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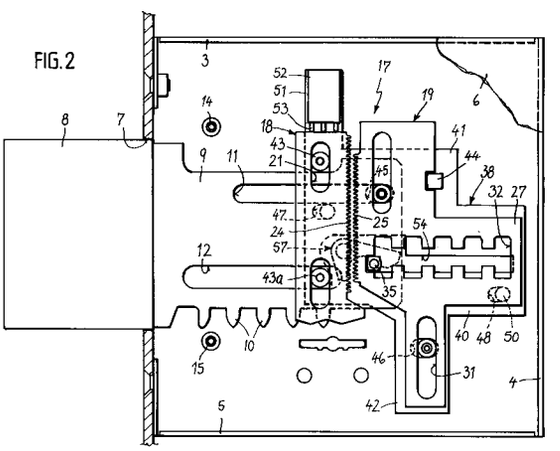
(54) Lock with flat tumblers and changeable combination.

(57) The lock comprises tumblers that are composed of two parts provided with oppositely arranged sets of teeth which can mesh frontally. By means of a combination-changing key, the sets of teeth are arranged according to a new combination which corresponds to the combination of the new actuation key.

FIG.2



EP 0 656 454 A1

The present invention relates to a lock with flat tumblers and changeable combination.

Locks with flat tumblers and changeable combination are known in the art, for example from British patent no. 2,081,796, from International Application WO91/02871, from Italian patent Appln. no. 67729A/90, and from German patent no. 565,027.

In these known locks, the tumblers oscillate with respect to a fulcrum and changing the combination consists in varying the extent of said oscillation, for example by moving the tumblers with respect to the fulcrum.

In French patent no. 2,663,072 the combination is changed by varying the position of the tumblers with respect to the position of respective contrast elements.

All known locks share the drawback that in order to change the combination it is necessary to open the lock itself to reposition the tumblers. Since this operation requires disassembling the already-installed lock, it has turned out to be very difficult, in addition to the fact that repositioning the tumblers requires a certain skill on the part of the operator.

A principal aim of the present invention is now to provide a lock with flat tumblers and changeable combination that allows to obviate the above described drawbacks.

This aim is achieved by means of a lock with flat tumblers and changeable combination whose characteristics are defined in the appended claims.

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

figure 1 is a view of the lock in operating condition;

figure 2 is a view of the same lock in the combination-changing position;

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

figures 4 and 5 are views of a detail of the lock of figures 1 and 2;

figures 6 and 7 are views of a safety device suitable to avoid possible jamming of the lock during combination changing;

figure 8 is a view of a different embodiment of the device of figures 6 and 7.

With reference to the above figures, the reference numeral 1 designates the faceplate of the lock casing which furthermore comprises the bottom 2, which is surrounded by a peripheral wall composed of the walls 3, 4, and 5, which are respectively referenced as upper, rear, and lower wall with reference to the drawing for the sake of convenience in description. The reference numeral 6 designates the cover that closes the casing.

The rectangular opening 7 is formed in the faceplate 1, and the bolt 8 protrudes outside through said opening, is slideable in the direction A, and extends inside the casing with the tang 9. The tang 9 is constituted by a flat bar which is less thick than the bolt 8 and lies on the centerline plane of said bolt. The tang 9 has, along its lower edge, multiple teeth 10 which form a rack on which the key acts to move the bolt. Two slots 11 and 12 are formed in the tang 9 and are elongated in the direction A; a threaded bush 13 engages in the first slot and rises from the bottom 2 of the casing to which it is fixed. The bush 13 allows to guide the bolt during its sliding and acts, together with other bushes 14, 15, and 16, as engagement element for the screws by means of which the cover 6 is fixed so as to close the lock casing. An equal number of flat tumblers is arranged on either side of the tang 9; one tumbler, generally designated by the reference numeral 17, is shown in the drawing.

In order to establish the conceptual situation, it is assumed that the total number of tumblers is six, divided into two groups of three adjacent tumblers: one group is on one side of the tang 9 and the other group is on the opposite side. Each tumbler 17 is composed of a rectangular part 18 and of a part 19 having a composite shape. The part 18 is hereinafter referenced as "changing strip" owing to its combination-changing function, as specified hereinafter, whereas the part 19 is termed "blocking lamina" owing to its ability to block the sliding of the bolt 8. The strip 18 has two slots 20 and 21 which are elongated in the direction B, at right angles to the direction A, and has a lower end 22 which is shaped so that it can be engaged by the web of a key 23 with double serrations which is inserted through an opening 26 of the bottom 2 or of the cover 6 of the casing and lifts the strip in the direction B. One edge of the strip 18 is straight, lies parallel to the slots 20 and 21, and has a set of teeth 24 suitable to mesh with a set of teeth 25 formed on a contiguous edge of the lamina 19. The lamina 19 comprises a central portion 27 which is rectangular and extends along the direction A; two rectangular wings 28 and 29 extend upwardly and downwardly from said central portion, and slots 30 and 31 are formed in said wings; said slots are elongated in a direction that is parallel to the slots 20 and 21.

The slots 30 and 31 are engaged by the bushes 13 and 16 so that the laminae 19 can only move in the direction B.

An opening 32 is formed in the central portion 27 of each lamina and is elongated in the direction A; a series of teeth 33 protrudes from the upper longitudinal edge of said opening and determines the combination of the lock together with a second

series of teeth 34 which lies opposite and protrudes from the lower edge of the opening 32.

The teeth 33 form gaps between them which have a square shape and allow to engage between said teeth a pin 35 having a square cross-section and protruding on either sides of the tang 9 to which it is rigidly coupled. The teeth 33 of each tumbler have alternately identical heights which are however different from the height of the teeth of the adjacent tumbler. The oppositely arranged ends of the upper teeth 33 and of the lower teeth 34 furthermore form a passage that allows the pin 35 to pass between the oppositely arranged teeth when the tumblers are actuated by the key 23.

