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(54) Title: CLUTCH RELEASE BEARING ASSEMBLY

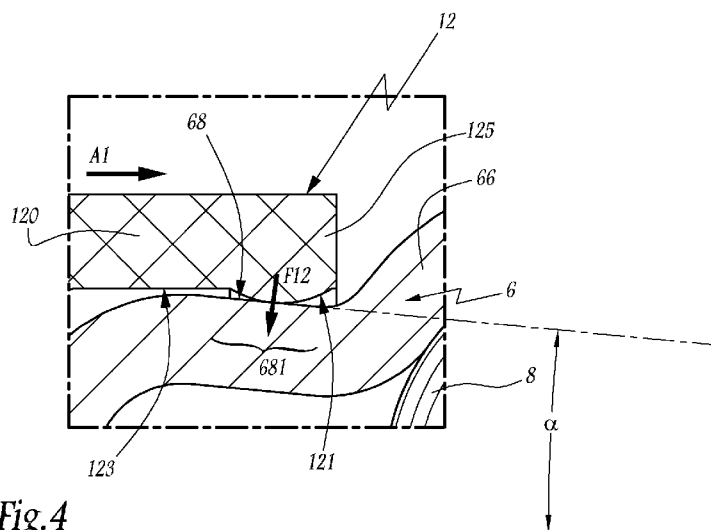


Fig. 4

(57) Abstract: This clutch release bearing assembly (A) comprises a bearing (3) including a fixed ring (4), a rotating ring (6), and rolling elements (8) arranged between the fixed ring (4) and the rotating ring (6), an axial clutch element (2) with which the fixed ring (4) is fast, and a wear plate (12) fast with the rotating ring (6) and adapted to make a contact with a clutch diaphragm spring (S). The rotating ring (6) comprises retainer elements (70) cooperating with a surface of the wear plate (12) to immobilize the wear plate (12) in translation and in rotation with respect to the rotating ring (6) by an elastic force (F12) exerted by the wear plate (12) on the rotating ring (6).



CLUTCH RELEASE BEARING ASSEMBLY**TECHNICAL FIELD OF THE INVENTION**

The invention concerns a clutch release bearing assembly.

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BACKGROUND OF THE INVENTION

Vehicles such as automotive vehicles are generally equipped with a clutch to transmit mechanical power to the wheels. This clutch is generally equipped with a clutch release bearing assembly in order to adjust misalignments between two portions of the clutch. Such a clutch bearing assembly generally comprises a wear plate fast with the rotating ring of the assembly and adapted to make a contact with a clutch diaphragm spring fast with the portion of the clutch to be driven so as to transmit mechanical power.

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It is known to fasten the wear plate on the rotating ring thanks to an external retention element, such as a metallic flange. This technique does not permit a simple and fast mounting of the wear plate, and needs specific production and machining operations on the parts of the assembly. Moreover, this technique does not insure that the wear plate does not rotate with respect to the rotating ring. Rotation of the wear plate can provoke wear at the interface between the wear plate and the rotating ring.

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SUMMARY OF THE INVENTION

The aim of the invention is to provide a new clutch release bearing assembly, allowing to mount the wear plate on the rotating ring, so that it is fast in translation and in rotation with the rotation ring, and in a more simple way than in the prior art.

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To this end, the invention concerns a clutch release bearing assembly comprising:

- a fixed ring, a rotating ring, and rolling elements arranged between the fixed ring and the rotating ring,
- an axial clutch element with which the fixed ring is fast,
- a wear plate fast with the rotating ring and adapted to make a contact with a clutch diaphragm spring.

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This clutch release bearing assembly is characterized in that the rotating ring comprises retainer elements cooperating with a surface of the wear plate to immobilize the wear plate in translation and in rotation with respect to the rotating ring by an elastic force exerted by the wear plate on the rotating ring.

