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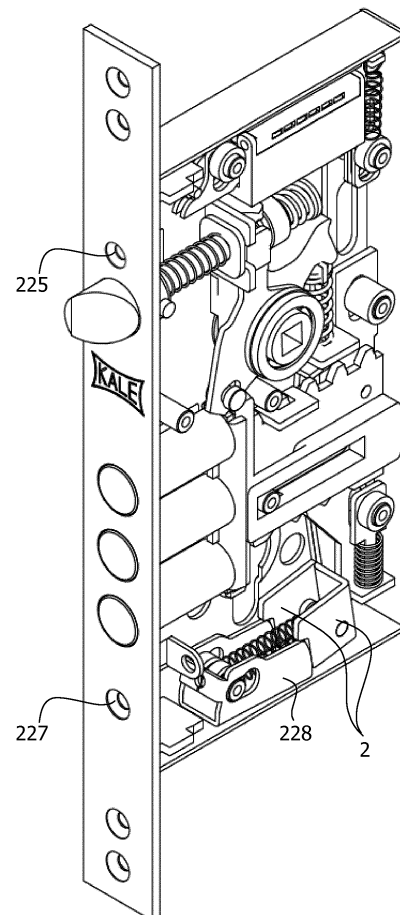
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(54) **SECURITY LOCK WITH AN AUTHORIZATION UNIT**

(57) The present invention proposes a cylinder lock (1) comprising a cylinder housing (6) and a plate (90) for moving linearly for transmitting motion from a cylinder pawl to a bolt of said cylinder lock; said cylinder lock further comprises a first blocking means (2) connected to the cylinder lock (1), said first blocking means (2) being movable between a normal position and a blockade position; the cylinder lock (1) further comprises a first spring (5) dictating force on the first blocking means (2) towards the cylinder housing (6); the first blocking means (2) is shaped and dimensioned such that upon removal of a cylinder from the cylinder housing (6); the blocking means (2) moves under force of said spring (5) from a normal position to a blockade position wherein the blocking means (2) at least partly accommodates and blocks the cylinder housing (6) from unauthorized positioning of a cylinder thereinto; and simultaneously, the first blocking means (2) engages with the plate (90) and prevents unauthorized moving of the plate (90); wherein the cylinder lock (1) further comprises an authorization unit (100) switchable from a first mode to a second mode using an authorization means (101), said authorization unit (100) being in connection with a safety element (30); such that in the first mode the safety element (30) is in a first position where the first blocking means (2) having access to the safety element (30) allowing engagement therewith, and in the second mode the safety element (30) is in a second position farther from the first blocking means (2) where the first blocking means (2) is movable without engaging the safety element (30).



**Figure 12**

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**Description****Technical Field of the Invention**

[0001] The present invention relates to a security lock providing a plurality of subsequent security measures.

**Background of the Invention**

[0002] A main method of burglary is removal of cylinder of a lock. When the cylinder is removed from the cylinder housing, it is not difficult to move the tumbler and open the door using basic tools e.g. a screwdriver.

[0003] One of widely employed measures in security locks is immobilization of the bolt through blocking the tumbler plates in case of unauthorized removal of a lock cylinder. Documents DE 3 800 298 A1, DE 3 909 584 A1, DE 2 657 802 A1, DE 8 814 086 U1, and FR 2 973 417 show several lock embodiments wherein tumbler plates are blocked and bolts are immobilized. In some of these documents said blockage is reversible (i.e. the blockage on the bolt or on the tumbler plates can be removed upon opening the door without damaging the lock).

[0004] Once the cylinder is removed from the cylinder housing, the lock can still be used by an unauthorized person, by mounting another cylinder into the housing and the door can be opened by a key coupling with said cylinder. In order to prevent this, it is a well known way to block the cylinder housing upon dislocation of the cylinder therefrom. Examples to such measure is available from documents DE 3 800 298 A1, DE 3 909 584 A1, DE 2 657 802 A1, DE 8 400 335 U1, DE 8 814 086 U1, DE 8 913 485 U1, EP 1 199 427 A1, EP 1 925 766 A1, FR 2 973 417, GB 2 438 491 A, and GB 2 489 094 A; and in some of these documents said blockage is reversible (i.e. the cylinder housing can be cleared upon opening the door without damaging the lock). In some of these documents, both types of said blockages appear simultaneously.

[0005] The main issue with the security lock mechanisms in the state of the art is the reversion of the blockages does not require an authorization step, and if the door can be opened in any way, an unauthorized person having suitable skills and tools can release the blockages.

[0006] Also said locks fail to provide tamper-evidence, since the cylinder can be changed with a new one (also with one suitable to function with the key for the dislocated cylinder), thus the authorized person can remain unaware that the lock cylinder has been removed and changed with a new one suitable to function with the key in hand.

**Objects of the Invention**

[0007] Primary object of the present invention is to overcome the abovementioned shortcomings of the prior

art.

[0008] Another object of the present invention is to provide a cylinder lock which prevents breaking in by replacement of the cylinder by unauthorized person, yet allowing said replacement by an authorized person without requiring further damage,

[0009] Yet another object of the present invention is to provide a cylinder lock allowing further repairs by reversible mode changes of an authorization unit,

[0010] A further object of the present invention is to provide a cylinder lock having a long service life due to its merely mechanical parts.

**Summary of the Invention**

[0011] The present invention proposes a cylinder lock comprising a cylinder housing and a plate for moving linearly for transmitting motion from a cylinder pawl to a bolt of said cylinder lock; said cylinder lock further comprises a first blocking means connected to the cylinder lock, said first blocking means being movable between a normal position and a blockade position; the cylinder lock further comprises a first spring dictating force on the first blocking means towards the cylinder housing; the first blocking means is shaped and dimensioned such that upon removal of a cylinder from the cylinder housing; the blocking means moves under force of said spring from a normal position to a blockade position wherein the blocking means at least partly accommodates and blocks the cylinder housing from unauthorized positioning of a cylinder thereinto; and simultaneously, the first blocking means engages with the plate and prevents unauthorized moving of the plate; wherein the cylinder lock further comprises an authorization unit switchable from a first mode to a second mode using an authorization means, said authorization unit being in connection with a safety element; such that in the first mode the safety element is in a first position where the first blocking means having access to the safety element allowing engagement therewith, and in the second mode the safety element is in a second position farther from the first blocking means where the first blocking means is movable without engaging the safety element.

**Brief Description of the Figures**

[0012] The figures, whose brief explanation is herewith provided, are solely intended for providing a better understanding of the present invention and are as such not intended to define the scope of protection or the context in which said scope is to be interpreted in the absence of the description.

Figure 1 shows an embodiment of the cylinder lock according to the present invention, wherein the authorization unit is in its first mode, and the cylinder housing is occupied with a cylinder.

Figure 2 is a simplified view of the cylinder lock shown in Fig.1, wherein the authorization unit is in its first mode, the cylinder housing is occupied with a cylinder, and the layout between the first blocking means and the safety element is shown.

Figure 3 shows the cylinder lock shown in Fig.1, wherein the authorization unit is still in first mode, the cylinder is removed from the cylinder housing, and the cylinder housing and the plate are blocked by the first locking means, which is blocked by the safety element.

Figure 4 is a simplified view of the cylinder lock shown in Fig.3, wherein the authorization unit is in its first mode, the cylinder is removed from the cylinder housing, and the blockage on first blocking means by the safety element is shown.

Figure 5 shows the cylinder lock shown in Fig.1, wherein the authorization unit is in second mode, the safety element is farther from the first blocking means such that the first blocking means is pivotable for allowing an authorized person to open the door and replace the cylinder.

Figure 6 is a simplified view of the cylinder lock shown in Fig.5, wherein it is shown that the first blocking means is no more blocked by the safety element.

Figure 7 shows an embodiment of the cylinder lock according to the present invention, wherein the switching of the authorization unit from the second mode to the first mode by means of tools is shown whilst the authorization means is engaged with the authorization unit.

Figure 8 shows the cylinder lock shown in the Fig. 7, wherein the authorization means is disengaged from the authorization unit after switching the authorization means back to its first mode upon cancellation of the blockages on cylinder housing and plate.

Figure 9 shows several parts of the mechanical security and modes selection system for employing in a cylinder lock according to the present invention.

Figure 10 shows perspective views of an embodiment of the authorization unit wherein it is in its first mode (a), and second mode (b).

Figure 11 shows an exploded view of the authorization unit embodiment shown in

Fig.10.

Figure 12 shows a perspective inner view of an embodiment of the cylinder lock according to the

present invention.

