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(54) Push-button actuating device for a vehicle lock

(57) A vehicle door lock is controlled by a push-button actuating device (3) having a supporting body (5) having a respective axis (6); a key cylinder (20) movable with respect to the supporting body (5) along the axis (6) and operated by a dedicated key (21); a control member (23) connectable to the lock and sliding axially with respect to the supporting body (5); and a connecting assembly (19) for connecting the key cylinder (20) to the control member (23); the connecting assembly (19) having a releasable angular-constraint device (35, 41, 42) which is retained by a spring (37) in a first operating position making the key cylinder (20) and the control member (23) angularly integral with each other, and is movable, by means of a cam actuating device (44) only excludable by means of the dedicated key (21), into a second operating position in which the key cylinder (20) rotates freely about the axis (6) with respect to the control member (23) and the supporting body (5).

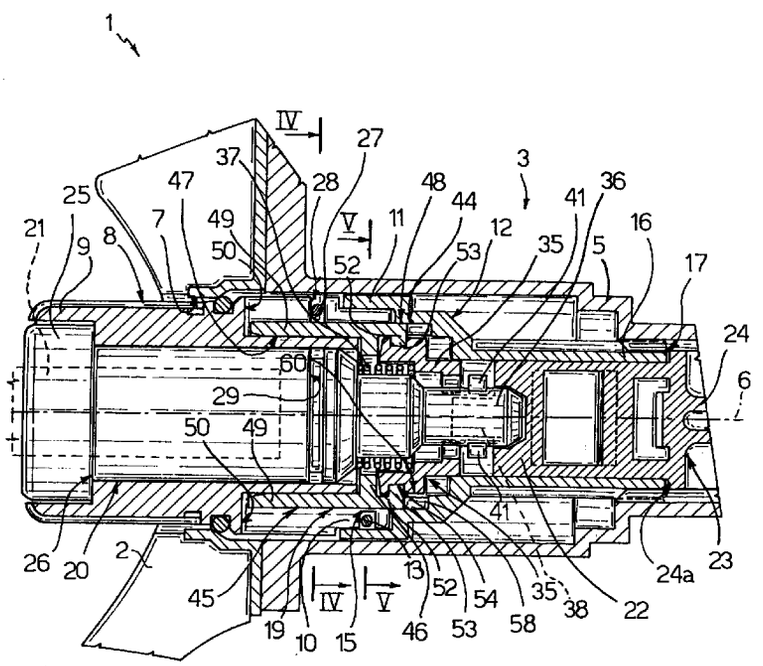

Fig.2

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Description

[0001] The present invention relates to a push-button actuating device for controlling a vehicle lock.

[0002] More specifically, the present invention relates to a push-button actuating device of the type comprising a key cylinder for switching a security member of the lock; and a control push-button by which to open the lock.

[0003] To prevent forcible entry, the key cylinder of known actuating devices of the above type must rotate "idly" in the event the key cylinder is rotated using other than the cylinder-dedicated key, and in the event the dedicated key is not inserted properly.

[0004] It is an object of the present invention to provide a push-button actuating device designed to meet the above requirement, and which, in particular, is cheap and easy to produce and provides for a high degree of reliability and efficiency.

[0005] According to the present invention, there is provided a push-button actuating device for a vehicle lock, the device comprising a supporting body having a respective axis; a key cylinder movable with respect to the supporting body along said axis; a dedicated key by which to rotate the key cylinder about said axis with respect to said supporting body; a control member connectable to said lock and which slides axially with respect to said supporting body; and connecting means for connecting said key cylinder to said control member; characterized in that said connecting means comprise releasable first angular-constraint means; elastic means for maintaining said first angular-constraint means in a first operating position making said key cylinder and said control member angularly integral with each other; and cam actuating means acting on said first angular-constraint means to move the first angular-constraint means into a second operating position in which the key cylinder is free to rotate with respect to said control member and said supporting body; releasable second angular-constraint means being interposed between said key cylinder and said cam actuating means, and only being excludable by means of said dedicated key to permit free rotation of the key cylinder with respect to said cam actuating means.