The lamina 19 is completed by two notches 36 and 37 which are formed on the edge of the wing 28 which lies opposite to the set of teeth 25 and at the end of the opening 32 towards which the pin 35 moves when the bolt 8 is pushed out of the lock. The tumblers 17 (three on one side of the tang 9 and three on its other side) lie between two plates 38 and 39: the plate 38 is adjacent to the bottom 2 of the casing and is referenced to as "lower plate", whereas the other plate 39 (see figure 3) is referenced to as "upper plate" as it is meant to make contact with the cover 6. Since the plates 38 and 39 are identical, their details are described hereinafter with reference only to the lower plate 38 which, as shown by figures 1 and 2, substantially duplicates the profile of the tumblers 17.

The plates 38 and 39 in fact include a central portion 40 from which an expansion 41 extends upwards and from which an expansion 42 extends downwards.

The plates 38 and 39 are mutually fixed (at a distance that is equal to the thickness of the tumblers 17 and of the tang 9) by means of screws that engage in spacer bushes 43 and 43a which are driven through the slots 20 and 21 of the strips 18 of the tumblers. The mutual fixing of the plates 38 and 39 also secures a square pin 44 located between the expansions 41 in the vicinity of the wings 28 of the blocking laminae 19 but above the notch 37.

The plates 38 and 39 are suitable to perform small horizontal movements in the direction A when changing the combination of the lock. For this purpose, slots 45, 46 and 47, 48 are formed in the expansions 41 and 42 of the plates 38 and 39 and at the opposite ends of the central portion 40; said slots are elongated in the direction A and are suitable to be engaged respectively by the bushes 13 and 16 used to guide the laminae 19 vertically and by pins 49 and 50 protruding inwardly from the bottom 2 and from the cover 6. The height of the pins 49 and 50 does not exceed the thickness of the plates 38 and 39, so as to avoid protruding into the space between the plates 38 and 39 and so as to avoid interfering with the strips 18 and the laminae 19 of the tumblers. A tab 51 extends from each expansion 41 towards the upper wall 3 for mounting a support 52 for multiple spring-loaded pins 53; each pin 53 acts on a corresponding strip 18 and is thus capable of pushing the tumblers 17 downwardly to move and keep the pin 35 in engagement position between the upper teeth 33 and thus block the movement of the bolt 8.

Respective longitudinal recesses 54 are formed in the lower plate 38 and in the upper plate 39 at the pin 35 (see figures 4 and 5); these recesses allow the pin 35 to slide, and their length matches the length of the openings 32 of the tumblers. The recesses 54 of the lower plate 38 and of the upper plate 39 furthermore have, at the region where the teeth 24 and 25 mutually engage, a recess 55 which is shaped so as to form, in each plate 38 and 39, a tooth 56 which is located opposite to the notch 36 and is suitable to be struck by the pin 35 when the bolt 8 has extended fully out of the lock casing.

A lever 57 is accommodated in the recess 55 of the lower plate 38 and is articulated to a pivot 58 rigidly coupled to the bottom 2. The lever 57 is thus co-planar with respect to the plate 38, has a thickness that does not exceed the thickness of the plate 38, and is L-shaped, with an arm 59 that extends horizontally and a vertical arm 60. The vertical arm 60 is shaped at its end so that it is in contact with the rear flank of the tooth 56, i.e. on the side opposite to the one where the pin 35 acts. The horizontal arm 59 instead has a cam 61 suitable to cooperate with the pin 35, as more clearly shown hereinafter. An identical lever 57 is also accommodated in the recess 55 of the upper plate 39 and is articulated in the cover 6 and thus cooperates with the pin 35. Said lever, however, is not shown in the drawings.

The operation of the described lock is as follows.

Each user has a key that is used for normal opening and closing operations, and an auxiliary key, hereinafter referenced to as "combination-changing key" since it is used to change the combination.

The first user of course has a combination-changing key which he does not need to change the combination, since the combination of the lock has been set in the factory. However, this combination-changing key (hereinafter referenced to as "old combination-changing key") must be stored in order to allow subsequent combination changing. Said combination changing can be performed, for example, when a new user of the lock wishes to prevent the previous user from opening the lock.

The new combination entails the use of a new combination-changing key and of a new normal

key. The old combination-changing key only allows to prepare the tumblers for combination changing, which is performed with the new combination-changing key as follows.

By operating the lock with the old key, the bolt is moved to the fully extracted position shown in figure 1, which is achieved after four turns in the example shown. In this position, the opposite ends of the pin 35 are adjacent to the teeth 56 of the plates 38 and 39, and the cams 61 of the levers 57 rest on top of said ends. It should be noted that during the sliding of the bolt 8 the movement of the plates 38 and 39 is prevented by the abutment of the pin 44 against the wings 28 of the laminae 19, which can move only in the direction B due to the bushes 13 and 16 which are guided in the slots 30 and 31.

At this point the old combination-changing key is inserted and turned, acting on the tumblers 17 to raise them to the level at which the notches 36 and 37 face the pins 35 and 44. In particular, the notches 36 lie above the teeth 56.

When the old combination-changing key turns again, the bolt 8 performs an additional movement, since the pins 35 and 44 can now engage the notches 36 and 37. However, the pin 35 acts on the teeth 56 of the plates 38 and 39, which are thus moved by an extent equal to the depth of the notches 36 and 37, carrying the strips 18 with them and spacing them from the laminae 19, which cannot follow the movement of the plates 38 and 39 because they are restrained by the bushes 13 and 16. Following the separation of the strips 18 from the laminae 19, the teeth 24 disengage from the teeth 25. At the same time, the teeth 56 of the plates 38 and 39, by acting on the arms 60 of the levers 57, force said levers to oscillate into the position in which the cams 61 engage the pin 35. The lock is now in the configuration shown in figure 2, ready for combination changing.

At this point the old combination-changing key is removed and the new key is inserted; said new key is actuated so as to retract the bolt 8 inside the casing. A first angle of rotation of the new combination-changing key raises the strips 18 according to the new combination set by the new combination-changing key. Once the new arrangement of the strips 18 has been achieved, the further rotation of the new combination-changing key moves the bolt 8 and thus the pin 35 which, by acting on the cams 61, forces the levers 57 to rotate in the direction in which the arms 60 act on the rear flank of the teeth 56 of the plates 38 and 39. In this manner, the entire pack formed by the plates 38 and 39 and by the strips 18 is returned to a position in which it is adjacent to the laminae 19, causing the teeth 24 to engage between the teeth 25 before the pins 35 and 44 leave the notches 36 and 37.

