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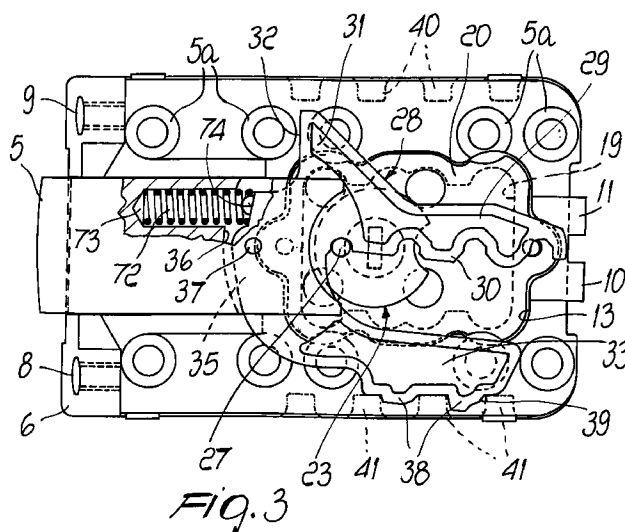
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(54) Externally-mounted lock with device for blocking the exit of the bolt and mounting adaptor

(57) An externally-mounted lock, comprising a case composed of a back plate (1) provided with means for fixing to a door and of a cover (12) which is associated with the back plate (1) and forms a seat (4) for the sliding of a bolt (5) in which an element (28) is articulated, the element having a set of teeth (30) which, by virtue of spring means (72), is kept engaged with two mutually opposite bits (23,61), one bit being supported in the cover (12) and being associated with an internal actuation cylinder or knob (67), the other bit being supported in the back plate (1) and being connected to an external actuation cylinder, the bits (23,61) being adapted to produce, as a consequence of the actuation of the knob (67) or of the cylinders, the disengagement of the set of teeth (30) of the element (28) from the bits (23,61) with a first rotation angle and a lock-turn stroke of the element (28) and of the bolt (5) with a second rotation angle, an arm (33) being rigidly coupled to the toothed element (28) and being provided with raised portions (38) which are adapted to engage against corresponding protrusions (40,41) formed inside the cover (12), the raised portions (38) being disengageable from the protrusions (40,41) simultaneously with the teeth (30) when the bits (23,61) are actuated.



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Description

The present invention relates to an externally-mounted lock with device for blocking the exit of the bolt and mounting adaptor.

So-called externally-mounted locks conventionally comprise a case which contains the mechanism for actuating a bolt; the case is adapted to be fixed proximate to the lock stile of a door, usually the door that allows access to a room. The bolt actuation mechanism comprises two bits: one is rotatably supported in the cover of the case on the inner side of the door and the other one is rotatably supported in the back plate of the case in contact with the inner face of the door.

The first bit is actuated by means of a knob or a cylinder lock (hereinafter referenced to as "inner cylinder" for convenience of description), the plug whereof, like the knob, is rotationally coupled thereto. The second bit is rotationally coupled, by means of a bar that passes through the thickness of the door, to the plug of a cylinder lock which is inserted in an adapted seat of the door, which is referenced to hereinafter as "outer cylinder" since it can be accessed from the outer side of the door.

Accordingly, whilst the bolt can be actuated from the inside by means of the knob or by means of the key of an inner cylinder, actuation from outside occurs by means of the key of the outer cylinder.

Considerable complexity in construction and assembly and limited flexibility in use have been observed in locks of this type, owing to the fact that the distance of the case from the edge of the lock stile can vary and that the direction of rotation of the knob (or of the key) must be correlated to the door swinging direction.

A principal aim of the present invention is therefore to provide an externally-mounted lock which allows to obviate the constructive and installation shortcomings of conventional locks.

Within the scope of this aim, an object of the present invention is to provide a lock which can offer greater resistance to effraction attempts, particularly against forcing actions applied to the bolt.

This aim and this object are achieved by an externally-mounted lock, which comprises a case composed of a back plate provided with means for fixing to a door and of a cover which is associated with said back plate and forms a seat for the sliding of a bolt in which an element is articulated, said element having a set of teeth which, by virtue of spring means, is kept engaged with two mutually opposite bits, one bit being supported in said cover and being associated with an internal actuation cylinder or knob, the other bit being supported in said back plate and being connected to an external actuation cylinder, said bits being adapted to produce, as a consequence of the actuation of said knob or of said cylinders, the disengagement of the set of teeth of said element from said bits with a first rotation angle and a lock-turn stroke of said element and of said bolt with a second rotation angle, characterized in that an arm is

rigidly coupled to said toothed element and is provided with raised portions which are adapted to engage against corresponding protrusions formed inside said cover, said raised portions being disengageable from said protrusions simultaneously with said teeth when the bits are actuated.

According to another object of the present invention, the lock is provided, in the back plate, with a secondary plate which allows to use various types of cylinder, presets said lock for right-handed or left-handed mountings (i.e., mountings on right-hinged or left-hinged doors), and allows adjustments in a horizontal direction with respect to the lock stile of the door.