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Thanks to the invention, the wear plate is directly fast with the rotating ring, without any third mechanical part. This makes the mounting of the wear easier and faster. Besides, this permits a tight mounting, by cooperation of surfaces between the wear plate

and the rotating ring, and to prevent wear at the interface between the wear plate and the rotating ring.

According to further aspects of the invention which are advantageous but not compulsory, such a clutch release bearing assembly may incorporate one or several of the following features:

- The wear plate is removably mounted on the rotating ring.
- The wear plate is made of a thermoplastic material.

The outer peripheral surface of the rotating ring comprises bosses distributed around the circumference of said surface and adapted to cooperate with a circumferential bulge realized on an inner peripheral surface of the wear plate on its end opposed to the clutch diaphragm spring.

The outer peripheral surface of the rotating ring comprises a boss running on the whole circumference of said surface.

An outer peripheral surface of the rotating ring comprises a concave-shaped zone adapted to cooperate with a circumferential bulge realized on an inner peripheral surface of the wear plate on its end opposed to the clutch diaphragm spring.

The rotating ring comprises a portion extending radially towards a center axis of the rotating ring, whereas an edge of the radial portion facing said center axis comprises retaining slots distributed around the circumference of said edge and adapted to cooperate with corresponding fingers extending radially and outwardly from an axial cylindrical portion of the wear plate.

- The retaining slots are made by punching.
- The rotating ring is the outer ring of the bearing.
- The rotating ring is the inner ring of the bearing.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be explained in correspondence with the annexed figures, as an illustrative example. In the annexed figures:

- figure 1 is a perspective view of a bearing belonging to a clutch release bearing assembly according to a first embodiment of the invention;
- figure 2 is a sectional view, along plane II on figure 1;
- figure 3 is a view, at a larger scale, of detail III on figure 2;
- figure 4 is a view similar to figure 3, of a clutch release bearing assembly according to a second embodiment of the invention;
- figure 5 is a sectional view similar to figure 2, of a clutch release bearing assembly according to a third embodiment of the invention.

DETAILED DESCRIPTION OF SOME EMBODIMENTS

The clutch release bearing assembly A represented on figures 2 to 5 comprises an axial clutch element 2 which has a substantially revolutionary form centered along an axis X-X'. Assembly A comprises a rolling bearing 3, which includes an inner ring 4 fast with clutch element 2. Bearing 3 also comprises an outer ring 6 and balls 8 arranged between inner ring 4 and outer ring 6. Inner ring 4 defines a center axis X4 and outer ring 6 defines a center axis X6. In the configuration of figure 1, inner ring 4 is fixed and outer ring 6 is the rotating ring of assembly A. Balls 8 are arranged in housings defined by a bearing cage 10.

Assembly A also comprises a wear plate 12 fast with outer ring 6 and adapted to make a contact with a clutch diaphragm spring S belonging to a portion of a clutch of a vehicle on which the assembly is mounted. Clutch diaphragm spring S belongs to the side of the clutch connected to the portion of the drive line of the vehicle to which mechanical power is to be delivered. The other side of the clutch is formed by axial clutch element 2 which is rotationally driven by a non-shown engine of the vehicle. When mechanical power is to be transmitted between the two portions of the clutch, that-is-to-say between axial clutch element 2 and diaphragm spring S, an axial effort along axis X4 of clutch element 2 is exerted so as to make a contact between wear plate 12 and spring S.

Wear plate 12 is preferably made of a thermoplastic material.

Wear plate 12 must be fast to outer ring 6 in rotation and in translation, so as to prevent wear at the interface between wear plate 12 and outer ring 6. Outer ring 6 comprises therefore retainer elements 621 extending radially from an exterior surface 62 substantially midway between an inwardly extending radial portion 64 of outer ring 6 and a curved portion 66 of outer ring 6. Retainer elements 621 are formed by bosses which protrude from surface 62 along a limited portion of the circumference of exterior surface 62.

