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(54) **A SWITCH WITH ADJUSTING WHEEL**

(57) The present invention relates to a rotary switch (10) comprising a body (2) having a housing (5) and a printed circuit board (1) positioned therein; an adjusting wheel (12) having limited circular movement on the body (2), a magnetic member (16) suitable for magnetic interaction with the printed circuit board (1) and a magnetic member shaft (8) having the magnetic member (16). The

magnetic member shaft (8) positioned inside the housing (5) comprises a shaft connection housing (9) and said adjusting wheel (12) is connected to the body (2) with the first lateral wall (29a) and to the shaft connection housing (9) with the second lateral wall (29b) for more sensitive rotation around a axis.

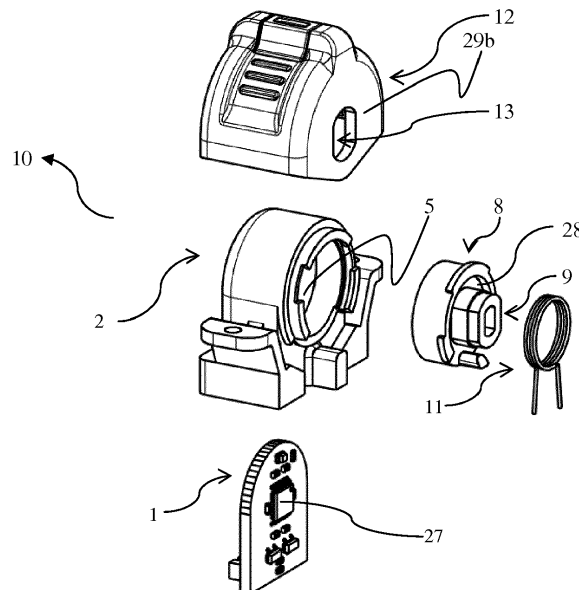


Fig. 1

EP 3 168 854 A1

Description

Technical Field of the Invention

[0001] The present invention relates to a switch suitable for multipurpose use and more particularly a sensitive rotary switch with reduced cost and facilitated production which can be controlled by finger.

State of the Art

[0002] Switches, which are suitable for multipurpose use and have a rotary adjusting wheel also referred to as finger joystick, are used as pieces providing precise control especially in the industry and motor vehicle industry. In this type of switches providing non-contact operation, the adjusting wheel touched by the user either rotates by being supported on the whole body or is supported to a shaft connected to a completely rotating magnetic member. The switches suitable to operate within an adjusted limited angle can be easily used by the user finger or hand with an adjusting wheel disposed thereon.

[0003] To be supported from a single body or shaft requires the use of more parts and complicates obtaining a more compact structure. Moreover, in this type of switches, the magnetic members should be hollow such that appropriate connection member will pass through the middle thereof. Hollow cylindrical magnetic members are more expensive and the production thereof is difficult and its magnetization is complicated.

[0004] Accordingly, a more compact and more cost-effective rotary switch structure is needed.

Objects of the Invention

[0005] The main object of the present invention is to provide a compact rotary switch structure in which fewer parts are used as well as more cost-effective magnetic members are used and which allows for precise control.

[0006] Another object of the present invention is to provide a rotary switch structure in which the adjusting wheel is embedded in a more secured manner.

[0007] Another object of the present invention is to provide a rotary switch structure which allows for the use of a flat magnetic member by eliminating a shaft in the middle.

[0008] Another object of the invention is to provide a finger joystick structure in which the printed circuit board can be positioned properly with suitable claws.

[0009] Yet another object of the invention is to provide a rotary switch in which a complete sealing is provided by filling the recesses in the portion where the printed circuit board is placed, with filling material and the need for extra screw or sealing members is eliminated.

Summary of the Invention

[0010] The present invention relates to a rotary switch

which comprises a body in which housing is disposed and a printed circuit board is placed; adjusting wheel which is suitable for performing limited circular movement on this body; a magnetic member which will interact with said printed circuit board and a magnetic member shaft comprising this magnetic member. Magnetic member shaft comprising a shaft connection housing is positioned inside the housing in the body. Rotary switch is connected to the body with the first lateral wall and to the shaft connection housing with the second lateral wall for more sensitive rotation of the adjusting wheel, and thus more precise control can be provided thanks to two different support portions.