Further characteristics and advantages of the present invention will become apparent from the following detailed description of a preferred embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a vertical sectional view of the lock according to the present invention;

figure 2 is a vertical sectional view, taken after removing the cover and the elements associated therewith;

figure 3 is a plan view, taken along the plane III-III of figure 1;

figure 4 is a plan view of the inside of the cover;

figure 5 is a sectional view of the cover, taken along the plane V-V of figure 4;

figures 6 and 7 are front and sectional views of the bit for the actuation of the bolt from the outer side of the door;

figures 8 and 9 are front and sectional views of the bit for the actuation of the bolt from the inner side of the door;

figure 10 is a view of the secondary plate for supporting the bit of figures 6 and 7 in a lock for a left-hinged door;

figures 10a-10d are views of various mounting possibilities of the secondary plate of figure 10;

figure 11 is a view of the secondary plate for supporting the bit of figures 6 and 7 in a lock for a right-hinged door;

figures 11a-11d are views of various mounting possibilities of the secondary plate of figure 11.

With reference to figures 1 to 9, the externally-mounted lock is composed of a rectangular back plate 1 on which two parallel ridges 2 and 3 form a sliding surface 4 for a bolt 5. A plurality of through holes 5a are formed in the back plate 1 and are arranged in various manners so as to allow to use studs to protect the outer cylinders and allow various door-mounting possibilities. Two posts 6 and 7 are provided at the sides of the sliding surface 4, at the two corners of the back plate 1 that form the bolt exit side; two respective threaded holes 8 and 9 are formed through the posts 6 and 7 and run parallel to the ridges 2 and 3.

Two teeth 10 and 11 protrude outwards from the

side of the back plate 1 that lies opposite to the posts 6 and 7 and are meant to engage the cover 12, which forms the case of the lock together with the back plate 1.

The sliding surface 4 affects only part of the back plate 1; a seat 13 is formed in the other part and has a contour which is complementarily shaped with respect to a secondary plate 14, which is fully accommodated in the seat. Holes for the passage of fixing screws, described hereinafter, are formed in the secondary plate 14.

In particular, two holes 15 and 16 are formed in the secondary plate 14 (figure 2), and pins 17 and 18 which protrude from the bottom of the seat 13 engage in said holes.

An opening 19 is formed in the seat 13 at the secondary plate 14 and its contour duplicates that of the seat 13 and accordingly forms a step 20 for the peripheral resting of the secondary plate 14.

The secondary plate 14 has, in an eccentric position, a hole 21 in which the hub 22 of a bit, generally designated by the reference numeral 23, is rotatably supported (figures 6 and 7).

The hub 22 extends into the opening 19 and is crossed axially by a blind hole 24 having a rectangular cross-section, which is open towards the lower face of the back plate 1. The bar for rotary connection to the plug of the cylinder lock to be installed on the outside of the door is subsequently inserted in the blind hole 24.

A flange 25 is rigidly coupled to the hub 22, above the secondary plate 14, and is peripherally provided with a recess 26 shaped like a sector of a circle. A pin 27 protrudes eccentrically from the flange 25 and reaches the centerline plane P of the bolt 5 without extending beyond it.

The pin 27 is adapted to cooperate with an element 28 which in practice constitutes an articulated extension of the bolt 5.

The element 28 (figure 3) is substantially U-shaped, with a first arm 29 which has a set of teeth 30 on the inner edge and, on the outer edge, a lug 31 which has a front 32 which is substantially perpendicular to the sliding direction of the bolt 5.

The second arm 33 of the element 28 forms, together with the first arm 29, a loop 34 which is open towards the teeth 10 and 11, and its distance from the first arm is at least greater than the eccentricity of the pin 27.

The first arm 29 is joined to the second arm 33 by an arc-shaped portion 35 which is inserted in a slot 36 of the bolt formed at the end thereof that lies inside the lock and is arranged on the centerline plane P that is coplanar to the bolt.

The element 28 is articulated to the bolt 5 by means of a pin 37 driven through the arc-shaped portion 35.

The second arm 34 has, on the outer edge, two raised portions 38, each whereof has a front 39 which protrudes concentrically with respect to the pin 37.

Hollows remain between the raised portions 38, and the protrusions 40 or 41 formed on the inner faces

of the cover 12, at the level of the element 28, engage between said hollows.

As shown more clearly by figures 4 and 5, the cover 12 is shaped like a prism-like box and comprises: two longitudinal walls 42 and 43, wherefrom protrusions 40 and 41 protrude inwards; two transverse walls 44 and 45; and a closure wall 46 which, together with the walls 42-45, encloses the compartment for containing the elements of the lock.

An opening 47 is formed in the transverse wall 44 that constitutes the front wall; the bolt 5 protrudes outside through the opening.

The upper edge of the opening 47 is aligned with a plane 48 formed on the inner face of the wall 46.

The plane 48 is delimited by two ridges 49 and 50 which are aligned with the lateral edges of the opening 47. The plane 48 and the ridges 49 and 50 form, together with the oppositely arranged surface 4 and the ridges 2 and 3 of the back plate 1, the sliding seat of the bolt 5.