[0006] A non-limiting embodiment of the invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a section of a preferred embodiment of the push-button actuating device according to the present invention;

Figure 2 shows a section along line II-II in Figure 1, with certain parts in a different operating condition;

Figure 3 shows a section along line III-III in Figure 1;

Figures 4 and 5 show sections along lines IV-IV and V-V respectively in Figure 2;

Figures 6 and 7 show sections along lines VI-VI and VII-VII respectively in Figure 1;

Figure 8 shows an exploded view in perspective of a detail in Figure 2.

[0007] Number 1 in Figures 1 and 2 indicates as a whole a handle for a vehicle door (not shown). Handle 1 comprises a grip body 2; and a push-button actuating device 3 for controlling a lock (not shown) on the door.

[0008] With reference to Figures 1 and 2, device 3 comprises an outer tubular supporting body 5 having a respective axis 6 and connectable integrally to a structure of the door and to grip body 2 at an opening 7 formed in grip body 2, coaxially with axis 6, to enable the inside of body 5 to communicate with the outside.

[0009] A further tubular body 8 extends, coaxially with axis 6, through opening 7 and partly inside body 5, and has an end portion 9 projecting outwards of grip body 2, and an opposite end portion 10 engaging an end collar portion 11 of a slide member 12 inside body 5 and coaxial with axis 6. As shown, particularly in Figures 2 and 5, slide member 12 is defined by a further elongated tubular body and is connected to body 8 by a pin 13, which extends perpendicularly to axis 6 through collar portion 11 and partly inside an outer circumferential groove 15 on portion 10 to connect body 8 in rotary manner about axis 6 and in axially-fixed manner to member 12. With reference to Figure 2, slide member 12 has an end portion 16, opposite collar portion 11, which is connected in axially-sliding, angularly-fixed manner to tubular body 5 by means of a splined coupling 17 (Figures 2, 6 and 7).

[0010] Body 8 and member 12 define a chamber housing, in line with each other and coaxial with axis 6, a known key cylinder 20 having a respective dedicated key 21, and an end portion 22 of a control member 23, and form part of a connecting assembly 19 for connecting key cylinder 20 to member 23. Member 23 comprises an end portion 24, opposite portion 22, which defines an axial shoulder 24a (Figures 1 and 2), against which member 12 rests, and is connected in known manner to a security member (not shown) and to a lock-opening lever A.

[0011] In particular, and as shown in Figures 1 and 2, key cylinder 20 engages tubular body 8 in rotary manner about axis 6 to define a push-button of device 3, comprises a head 25 resting against an inner axial shoulder 26 of body 8, and is locked axially with respect to body 8 by an Ω-shaped spring 27 (Figures 2 and 4) engaging an outer circumferential groove 28 formed on body 8 and adjacent to portion 10, and a corresponding circumferential groove 29 formed on an intermediate portion of key cylinder 20. The intermediate portion of key cylinder 20 houses a number of known rocker-arm members 31 - only one shown schematically in Figure 1 - which are maintained inside key cylinder 20 by key 21, but which, when key 21 is partly or fully withdrawn, project radially outwards of the intermediate portion through respective openings (not shown) and engage respective axial grooves 32 (Figure 1) inside body 8 to

angularly and releasably connect key cylinder 20 and body 8.

[0012] As shown in Figures 1 to 3, slide member 12 houses a slide body 35 which forms part of assembly 19, surrounds an end portion 36, opposite head 25, of key cylinder 20 coaxially with axis 6, and is maintained in a first operating position (Figure 1) resting against an axial shoulder on slide member 12 by a spring 37 surrounding portion 36 and compressed between body 35 and a radial surface of key cylinder 20 (Figure 2).

[0013] With reference to Figures 1 and 3, slide body 35 is connected to control member 23 in axially-sliding, angularly-fixed manner by two appendixes or axial arms 38 facing each other, integral with control member 23, and engaging in sliding manner respective diametrically-opposite axial seats 39 formed on slide body 35 (Figure 3). In the first operating position, slide body 35 is also connected in angularly-fixed manner to key cylinder 20 by a splined coupling forming part of assembly 19 and comprising two radial teeth 41 integral with portion 36 of key cylinder 20 and engaging, positively and in axially-sliding manner, respective seats 42 formed in slide body 35.

