

(19)



(11)

EP 2 889 443 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
01.07.2015 Bulletin 2015/27

(51) Int Cl.:
E05B 63/00 (2006.01) **E05B 65/08** (2006.01)
E05B 15/02 (2006.01)

(21) Application number: **14195490.9**

(22) Date of filing: **28.11.2014**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

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(30) Priority: **24.12.2013 IT TV20130214**

(54) Lock for in-wall frames of retractable sliding doors

(57) A lock (1), particularly for in-wall frames of retractable sliding doors, which is constituted by a box-like containment structure (3) for a cylinder (6), which rotates in contrast with a radial means for selecting the position, on the lateral surface (10) of the cylinder there being first

temporary engagement and retention means for a locator (16) that protrudes from an abutment frame (19) for the door, second means being also provided, which can be activated by the user, in order to turn the cylinder (6).

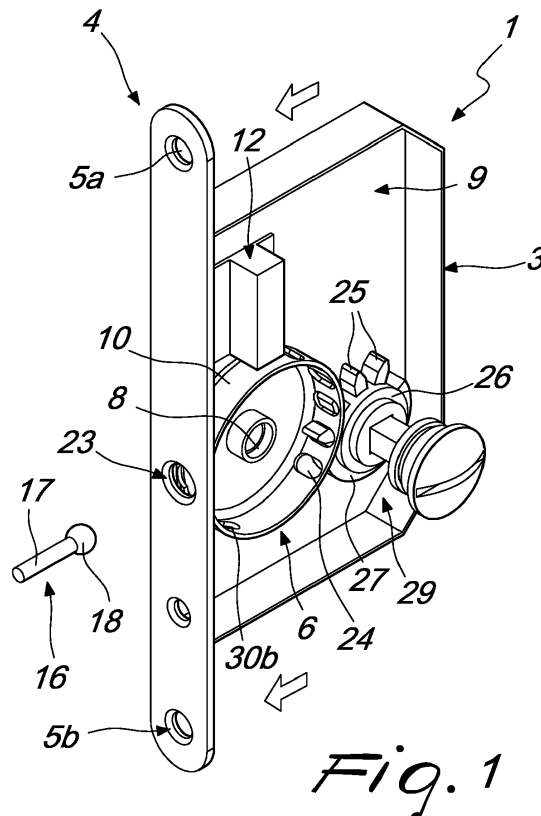


Fig. 1

Description

[0001] The present invention relates to a lock, particularly for front posts for in-wall frames of retractable sliding doors.

[0002] Nowadays it is known to provide door frames which involve the use of a casing, positioned inside a wall, in which a door or a panel is slideably associated and which is also known as a "retractable door".

[0003] Such solution makes it possible to reduce the encumbrances of the door in a room thanks to the possibility of sliding it into the casing: thus one can use the space adjacent to the door, which would otherwise be occupied by doors of the type that are hinged laterally to a casement.

[0004] In the known art, the frame embedded in the wall is usually constituted by a framework which comprises a plurality of vertical profiled elements, a front post and a rear post, which are connected by horizontal cross-members which define a containment casing of the panel or of the door.

[0005] Protruding above the case, along an axis that is longitudinal with respect to the case proper and that extends from the side opposite to that of the containment case, is a rail which is hidden by a jamb.

[0006] Trolleys coupled to the upper edge of the door are slideably integrated in the rail in order to enable the sliding of the door into and out of the in-wall casing.

[0007] Usually associated with the end of the rail which is not associated with the vertical post locators is an additional post that acts as a terminal for the abutment of the front edge of the door.

[0008] Such conventional door frames thus use metallic profiles that can be mounted together and are sold for example in kit form for assembly.

[0009] The doors are usually associated with a lock of the type constituted by a hook-shaped coupler, which can perform an oscillating movement that is such as to allow its temporary locking at a tooth that is present on the abutment frame for the door.

[0010] Such solution suffers drawbacks, which consist mainly of the difficulty of achieving both optimal and rapid locking and unlocking between the coupler and the tooth, it being also possible for sticking to occur, which hinders such operations.

[0011] Furthermore the locking is not particularly stable.

[0012] The aim of the present invention is therefore to resolve the above mentioned technical problems, by eliminating the drawbacks in the cited known art and thus devising a lock for in-wall frames of retractable sliding doors which makes it possible to obtain an optimal and stable closure of the door.

[0013] Within the above aim, an object of the invention is to provide a lock that can be opened or closed rapidly and easily and with no sticking.

[0014] Another object is to provide a lock that makes it possible to achieve an optimal and precise coupling

with a locator element which is such as to ensure a stable open or closed condition.

[0015] Another object is to provide a lock that is structurally simple, can be provided with conventional systems and machines, and is low cost.

[0016] This aim and these and other objects which will become better apparent hereinafter, are achieved by a lock, particularly for in-wall frames of retractable sliding doors, characterized in that it is constituted by a box-like containment structure for a cylinder, which rotates in contrast with a radial means for selecting its position, on the lateral surface of which there are first temporary engagement and retention means for a locator that protrudes from an abutment frame for said door, and second means, which can be activated by the user, in order to turn said cylinder.

[0017] Conveniently means are provided that are adapted to temporarily occlude the inlet hole for the locator and to prevent the rotation of the cylinder in the event the sliding door is open.

[0018] Further characteristics and advantages of the invention will become better apparent from the detailed description of a particular, but not exclusive, embodiment, illustrated by way of non-limiting example in the accompanying drawings wherein:

Figure 1 is a first perspective view of the lock and its internal components and the locator;

Figure 2 is a side view of the condition in Figure 1;

Figure 3 is a second perspective view of the lock and its internal components in the open condition;

Figure 4 is a side view of the condition in Figure 3;

Figure 5 is a third perspective view of the lock and its internal components in the closed condition;

Figure 6 is a side view of the condition in Figure 5;

Figure 7 is a sectional view of the lock, taken along the line VII-VII in Figure 4;

Figure 8 shows a detail of Figure 7;

Figure 9 is a sectional view of the lock, taken along the line IX-IX in Figure 6;

Figure 10 shows a detail of Figure 9;

Figure 11 is a perspective view of the invention and with the box-like structure in a closed configuration;

Figure 12 shows the invention in Figure 11 with the box-like structure in a partially open configuration;

Figure 13 is a perspective view of the cover of the box-like structure;

Figures 14, 15 and 16 show the invention in a view similar to that in Figure 3 in which the operation is shown of the means adapted to temporarily occlude the hole for the entry of the locator;

Figure 17 is a side view of the interior of the box-like structure.

[0019] In the embodiments illustrated, individual characteristics shown in relation to specific examples may in reality be interchanged with other, different characteristics, existing in other embodiments.

[0020] With reference to the figures, the reference numeral 1 generally designates a lock for in-wall frames of retractable sliding doors which is constituted by a box-like structure 3 that is parallelepiped in shape, is open on one side and can be closed by means of a cover 32, and is connected frontally by a faceplate 4 which is provided with first holes 5a and 5b for coupling to the door.

[0021] A cylinder 6 is arranged within the box-like structure 3 and is open at one end and closed at the other end by a wall 7 that is provided axially with a pivot 8 for pivoting to the backplate 9 of the box-like structure 3.

[0022] Such pivot 8 is arranged in a substantially intermediate region between the first holes 5a, 5b and the cylinder 6 has a diameter that is such as to arrange its lateral surface 10 approximately tangential to the inner surface 11 of the faceplate 4.

[0023] The cylinder 6 is thus idle and associated rotatably with the box-like structure 3, its lateral surface 10 skimming, during rotation, the inner surface 11 of the faceplate 4.

[0024] The cylinder 6 rotates in contrast with a means that is arranged radially thereto and which makes it possible to achieve the temporary selection of a chosen position of the cylinder 6, the means being constituted by a receptacle 12 that is shaped like a parallelepiped, is associated with the backplate 9 and is arranged radially to the cylinder 6 in a region that lies above it, advantageously along an axis that is parallel to the inner surface 11 of the faceplate 4.

