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(54) **LOCK DEVICE AND ACTUATION METHOD OF LOCKSET**

(57) A lock device is provided and includes a lock assembly in an accommodating space of a housing equipped with a main lock head to actuate the main lock head, an active member secured to the main lock head, a drive member that can actuate the active member, a control structure linked to the drive member, a passive structure that is provided on the housing in a displaceable manner, and an action member linked with the passive structure. Therefore, a user can usually use a target key to lock the emergency door to prevent malicious intruders from breaking in. Moreover, during an emergency, the user only needs to turn the control structure to open the door for fast egress without having to unlock the door with the target key.

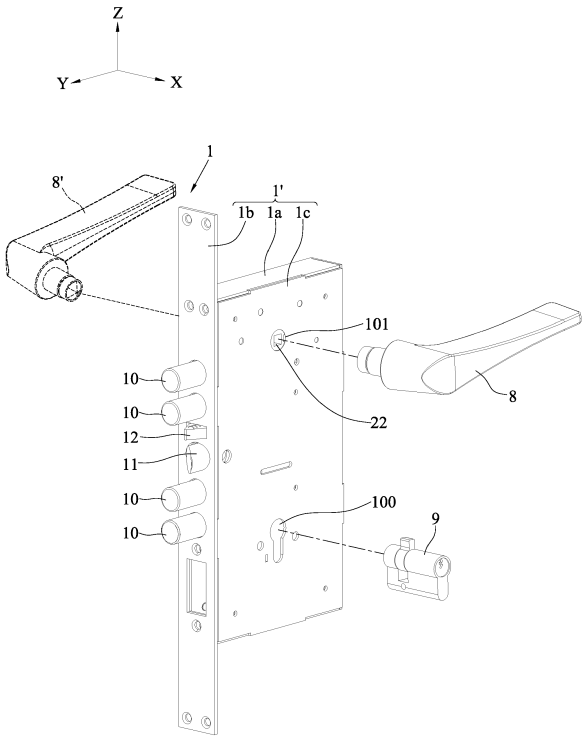

FIG. 1A

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Description

BACKGROUND

1. Technical Field

[0001] The present disclosure relates to a lockset, and more particularly, to a lock device and an actuation method of a lockset.

2. Description of Related Art

[0002] In order to prevent theft and intrusion, a conventional emergency exit can usually be locked from inside with a key.

[0003] However, during emergency evacuation, a person has to find the right key for the door, unlock the door, and push open the door before egress. This results in a lot of precious time being wasted and is not conducive to swift evacuation.

[0004] Therefore, there is a need for a solution that addresses the aforementioned shortcomings in the prior art.

SUMMARY

[0005] In view of the aforementioned shortcomings of the prior art, the present disclosure provides a lock device, which may include: a housing with an accommodating space; a main lock head arranged at one side of the housing and capable of sliding into or out of the accommodating space; and a lock assembly arranged in the accommodating space to actuate the main lock head. The lock assembly may include an active member secured to the main lock head, a drive member capable of actuating the active member, a control structure linked with the drive member, a passive structure provided on the housing in a displaceable manner, and an action member linked with the passive structure.

[0006] In the lock device above, the drive member is pivotally connected to the housing.

[0007] In the lock device above, the control structure includes a control port to pivotally connected to the housing.

[0008] In the lock device above, the passive structure is a reciprocating structure.

[0009] In the lock device above, the action member is pivotally connected to the housing, one side of the action member functioning as an action portion that actuates correspondingly with the passive structure, and another side of the action member functioning as a limiter that actuates correspondingly with the active member.

[0010] The lock device above may further include an idle-run assembly arranged in the accommodating space, which may include an actuating member provided on the housing in a displaceable manner, a toggle member pivotally connected to the housing, a pushing member provided on the control structure in a displaceable manner, and a passive member provided on the control structure. For example, the passive member is formed with an idle-run recess capable of engaging with or disengaging from the pushing member.

[0011] The lock device above may further include a safety assembly arranged in the accommodating space, and a safety bolt and an auxiliary bolt provided on the housing, wherein the safety assembly includes a first active member provided on the housing in a displaceable manner to displace the safety bolt along with the first active member, a second active member provided on the housing in a displaceable manner to displace the auxiliary bolt along with the second active member, and a cam member linked with the first and second active members. For example, the cam member may include a hook portion for releasing or fixating the first active member. For example, the drive member may include a drive stop block capable of abutting against the cam member for actuating or stopping the cam member.

[0012] The present disclosure also provides an actuation method of a lockset, which may include: providing a lockset including a housing and at least one bolt provided on the housing, and a first target handle and a second target handle disposed at two opposite sides of the lockset; at a first time point, turning the first target handle in a first target direction to lock the bolt extending out of the housing to place the bolt in a locked state; at a second time point, turning the first target handle in a second target direction to release the bolt from the locked state, thereby retracting the bolt into the housing and placing the bolt in an unlocked state, wherein the first target direction is in an opposite direction to the second target direction; and at a third time point, turning the second handle in a third target direction to bring the bolt out of the housing to lock the bolt and place the bolt in the locked state, wherein the first target direction is the same direction as the third target direction.

[0013] In the method above, the first target handle is an indoor handle, and the second target handle is an outdoor handle.

[0014] In the method above, the first target handle is an outdoor handle, and the second target handle is an indoor handle. For example, the method includes using a target key to manipulate the lockset between the first time point and the second time point.

[0015] The method above includes using a target key to manipulate the lockset.

[0016] In the method above, the first target direction is an upward direction in which the first target handle is turned.

[0017] In the method above, the second target direction is a downward direction in which the first target handle is turned.

[0018] In the method above, the third target direction is an upward direction in which the second target handle is turned.

[0019] The present disclosure further provides an actuation method of a lockset, which may include: providing

a lockset including a housing and at least one bolt provided on the housing; at a first time point, electronically actuating the bolt to extend out of the housing to lock the bolt and place the bolt in a locked state; at a second time point, electronically releasing the bolt from the locked state, thereby retracting the bolt into the housing and placing the bolt in an unlocked state, and at a third time point, electronically actuating the bolt to extend out of the housing to lock the bolt and place the bolt in a locked state.

[0020] In the method above, the lockset is provided with an induction assembly linked to the bolt.

[0021] In the two methods above, the lockset is the aforementioned lock device.

[0022] From the above, it can be seen that the lock device and the actuation method of a lockset of the present disclosure, with the configuration of the lock assembly, usually allows the emergency exit to be locked with the target key to prevent intruders from breaking in, but also allows the emergency exit to be unlocked during an emergency by simply turning the control structure without the need for the target key. Therefore, an emergency exit including the lock device in accordance with the present disclosure not only prevents intrusion but also facilitates fast evacuation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

FIG. 1A is an isometric front view of a lock device in accordance with the present disclosure.