[0014] With reference to Figure 2, slide body 35 is movable axially into a second operating position (Figure 2) in which teeth 41 release seats 42 to enable key cylinder 20 to be rotated freely with respect to slide body 35 and control member 23 by a cam device 44 (Figure 8) forming part of assembly 19.

[0015] As shown in Figure 2 and particularly in Figure 8, device 44 comprises, in addition to member 12, a further slide body 45 which surrounds spring 37, coaxially with axis 6, and in turn comprises an intermediate annular portion 46 resting against a front surface of slide body 35, and two opposite fork-shaped end portions 47 and 48. Portion 47 comprises two diametrically-opposite axial arms 49, each of which engages, in sliding manner and with substantially no circumferential clearance, a respective axial slide seat 50 formed through end portion 10 of tubular body 8; and portion 48 comprises two axial teeth 52, each of which forms an extension of a respective arm 49 and is connected in rotary manner about axis 6 and in axially-fixed manner to slide body 35 by a respective inner radial projection 53 engaging an outer circumferential groove 54 formed on body 35. As shown, particularly in Figure 8, each tooth 52 is defined laterally by two opposite flat surfaces 55 converging with each other towards a free end of respective tooth 52. In use, teeth 52 engage respective complementary flared axial seats 57 formed on slide member 12, on opposite sides of axis 6, and each defined by two flat surfaces 58 converging with each other towards the bottom of respective seat 57. Surfaces 58 each extend parallel to a respective surface 55, and, when slide body 35 is in the first position, are each positioned contacting respective surface 55 to define respective inclined-plane assemblies 60 (Figures 2) for overcoming the action of spring 37 and sliding body 35 axially towards tubular body 8 regardless of the rotation direction of body 8 about axis 6.

[0016] With reference to Figures 1 and 6, control member 23 is fitted with a radial pin 62 which projects outwards of member 12 and engages a circumferential seat 63 formed on member 12 and defined by two radial shoulders 64 (Figure 6) defining respective limit angular positions of pin 62. As shown in Figure 7, pin 62 and, consequently, control member 23 are maintained in a zero relative angular position between the limit angular positions by a torsion pin spring 65.

[0017] Operation of device 3 will now be described as of the condition shown in Figure 1, in which slide body 35 is set by spring 37 to the first operating position and is therefore connected angularly integral with key cylinder 20, and in which dedicated key 21 is withdrawn from key cylinder 20 so that rocker-arm members 31 project outwards of key cylinder 20 and engage respective grooves 32 to angularly connect key cylinder 20 and tubular body 8.

[0018] When dedicated key 21 is inserted inside key cylinder 20, as of the above condition, rocker-arm members 31 are withdrawn fully inside key cylinder 20 to enable key cylinder 20 to rotate freely with respect to body 8 and so switch the security member (not shown) of the lock by rotating body 35 which in turn rotates control member 23. At this point, when axial pressure is exerted on key cylinder 20, body 8, slide member 12 and control member 23 are moved forward simultaneously, and control member 23 opens the lock.

[0019] In the event key cylinder 20 is operated using a key other than dedicated key 21 or any of various tools to force entry, or dedicated key 21 is not inserted properly, all or some of members 31 remain in the extracted position engaging grooves 32 to angularly connect key cylinder 20 and body 8, so that, as key cylinder 20 rotates about axis 6, tubular body 8 rotates together with key cylinder 20 and in turn rotates body 45, surfaces 55 of which slide in contact with surfaces 58 so that slide body 45 is gradually withdrawn towards tubular body 8, thus releasing teeth 52 from seats 57. As it is withdrawn, slide body 45 acts in opposition to spring 37 to take with it slide body 35, which is therefore moved gradually into the second operating position enabling key cylinder 20 to rotate freely with respect to control member 23. As key cylinder 20 rotates, each tooth 52, on reaching the seat 57 formerly occupied by the other tooth 52, clicks into seat 57 and is then immediately withdrawn as surfaces 55 again slide in contact with surfaces 58.