### Detailed Description of the Invention

5 **[0013]** Referring now the figures outlined before, the present invention proposes a security lock having a cylinder hole and tumbler plates, wherein the cylinder hole gets blocked and the tumbler plates are immobilized upon removal of cylinder in case of a burglary attempt; the security lock comprises an authorization mechanism through which said blockages can be released only with an authorization proving means.

10 **[0014]** A cylinder lock (1) comprising a cylinder housing (6) and a plate (90) for moving linearly for transmitting motion from a cylinder pawl to a bolt of said cylinder lock,

- 15 - said cylinder lock further comprises a first blocking means (2) connected to the cylinder lock (1), said first blocking means (2) being movable between a first normal position and a blockade position,
- 20 - the cylinder lock (1) further comprises a first spring (5) dictating force on the first blocking means (2) towards the cylinder housing (6);
- 25 - the first blocking means (2) is shaped and dimensioned such that upon removal of a cylinder from the cylinder housing (6), the blocking means (2) moves under force of said spring (5) from a normal position to a blockade position wherein the blocking means (2) at least partly accommodates and blocks the cylinder housing (6) from unauthorized positioning of a cylinder thereinto; and simultaneously, the first blocking means (2) engages with the plate (90) and prevents unauthorized moving of the plate (90);

30 wherein the cylinder lock (1) further comprises an authorization unit (100) switchable from a first mode to a second mode using an authorization means (101), said authorization unit (100) being in connection with a safety element (30); such that in the first mode the safety element (30) is in a first position where the first blocking means (2) having access to the safety element (30) allowing engagement therewith, and in the second mode the safety element (30) is in a second position farther from the first blocking means (2) where the first blocking means (2) is movable without engaging the safety element (30).

35 **[0015]** Preferably, the first blocking means (2) comprises a housing blocker (4) for blocking the cylinder housing (6) in case of removal of cylinder (55) of said cylinder housing (6) by at least partly entering thereinto by a motion of the first blocking means (2) dictated by the first spring (5).

40 **[0016]** In a preferred embodiment according to the present invention, said first blocking means (2) further comprises one or more rib (10) shaped and dimensioned to engage with the safety element (30) in one direction and not to engage with the safety element (30) in an opposite direction, the safety element (30) having a linear

motion range for getting closer or farther to the first blocking means (2).

**[0017]** The cylinder lock (1) further comprises an authorization unit (100) switchable from a first mode to a second mode using an authorization means (101), said authorization unit (100) being in connection with the safety element (30); such that in the first mode the safety element (30) is in a first position wherein the rib (10) having access to the safety element (30) allowing engagement therewith, and in the second mode the safety element (30) is in a second position farther from the rib (10) wherein the first blocking means (2) is movable without the rib (10) engaging the safety element (30). The term 'engagement' here means that the first blocking means (2) is blocked from turning back, once the it is pivoted towards the safety element (30) at the first mode.

**[0018]** Here, in case of removal of the cylinder (55) from the cylinder housing (6), the rib (10) engages with the safety element (30) due to a spring dictated motion of the first blocking means (2) by the spring (5), thus the first blocking means (2) is prevented from disengaging of the safety element (30). It is emphasized with thick arrows in Fig. 4 that the disengagement of the first blocking means (2) is prevented from disengaging from the safety element (30).

**[0019]** The plate (90) is linearly movable when pushed by a pawl (56) of a cylinder (55) into a first direction against a force of a second spring (21) pulling the plate (30) to the opposite direction with respect to the push as known in the art. In a preferred embodiment according to the present invention, the first blocking means (2) further comprises a plate blocker (20) which is shaped and dimensioned to reversibly engage with the plate (90), such that, in a normal position the plate blocker (20) and the plate (90) engage and block the motion of the plate (90); and when said plate blocker (20) is moved to said first direction thereof, the plate blocker (20) disengages from the plate (90) thus releases the plate (90). The engagement of the plate blocker (20) and the plate (90), and the blockage of the linear movement of the plate (90) are emphasized in the Fig. 3. Thus, the movement of the lock bolt (40) and the bolt member (41) by an unauthorized person is blocked due to the blockage of the plate (90).

**[0020]** In this embodiment, said first blocking means (2) preferably further comprises a reciprocation blocker (8) shaped and dimensioned such that it engages with the bolt member (21) by motion of the plate (30) dictated by the second spring (21).

**[0021]** Figure 5 shows an embodiment of the cylinder lock according to the present invention, wherein the authorization unit (100) is switched to its second mode by an authorized person using the authorization means (101), and it is emphasized on Fig. 6, that the safety element (30) is moved farther from the first blocking means (2). In this case the authorized person will be able to move the plate (90), the bolt member (41) and the bolt (40) fixed thereto to the unlocked position of the cylinder

lock, and finally open the door by using suitable tools (300) such as a screwdriver or any suitable tool obvious for a locksmith.

**[0022]** In a preferred embodiment according to the present invention, as schematically shown in Figure 10 (a) and (b), the authorization means (101) comprises one or more protrusions (114) which provides a combination of authorization, said protrusions (114) corresponding with a plurality of combination pins (113) comprised by the authorization unit (100),

the authorization unit (100) comprises one or more mode rod (110) having a plurality of projections (111) aligned with each other facing a direction, said mode rod (110) being under force of a spring (112); the safety element (30) being in connection with the mode rod (110) and being movable along with the mode rod (110) between said first and second positions of the safety element (30); at the first mode represented in Fig 10 (a), the combination pins (113) are in a first position wherein the projections (111) being abut to the combination pins (113) in accordance with the force of the spring (112) (not shown), such that the passage of the projections (111) is hindered by the combination pins (113), which hindrance is represented with a thick arrow in Fig. 10 (a), and

when the combination pins (113) are moved by the protrusions (114) upon the authorisation means (101) being pushed to the authorization unit (100) by an authorized person, the combination pins (113) line up such that passage of the projections (111) is no longer hindered and the mode rod (110) moves towards the projections in accordance with the force of the spring (112) (not shown), thus the authorization unit (100) switches to said second mode as represented in Fig. 10 (b).

**[0023]** Preferably, the cylinder lock (1) comprises a side plate (226) having a first opening (225) for accessing the restoring element (115) and for switching thereof from a first position to a second position. Also preferably, the side plate further comprises a second opening (227) for accessing the first blocking means (2) and for pushing thereof from its blockade position to its normal position. The cylinder lock (1) preferably further comprises an intermediate element (228) between the second opening (227) and the first blocking means (2) for conducting a force applied by a tool (300) through the second opening (227) towards the first blocking means (2).

**[0024]** More preferably, the authorization unit (100) further comprises a restoring element (115) comprising a restoring pin (116) fixed thereon, and the restoring element (115) is pivotably attached to the authorization unit (100), the restoring pin (116) facing a restoring protrusion (117) provided on the mode rod (110), such that when the authorization unit (100) switches from the first mode to the second mode, with the movement of the mode rod (110), restoring protrusion (117) pushes the restoring pin (116) from a first position to a second position, and thus the restoring element (115) pivots from a first position to a second position; and the restoring element (115) is accessible (e.g. by a tool used by an authorized person)

through a first opening (225) on the side plate (226) of the cylinder lock (1); such that the switching of the authorization unit (100) from the second mode to the first mode is performable by forcing and pivoting the restoring element (115) from its second position to its first position against the spring (112) force, thus moving of the mode rod (110) and thus moving of the safety element (30) from its second position to its first position as emphasized in Fig. 7, followed by changing the lineup of the combination pins (113) back such that the passage of the projections (111) therethrough is re-hindered. Figure 7 schematically shows the switching of the authorization unit (100) using tools (300) back into the first mode thereof.

**[0025]** In order to provide a cylinder lock according to the present invention, which is further suitable for employment and functioning in a door notwithstanding the opening direction thereof, the cylinder lock (1) is provided with a pair of first blocking means (2), a pair of safety elements (30), and a pair of mode rods (110) as represented in figures 5, 6, 9, 10 and 11. Here, the authorization unit (100) is operable by the authorization means (101) from both sides of a door equipped with said cylinder lock. In this embodiment, preferably each of the first blocking means (2) are provided with housing blocker (4) such that in case of unauthorized removal of lock cylinder (55), the cylinder housing (6) is blocked for introduction of another cylinder (55) from both sides of the door.

**[0026]** As the cylinder lock (1) according to the present invention comprises merely mechanical parts, it has a long service life and excluded from failures due to vulnerabilities of electronic features such as battery leakages etc.

**[0027]** Furthermore, since the cylinder lock (1) according to the present invention mandates authorization for replacement of lock cylinder (55), it provides tamper-evidence if the lock cylinder (55) is damaged and removed maliciously by an unauthorized person.