FIG. 1B is an isometric partial exploded view of FIG. 1A.

FIG. 1C is a rear plan view of FIG. 1A.

FIG. 1D is an isometric view of a target key corresponding to FIG. 1A.

FIG. 2A is an isometric partial front view of FIG. 1A.

FIG. 2B is an isometric partial exploded view of FIG. 2A.

FIG. 2B' is an isometric partial view of FIG. 2A.

FIG. 2C is an isometric partial view of FIG. 2A.

FIGs. 2D and 2D' are schematic views illustrating a lock assembly of FIG. 2A during actuation.

FIG. 3A is an isometric partial front view of a lock device in accordance with a second embodiment of the present disclosure.

FIG. 3A' is a schematic view depicting an actuation state of FIG. 3A.

FIG. 3B is an isometric partial exploded view of FIG. 3A.

FIG. 3C is an isometric partial exploded view of FIG. 3B.

FIG. 4A is an isometric partial front view of a lock device in accordance with a third embodiment of the present disclosure.

FIG. 4B is an isometric partial exploded view of FIG. 4A.

FIG. 4C is an isometric partial exploded view of FIG. 4A.

FIG. 4D is a schematic view of FIG. 4C from another perspective.

FIG. 4E is an isometric partial view of FIG. 4A.

FIG. 5A is an isometric partial front view of a lock device in accordance with a fourth embodiment of the present disclosure.

FIG. 5B is an isometric partial front view of FIG. 5A.

FIG. 5C is an isometric partial front view of FIG. 5B.

FIG. 5D is an isometric partial view of a regulating assembly in FIG. 5A.

FIG. 5E is another isometric partial view of the regulating assembly in FIG. 5A.

FIG. 6A is a flowchart illustrating a first embodiment of an actuation method of a lockset in accordance with the present disclosure.

FIGs. 6B to 6E are illustrations of various steps in FIG. 6A.

FIG. 7A is a flowchart illustrating a second embodiment of an actuation method of a lockset in accordance with the present disclosure.

FIGs. 7B to 7E are illustrations of various steps in FIG. 7A.

FIG. 8 is a flowchart illustrating a third embodiment of an actuation method of a lockset in accordance with the present disclosure.

FIG. 8' is an isometric partial exploded view of an electronic lock illustrated in FIG. 8.

DETAILED DESCRIPTION

[0024] Implementations of the present disclosure are described below by specific embodiments. Other advantages and technical effects of the present disclosure can be readily understood by one of ordinary skill in the art upon reading the disclosure of this specification.

[0025] It should be noted that the structures, ratios, sizes shown in the drawings appended to this specification are provided in conjunction with the disclosure of this specification in order to facilitate understanding by those skilled in the art. They are not meant, in any ways, to limit the implementations of the present disclosure, and therefore have no substantial technical meaning. Without influencing the effects created and objectives achieved by the present disclosure, any modifications, changes or adjustments to the structures, ratios or sizes are construed as fall within the scope covered by the technical contents disclosed herein. Meanwhile, terms such as "above," "below," "front," "back," "left," "right," "one," "a," "an," and the like, are for illustrative purposes, and are not meant to limit the scope implementable by the present disclosure. Any changes or adjustments made to the relative relationships, without substantially modifying the technical contents, are also to be construed as within the scope implementable by the present disclosure.

[0026] FIGs. 1A, 1B and 1C are schematic views illustrating a lock device 1 in accordance with the present

disclosure. As shown in FIGs. 1A and 1B, the lock device 1 is a metal product, which includes a housing 1', at least one main lock head 10, and a lock assembly 2.

[0027] In an embodiment, the directions of a door entry and exit (or the directions of insertion and removal of a target key 9 as shown in FIGs. 1A and 1D) are defined as the front and back directions (along a X axis); the extension and retraction of the main lock head 10 are defined as the left and right directions (along a Y axis); and the directions along the side of a face plate are defined as the up and down directions (along a Z axis). It should be noted that the orientations of these directions are merely chosen to illustrate this embodiment, and there is no particular limits.

[0028] The housing 1' includes a case body 1a, a side plate 1b provided on the case body 1a, and a cover plate 1c covering the case body 1a.

[0029] In an embodiment, the case body 1a is in the form of a rectangular receptacle, which includes an accommodating space S for accommodating the lock assembly 2. For example, a key hole 100 is formed at the bottom face of the case body 1a to allow the entry/exit of a target key 9 into/out of the case body 1a.

[0030] Moreover, the side plate 1b is provided on the left-hand side of the case body 1a, and the main lock heads 10 are positioned such that the main lock heads 10 can slide in and out of the accommodating space S. For example, the side plate 1b is in the shape of a flat rectangular piece with two ends protruding from the upper and lower surfaces of the case body 1a, respectively. Specifically, at least one safety bolt 11 and at least one auxiliary bolt 12 can be provided on the side plate 1b based on needs.

[0031] Moreover, the cover plate 1c is a rectangle plate, which covers the front of the case body 1a to enclose the accommodating space S. For example, the cover plate 1c includes a key hole 100 (for insertion and removal of the target key 9 into and from the case body 1a) and a handle hole 101 that are separately provided, and the handle hole 101 is to be installed with a pivoted handle, which is used as an outdoor handle 8.

[0032] The main lock heads 10 are a plurality of bars, the safety bolt 11 resembles a tongue shape (i.e., a lock tongue), and the auxiliary bolt 12 resembles a triangular prism (i.e., a lock tongue).

[0033] In an embodiment, the main lock heads 10, the safety bolt 11, and the auxiliary bolt 12 are arranged in accordance with the European Union standards. The safety bolt 11 and the auxiliary bolt 12 are arranged between the main lock heads 10 with two main lock heads 10 provided below the safety bolt 11 and two main lock heads 10 above the auxiliary bolt 12. It should be appreciated that there are numerous types of arrangements of the bolts, such as those in accordance with the U.S. and other standards, and the present disclosure is not limited to the above.

[0034] As shown in FIGs. 2A to 2D, the lock assembly 2 includes an active member 20 secured to the main lock heads 10, a drive member 21 capable of actuating the active member 20, a control structure 2a linked with the drive member 21, a passive structure 2b provided on the case body 1a in a displaceable manner, and an action member 24 linked with the passive structure 2b, where the lock assembly 2 can be provided with an auxiliary structure 2c linked with the control structure 2a based on needs.