Bosses 621 cooperate with a circumferential bulge 121 realized on an inner peripheral surface 123 of wear plate 12 on the end 125 of an axial portion 120 of wear plate 12 extending parallelly to a center axis X12 of wear plate 12. End 125 is opposed to a bottom portion 126 of wear plate 12, adapted to lay against radial portion 64 on a first side, and to make a contact with clutch diaphragm spring S on the other side.

Alternatively, bulge 121 can be realized on limited angular sectors of inner peripheral surface 123.

The invention allows wear plate 12 to be mounted directly on outer ring 6 in a relatively fast and easy operation. The cooperation between bulge 121 and bosses 621

implies that wear plate 12 is mounted by clipping on outer ring 6. In other words, wear plate 12 is mounted on outer ring 6 by a movement shown by arrow A1, parallel to axis X6. During this movement, axial portion 120 of wear plate 12 expands around bosses 621 until bulge 121 lays on the side of surface 62 close to curved portion 66. At the same time, as bottom 126 of wear plate 12 lays against radial portion 64 of outer ring 6, bulge 121 laying past bosses 621 induce a retaining elastic force F12 exerted by wear plate 12 on outer ring 6. This force is directed radially towards axis X6 and it immobilizes wear plate 12 in translation and in rotation with respect to outer ring 6.

As wear plate 12 is made of a thermoplastic material, it can be removed from outer ring 6 by moving bulges 121 away from outer ring 6 to overcome elastic force F12, by hand or with an specific tool.

According to a non-shown embodiment, outer ring 6 may comprise a boss 621 extending from peripheral surface 62 and running on the whole circumference of surface 62.

In the following embodiments, elements similar to the first embodiment have the same references and work in the same way.

A second embodiment of the invention is represented on figure 4. In this embodiment, outer ring 6 comprises a substantially frustoconical surface 68 extending between radial portion 64 and curved portion 66. On the sectional view of figure 4, surface 68 forms a non zero angle α with axis X6. Surface 68 defines, at its joint with portion 66, an area having an outer diameter inferior to the outer diameter of the joint between surface 68 and portion 64. This area forms a concave-shaped zone 681 in the sectional profile of outer ring 6 on figure 4.

In this embodiment, wear plate 12 is also mounted on outer ring 6 by clipping, bulge 121 cooperating with frustoconical surface 68. Wear plate 6 is fast in translation and in rotation with outer ring 6 by elastic retaining force F12 exerted by wear plate 12 on outer ring 6.

According to one embodiment, outer ring 6 may comprise conical shapes extending from surface 62 between radial portion 64 and curved portion 66 and distributed around the circumference of surface 62, so as to create a global frustoconical-shaped envelope similar to surface 68.

A third embodiment of the invention is represented on figure 5. In this embodiment, radial portion 64 comprises, at its edge 69 facing axis X12, retaining slots 70 which can be realized by punching. Retaining slots 70 define cavities in radial portion 64. These cavities open to a direction opposed to bottom 126 of wear plate 12.

In this embodiment, wear plate 12 comprises a radial extending cylindrical portion 127 which comprises radially extending fingers 129. Wear plate 12 is clipped on outer ring 6, and fingers 129 are inserted in retaining slots 70 so that wear plate 12 is fast in translation and in rotation with outer ring 6 by an elastic force F12 exerted by fingers 129 on outer ring 6, radially and outwardly from axis X12.

According to one embodiment, retaining slots 70 are distributed around the circumference of wear plate 12.

According to a non-shown embodiment, outer ring 6 may comprise a retaining slot 70 running on the whole circumference of wear plate 12.

According to a non-shown alternative embodiment of the invention, outer ring 6 can be fast with the axial clutch element 2, while inner ring 4 is the rotating ring. In this case, wear plate 12 is fast with inner ring 4, on which retainer elements are realized.

According to a non-shown embodiment of the invention, a swivelling movement can be allowed between inner ring 4 and outer ring 6.

The features described in the various embodiments can be combined in the scope of the present invention.