**[0028]** Thus the following objects are achieved by the present invention:

- overcoming the abovementioned shortcomings of the prior art,
- provision of a cylinder lock preventing breaking in by replacement of the cylinder by unauthorized person, yet allowing said replacement by an authorized person without requiring further damage,
- provision of a cylinder lock allowing further repairs by reversible mode changes of an authorization unit,
- provision of a cylinder lock having a long service life due to its merely mechanical parts.

## Claims

1. A cylinder lock (1) comprising a cylinder housing (6) and a plate (90) for moving linearly for transmitting motion from a cylinder pawl to a bolt of said cylinder lock,

- said cylinder lock further comprises a first blocking means (2) connected to the cylinder lock (1), said first blocking means (2) being movable between a normal position and a blockade position,

- the cylinder lock (1) further comprises a first spring (5) dictating force on the first blocking means (2) towards the cylinder housing (6);

- the first blocking means (2) is shaped and dimensioned such that upon removal of a cylinder from the cylinder housing (6), the blocking means (2) moves under force of said spring (5) from a normal position to a blockade position wherein the blocking means (2) at least partly accommodates and blocks the cylinder housing (6) from unauthorized positioning of a cylinder thereinto; and simultaneously, the first blocking means (2) engages with the plate (90) and prevents unauthorized moving of the plate (90);

**characterized in that** the cylinder lock (1) further comprises an authorization unit (100) switchable from a first mode to a second mode using an authorization means (101), said authorization unit (100) being in connection with a safety element (30); such that in the first mode the safety element (30) is in a first position where the first blocking means (2) having access to the safety element (30) allowing engagement therewith, and in the second mode the safety element (30) is in a second position farther from the first blocking means (2) where the first blocking means (2) is movable without engaging the safety element (30).

2. Cylinder lock according to the Claim 1, wherein the first blocking means (2) comprises a housing blocker (4) for blocking the cylinder housing (6) in case of removal of cylinder of said cylinder housing (6) by at least partly entering thereinto by a motion of the first blocking means (2) dictated by the first spring (5).

3. Cylinder lock according to any of the Claims 1 or 2, wherein said first blocking means (2) further comprises one or more rib (10) shaped and dimensioned to engage with the safety element (30) in one direction and not to engage with the safety element (30) in an opposite direction, the safety element (30) having a linear motion range for getting closer or farther to the first blocking means (2).

4. A cylinder lock according to the Claim 3, wherein the

cylinder lock (1) further comprises an authorization unit (100) switchable from a first mode to a second mode using an authorization means (101), said authorization unit (100) being in connection with the safety element (30); such that in the first mode the safety element (30) is in a first position wherein the rib (10) having access to the safety element (30) allowing engagement therewith, and in the second mode the safety element (30) is in a second position farther from the rib (10) wherein the first blocking means (2) is movable without the rib (10) engaging the safety element (30).

5. Cylinder lock according to any of the Claims 3 or 4, wherein in case of removal of the cylinder from the cylinder housing (6), the rib (10) engages with the safety element (30) due to the spring dictated motion of the first blocking means (2), thus the first blocking means (2) is prevented from disengaging of the safety element (30).
6. Cylinder lock according to any of the Claims 1 to 5, wherein the plate (30) is linearly movable when pushed by a pawl (56) of a cylinder (55) into a first direction against a force of a second spring (21) pulling the plate (30) to the opposite direction with respect to the push; the first blocking means (2) further comprises a plate blocker (20) which is shaped and dimensioned to reversibly engage with the plate (90), such that, in a normal position the plate blocker (20) and the plate (90) engage and block the motion of the plate (90); and when said plate blocker (20) is moved to said first direction thereof, the plate blocker (20) disengages from the plate (90) thus releases the plate (90).
7. Cylinder lock according to the Claim 6, wherein said first blocking means (2) further comprises a reciprocation blocker (8) shaped and dimensioned such that it engages with a bolt member (21) by motion of the plate (30) dictated by the second spring (21).
8. Cylinder lock according to any of the Claims 1 to 7, wherein the authorization means (101) comprises one or more protrusions (114) which provides a combination of authorization, said protrusions (114) corresponding with a plurality of combination pins (113) comprised by the authorization unit (113), the authorization unit (100) comprises one or more mode rod (110) having a plurality of projections (111) aligned with each other facing a direction, said mode rod (110) being under force of a spring (112); the safety element (30) being in connection with the mode rod (110) and being movable along with the mode rod (110) between said first and second positions of the safety element (30); at the first mode, the combination pins (113) are in a first position wherein the projections (111) being

abut to the combination pins (113), such that the passage of the projections (111) is hindered by the combination pins (113), and when the combination pins (113) are moved by the protrusions (114) upon the authorisation means (101) being pushed to the authorization unit (100) by an authorized person, the combination pins (113) line up such that passage of the projections (111) is no longer hindered and the mode rod (110) moves towards the projections in accordance with the force of the spring (112), thus the authorization unit (100) switches to said second mode.

9. Cylinder lock according to the Claim 8, wherein the authorization unit further comprises a restoring element (115) comprising a restoring pin (116) fixed thereon, and the restoring element (115) is pivotably attached to the authorization unit (100), the restoring pin (116) facing a restoring protrusion (117) provided on the mode rod (110), such that when the authorization unit (100) switches from the first mode to the second mode, with the movement of the mode rod (110), restoring protrusion (117) pushes the restoring pin (116) from a first position to a second position, and thus the restoring element (115) pivots from a first position to a second position; and the restoring element (115) is accessible through an opening (225) on a side plate (226) of the cylinder lock (1), such that the switching of the authorization unit (100) from the second mode to the first mode is performable by forcing and pivoting the restoring element (115) from its second position to its first position against the spring (112) force, thus moving of the mode rod (110) and thus moving of the safety element (30) from its second position to its first position, followed by changing the lineup of the combination pins (113) back such that the passage of the projections (111) there-through is re-hindered.
10. Cylinder lock according to any of the Claims 1 to 9, wherein the cylinder lock (1) is provided with a pair of first blocking means (2), a pair of safety elements (30), and a pair of mode rods (110); and the authorization unit (100) is operable by the authorization means (101) from both sides of a door equipped with said cylinder lock.
11. Cylinder lock according to the Claim 10, wherein each of the first blocking means (2) are provided with housing blocker (4) such that in case of unauthorized removal of lock cylinder, the cylinder housing (6) is blocked for introduction of another cylinder from both sides of the door.
12. Cylinder lock according to the Claim 9, further comprising a side plate (226) having a first opening (225) for accessing the restoring element (115) and for

switching thereof from a first position to a second position.

**13.** Cylinder lock according to any of the Claims 1 to 12, comprising a side plate (226) having a second opening (227) for accessing the first blocking means (2) and for pushing thereof from its blockade position to its normal position. 5

**14.** Cylinder lock according to the Claim 13, further comprising an intermediate element (228) between the second opening (227) and the first blocking means (2) for conducting a force applied by a tool (300) through the second opening (227) towards the first blocking means (2). 10 15

