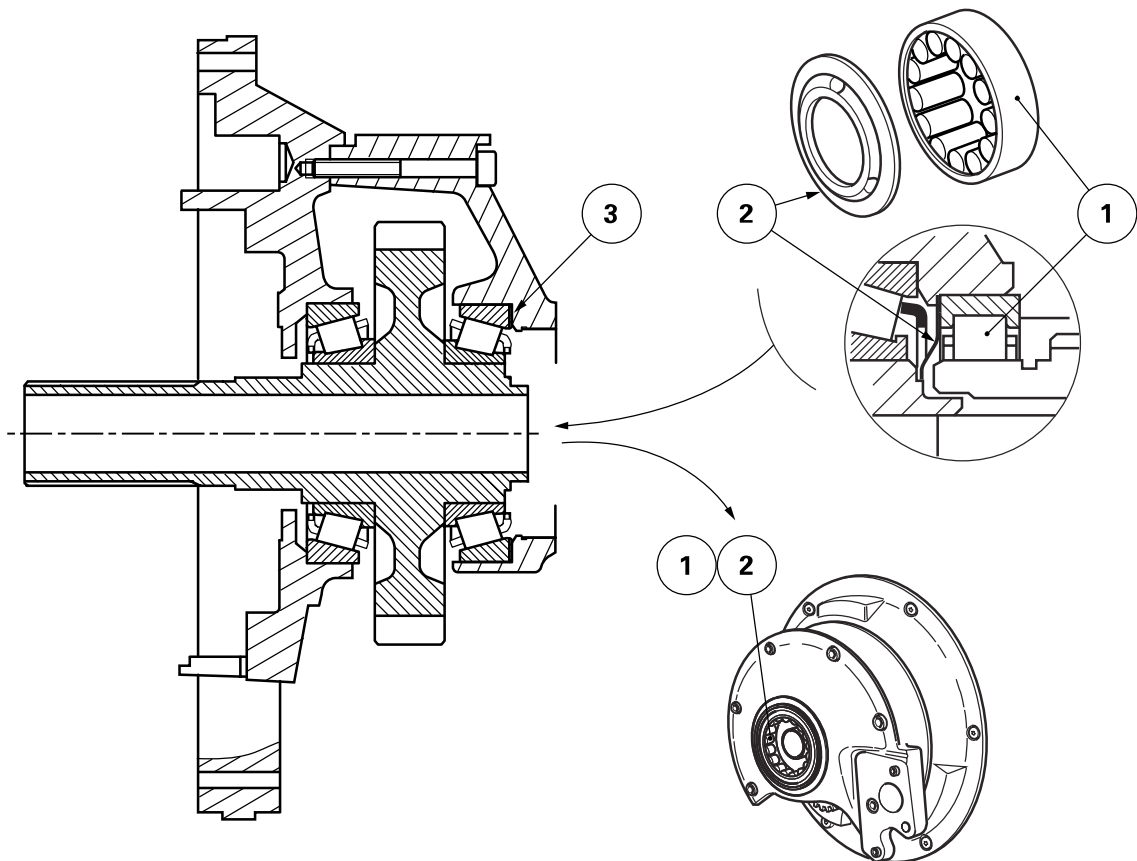


Fig. 18

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Reassembly (Fig. 19)

107. Check that the ports of the secondary shaft are not clogged and check for the presence of lubrication restrictor "R"
108. Clean and check parts. Replace any defective ones.
109. Lubricate the bearing cones and cups with transmission oil before assembly.
110. Insert bearing cones (7) (9) in contact with pinion (2) using a suitable press and fixture.
111. Place the bearing cup (8) in cover (14).
112. Refit the secondary shaft (1), pinion and bearing cones assembly inside the cover.

Preparation for shimming

113. Determine the thickness of shims (3) required in order to obtain a temporary clearance of 0.10 mm to 0.15 mm approximately. For the definitive shimming with pre-loading, see the following paragraphs.
114. Place the previously determined shims in casing (5) followed by the bearing cup (16).
115. Place the locating pin (4) and the unit on cover (14). Tighten screws (13) to a torque of 29 - 37 Nm.
116. Place the unit in a vice with jaw protectors, and carry out a definitive shimming of the shaft.