As soon as the pins 35 and 44 have left the notches 36 and 37, by removing the new combination-changing key the pin 35 engages between the upper teeth 33 due to the spring-loaded pins 53 which, by pushing the strips 18 downwardly, also move the laminae 19 downwardly by virtue of the meshing of the teeth 24 and 25.

It is evident that the mutual displacement of the strips 18 and of the laminae 19 modifies the tumblers 17 according to a new combination that corresponds to the combination of the new combination-changing key; said combination can entail a new arrangement of one or more strips 18 relative to the respective laminae.

The lock is now ready to be operated with the new normal key, which has such a profile that when the tumblers 17 are raised the passage formed between the opposite teeth 33 and 34 is aligned with the pin 35 to allow the turn strokes of the bolt. In summary, the combination-changing key allows the bolt to perform the stroke for separating the strips 18 from the laminae 19 at a level that is set by the notches 36 and 37. Said level thus becomes a combination variable together with the profile of the combination-changing key.

The described invention is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept.

In particular there are provisions which while ensuring on one hand higher precision in the movement of the strips 18 and thus in the selection of the new combination, on the other hand prevent the incorrect insertion of a key other than the combination-changing key, owing to user error, from compromising the operation of the lock.

According to the invention, this higher precision in strip movement can be obtained by providing, on the tooth 10 that performs the last turn (i.e. outward stroke) of the bolt 8 (see figures 6 and 7), a tab 62 on which the old combination-changing key C, by rotating in the direction F, can act with a central portion D of its web. The height of the portion D is such that said portion passes below the end of the teeth 10, so that the contact point of the key on the tab 62 with respect to the rotation axis of the key has a smaller radius than it would have if the key acted on the flank of the tooth as in the embodiment of figures 1-5. Indeed, in view of the play of the key in the opening 26 and of the machining and assembly tolerances of the various parts in the lock, there remains a certain margin of error in the movement of the bolt and thus in the placement of the strips 18 which can lead to significant variations in the stroke of the strips, such as to compromise the meshing of the set of teeth 24 in the set of teeth 25 when the new combination is set with the new combination-changing key. The tab 62, by reducing the actuation radius of the key,

reduces the error in the movement of the bolt and thus of the strips 18 to values that always ensure the meshing of the sets of teeth 24 and 25.

In the lock of figures 1 to 5 there is a critical period that occurs when the lock is in the configuration of figure 2, in which the old combination-changing key, after disengaging the set of teeth 24 from the set of teeth 25, has been removed. In this configuration, if one inserts a key other than the new combination-changing key, for example the new lock actuation key, the sets of teeth 24 and 25 mesh in a manner that does not take into account the profile of the new actuation key with respect to the profile of the new combination-changing key.

This no longer allows to align the pin 35 with the passage between the teeth 33 and 34, and the lock is therefore blocked. A similar problem would occur in case of impacts which, by causing an accidental movement of the plates 38 and 39, displace the correct meshing of the sets of teeth 24 and 25.

In order to avoid the above mentioned problems, below the opening 26 of the key there is a lever 63 that oscillates about a fulcrum 63a on a plane that coincides with the plane of the tang 9.

The lever 63 has, at the end that lies opposite to the fulcrum 63a, a lug 64 that lies at right angles to the plane of oscillation of said lever and engages in a recess 65 formed in at least one of the lower expansions 42 of the plates 38 and 39.

The recess 65 forms a supporting tooth 66 and an engagement tooth 67.

A spring 68 acts on the lever 63 and tends to lift it so as to move the lug 64 into engagement position behind the tooth 67.

The lever 63 has, in the region below the opening 26 for the key, an expansion 69 that extends upwards and in which there is a curved slot 70 whose center of curvature lies at the fulcrum 63a.

A pin 71 engages in the slot 70 and keeps the lever 63 guided in its plane, preventing it from shifting laterally. According to what has been shown by the above description, in normal operating conditions the plates 38 and 39 are blocked in their movement by the abutment of the pin 44 against the expansions 28 of the laminae 19, and the spring 68 keeps the lever 63 in the raised position in which the lug 64 lies outside the recess 65.

Accordingly, when the normal actuation key of the lock is inserted in the opening 26, the bolt 8 is moved forward or backward and the lever 63 oscillates idly, causing no effect. When instead the combination is being changed, the outward movement of the bolt into the position of figure 6, which is a consequence of the rotation of the old combination-changing key C in the direction F and of the action of the portion D on the tooth 62 (vertical position in figure 6), the plates 38 and 39 are moved towards the faceplate 1. The plates 38 and 39, by moving from the position shown in dashed lines in figure 6 to the position shown in solid lines, cause the insertion of the lug 64 in the recess 65, so that when the combination-changing key is returned to the extraction position the lug 64, by virtue of the action of the spring 68, rises and engages behind the tooth 67, retaining the plates 38 and 39 and preventing them from performing, as a consequence of accidental impacts, movements that might make the set of teeth 24 mesh with the set of teeth 25, blocking the lock.

If the new combination-changing key C1 is now inserted to set the new combination, said key, during a first rotation angle in the direction G, acts on the expansion 69 (see the inclined position in figure 6) so as to lower the lever 63 into the position for disengaging the lug 64 from the tooth 67; during a subsequent rotation angle, it spaces the plates 38 and 39 from the lug 64, which exits from the recess 65. It should be noted that both the new combination-changing key and the old combination-changing key must have portions D that have the same height and can pass below the teeth 10.