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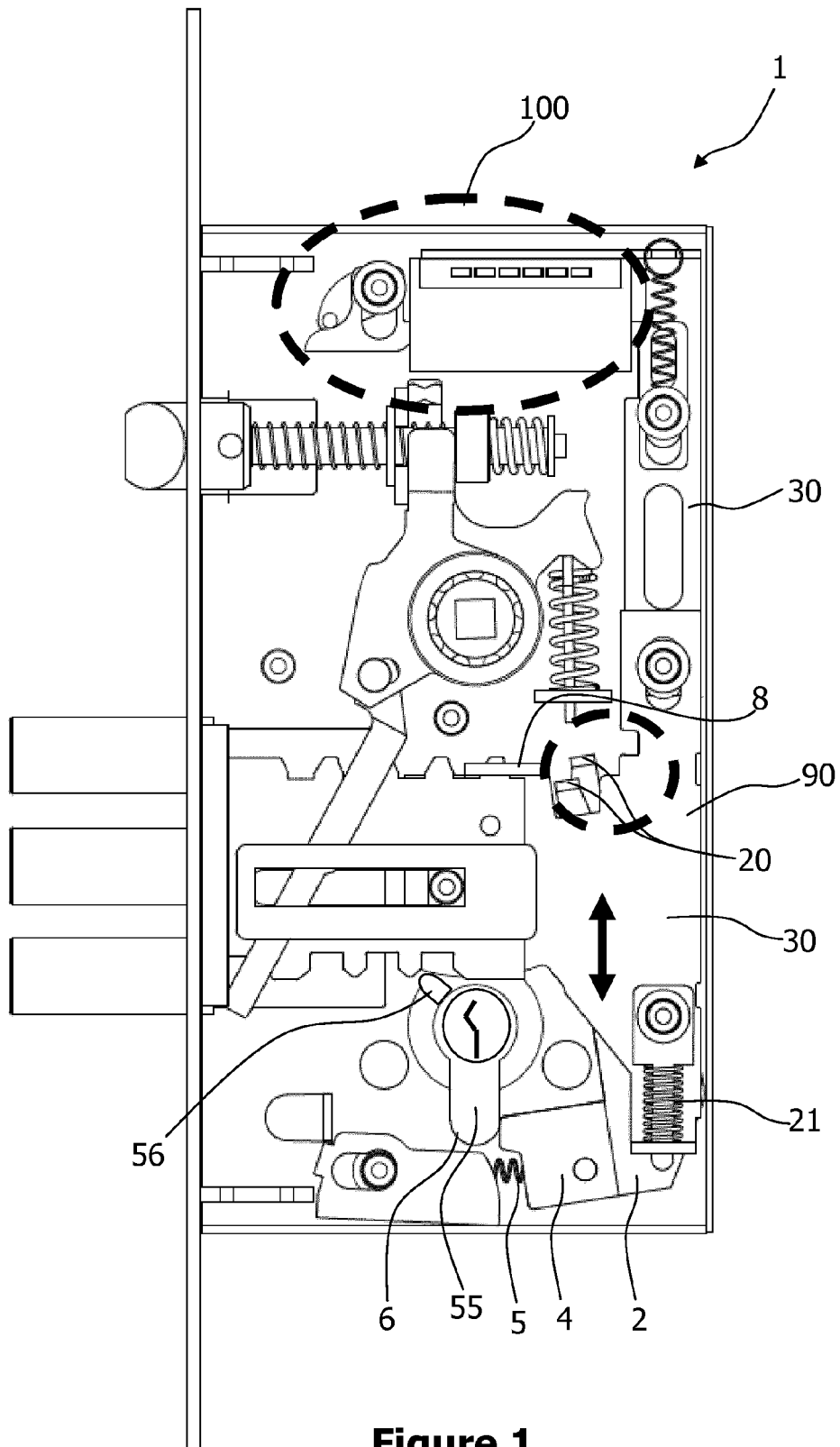
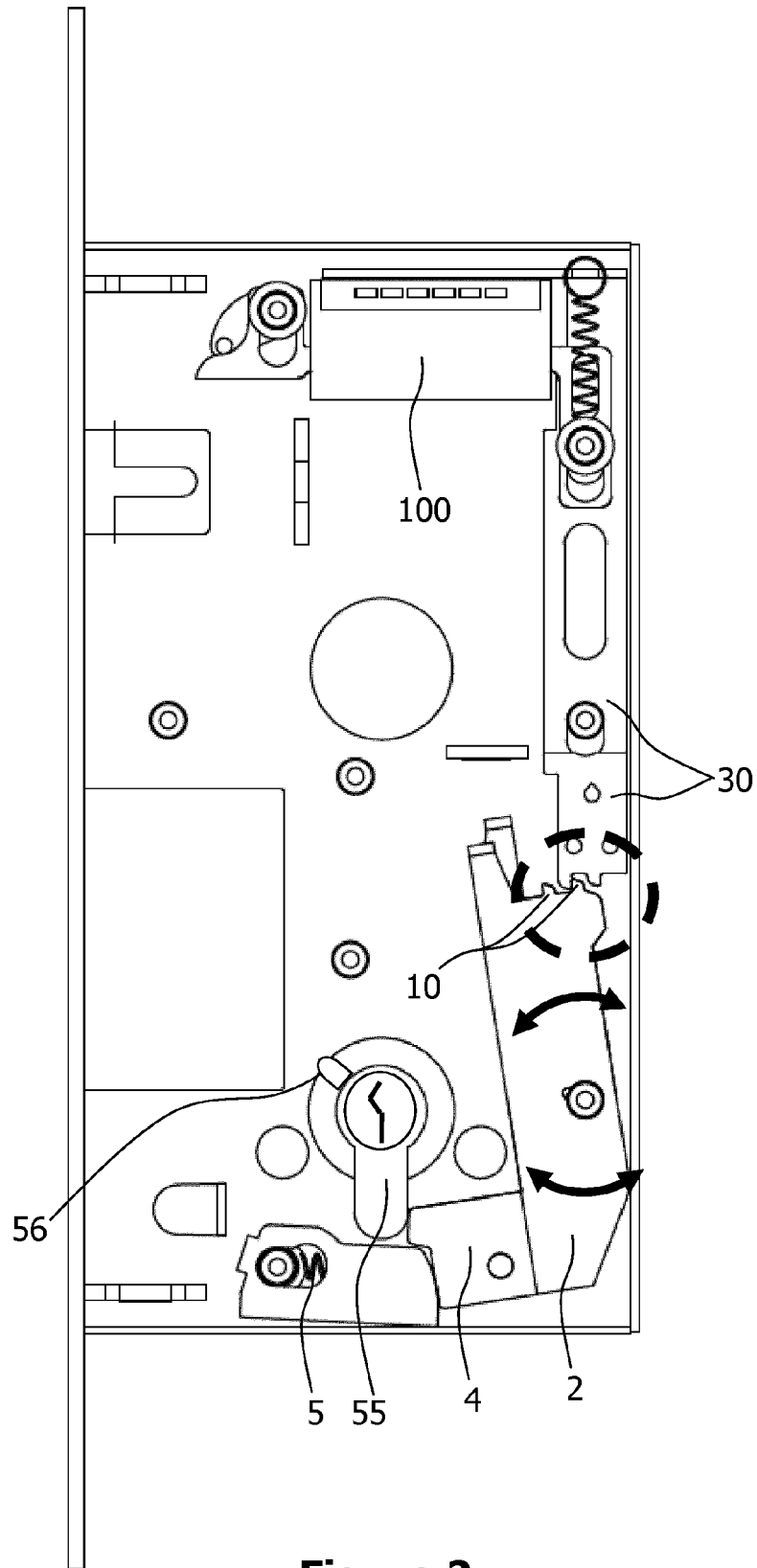


