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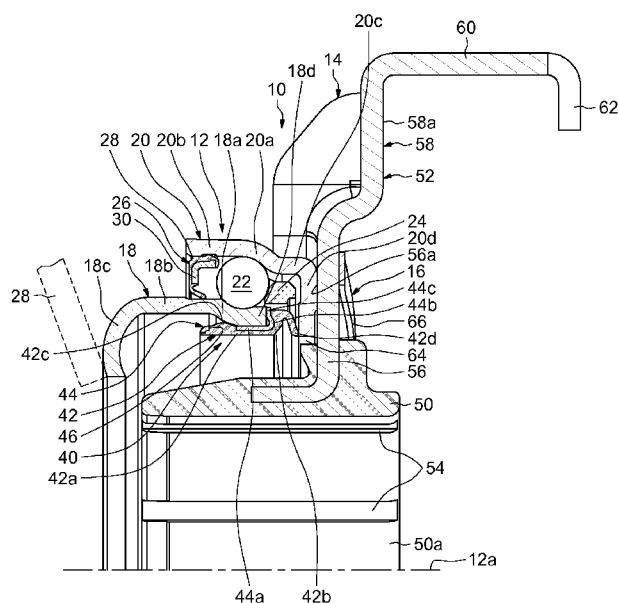
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(54) Title: CLUTCH RELEASE BEARING COMPRISING A ROTATING SEAL

FIG.1



(57) Abstract: The clutch release bearing comprises an inner ring (18), an outer ring (20) and at least one row of rolling elements (22) positioned between raceways provided on the rings, one of said rings being rotatable relative to the other and able to come into contact with a clutch mechanism diaphragm. The bearing further comprises a sealing ring (40) mounted on the rotating ring in order to be rotationally connected to said ring, said sealing ring comprising at least one friction lip (42d) axially bearing against the other ring.

Clutch release bearing comprising a rotating seal.

The present invention relates to the field of clutch release bearing devices intended to act on the diaphragm of a clutch,
5 particularly for a motor vehicle.

Such devices generally comprise a rolling bearing of which one of the rings is rotating and the other is non-rotating. The rotating ring is provided with a substantially radial engagement surface intended to come into contact with the end of the fingers making up the clutch
10 diaphragm.

A non-rotating operating element supports the rolling bearing and, under the action of a control member (mechanical, electrical or hydraulic), axially moves the clutch release bearing against the clutch diaphragm so as to actuate the clutch system or mechanism. The
15 operating element may be in the form of a sleeve sliding axially along a guide tube under the action of the control member.

A self-centring element is generally interposed between the non-rotating ring of the rolling bearing and the operating element. Said self-centring element provides the axial connexion between these
20 two parts while at the same time, by virtue of its elasticity, allowing a radial relative movement between them. The clutch release bearing can thus move radially in order to obtain an alignment of the axes of rotation of the bearing and of the clutch diaphragm so as to be self-centred on this clutch diaphragm. A clutch release bearing device such
25 as this is known in particular from patent application FR-A1-2 928 983.

In this document, the sealing obtained between the inner and outer rings of the rolling bearing may be insufficient in some operating conditions and foreign matter may reach the rolling space
30 delimiting between said rings.

One aim of the present invention is therefore to overcome the aforementioned drawbacks.

It is a particular object of the present invention to provide a clutch release bearing which is simple to manufacture and to assembly, economic, while guaranteeing good sealing properties.

5 In one embodiment, the clutch release bearing comprises an inner ring, an outer ring and at least one row of rolling elements positioned between raceways provided on the rings. One of said rings is rotatable relative to the other and able to come into contact with a clutch mechanism. The bearing further comprises a sealing ring
10 mounted on the rotating ring in order to be rotationally connected to said ring. The sealing ring comprises at least one friction lip axially bearing against the other ring.

The dynamic friction lip mounted on the rotating ring and coming into axial contact with the other ring limits the ingress of foreign particles between the rings of the bearing. With such
15 disposition, the space requirement of the rolling bearing is limited. The lip forms an internal dynamic sealing with the corresponding ring. "Dynamic sealing" means the sealing between two parts that move relative to one another.

In a preferred embodiment, the friction lip extends obliquely
20 inwards. The orientation of the friction lip is particularly advantageous since the centrifugal effect tends to move radially outwards said lip, which further increases the contact pressure between the lip and the corresponding ring. The centrifugal effect tends to keep the sealing lip in contact with the corresponding ring. Otherwise, with
25 the inward orientation of the sealing friction lip, the contact pressure between said lip and the corresponding ring is also increased when any splashes of water or other pollutants press against said lip.

Advantageously, the friction lip is elastic at least in the axial direction.

30 In one embodiment, the friction lip bears against a radial portion of the corresponding ring.

Advantageously, the friction lip is axially disposed between an end portion of the rotating ring and the radial portion situated axially facing said end portion.

In one embodiment, the sealing ring comprises a body made of flexible material and a stiffening cup made of rigid material. The stiffening cup may comprise an axial portion for the mounting of the sealing ring on the rotating ring. The axial portion may be disposed
5 into the bore of the rotating ring.

In one embodiment, the sealing ring comprises retaining means adapted to cooperate with the rotating ring to axially retain the sealing ring relative to said rotating ring. The retaining means advantageously cooperate with the rotating ring by diametral interference.

10 In one embodiment, the sealing ring is freely moveable in axial direction between the rings. The sealing ring may further comprise an additional friction lip axially bearing against the rotating ring. One of the friction lips is advantageously more flexible than the other.

15 In one embodiment, the bearing comprises a sealing member disposed radially between the inner and outer rings and positioned axially on the opposite side to the sealing ring with regard to the rolling elements.

20 According to another aspect, it is proposed a clutch release bearing device comprising a clutch release bearing as previously defined and an operating element comprising a flange against which a ring of the bearing presses. A retaining member for retaining the bearing on the operating element may also be provided.

25 It is also proposed a rolling bearing comprising an inner ring, an outer ring and at least one row of rolling elements positioned between raceways provide on the rings, at least one of said rings being rotatable relative to the other. The rolling bearing further comprises a sealing ring mounted on the rotating ring in order to be rotationally connected to said ring. The sealing ring comprises at least one friction lip axially bearing against the other ring. The lip is axially disposed
30 between an end portion of the rotating ring and a radial portion of the other ring situated axially facing said end portion.

The present invention and its advantages will be more readily understood by studying the detailed description of specific

embodiments, which constitute non-limiting examples of the present invention, and illustrated by the appended drawings on which:

- Figure 1 is a half-view in axial section of a clutch release bearing device according to a first example of the invention,
- 5 - Figures 2 and 3 are respectively back and side views of the device of Figure 1,
- Figure 4 is a partial view in axial section on IV-IV of Figure 2,
- Figure 5 is a view in perspective of a stiffening cup of the device of Figure 1,
- 10 - Figure 6 is a half-view in axial section of a clutch release bearing device according to a second example of the invention,
- Figure 7 is a half-view in axial section of a clutch release bearing of the device of Figure 6,
- 15 - Figure 8 is a half-view in axial section of a clutch release bearing device according to a third example of the invention,
- Figure 9 is a partial view in axial section on IX-IX of Figure 8,
- Figure 10 is a view in perspective of a stiffening cup of the device of Figure 8, and
- 20 - Figure 11 is a half-view in axial section of a clutch release bearing device according to a fourth example of the invention.