The cover 12 is fixed to the back plate 1 by engaging the teeth 10 and 11 in adapted indents 51 and 52 formed in the transverse wall 45 and by inserting the posts 7 and 8 in recesses 53 and 54 formed behind the front wall 44 by flaps 55 and 56 which protrude inwards from the walls 42 and 43. Two holes 57 and 58 are formed in the front wall 44, to the sides of the opening 47, and two screws for locking the cover 12 to the back plate 1 are guided through said holes.

A circular recess 59 is formed outside the wall 46 and continues centrally inwards with a tubular portion 60.

A second bit 61 (figures 1, 8, and 9) can rotate in the tubular portion 60 and is composed of a disk 62, from which two axial pins 63 and 64 protrude in diametrically opposite positions.

The disk 62 has a cavity 65 which is elongated diametrically between the pins 63 and 64. Two slots 65a are formed in the bottom of the cavity 65 and are shaped like an arc concentrically to the axis of the disk 62. Two ridges 65b are engaged in the slots 65a and fixed therein by folding their edges; the ridges are formed frontally in a hub 66, which is thus rotationally coupled to the disk 62. The hub 66 protrudes outwards through the recess 59, and a knob 67 is rigidly coupled thereto.

The hub 66 can rotate in a bush 68 which has a collar 69 that is recessed in a hollow 70 of the recess 59 and is retained by a washer 71 which rests on the collar 69 and is fixed by screws which engage the bottom of the recess 59.

The pins 63 and 64 protrude into the loop 34 of the element 28 to engage between the teeth 30 of the arm 29.

The described lock is completed by a spring 72 which is accommodated in a hole 73 formed in the bolt 5 and leading into the slot 36. The spring 72 acts on a chamfered portion 74 formed in the peripheral region of the arc-shaped portion 35 eccentrically with respect to

the pin 37. In this manner, the element 38 is turned, causing the engagement of the pins 27 and 63, 64 between the teeth 30 of the arm 29.

The operation of the described lock is as follows.

When inactive, with the bolt engaged or disengaged, the action of the spring 72 causes the oscillation of the element 28 towards the wall 42 of the cover and therefore the engagement of the raised portions 38 between the protrusions 40 of the cover.

In this situation, any force applied to the bolt in the direction in which it retracts into the case is neutralized by the abutment of the raised portions 38 against the protrusions 42 and is therefore not discharged exclusively onto the pins 27, 63, and 64, as occurs in conventional locks of this type.

It should also be noted that the front 39 of the raised portions 38, by being perpendicular to the radius that passes through the pin 37, prevents any possibility of mutual jamming of the raised portions 38 and of the protrusions 42 and therefore prevents the occurrence of friction which might compromise the disengagement of the element 28 when the lock is operated. By actuating the bit 62 through the knob 66, or the bit 23 by means of an external key, the consequent rotation of the pins 27 or 63, 64 must only overcome the resistance of the spring 72 which contrasts the lifting of the arm 29, which is required in order to first disengage the raised portions 38 from the protrusions 40 and then move the bolt so that it protrudes from the case or retracts therein. It should also be noted that when the bolt is fully outside the lock, i.e., when it engages the respective selvage, the lug 32 rests on the post 7 and prevents the element 28 from rotating and prevents the raised portions 38 from disengaging from the protrusions 40 if the bolt 5 is forced so as to retract into the case 1, 12.

The fact is also important that the wear that affects the pins 27, 63, and 64 and the raised portions 38 over time does not compromise the efficiency of the lock.

Any increase in play caused by wear is in fact compensated for automatically by the spring 72 that acts on the element 28.

A substantial prerogative of the present invention is constituted by the fact that the hole 21 for supporting the hub 23 in the secondary plate 14 is offset with respect to the center thereof, in the bolt sliding direction, and that two pairs of holes 75 and 76 are formed around said center; the holes are arranged like the corners of a rectangle and the pair of holes 75 has, with respect to the axis D that runs through the holes 15 and 16, a distance (a) that is greater than the distance (b) of the pair of holes 76 from said axis. This arrangement of the holes 75 and 76 allows to arrange the lock horizontally, i.e., in the bolt sliding direction, according to the requirements so as to allow the use of various types of external cylinder.

For example, figure 10 illustrates the back plate 1 of a lock which is mounted on a left-hinged door, whereas figures 10a-10d illustrate four different possibilities of mounting the secondary plate 14, which allow to mount

a matching number of external cylinders.

Figures 11 and 11a-11d illustrate a similar situation for a right-hinged door.

It should be noted that the plate has recesses 77 along two sides to allow the passage of the screws for fixing the back plate 1 to the door. Likewise, the recess 26 of the bit 23 allows the screws to pass through the holes 75 and 76.

The described invention is susceptible of numerous modifications and variations, all of which are within the scope of the same inventive concept. For example, the internal bit 61 can be actuated by a pin-tumbler cylinder accommodated in a seat of the knob 67, which in this case is rigidly coupled to the cover 12.

