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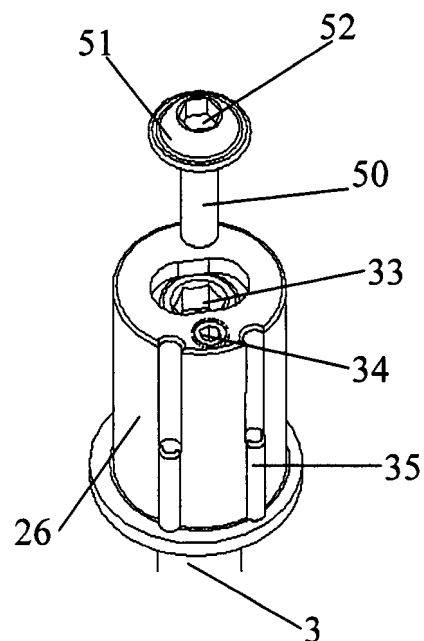
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(54) **Adjustable hinge for window or door casing**

(57) An adjustable hinge is disclosed for window or door casing (1) of the heavy type (particularly doors), comprising: at least two bodies (7, 17) adapted to allow fixing the hinge (1) on window or door casing and on a fixed frame; an articulation pin (3); two adjusting bushes (5, 26); at least one adjusting screw (4); a plurality of shimming washers (2); two end plugs (22); and a small oscillating bush (29) adapted to contain therein the adjusting screw (4); and at least one locking screw (50) equipped with a head (51) with a flange (52) adapted to be inserted into the pin (3) of the hinge (1).

FIG. 7A



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Description

[0001] The present invention deals with a hinge to be applied to window or door casing of the heavy type (particularly doors) with the chance of adjusting them on three axes.

[0002] Usually this type of window or door casing is realised with structurally sturdier profiles than the standard one, thereby allowing to build manufactured products with greater sizes with the consequent higher weight.

[0003] Due to the higher weight of the window or door casing, the above adjustments allow better adapting the mobile frame position with respect to a fixed frame (whose weight generally exceeds 80 Kg), making it easier to work both in a workshop, and during installation.

[0004] The adjustments substantially comprise: closing pressure adjustment, side adjustment and height adjustment.

[0005] Usually these hinges are substantially composed of:

- two bodies respectively secured to frame and wing;
- one articulation pin made of steel;
- two adjustment bushes.

[0006] The two bodies further have:

- an eyelet, longitudinal to the pin, that houses the bushes;
- a wing for securing respectively to fixed frame or mobile frame (wing);
- housing holes for securing screws, frame hinges, and seats for screw-covering cases, all being present on the wings.

[0007] Bushes are generally composed of a cylinder body closed at one end, with a collar at the opposed end and the internal hole offset with respect to the body.

[0008] This bush structure allows, due to a rotation in the corresponding eyelet body rotation, to move the pin axis thereby allowing to adjust the wing positions with respect to the frame.

[0009] Sometimes, the hinge body and the bush respectively have grooves and keying teeth; therefore, in order to be able to rotate the bush, it is necessary to lift the wing, withdraw the bush from the hinge body, insert it into the new seat and finally place again the wing.

[0010] This operation is very uncomfortable both for the wing weight, and for the need of engaging at least two people, and not always they manage to perform an adequate adjustment on the first attempt.

[0011] Another negative aspect with this method is that pressure and side adjustments depend one on the other, and therefore when operating it is necessary to find the

right compromise between the two bushes available (upper and lower ones) to obtain the optimum result.

[0012] As regards the height adjustment, the more classic solution is interposing some washers between the two bushes. This solution is very uncomfortable to be actuated, since the wings, that already have the problem of their weight, must be withdrawn, a shim must be inserted thereinto and they must be inserted again.

[0013] In the past somebody attempted to improve the way of operating of the above adjustments.

[0014] A solution has been obtaining the side adjustment through a longitudinal cam that is integral with the pin: in this way it is enough to rotate the cam in order to obtain a displacement.

[0015] Another solution has been inserting a threaded means transverse to the pin, so that, upon rotating the threaded means, the pin is moved.

[0016] Such solution, though being valid, has some disadvantages: in fact, to perform such adjustments, it is necessary to disassemble the screw-covering cases in order to uncover the adequate slits through which one intervenes to adjust and secure the wind position.

[0017] In these cases it happens that the assembling worker in the yard must take the hinge assembled onto the window and door casing, but with disassembled plugs and cases, with the risk of losing them and with an enormous loss of time to assemble again everything.

[0018] In order to solve the above-mentioned problems, the Applicant of the present invention has filed in the past patent EP-B1-1455042, which allows making such regulations easier and being able to intervene thereon without necessarily disassembling the cases.

[0019] In such a way the yard operator is helped since he only has to disassemble the plugs, perform the adjustment and assemble the plugs again.

[0020] The present invention deals with an improvement of the adjustable hinge of document EP-B1-1455042, whose object is performing a final, stable and long locking of the hinge, which guarantees keeping the regulation of window and door casing unaltered in time and further guarantees a functionality of the hinge itself under applications not complying with declared technical specifications.

[0021] The above and other objects and advantages of the invention, as will appear from the following description, are obtained with an adjustable hinge for window and door casing as disclosed in Claim 1. Preferred embodiments and non-trivial variations of the present invention are disclosed in the dependent Claims.

[0022] The present invention will be better described by some preferred embodiments thereof, provided as a non-limiting example, with reference to the enclosed drawings, in which:

- Figure 1 is a perspective view of the hinge according to the present invention;
- Figure 2 is an exploded perspective view of the hinge of Fig. 1;

- Figure 3 is a perspective view of the hinge in Fig. 1 where an operating coupling with one of its components is shown;
- Figure 3A is a detailed view of part of Fig. 3;
- Figure 3B is a detailed view of the shimmming washer 1;
- Figure 4 is a detailed view of the bush of the hinge in Fig. 1;
- Figure 5 is a sectional view, along the pin axis, of the hinge in Fig. 1;
- Figure 6 is a detailed view of the metallic bush;
- Figures 6A - 6B - 6C - 6D - 6E show sectional views of the hinge in Fig. 1, pointing out the invention in an operating position;
- Figures 7A to 7C are perspective views that show three assembling steps of the flanged screw of the present invention on an adjustable hinge; and
- Figures 8A to 8C are sectional views respectively corresponding to Figures 7A to 7C.

[0023] With reference to the Figures, a preferred embodiment of the hinge of the present invention is shown and described. It will be immediately obvious that numerous variations and modifications (for example related to shape, sizes, various colours and parts with equivalent functionalities) could be made to what is described without departing from the scope of the invention as appears from the enclosed Claims.

[0024] According to what is shown, the height adjustment according to Y axis substantially uses a method of the type with washers but with two major modifications with respect to what is realised nowadays:

- it is not necessary to withdraw the wing to insert the shimmming washers;
- the operator must not make any effort to manually lift the wing.

[0025] The washer 2 (Fig. 3B) has an opening 2A, on one side, whose size is slightly less than the pin 3 diameter (Fig. 3A) and operates so that, during adjustment, it can be inserted without having to withdraw the wing: in fact it is enough to lift the wing for about two millimeters and insert the washer thanks to the above opening 2A. In facat, as soon as the opening 2A of the washer 2 has exceeded the center distance of pin 3 (Fig. 3A), due to the lower sizes with respect to pin 3 diameter, it snaps and goes into a stable position on pin 3 itself.

[0026] In order to lift the wing, making the operator work easier, a screw 4 (Fig. 2) has been inserted on pin 3 head and is threaded onto pin 3 itself.