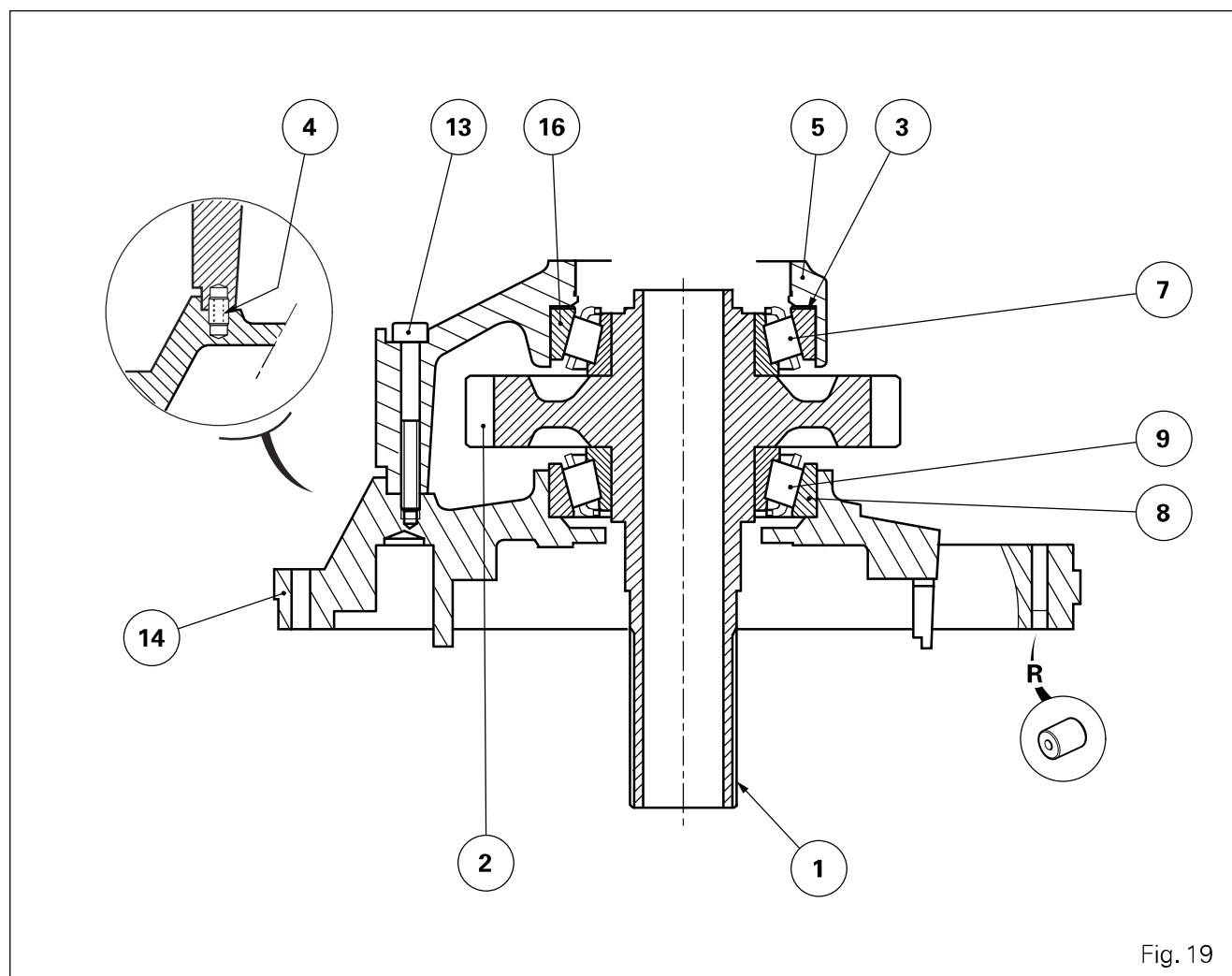


Fig. 19



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Shimming the shaft (1) (Figs. 19 - 20)

Remark:

- The principle consists in determining a thickness of shims (3) to fit between the bearing cup of bearing (16) and casing (5) (Fig. 19).

Reminder:

- It is recommended to remove oil deflector (2) (Fig. 18) in order to avoid any interference between it and the shaft (1) (Fig. 19).