[0025] The receptacle 12 has an open end 13 that is arranged adjacent to the underlying lateral surface 10 of the cylinder 6 and has a ball 14 arranged inside it which acts in contrast with an elastically deformable element 15, such as a cylindrical helical compression spring.

[0026] First temporary engagement and retention means are provided on the lateral surface 10 of the cylinder 6 for a locator 16 that is constituted by a shaft 17 that ends with a spherical head 18.

[0027] The locator 16 protrudes from an abutment frame or rabbet 19 for the door 2.

[0028] The first engagement and retention means are constituted by a first seat 20 that is T-shaped so as to define a first portion 21, which is circular and has a larger diameter than that of the spherical head 18, followed by a second portion 22 that is slightly wider than the shaft 17, the second portion 22 being extended over a chosen circular arc, considering a counterclockwise rotation as positive.

[0029] The first portion 21 of the first seat 20 can be positioned at a second hole 23 which is provided in the faceplate 4 and is adapted to allow the passage of the spherical head 18.

[0030] Second means that can be activated by the user are provided on the lateral surface 10 of the cylinder 6 in order to turn the cylinder 6, the second means being constituted by a plurality of second seats 24 that are provided approximately opposite the first portion 21 of the first seat 20 and have a shape and mutual distance that are such

as to allow their interaction with teeth 25 that protrude radially with respect to a hub 26 that is associated rotatably with a support 27 that protrudes from, and is integral with, the backplate 9 in a region that is adjacent to the cylinder 6 opposite the faceplate 4.

[0031] A shank 28 of a knob 29 that protrudes externally to the box-like structure 3 is keyed to the hub 26.

[0032] The selection of the position of the cylinder 6 is made possible by the presence of two third holes 30a, 30b that are provided on the lateral surface 10 of the cylinder 6, with which the ball 14 interacts selectively; the third holes 30a, 30b are provided in a position that is such that the ball 14 arranges itself thereat if the first portion 21 of the first seat 20 is arranged at the second hole 23 provided on the faceplate 4 and if the shaft 17 brings itself approximately at the closed end of the second portion 22.

[0033] In this way the cylinder 6 is in a stable open or closed position, since it allows either the insertion in the lock of the head 18 of the locator 16, or the locking of the locator 16 in the second portion 22.

[0034] Figures 11 to 17 show third means that are adapted to temporarily occlude the inlet hole for the locator 16 and to prevent the rotation of the cylinder 6 in the event the sliding door is open.

[0035] Such third means are associated at the inner lateral surface 31 of a cover 32, which is adapted to occlude the internal space of the box-like structure 3 and is associated rotatably with it by way of adapted hooks 33a, 33b that bear on adapted seats 34a, 34b which are provided at the inner surface 11 of the faceplate 4.

[0036] The third means are constituted by a cylindrical tumbler 35, which has a larger diameter than that of the second hole 23 defined on the faceplate 4, and which can be positioned, in use, on the same axis of arrangement of the locator 16.

[0037] The tumbler 35 is in fact slideably and axially associated with a perforated tab 36 that protrudes perpendicularly to the inner lateral surface 31, a shank 37 protruding axially from the tumbler 35, on the opposite side with respect to the locator 16, and being slideably associated with a flap 38 that protrudes perpendicularly from the inner lateral surface 31.

[0038] The axial sliding of the shank 37 is limited by the presence of a locator 48 that protrudes radially from its end which in turn protrudes beyond the flap 38.

[0039] Coaxially to the shank 37 there is an elastically compressible element 39, such as a cylindrical helical compression spring interposed between the tab 36 and the flap 38.

[0040] The dimensions and placement of the tumbler 35 are such that it is, when the door is in the open position shown in Figure 14, with the spring 39 pushing its front surface 40 to be positioned facing the lateral surface 10 of the cylinder 6 at the first portion 21, which has a larger diameter and so allows it to pass through and temporarily occlude the second hole 23 defined on the faceplate 4.

[0041] In the region of the cylinder 6 that, when the

door is in the open condition, is above the first portion 21 and therefore the tumbler 35, there is a protrusion 41 that prevents the anticlockwise rotation of the cylinder 6 which may be imposed by way of the knob 29

[0042] In this way a level of security is obtained, since only if the tumbler 35 is made to retreat sufficiently, and this occurs, as shown in Figures 15 and 16, only when the locator 16 affects the second hole 23 and thus the first portion 21, will the clockwise rotation be permitted of the cylinder 6 thus achieving the closure of the door.

[0043] Only by rotating the knob 29 clockwise will the cylinder 6 be made to perform an anticlockwise rotation until the head 18 of the locator 16 arranges itself at the first portion 21 and at the second hole 23 and, under pressure from the spring 39, the opening of the door is made easier.

[0044] Figure 17 shows a fourth means that is adapted to define the positions of "open" and "closed", such fourth means being constituted by a lamina 42 made of harmonic steel, arranged below the cylinder 6 and the knob 29.

[0045] The lamina 42 is fixed at a first end 43 to a first wing 44, which protrudes from the backplate 9, and rests on an adjacent, and underlying, second wing 45, which also rises from the backplate 9 in a region that is closer to the inner surface 11 of the faceplate 4.

[0046] The second end 46 of the lamina 42 has a curved shape and is adapted to interact selectively with one of two complementarily shaped undercuts 47a, 47b that are defined on the perimetric edge of the cylinder 6.

[0047] The undercuts 47a, 47b are positioned so that when the second end 46 of the lamina 42 interacts with the undercut 47a the door is in the open condition, while when it interacts with the undercut 47b the door is in the closed condition.

[0048] Thus it has been found that the invention fully achieves the intended aim and objects, a lock being devised that makes it possible to achieve a simple closure and an equally simple opening of the door, it being necessary merely to pull the door to the locator and subsequently turn the knob.

[0049] Furthermore an optimal and stable closure of the door is achieved thanks to the shape structure of the cylinder, it being possible to open or close such door rapidly and easily and without sticking.

[0050] The lock further makes it possible to achieve an optimal and precise coupling with the locator element which is such as to ensure a stable open or closed condition.

[0051] Furthermore the presence of the tumbler 35 considerably improves the appearance of the lock, given that when the door is open, the spring 39 pushes it forward and it occludes the second hole 23 defined on the faceplate 4.

[0052] The tumbler 35 further increases security and the presence of the spring helps, when opening the door, the initial movement of the door proper.

[0053] Lastly, the lock is structurally simple and is low

cost.

[0054] The invention is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

5 [0055] The materials used as well as the dimensions of the individual components of the invention may be more pertinent according to specific requirements.

[0056] The various means of achieving certain different functions certainly need not coexist only in the embodiment shown, but may be present in many embodiments, even if they are not shown. The characteristics indicated above as advantageous, convenient or the like, may also be missing or be substituted by equivalent characteristics.

10 [0057] The disclosures in Italian Patent Application No. TV2013A000214 from which this application claims priority are incorporated herein by reference.

[0058] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A lock (1), particularly for in-wall frames of retractable sliding doors (2), **characterized in that** it is constituted by a box-like containment structure (3) for a cylinder (6), which rotates in contrast with a radial means for selecting its position, on the lateral surface (10) of which there are first temporary engagement and retention means for a locator (16) that protrudes from an abutment frame (19) for said door, and second means, which can be activated by the user, in order to turn said cylinder (6).
2. The lock according to claim 1, **characterized in that** it comprises third means (35) adapted to temporarily occlude the inlet hole for said locator (16) and to prevent the rotation of said cylinder (6) in the event said sliding door is open, and fourth means (42) adapted to define the positions of "open" and "closed".
3. The lock according to claim 1, **characterized in that** said box-like structure (3) is shaped like a parallelepiped, is open on one side, can be closed by means of a cover (32) and is connected frontally by a faceplate (4) provided with first holes (5a, 5b) for coupling to said door (2), a cylinder (6) being arranged within said box-like structure (3) and being open at one end and closed at the other end by a wall (7) that is provided axially with a pivot (8) for pivoting to the backplate (9) of said box-like structure (3).