[0027] In this way the operator must do nothing else that, with the hinge assembled on the window and door casing, rotate the screw 4 (Fig. 2) counterclockwise: the screw 4 will push the bottom 5a of the opposed bush 5; this latter one in turn will discharge the thrust through its collet on the hinge body 7, that is integrally secured onto the wing.

[0028] Now the wing will be lifted allowing the operator, for all the necessary time, to insert the shimmming washers 2, without any effort, and the operator will be able to lower it by simply rotating the screw 4 clockwise.

[0029] In order to avoid that the washer 1, once having been inserted, can be withdrawn due to the compression and rotation actions to which it is subjected, a projecting tooth 8 (Fig. 3B) on one side has been obtained thereon, around its internal diameter, together with a recess 9 (Fig. 3B) on the other side, so that the projecting part 8 is inserted in an undercut 10 (Fig. 4) suitably obtained on the bush 5 (Fig. 4).

[0030] The recess 9 (Fig. 3B) is also used for mutually coupling many washers 1 in order to have a varying adjustment range.

[0031] In addition, to avoid that the assembled washer 1 is able to turn, taking the opening 2 (Fig. 3B) in view, a further tooth 11 has been obtained that is keyed-in on another undercut 12 of the bush 5 to avoid its rotation.

[0032] For adjusting the pressure Z, the classic method is used with a bush made of plastic self-lubricating material with offset hole, to which some improvements have been made.

[0033] As described previously, the bush 5 (Fig. 4) is composed of a cylinder body 13 closed at one end 14 with a collet 6 at the opposite end and the internal hole 15 offset with respect to the body 13.

[0034] At the opposite end of the collet 6, an hexagonal seat 16 has been obtained that goes out of the offset hole 15 and is used to perform the rotation of the bush 5 for the following pressure adjustment.

[0035] In order to define the bush 5 position, on hinge bodies 7 and 17 (Fig. 2) and precisely on respective eye-lets 18 and 19 in which the bush 5 is inserted, two semicircular grooves 20 are present and oppose the grooves 21 (always of the semicircular type) that are present on the bush 5 (Fig. 4).

[0036] Specifically, on the bush 5, the grooves 21 are present on 360° with pitches of 30°.

[0037] In this way, after having rotated the bush 5 to perform the adjustment, everything is blocked in position by the plug 22 (Fig. 2), that abuts onto the hinge bodies 7 and 17 on the opposite part to the one in which the bush 5 is inserted, by means of two small fingers 23 (Fig. 2) that are inserted into the circular seats obtained with the semicircular grooves 20 of the hinge bodies 7 and 17 that are facing the semicircular grooves 21 of the bush 5.

[0038] To facilitate the correct positioning of the bush 5 when rotating, some reference notches 25 and 24 (Fig. 4) has been created in view on the collet 6 of the bush 5 with pitches of 30°, so that, when the operator rotates the bush 5 (to perform the adjustment), he can have a visual and immediate reference both of the bush 5 position and of the adjustment that he is performing.

[0039] In order to have an easy and quick reading of the adjustment position, the notches 24 (Fig. 4) have been realised at a variable and progressive height, starting from the single notch 25 (Fig. 4), with an intermediate

length, that shows the position "0".

[0040] By rotating the bush 5 (Fig. 4) on the side where the notch height increases, there is a pressure increase on the gasket, while instead on the side where the notch height decreases, there is a pressure decrease on the gasket; moreover, the number of notches also changes in the different positions, namely 1: notch in position "0", 2: notches in intermediate position, 3: notch in maximum adjustment position.

[0041] The side adjustment of the pin 3 (Fig. 6) according to X axis has been obtained by closing it into a metal bush 26 (Fig. 6) that has two slots 27 and 28 (Fig. 6), within which the pin 3 is able to slide, in practice securing its adjustment range: in this way the pin 3 has been pressure-blocked along axis Z and its movement is allowed only along the side axis X perpendicular to the previous one, and within the above adjustment range.

[0042] In this way the pin 3 (Fig. 6) is free of sliding for the whole adjustment range that has been set with slots 27 and 28 (Fig. 6); to be able to define and afterwards lock its position along X axis, a small bush 29 (Fig. 6) has been inserted that is guided at one end, within a groove (26A) obtained in the metal bush 26, in an oscillating movement according to a predetermined axis. Inside it contains the above pin 3: in this way the small bush 29 (Fig. 6B), thereby centered at one end of the above axis, is made free of oscillating and by oscillating it drags together the pin 3 determining its position.

[0043] The above metal bush 26 (Fig. 6) has been adequately emptied to house pin 3 and small bush 29, with such a shape as to reproduce the above rotation axis for the small bush 29; this also generates the limit stops 26B as regards its oscillation. Finally, one of the two above slots 28 has been created on the bottom.

[0044] The other slot 27 has been obtained on the metal plug 30 that closes the above metal bush 26.

[0045] In order to oscillate the small bush 29 (Fig. 6A) and consequently to move pin 3, since it was not possible to directly operate on the above small bush 29, dragging faces 31 (Fig. 6C) have been created on pin 3, such faces 31 facing the internal surfaces 32 (Fig. 6B) existing in the small bush 29 and on the same side there is an hexagonal seat 33 (Fig. 6) on the head part.

[0046] In fact, when one operates with an hexagonal wrench on pin 3, the small bush 29 is forced to rotate due to the above dragging faces 31 and 32.

[0047] The adjustment is blocked by means of a dowel 34 (Fig. 6), placed on the same side in which the hexagonal seat 33 of pin 3 is present, which directly clamps the small bush 29: by blocking this latter one, pin 3 is consequently blocked.

[0048] This metal bush 26 finally, in order to be referred with respect to the hinge body 17, has two small barrels 35 (Fig. 6) that engage the above semicircular grooves 20 (Fig. 2) present on the hinge body 17 (Fig. 2).

[0049] To the above-described hinge 1, and to its preferred installation process, the improvement of the present invention will now be applied, which allows ob-

taining the above mentioned objects.

[0050] Such improvement consists in providing at least one locking screw 50 equipped with a head 51 with flange 52 adapted to be inserted into the pin 3 of the hinge 1, pin 3 adequately equipped with the above-described suitable threaded seat 33 (preferably of the M5 type).

[0051] In practice, after having performed the adjustments on the hinge 1 with an installed window or door casing, before applying the end plugs 22 at the ends of the hinge 1 itself, the locking screw 50 is applied to the pin 3 and they are tightened till the complete locking of the pin 3 itself.

[0052] By applying this specific screw 50 (preferably, as seen, of the M5 type), the pin 3/bush 26 assembly is acted upon, by locking it in its correct position due to the screw 50 which operates as clamp, by mutually closing as a package the adjustable movable components thereof.

[0053] As shown in Figures 7A to 7C and 8A to 8C, the operating installation sequence provides the following steps: first of all, adjusting the hinge 1; then, tightening the seat 33, screwing the flanged screw 50 till it is completely tightened, and then finally inserting the end plugs 22.

[0054] A final stable and long locking of the hinge 1 is thereby performed, which guarantees in time the keeping the regulation of window and door casing unaltered in time and further guarantees a functionality of the hinge itself under applications not complying with declared technical specifications.