As illustrated on Figures 1 to 4, a clutch release bearing device 10 comprises a rolling bearing 12, with an axis 12a, mounted on an operating element 14 adapted to slide axially with respect to a guide tube (not shown). The device 10 also comprises a member 16 for self-centring and retaining the rolling bearing 12 on the operating element 14. As will be described later, the member 16 also provides a connection between the operating element 14 and a control fork (not shown) adapted to apply axial force to cause the device 10 to move during a clutch release operation.

The rolling bearing 12 comprises an inner ring 18, an outer ring 20 between which is mounted a row of rolling elements 22, which in this case are balls, a retaining cage 24 for maintaining an even

circumferential spacing of the rolling elements 22, and a sealing member 26.

5 The inner ring 18, for example made of a thin metal sheet which has been stamped or rolled, comprises a toroidal portion 18a having, in cross section, a concave outer surface forming a track or raceway for the rolling elements 22. The toroidal portion 18a is extended outwards, from a large-diameter edge, by an annular axial portion 18b from the end of which extends radially inwards a convex portion 18c. The convex portion 18c cooperates by contact with a diaphragm 28 to actuate a clutch system or mechanism (not shown).
10 Alternatively, the portion adapted to come into contact with the clutch mechanism may have another shape, for example a radial form. The inner ring 22 also comprises an annular axial portion 18d extending the toroidal portion 18a axially on the side opposite to the axial portion 18b. In the illustrated embodiment, the inner ring 18 is a rotating ring and the outer ring 20 is a non-rotating ring.

The outer ring 20, which may also be made of a thin metal sheet which has been stamped or rolled, comprises a toroidal portion 20a having, in cross section, a concave inner surface forming a track or raceway for the rolling elements 22. The toroidal portion 20a is extended, from a large-diameter edge, by an annular axial portion 20b extending outwards and radially surrounding the axial portion 18b of the inner ring. Axially on the opposite side to the axial portion 20b, the toroidal portion 20a is extended, from a small-diameter edge, by an annular axial portion 20c. The end of the axial portion 20c is extended radially inwards by a radial portion 20d pressing against the operating element 14 axially on the side opposite to the inner ring 22. The inner diameter of the radial portion 20d is smaller than that of the axial portion 18d of the inner ring. The radial portion 20d is situated axially facing the axial portion 18d of the inner ring 22. An axial gap exists between the axial portion 18d and the radial portion 20d.
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The retaining cage 24 is radially disposed between the inner and outer rings 18, 20 and is positioned axially between the rolling elements 22 and the radial portion 20d of the outer ring. The inner

diameter of the cage 24 is greater than the outer diameter of the axial portion 18d of the inner ring 18 so that a radial end surface of said axial portion is completely unencumbered.

5 The sealing member 26 comprises a flexible part 28, for example made of an elastomer, disposed radially between the inner and outer rings 18, 20 axially on the opposite side to the cage 24 with regard to the rolling elements 22. An annular lip formed on the inner periphery of the flexible part 28 extends obliquely inwards and radially bears against the outer surface of the axial portion 18b of the
10 inner ring 18. The sealing member 26 also comprises a reinforcement cup 30, for example made of steel that supports the flexible part 28.

The rolling bearing 12 also comprises a sealing ring 40 fixed to the inner ring 18 and adapted to reduce any ingress of foreign matter between the axial portion 18d of said ring and the radial portion 20d of
15 the outer ring 20. The sealing ring 40 comprises a body 42 made of a flexible material, for example nitrile or elastomer such as synthetic rubber, and a stiffening cup 44 made of rigid material. The stiffening cup 44 may be advantageously made from plastic material by moulding, for example in polyamide (PA), or alternatively made from
20 a thin metal sheet which has been stamped.

The stiffening cup 44, which has an annular general shape, comprises an annular axial portion 44a mounted into contact with the bore of the axial portion 18d of the inner ring. The axial portion 44a is extended radially outwards by an annular rounded portion 44b which is
25 extended outwards by an annular radial portion 44c abutting against the radial end surface of the axial portion 18d of the inner ring. The radial portion 44c remains at a distance from the cage 24.

The axial portion 44a comprises a plurality of cylindrical through holes 46 spaced in a uniform manner in the circumferential
30 direction. The holes 46 allow the material to pass through during the overmoulding of the body 42, thereby ensuring good mutual fastening of these two elements. Alternatively, the body 42 may be attached to the stiffening cup 40 using any other suitable means, for example by gluing.

The body 42 is made in one part and may be advantageously made by moulding. The body 42, which has an annular general shape, comprises an annular axial portion 42a covering the bore of the axial portion 44a of the stiffening cup, and a radial heel or collar 42b extending radially outwards an axial end of the axial portion 42a. The collar 42b covers the rounded portion 44b and the radial portion 44c of the stiffening cup axially to the side opposite to the inner ring 18. The collar 42b remains at a distance from the cage 24. The body 42 also comprises radial ribs 42c extending through the holes 46 of the stiffening cup and coming into friction contact with the toroidal portion 18a of the inner ring in order to obtain the axial retaining of the sealing ring 40 relative to the inner ring 18. To this end, the external diameter of the ribs 42c is greater than the inner diameter of the toroidal portion 18a so that a diametral interference can exist between the sealing ring 40 and the inner ring 18 to prevent an axial displacement of said sealing ring.

The body 42 further comprises an annular sealing lip 42d extending from a large-diameter edge of the radial collar 42b. The lip 42d extends obliquely inwards and downwards from the collar 42b and comes into permanent friction contact with a radial surface of the radial portion 20d of the outer ring 20. The contact between said radial portion and the lip 42d is axial. The lip 42d extends radially inwards and axially in the direction of the radial portion 20d and bears against this portion. The lip 42d is axially disposed into the axial gap existing between the radial end surface of the axial portion 18d and the radial portion 20d of the outer ring and is adapted to block any ingress of foreign matter between said portions. The lip 42d is in axial friction contact with the radial portion 20d of the outer ring. The lip 42d is radially located between the inside diameter of the radial portion 20d and the exterior surface of the axial portion 18d. The lip 42d remains at a distance from the cage 24.

In the illustrated embodiment, the thickness of the lip 42d is constant. Alternatively, the thickness may reduce from the collar 42b towards its free end or tip which axially bears against the radial

portion 20d of the outer ring 20. The tip of the lip 42 in friction contact with the radial surface of the radial portion 20d has in cross-section a triangular shape in order to obtain an annular linear contact with the outer ring 20.