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. An externally-mounted lock, comprising a case composed of a back plate (1) provided with means for fixing to a door and of a cover (12) which is associated with said back plate (1) and forms a seat (4) for the sliding of a bolt (5) in which an element (28) is articulated, said element having a set of teeth (30) which, by virtue of spring means (72), is kept engaged with two mutually opposite bits (23, 61), one bit being supported in said cover (12) and being associated with an internal actuation cylinder or knob (67), the other bit being supported in said back plate (1) and being connected to an external actuation cylinder, said bits (23, 61) being adapted to produce, as a consequence of the actuation of said knob (67) or of said cylinders, the disengagement of the set of teeth (30) of said element (28) from said bits (23, 61) with a first rotation angle and a lock-turn stroke of said element (28) and of said bolt (5) with a second rotation angle, characterized in that an arm (33) is rigidly coupled to said toothed element (28) and is provided with raised portions (38) which are adapted to engage against corresponding protrusions (40, 41) formed inside said cover (12), said raised portions (40, 41) being disengageable from said protrusions (40, 41) simultaneously with said teeth (30) when the bits (23, 61) are actuated.
2. A lock according to claim 1, characterized in that said element (28) is U-shaped with a first arm (29) which has, on an inner edge, a set of teeth (30) which is adapted to mesh with pins (27, 63, 64) of said bits (23, 61) and a second arm (33) which has, on its outer edge, raised portions (38) which are adapted to engage internal protrusions (41) of said

cover (12).

3. A lock according to claim 2, characterized in that said raised portions (38) have a front (39) for engagement on said protrusions (41) which is concentric with respect to the rotation axis (37) of said element (28) with respect to said bolt (5). 5
4. A lock according to claim 1, characterized in that the bit (23) has a hub (22) which is rotatably mounted in a secondary plate (14) that is fully accommodated in a seat (13) of said hack plate (1). 10
5. A lock according to claim 4, characterized in that said hub (22) is offset with respect to the center of said secondary plate (14) and in that passage holes (75, 76) for screws for fixing cylinders of various kinds are arranged around said hub. 15
6. A lock according to claim 5, characterized in that said hub (22) is offset with respect to the center of said secondary plate (14) along the centerline axis (D) thereof and in that two pairs of holes (75, 76) are arranged around said hub and are located like the corners of a rectangle, the distance of the holes of one pair (75) from said centerline axis (D) being different from the distance of the other pair of holes (76). 20 25