Claims

1. Adjustable hinge for window or door casing (1) comprising:

- at least two bodies (7, 17) adapted to allow fixing the hinge (1) on the window or door casing and on a fixed frame;
- an articulation pin (3);
- a first and a second adjusting bushes (5, 26), housed in corresponding eyelets (18, 19) of the first and second bodies (7, 17), said eyelets (18, 19) being longitudinal to the pin (3);
- at least one adjusting screw (4) for regulating the height;
- a plurality of shimming washers (2);
- two end plugs (22);
- wherein said adjustment screw (4) is inserted on said pin (3) head, said adjustment screw (4) screwing itself on said pin (3) to facilitate wing lifting and lowering;
- said adjustable hinge further comprises a small oscillating bush (29) adapted to contain therein said articulation pin (3) with said at least one adjusting screw (4) screwed therein;
- said bodies (7, 17) are equipped with grooves

- (20) in order to mate with corresponding grooves (21) of the first bush (5);
- said second bush (26) has a slot (28) in which said pin (3) can slide along the lateral axis;
 - said small bush (29) is contained in said second adjusting bush (26), said small bush (29) being guided at one end within a groove (26A) obtained inside said second adjusting bush (26) in an oscillating movement, the presence inside the small bush (29) of dragging faces (32) facing analogous dragging faces (31) obtained on the external surface of pin (3) allowing the small bush (29) to drag the pin (3) when said small bush (29) is oscillating inside the second bush (26);
- characterised in that** it further comprises at least one locking screw (50) equipped with a head (51) with a flange (52) adapted to be inserted into a corresponding seat (33) of the pin (3), said locking screw (50) being adapted to operate on the pin (3)/bush (26) assembly and to lock them in their installation position by acting as a clamp and mutually closing as a package the adjustable movable components of the hinge (1).
2. Adjustable hinge for window or door casing (1) according to Claim 1, **characterised in that** said grooves (20) of said bodies (7, 17) are semicircular or of any other shape useful to correctly positioning the first bush (5).
 3. Adjustable hinge for window or door casing (1) according to Claim 1, **characterised in that** said first bush (5) is composed of a cylindrical body (13) closed at one end (14), with a collet (6) at an opposite end and an internal hole (15).
 4. Adjustable hinge for window or door casing (1) according to Claim 3, **characterised in that** said hole (15), that is a seat of pin (3), is offset with respect to body (13).
 5. Adjustable hinge for window or door casing (1) according to Claim 4, **characterised in that** said first bush (5) is equipped on the opposite end of the collet (6) with a hexagonal seat (16) that projects from the offset hole (15) allowing access to screw (4).
 6. Adjustable hinge for window or door casing (1) according to Claim 5, **characterised in that** said collet (6) is equipped with visible reference notches (24, 25) in order to facilitate a correct placement with respect to the first bush (5).
 7. Adjustable hinge for window or door casing (1) according to Claim 6, **characterised in that** said reference notches (24, 25) are realized with a variable and progressive height.
 8. Adjustable hinge for window or door casing (1) according to Claim 1, **characterised in that** said first bush (5) is equipped with grooves (21) on 360° with constant pitch that are able to be coupled with grooves (20) being present on the hinge body (7).
 9. Adjustable hinge for window or door casing (1) according to Claim 1, **characterised in that** said plugs (22) are equipped with at least one small finger (23).
 10. Adjustable hinge for window or door casing (1) according to Claim 1, **characterised in that** said plugs (22) abut on hinge bodies (7, 17) on the opposite side to the one in which the first bush (5) and the second bush (26) are inserted, through small fingers (23) which are inserted in the circular seats obtained with the grooves (20) on hinge bodies (7, 17) which face the grooves (21) of the first and second bushes (5, 26).
 11. Adjustable hinge for window or door casing (1) according to Claim 1, **characterised in that** said pin (3) is partially contained inside the second bush (26).
 12. Adjustable hinge for window or door casing (1) according to Claim 11, **characterised in that** said second bush (26) is closed with a metal plug (30) which has a slot (27) in which the pin (3) can slide along the lateral axis.
 13. Adjustable hinge for window or door casing (1) according to Claim 11, **characterised in that** said second bush (26) has two small barrels (35) which engage the grooves (20) being present on hinge body (17).
 14. Adjustable hinge for window or door casing (1) according to Claim 1, **characterised in that** said washers (2) have on the lower diameter circumference a recess (9) and, on the opposite side, a protruding tooth (8), adapted to engage either the recess (9) of the adjacent washer (2) or in an undercut (10) obtained on the first bush (5) in order to avoid that under compression and rotation actions to which they are subjected, the washers (2) are withdrawn from their seat.
 15. Adjustable hinge for window or door casing (1) according to Claim 1, **characterised in that** said washers (2) are equipped with a recess (11A) and, on the opposite surface, with a tooth (11) which is adapted to engage either the recess (11A) of the adjacent washer (2) or a discharging tooth (12) with which said first bush (5) is equipped in order to prevent the

installed washers (2) from rotating which would take an opening (2A) in view.

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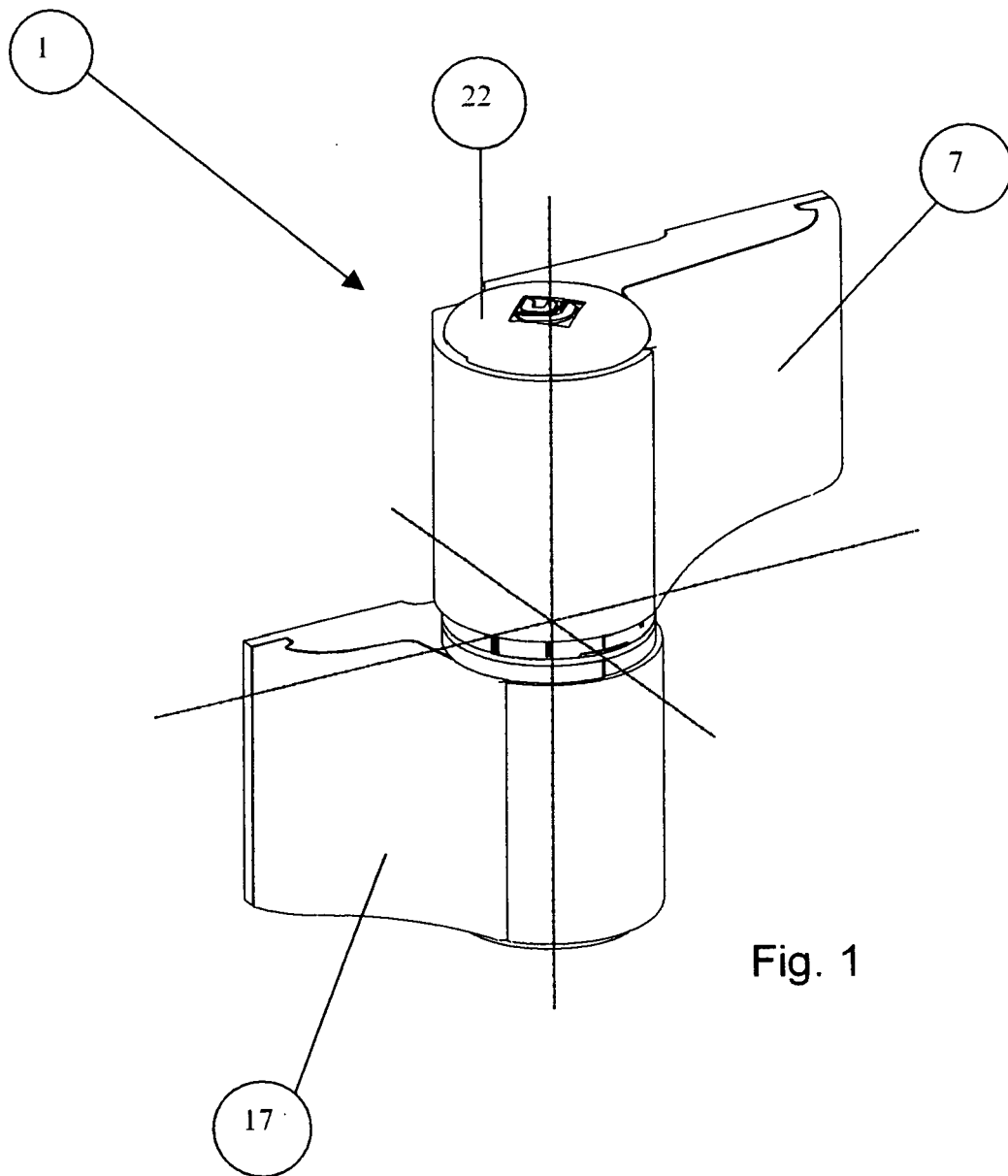