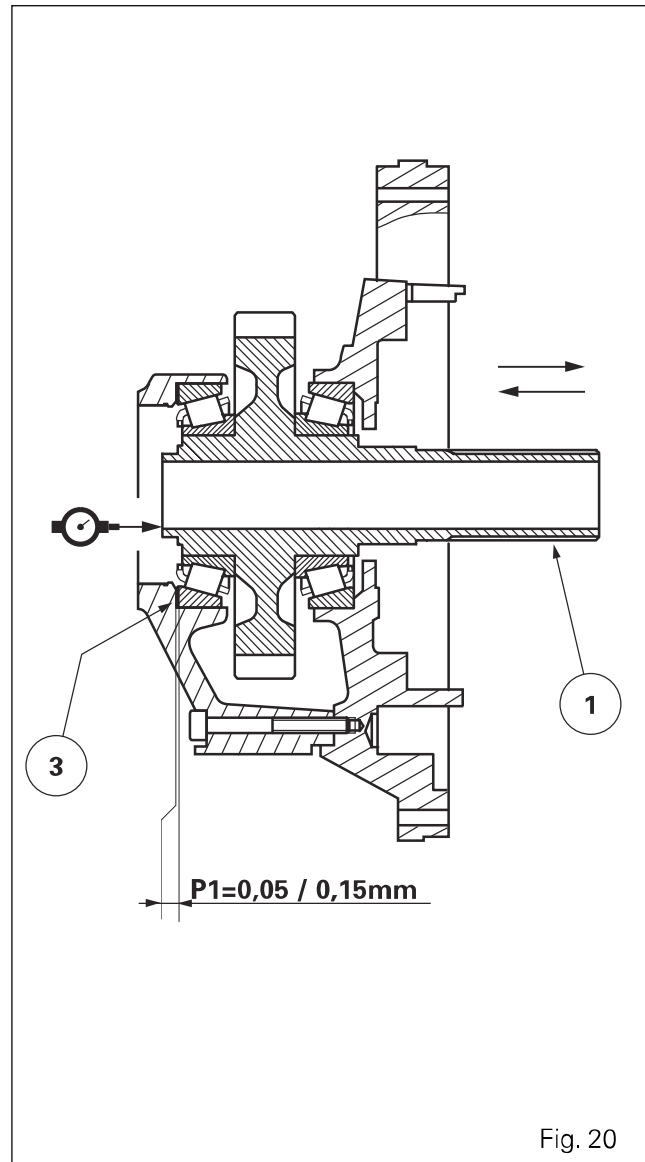
117. Position the feeler of the dial gauge on the end of the shaft.
118. Pull hard on shaft (1), alternately turning it from left to right in order to correctly seat the cones in the bearing cups.
119. Set the needle of the dial gauge to zero.
120. Repeat operation 118 this time while pushing.
121. Depending on the clearance measured (Fig. 20), select a new shim thickness (3) to provide a P1 pre-loading of:

P1 = 0.05 mm to 0.15 mm

Note:

- Where possible, shim to the maximum tolerance.

122. Remove screws (13). Remove casing (5).
123. Position the definitive shims (3) selected during operation 121 along with bearing cup (16) in the casing (5).
124. Refit the casing, shim(s) and bearing cup assembly on cover 14, first checking for the presence of locating pin (4).
125. Fit and definitively tighten screws (13) to a torque of 29 - 37 Nm, the threads previously smeared with Loctite 242 or equivalent.
126. Manually check the rotation of the shaft.
127. Turn the oil deflector (2) in accordance with Fig. 18 and insert the roller bearing (1) in thrust against the unit housing.



Final operations

128. Refit the Dynashift device (see section 5B04).
129. Refit the rear clutch (see § D).
130. Refit the input unit (see section 5B02).
131. Refit the front clutch (see § A).

Gearbox - Power Shuttle

F . Service tools

1. Tools available in the AGCO network
- 3378240 M1 - Planetary carrier immobilizing tool
(Fig. 21)

2. Locally made tools

- Sleeve for removing and refitting the clutch assembly (Fig. 22)

- (1) - Pipe: Tu52B, external \varnothing 42.4, thickness 5
- (2) - Pipe: Tu52B, external \varnothing 48.3, thickness 2.9

- Belleville washer compression tool (Fig. 23)

- (1) U iron profile: 60
- (2) Threaded rod: \varnothing 8
- (3) Round iron machined with the following dimensions:
 $\varnothing = 36$, $L = 60$.