CLAIMS

1. A clutch release bearing assembly (A) comprising:

- a bearing (3) including a fixed ring (4), a rotating ring (6), and rolling elements (8) arranged between the fixed ring (4) and the rotating ring (6);
- an axial clutch element (2) with which the fixed ring (4) is fast;
- a wear plate (12) fast with the rotating ring (6) and adapted to make a contact with a clutch diaphragm spring (S),

wherein the rotating ring (6) comprises retainer elements (621; 68; 70) cooperating with a surface of the wear plate (12) to immobilize the wear plate (12) in translation and in rotation with respect to the rotating ring (6) by an elastic force (F12) exerted by the wear plate (12) on the rotating ring (6).

2. Clutch release bearing assembly according to claim 1, wherein the wear plate (12) is removably mounted on the rotating ring (6).

3. Clutch release bearing assembly according to one of the previous claims, wherein the wear plate (12) is made of a thermoplastic material.

4. Clutch release bearing assembly according to one of the previous claims, wherein the outer peripheral surface of the rotating ring (6) comprises bosses (621) distributed around the circumference of said surface and adapted to cooperate with a circumferential bulge (121) realized on an inner peripheral surface (123) of the wear plate (12) on its end (125) opposed to the clutch diaphragm spring (S).

5. Clutch release bearing assembly according to claim 4, wherein the outer peripheral surface (62) of the rotating ring (6) comprises a boss (621) running on the whole circumference of said surface.

6. Clutch release bearing assembly according to one of claims 1 to 3, wherein an outer peripheral surface (68) of the rotating ring (6) comprises a concave-shaped zone (681) adapted to cooperate with a circumferential bulge (121) realized on an inner peripheral surface (123) of the wear plate (12) on its end (125) opposed to the clutch diaphragm spring (S).