Figure 1



**Figure 2**

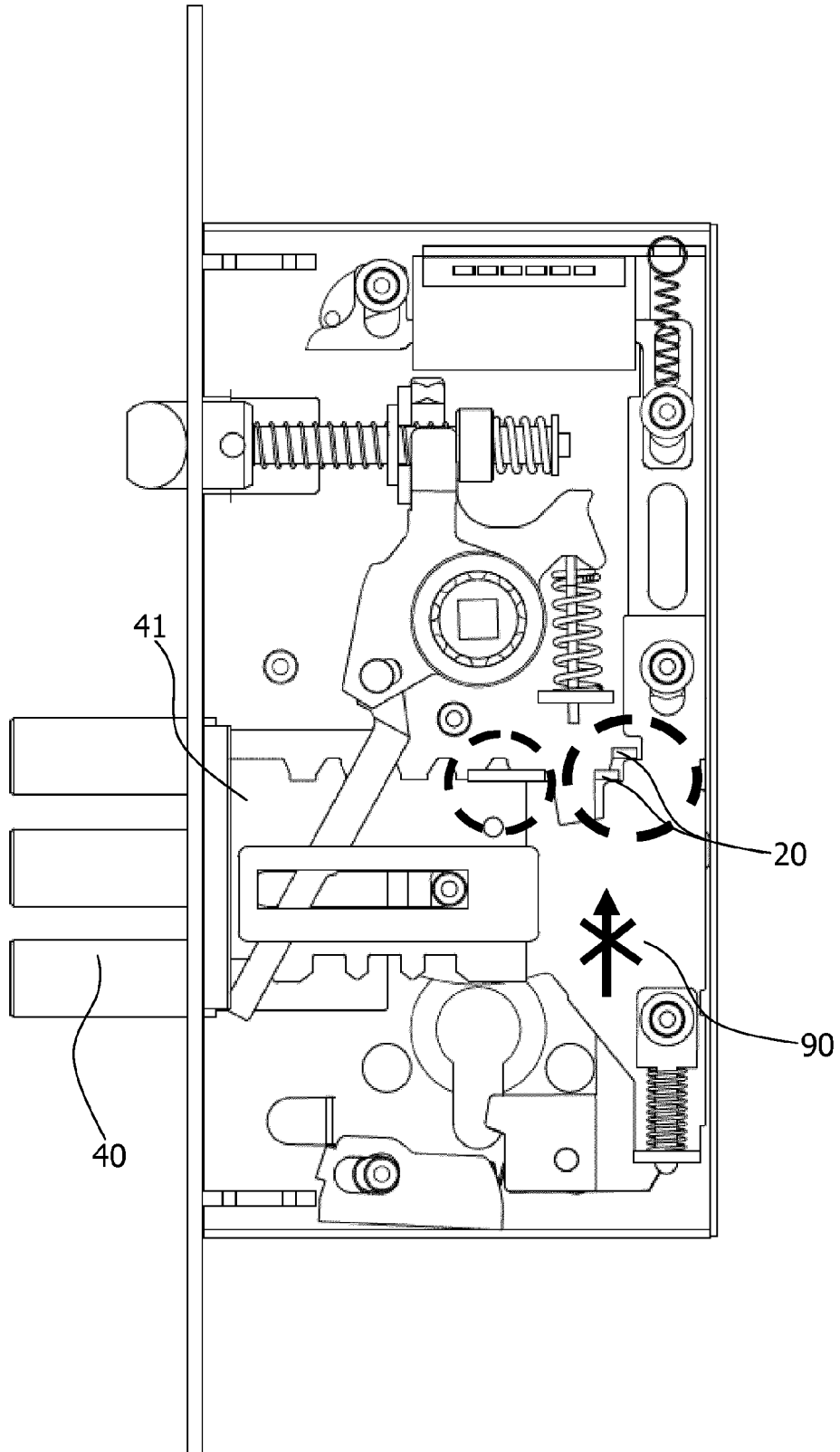
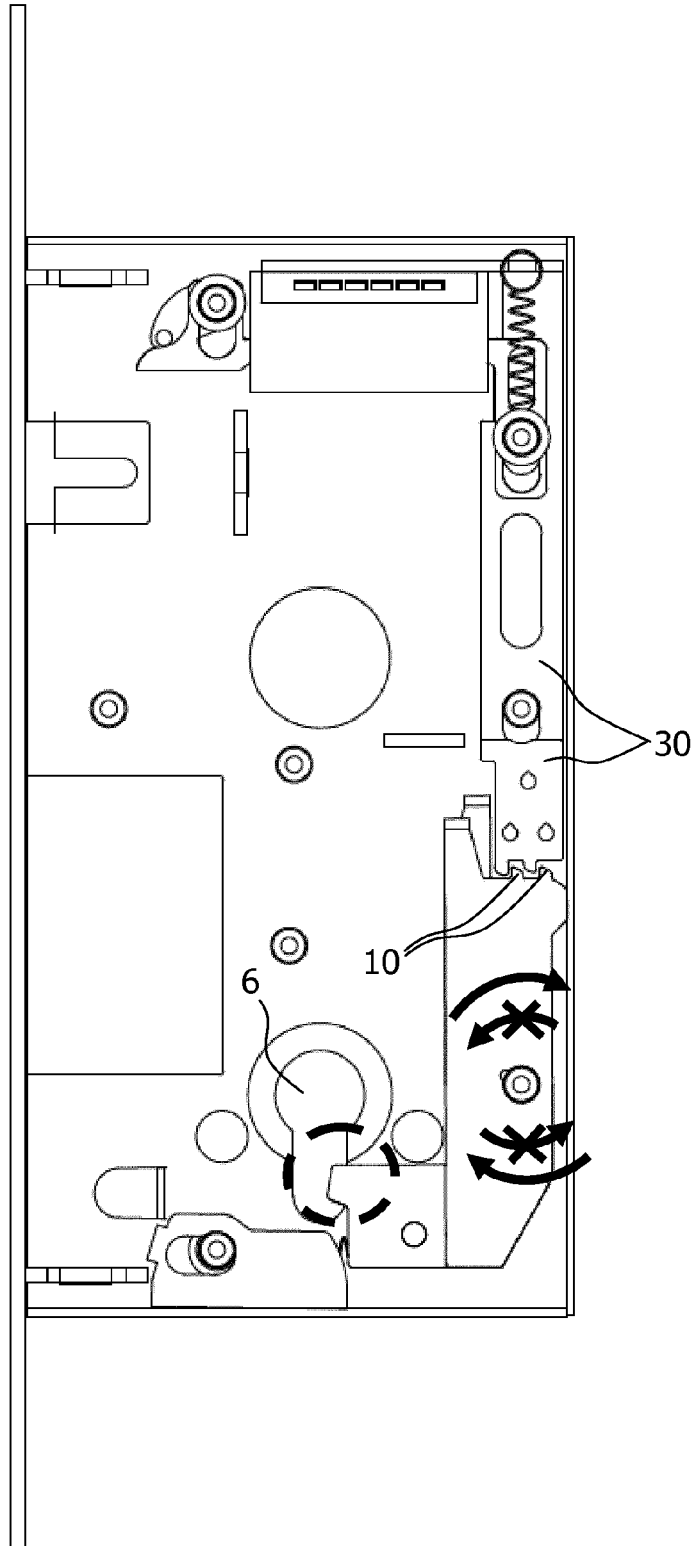
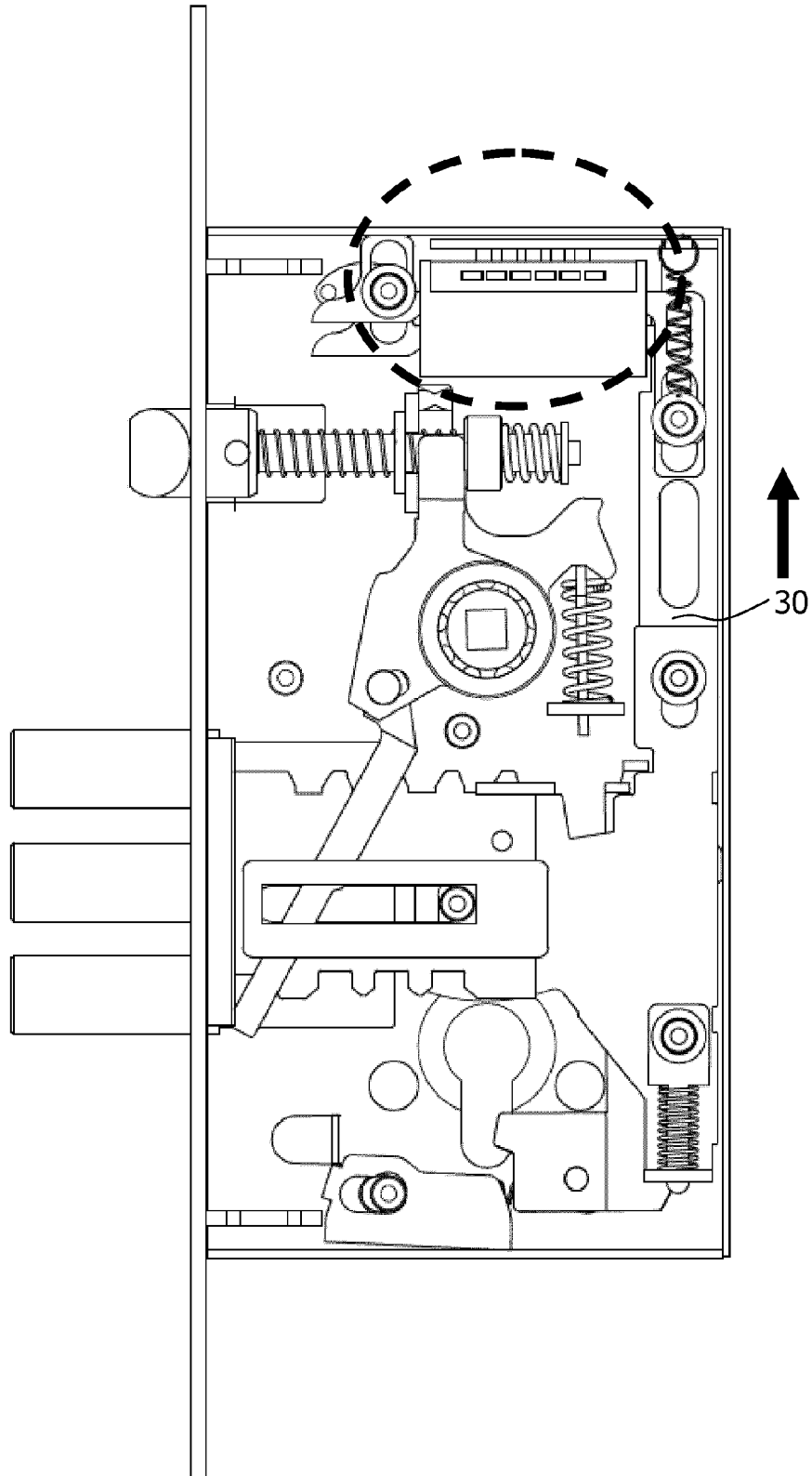