5 With such a contact, when wear appears, there is less friction than with a rounded portion for the tip of the lip 42d. Besides, even if the pressing force of the lip 42d is low, the surface pressure of said lip on the outer ring 20 increases. Hence, even with a small interference between said lip and the ring 20, intrusion of foreign matter can be
10 effectively prevented.

 Otherwise, since the sealing ring 40 is mounted on the rotating inner ring 18, the centrifugal effect tends to move radially outwards the friction sealing lip 42d and to keep the contact between said lip and the radial surface of the radial portion 20d of the outer ring 20.
15 With the rotation of the inner ring 18 around the axis 12a, the lip 42d is thus pressed against the radial portion 20d of the outer ring 20. Otherwise, the inward orientation of the lip 42d is advantageous since the contact pressure between said lip and the radial portion 20d increases with any splashes of water or other pollutant. The
20 effectiveness of the lip 42d is thus increased.

 The lip 42d also acts as an elastic spring having a first end in axial contact with the radial portion 20d of the outer ring and an opposite second end bearing against the collar 42b and the axial portion 18d of the inner ring. The elastic sealing lip 42d exerts an
25 axial force on the inner ring 18 mounted into contact with the diaphragm 28. By return, the diaphragm 28 exerts an axial force on the inner ring 18 supporting the sealing ring 40. The axial contact between the sealing lip 42d and the radial portion 20d of the outer ring is maintained. The intrusion of foreign matter between the sealing ring
30 40 and the outer ring 20 is prevented. In this embodiment, the axial contact between the friction lip 42d and the radial portion 20d is the only contact of said seal with the outer ring 20. The lip 42d only acts in axial direction on the outer ring 20. The sealing ring 40 remains at a distance from the operating element 14. There is no contact between

said operating element and the sealing ring. The sealing ring 40 is distinct from the operating element 14.

5 In case of an axial displacement of the inner ring 18 relative to the outer ring 20, the lip 42d may be elastically compressed in axial direction between the axial portion 18d and the radial portion 20d, and than recovers its initial shape by elasticity. During the displacement of the inner ring 18 towards the radial portion 20d of the outer ring, the axial friction contact between the sealing lip 42d and said radial portion is maintained.

10 The operating element 14 is a part separate from the control fork and able to slide on the guide tube under the action of the said fork. The operating element 14 comprises a cylindrical sleeve 50 provided with a bore 50a in contact with the exterior surface of the guide tube, and a flange 52 extending from the sleeve 50. The bore 50a
15 comprises axial grooves 54 adapted to cooperate with corresponding ribs of the guide tube.

The flange 52 comprises a radial portion 56 provided with a radial bearing surface 56a in friction contact with the radial portion 20d of the outer ring 20 axially on the opposite side to the sealing ring 40. The radial portion 56 is extended, from a large-diameter edge, by an annular axial portion itself extended radially outwards by two opposite radial arms 58 each provided with a radial bearing surface 58a directed towards the rear of the device and adapted to cooperate with fingers of the control fork. The flange 52 also comprises two
20 axial fingers 60 extending from a large-diameter edge of the radial arms 58 axially on the opposite side to the rolling bearing 12, i.e. towards the rear. One of the fingers has a radial tongue 62 extending radially inwards at its axial end. The fingers 60 and the tongue 62 are adapted to provide an axial and angular connection between the
25 operating element 14 and the control fork. The flange 52 may be made from metal and the sleeve 50 advantageously made from plastic material by overmoulding on said flange. There is a radial clearance 64 between the exterior surface of the sleeve 50 of the operating
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element 14 and the inside diameter of the radial portion 20d of the outer ring 20.

As indicated previously, the member 16 provides axial retention of the rolling bearing 12 against the operating element 14 and more specifically axially secures the non-rotating outer ring 20 to the bearing surface 56a. The member 16 also allows the rolling bearing 12 a radial movement with respect to the operating element 14 and thus allows the said bearing to self-align or self-centre with respect to the diaphragm 28. The radial clearance 64 is foreseen to this end. The radial movement of the rolling bearing 12 with respect to the operating element 14 is performed with friction between the radial portion 20d of the non-rotating ring 20 and the radial portion 56 of the flange 52 of the operating element. The contact between the radial portion 20d and the radial portion 56 is the only contact of the clutch release bearing 12 with the operating element 14.

The member 16 comprises an annular portion 66 that presses axially against the radial portion 56 of the flange 42 of the operating element 14 on the side opposite to the rolling bearing 12. The annular portion 66 is formed from elastic corrugations evenly distributed around its circumference. The annular portion 66 forms an elastic crinkle washer with corrugations. The annular portion 66 is extended by axial tabs 68 that extend axially towards the rolling bearing 12, i.e. forwards. The axial tabs 68 are in this case four in number. Each tab 68 is linked to the large-diameter edge of the annular portion 66 via a curved portion 70 (Figure 4) and extends axially towards the rolling bearing 12, passing through hole 72 provided in the radial portion 56 of the flange 52 of the operating element 14. Collaboration between the tabs 68 and the holes 72 also provides the angular connection between the operating element 14 and the member 16. Each axial tab 68 radially surrounds the outer ring 20 of the rolling bearing 12 while being situated some distance therefrom. Each tab 68 is provided, at its end, with a hook 74 that extends radially inwards and presses against the frontal surface of the axial portion 20b of the outer ring 20. By virtue of the elasticity of the annular portion 66 and of the

collaboration between the hooks 74 and the non-rotating ring 20, the said ring is kept pressed elastically against the radial portion 56 of the flange 52 of the operating element.

5 The embodiment shown on Figure 6, in which identical parts are given identical references, only differs from the first embodiment in that the stiffening cup 44 enables the axial retaining of the sealing ring 40 relative to the inner ring 18. In this embodiment, the axial portion 44a of the stiffening cup does not comprise the holes 46 and the body 42 is deprived of ribs 42c. The outer surface of the axial
10 portion 44a is not covered by some material of the body 42.

In order to attach the sealing ring 40 to the inner ring 18, the axial portion 44a of the stiffening cup 44 is radially deformed outwards in order to be press-fitted into the bore of the toroidal portion 18a of the inner ring. The deformation can be carried out by
15 crimping. Figure 7 shows the clutch release bearing 12 before the crimping operation.

In the previous disclosed embodiments, the sealing ring 40 is provided with a body 42 made of flexible material and with a stiffening cup 44 made of rigid material. Alternatively, it could also
20 be possible to use a sealing ring only comprising a body made of flexible material. For instance, the body could be overmoulded on the radial end surface of the axial portion 18d of the inner ring and could comprise an annular radial collar covering said end surface from which is issued a sealing lip similar to the friction lip 42d previously
25 described. Alternatively, the sealing ring could be fixed onto the inner ring 18 by any appropriate means, for example by gluing.