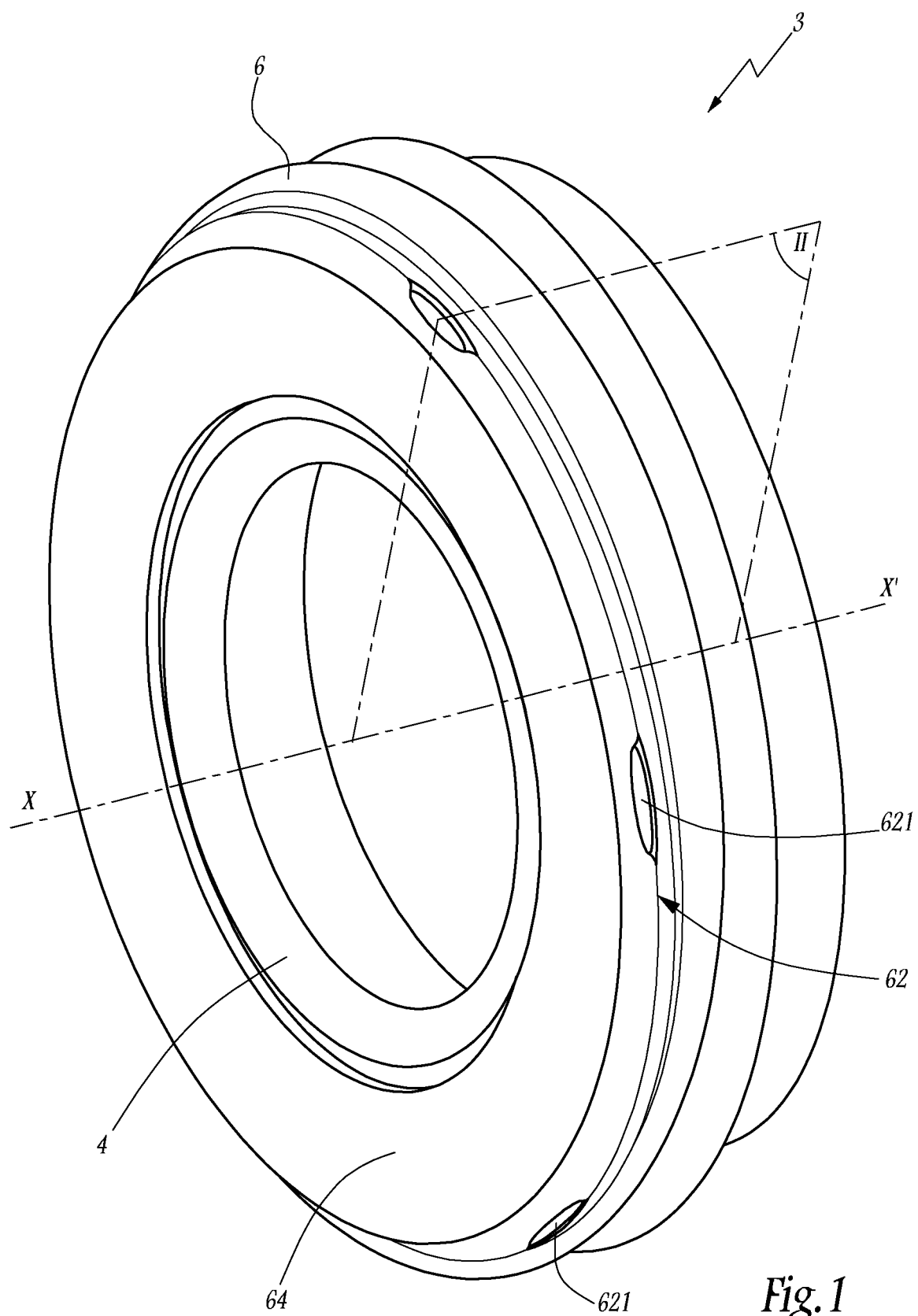
7. Clutch release bearing assembly according to one of claims 1 to 3, wherein the rotating ring (6) comprises a portion (64) extending radially towards a center axis (X6) of the rotating ring (6) and wherein an edge (69) of the radial portion (64) facing said center axis (X6) comprises retaining slots (70) distributed around the circumference of said edge (69) and adapted to cooperate with corresponding fingers (129) extending radially and outwardly from an axial cylindrical portion (127) of the wear plate (12).

8. Clutch release bearing assembly according to claim 7, wherein the retaining slots (70) are made by punching.

9. Clutch release bearing assembly according to one of the previous claims, wherein the rotating ring is the outer ring (6) of the bearing (3).

10. Clutch release bearing according to one of claims 1 to 8, wherein the rotating ring is the inner ring (4) of the bearing (3).