4. The lock according to one or more of the preceding claims, **characterized in that** said pivot (8) is arranged in a substantially intermediate region between said first holes (5a, 5b) and said cylinder (6) has a diameter that is such as to arrange its lateral surface (10) approximately tangential to the inner surface (11) of said faceplate (4), said cylinder (6) being idle and associated rotatably with said box-like structure (3), said lateral surface (10) skimming, during rotation, the inner surface (11) of said faceplate (4).
5. The lock according to one or more of the preceding claims, **characterized in that** said cylinder (6) rotates in contrast with a means that is arranged radially thereto and which makes it possible to achieve the temporary selection of a chosen position of said cylinder (6), said means being constituted by a receptacle (12) that is shaped like a parallelepiped, is associated with said backplate (9) and is arranged radially to said cylinder (6) in a region that lies above it along an axis that is parallel to said inner surface (11) of said faceplate (4), said receptacle (12) having an open end (13) that is arranged adjacent to said, underlying, lateral surface (10) of said cylinder (6) and having a ball (14) arranged inside it which acts in contrast with an elastically deformable element (15), such as a cylindrical helical compression spring.
6. The lock according to one or more of the preceding claims, **characterized in that** said first temporary engagement and retention means are provided on said lateral surface (10) of said cylinder (6) for a locator (16) constituted by a shaft (17) that ends with a spherical head (18), said locator (16) protruding from an abutment frame or rabbet (19) for said door, said first engagement and retention means being constituted by a first seat (20) that is T-shaped so as to define a first portion (21), which is circular and has a larger diameter than that of said spherical head (18), followed by a second portion (22) that is slightly wider than said shaft (17), said second portion (22) being extended over a chosen circular arc, considering a counterclockwise rotation as positive.
7. The lock according to one or more of the preceding claims, **characterized in that** said first portion (21) of said first seat (20) can be positioned at a second hole (23), which is provided in said faceplate (4) and is adapted to allow the passage of said spherical head (18).
8. The lock according to one or more of the preceding claims, **characterized in that** second means that can be activated by the user are provided on the lateral surface (10) of said cylinder (6) in order to turn said cylinder (6), said second means being constituted by a plurality of second seats (24) that are provided approximately opposite said first portion (21) of said first seat (20) and have a shape and mutual distance that are such as to allow their interaction with teeth (25) that protrude radially with respect to a hub (26) that is associated rotatably with a support (27) that protrudes from, and is integral with, said backplate (9) in a region that is adjacent to said cylinder (6) opposite said faceplate (4), a shank (28) of a knob (29) that protrudes externally to said box-like structure (3) being keyed to said hub (26).
9. The lock according to one or more of the preceding claims, **characterized in that** the selection of the position of said cylinder (6) is made possible by the presence of two third holes (30a, 30b) that are provided in said lateral surface (10) of said cylinder (6), with which said ball (14) interacts selectively, said third holes (30a, 30b) being provided in a position that is such that said ball (14) arranges itself thereat if said first portion (21) of said first seat (20) is arranged at said second hole (23) provided on said faceplate (4) and if said shaft (17) brings itself substantially at the closed end of said second portion (22).
10. The lock according to one or more of the preceding claims, **characterized in that** said cylinder (6) can be arranged in a stable open or closed condition, since it allows either the insertion in said lock of said head (18) of said locator (16) or the locking of said locator (16) in said second portion (22).
11. The lock according to one or more of the preceding claims, **characterized in that** said third means are associated at the inner lateral surface (31) of said cover (32) that is rotatably associated with said box-like structure (3), said third means being constituted by a cylindrical tumbler (35), which has a larger diameter than that of said second hole (23) defined on said faceplate (4), and which can be positioned, in use, on the same axis of arrangement of the locator (16), said tumbler (35) being slideably and axially associated with a perforated tab (36) that protrudes perpendicularly to said inner lateral surface (31), a shank (37) protruding axially from said tumbler (35), on the opposite side with respect to said locator (16), and being slideably associated with a flap (38) that protrudes perpendicularly from said inner lateral surface (31).
12. The lock according to one or more of the preceding claims, **characterized in that** the axial sliding of said shank (37) is limited by the presence of a locator (48) that protrudes radially from its end which in turn protrudes beyond said flap (38), coaxially to said shank (37) there being an elastically compressible element

(39), such as a cylindrical helical compression spring interposed between said tab (36) and said flap (38), the dimensions and placement of said tumbler (35) being such that it is, when the door is in the open condition, with said spring (39) pushing its front surface (40) to be positioned facing said lateral surface (10) of said cylinder (6) at said first portion (21), which has a larger diameter and so allows it to pass through and temporarily occlude said second hole (23) defined on said faceplate (4), in the region of said cylinder (6) that, when the door is in the open condition, is above said first portion (21) and therefore said tumbler (35), there being a protrusion (41) that prevents the anticlockwise rotation of said cylinder (6) which may be imposed by way of said knob (29). 5 10 15

13. The lock according to one or more of the preceding claims, **characterized in that** said fourth means that is adapted to define the positions of "open" and "closed" is constituted by a lamina (42) made of harmonic steel, which is arranged below said cylinder (6) and below said knob (29), said lamina (42) being fixed at a first end (43) to a first wing (44), which protrudes from said backplate (9), and resting on an adjacent, and underlying, second wing (45), which also rises from said backplate (9) in a region that is closer to the inner surface (11) of the faceplate (4). 20 25

14. The lock according to one or more of the preceding claims, **characterized in that** the second end (46) of said lamina (42) has a curved shape and is adapted to interact selectively with one of two complementarily shaped undercuts (47a, 47b) that are defined on the perimetric edge of said cylinder (6), said undercuts (47a, 47b) being positioned so that when said second end (46) of said lamina (42) interacts with the undercut (47a) the door is in the open condition, while when it interacts with the undercut (47b) the door is in the closed condition. 30 35 40

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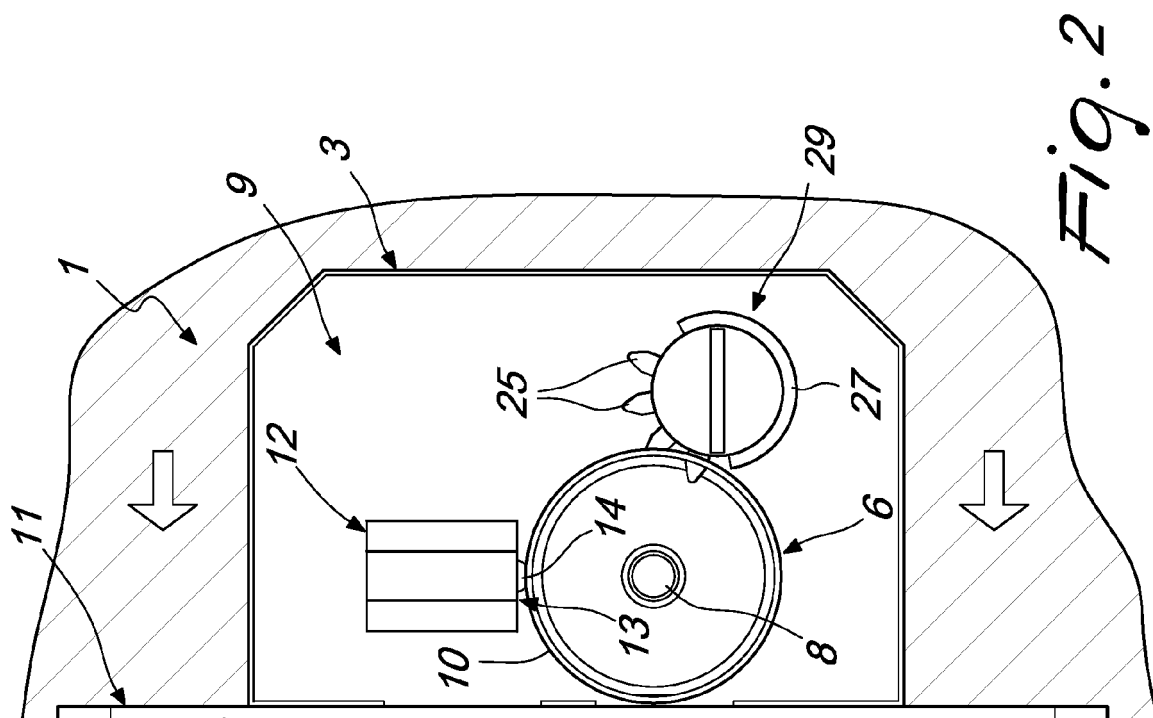