[0035] In an embodiment, the active member 20 is provided on the case body 1a in a displaceable manner, such that the main lock heads 10 can be displaced along with the active member 20. A stepped stop portion 20a is formed at one of the corners of the active member 20 (as shown in FIG. 2B). For example, the active member 20 can be a horseshoe- or U-shaped flat plate with two leg plates (as shown in FIG. 2B), wherein one of the leg plates is provided with a main guide rod 200, and a main guide rail 102 in the form of a linear groove for engaging the main guide rod 200 is formed at the bottom face of the case body 1a (as shown in FIG. 2B). The stop portion 20a is located at the corner of the other leg plate of the active member 20. Specifically, a first reciprocating rod 104 fitted with a first reciprocating spring 104a is provided on a side face of the case body 1a, and the first reciprocating rod 104 is inserted into a main reciprocating hole portion 20b on the other leg plate of the active member 20, such that the main reciprocating hole portion 20b of the active member 20 can move back and forth along the first reciprocating rod 104 in cooperation with the movements of the first reciprocating spring 104a.

[0036] Furthermore, the drive member 21 is in the form of a swing arm (as shown in FIGs. 2B and 2C), which is pivotally connected to the bottom face of the case body 1a. The control structure 2a is a structure having stacked cam disks, and is pivotally connected to the bottom face of the case body 1a with a square control port 22 at the center of the cam disks as a pivot point. For example, a shorter first arm 211 and a longer second arm 212 extending from a drive spindle 210 (fitted with a drive torsional spring 210a for reciprocating motions as shown in FIG. 2B) of the drive member 21. The control structure 2a includes a plurality of stacked first cam disks 22a and second cam disks 22b secured at relative different heights (as shown in FIGs. 2B and 2B'), and the control port 22 is exposed from the handle hole 101 for installing the outdoor handle 8 thereon (as shown in FIG. 1A). Specifically, the first cam disks 22a and the second cam disks 22b are stacked together in a symmetrical manner (the first cam disks 22a being at the outermost sides as shown in FIG. 2B', such that the lock/unlock actuation principles are more or less similar from outdoor and indoor). An upright drive plate 211a is formed extending from the first arm 211 in an upright direction, and a control tab 220 extending outwardly from the periphery of the first cam disks 22a is formed for abutting against the drive plate 211a. As such, when the control structure 2a is turned via the control port 22 by the outdoor handle 8, the control tab 220 pushes the drive plate 211a, which in turn turns

the drive member 21.

[0037] In addition, the passive structure 2b is a reciprocating structure, which includes at least one guide member 23a and at least one elastic member 23b (e.g., a spring). The two ends of the elastic member 23b are connected with the guide member 23a and a wall of the case body 1a, respectively, which results in the reciprocating motions of the guide member 23a. For example, the guide member 23a includes at least one guide groove 230, as shown in FIG. 2B' and FIG. 2C, and at least one guide rod 103 engaging the guide groove 230 is formed on the bottom face of the case body 1a, such that the guide groove 230 cooperates with the guide rod 103 to move the guide member 23a in a linear fashion. The elastic member 23b limits the guide member 23a to generate linear back and forth movements.

[0038] Furthermore, an auxiliary structure 2c is also a reciprocating structure, which consists of the same elements as those of the passive structure 2b, i.e., including the arrangements of a guide member 23a', an elastic member 23b', guide groove 230', and guide rod 103', etc. As shown in FIGs. 2A, 2B' and 2C, the outdoor handle 8 can perform reciprocating action of opening and closing via the control structure 2a and the auxiliary structure 2c. For example, a first control column 221 extending over the second cam disk 22b is formed on the periphery of the first cam disk 22a (or the control structure 2a includes a second control column 221' directly linked with the control port 22, and the second control column 221' corresponds to the first control column 221 and abuts against the auxiliary structure 2c). As shown in FIG. 2B', when the outdoor handle 8 turns in one direction, the control structure 2a is turned, such that the first control column 221 (or the second control column 221') pushes the auxiliary structure 2c to move linearly (as indicated by a pushing direction B1 shown in FIG. 2B'). On the other hand, when the outdoor handle 8 turns in another direction, the control structure 2a is turned, such that the first control column 221 (or the second control column 221') pushes the passive structure 2b to move linearly (as indicated by a pushing direction B2 shown in FIG. 2B').

[0039] Furthermore, the action member 24 is a block of a generally isosceles triangular shape with an action spindle 240 provided at the center of the action member 24 (as shown in FIG. 2C) so as to be pivotally connected to the bottom face of the case body 1a. For example, one corner of the action member 24 is an action portion 241, while the other corner acts as a limiter 242. Specifically, the action spindle 240 is fitted with a reciprocating mechanism (as indicated by an action torsional spring 240a shown in FIG. 2C), the limiter 242 actuates corresponding to the stop portion 20a of the active member 20, and the action portion 241 actuates corresponding to the guide member 23a of the passive structure 2b. As such, the guide member 23a can be formed with a guide/control portion 231 that cooperates with the action portion 241 (as indicated by a stepped portion in FIG. 2D acting as a slide).

[0040] When the target key 9 actuates the lock assembly 2 (during normal use), that is, the target key 9 is inserted into the key hole 100 and turned to move the active member 20, the main guide rod 200 is displaced linearly along the main guide rail 102, so that the first reciprocating spring 104a of the first reciprocating rod 104 cooperates with the active member 20 to move the main lock heads 10 along in a linear fashion, thus allowing the main lock heads 10 to protrude out of or withdraw into the side plate 1b (i.e., to exit or enter into the accommodating space S of the case body 1a), and the locations of the main lock heads 10 can be in a locked position as shown in FIG. 2D or in an unlocked position as shown in FIG. 2D'.

[0041] Furthermore, after a door is locked by the target key 9 (i.e., when the main lock heads 10 are in the locked position in FIG. 2D), the door can be unlocked by the outdoor handle 8 without using the target key 9. Specifically, a user turns the outdoor handle 8, which rotates the control structure 2a (in a direction R1 in FIG. 2D) and pushes the auxiliary structure 2c. This allows the control tab 220 to push the drive plate 211a, which in turns moves the drive member 21, so that the second arm 212 of the drive member 21 drives (as indicated by an action direction F1 shown in FIG. 2D) the main guide rod 200 to move linearly along the main guide rail 102. The first reciprocating spring 104a of the first reciprocating rod 104 is thus depressed by the active member 20, and the main lock heads 10 are displaced linearly to be withdrawn back into the accommodating space S of the case body 1a (as shown in FIG. 2D'). While the main lock heads 10 are being retracted back into the accommodating space S of the case body 1a, the stop portion 20a of the active member 20 can move pass the action member 24, and the stop portion 20a is limited by the limiter 242 of the action member 24 (as shown in FIG. 2D') to inhibit movements the active member 20. Thus, when the user releases the outdoor handle 8, through the reciprocating mechanism, i.e., the auxiliary structure 2c moving the outdoor handle 8 and the control structure 2a and the drive spindle 210 moving the drive member 21, the outdoor handle 8, the control structure 2a, and the drive member 21 will return to their original positions. However, the active member 20 will stay in the same place without going back to its original position (as the stop portion 20a is stopped by the limiter 242). As such, the main lock heads 10 remain retracted inside the accommodating space S of the case body 1a, such as in the unlocked state shown in FIG. 2D', and the user can subsequently push the door open without operating the outdoor handle 8.