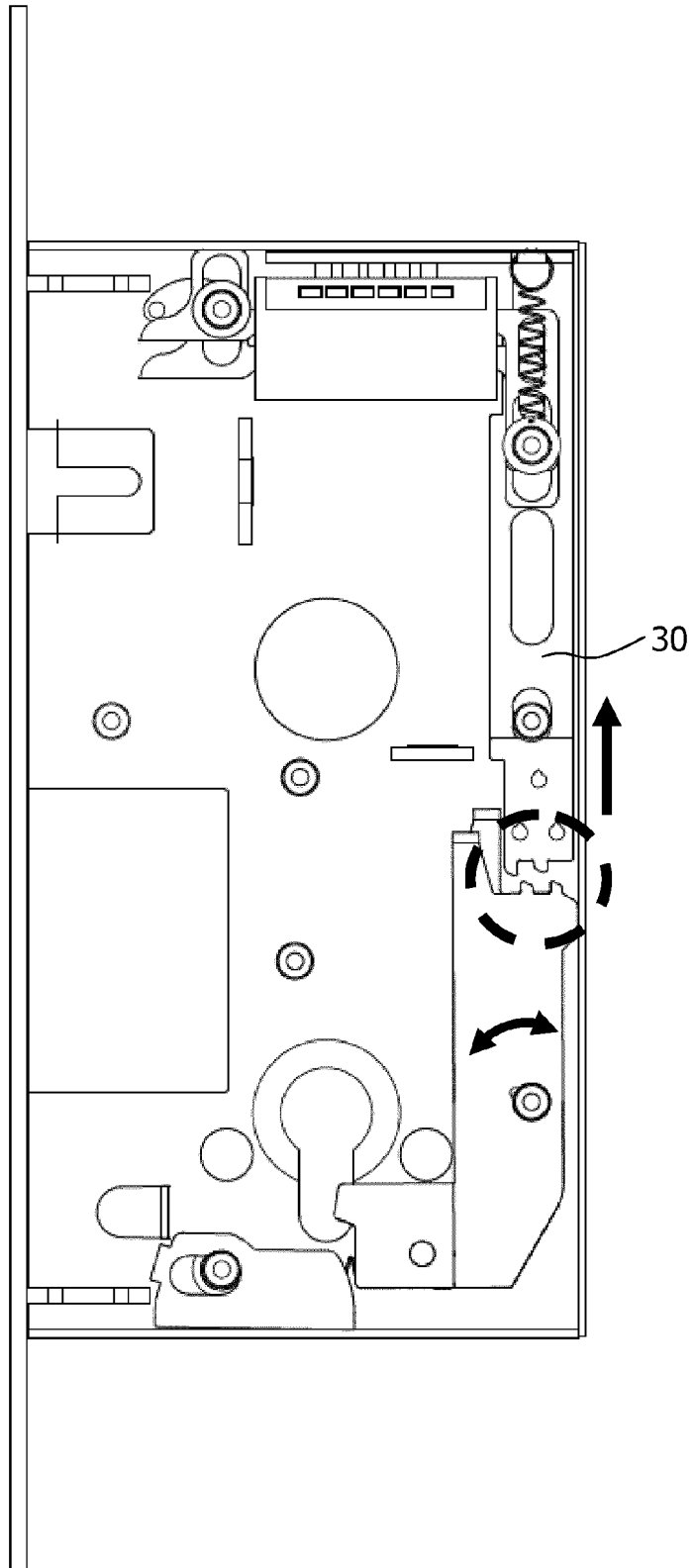
Figure 3



**Figure 4**



**Figure 5**



**Figure 6**

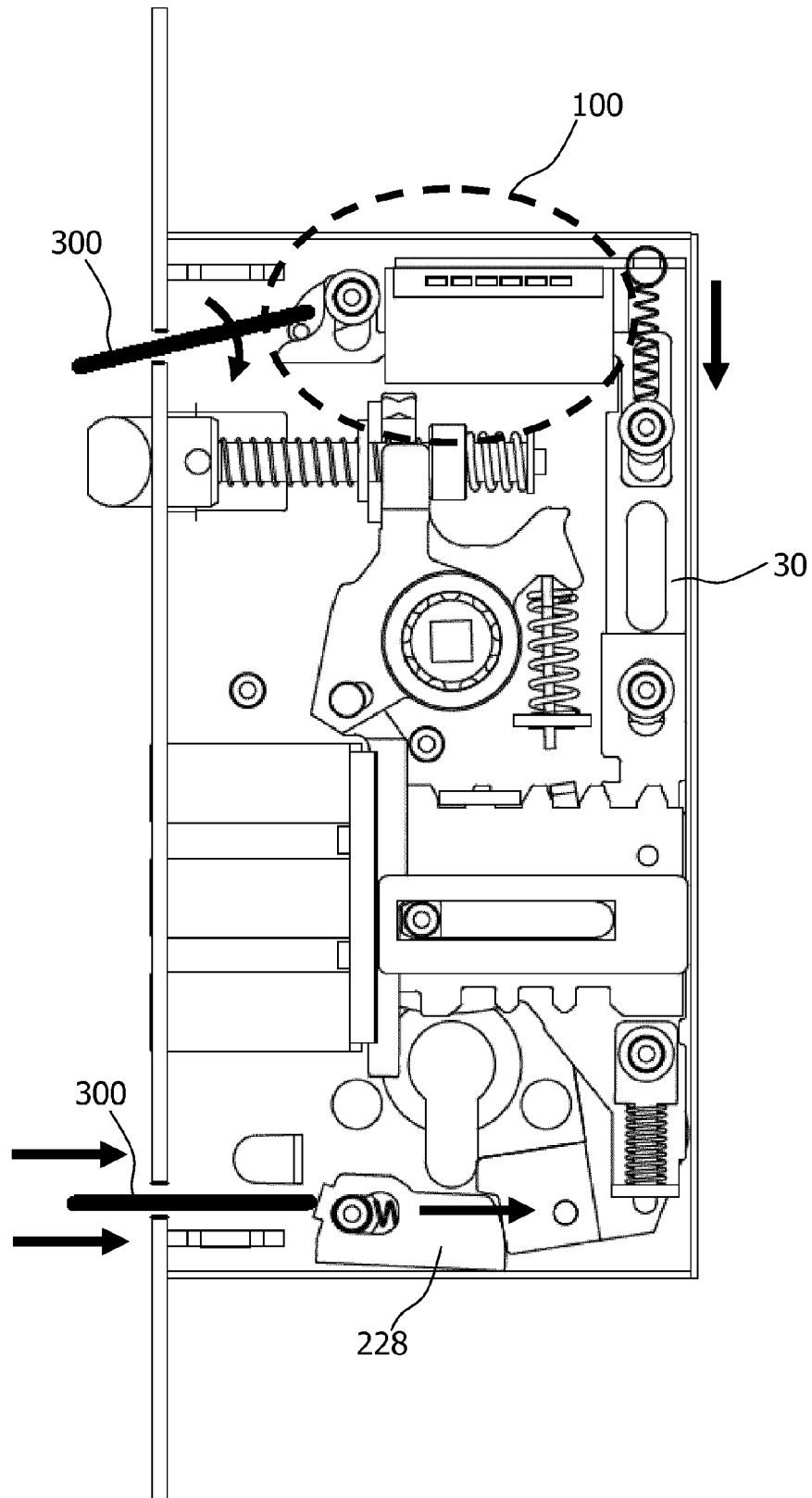
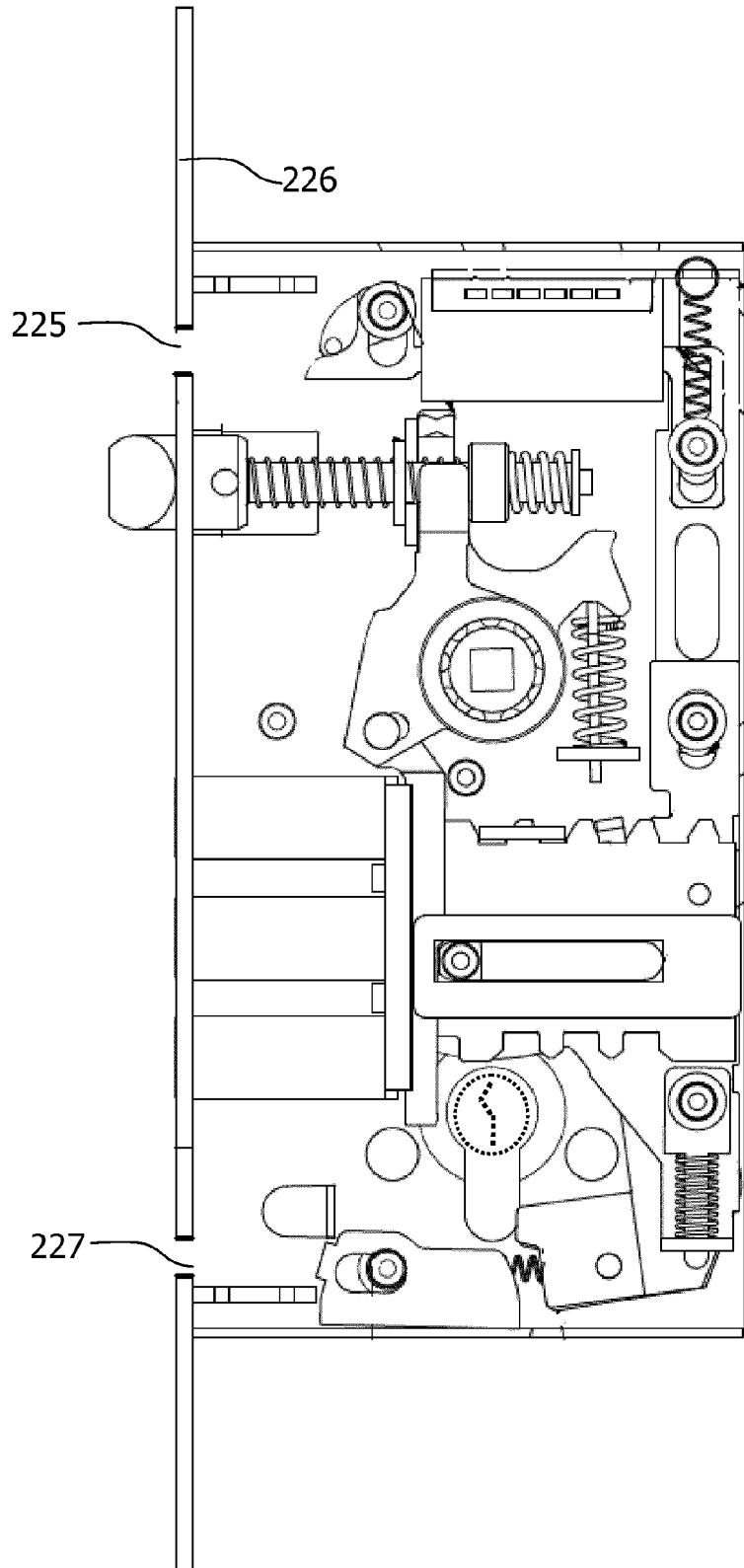