Fig. 1

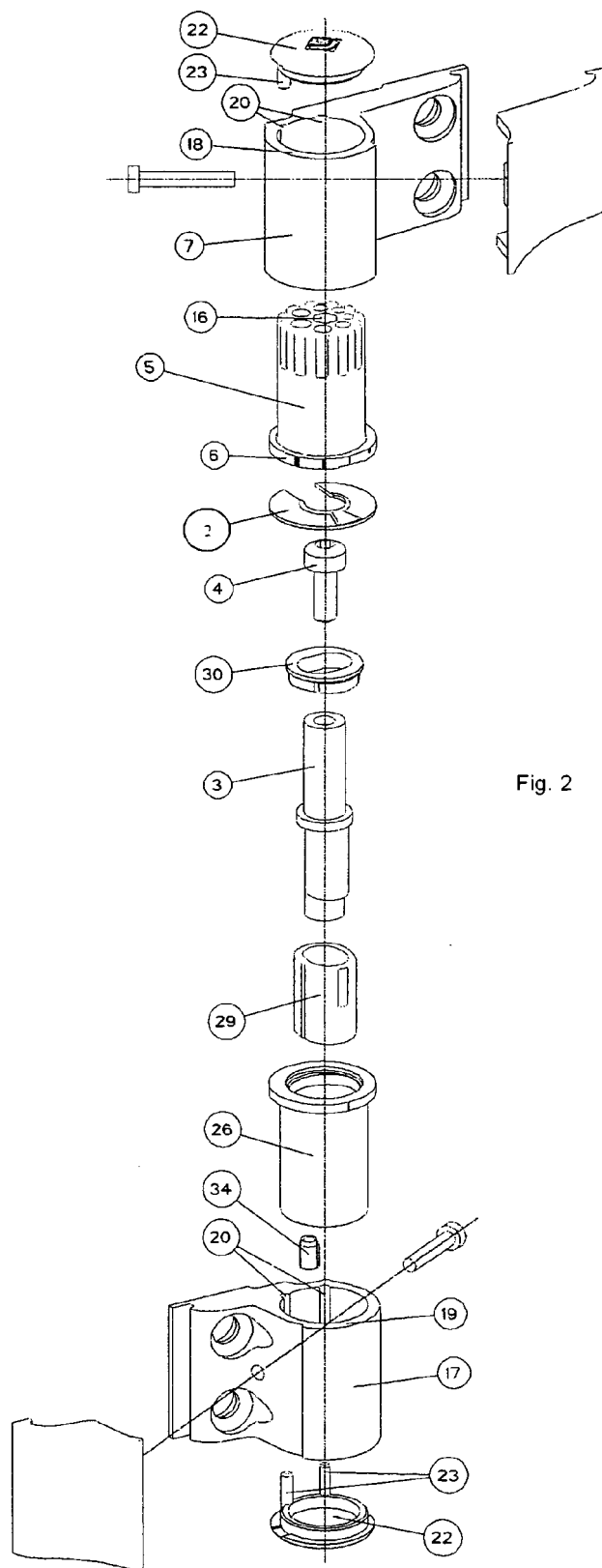


Fig. 2

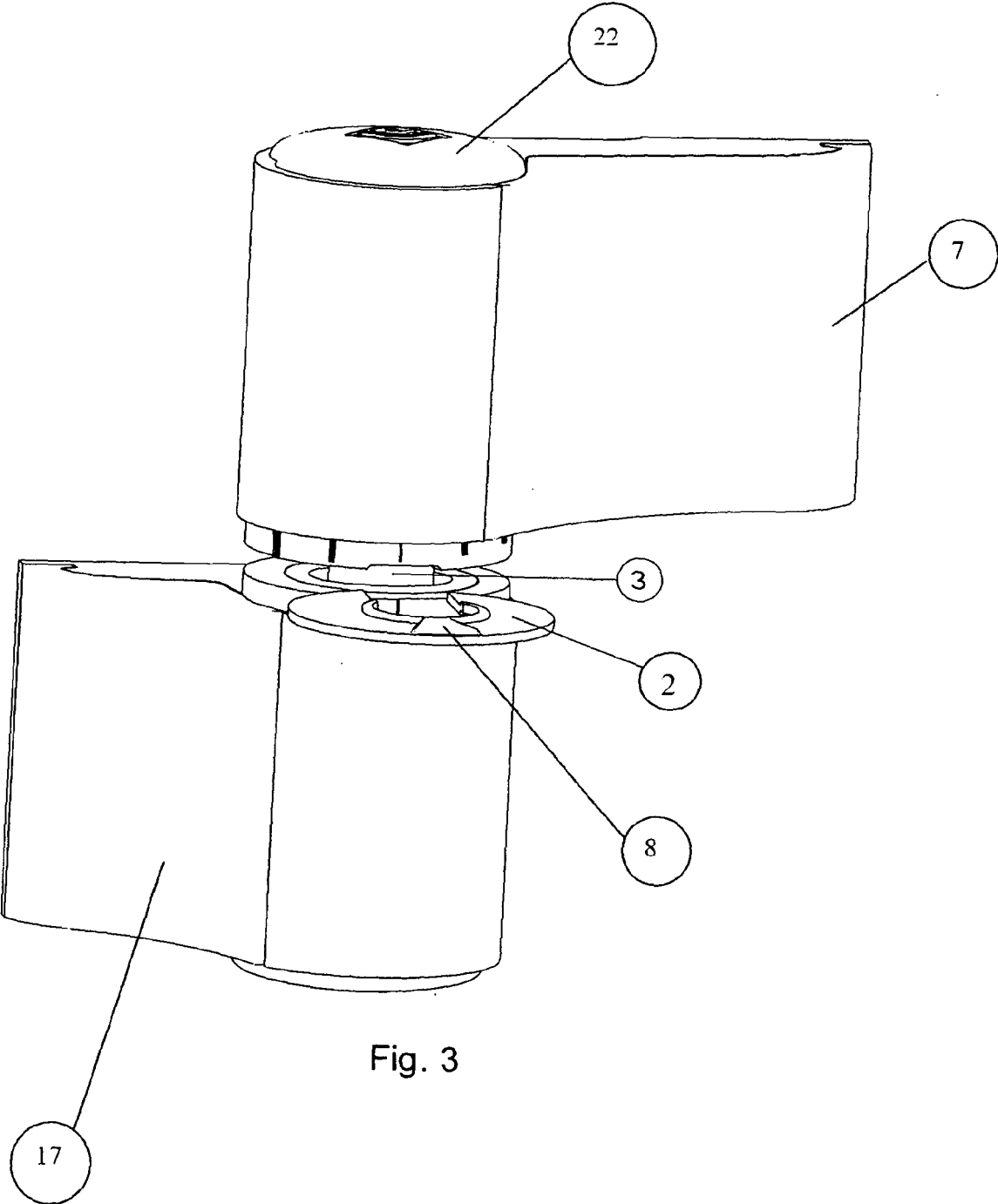