[0042] It can be appreciated that the principles of actuations for locking and unlocking the door from outside and inside are essentially the same, so the lock assembly 2 can be actuated by an indoor handle 8' (as shown in FIG. 1A) in the same way.

[0043] Therefore, when the lock assembly 2 of the present disclosure is applied to an emergency exit, the door can usually be locked using the target key 9 to prevent intruders from breaking in. In an emergency, an

evacuee can open the door by simply turning the indoor handle 8' and gain access to the outside world without the need of unlocking the door using the target key 9. Compared to the prior art, the lock device 1 of the present disclosure, when applied to an emergency exit, can prevent break-ins while making the door easy to open during emergency situations.

[0044] On the other hand, after evacuation, the main lock heads 10 can be returned into the locked position by operating the control port 22 without the need to use the target key 9. Specifically, after the user (e.g., the evacuee) has closed the emergency door from outside (or after returning indoor), the outdoor handle 8 (or the indoor handle 8') can be used to operate the control port 22 in order to turn it in a specific direction (indicated by a rotating direction R2 shown in FIG. 2D'), such that the first control column 221 (or the second control column 221') of the control structure 2a will push the passive structure 2b to move in a linear fashion (in a pushing direction B2 shown in FIG. 2D'), which allows the guide/control portion 231 of the guide member 23a to push the action portion 241 of the action member 24. As a result, action member 24 swings in an action direction F2 shown in FIG. 2D', and the limiter 242 retracts and is disengaged from the stop portion 20a of the active member 20, thereby allowing the active member 20 along with the main lock heads 10 to be returned linearly back to their original positions with the help of the first reciprocating spring 104a of the first reciprocating rod 104, that is, the main lock heads 10 extend out of the accommodating space S of the case body 1a (e.g., the state shown in FIG. 2D). Once the main lock heads 10 protrude from the accommodating space S of the case body 1a, the action member 24 will be returned to its original position through the restoring mechanism of the action spindle 240, and the user can then dial back the control port 22, so that the guide member 23a will be returned to its original position through the elastic member 23b (e.g., back to the state shown in FIG. 2D).

[0045] FIGs. 3A, 3B and 3C are schematic diagrams illustrating a lock device 1 in accordance with a second embodiment of the present disclosure. The present embodiment is different from the first embodiment in that an idle-run assembly 3 that disables the operations of the control structure 2a is further provided, while the rest of the components are similar and are thus omitted below to avoid repetitions.

[0046] As shown in FIGs. 3A to 3C, the idle-run assembly 3 includes an actuating member 30 provided on the bottom face of the case body 1a in a displaceable manner, a toggle member 32 pivotally connected on the bottom face of the case body 1a, and a pushing member 33 provided on the control structure 2a in a displaceable manner, and a passive member 34 provided on the control structure 2a.

[0047] In an embodiment, the actuating member 30 is in the form of a flat plate. The actuating member 30 and the active member 20 are stacked on top of each other, as shown in FIG. 2B, and is controlled by the target key 9. For example, an upright tooth portion 30a is provided on one side of the actuating member 30, and an upright flat actuating portion 30b is provided on the other side thereof. A tooth opening 300 on the tooth portion 30a corresponds to a tooth piece 90 of the target key 9 (as shown in FIG. 1D) for moving the actuating member 30. Specifically, at least one (e.g., two) actuating groove(s) 301 are formed between two sides of the actuating member 30 extending in a direction that is perpendicular to the direction of the main guide rail 102. At least one control rod 105 engaged with the actuating groove 301 is provided on the bottom face of the case body 1a. As such, the actuating member 30 can be displaced along the arrangement direction of the side plate 1b (indicated by a first actuating direction C1 shown in FIG. 3B) through the cooperation of the control rod 105 and the actuating groove 301. On the other hand, the active member 20 can be displaced along the extension/retraction direction of the main lock heads 10 (indicated by a second actuating direction C2 shown in FIG. 3B) through the cooperation of the control rod 105 and a linkage groove 20c of the active member 20 (as shown in FIG. 2B), wherein the first and second actuating directions C1 and C2 are perpendicular to each other.

[0048] Moreover, the toggle member 32 is in the form of a swing arm, which abuts against the actuating portion 30b. The toggle member 32 is turned by the actuating portion 30b pushing on it. For example, a first arm 321 and a second arm 322 that are substantially perpendicular to each other extend outwards from a toggle spindle 320 of the toggle member 32. The first arm 321 abuts against the actuating portion 30b, while the second arm 322 abuts against the pushing member 33. Specifically, the second arm 322 is connected to a pillar 31a disposed on the bottom face of the case body 1a via a spring 31, such that reciprocating movements of the toggle member 32 can be created.

[0049] In addition, the pushing member 33 has a shape that resembles a mushroom or a screw that is connected with the second cam disk 22b of the control structure 2a in a displaceable manner. As shown in FIG. 3C, the pushing member 33 includes an engaging portion 330 (e.g., in the form of a rectangular column) and a hat-shaped force bearing portion 331 at an end of the engaging portion 330. For example, the second cam disk 22b has an annular body with a control groove 222 that corresponds to the pushing member 33 (as shown in FIG. 3B), so that if the force bearing portion 331 is actuated by the second arm 322, the engaging portion 330 can be displaced along the direction of the control groove 222 (indicated by the second actuation direction C2 shown in FIG. 3B) to access (e.g., enter and exit) the control groove 222 relative to the second cam disk 22b. Specifically, the engaging portion 330 is fitted with a push-pull spring 33a (as shown in FIG. 3B), and one end of the push-pull spring 33a is secured to the force bearing portion 331, while the other end is secured to the second cam disk 22b, so as

to create reciprocating movements of the pushing member 33 along the control groove 222.

[0050] In addition, the passive member 34 is generally in the form of a cylinder (as shown in FIG. 3C), and is placed inside the ring of the second cam disk 22b. The passive member 34 is formed with the control port 22 in the middle thereof, and an idle-run recess 340 provided on the periphery thereof. The engaging portion 330 can engage with or disengage from the idle-run recess 340. For example, a second control column 221' corresponding to the first control column 221 can be formed on the periphery of the passive member 34. Specifically, the idle-run recess 340 and the second control column 221' are arranged on the periphery of the passive member 34 at a perpendicular direction as shown in FIG. 3C.