[0020] The characteristics of device 3 as described therefore provide for preventing forcible entry, by key cylinder 20, in the absence of dedicated key 21, continually rotating "idly" or clicking about axis 6 and producing no rotation of control member 23, so that the lock remains disabled and cannot be opened even by axial pressure on key cylinder 20 and/or body 8.

[0021] Device 3 as described is therefore also

extremely straightforward construction-wise, comprises a relatively small number of fairly straightforward components, and is therefore relatively cheap to produce and assemble.

[0022] Clearly, changes may be made to device 3 as described herein without, however, departing from the scope of the present invention. In particular, cam actuating device 44 may be formed otherwise than as described by way of example; bodies 35 and 45 and member 23 may be formed otherwise than as described herein, e.g. to adapt to a different cam actuating device; key cylinder 20 may be formed otherwise than as described herein; and body 8 may also be formed otherwise to adapt to a different key cylinder.

Claims

1. A push-button actuating device (3) for a vehicle lock, the device (3) comprising a supporting body (5) having a respective axis (6); a key cylinder (20) movable with respect to the supporting body (5) along said axis (6); a dedicated key (21) by which to rotate the key cylinder (20) about said axis (6) with respect to said supporting body (5); a control member (23) connectable to said lock and which slides axially with respect to said supporting body (5); and connecting means (19) for connecting said key cylinder (20) to said control member (23); characterized in that said connecting means (19) comprise releasable first angular-constraint means (35, 41, 42); elastic means (37) for maintaining said first angular-constraint means (35, 41, 42) in a first operating position making said key cylinder (20) and said control member (23) angularly integral with each other; and cam actuating means (44) acting on said first angular-constraint means (35, 41, 42) to move the first angular-constraint means (35, 41, 42) into a second operating position in which the key cylinder (20) is free to rotate with respect to said control member (23) and said supporting body (5); releasable second angular-constraint means (8, 31) being interposed between said key cylinder (20) and said cam actuating means (44), and only being excludable by means of said dedicated (21) key to permit free rotation of the key cylinder (20) with respect to said cam actuating means (44).

2. A device as claimed in Claim 1, characterized in that said first angular-constraint means (35, 41, 42) comprise a first slide member (35) connected to said control member (23) in axially-sliding and angularly-fixed manner with respect to the control member; said first slide member (35) being movable axially between said first and second operating positions by said elastic means (37) and said cam actuating means (44); said first angular-constraint means (35, 41, 42) also comprising at least one radial retaining seat (42) carried by one of said key cylinder (20) and said first slide member (35), and at least one radial projection (41) carried by the other of said key cylinder (20) and said first slide member (35) and only positively engaging said retaining seat (42) when the first slide member (35) is in the first operating position.

3. A device as claimed in Claim 2, characterized in that said cam actuating means (44) comprise at least one inclined-plane device (60).

4. A device as claimed in Claim 3, characterized in that said inclined-plane device (60) comprises at least one first (58) and at least one second (55) surface inclined with respect to said axis (6) and cooperating in sliding manner with each other; said first surface (58) being axially fixed with respect to said key cylinder (20); and said second surface (55) sliding axially with respect to the key cylinder (20).

5. A device as claimed in Claim 3 or 4, characterized in that said cam actuating means (44) comprise two said inclined-plane devices (60), one for each rotation direction of said key cylinder (20) about said axis (6).

6. A device as claimed in Claim 5, characterized in that said cam actuating means (44) also comprise a second slide member (45) which translates axially with respect to said key cylinder (20); said second slide member (45) carrying said second surface (55); and coupling means (53, 54) being provided to connect said first slide member (35) and said second slide member (45) in rotary manner with respect to each other about said axis (6) and in fixed axial positions with respect to each other.

7. A device as claimed in Claim 5 or 6, characterized in that said cam actuating means (44) comprise a third slide member (12) connected to said supporting body (5) in angularly-fixed manner and so as to slide along said axis (6); said third slide member (12) carrying said first surface (58).