Figure 7



**Figure 8**

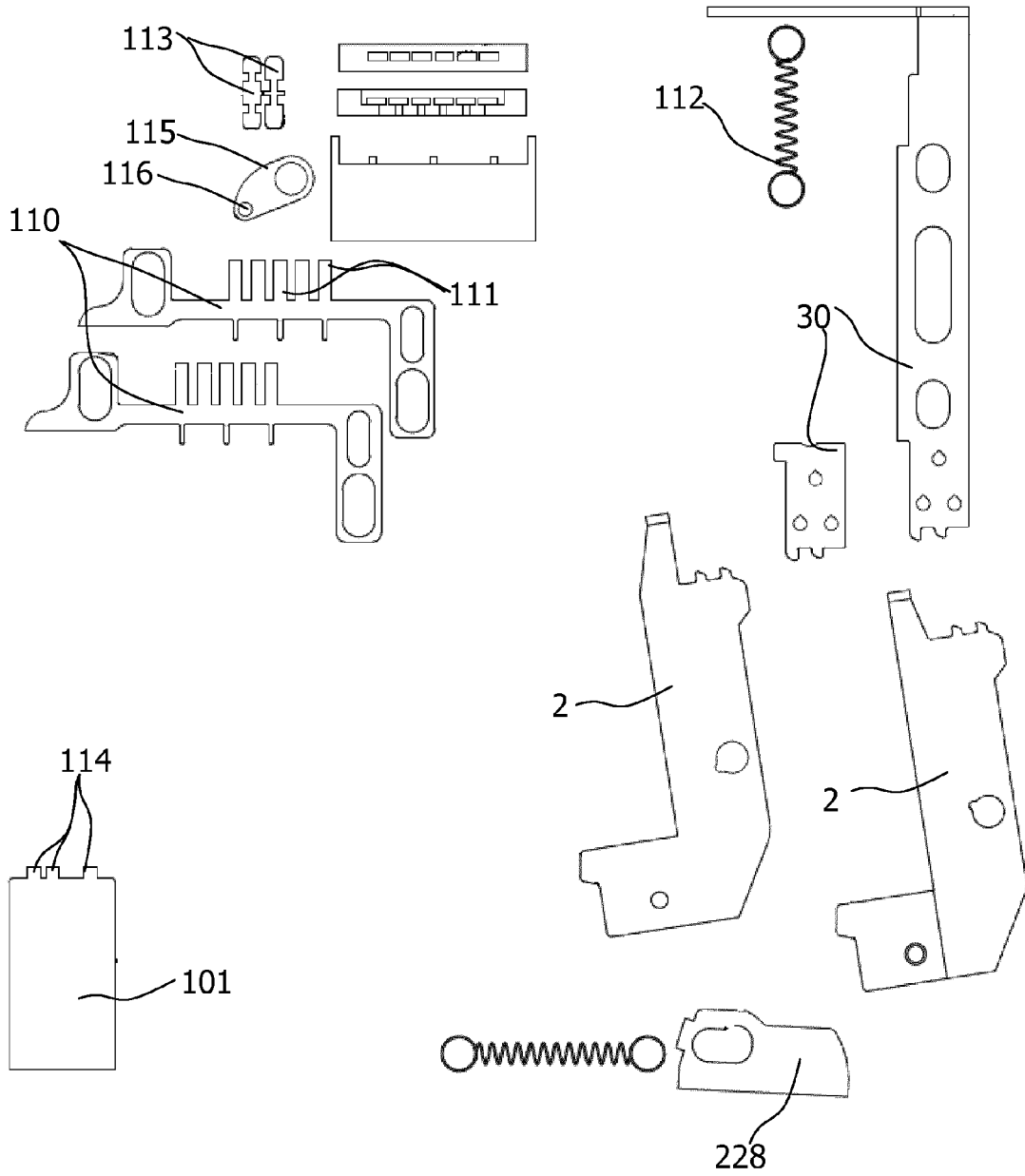


Figure 9

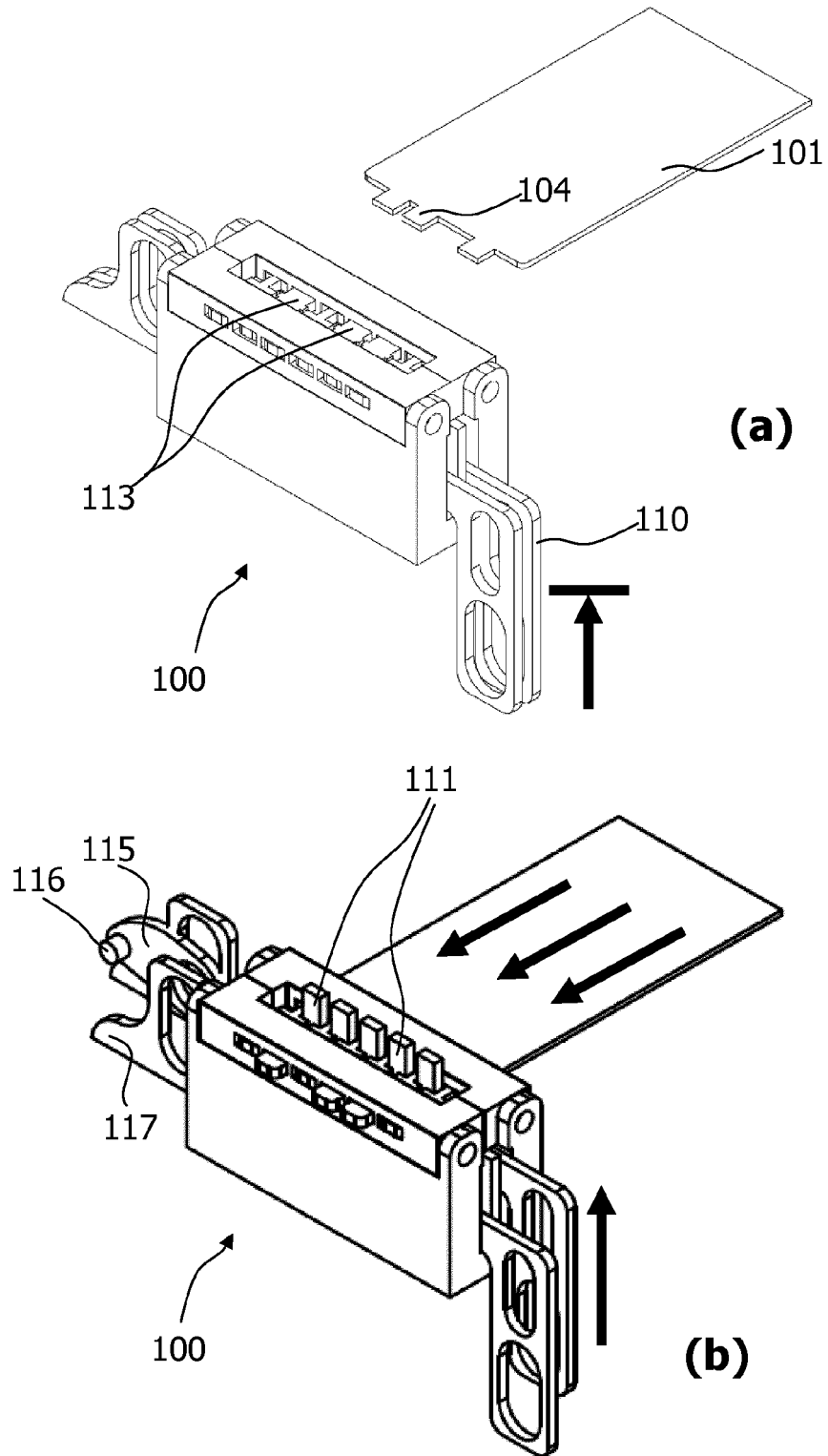
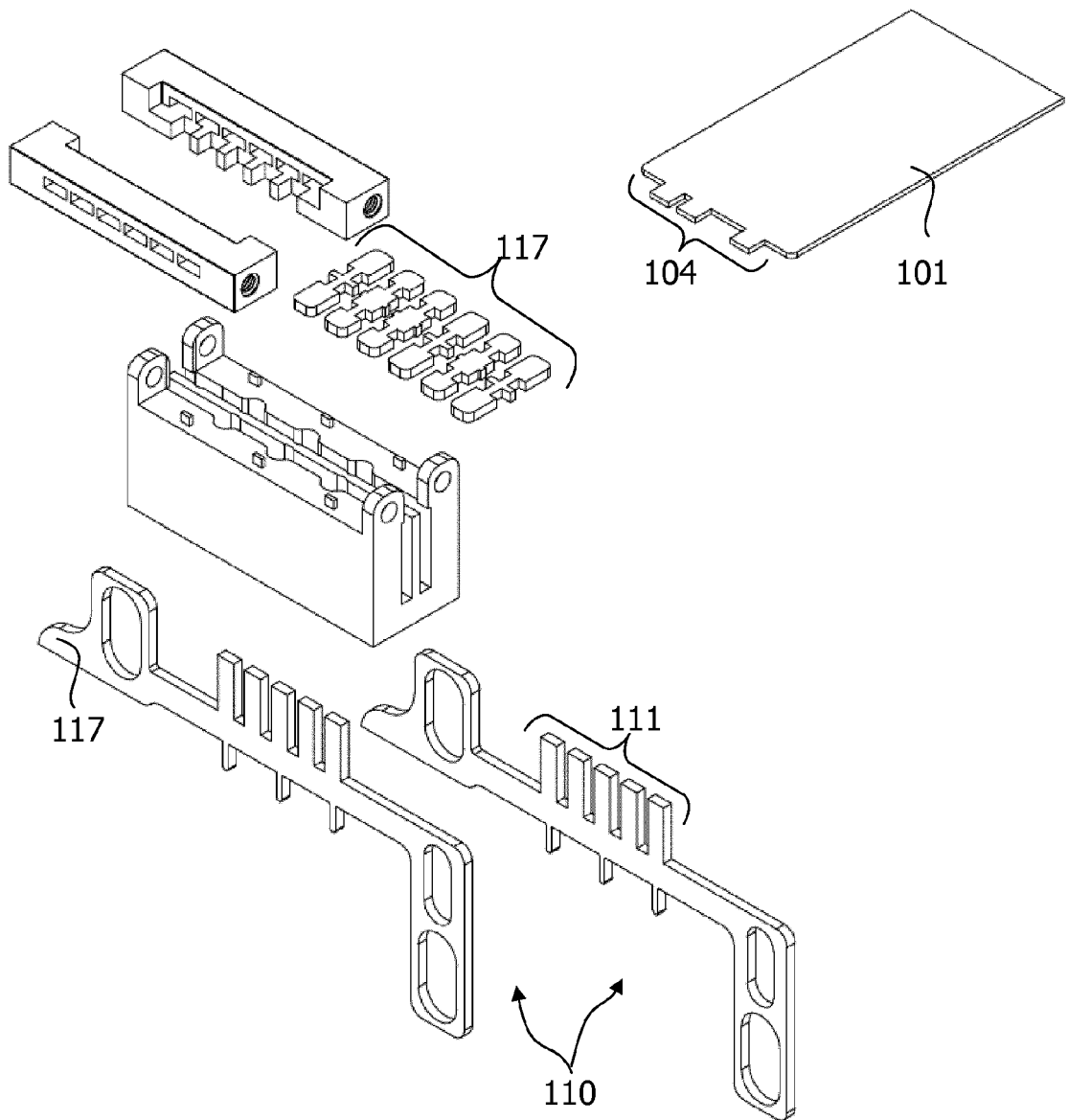
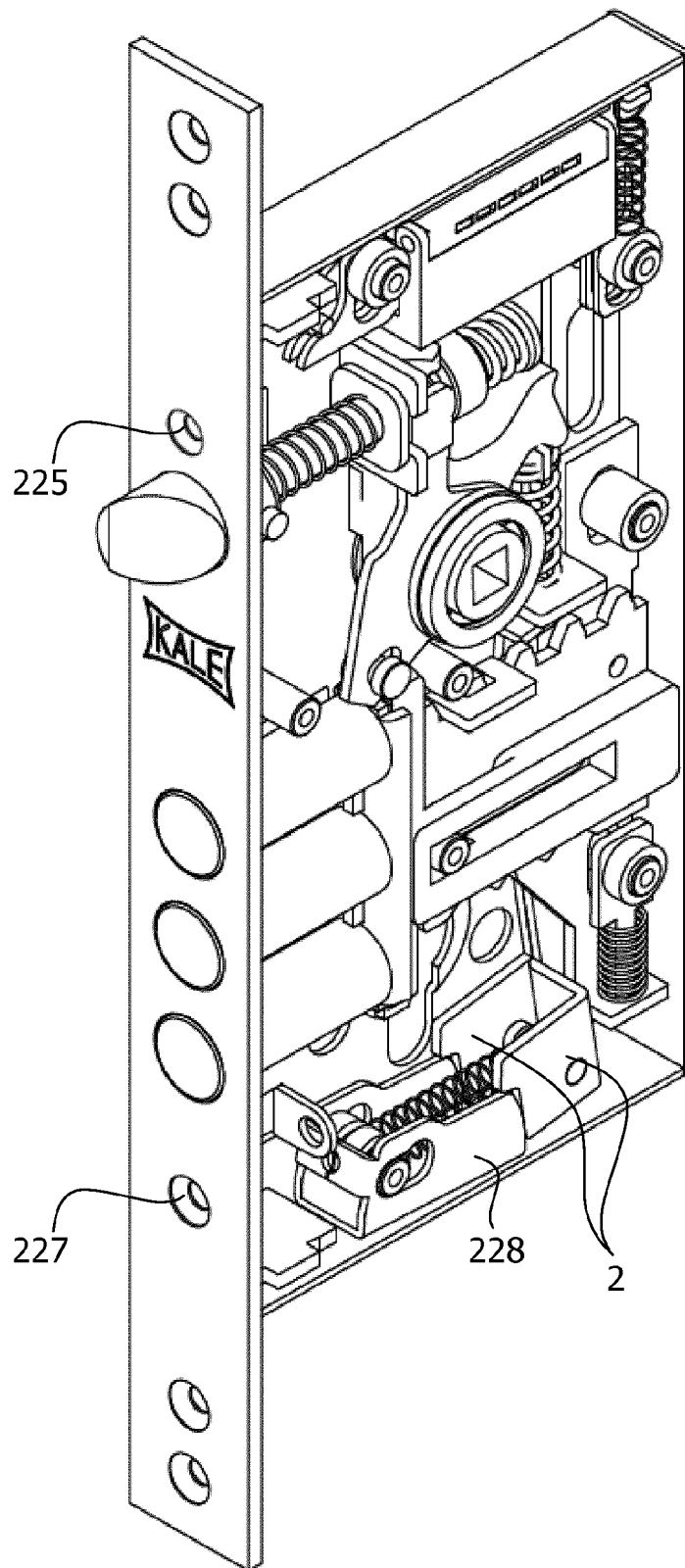


Figure 10



**Figure 11**



**Figure 12**



EUROPEAN SEARCH REPORT

Application Number  
EP 15 15 5987

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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