[0051] Therefore, a user can push the actuating member 30 towards the control structure 2a (along the actuating direction C shown in FIG. 3A) using the target key 9. The actuating portion 30b pushes the first arm 321 of the toggle member 32 and turns the toggle member 32 (in a rotating direction R shown in FIG. 3A). This in turn allows the second arm 322 to push the force bearing portion 331 of the pushing member 33 (along an action direction P in FIG. 3A). Meanwhile, the engaging portion 330 extends into the control groove 222 (along an action direction P in FIG. 3A) and engages with the idle-run recess 340 of the passive member 34. As a result, the passive member 34 can be linked with the first cam disk 22a and the second cam disk 22b through the pushing member 33, forming a linkage mechanism (as shown in FIG. 3A'). Thus, when the user turns the passive member 34 via the control port 22, this will sequentially actuate the pushing member 33, the second cam disk 22b and the first cam disk 22a (as shown in FIG. 2B'), and the rotation of the first cam disk 22a allows the drive member 21 to be turned by the control tab 220 (as shown in FIG. 2D). Therefore, the drive member 21 can be controlled by the outdoor handle 8 (or the indoor handle 8') through the control structure 2a.

[0052] Moreover, if one wishes to let the outdoor handle 8 become "idle run" (e.g., after locking), that is, unable to control the drive member 21 through the control structure 2a, the user can move the actuating member 30 away from the control structure 2a using the target key 9 (in an actuating direction C' shown in FIG. 3A'), so that the actuating portion 30b is moved back, and the toggle member 32 is turned back (in a rotating direction R' shown in FIG. 3A') as a result of the reciprocating movements of the spring 31. This means that the pushing member 33 is retracted (in an action direction P' shown in FIG. 3A') due to the reciprocating movements of the push-pull spring 33a. Meanwhile, the engaging portion 330 is disengaged from the idle-run recess 340 of the passive member 34 and retracted back to the control groove 222, such that the passive member 34 is no longer linked with the second cam disk 22b (an idle-run state shown in FIG. 3A). Therefore, when the user rotates the passive member 34 via the control port 22, the passive member 34 can only move the second control column 221' towards the pushing direction B1, but cannot move the second cam disk 22b and the first cam disk 22a as the pushing member 33 is not linked. As such, the first cam disk 22a cannot move since the control tab 220 will not actuate the drive member 21, resulting in an idle-run state of the control structure 2a, in other words, the drive member 21 cannot be controlled by the outdoor handle 8 through the control structure 2a.

[0053] As can be seen from above, an idle-run mechanism of the control structure 2a is achieved with the arrangement of the pushing member 33 and the passive member 34. If this idle-run mechanism is not desired (such as in the case of the indoor handle 8'), then the toggle member 32 can be removed and the pushing member 33 can be permanently engaged with the passive member 34, i.e., the idle-run function is canceled. Alternatively, the first cam disk 22a, the second cam disk 22b and the passive member 34 can be formed integrally (the first and second control columns 221 and 221' formed as one column) to eliminate the idle-run mechanism (such as in the case of the indoor handle 8').

[0054] FIGs. 4A, 4B, 4C, 4D and 4E are schematic diagrams illustrating a lock device 1 in accordance with a third embodiment of the present disclosure. The present embodiment is different from the first embodiment in that a safety assembly 4 for the safety bolt 11 and the auxiliary bolt 12 is further provided, while the rest of the components are similar and are thus omitted below to avoid repetitions.

[0055] As shown in FIGs. 4A to 4E, the safety assembly 4 includes a first active member 41 secured to the safety bolt 11, a second active member 42 secured to the auxiliary bolt 12, and a cam member 40 linked with the first and second active members 41 and 42.

[0056] In an embodiment, the first active member 41 is provided on the case body 1a in a displaceable manner so as to move the safety bolt 11 along with it. For example, the first active member 41 is a rectangular flat piece with at least one auxiliary guide column 410 and a corresponding column 412 provided upright thereon. At least one auxiliary guide 107 in the form of a linear groove for engaging the auxiliary guide column 410 and the corresponding column 412 is formed on the bottom face of the case body 1a (as shown in FIG. 4C), such that the first active member 41 can move in a linear fashion. Specifically, as shown in FIGs. 4B and 4C, a second reciprocating rod 106 fitted with a second reciprocating spring 106a is provided on the side face of the case body 1a, and the second reciprocating rod 106 is inserted into an auxiliary reciprocating hole portion 411 on the other end of the first active member 41, such that the auxiliary reciprocating hole portion 411 of the first active member 41 can move along the second reciprocating rod 106 and create reciprocating movements with the help of the extension/contraction of second reciprocating spring 106a.

[0057] Furthermore, the second active member 42 can be provided on the case body 1a in a displaceable man-

ner so as to move the auxiliary bolt 12 along with it. For example, the second active member 42 is in the form of a rod body with one end secured to the auxiliary bolt 12, while the other end provided with at least one safety guide block 420. At least one safety guide rail 108 in the form of a linear groove for engaging the safety guide block 420 is formed on the bottom face of the case body 1a (as shown in FIG. 4D), so as to allow linear displacement of the second active member 42. Specifically, an arch wall 109 spanning over the second active member 42 is provided at the bottom face of the case body 1a, and the safety guide block 420 and the auxiliary bolt 12 are located at different sides of the fixed arch wall 109, wherein the second active member 42 is fitted with a safety spring 42a between the auxiliary bolt 12 and the fixed arch wall 109, and the two ends of the safety spring 42a can be secured to the auxiliary bolt 12 and the fixed arch wall 109, respectively, such that the second active member 42 passes through the fixed arch wall 109 for reciprocating movements in cooperation with the extension/contraction of the safety spring 42a.

[0058] Moreover, the cam member 40 is in the form a strip that is pivotally connected to the bottom face of the case body 1a to release the first active member 41 or fix it in position. In one example, one end of a pivot portion 400 of the cam member 40 is a fixating portion 401 that abuts between the safety guide block 420 of the second active member 42 and the fixed arch wall 109, and the other end of the pivot portion 400 of the cam member 40 is a hook portion 402. Specifically, the pivot portion 400 of the cam member 40 is provided with a safety torsional spring 40a with one end secured by a stand 43 of the hook portion 402 and the other end attached to a fixating rod 109' on the bottom face of the case body 1a, such that the cam member 40 generates reciprocating movements through the torque of the safety torsional spring 40a, such that the fixating portion 401 is actuated in cooperation with the second active member 42.