Fig. 2

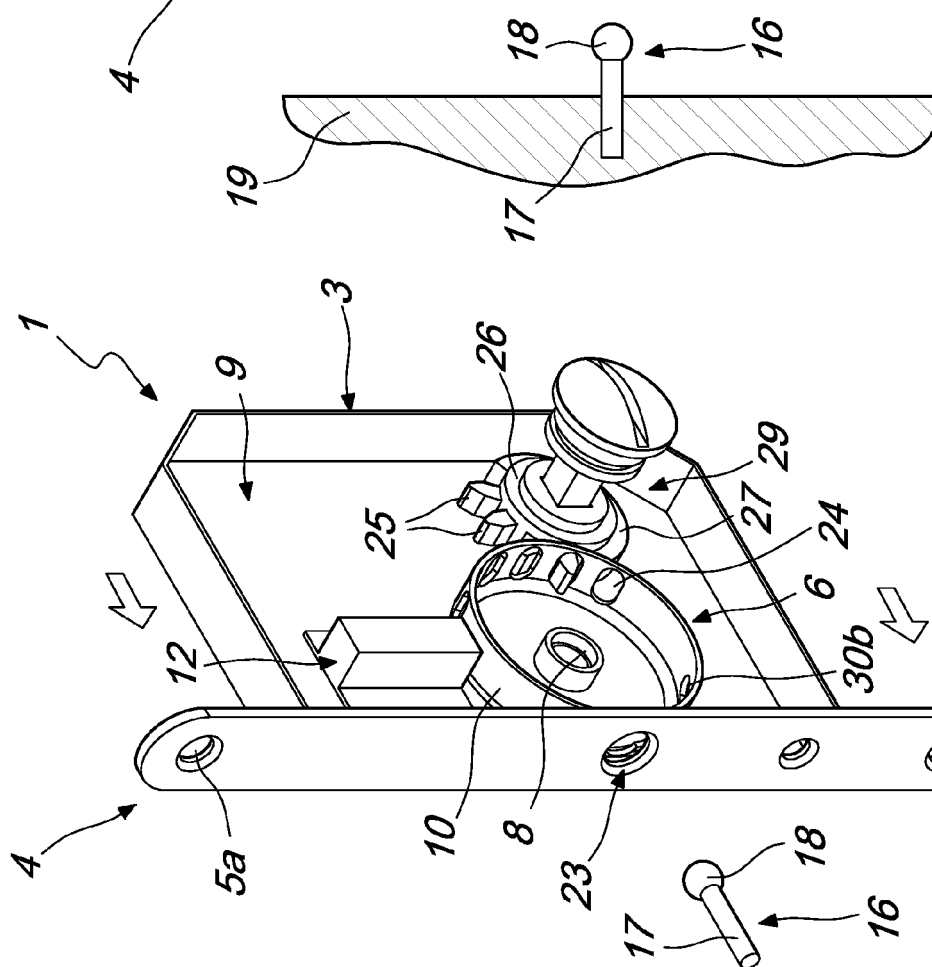


Fig. 1

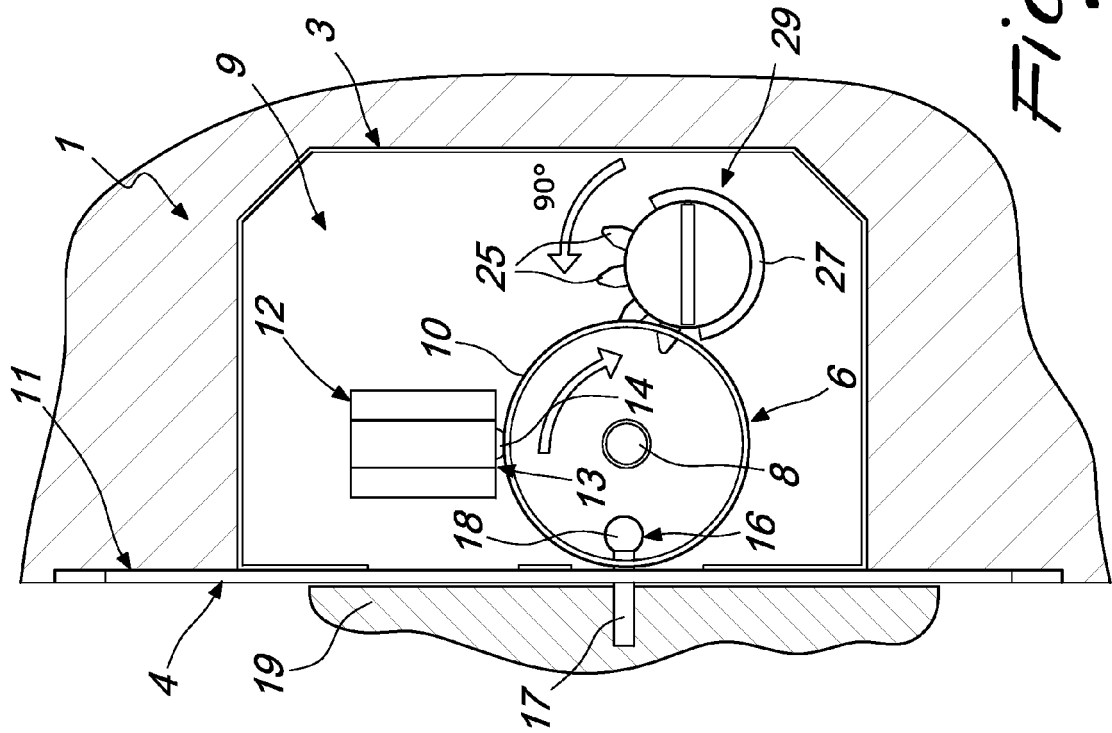


Fig. 4

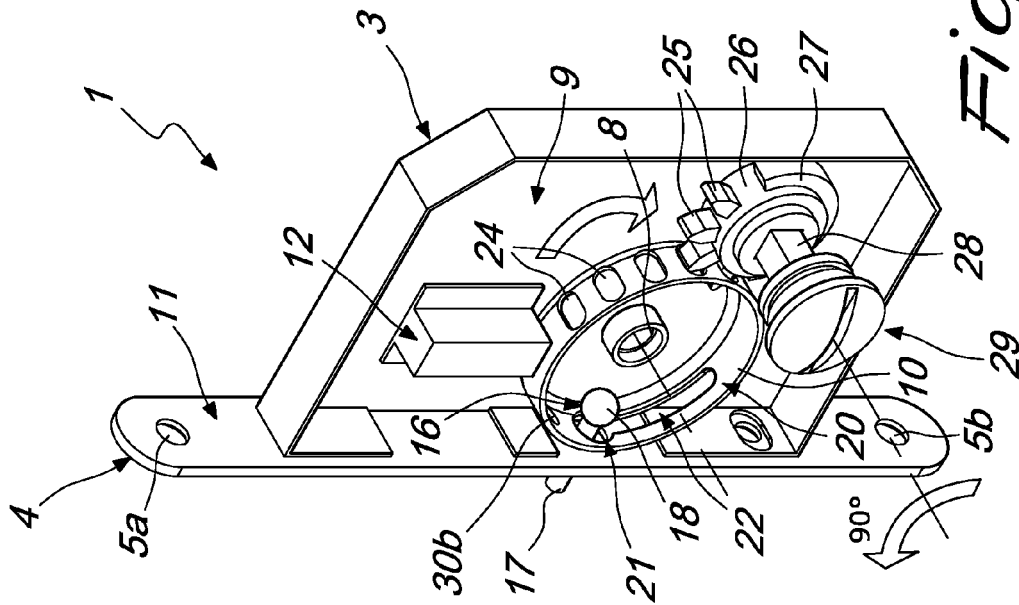