8. A device as claimed in Claim 7, characterized in that said second angular-constraint means (8, 31) comprise a tubular body (8) connected to said supporting body (5) in axially-sliding and rotary manner about said axis (6), and in turn comprising at least one inner retaining seat (32); said key cylinder (20) at least partially engaging said tubular body (8) in axially-fixed and rotary manner about said axis (6), and comprising a number of angular-locking elements (31) positively engaging said inner retaining seat (32) when said dedicated key (21) is not inserted inside the key cylinder (20); connecting means (49) being provided to connect said second slide member (45) to said tubular body (8) in axially-

sliding and angularly-fixed manner about said axis (6).

9. A device as claimed in Claim 8, characterized by also comprising elastic means (27) for connecting said key cylinder (20) to said tubular body (8) in rotary manner about said axis (6) and in fixed axial positions with respect to each other.

10. A device as claimed in Claim 8 or 9, characterized by comprising axial-constraint means (13) for connecting said tubular body (8) and said third slide member (12) in rotary manner with respect to each other about said axis (6) and in axially-fixed positions with respect to each other.

11. A device as claimed in any one of Claims 7 to 10, characterized in that said control member (23) partially engages said third slide member (12) so as to rotate about said axis between two limit angular positions; elastic means (65) being interposed between said control member (23) and said third slide member (12) to keep the control member (23) in an intermediate zero position between said two limit angular positions.