[0059] In addition, a pea-shaped drive stop block 213 is formed on the second arm 212 of the drive member 21, which abuts against the pivot portion 400 of the cam member 40 in order to actuate or stop the cam member 40.

[0060] Therefore, when the user turns the outdoor handle 8 to turn (indicated by the rotating direction R1 shown in FIG. 2D) the control structure 2a, the control tab 220 pushes the drive plate 211a and thus turns the drive member 21, so the second arm 212 of the drive member 21 pushes (indicated by the action direction F1 shown in FIGs. 2D and 4C) the main guide column 200 and the auxiliary guide column 410, such that the corresponding column 412 follows the auxiliary guide column 410 and they move linearly along the auxiliary guides 107. This allows the first active member 41 to depress the second reciprocating spring 106a of the second reciprocating rod 106 and linearly move the safety bolt 11 along with it, so the safety bolt 11 is retracted into the accommodating space S of the case body 1a. Meanwhile, the drive stop block 213 on the second arm 212 is disengaged from the pivot portion 400 of the cam member 40, such that the cam member 40 is turned by the safety torsional spring 40a (in a rotating direction R3 shown in FIG. 4C), and that the hook portion 402 is hooked onto the auxiliary guide column 410 in order to fix the first active member 41 (or the safety bolt 11) in place. Meanwhile, the fixating portion 401 of the cam member 40 will push the safety guide block 420 of the second active member 42 (in an action direction D shown in FIGs. 4C and 4E) away from the fixed arch wall 109, so the safety guide block 420 moves linearly along the safety guide rail 108, such that the second active member 42 linearly moves the auxiliary bolt 12 along with it, so the auxiliary bolt 12 is retracted into the accommodating space S of the case body 1a.

[0061] Moreover, when the user releases the outdoor handle 8, the control structure 2a will return to its original position, but the drive member 21 will not be actuated (since the hook portion 402 is hooked to the auxiliary guide column 410, the first active member 41 is held in place, and the corresponding column 412 inhibits the return of the drive member 21). Therefore, the safety guide block 420 has to be moved (indicated by an action direction D' shown in FIG. 4C) via the safety guide rail 108 from the outside of the bottom face of the case body 1a (e.g., indoor), so that the auxiliary bolt 12 can extend out of the accommodating space S of the case body 1a by the second active member 42, and the fixating portion 401 of the cam member 40 is pushed towards the fixed arch wall 109 (indicated by the action direction D' shown in FIG. 4C), and the cam member 40 is turned (in a rotating direction R4 shown in FIG. 4C) via the safety torsional spring 40a, such that the hook portion 402 is unhooked from the auxiliary guide column 410. Meanwhile, the restoring force of the drive member 21 (i.e., the torque of the drive torsional spring 210a of the drive spindle 210) exerts a force (indicated by an action direction F4 shown in FIG. 4C and FIG. 4E) on the corresponding column 412, such that the safety bolt 11 can spring out of the accommodating space S of the case body 1a as a result of the first active member 41. It can be understood that when the drive member 21 is returned to a certain position, the drive stop block 213 will abut with the pivot portion 400 of the cam member 40 to prevent the cam member 40 and its safety torsional spring 40a from moving.

[0062] Therefore, when the drive member 21 brings the main lock heads 10 and the safety bolt 11 into the accommodating space S of the case body 1a, the safety guide block 420 can be moved to actuate the second active member 42 and allow the cam member 40 to be unhooked, which actuates the drive member 21 to spring out the safety bolt 11 from the accommodating space S of the case body 1a. As a result, even if the main lock heads 10 are not protruding from the accommodating space S of the case body 1a (in the state shown in FIG. 2D'), the safety bolt 11 and the auxiliary bolt 12 can still be extended out of the accommodating space S of the case body 1a.

[0063] On the other hand, since the auxiliary bolt 12 and the second active member 42 can move independently of (i.e., not linked with) the outdoor handle 8 or the target key 9, when in a locked state (such as the state shown in FIG. 4A), if the safety guide block 420 is manually moved via the safety guide rail 108 of the case body 1a, only the auxiliary bolt 12 will be moved back into the accommodating space S of the case body 1a, the cam member 40 will not be actuated to hook onto the auxiliary guide column 410 (since the fixating portion 401 is situated between the safety guide block 420 of the second active member 42 and the fixed arch wall 109), so the outdoor handle 8 (or the indoor handle 8') is still free to turn. This prevents the outdoor handle 8 (or the indoor handle 8') from locking and not operable during an emergency.

[0064] FIGs. 5A, 5B, 5C, 5D and 5E are schematic diagrams depicting a lock device 1 in accordance with a fourth embodiment of the present disclosure. The present embodiment is different from the first embodiment in the design of the indoor handle 8' of the case body 1a during an emergency, the remainder of the structures are substantially the same and will not be repeated for conciseness.

[0065] The indoor handle 8' (as shown in FIG. 1A) is pivotally connected to another handle hole 101' (as shown in FIG. 1C corresponding to the control structure 2a) at the bottom face of the case body 1a, such that the indoor handle 8' is able to always control the control structure 2a with no idle-run mechanism as described with respect to FIGs. 3A to 3C. In other words, the idle-run mechanism is not applicable to the indoor handle 8', but rather, the indoor handle 8' is capable of driving the drive member 21 to actuate the main lock heads 10 (as shown by the actuating methods described with respect to FIGs. 2D and 2D'), the safety bolt 11 (as shown in FIGs. 4A to 4E) and the auxiliary bolt 12 to retract into the accommodating space S of the case body 1a to enable fast emergency escape.

[0066] As shown in FIGs. 5A, 5B, 5C, 5D and 5E, the case body 1a is provided with a regulating assembly 5a.

[0067] In an embodiment, the regulating assembly 5a includes a regulating member 50 that is disposed coaxially (e.g., with respect to the drive spindle 210) on the drive member 21 (as shown in FIG. 5D) and at least one regulating column 51 corresponding to the regulating member 50 and formed on the actuating member 30 (as shown in FIG. 5E), wherein the regulating member 50 rotates synchronously with the drive member 21, and the regulating member 50 in rotation pushes the regulating column 51, which in turn displaces the actuating member 30 (e.g., along the actuating direction C shown in FIG. 3A or 5B). For example, the regulating member 50 is a curved member with one end 50a abuts against the drive plate 211a of the first arm 211 of the drive member 21 and another end 50b abuts against the regulating column 51. The regulating column 51 is in the form of a cylinder, such that the regulating member 50 travels around the circumference of the regulating column 51 after pushing the regulating column 51.