The embodiment shown on Figures 8 to 10, in which identical parts are given identical references, differs from the previous
embodiments in that a sealing ring 80 is mounted on the inner ring 18
30 in order to be rotationally connected with the inner ring while being freely moveable in axial direction relative to said ring.

The sealing ring 80 comprises a stiffening cup 82 made of rigid material, for example metal or plastic material, and a body 84 made of a flexible material such as nitrile or elastomer. The stiffening cup 82

comprises an annular axial portion 82a mounted into contact with the bore of the axial portion 18d of the inner ring. The axial end of said axial portion 82a is extended radially outwards by an annular radial portion 82b. The radial portion 82b is axially disposed between the axial portion 18d and the radial portion 20d of the rings and extends radially towards the retaining cage 24. The free end of the radial portion 82b remains at a distance from said cage.

The cup 82 also comprises axial deformations 82c formed on the outer surface of the axial portion 82a from its axial end opposite to the radial portion 82b. Said deformations extend radially inwards and are delimited axially by a frustoconical portion 82d extending obliquely outwards and connected to the axial portion 82a. In the embodiment, the deformations 82c are four in number and spaced in a uniform manner in the circumferential direction. Each of the deformations 82c is adapted to cooperate with a corresponding protrusion 18e provided in the bore of the axial portion 18d of the inner ring. The protrusions 18e are produced at the axial end of said axial portion 18d so that material is upset radially inwards. This operation can be performed easily by axial punching using a toothed tool. Retaining means adapted to cooperate with the deformations 82c are thus formed in order to angularly retain the sealing ring 80 relative to the inner ring 18. The sealing ring 80 is rotatably connected to the inner ring. Otherwise, by cooperation with the frustoconical portion 82d of the cup, the protrusion 18e also form retaining means to axially retain the sealing ring 80 relative to the inner ring 18 when said ring moves axially away from the radial portion 20d of the outer ring.

The body 84 of the sealing ring 80 comprises an annular radial portion 84a overmoulded onto the radial portion 82b of the cup 82. The radial portion 84a remains at a distance from the rings 18, 20 and from the cage 24. From said radial portion 84a there issue first and second annular sealing lips 84b, 84c. The first sealing lip 84b extends from a large-diameter edge of the radial portion 84a. The lip 84b extends obliquely inwards and downwards from said radial portion 84 and comes into permanent friction contact with the radial surface of

the radial portion 20d of the outer ring 20. The contact between the radial portion 20d and the lip 84b is axial. The lip 84b extends radially inwards and axially in the direction of the radial portion 20d and bears axially against this portion.

5 The second sealing lip 84c is situated axially on the opposite side to the first lip 84b with regard to the radial portion 82d of the cup. The lip 84c extends from a small-diameter edge of the radial portion 84a and extends obliquely outwards and upwards from said radial portion 84. The lip 84c comes into permanent friction contact
10 with the radial end surface of the axial portion 18d of the inner ring 18. The contact between the axial portion 18d and the lip 84c is axial. The lip 84c extends radially outwards and axially in the direction of the inner ring 18 and bears against said ring.

15 The lips 84b, 84c are axially disposed into the axial gap existing between the radial end surface of the axial portion 18d of the inner ring and the radial portion 20d of the outer ring. The lips 84b, 84c are adapted to block any ingress of foreign matter between said portions. The lips 84b, 84c are in axial friction contact with the corresponding rings. The lips remain at a distance from the cage 24.

20 In the illustrated embodiment, the thickness of the lips 84b, 84c is constant. Alternatively, the thickness may reduce from the radial portion 84a towards the tips which axially bear against the corresponding rings. The tip of each lip 84b, 84c has in cross-section a triangular shape in order to obtain an annular linear contact with the
25 corresponding ring.

Advantageously, one of the friction lips 84b, 84c is more flexible than the other. Thus, the axial equilibrium position of the radial portion 82b of the cup between the axial portion 18d of the inner ring and the radial portion 20d of the outer ring may be reached
30 during the rotation of said inner ring. To this end, one of the lips 84c, 84d may be designed with a thickness which is reduced in comparison to the one of the other lip. Alternatively, one of said lips may be made from a flexible synthetic material more flexible than the material used for the other lip.

In the disclosed embodiments, the sealing rings are each provided with one friction sealing lip axially bearing on the outer ring. Alternatively, it may also be possible to foresee sealing rings having a different number of friction lips, for example two lips or more.

5 For instance, the embodiment shown on Figure 11, in which identical parts are given identical references, differs from the previous embodiment in that the body 84 comprises two sealing lips 84d, 84e in axial friction contact with the radial portion 20d of the outer ring 20. The lip 84e extends from a large-diameter edge of the radial portion 84a. The lip 84e extends obliquely outwards and upwards from said
10 radial portion and comes into permanent friction contact with the radial surface of the radial portion 20d of the outer ring. The contact between the lip 84e and the outer ring is axial. The lip 84d extends from a small-diameter edge of the radial portion 84a and extends
15 axially in the direction of the outer ring 20 and bears axially against said ring. The tip of each lip 84d, 84e has in cross-section a triangular shape. The two lips 84d, 84e have in cross-section the overall shape of a V oriented axially towards the radial portion 20d of the outer ring.

 It should be noted that the embodiments illustrated and
20 described were given merely by way of a non-limiting indicative examples and that modifications and variations are possible within the scope of the invention. Thus, the invention applies not only to an angular contact ball bearing with a single row of balls but also to other types of rolling bearing, for example bearings having four points
25 contacts and/or with double rows of balls, or with at least three rows of balls. It is easily understood that it could also be possible to use bearing with other types of rolling members such as rollers.

 In the disclosed embodiments, the inner ring is the rotating ring supporting the sealing ring which axially bears against the outer
30 ring. Alternatively, it may also be possible to foresee a sealing ring mounting on a rotating outer ring and axially bearing against a portion of the inner ring. In this case, the outer ring is adapted to come into contact with the diaphragm.

The disclosed bearings are particularly useful as bearing for clutch release bearing devices. However, the bearings can be applied equally well to others applications, for example for a pump or a pulley.

CLAIMS

1. Clutch release bearing comprising an inner ring (18), an outer ring (20) and at least one row of rolling elements (22) positioned between raceways provided on the rings, one of said rings being rotatable relative to the other and able to come into contact with a clutch mechanism diaphragm, characterized in that it comprises a sealing ring (40 ; 80) mounted on the rotating ring in order to be rotationally connected to said ring, said sealing ring comprising at least one friction lip (42d ; 84b ; 84d) axially bearing against the other ring.
2. Bearing according to claim 1, wherein the friction lip extends obliquely inwards.
3. Bearing according to claims 1 or 2, wherein the friction lip is elastic at least in the axial direction.
4. Bearing according to any of the preceding claims, wherein the friction lip bears against a radial portion (20d) of the corresponding ring.
5. Bearing according to claim 4, wherein the friction lip is axially disposed between an end portion (18d) of the rotating ring and the radial portion (20d) situated axially facing said end portion.
6. Bearing according to any of the preceding claims, wherein the sealing ring (40 ; 80) comprises a body (42 ; 84) made of flexible material and a stiffening cup (44 ; 82) made of rigid material.
7. Bearing according to claim 6, wherein the stiffening cup (44 ; 82) comprises an axial portion (44a ; 82a) for the mounting of the sealing ring on the rotating ring.
8. Bearing according to claim 7, wherein the axial portion (44a ; 82a) is disposed into the bore of the rotating ring.
9. Bearing according to any of the preceding claims, wherein the sealing ring (40 ; 80) comprises retaining means (42c; 44a; 82d) adapted to cooperate with the rotating ring to axially retain the sealing ring relative to said rotating ring.