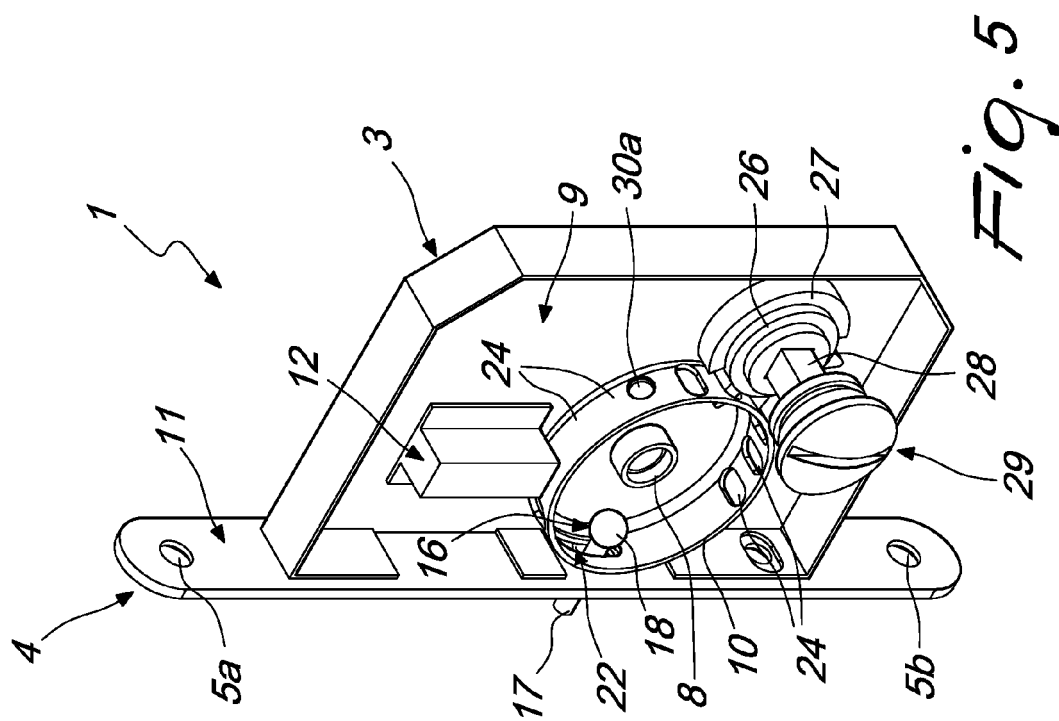
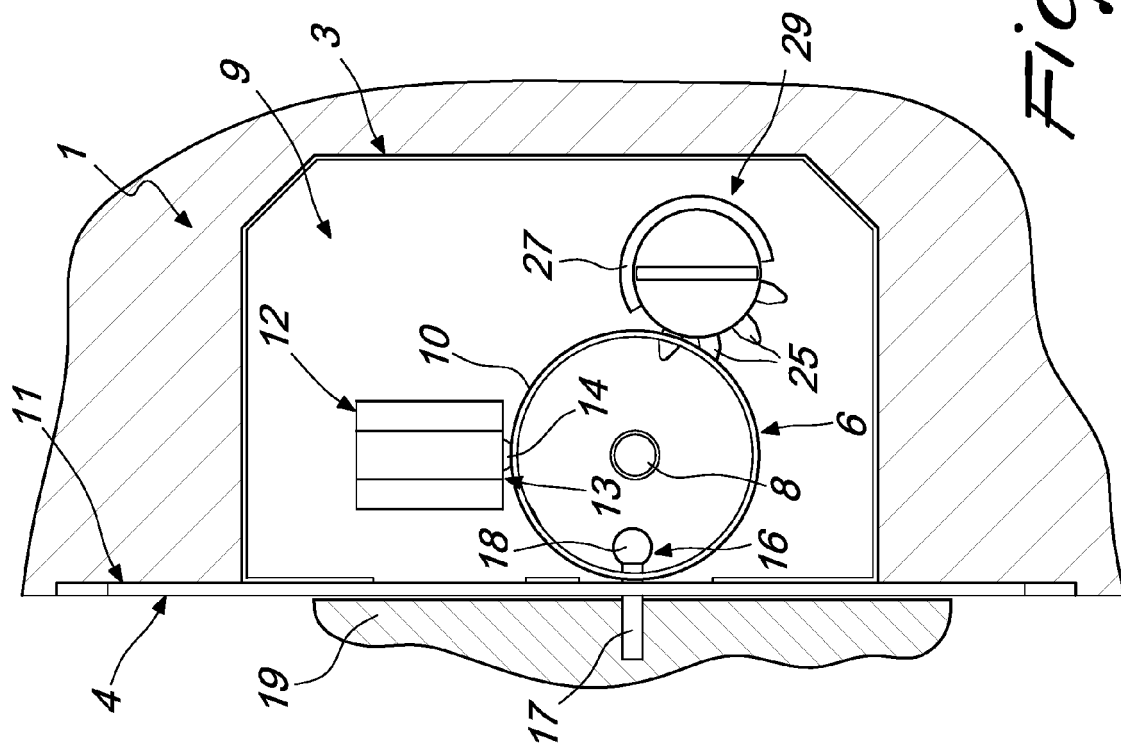
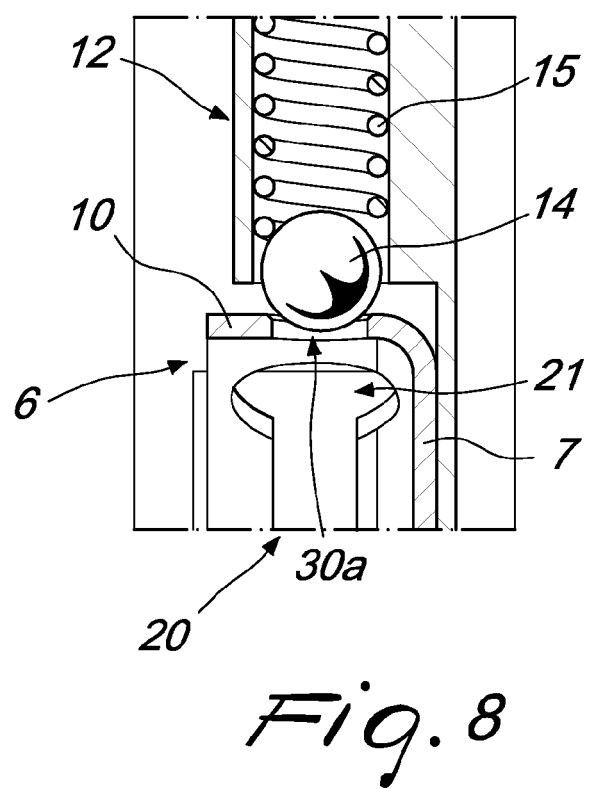