Brief Description of the Figures

[0011] Accompanying drawings are given solely for the purpose of exemplifying a switch with adjusting wheel whose advantages over prior art were outlined above and will be explained in detail hereinafter:

Fig. 1 demonstrates an exploded view of the switch according to the present invention.

Fig. 2 demonstrates a perspective view of the body and adjusting wheel of the switch according to the present invention.

Fig. 3 demonstrates a perspective view of the switch taken along the longitudinal axis, according to the present invention.

Fig. 4 demonstrates a side view of the fig. 3.

Fig. 5 demonstrates another view of the switch taken along the longitudinal axis, according to the present invention.

Fig. 6 demonstrates a perspective view of the magnetic member shaft of the switch according to the present invention.

Fig. 7a demonstrates a front view of the switch where the magnetic member shaft is matched with corresponding housing according to the present invention.

Fig. 7b demonstrates a front view of the switch where the magnetic member shaft shown in Fig. 7a is rotated 180°.

Fig. 7c demonstrates a front view of the switch where the switch is in a working position according to the present invention.

Fig. 8 demonstrates a perspective view of the body and magnetic member shaft of the switch according to the present invention.

Fig. 9 demonstrates a view taken from another angle of the switch shown in fig. 8.

Detailed Description of the Invention

[0012] The invention, based on the figures given in the attachment of the description, will be described in a detailed manner in this section, wherein the reference list used in the figures is as follows;

1. Printed circuit board
2. Body
3. Adjusting wheel protrusion
5. Housing
6. Recess
7. Protrusion
8. Magnetic member shaft
9. Shaft connection housing
10. Rotary switch
11. Resilient member
12. Adjusting wheel
13. Adjusting wheel shaft housing
14. Adjusting wheel connection housing
15. Claw
16. Magnetic member
17. Shaft recess
18. Shaft protrusion
20. Connection portion
21. Connection housing
22. Magnetic member housing
25. Adjusting wheel holding portion
26. PCB housing
27. Sensor
28. Resilient member housing
- 29a First lateral wall
- 29b Second lateral wall

[0013] Referring now to the figures outlined above, a switch (10) presented according to the invention, referring to Figure 1, mainly comprises a body (2) with a housing (5) therein; a printed circuit board (1) positioned inside the body (2); an adjusting wheel (12) which perform a limited circular motion on the body (2); a magnetic member (16) which will interact with said printed circuit board (1) and a magnetic member shaft (8) comprising the magnetic member (16). Magnetic member shaft (8) comprising a shaft connection housing (9) which will allow for being in connection with said adjusting wheel (12) is positioned inside the housing (5) and it is connected to the body (2) with the first lateral wall (29a) and to the shaft connection housing (9) with the second lateral wall (29b) for more sensitive rotation of the adjusting wheel (12).

[0014] The adjusting wheel (12) comprises two lateral walls, of these lateral walls, an adjusting wheel connection housing (14) is disposed on the first lateral wall (29a) and an adjusting wheel shaft housing (13) is disposed on the second lateral wall (29b). Thus, it is aimed to support the rotary switch (10) both from the body (2) and with the magnetic member shaft (8) with the openings disposed on two lateral walls and thereby to obtain a more sensitive switch (10).

[0015] Said adjusting wheel (12) is formed in a manner to be hollow and semicircular, and it comprises two openings with different size and shape on the first lateral wall (29a) and second lateral wall (29b). Since to be supported from a single body or shaft requires the use of more parts, it is aimed to obtain the switch (10) providing more precise control with the use of less material in the scope of the