10. Bearing according to claim 9, wherein the retaining means cooperate with the rotating ring by diametral interference.

5 11. Bearing according to any of the preceding claims, wherein the sealing ring (80) is freely movable in axial direction between the rings.

12. Bearing according to claim 11, wherein the sealing ring further comprises an additional friction lip (84c) axially bearing against the rotating ring.

10 13. Bearing according to claim 12, wherein one of the friction lips (84c, 84d) is more flexible than the other.

14. Bearing according to any of the preceding claims, further comprising a sealing member (26) disposed radially between the inner and outer rings and positioned axially on the opposite side to the sealing ring (40) with regard to the rolling elements (22).

15 15. Clutch release bearing device comprising a clutch release bearing (12) according to any of the preceding claims and an operating element (14) comprising a flange against which a ring of the bearing presses.

20 16. Rolling bearing comprising an inner ring (18), an outer ring (20) and at least one row of rolling elements (22) positioned between raceways provided on the rings, at least one of said rings being rotatable relative to the other, characterized in that it comprises a sealing ring (40 ; 80) mounted on the rotating ring in order to be rotationally connected to said ring, said sealing ring comprising at
25 least one friction lip (42 ; 84b ; 84d) axially bearing against the other ring and axially disposed between an end portion (18a) of the rotating ring and a radial portion (20d) of the other ring situated axially facing said end portion.