If instead another key, for example the new actuation key, is inserted by mistake instead of the new combination-changing key after the plates 38 and 39 have been moved with the old combination-changing key into the position in which the lug 64 engages in the recess 65 and before the new combination has been set with the new combination-changing key, the actuation of the incorrect key causes the abutment of the lug 64 on the supporting tooth 66 and blocks the rotation of the key because said incorrect key has a central portion that is higher than the portion D of the combination-changing keys in order to be able to act on the actuation teeth 10. The user can thus notice the mistake he has made and replace the wrong key with the right one before the sets of teeth 24 and 25 are moved so as to mutually mesh, blocking the lock.

In a different embodiment of the invention, a secondary plate 72 (see Figure 8) is used instead of the oscillating lever 63; said secondary plate is guided beneath the opening 26 by the engagement of the pins 73 and 74 in slots 75 and 76 that allow the secondary plate to slide in the direction B. The secondary plate is actuated by a spring 77 that rests on the wall 5 so as to move the top part 78 to the level for cooperating with the webs of the combination-changing and actuation keys and allow a lateral tooth 79 to engage in the recess 65 according to what has been described above with reference to figures 6 and 7.

As is evident, the described lock perfectly achieves the intended aim and objects. A considerable advantage resides in the fact that regardless of the combination that has been set, the strips 18 abut against the bushes 43 and 43a when the key is not inserted in the lock, so that the lower edges of the ends 22, on which the serrations of the key act, all remain at the same level, making it impossible to decipher the combination by detecting the tumblers through the opening 26.

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 scope of each element identified by way of example by such reference signs.

Claims

1. Lock with flat tumblers and changeable combination, comprising a box-like body (2-6) which slidingly accommodates a bolt (8) provided with a tang (9) that has teeth (10) for moving the bolt by means of an actuation key with double serrations, said body also comprising a transverse pin (35) that engages in openings (32) of the tumblers (17) which extend in the direction (A) along which the bolt (8) slides and have, along their longitudinal edges, oppositely arranged teeth (33) that form passages through which said pin (35) advances by successive turns; characterized in that each tumbler (17) is composed of a first part (19), which is provided with said openings (32) and is guided at right angles to said tang (9) between a position for blocking said bolt (8), in which said pin (35) engages between the teeth (33) of said opening (32), and a position for the sliding of the bolt (8), wherein said pin (35) can slide through said passages; and of a second part (18), which is mounted between two plates (38, 39) which are mutually rigidly coupled and are guided in a direction that is parallel to the sliding direction (A) of said bolt (8); in that said second parts (18) are guided between said plates (38, 39) parallel to said first parts (19) and can be actuated by virtue of key means with double serrations; in that said first and second parts (18, 19) have mutually opposite sets of teeth (24, 25) which are adapted to mesh with each other in order to keep said parts (18, 19) coupled in a direction (B) that lies at right angles to the bolt (8); in that at least one (38) of said plates (38, 39) has a recess (54) which allows the pin (35) of the bolt (8) to slide freely and forms an abutment tooth (56) for said pin (35) when the bolt (8) is fully extracted from said box-like body (2-6); and in that said key means comprise: a first combination-changing key (C), which is suitable to lift the tumblers (17) into a position in which said pin (35) is in front of a notch (36) which is located at a different level relative to said passages between the teeth (33) and thus acts on the tang (9) of the bolt (8) so as to move said pin (35) so that it acts on said tooth (56) and therefore moves said plates (38, 39) into a position in which the sets of teeth (24, 25) of the first and second parts (18, 19) are mutually disengaged; and a second combination-changing key (C1) which, by acting on said second part (18) of the tumblers (17), raises them according to a new combination; lever means (57) being furthermore provided, said lever means cooperating with said pin (35) so that when said second combination-changing key (C1) is actuated so as to make said bolt (8) retract into said box-like body (2-6) said lever means (57) act on at least one of said plates (38, 39) to move said second parts (18) of the tumblers (17) into a position in which their sets of teeth (24) mesh with the sets of teeth (25) of said first parts (19), so as to preset the tumblers (17) according to the combination of a new actuation key with double serrations.

2. Lock according to claim 1, characterized in that said lever means are constituted by a lever (57) which is articulated in the box-like body (2-6) and is accommodated in a recess (55) of said plate (38-39) which has said tooth (56), said lever (57) comprising a first arm (59), which lies substantially parallel to the sliding direction (A) of the bolt (8), and a second arm (60), which engages said tooth (56) on the side that is opposite to the one where said pin (35) abuts, said first arm (59) forming a cam (61) that cooperates with said pin (35) so that when said second combination-changing key (C1) returns the bolt (8) inside the box-like body (2-6) said pin (35) acts on said cam (61) so as to cause the rotation of the lever (57) in the direction in which said second arm (59) acts on said plate (38, 39) to restore the mutual meshing of the sets of teeth (24, 25) of said first and second parts (18, 19) of the tumblers (17).

3. Lock according to claim 1 or 2, characterized in that said plates (38, 39) support spring-loaded pins (53) that act on said second parts (18) of the tumblers (17) to move said tumblers into the position for blocking the bolt (8).

4. Lock according to one of claims 1 to 3, characterized in that said first parts (19) have a notch (37) that can be engaged by a pin (44) lying between said plates (38, 39) simultaneously with the engagement of the pin (35) of the bolt (8) in the respective notch (36).

5. Lock according to one of the preceding claims, characterized in that said plates (38, 39) have slots (45, 48) which are elongated in a direction that is parallel to the sliding direction (A) of the bolt (8) and are engaged by pins (13, 16, 49, 58) which are fixed to the box-like body (2-6), said slots (45-48) having a length that determines the movement stroke of the plates (38, 39).

6. Lock according to one of the preceding claims, characterized in that the last of the teeth (10) that move the bolt (8) has a tab (62) that is suitable to be engaged by a portion (D) of the combination-changing keys (C, C1) which has, with respect to the key rotation axis, a radius that is smaller than the radius between said axis and the end of the teeth (10) of the bolt (8).