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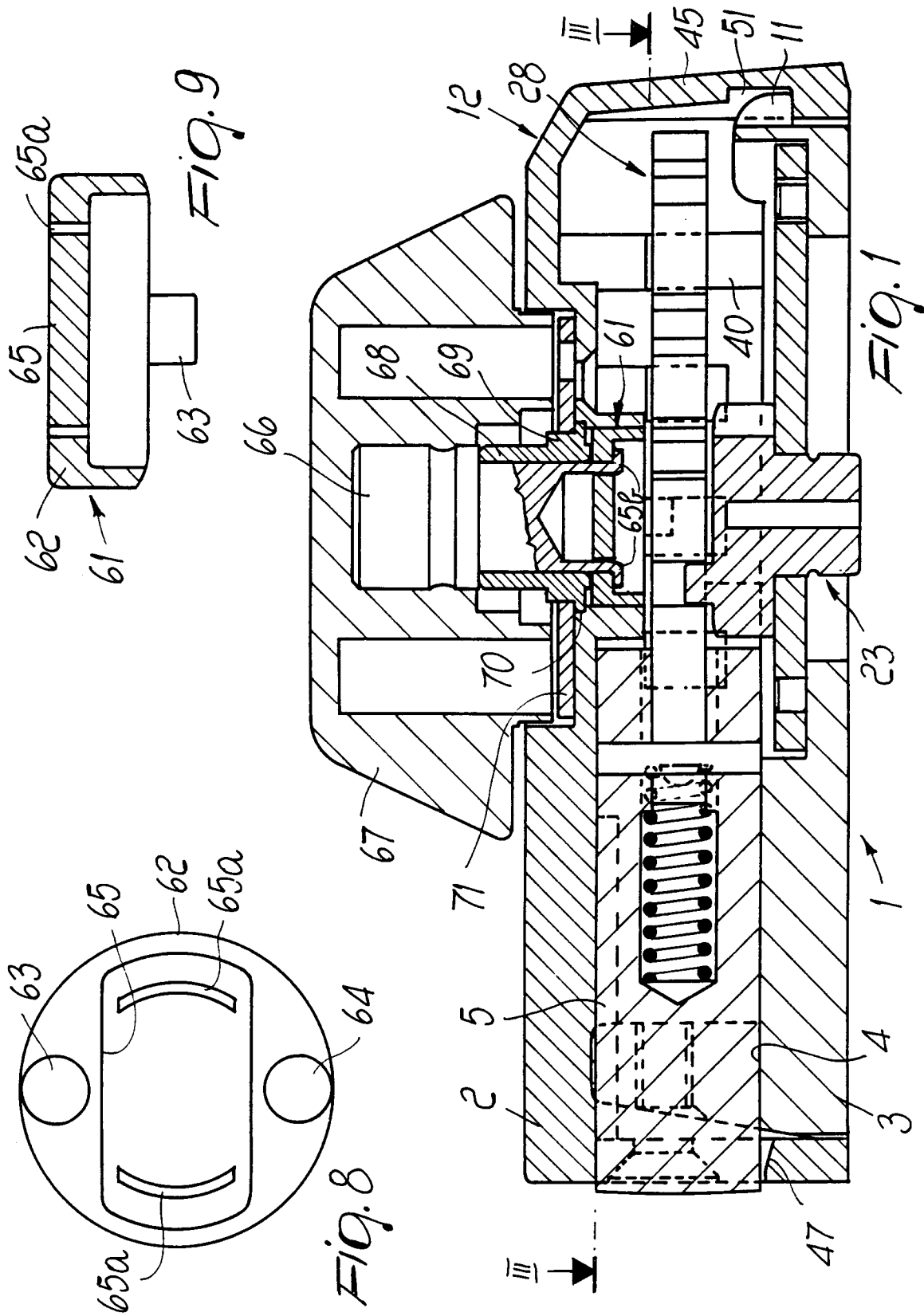
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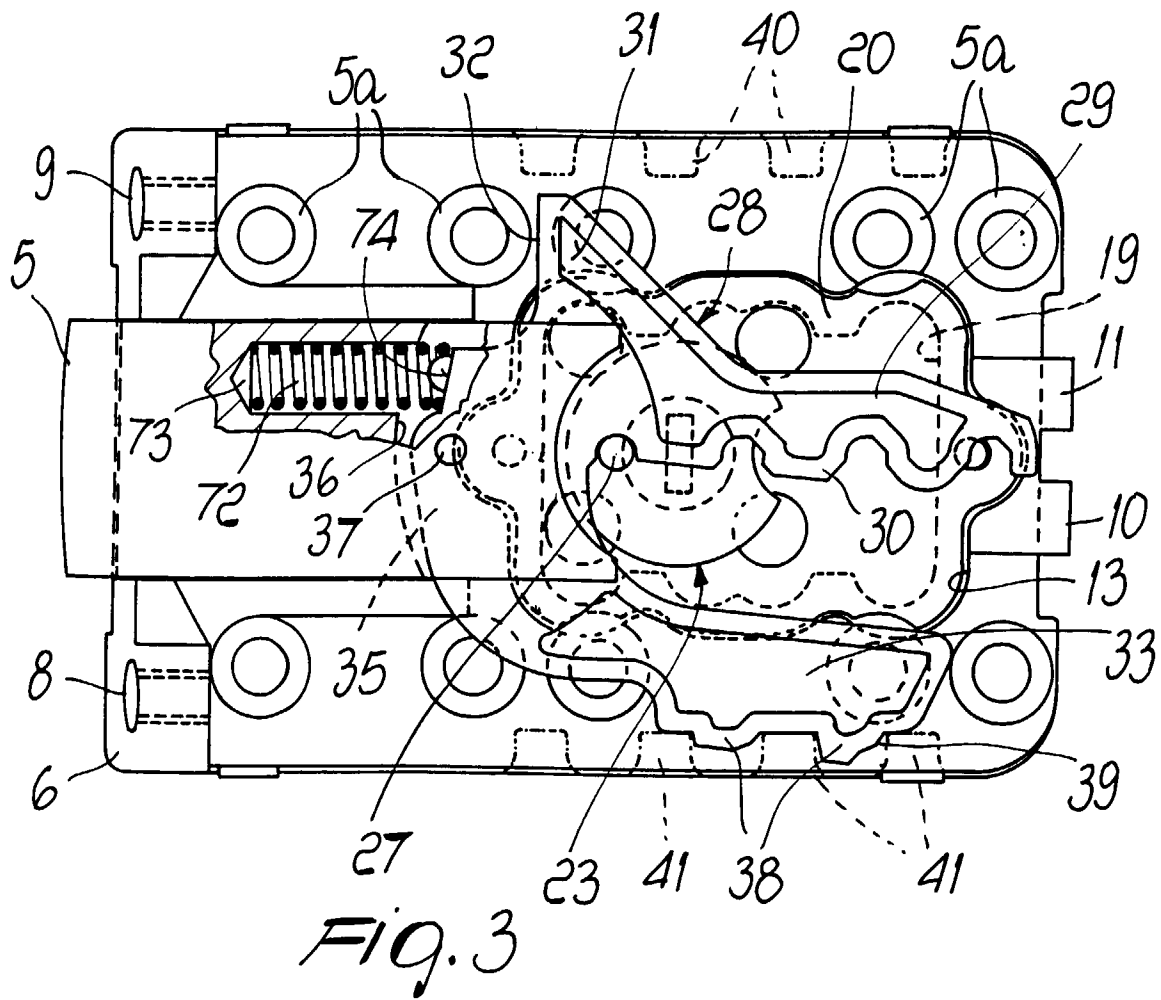
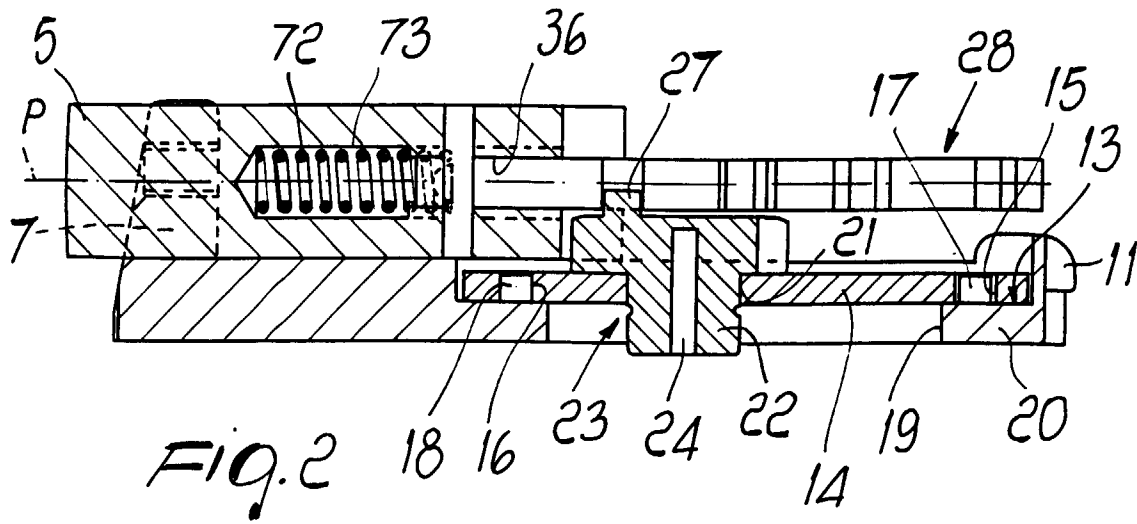
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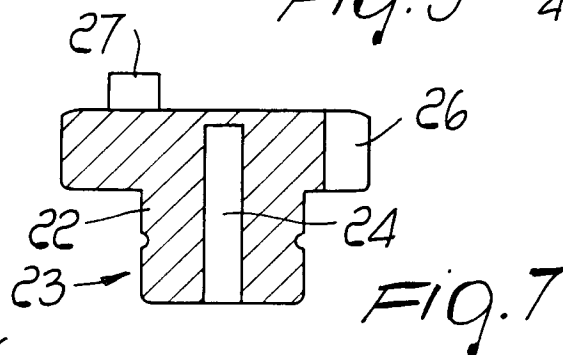
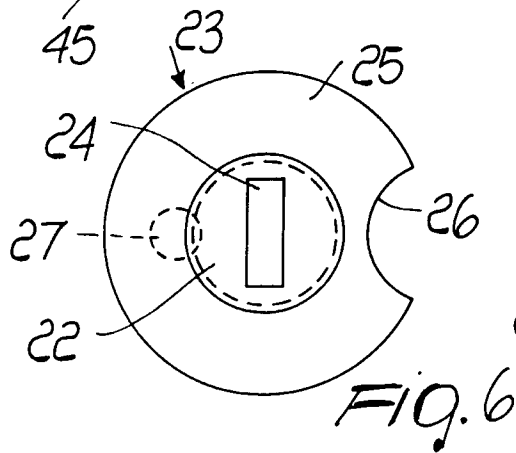
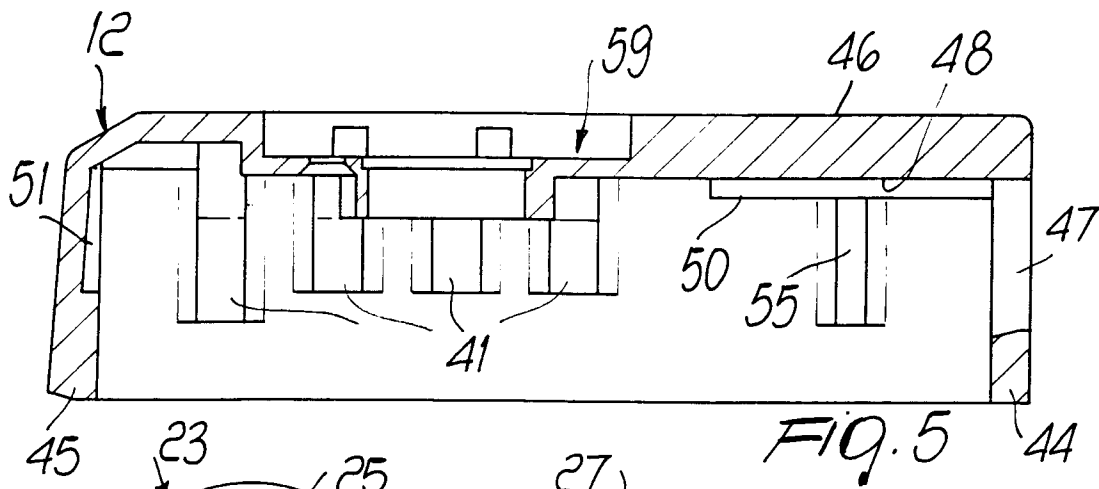
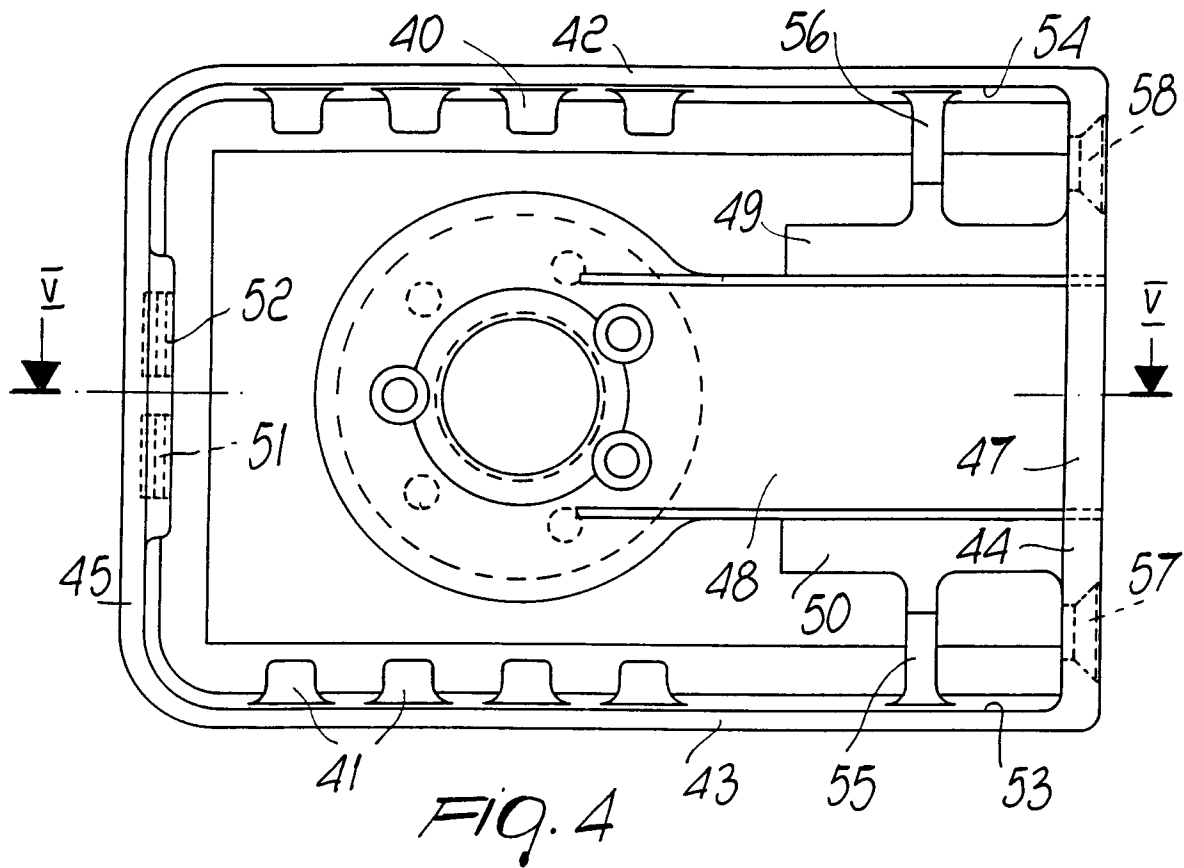