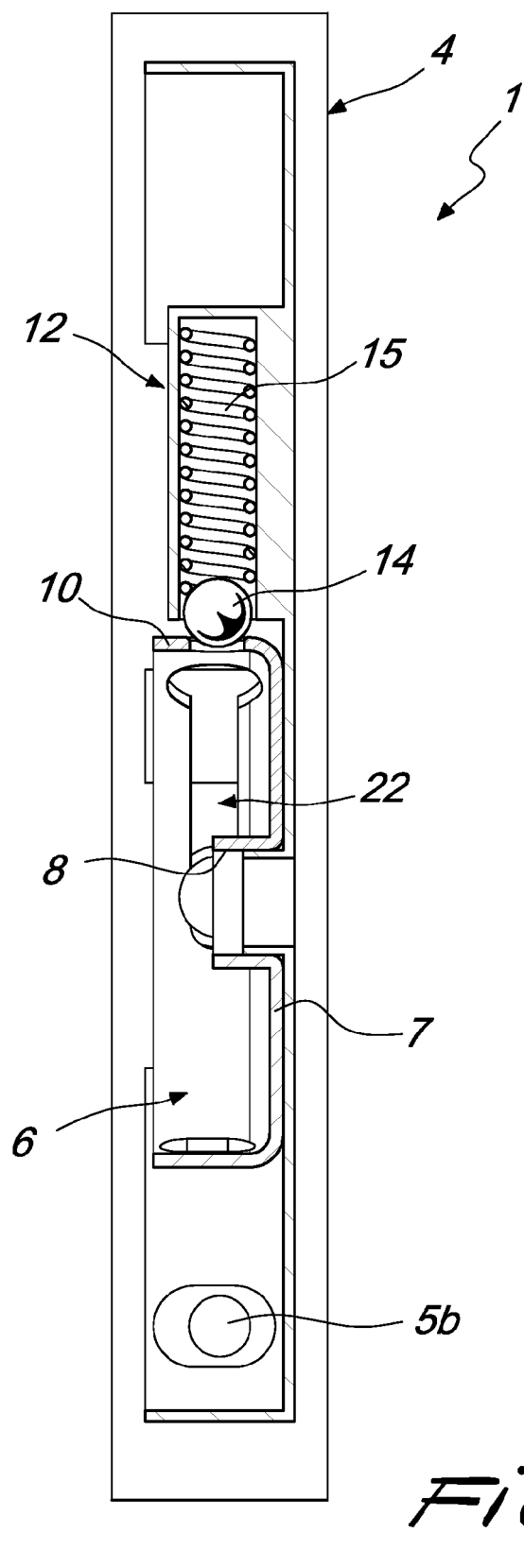
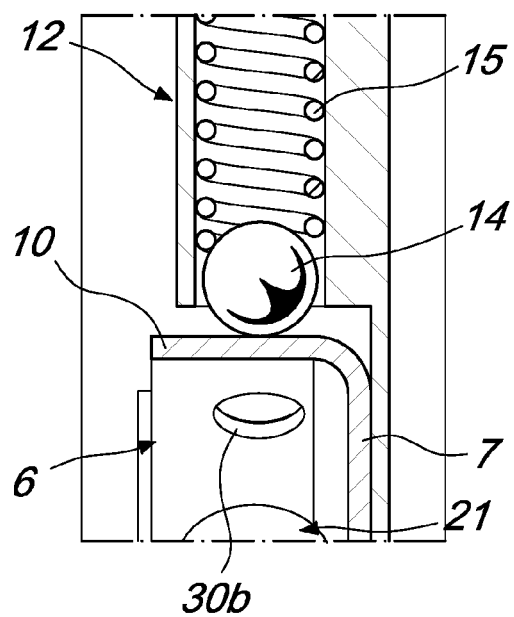
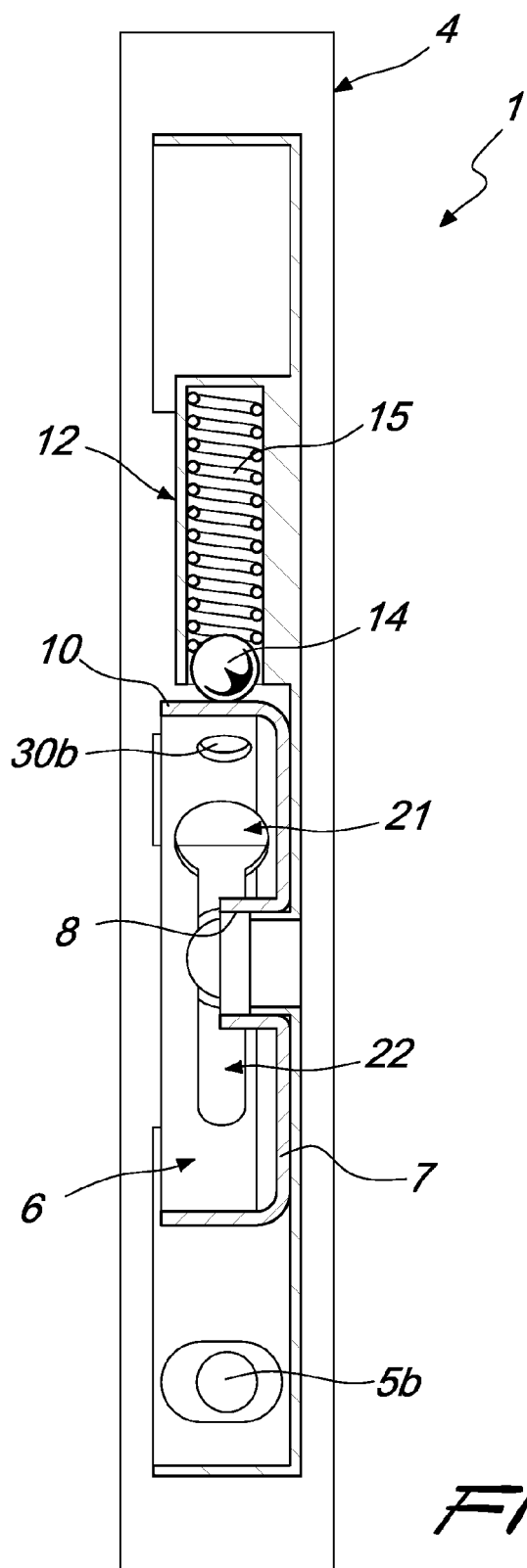