7. Lock according to claim 6, characterized in that it comprises a movable element (63, 72) which has a lug (64, 79) that is suitable to engage in a recess (65) of at least one of said plates (38, 39), said recess (65) having a supporting tooth (66) and an engagement tooth (67), said movable element (63, 72) having an expansion (69, 78) that cooperates with said portion (D) so that said lug (64, 79) assumes a position in which it engages said engagement tooth (67) to retain the plate (38, 39) when the sets of teeth (24, 25) of the first and second parts (18, 19) of the tumblers (17) have been spaced by said first combination-changing key (C) in order to change the combination, and a disengagement position when one acts on the movable element (63, 72) with the second combination-changing key (C1), said lug (64, 79) being suitable to assume a position in which it abuts against said supporting tooth (66) when one acts on the movable element (63, 72) with a key other than the second combination-changing key (C1) after the separation of the first and second parts (18, 19) performed by the first combination-changing key (C).

8. Lock according to claim 7, characterized in that said movable element is constituted by a lever (63) that oscillates in contrast with elastic return means (68).

9. Lock according to claim 8, characterized in that said movable element is constituted by a plate (72) which is guided in contrast with elastic return means (77).

10. Lock with flat tumblers and changeable combination according to what can be deduced from the description and from the accompanying drawings.

