

(12) UK Patent Application (19) GB (11) 2 186 331 (13) A

(43) Application published 12 Aug 1987

(21) Application No 8611835

(22) Date of filing 15 May 1986

(30) Priority data

(31) 19377 (32) 12 Feb 1986 (33) IT

(71) Applicant
Automotive Products plc

(Incorporated in United Kingdom),

Tachbrook Road, Leamington Spa, Warwickshire
CV31 3ER

(72) Inventors
Luigi Cucinotta,
Orazio Di Benedetto

(74) Agent and/or Address for Service
R. M. Farrow & J. Kinrade, Automotive Products plc,
Tachbrook Road, Leamington Spa, Warwickshire
CV31 3ER

(51) INT CL⁴
F16D 13/70

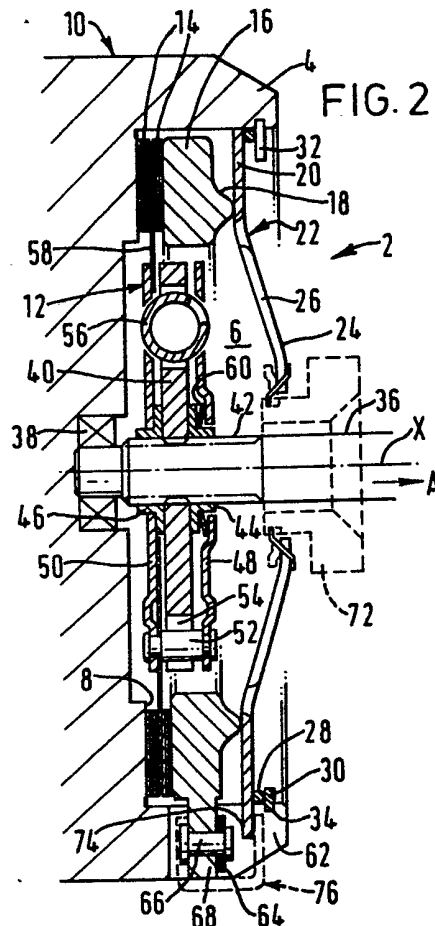
(52) Domestic classification (Edition I)
F2C 1C9A2 1C9B2 1C9B3 1CX3

(56) Documents cited
GB A 2158530 GB 1322315
GB A 2022730 GB 1187365
GB 1568164 GB 1115729

(58) Field of search
F2C
Selected US specifications from IPC sub-class F16D

(54) Method of preventing axial separation of a clutch pressure plate and a diaphragm spring

(57) To assemble a diaphragm spring clutch 2, the diaphragm spring 22 and pressure plate 16 are initially clipped together at their respective peripheral lugs 68 and 74 by removable U-shaped clips 76 to hold the pre-stressed diaphragm spring and the pressure plate axially together. A fly-wheel 10 providing counter-pressure face 8 is integral with a cylindrical clutch cover wall 4 defining a cylindrical chamber 6 in which a clutch driven plate 12 is disposed. The clipped combination of the diaphragm spring 22 and pressure plate 16 are then inserted pressure plate first into chamber 6 followed by fulcrum ring 28 which is held against the diaphragm spring 22 by a retaining circlip 30 engaged in a groove in the wall 4. Leaf springs 64 forming release and drive straps riveted to the pressure plate lugs 68 are now bolted to the cover wall 4 and then the clips 76 are pulled off the pressure plate and diaphragm spring through axial slots 62 in the cover wall 4.