Fig. 3







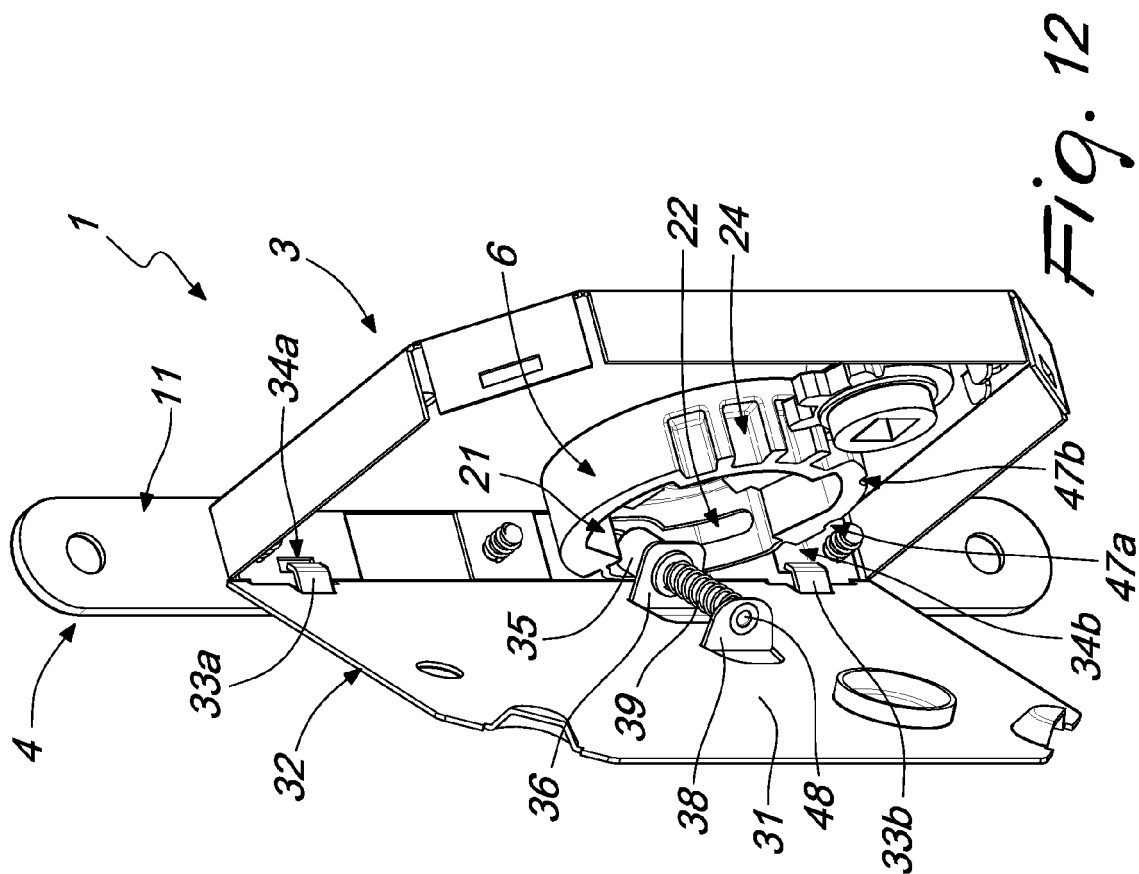


Fig. 12

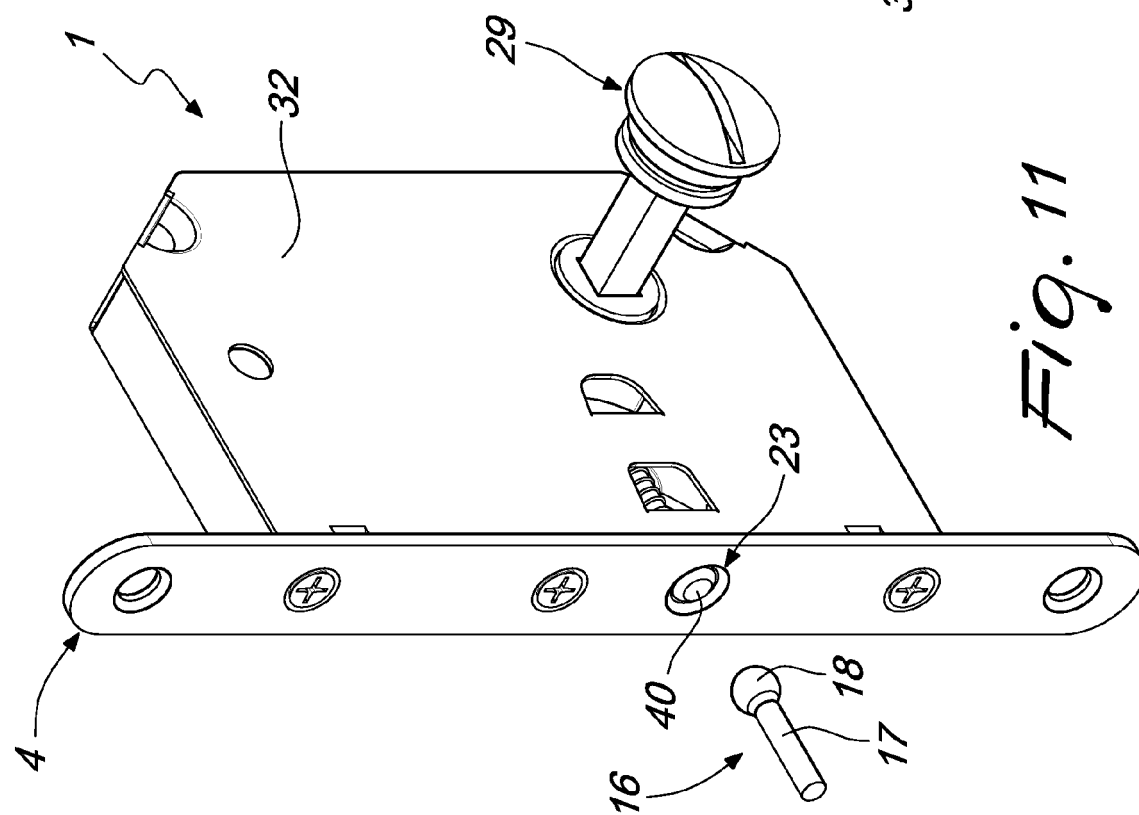


Fig. 11

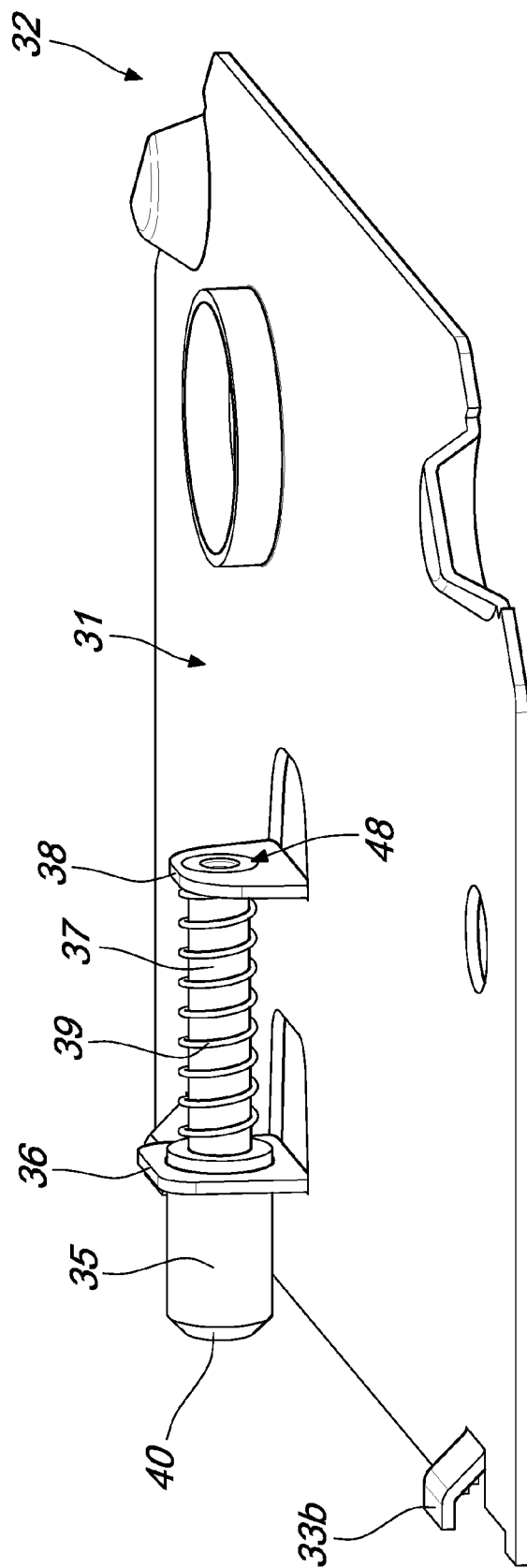
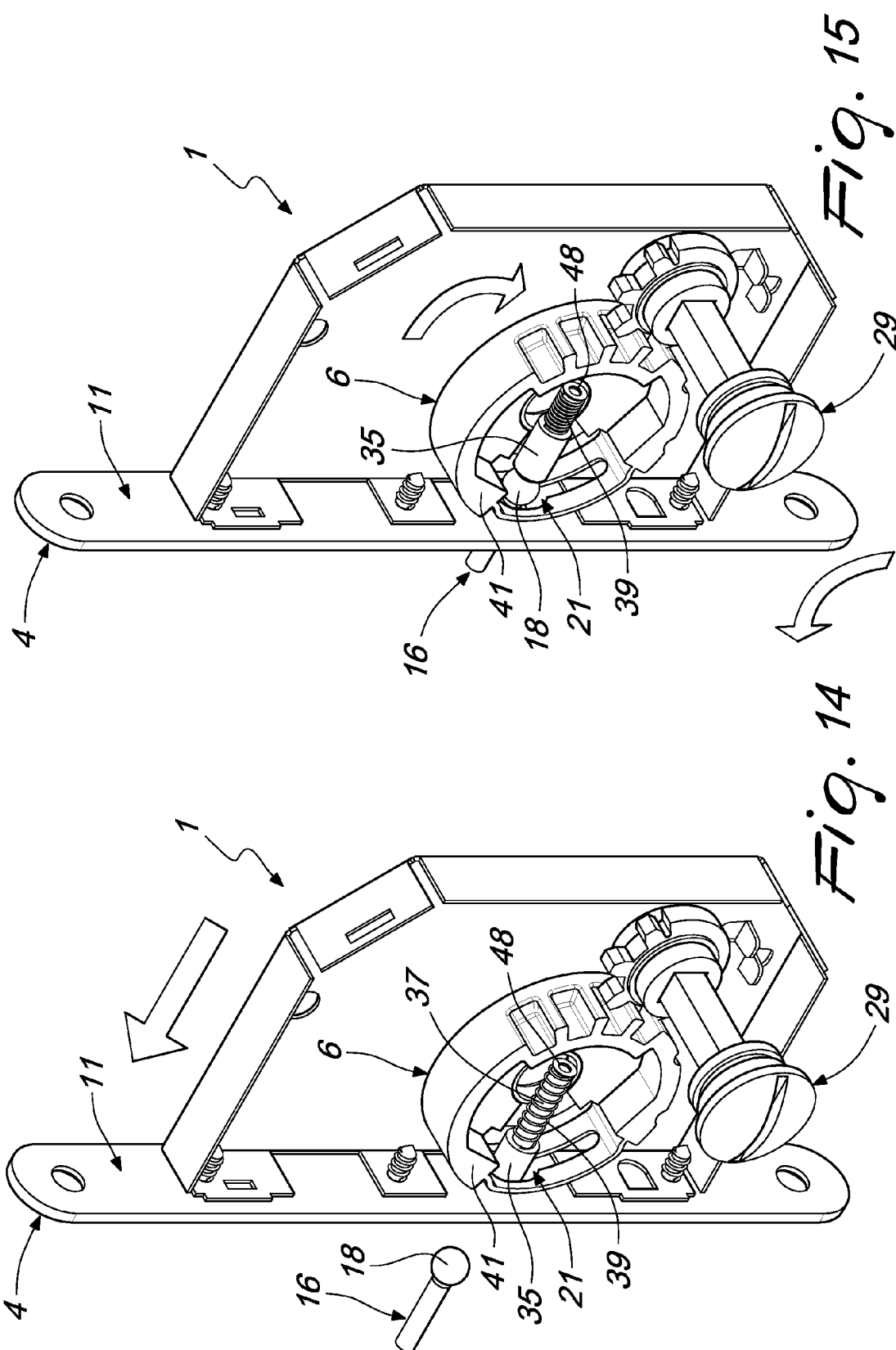
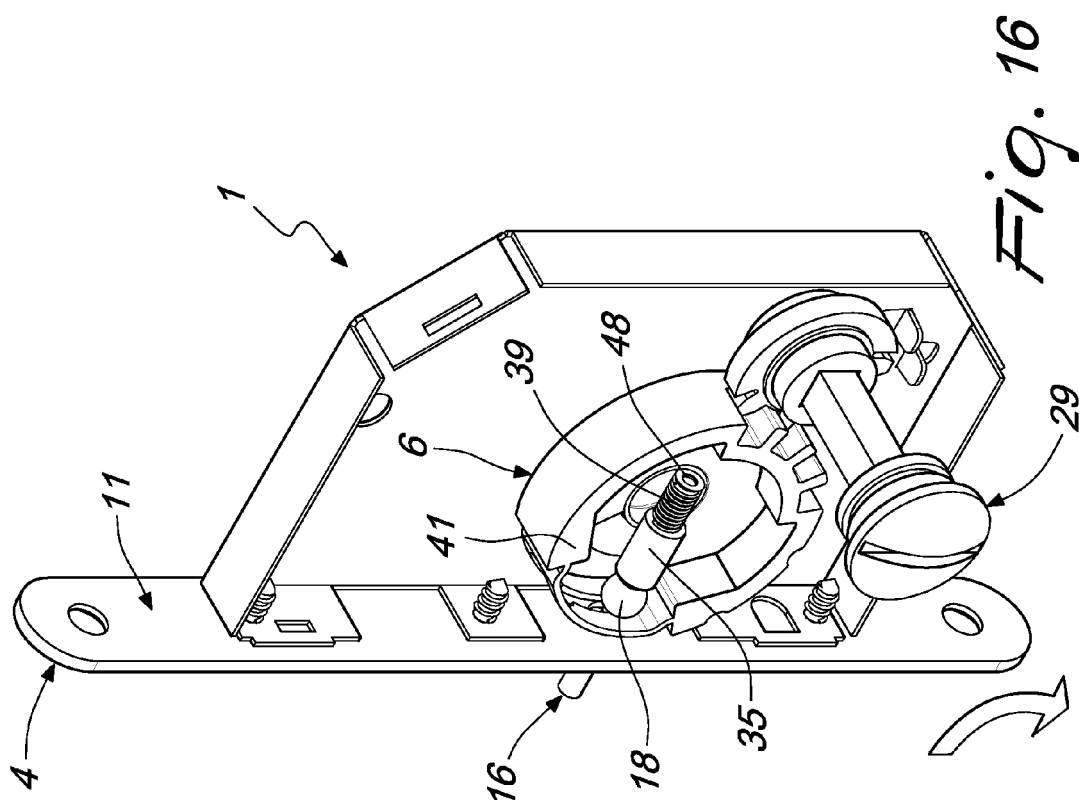
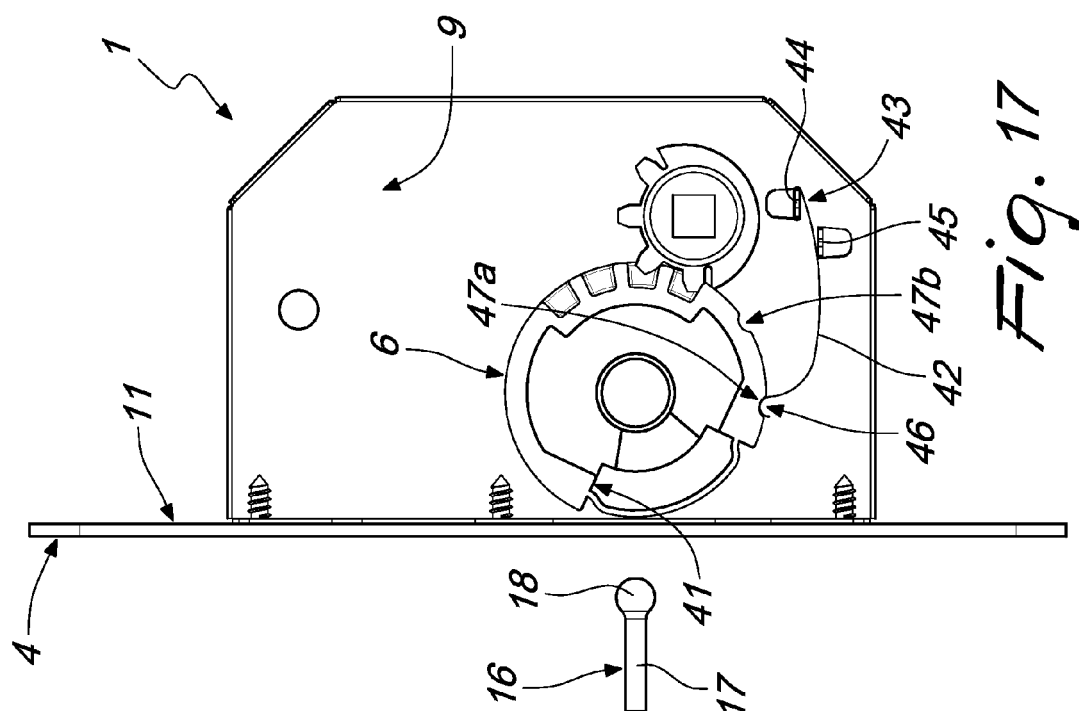


Fig. 13







EUROPEAN SEARCH REPORT

Application Number
EP 14 19 5490

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DOCUMENTS CONSIDERED TO BE RELEVANT			
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			TECHNICAL FIELDS SEARCHED (IPC)
			E05B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 13 May 2015	Examiner Cruyplant, Lieve
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ON EUROPEAN PATENT APPLICATION NO.**

EP 14 19 5490

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13-05-2015

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