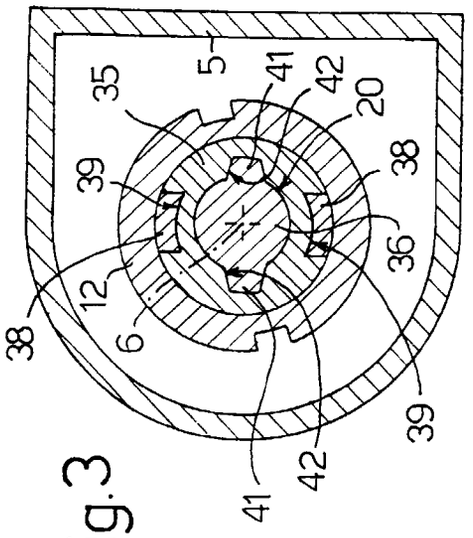

Fig.3

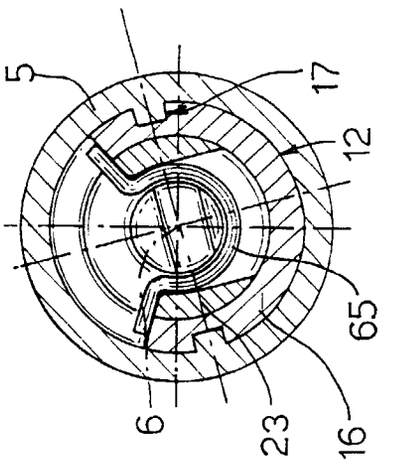

Fig.7

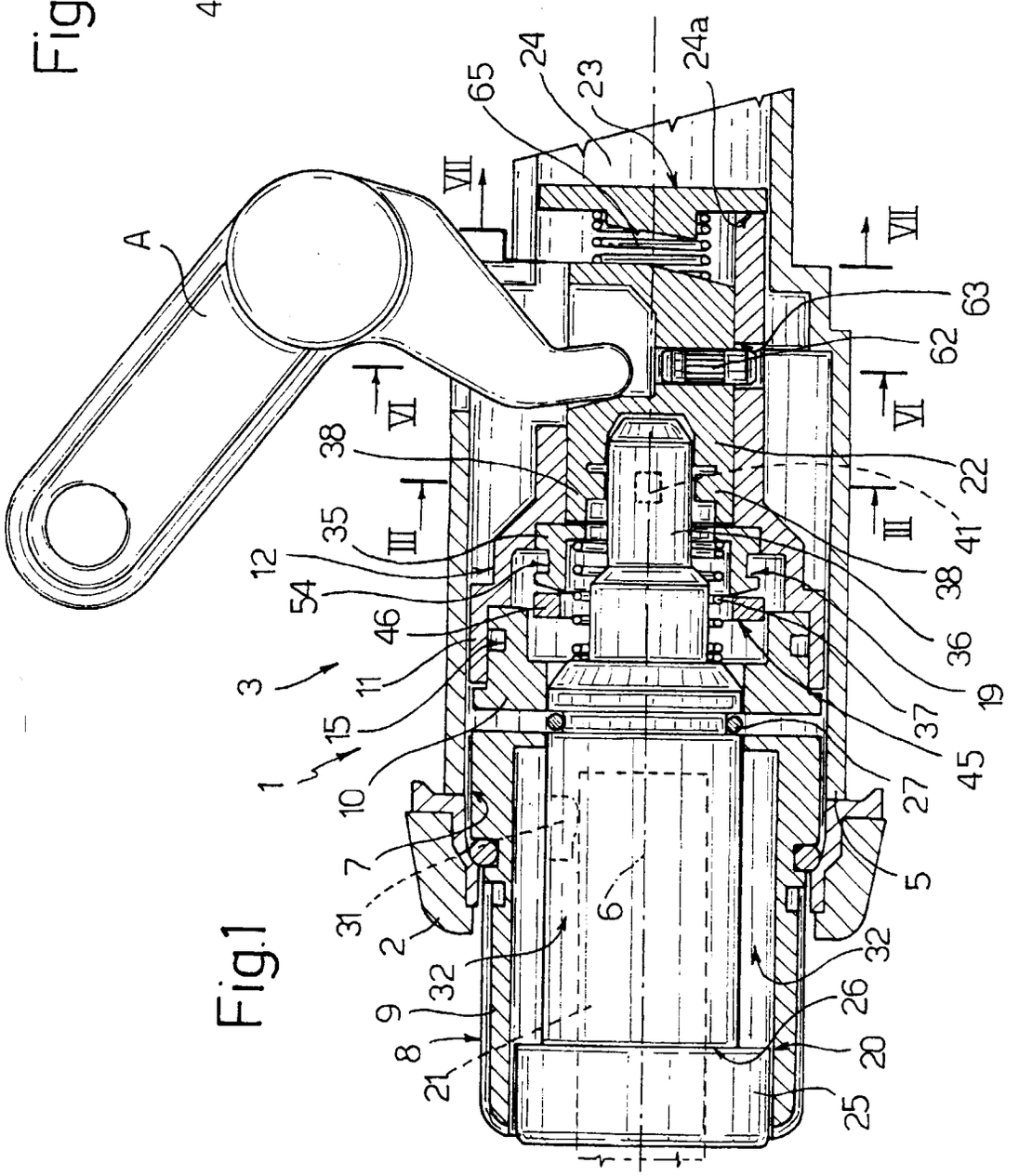

Fig.1

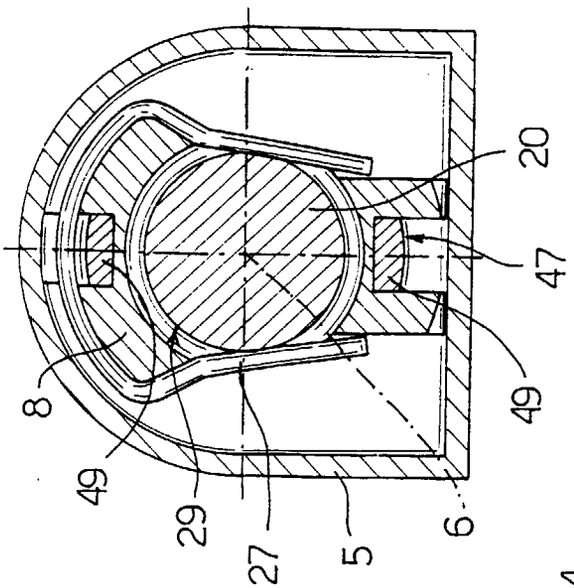
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Fig.4