GB 2 186 331 A

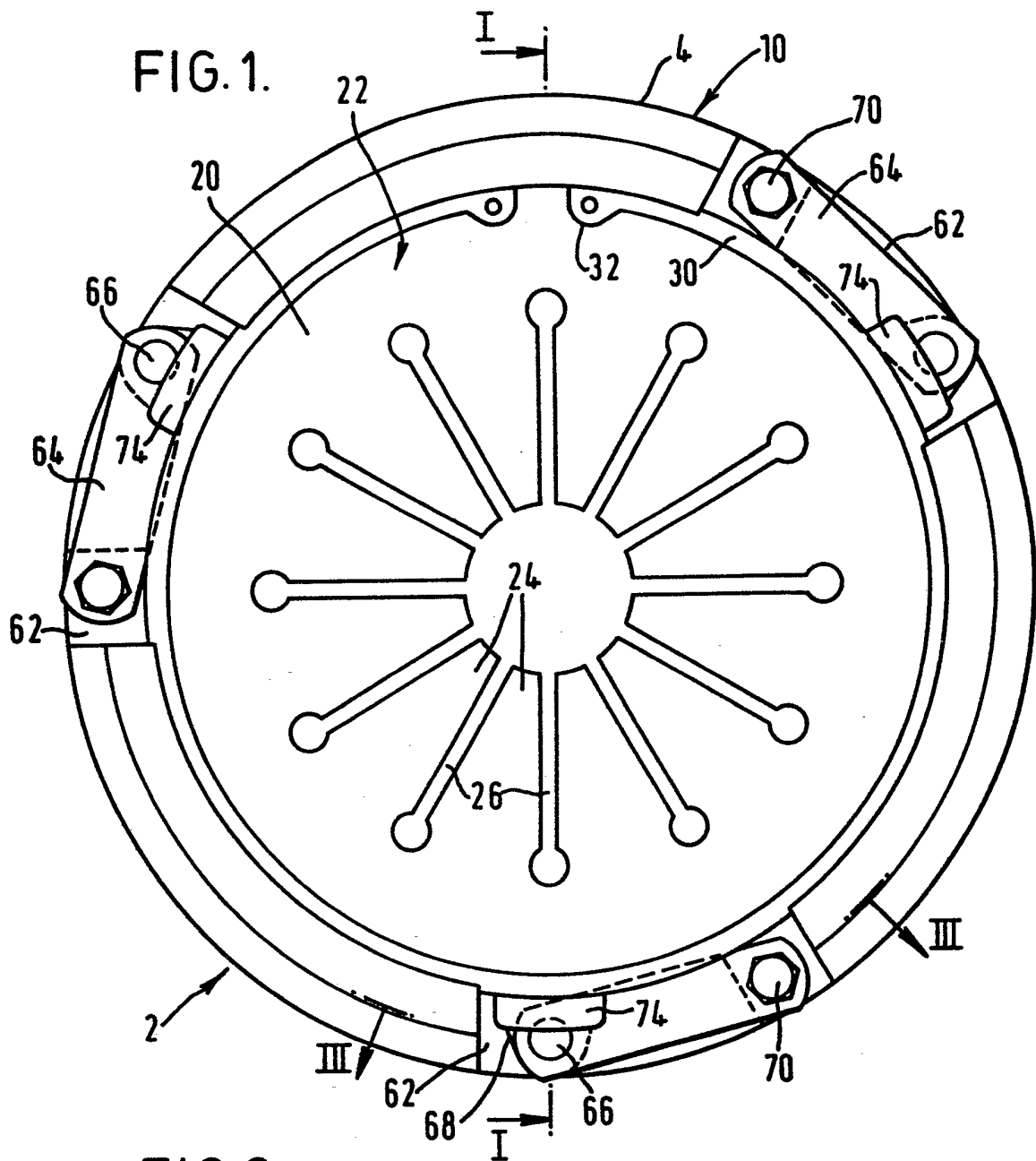
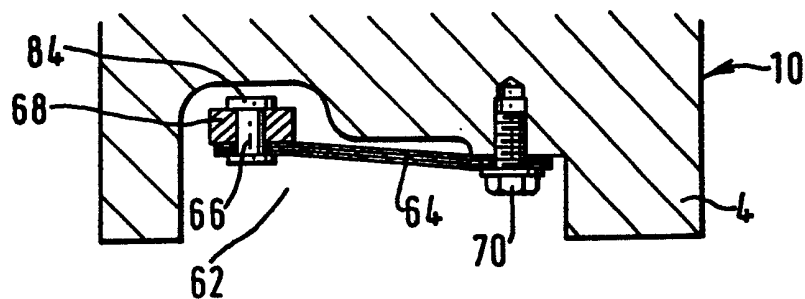


FIG. 3.