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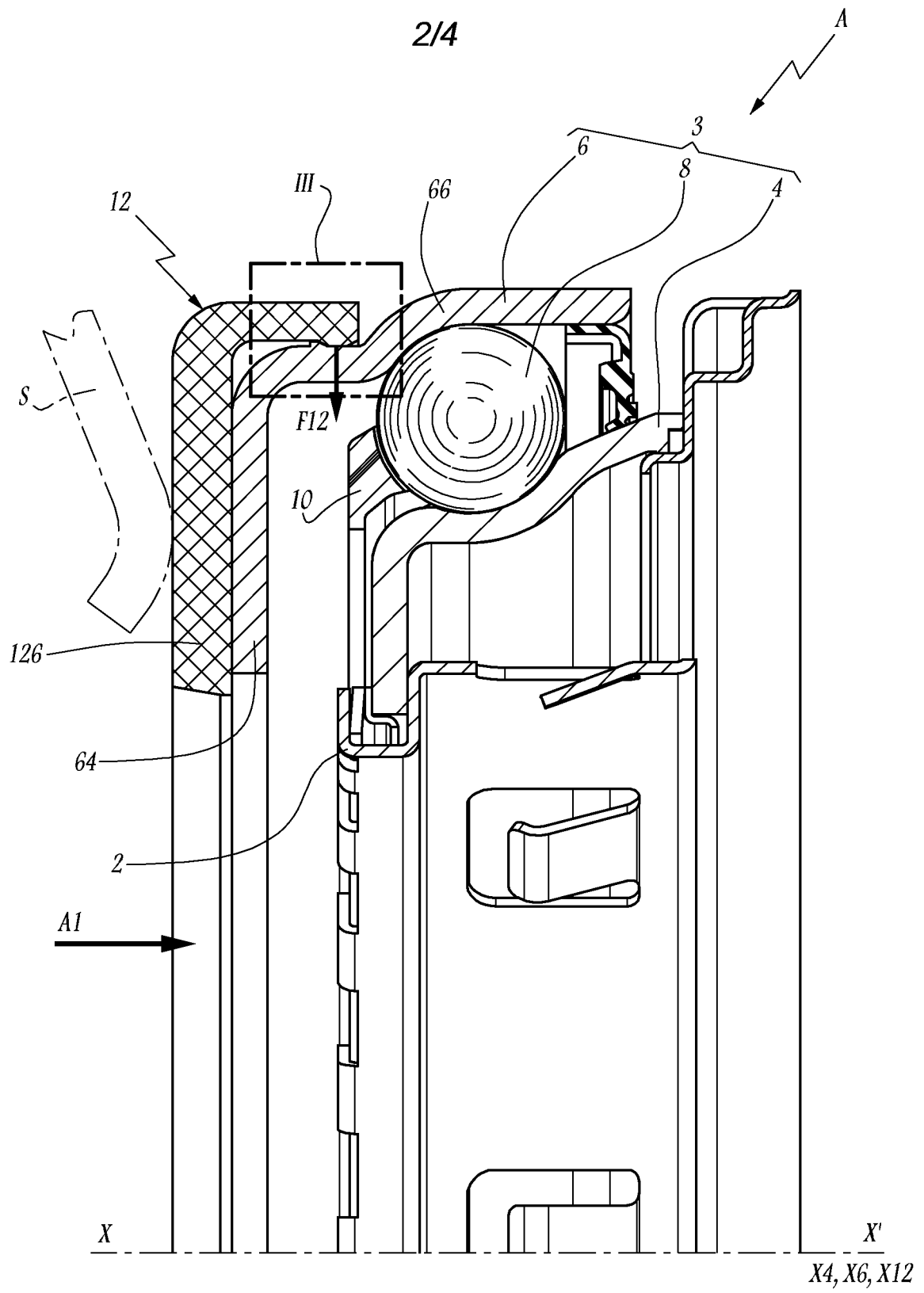