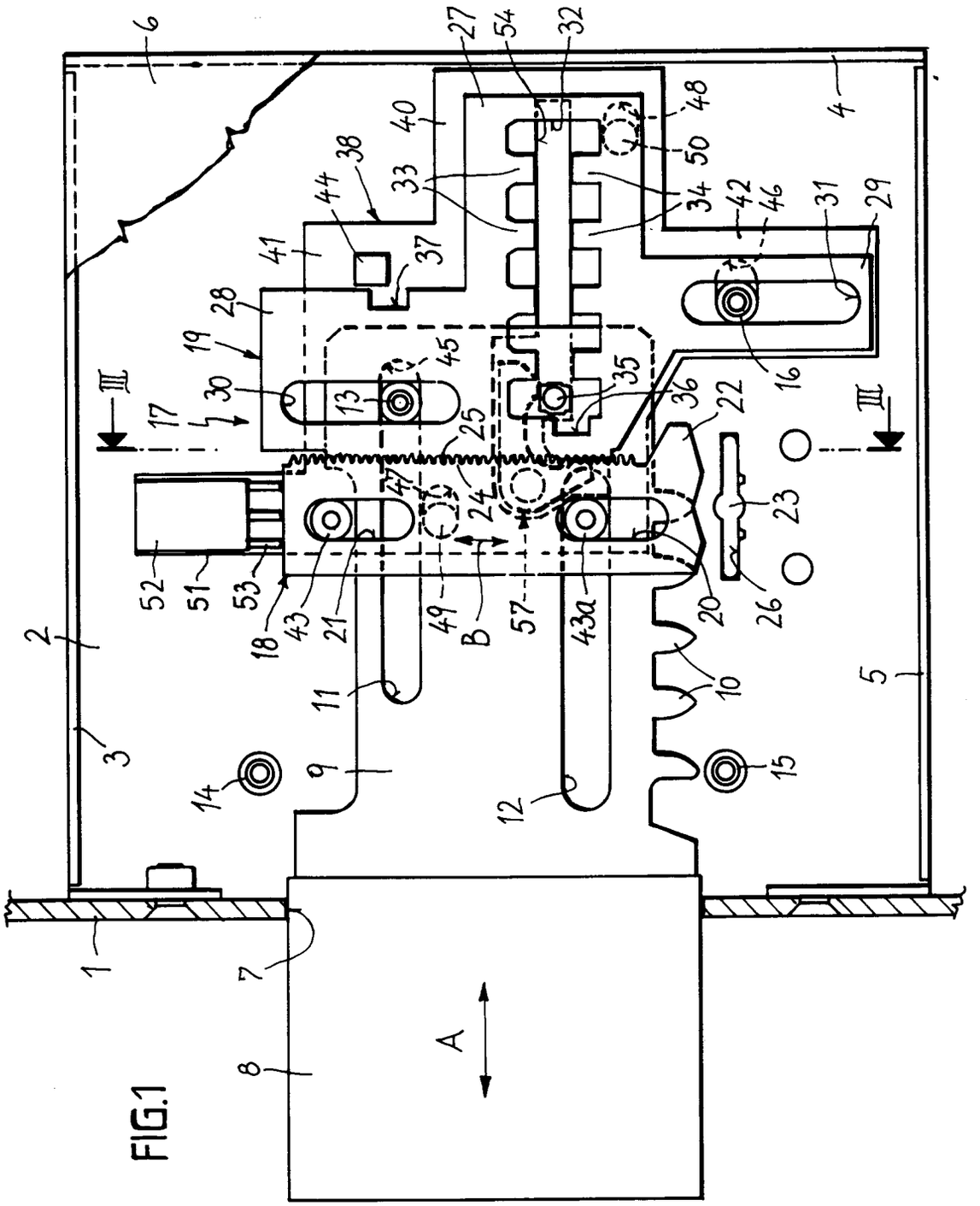

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FIG.1

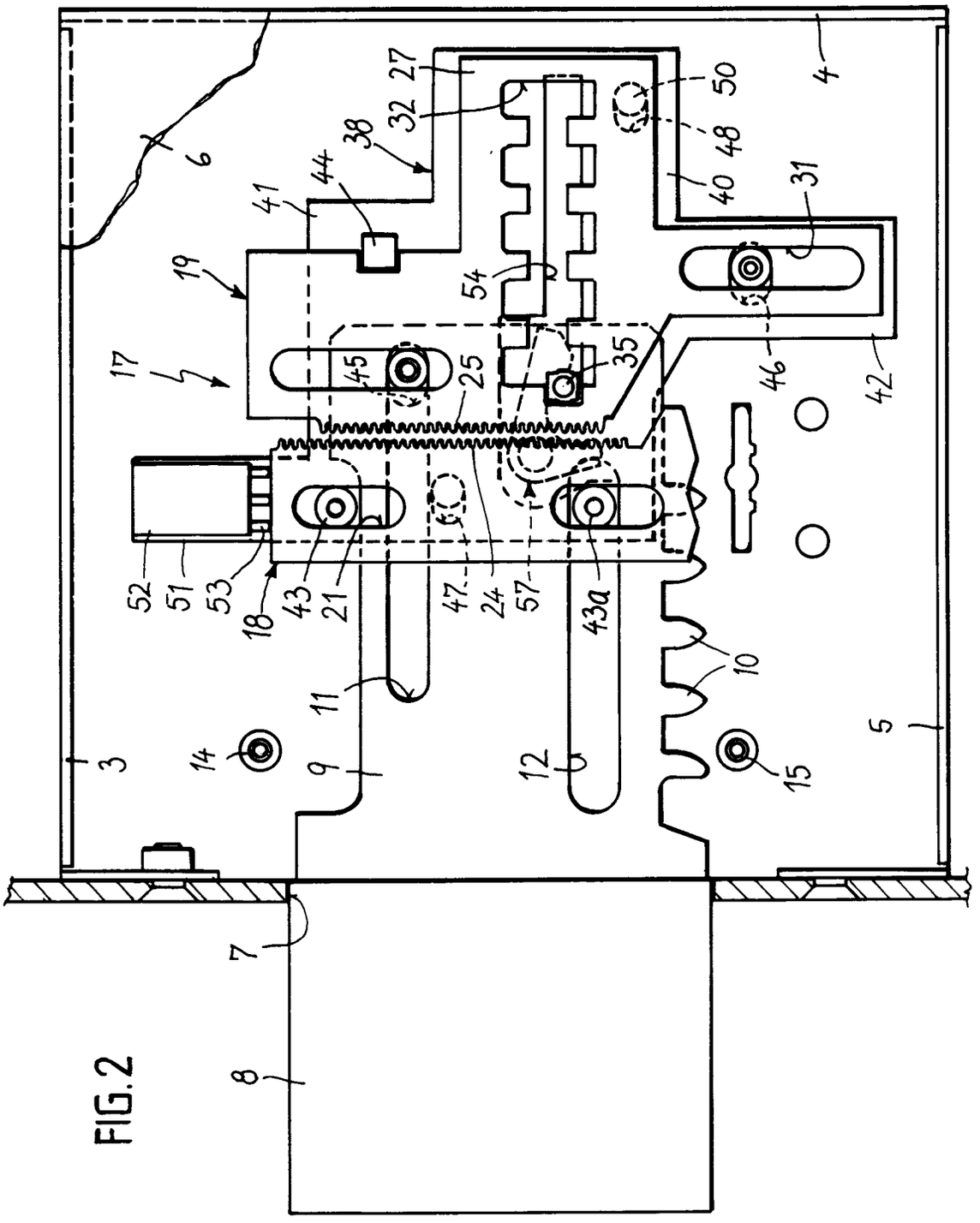
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FIG.2