SPECIFICATION

Method of Preventing Axial Separation of a Clutch Pressure Plate and a Diaphragm Spring

5 This invention concerns a method of preventing axial separation of a clutch pressure plate and a diaphragm spring.

According to a first aspect of the invention there is provided a method of preventing axial separation of
10 a clutch pressure plate and a diaphragm spring, the combination of the pressure plate and diaphragm spring being for a diaphragm spring clutch of the type which comprises a driving plate, a driven plate, the pressure plate, and the diaphragm spring, and in
15 which the driven plate is clampable between the driving plate and the pressure plate under urging by the diaphragm spring, the method comprising maintaining the axial positions of the diaphragm spring and pressure plate one relative to the other
20 by gripping the diaphragm spring and pressure plate between a plurality of removable spaced clips each simultaneously engaging a peripheral portion of the diaphragm spring and a peripheral portion of the pressure plate.

25 The peripheral portion of the diaphragm spring may be a lug at the periphery of the spring.

Each clip may be placed in its gripping position by moving the clip radially inwardly over the pressure plate and the diaphragm spring and can be removed
30 by moving the clip radially outwardly of the diaphragm spring and pressure plate.

Each clip may be of U-shape form in which one or a first limb of the U engages a surface of the pressure plate on a side of the pressure plate remote
35 from the diaphragm spring and the other or second limb of the U engages a surface of the spring remote from the pressure plate.

The first limb may be formed to fit about a fastening device on the pressure plate. The
40 fastening device may be a rivet.

According to a second aspect of the invention there is provided a method of assembling a diaphragm spring clutch in which the clutch comprises a hollow cover surrounding an internal
45 chamber which is open at at least one end, a clutch driving plate fixed for rotation with the cover and defining at least in part an end of the chamber, and a clutch driven plate disposed with a clutch pressure plate and a diaphragm spring in said chamber in
50 which the driven plate is clampable between the pressure plate and the driving plate under urging by the diaphragm spring, the method of assembly comprising preventing axial separation of the pressure plate and diaphragm spring by the method
55 according to the first aspect of the invention, bringing the cover and driven plate into a relationship in which the driven plate is disposed in the chamber, inserting the clipped combination of the pressure plate and diaphragm spring into the
60 chamber, mounting retaining means in position to retain the diaphragm spring in the chamber, and removing the clips.

In producing the clipped combination in accordance with the first aspect of the invention the
65 pressure plate and diaphragm spring are brought

together and the circumferential Belleville portion of the spring is axially pre-stressed towards the pressure plate. Then the pre-stressed Belleville portion is clipped to the pressure plate so that the
70 spring is held in the pre-stressed state against the plate and cannot separate therefrom until the clips are removed. Thus the clipped combination forms a single unit which is easy to handle and can be readily inserted into the cover with the diaphragm
75 spring constrained by the clips to facilitate the mounting of the retaining means in position. In other words it is not necessary to struggle against the power of the diaphragm spring whilst fitting the retaining means which retains the diaphragm spring
80 in a stressed state after the clips are removed. The clipped combination may be produced and then stored until needed and/or transported to the place where the combination is required for forming a clutch.

85 The cover and driving plate may be integral and form a fly-wheel of an engine, for example an internal combustion engine which may be used to power a motor vehicle.

The restraining means may comprise a circular
90 spring clip inserted in a groove in a wall of the cover surrounding the chamber.

The pressure plate may be provided with release springs secured thereto and after insertion of the pressure plate into the chamber the release springs
95 may be fastened to the cover by means of detachable screw devices engaging the cover.