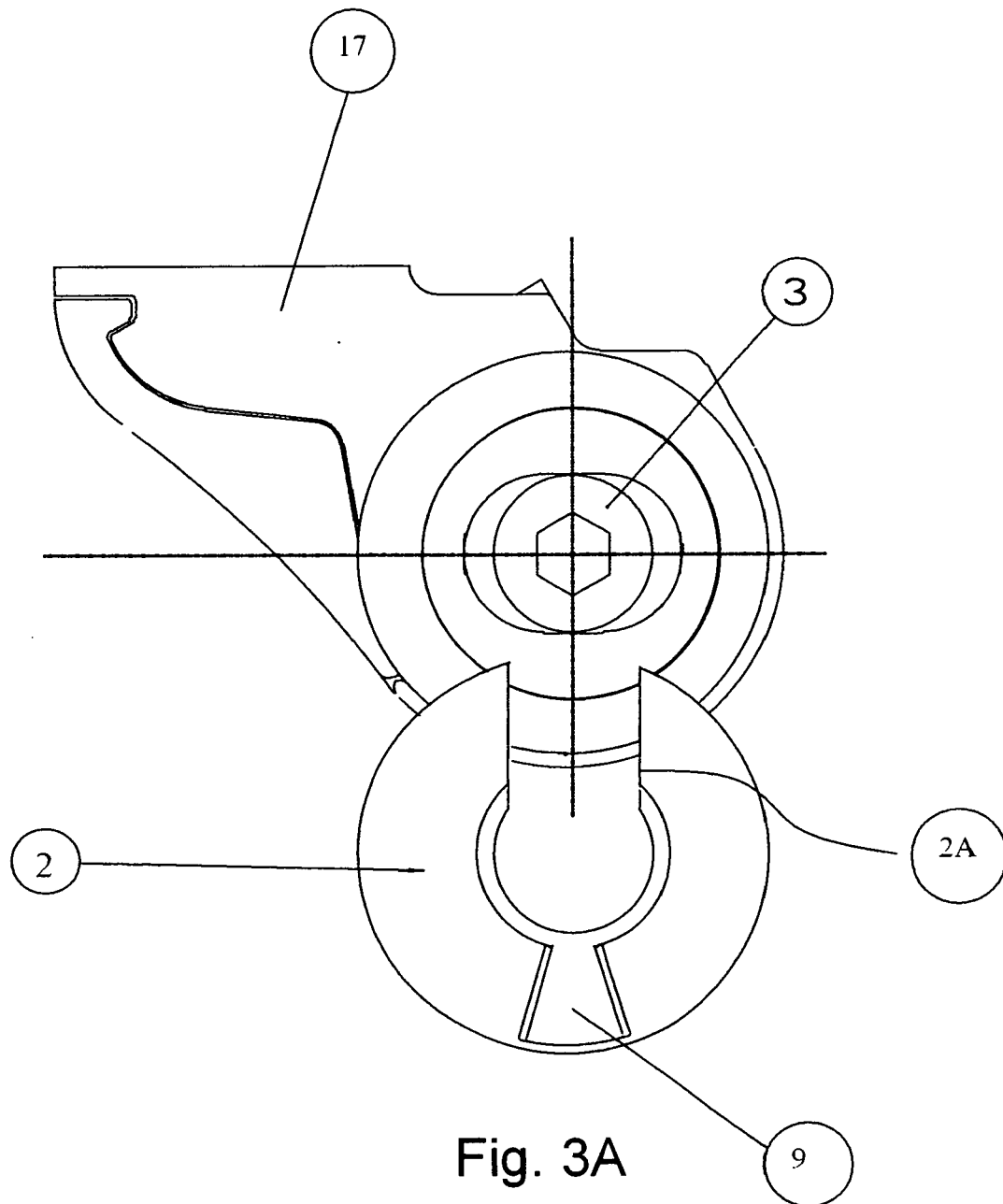
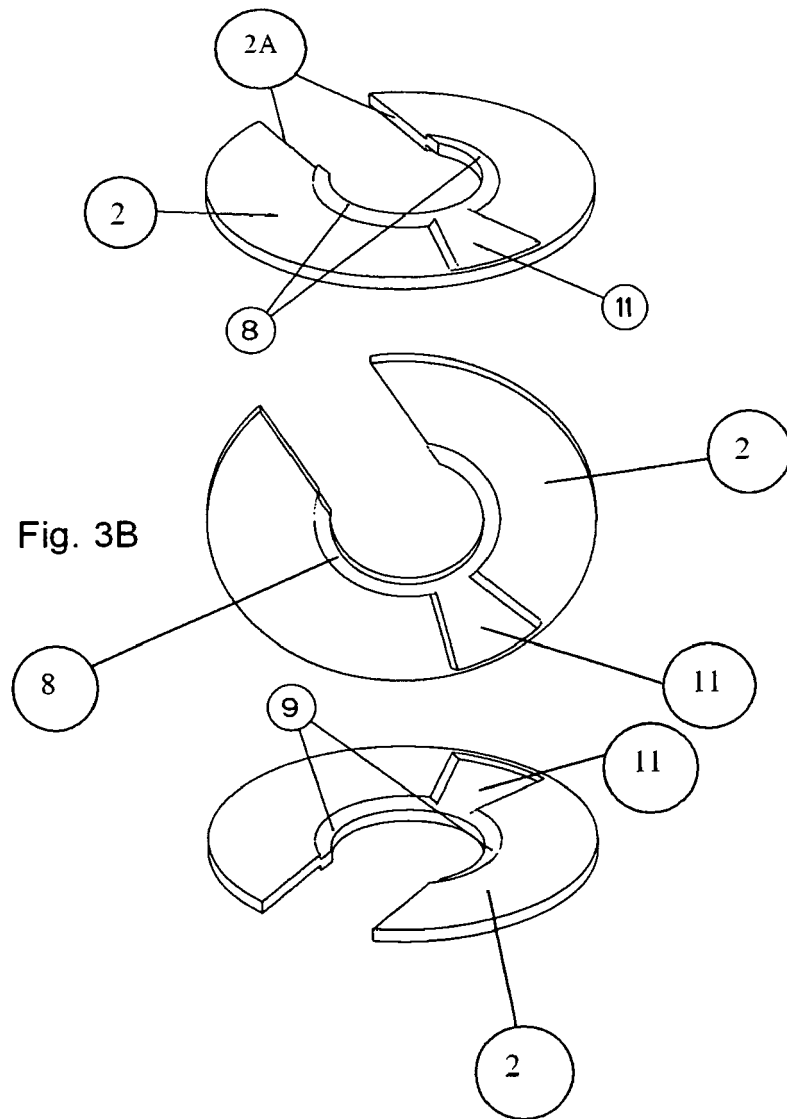