FIG.3

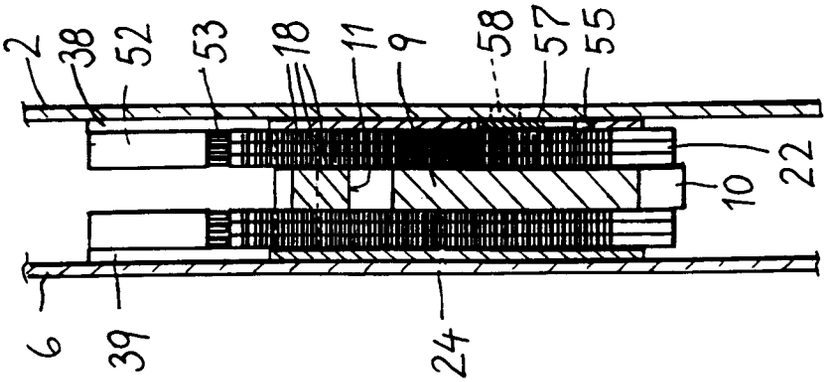


FIG.5

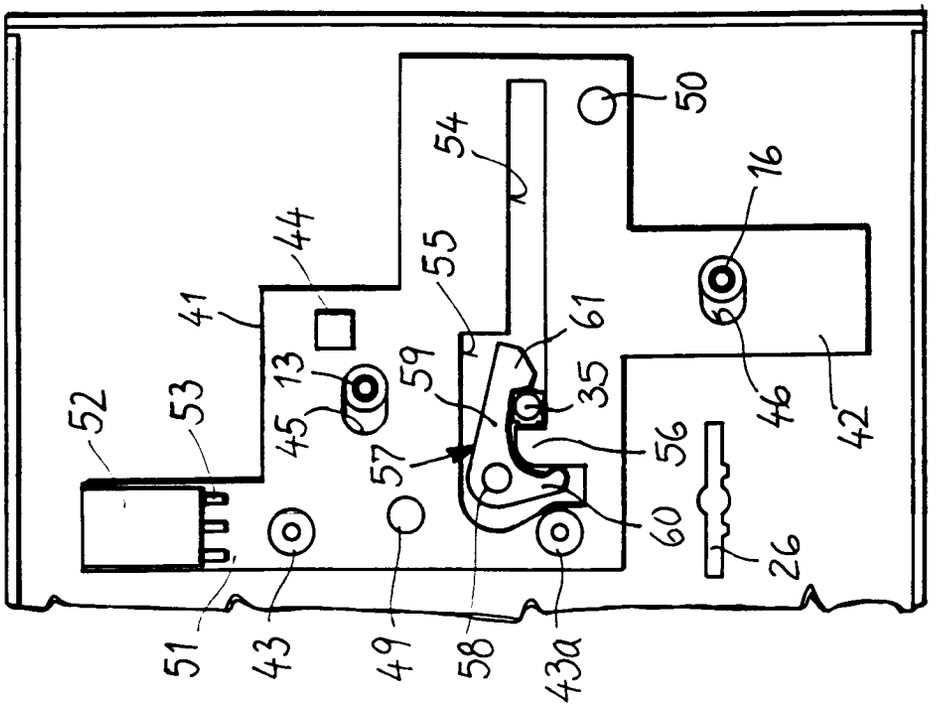
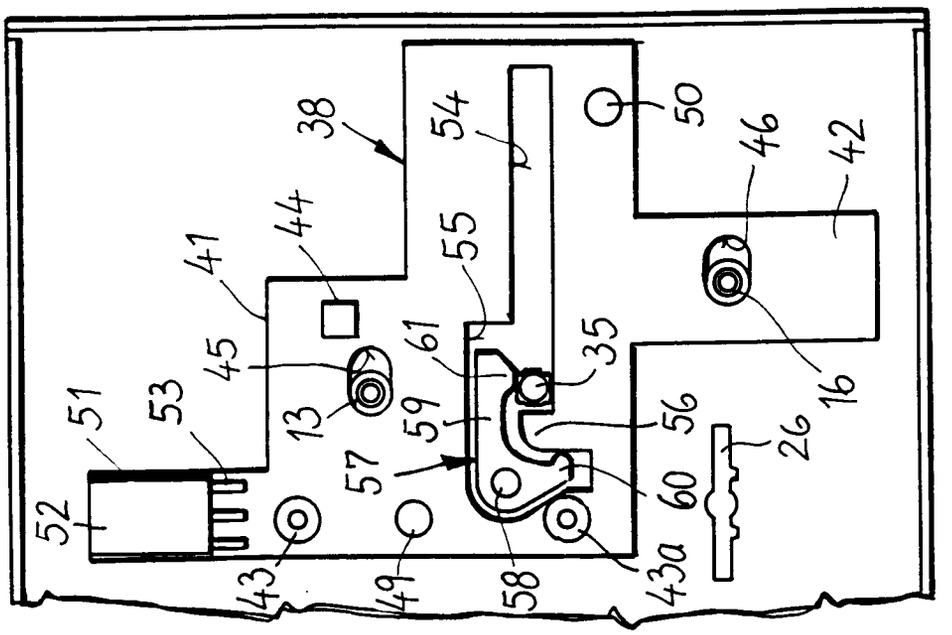
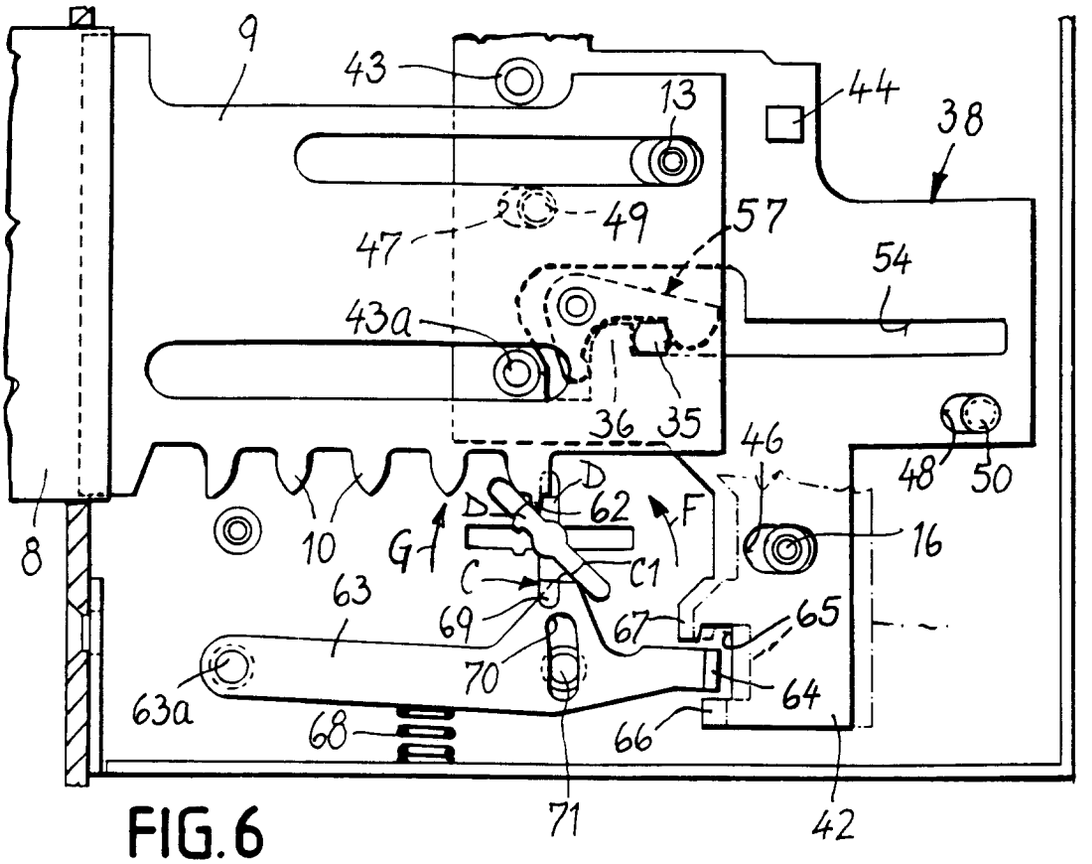