Various aspects of the invention will now be further described, by way of example, with reference to the accompanying drawings in
100 which:—

Fig. 1 is a plan view of a clutch assembled using the method according to the second aspect of the invention;

Fig. 2 is a section on line II—II in Fig. 1;

105 Fig. 3 is a section on line III—III in Fig. 1;

Fig. 4 is a section of the clutch pressure plate and diaphragm spring of Fig. 1 prevented from axial separation using the method according to the first aspect of the invention; and

110 Fig. 5 is a fragmentary view in the direction of arrow V in Fig. 4.

Referring to Figs. 1 to 3, a pull-type clutch is shown at 2 to transmit rotary motion from a driving source to driven means. The clutch may be used in a
115 motor vehicle.

The clutch has a cover 4 defining an internal cylindrical chamber 6 open at one end and closed at the other by an end wall formed at least in part by an annular driving plate 8 integral with the cover as
120 parts of a fly-wheel 10 to be rotated about an axis X by, for example, an internal combustion engine.

The clutch further comprises a driven plate 12 with friction facings 14, and an annular pressure plate 16 with an annular fulcrum arrangement 18 bearing on a circumferential Belleville portion 20 of a diaphragm spring 22 having radially inwardly directed fingers 24 spaced by slots 26. Remote from the pressure plate, the diaphragm spring 22 bears on a fulcrum ring 28 braced against a circular spring
125 clip or circlip 30 having the usual release ears 32 and
130

seated in an annular groove 34 in an inner wall of the cover and adjacent to the open end of the chamber 6. The fulcrum ring 28 may provide cushioning and can be of the wavy ring kind described in British Patent No. 1 583 403 of Automotive Products Limited.

The driven plate 12 is mounted on an output shaft 36 (which may be an input shaft to a vehicle gearbox) in a bearing 38 in the fly-wheel. The driven plate 12 has a disc 40 with internal teeth engaging axial splines 42 on the shaft 36. Sitting on the splines are bushes 44 and 46 each carrying a respective cheek plate 48 or 50 secured together by stop rivets 52 passing through arcuate recesses 54 in the disc 40. Torsion damping springs 56 are disposed in windows in the disc 40 and cheek plates 48 and 50. The friction facings 14 are secured to a carrier plate 58 secured to the cheek plate 50 by the rivets 52, and the driven plate assembly is axially braced by a Belleville washer 60.

The wall of cover 4 has three substantially equi-angularly spaced slots 62 therein each extending axially and being through in the radial direction. Disposed in each slot is a tangential release spring strap 64 secured at one end by a rivet 66 to a respective radial lug 68 integral with the pressure plate 16 at its circumference. The other end of strap 64 is secured to the fly-wheel 10 by a screw or threaded bolt 70 of which the head is wholly inset in the recess 62.

In Fig. 2 the clutch is shown engaged. To release the clutch a release bearing 72 engaging the inner ends of the fingers 24 pulls them in direction A (Fig. 2).

The lugs 68 are substantially equi-angularly spaced apart and a similar number of equi-angularly spaced radial lugs 74 are integral with the diaphragm spring 22 at its circumference. Therefore when one of the lugs 74 overlies a said lug 68 each of the other lugs 74 overlies a respective one of the other said lugs 68.

As an aid to assembling the clutch a plurality of clips 76 are provided. Each clip is of substantially U-shape and of sheet material so that major planar faces of its two limbs 78 and 80 face one another. The clips may have some resilience and may be of metal, for example steel. When the clips are not in use at least one of the limbs 78 or 80 may have at least a portion inclined or extending towards the other limb along a direction away from the cross-piece of the U end towards the free ends of the limbs. If desired the free end of either or each limb 78, 80 may be outwardly chamfered or flared to provide a lead-in.