present invention. An adjusting wheel protrusion (3) disposed on the body (2) corresponds to the adjusting wheel connection housing (14) disposed on the first lateral wall (29a) of the adjusting wheel (12) and shaped and formed according to it. Adjusting wheel protrusion (3) is preferably formed cylindrically, but it is also possible to configure it in different shapes. On the other hand, magnetic member shaft (8) which is suitable to be positioned inside the support body (2) and comprises the magnetic member (16) comprises a shaft connection housing (9) in which a hollow is formed in one side thereof. As will be seen in Figure 3, this shaft connection housing (9) corresponds to the adjusting wheel shaft housing (13) disposed on the adjusting wheel (12) second lateral wall (29b). Thus, while said adjusting wheel (12) is in connection with the body (2) also referred to as support body on the one hand; it is in connection with the shaft connection housing (9) positioned again inside the support body (2) on the other hand. The present invention advantageously eliminates the classical shaft use, and instead comprises a magnetic member shaft (8) holding the magnetic member and embedded only inside the body (2). Moreover, the use of a hollow magnetic member is not needed and it is possible to obtain the rotary switch (10) with reduced cost.

[0016] Magnetic member is hereinafter mentioned as shaft, referring to Figure 9, body (2) portion in which the shaft (8) will be positioned is preferably hollowed cylindrically and one end thereof is closed. Preferably on the outer wall of the housing (5) inside the body (2), at least one protrusion (7) which will allow for the attachment of the shaft (8) and a recess (6) extending circularly following this protrusion are disposed. Said shaft (8) comprises at least one shaft protrusion (18) thereon in a manner to fit in this recess (6) and at least one shaft recess (17) so that the protrusion (7) will pass therethrough.

[0017] Referring to Figure 7a, the shaft (8) comprising the magnetic member (16) therein corresponds to the housing (5) inside the body (2) with the suitable mounting protrusions, in the next stage as seen in Figure 7b, a 180 degree rotation is performed and the operating position in Figure 7c is reached. Operation of the rotary shaft (10) presented within the scope of the invention is performed preferably to be 30 degree forward and backward according to the rotation axis, and thus a problem such as displacement of the adjusting wheel (12) is not encountered.

[0018] Referring to Figure 3, a printed circuit board (1) as PCB is placed inside a PCB housing (26) extending longitudinally along the axis inside the body (2). A magnetic field sensor (27) is disposed on said printed circuit board (1); it is possible to use a hall type sensor or reed switch for the magnetic field sensor (27). The shaft (8) presented in Figure 6 holds at least on the magnetic member (16) with its more than one magnetic member housings (22) disposed therein. The magnetic member (16) enters into interaction preferably with a hall effect sensor on the printed circuit board (1) according to the

position of the adjusting wheel (12). Using a hall effect sensor provides non-contact magnetic interaction. User holds the protruding portion disposed on the adjusting wheel (12) and moves the adjusting wheel (12) clockwise or counter clockwise. With this movement, non-contact interaction of the magnetic member (16) with the hall type sensor is provided.

[0019] A circular resilient member housing (28) is disposed around the outer wall of said shaft connection housing (9), and spring is used as a resilient member (11) inside the resilient member housing (28). As double arm torsion spring can be used for said spring, it is also possible to choose different types of springs. An adjusting wheel holding portion (25) which is protruded upward is disposed as the portion of the adjusting wheel (12) held by the user.

[0020] The printed circuit board (1) disposed inside the body (2) is firmly kept with at least one flexible claw (15) again inside the body. Said claws (15), preferably two in number, are kept from the bottom surface of the printed circuit board (1) close to the end section thereof. As can be seen in Figure 5, two flexible claws in the bottom section of the portion where printed circuit board (1) is kept provide appropriate positioning of the printed circuit board (1). Moreover, said PCB housing (26) is filled with a suitable filling material and complete sealing is provided. Thus, the use of extra members for sealing or connection member is eliminated.

[0021] Referring to Figure 9, both ends of the body (2) comprise two connection portions (20) which are protruded as reverse "L". Each connection portion (20) comprises at least one connection housing (21).

Claims

1. A rotary switch (10) comprising: a body (2) having a housing (5) and a printed circuit board (1) positioned therein; an adjusting wheel (12) having a limited circular motion on the body (2); a magnetic member shaft (8) having a magnetic member (16) for magnetic interaction with the printed circuit board (1) **characterized in that** the magnetic member shaft (8) positioned in the housing (5) comprises a shaft connection housing (9), and said adjusting wheel (12) is connected to the body (2) with a first lateral wall (29a) of the adjusting wheel (12) and is connected to the shaft connection housing (9) with a second lateral wall (29b) of the adjusting wheel (12).
2. The rotary switch (10) as in Claim 1 wherein said rotary switch (10) comprises at least one recess (6) and protrusion (7) on the outer wall of said housing (5) and at least one shaft recess (17) and a shaft protrusion (18) on the magnetic member shaft (8) which correspond to this recess (6) and protrusion

(7).