FIG.4

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F
8
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G1
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C
C1
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63a
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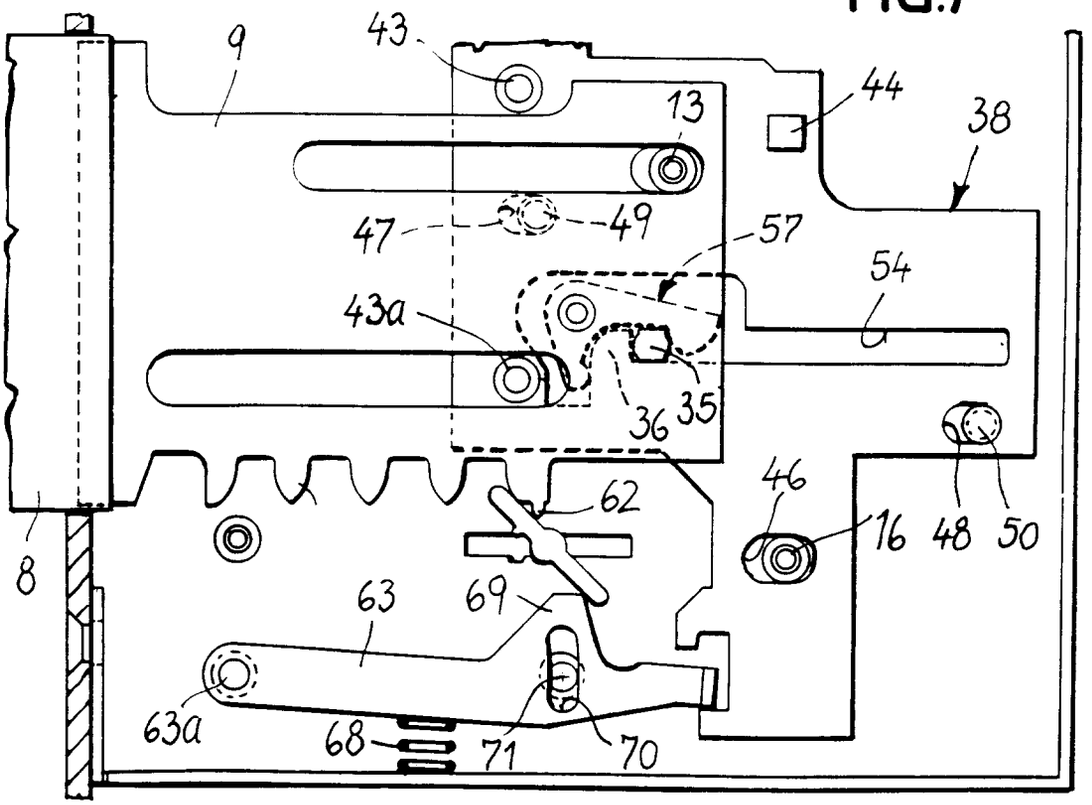
FIG.6

FIG.7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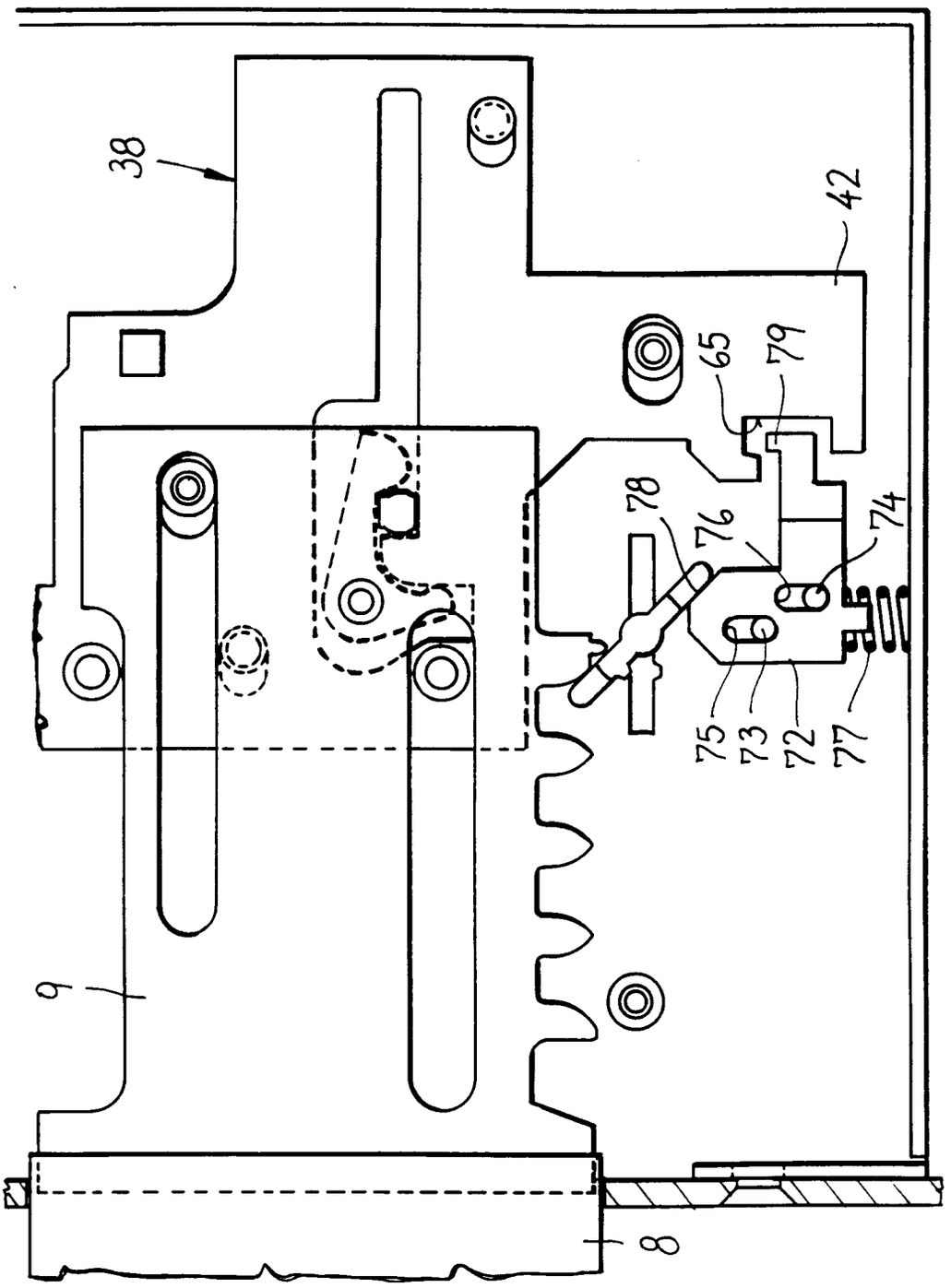

FIG.8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 94 11 8920

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)
A	FR-A-850 869 (SKRZEPINSKI) * the whole document *	1,10	E05B35/08
A	DE-A-17 03 277 (KROMER) * the whole document *	1,10	
A	US-A-2 221 664 (SÜSSER) * the whole document *	1,10	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	7 March 1995	Verelst, P

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