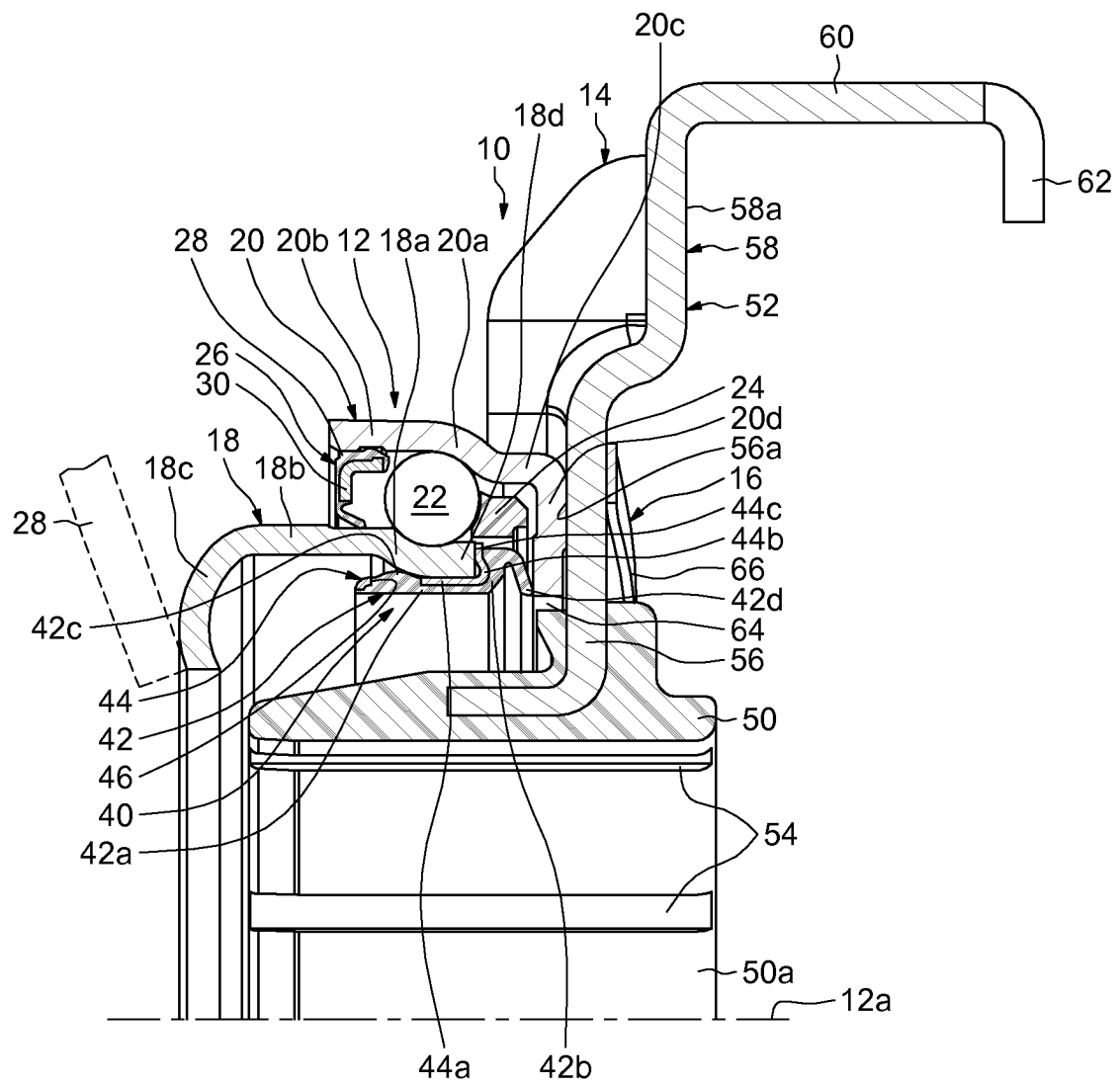
1/7
FIG. 1

FIG.3

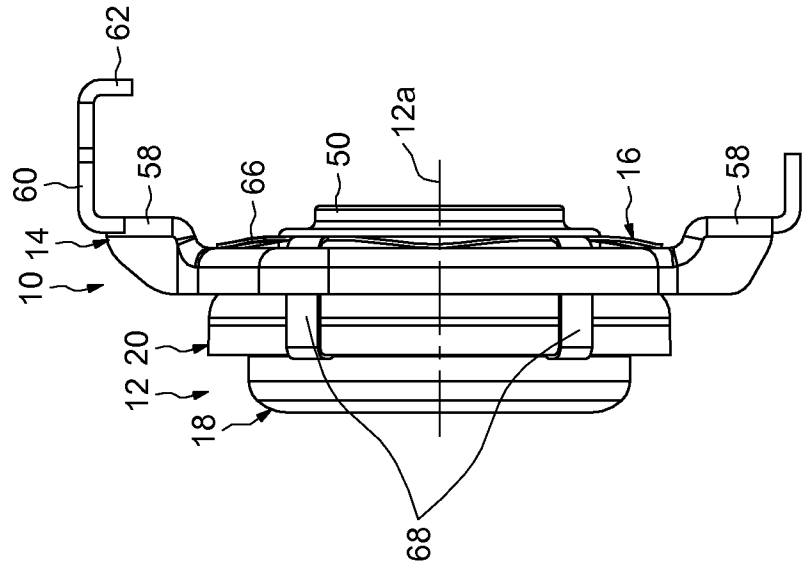
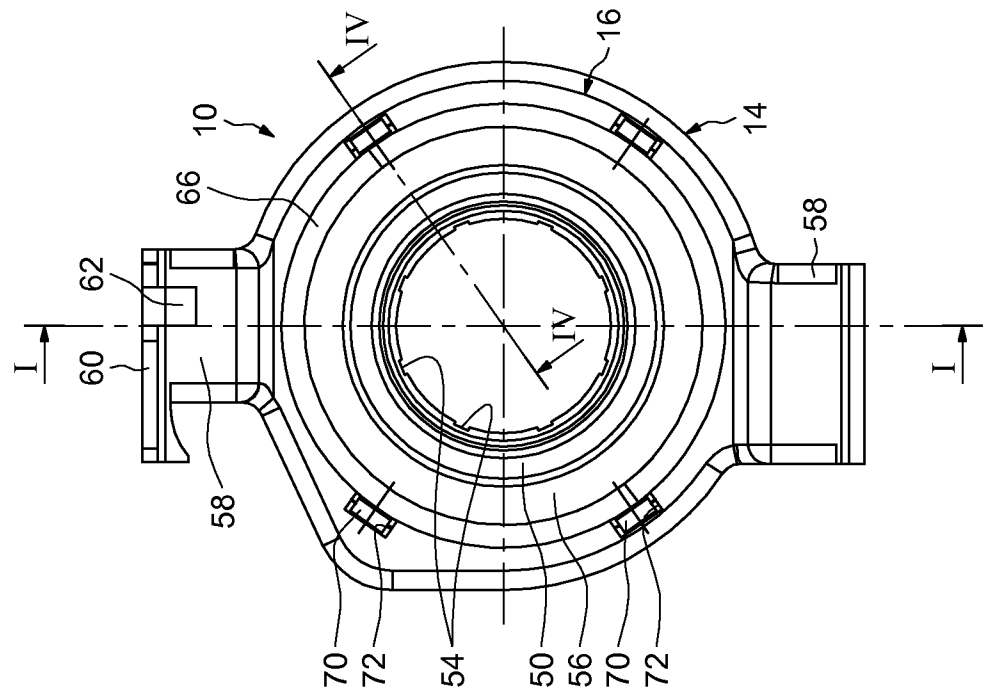