3. The rotary switch (10) as in Claim 1 wherein said rotary switch (10) comprises an adjusting wheel protrusion (3) shaped and formed according to an adjusting wheel connection housing (14) disposed on the first lateral wall (29a).
4. The rotary switch (10) as in Claim 1 wherein said rotary switch (10) comprises a PCB housing (26) in which the printed circuit board (1) is placed in said body (2) and which extends along the longitudinal axis of the body (2).
5. The rotary switch (10) as in Claim 4 wherein said rotary switch (10) comprises at least one flexible claw (15) which firmly keeps the printed circuit board (1) inside said PCB housing (26).
6. The rotary switch (10) as in Claim 1 wherein said rotary switch (10) comprises an adjusting wheel holding portion (25) which allows the adjusting wheel (12) to be held, when in use, by the user.
7. The rotary switch (10) as in Claim 1 wherein said rotary switch (10) comprises a resilient member (11) for being positioned in a resilient member housing (28) disposed on the magnetic member shaft (8).
8. The rotary switch (10) as in Claim 7 wherein said resilient member (11) is a double arm torsion spring.
9. The rotary switch (10) as in Claim 1 wherein said rotary switch (10) comprises an adjusting wheel shaft housing (13) shaped and formed according to the shaft connection housing (9) disposed on the second lateral wall (29b).
10. The rotary switch (10) as in Claim 1 wherein said rotary switch (10) comprises a hall effect sensor or reed switch which provides magnetic and non-contact operation of said switch (10) on the printed circuit board (1).
11. The rotary switch (10) as in Claim 4 wherein said PCB housing (26) is filled with a filling material in a manner to provide complete sealing.
12. The rotary switch (10) as in Claim 1 wherein said magnetic member (16) is embedded inside the magnetic member shaft (8).
13. The rotary switch (10) as in Claim 1 wherein said rotary switch (10) comprises at least one connection portion (20) and connection housing (21).