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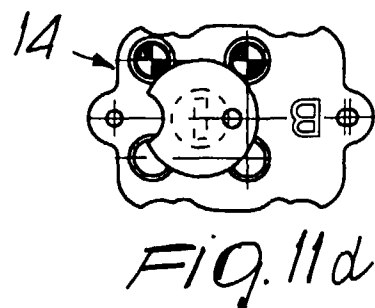
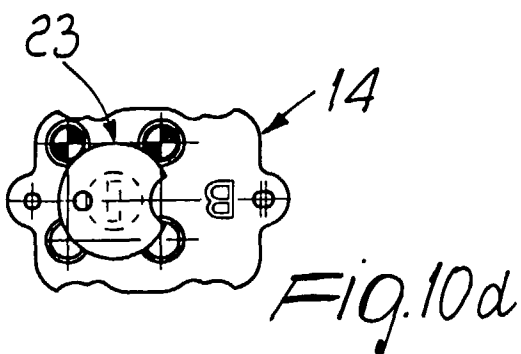
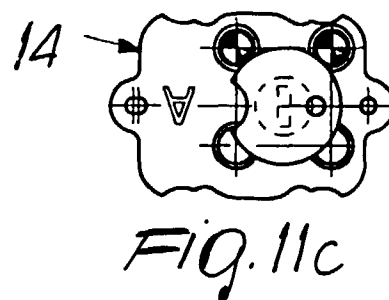
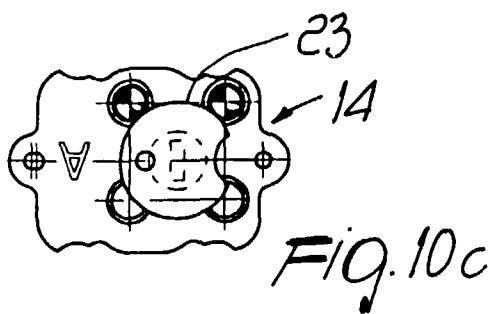
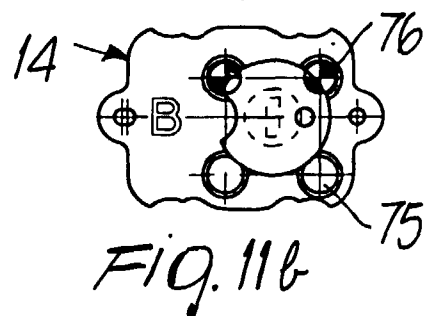
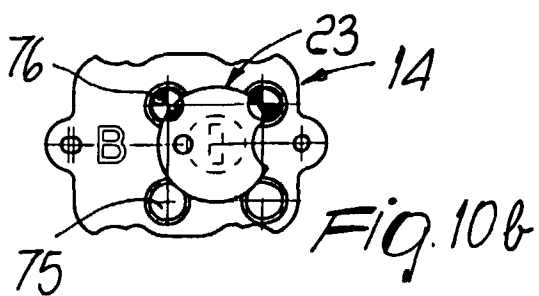
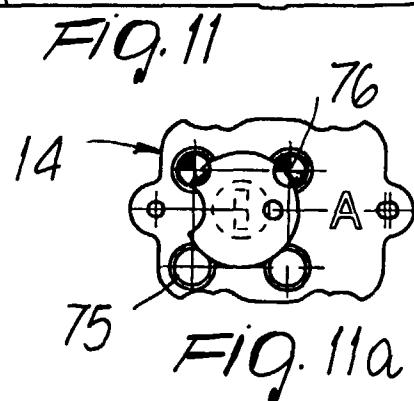
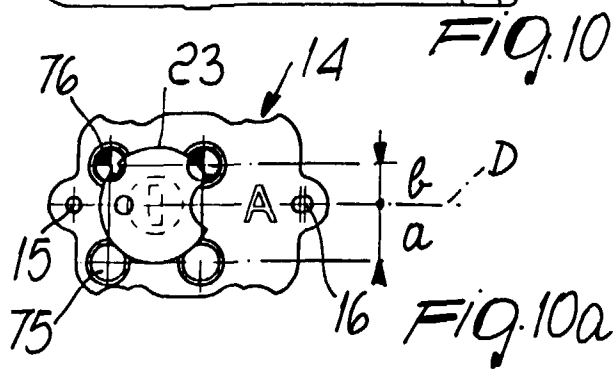
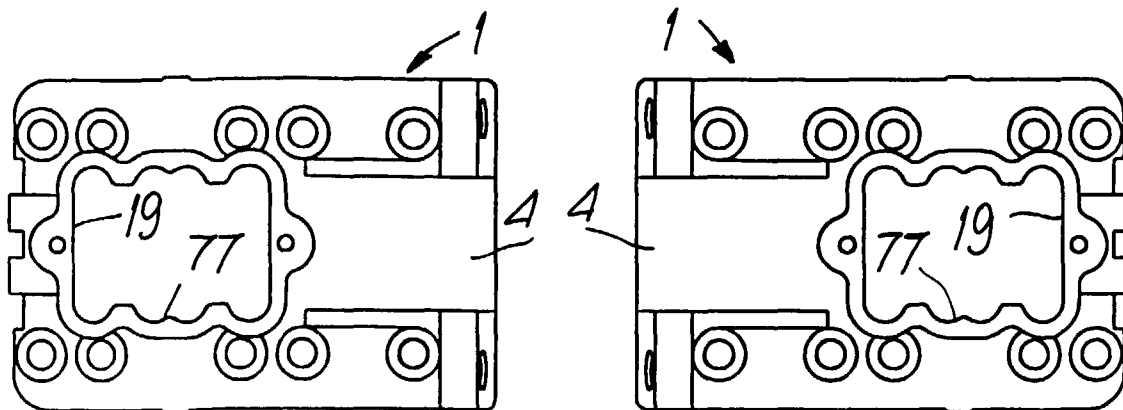
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EUROPEAN SEARCH REPORT

Application Number
EP 96 12 0080

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	US 1 699 370 A (MENZEL) * page 1, line 35 - page 2, line 11; figures *	1-4 5,6	E05B63/00
X A	US 2 296 020 A (CARTER) * page 1, line 30 - line 41; figures *	1,4 2,3	
Y A	US 3 141 319 A (SCHLAGE) * column 3, line 3 - column 8, line 30; figures *	5,6 1	
A	US 4 012 929 A (SOLOVIEFF PAUL G) 22 March 1977 * column 5, line 19 - column 10, line 42; figures *	1-5	
A	GB 1 565 196 A (KABA LOCKS LTD) 16 April 1980 * page 1, line 81 - page 2, column 106, line - *	1-4	
A	US 3 435 644 A (HINES JOHN) 1 April 1969 * column 2, line 69 - column 5, line 2; figures *	1-3	TECHNICAL FIELDS SEARCHED (Int.Cl.6) E05B
A	US 2 073 109 A (KIRKWOOD) * page 1, left-hand column, line 21 - page 2, left-hand column, line 57; figures *	1	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 March 1997	Examiner Henkes, R
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