Fig. 3





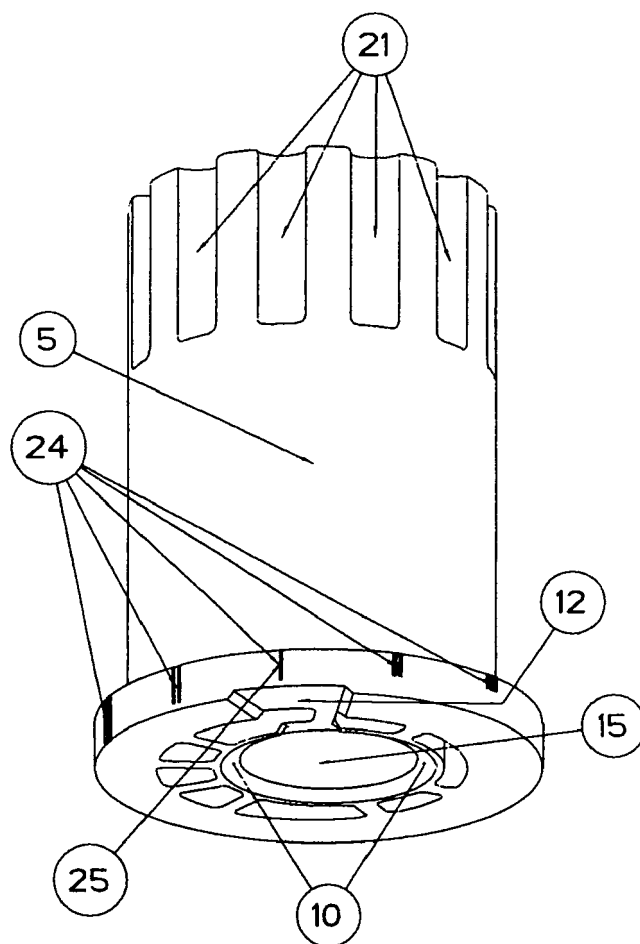


Fig. 4

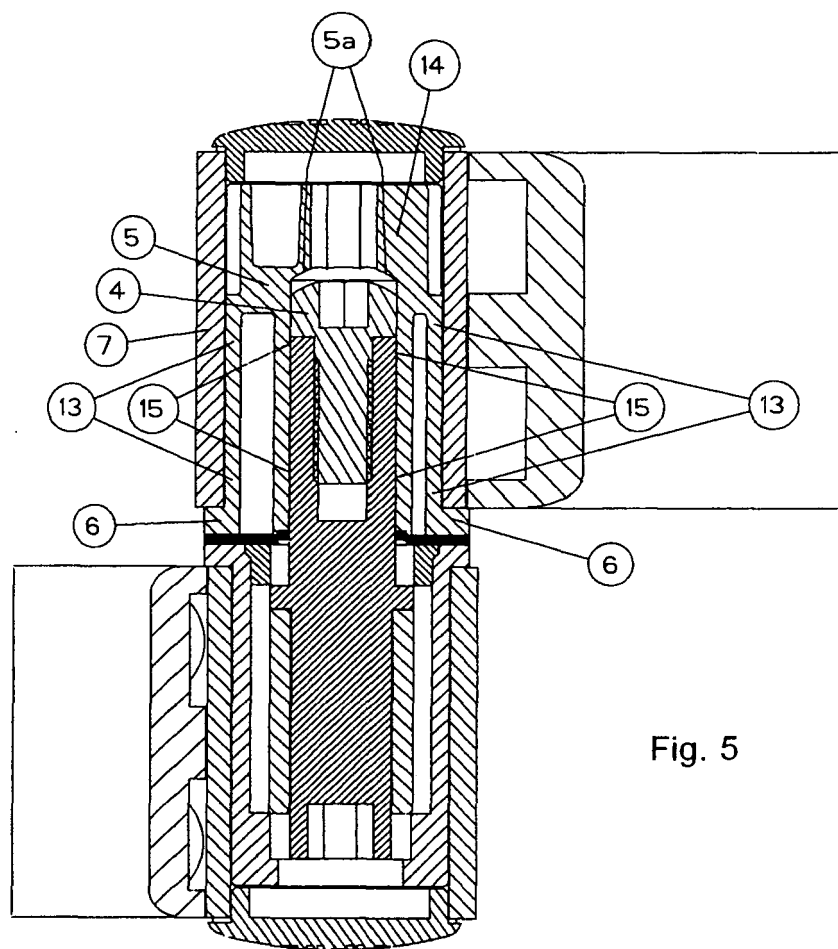


Fig. 5

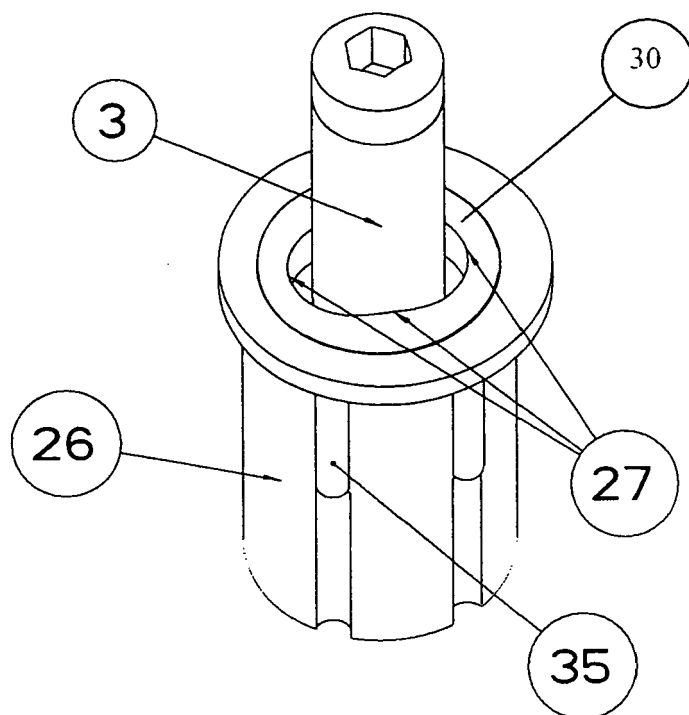
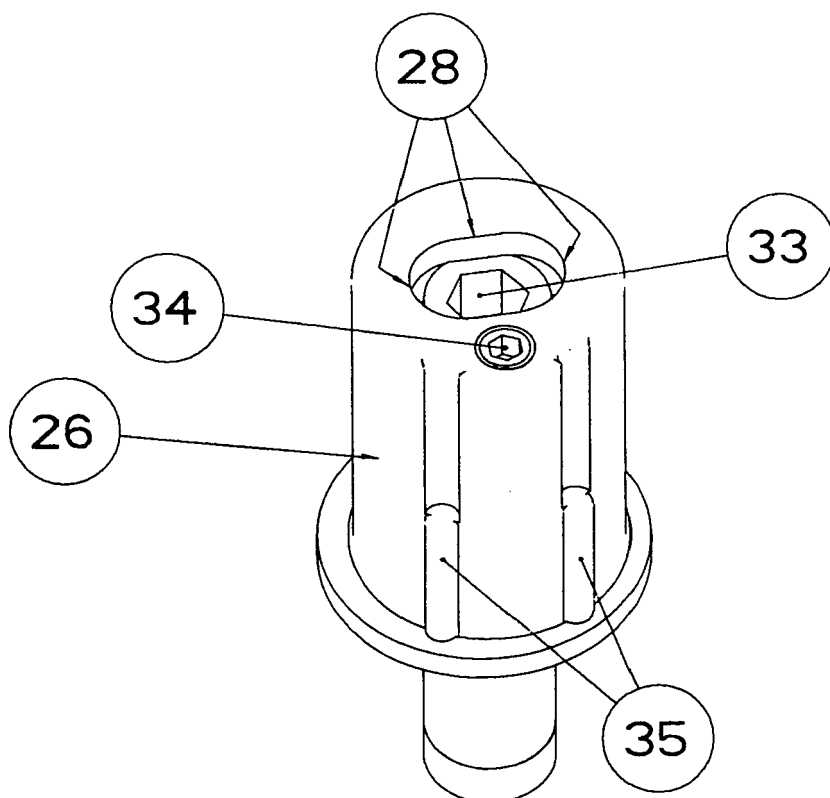