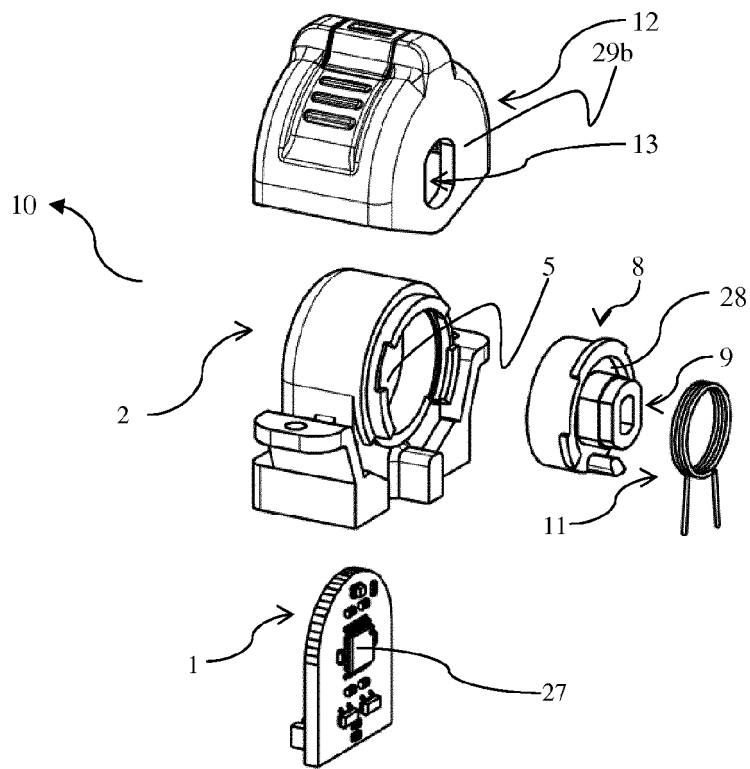


Fig. 1

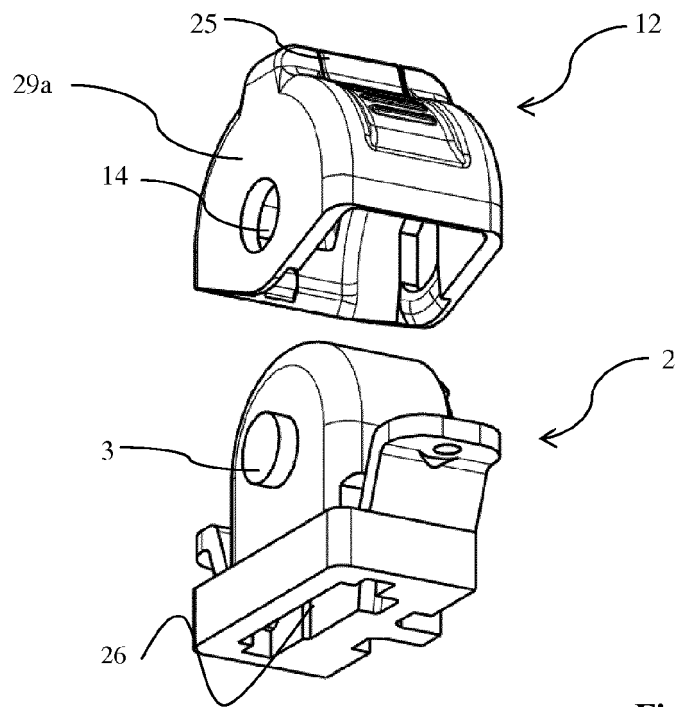


Fig. 2

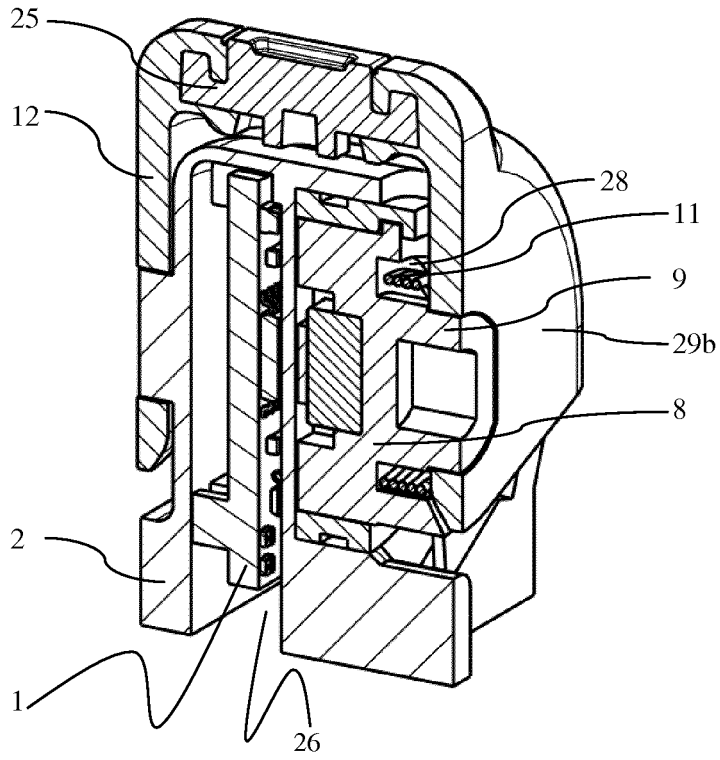


Fig. 3

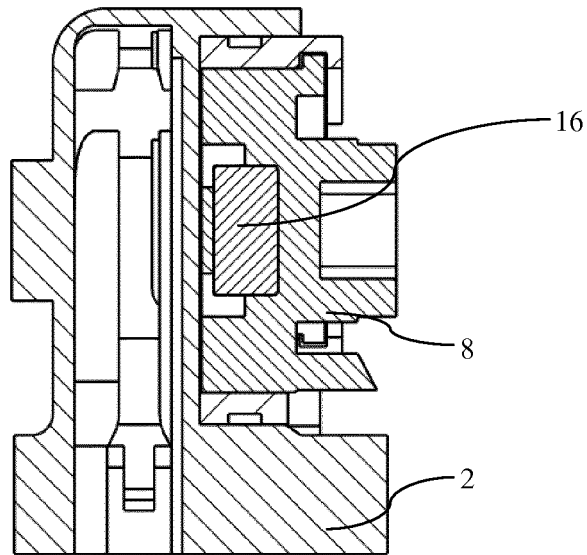


Fig. 4

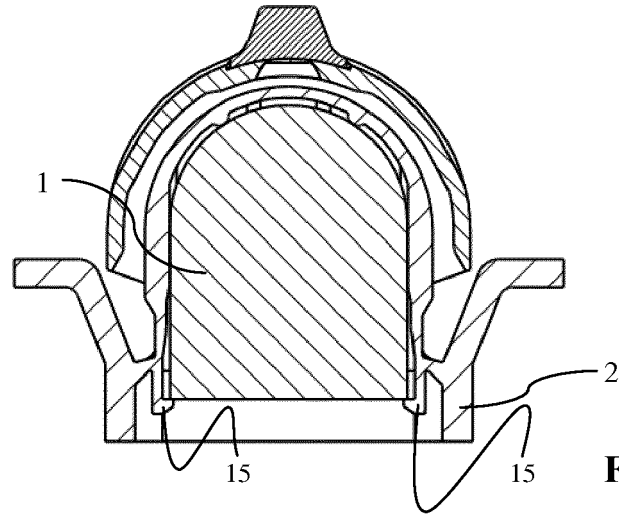


Fig. 5

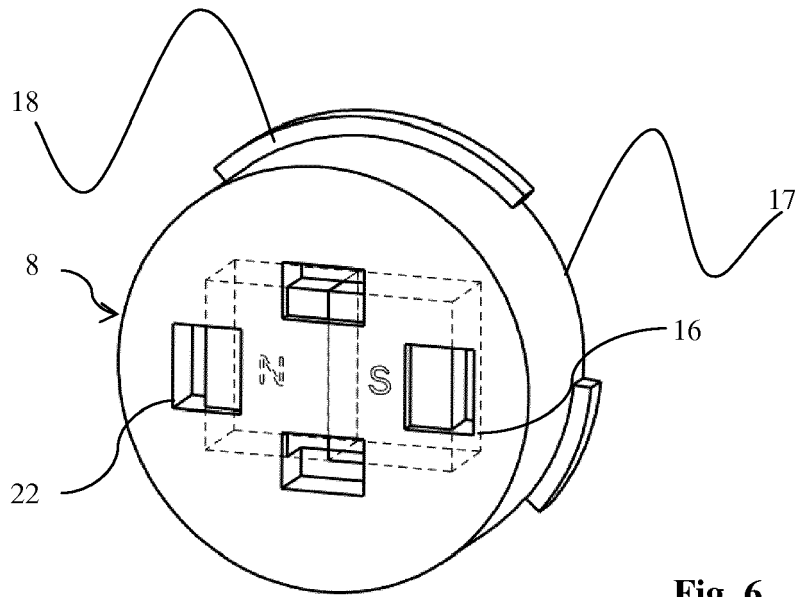


Fig. 6