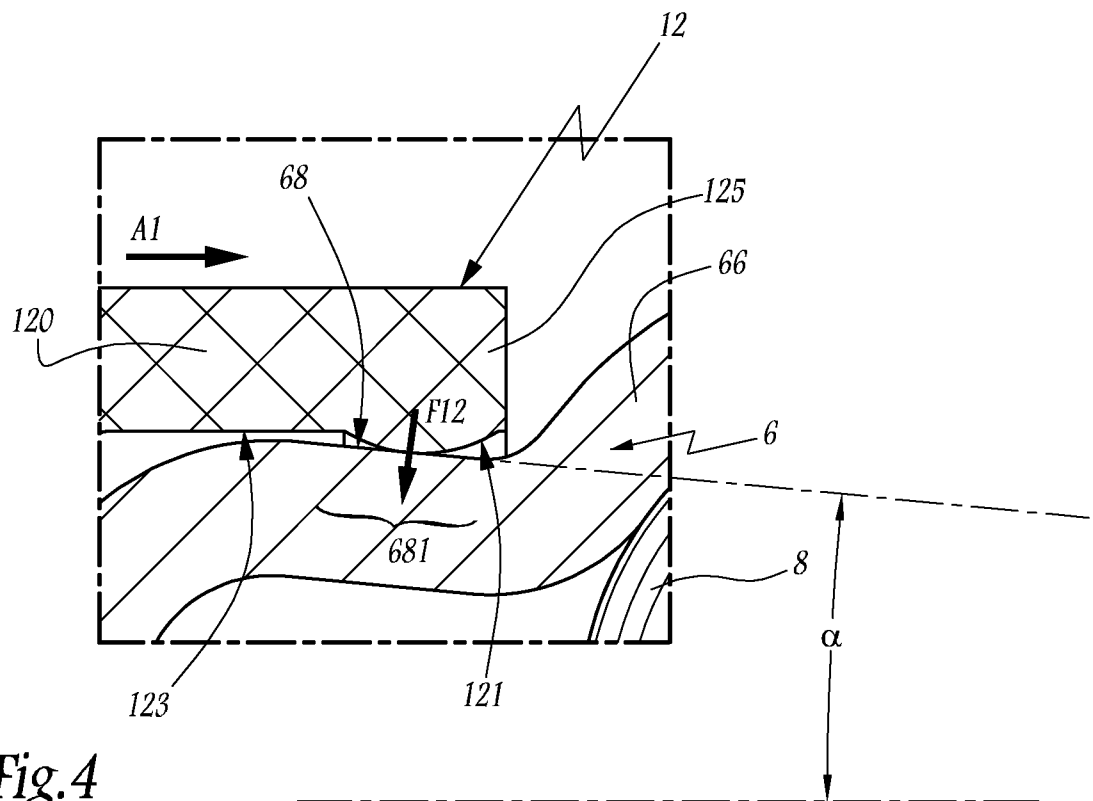
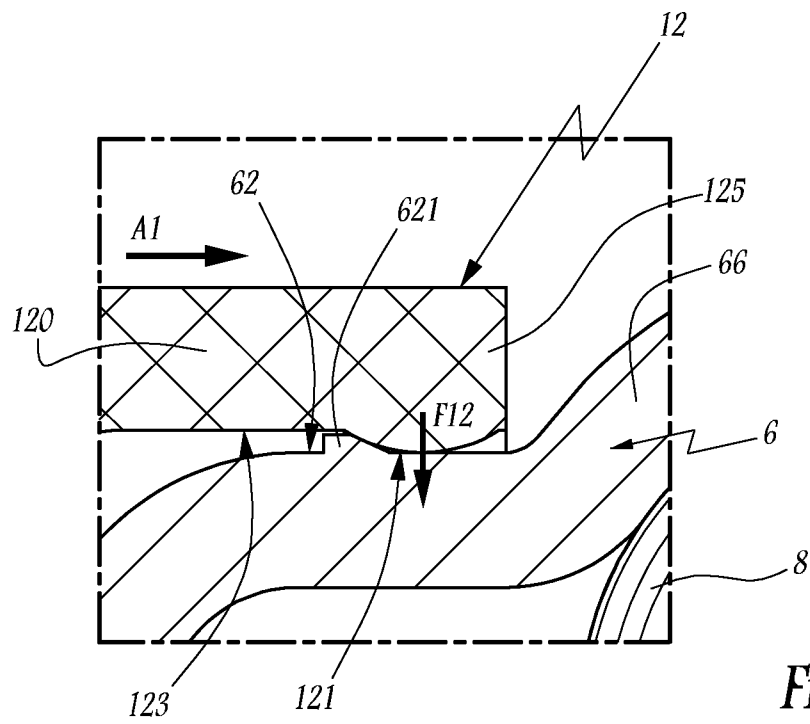