FIG.2



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FIG.4

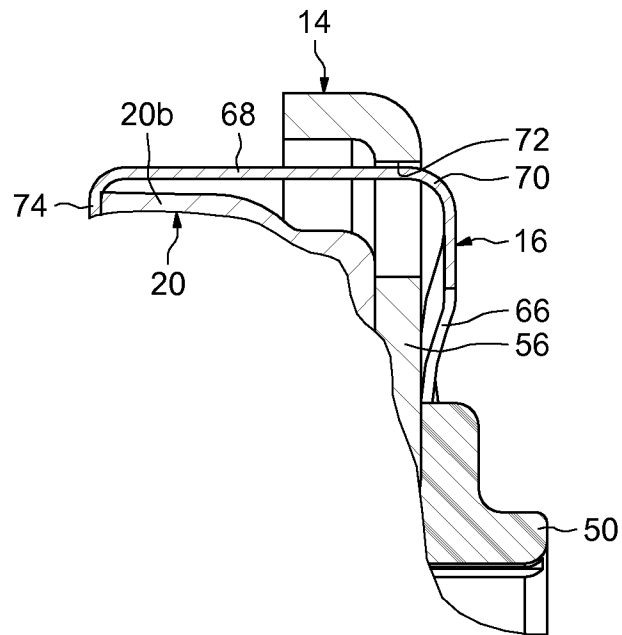


FIG.5

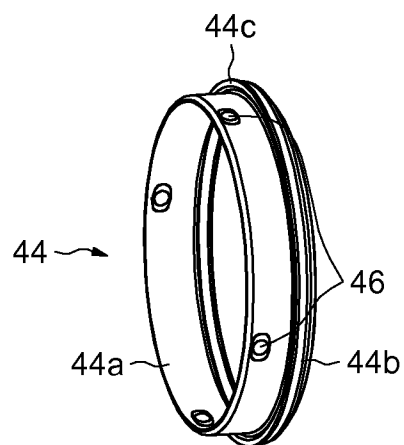
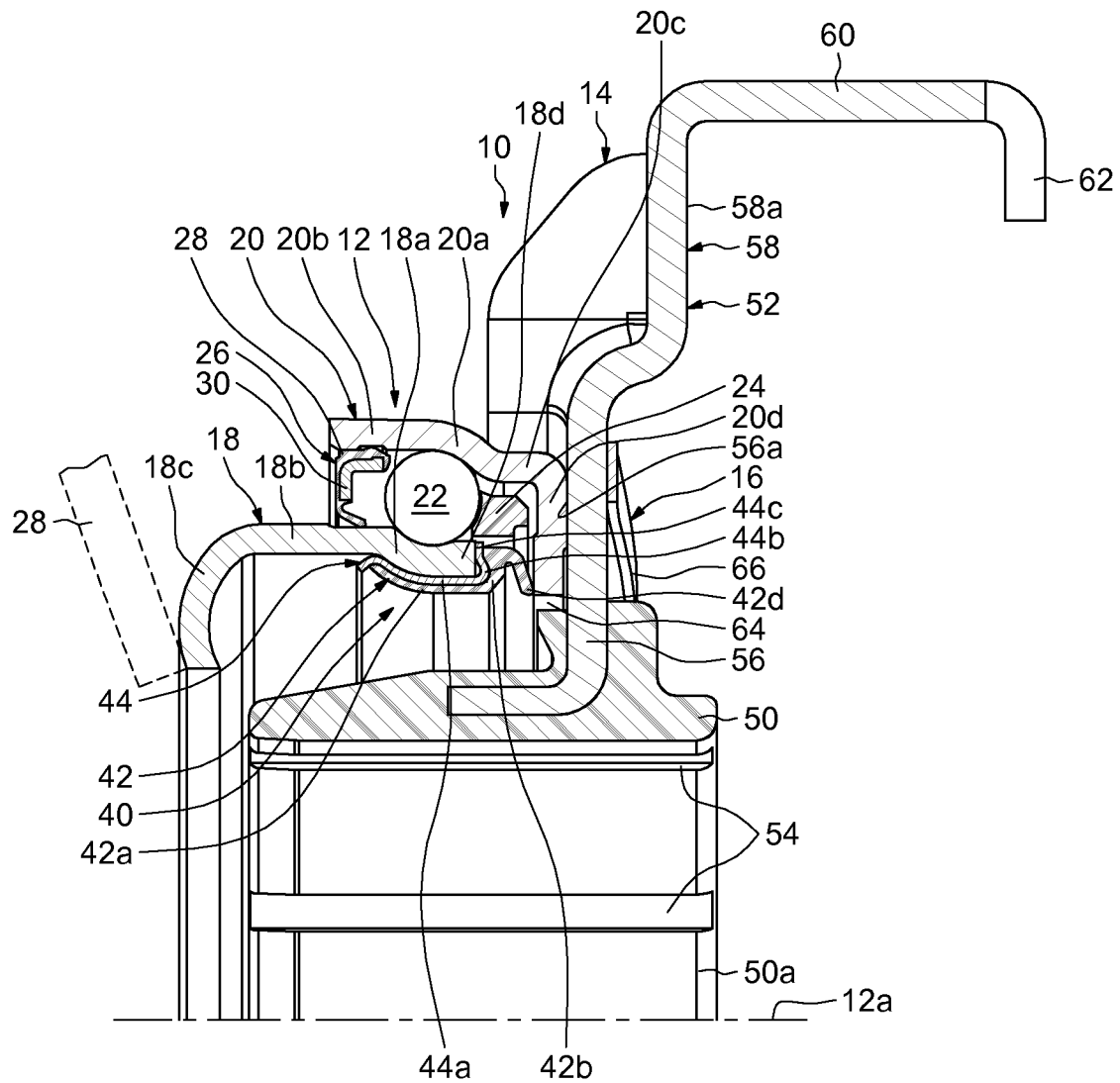
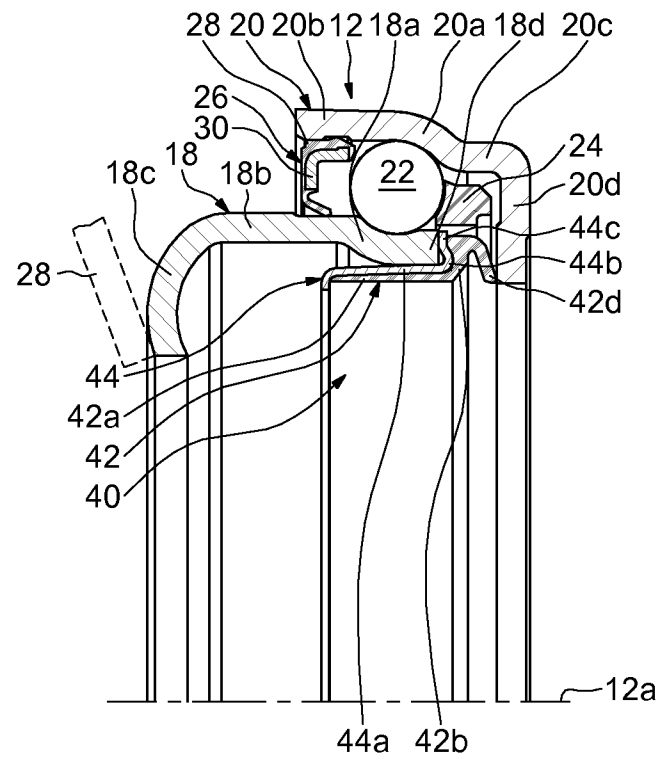