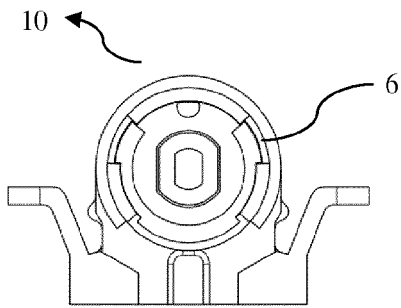


Fig. 7a

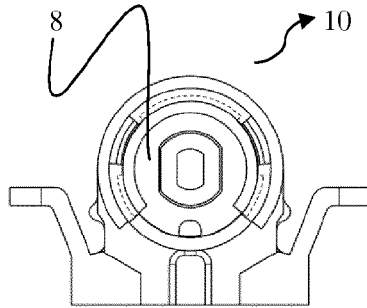


Fig. 7b

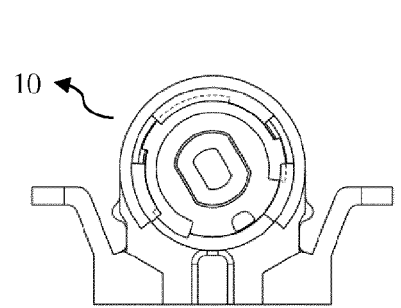


Fig. 7c

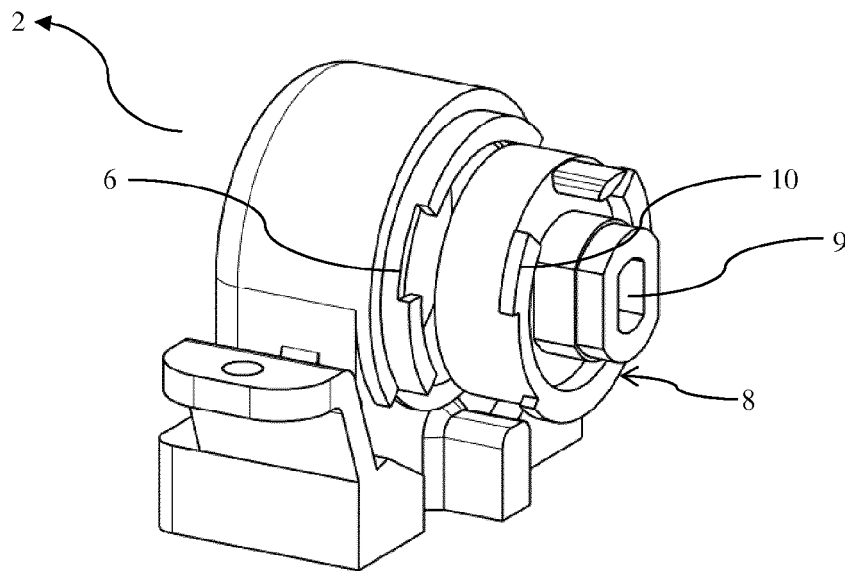


Fig. 8

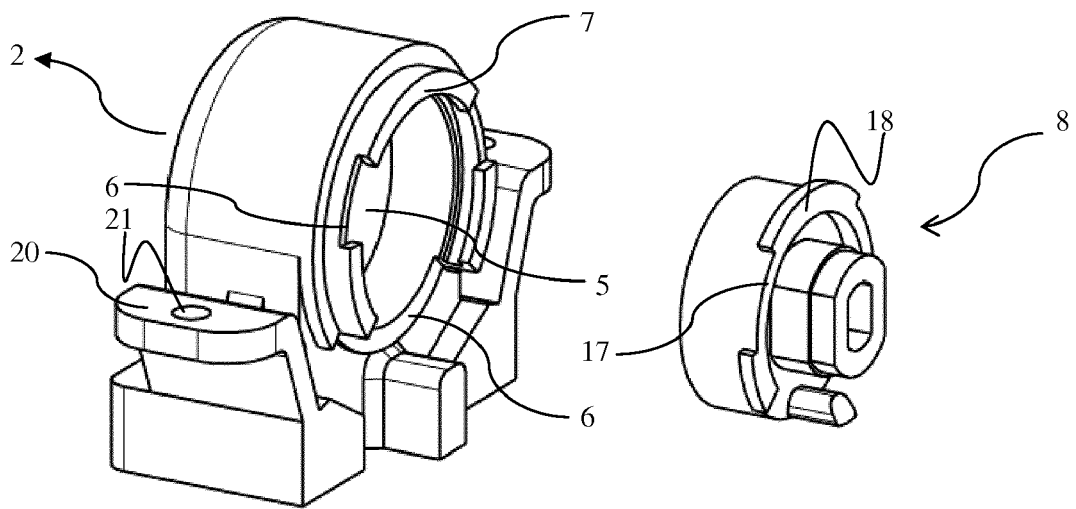


Fig. 9



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Application Number
EP 16 17 9603

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search		Date of completion of the search	Examiner
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X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 16 17 9603

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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