Fig.2

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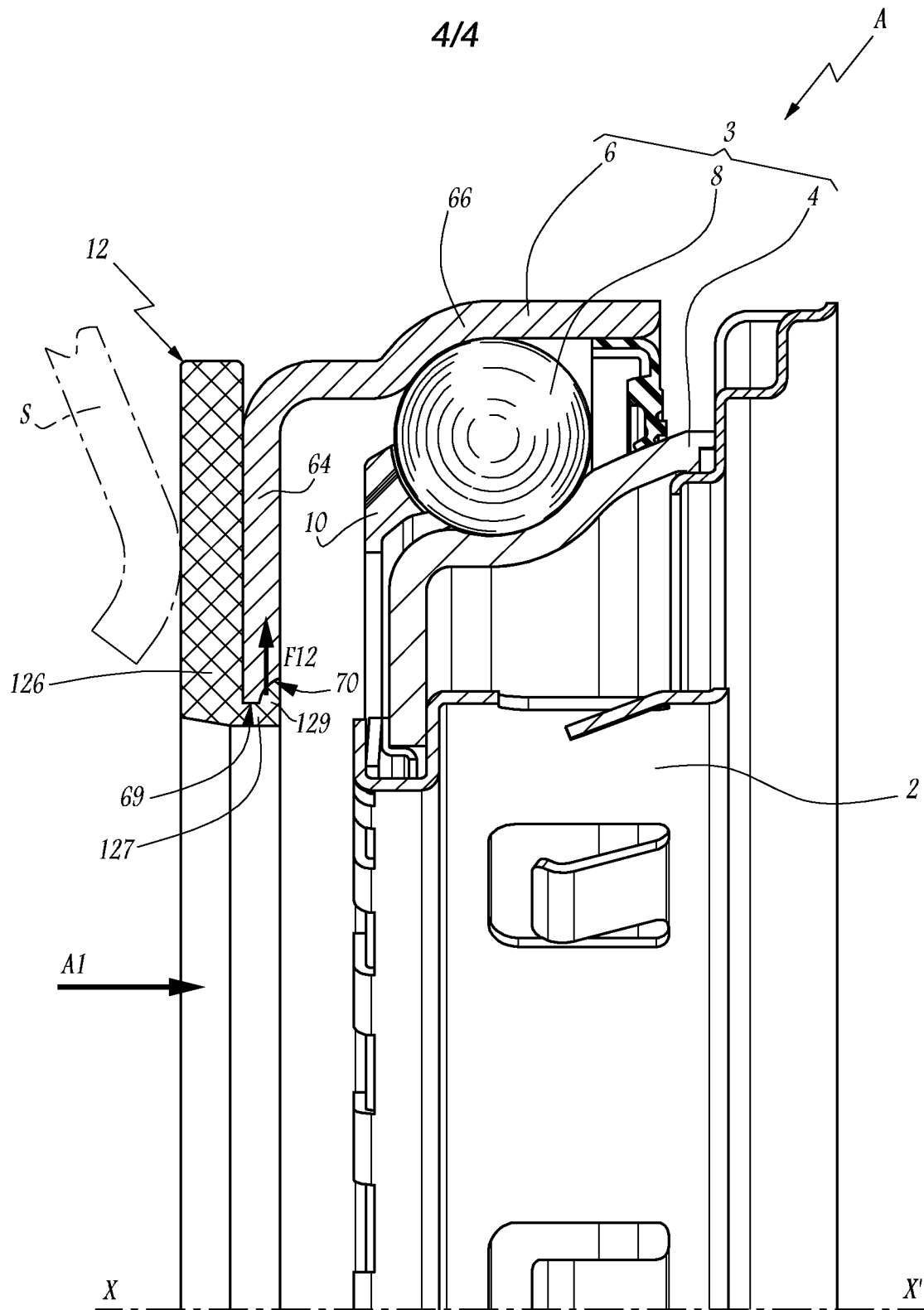


Fig.5

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2011/001446

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	DE 10 2006 053713 A1 (SCHAEFFLER KG [DE]) 21 May 2008 (2008-05-21) paragraph [0041]; figure 1 -----	1-4,7,10

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Further documents are listed in the continuation of Box C.

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See patent family annex.

* Special categories of cited documents :

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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