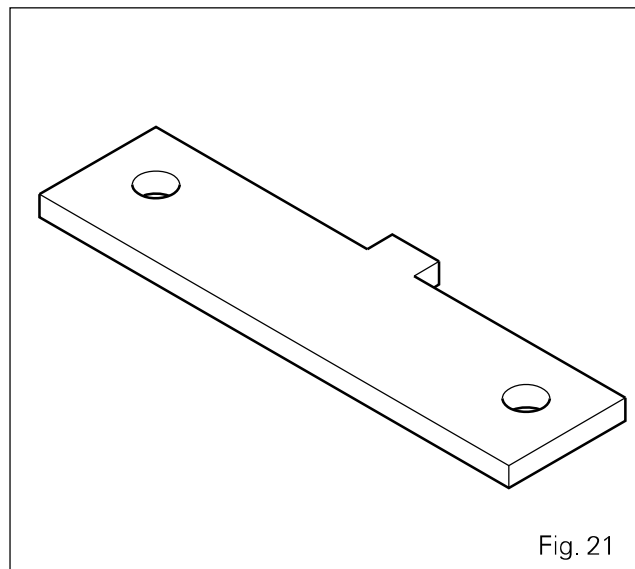


Fig. 21

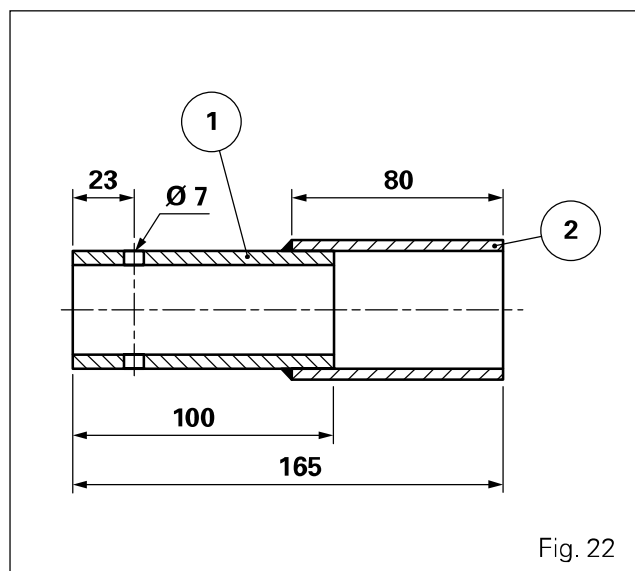


Fig. 22

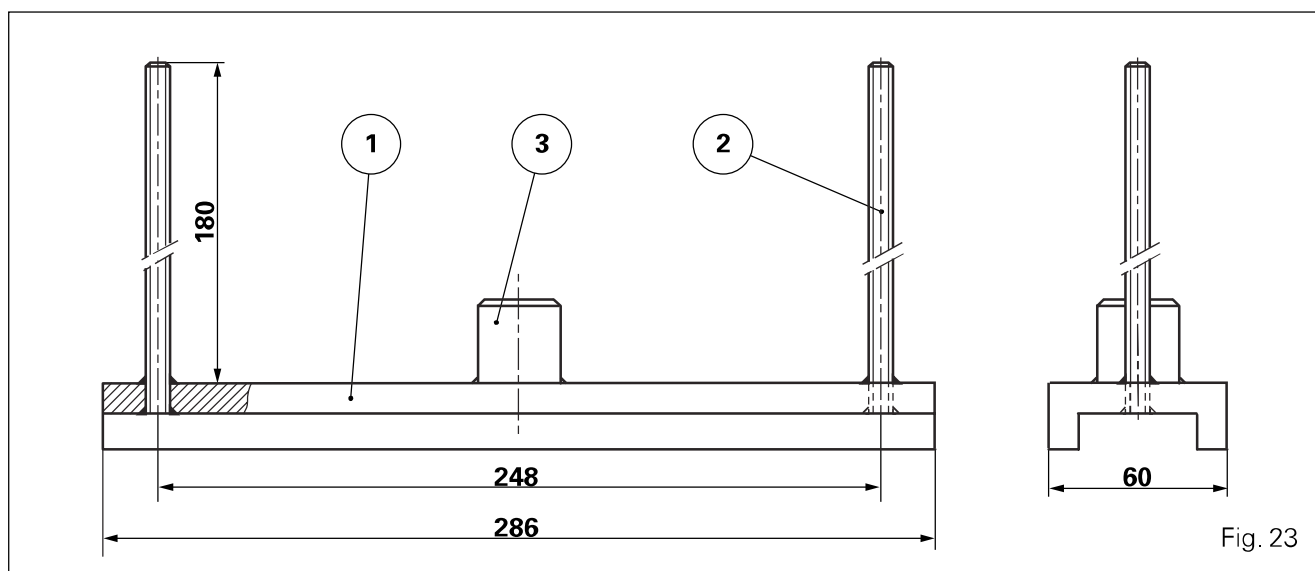


Fig. 23

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