[0068] Moreover, if the regulating mechanism is not in place (i.e., there is no regulating member 50 and regulating column 51), since the idle-run mechanism is not actuated, and the actuating member 30 is not manipulated by the target key 9 from indoor, the active member 20 when displaced (in the action direction F1 shown in FIG. 2D or 5A) will come into contact with a stop wall 53 of the actuating portion 30b of the actuating member 30 (as shown in FIG. 5E), thus limiting further movements of the active member 20, as well as movements of the main lock heads 10, the auxiliary bolt 12 and the safety bolt 11 (i.e., thus stuck in position), so the main lock heads 10, the safety bolt 11 and the auxiliary bolt 12 will still stay protruded outside the case body 1a.

[0069] Thus, the regulating member 50 pushes the regulating column 51 to displace the actuating member 30, such that the stop wall 53 of the actuating portion 30b of the actuating member 30 is moved out of the displacement path of the active member 20, allowing the active member 20 to displace successfully, and the main lock heads 10, the safety bolt 11 and the auxiliary bolt 12 to be retracted back into the accommodating space S of the case body 1a.

[0070] It can be appreciated that the regulating member 50 only needs to push the actuating portion 30b of the actuating member 30 out of the displacement path of the active member 20. In other words, the actuating portion 30b only needs to be moved by a relatively short distance (not actuating the idle-run mechanism) unlike in the case of actuating the idle-run mechanism (as described with respect to FIGs. 3A to 3C) where the actuating portion 30b is moved by target key 9 by a relatively longer distance.

[0071] Moreover, when the user releases the indoor handle 8', the control structure 2a returns to its original position, and the regulating member 50 is rotated back by the drive torsion spring 210a of the drive spindle 210, such that the stand 43 of the hook portion 402 is pushed by the regulating member 50 so as to push the hook portion 402 away from the auxiliary guide column 410 (refer to descriptions with respect to FIGs. 4A to 4E). This allows the fixating portion 401 of the cam member 40 to move towards the fixed arch wall 109, and in turn, move the auxiliary bolt 12 out of the accommodating space S of the case body 1a. Meanwhile, the turning force of the drive member 21 (exerted by the drive torsion spring 210a of the drive spindle 210) pushes the corresponding column 412 (along the action direction F4 shown in FIGs. 4C and 4E) to pop the safety bolt 11 out of the accommodating space S of the case body 1a. As a result, both the safety bolt 11 and the auxiliary bolt 12 can be pushed out of the accommodating space S of the case body 1a without the need to move the safety guide block 420 at the safety guide 108 rail.

[0072] FIG. 6A is a flowchart illustrating a first embodiment of an actuation method of a lockset in accordance

with the present disclosure, and FIGs. 6B to 6E are illustrations of the steps in FIG. 6A.

[0073] In an embodiment, the actuation method of the lockset is with regard to a user moving from indoor to outdoor, for example, going out, leaving a room, emergency escape, etc.

[0074] In step S60, a lockset, such as the lock device 1, is provided, which includes a housing 1' and at least one bolt provided on the housing 1' (e.g., the main lock heads 10, the safety bolt 11 and the auxiliary bolt 12), and a first target handle and a second target handle are provided on opposite sides of the lockset.

[0075] In an embodiment, the lockset is provided on a door panel 6, and the door panel 6 is in a closed state as shown in FIG. 6B.

[0076] Furthermore, as shown in FIG. 6B, the first target handle is the indoor handle 8', which can always control the control structure 2a, and the second target handle is the outdoor handle 8, which is controlled by the idle-run mechanism.

[0077] In step S61, at a first time point (after the user entered the room), the bolt is protruding from the housing 1', and the indoor handle 8' is turned in a first target direction A1 to lock the bolt in a "locked" state, which prevents the bolt from being retracted in the housing 1' by the outdoor handle 8.

[0078] In an embodiment, the first target direction A1 is an upward direction in which the indoor handle 8' is pushed (or a clockwise rotation from the viewpoint of the user shown in FIG. 6C), but it can be appreciated that there are numerous types of indoor handles, such as press handles (in which the first target direction may be lifting upwards the handle from the viewpoint of the user), and the present disclosure is not limited as such.

[0079] Furthermore, the indoor handle 8' will reinstate its original position after the bolt is locked (as shown by the horizontal position in FIG. 6B).

[0080] In step S62, at a second time point (when the user wishes to leave the room), the indoor handle 8' is turned in a second target direction A2 to release the bolt from the "locked" state and cause the bolt to retract into the housing 1' so as to be in an "unlocked" state. At this time, the user can push the door panel 6 to leave the room.

[0081] In an embodiment, the first target direction A1 and the second target direction A2 are opposite directions. More specifically, the second target direction A2 is a downward direction in which the indoor handle 8' is moved (or an anticlockwise direction based from the viewpoint of the user as shown in FIG. 6D), but it can be appreciated that there are numerous types of indoor handles, such as press handles (in which the second target direction may be pressing down the handle based on the viewpoint of the user), and the present disclosure is not limited as such.

[0082] Furthermore, the indoor handle 8' will reinstate its original position after the bolt is locked (as shown by the horizontal position in FIG. 6B).

[0083] In step S63, at a third time point (after the user left the room and shut the door panel 6 from outside), the outdoor handle 8 is turned in a third target direction A3 to cause the bolt to protrude out of the housing 1' and put the bolt in a "locked" state.

[0084] In an embodiment, the first target direction A1 and the third target direction A3 are the same directions. More specifically, the third target direction A3 is an upward direction in which the outdoor handle 8 is moved (or an anticlockwise rotation from the viewpoint of the user shown in FIG. 6E), but it can be appreciated that there are numerous types of outdoor handles, such as press handles (in which the third target direction may be lifting upwards the handle from the viewpoint of the user), and the present disclosure is not limited as such.

[0085] Furthermore, the outdoor handle 8 will reinstate its original position after the bolt is locked (as shown by the horizontal position of the indoor handle 8' in FIG. 6B).

[0086] Moreover, when the lock device 1 is locked, the idle-run mechanism is enabled, which means that the door cannot be unlocked by the outdoor handle 8.

[0087] FIG. 7A is a flowchart illustrating a second embodiment of an actuation method of a lockset in accordance with the present disclosure, and FIGs. 7B to 7E are illustrations of the steps in FIG. 7A. This embodiment is different from the first embodiment in the scenario in which the lockset is used, so those that are similar or the same will not be repeated below.

[0088] In an embodiment, the actuation method of the lockset is with regard to a user moving from outdoor to indoor, for example, returning home, entering a room, or the like, and the first target handle is the outdoor handle 8 and the second target handle is the indoor handle 8'.

[0089] In step S70, at a first time point (after the user has left the room and closed the door panel 6 from the outside), the bolt is protruding from the housing 1', and the outdoor handle 8 is turned in a first target direction A1' (as shown in FIG. 7B) to lock the bolt in a "locked" state.