Fig. 6



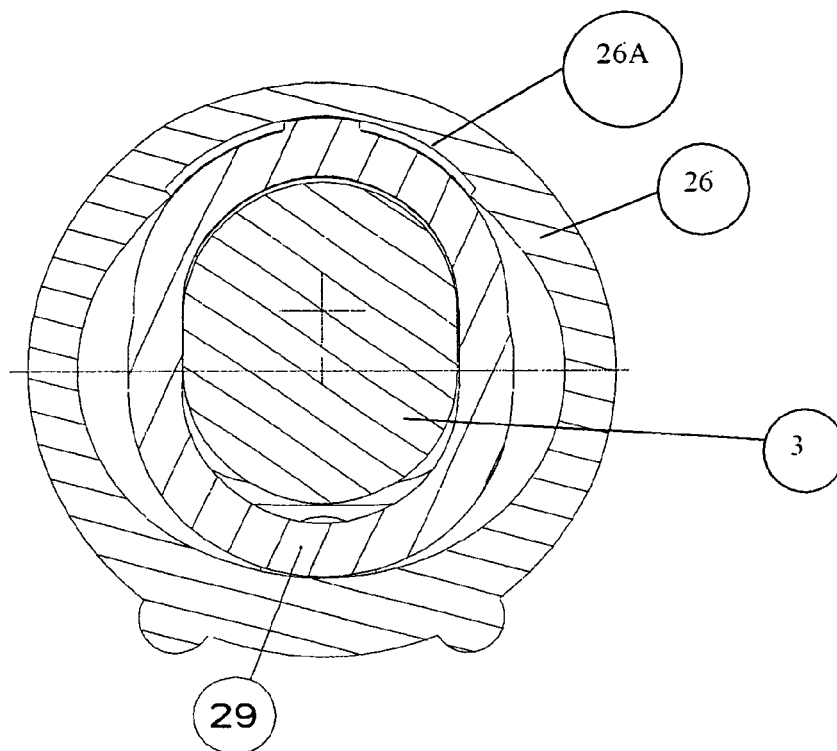


Fig. 6A

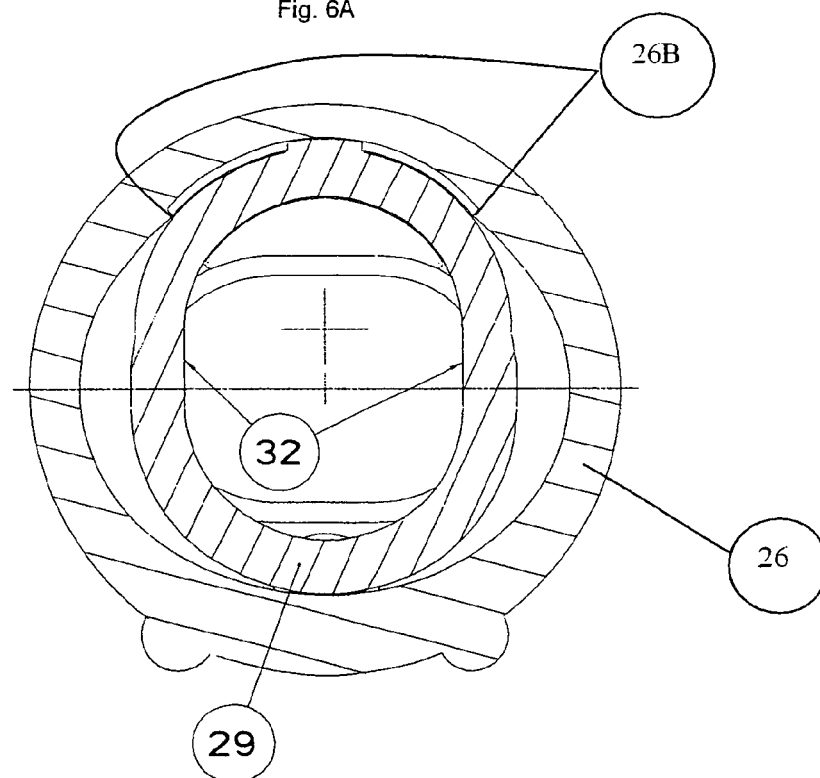


Fig. 6B

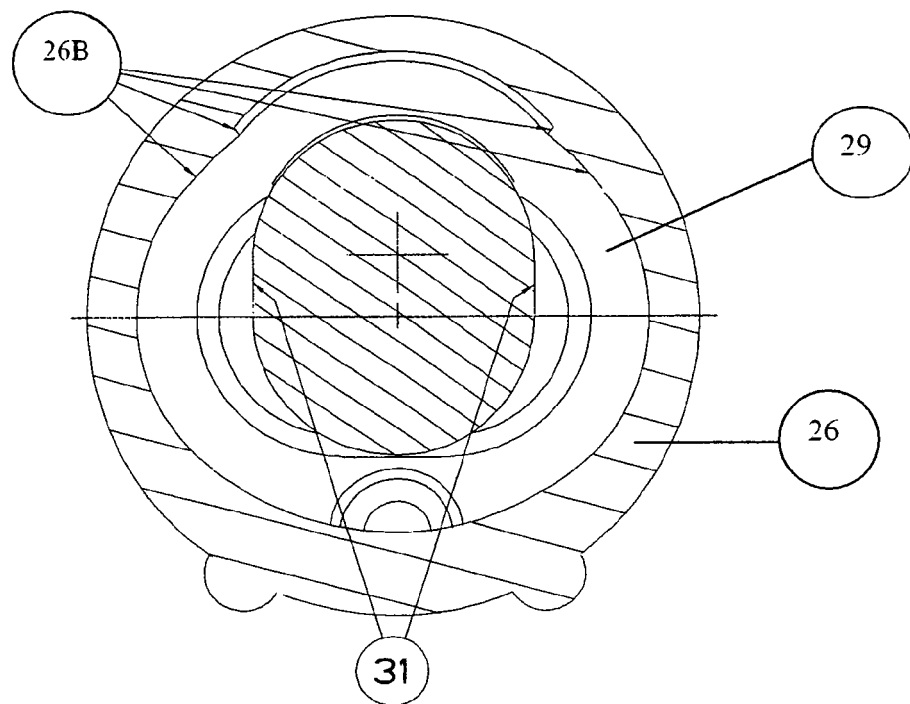


Fig. 6C

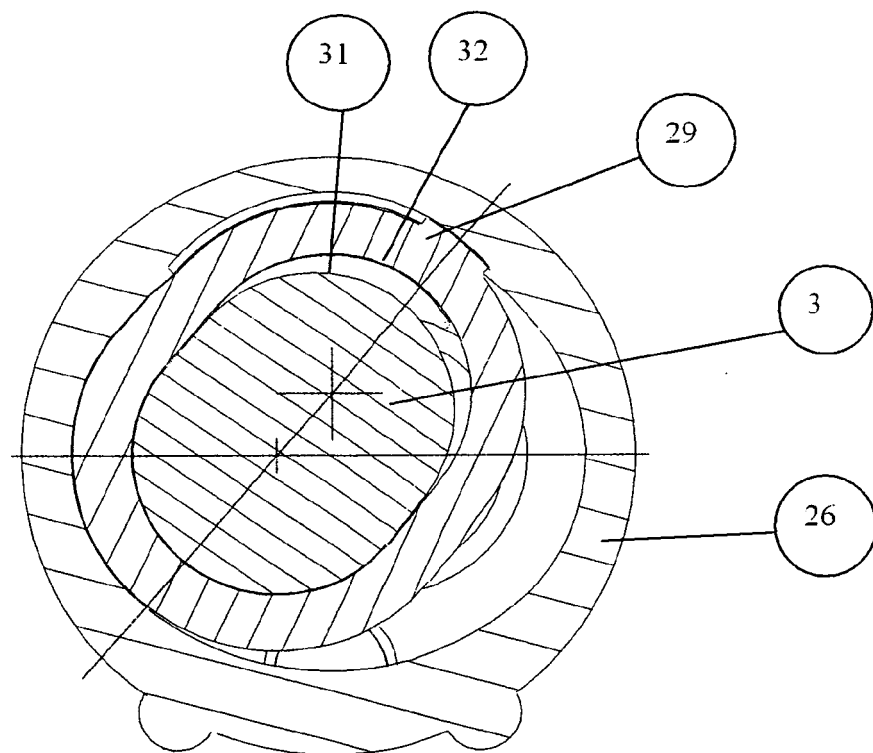


Fig. 6D

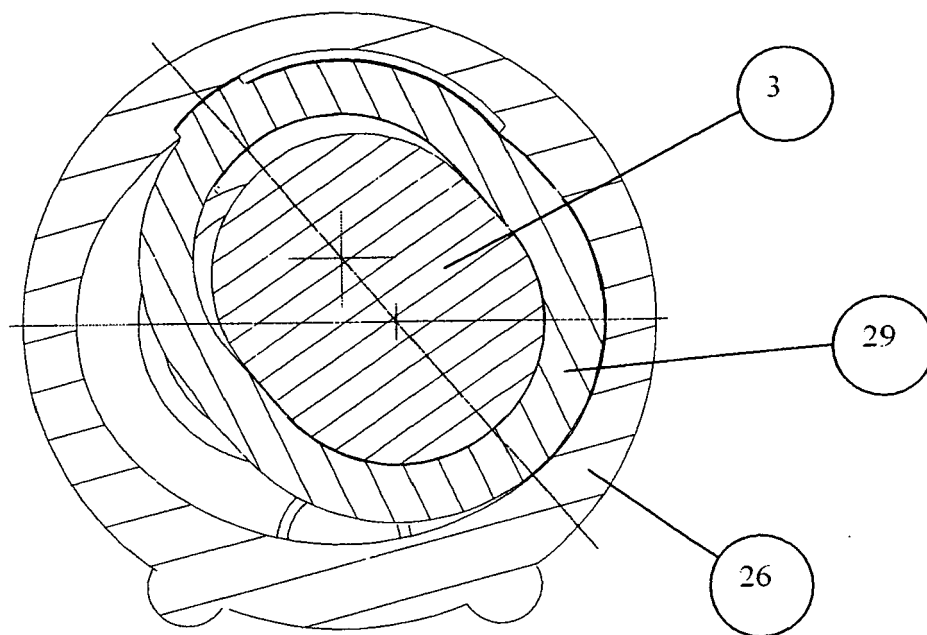


Fig. 6E

FIG. 7A

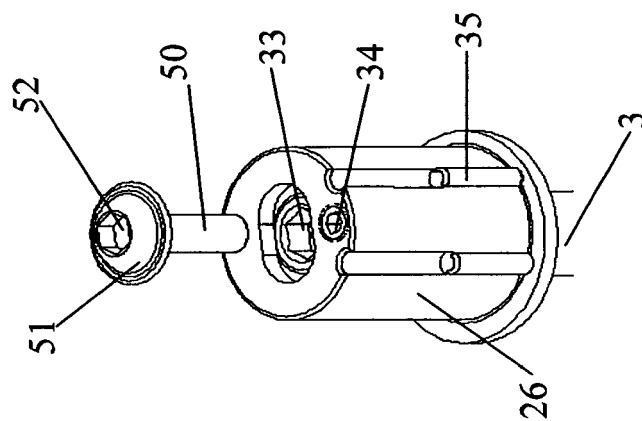


FIG. 7B

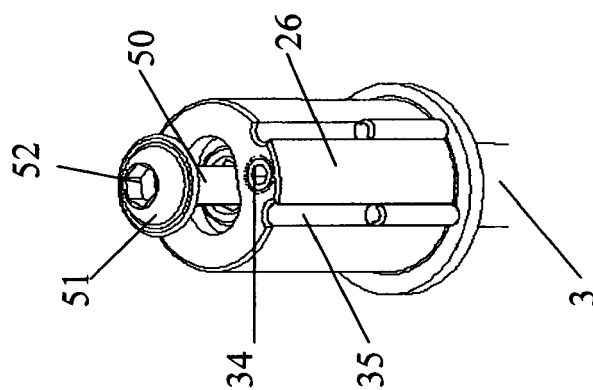


FIG. 7C

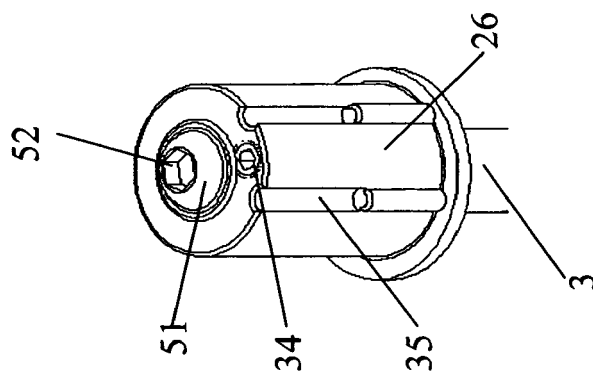


FIG. 8A

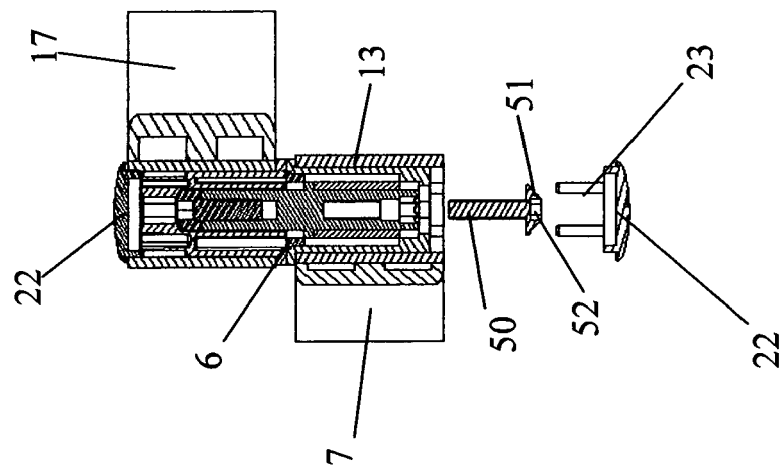


FIG. 8B

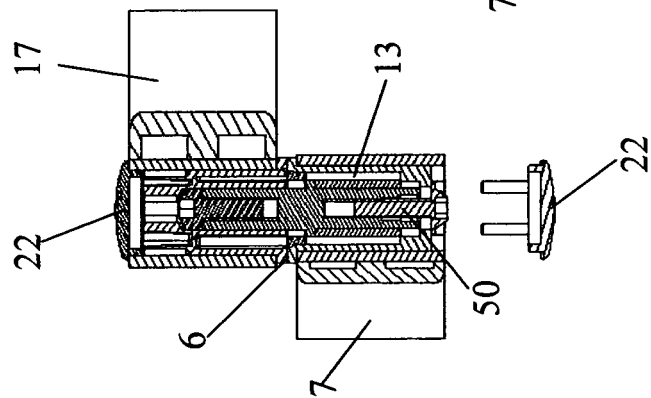
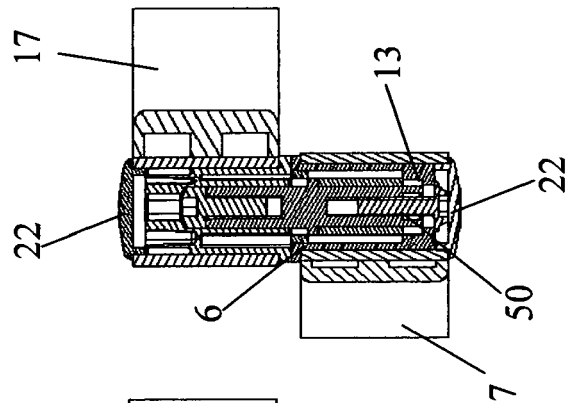


FIG. 8C





EUROPEAN SEARCH REPORT

Application Number
EP 09 42 5234

| 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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| <p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p> | | | |

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EPO FORM 1503 03-02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 09 42 5234

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 1455042 B1 [0018] [0020]