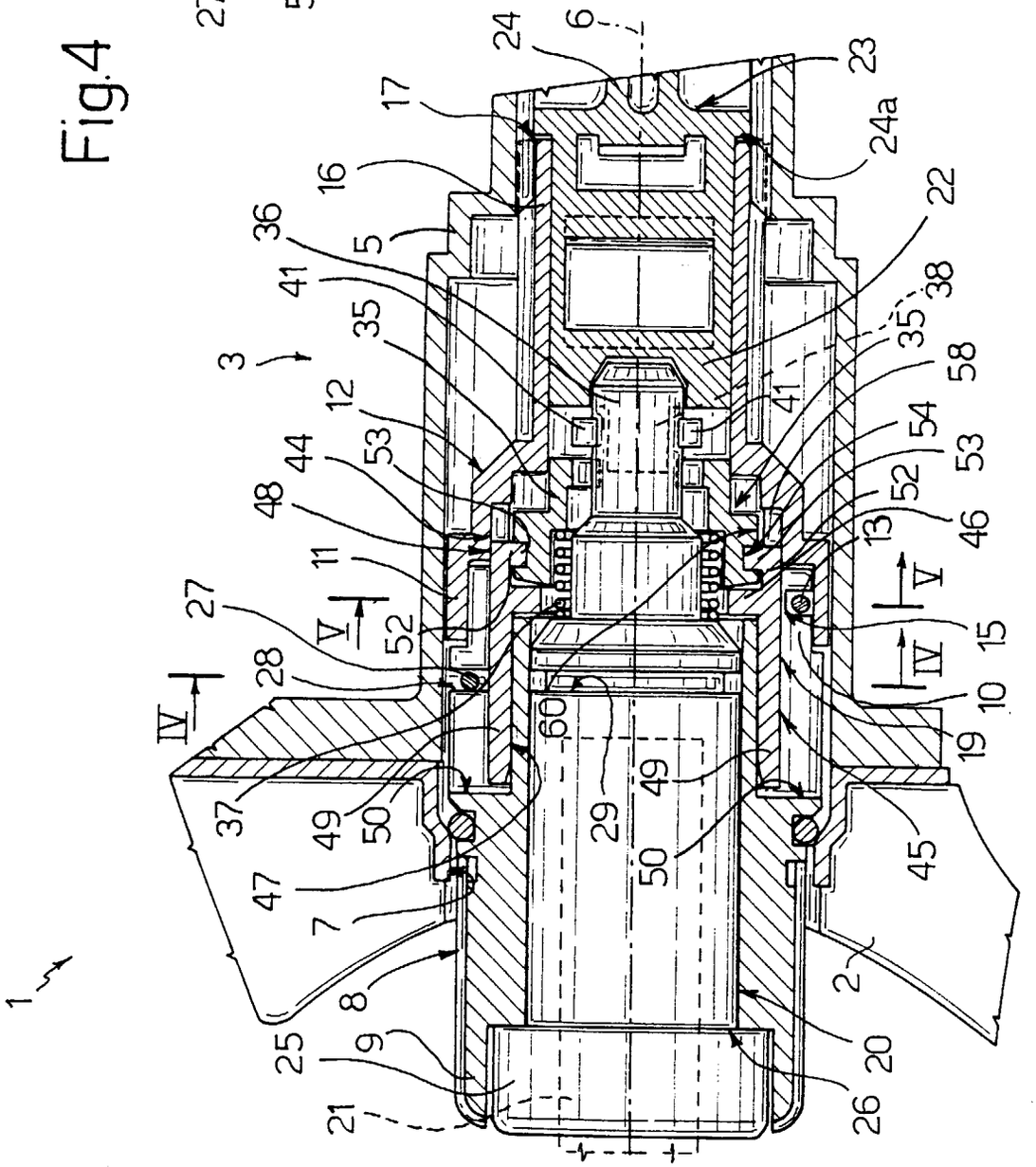
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Fig.2