When the clutch is to be assembled the diaphragm spring 20 is placed on the fulcrum 18 so that the lugs 78 overlie the lugs 68. Then the Belleville portion 20 is pre-stressed by axially directed force towards the pressure plate 16 until the clips 78 can each be pushed over a respective said lug 68 and the corresponding overlying lug 74 as shown in Fig. 4 (and also in Fig. 5) so that the diaphragm spring 22 is held in a pre-stressed state by the three spaced clips 78 against the pressure plate and cannot be separated axially from the plate.

To facilitate the fitting of each clip, the limb 80 has from its free end a slot or notch 82, which may be U-shape, enabling the limb to fit about a head or end enlargement 84 on a said rivet 66. After the driven plate 12 becomes disposed in the chamber 6 the clipped combination of diaphragm spring 22 and pressure plate 16 is inserted into the chamber past the groove 34. Since the diaphragm spring 24 is held by the clips 76 (shown in phantom lines in Fig. 2) the diaphragm spring does not provide a strong reaction against insertion of the fulcrum ring 28 or the introduction of the circlip 30 into the groove 34. The screws or bolts 70 are inserted into the slots 62 and screwed into place to clamp the release straps 64 to the fly-wheel 10. Now the clips 76 are pulled off through the slots by an appropriate tool so that the Belleville portion 20 can press fully against the retaining circlip 30 via the fulcrum ring 28.

85 CLAIMS

1. A method of preventing axial separation of a clutch pressure plate and a diaphragm spring, the combination of the pressure plate and diaphragm spring being for a diaphragm spring clutch of the type which comprises a driving plate, a driven plate, the pressure plate, and the diaphragm spring, and in which the driven plate is clampable between the driving plate and the pressure plate under urging by the diaphragm spring, the method comprising maintaining the axial positions of the diaphragm spring and pressure plate one relative to the other by gripping the diaphragm spring and pressure plate between a plurality of removable spaced clips each simultaneously engaging a peripheral portion of the diaphragm spring and a peripheral portion of the pressure plate.

2. A method as claimed in Claim 1, in which the peripheral portion of the diaphragm spring is a lug at the periphery of said spring.

3. A method as claimed in Claim 1 or Claim 2, in which the peripheral portion of the pressure plate is a lug at the periphery of the pressure plate.

4. A method as claimed in any one preceding claim, in which each clip is placed in its gripping position by moving the clip radially inwardly over the pressure plate and the diaphragm spring and can be removed by moving the clip radially outwardly of the diaphragm spring and pressure plate.

5. A method as claimed in any one preceding claim, in which each clip has a U-shape form in which one or a first limb of the U engages a surface of the pressure plate on a side of the latter remote from the diaphragm spring and the other or second limb of the U engages a surface of the diaphragm spring on that side of the spring remote from the pressure plate.

6. A method as claimed in Claim 5, in which each clip is of strip material.

7. A method as claimed in Claim 5 or in Claim 6, in which the first limb is formed to fit about a fastening device on the pressure plate.

8. A method as claimed in Claim 7, in which the first limb is formed with an opening to accommodate the fastening device.

9. A method of assembling a diaphragm spring clutch in which the clutch comprises a hollow cover surrounding an internal chamber which is open at at least one end, a clutch driving plate fixed for rotation with the cover and defining at least in part an end of the chamber, and a clutch driven plate disposed with a clutch pressure plate and a diaphragm spring in said chamber in which the driven plate is clampable between the pressure plate and the driving plate under urging by the diaphragm spring, the method of assembly comprising preventing axial separation of the pressure plate and diaphragm spring by the method claimed in any one preceding claim, bringing the cover and driven plate into a relationship in which the driven plate is disposed in the chamber, inserting the clipped combination of the pressure plate and diaphragm spring into the chamber, mounting retaining means in position to retain the diaphragm spring in the chamber, and removing the clips.

10. A method as claimed in Claim 9, in which the retaining means comprises a circular spring clip inserted in a groove in a wall of the cover surrounding the chamber.

11. A method as claimed in Claim 9 or Claim 10, in which a fulcrum ring is positioned between the diaphragm spring and the retaining means.