FIG.6



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FIG.7



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FIG.8

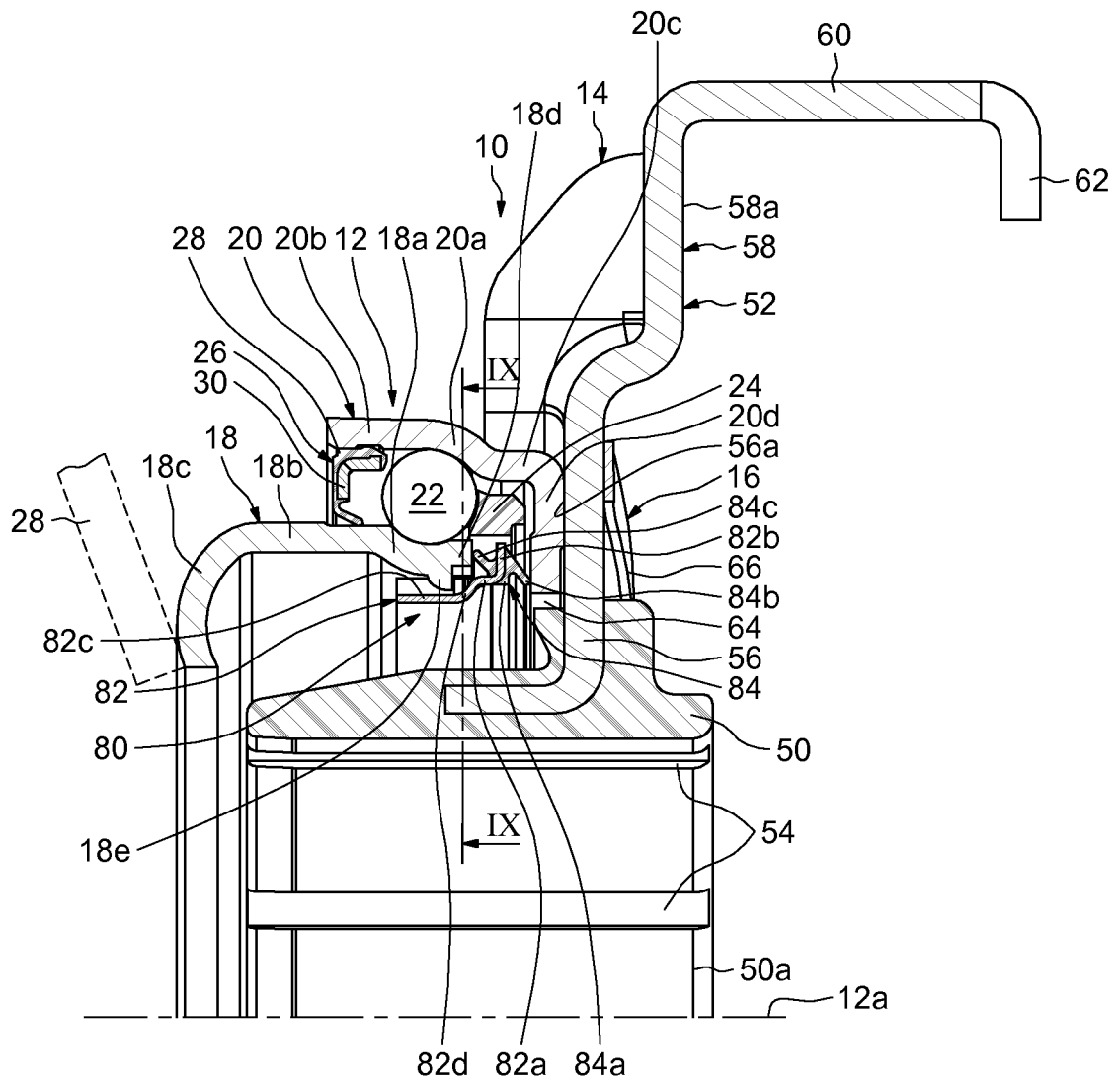


FIG.9

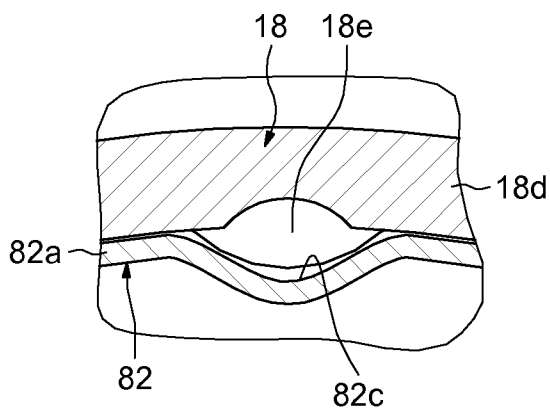


FIG.10

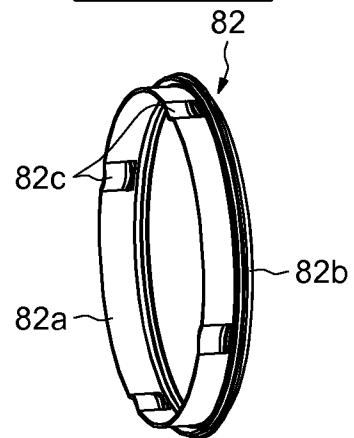
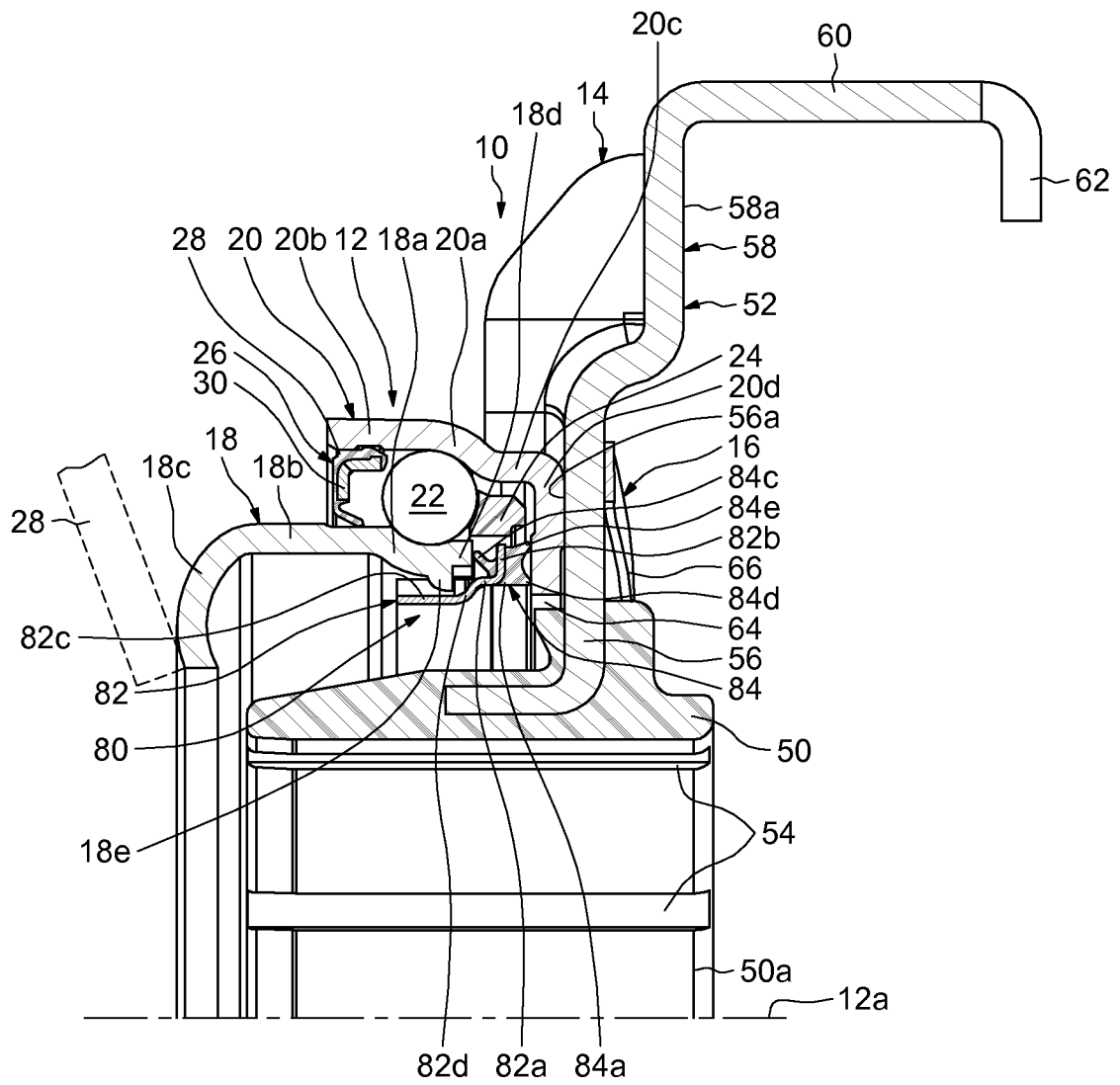


FIG.11

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2010/061068

A. CLASSIFICATION OF SUBJECT MATTER

INV. F16D23/14

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

F16D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 10 2008 006656 A1 (SCHAEFFLER KG [DE]) 6 August 2009 (2009-08-06) figures 8,10 -----	1-10, 14-16
X	DE 10 2008 039489 A1 (SCHAEFFLER KG [DE]) 25 February 2010 (2010-02-25) figures 1,2 -----	1-10, 14-16
X	FR 2 675 877 A1 (SKF FRANCE [FR]) 30 October 1992 (1992-10-30) figures 1-3 -----	1-7,9, 10,14-16
A	DE 10 2005 053612 A1 (SCHAEFFLER KG [DE]) 16 May 2007 (2007-05-16) figure 4 -----	12,13
A	US 3 606 351 A (HALLERBACK STIG LENNART) 20 September 1971 (1971-09-20) figures 1-4 -----	11

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Further documents are listed in the continuation of Box C.

☒

See patent family annex.

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Date of the actual completion of the international search

16 March 2011

Date of mailing of the international search report

24/03/2011

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Pecquet, Gabriel

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2010/061068

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