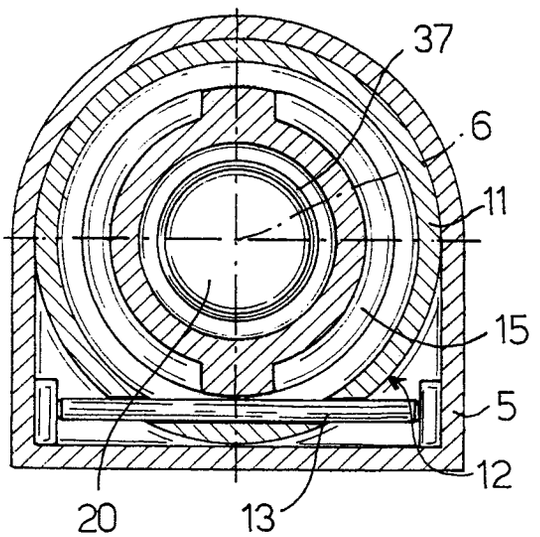

Fig.5

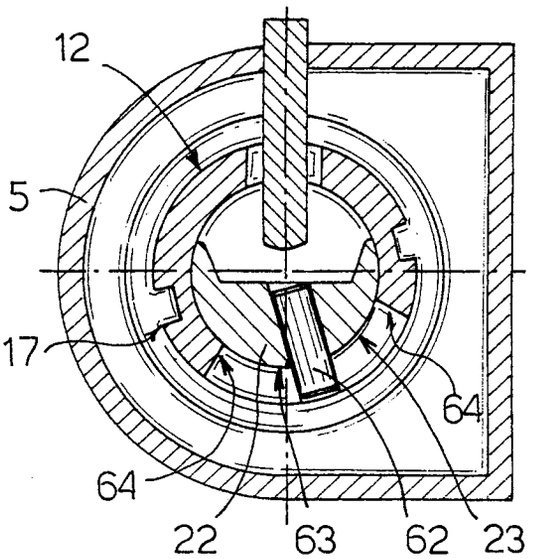

Fig.6

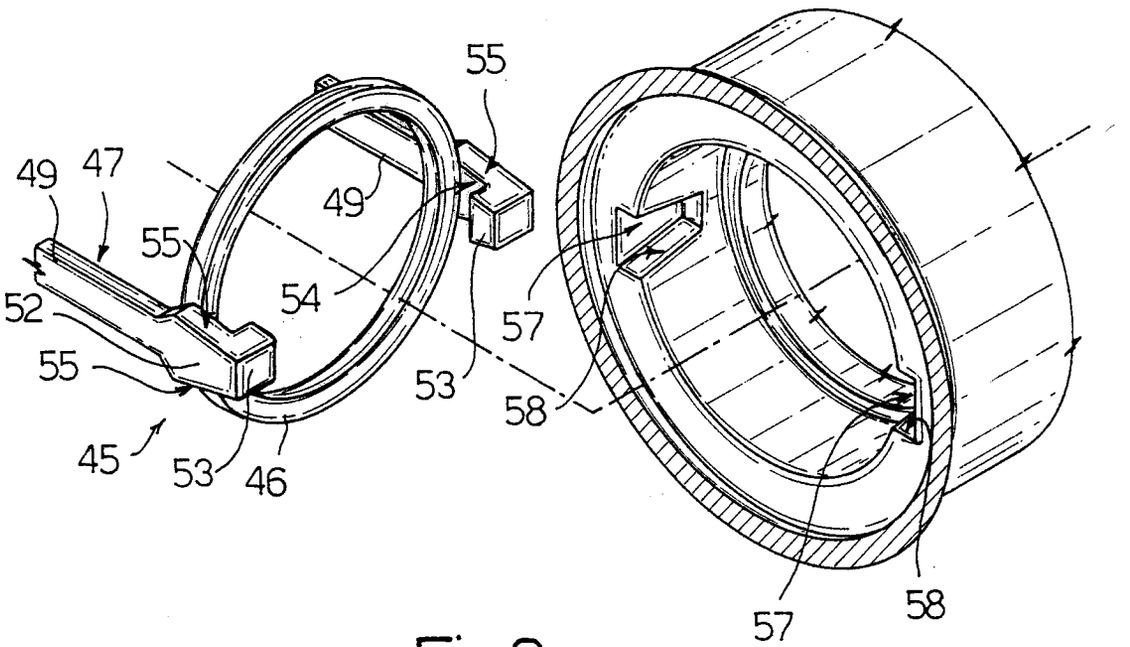

Fig.8