12. A method as claimed in any one of Claims 9 to 11, in which the pressure plate is provided with release springs secured thereto, and after insertion of the pressure plate into the chamber the release springs are fastened to the cover by means of detachable screw devices engaging the cover.

13. A method as claimed in any one of Claims 9 to 12, in which the cover and driving plate are integral and form a fly-wheel.

14. A combination of a clutch pressure plate and a diaphragm spring prevented from axial separation by the method as claimed in any one of Claims 1 to 8.

15. A clutch assembled using the method claimed in any one of Claims 9 to 13.

16. A method of preventing axial separation of a clutch pressure plate and a diaphragm spring substantially as hereinbefore described with reference to the accompanying drawings.

17. A clutch assembled using the method substantially as hereinbefore described with reference to the accompanying drawings.

18. A motor vehicle provided with a clutch as claimed in Claim 15 or Claim 17.

Amendments to the claims have been filed, and have the following effect:—
Claims 1—18 above have been deleted.
New claims have been filed as follows:—

CLAIMS

1. A method of assembling a diaphragm spring clutch in which the clutch comprises a hollow cover surrounding an internal chamber which is open at at least one end, a clutch driving plate fixed for rotation with the cover and defining at least in part an end of the chamber, and a clutch driven plate

disposed with a clutch pressure plate and a diaphragm spring in said chamber in which the driven plate is clampable between the pressure plate and the driving plate under urging by the diaphragm spring, the method of assembly comprising maintaining the axial positions of the diaphragm spring and pressure plate one relative to the other by gripping the diaphragm spring and pressure plate between a plurality of removable spaced clips each simultaneously engaging a peripheral portion of the diaphragm spring and a peripheral portion of the pressure plate, bringing the cover and driven plate into a relationship in which the driven plate is disposed in the chamber, inserting the clipped combination of the pressure plate and diaphragm spring into the chamber, mounting retaining means in position to retain the diaphragm spring in the chamber, and removing the clips.

2. A method as claimed in Claim 1, in which the cover and driving plate are integral and form a fly-wheel.

3. A method as claimed in Claim 1 or Claim 2, in which the peripheral portion of the diaphragm spring is a lug at the periphery of said spring.

4. A method as claimed in any one preceding claim, in which the peripheral portion of the pressure plate is a lug at the periphery of the pressure plate.

5. A method as claimed in any one preceding claim, in which each clip is placed in its gripping position by moving the clip radially inwardly over the pressure plate and the diaphragm spring and can be removed by moving the clip radially outwardly of the diaphragm spring and pressure plate.

6. A method as claimed in any one preceding claim, in which each clip has a U-shape form in which one or a first limb of the U engages a surface of the pressure plate on a side of the latter remote from the diaphragm spring and the other or second limb of the U engages a surface of the diaphragm spring on that side of the spring remote from the pressure plate.

7. A method as claimed in Claim 6, in which each clip is of strip material.

8. A method as claimed in Claim 6, in which the first limb is formed to fit about a fastening device on the pressure plate.

9. A method as claimed in Claim 8, in which the first limb is formed with an opening to accommodate the fastening device.

10. A method as claimed in any one preceding claim, in which the retaining means comprises a circular spring clip inserted in a groove in a wall of the cover surrounding the chamber.

11. A method as claimed in any one preceding claim, in which a fulcrum ring is positioned between the diaphragm spring and the retaining means.

12. A method as claimed in any one preceding claim, in which the pressure plate is provided with release springs secured thereto, and after insertion of the pressure plate into the chamber the release springs are fastened to the cover by means of detachable screw devices engaging the cover.

13. A method of assembling a diaphragm spring clutch substantially as hereinbefore described with reference to the accompanying drawings.

14. A clutch assembled using the method as

5 claimed in any one preceding claim.

15. A motor vehicle provided with a clutch as claimed in Claim 14.

Printed for Her Majesty's Stationery Office by Courier Press, Leamington Spa, 8/1987. Demand No. 8991685.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY. from which copies may be obtained.