[0090] In an embodiment, when the lock device 1 is locked, the idle-run mechanism is enabled, and the door cannot be unlocked by the outdoor handle 8.

[0091] In step S71, the lock device 1 is manipulated by the target key 9 (as shown in FIG. 7C) to disable the idle-run mechanism of the lock device 1, such that the control structure 2a can be controlled by the outdoor handle 8.

[0092] In step S72, at a second time point (the user wishes to enter the room), the outdoor handle 8 is turned in a second target direction A2' (as shown in FIG. 7D) to release the bolt from the "locked" state, so that the bolt retracts into the housing 1' and becomes "unlocked." At this time, the user can pull the door panel 6 in order to enter into the room.

[0093] In an embodiment, the first target direction A1' and the second target direction A2' are opposite directions.

[0094] In step S73, at a third time point (after the user

has entered the room and shut the door panel 6 from inside), the indoor handle 8' is turned in a third target direction A3' (as shown in FIG. 7E) to cause the bolt to extend out of the housing 1' and the bolt is in a "locked" state.

[0095] In an embodiment, the first target direction A1' and the third target direction A3' are the same directions.

[0096] Therefore, the lock device 1 of the present disclosure can be used for household door locks, where the outdoor handle 8 and the indoor handle 8' are disposed at the two opposite sides, the side on which the key hole 100 of the target key 9 and its corresponding outdoor handle 8 are provided is the outside, and the side on which the indoor handle 8' is provided is the inside. When the lock device 1 is in the "locked" state, the user can quickly evacuate during an emergency by simply pushing down the indoor handle 8' (in the second target direction A2 shown in FIG. 6D) to open the door without the need to use a key or turn any parts.

[0097] FIG. 8 is a flowchart illustrating a third embodiment of an actuation method of a lockset in accordance with the present disclosure, and FIG. 8' is an illustration of FIG. 8. This embodiment is different from the previous embodiments in the form of the lockset, so those that are similar or the same will not be repeated below.

[0098] In step S80, an electronic lock is provided as the lockset.

[0099] In an embodiment, an inductive assembly 8" is provided in the accommodating space S of the lock device 1, so that the lock device 1 becomes an electronic lock, in which the bolt can be actuated by the inductive assembly 8". For example, the inductive assembly 8" includes a circuit board 80, a motor 81 electrically controlled by the circuit board 80, and related mechanism (not shown) driven by the motor 81 as shown in FIG. 8'. It can be appreciated that there are numerous types of electronic lock, and the present disclosure is not limited as such.

[0100] In step S81, at a first time point, the bolt is actuated to extend out of the housing 1' via electronic control (e.g., via an induction key) to lock the bolt in a "locked" state.

[0101] In step S82, at a second time point, the bolt is retracted into the housing 1' via electronic control (e.g., via the induction key) to put the bolt in a "unlocked" state.

[0102] In step S83, at a third time point, the bolt is actuated to extend out of the housing 1' via electronic control (e.g., via the induction key) to lock the bolt in a "locked" state.

[0103] It can be appreciated that there are numerous ways to actuate the electronic lock, and the present disclosure is not limited to the induction key. Moreover, the steps S81 to S83 are applicable to a scenario in which a user wishes to leave the room or go outside.

[0104] Accordingly, in the electronic lock of the present disclosure, depending on the evacuation requirements, the actuation function of the outdoor handle 8 can be replaced by the induction key, and the indoor handle 8' is used inside, which means after the lock device 1 is locked, the user can quickly escape during an emergency by simply pushing down the indoor handle 8' (in the second target direction A2 shown in FIG. 6D) to open the door without the need to use the induction key.

[0105] In summary of the above, the lock device 1 of the present disclosure, with the configuration of the lock assembly 2, usually allows the emergency door to be locked to prevent intruders from breaking in, but also allows the door to be opened during an emergency by simply turning the indoor handle 8' (i.e., turning the control structure 2a) without the need to use the target key 9, the induction key, or turn a specific part of the lock device 1. Therefore, an emergency door or a household door including the lock device 1 in accordance with the present disclosure not only prevents intrusion but also facilitates fast evacuation.

[0106] The above embodiments are merely provided for illustrating the principles of the present disclosure and its technical effects, and should not be construed as to limit the present disclosure in any way. The above embodiments can be modified by one of ordinary skill in the art without departing from the scope of the present disclosure. Therefore, the scope of the present disclosure sought to be protected should be defined by the appended claims.

Claims

1. A lock device, comprising:

   a housing with an accommodating space;
   a main lock head arranged at one side of the housing and capable of sliding into or out of the accommodating space; and
   a lock assembly arranged in the accommodating space to actuate the main lock head, comprising an active member secured to the main lock head, a drive member capable of actuating the active member, a control structure linked with the drive member, a passive structure provided on the housing in a displaceable manner, and an action member linked with the passive structure.

2. The lock device of claim 1, wherein the drive member is pivotally connected to the housing.

3. The lock device of claim 1, wherein the control structure includes a control port to pivotally connected to the housing.

4. The lock device of claim 1, wherein the passive structure is a reciprocating structure.

5. The lock device of claim 1, wherein the action member is pivotally connected to the housing, one side

of the action member functioning as an action portion that actuates correspondingly with the passive structure, and another side of the action member functioning as a limiter that actuates correspondingly with the active member.

6. The lock device of claim 1, further comprising an idle-run assembly arranged in the accommodating space and including an actuating member provided on the housing in a displaceable manner, a toggle member pivotally connected to the housing, a pushing member provided on the control structure in a displaceable manner, and a passive member provided on the control structure, wherein the passive member is formed with an idle-run recess capable of engaging with or disengaging from the pushing member.

7. The lock device of claim 1, further comprising a safety assembly arranged in the accommodating space, and a safety bolt and an auxiliary bolt provided on the housing, wherein the safety assembly includes a first active member provided on the housing in a displaceable manner to displace the safety bolt along with the first active member, a second active member provided on the housing in a displaceable manner to displace the auxiliary bolt along with the second active member, and a cam member linked with the first and second active members, wherein the cam member includes a hook portion for releasing or fixating the first active member, and wherein the drive member includes a drive stop block capable of abutting against the cam member for actuating or stopping the cam member.

8. An actuation method of a lockset, comprising:

providing a lockset including a housing and at least one bolt provided on the housing, and a first target handle and a second target handle disposed at two opposite sides of the lockset;
at a first time point, turning the first target handle in a first target direction to lock the bolt extending out of the housing to place the bolt in a locked state;
at a second time point, turning the first target handle in a second target direction to release the bolt from the locked state, thereby retracting the bolt into the housing and placing the bolt in an unlocked state, wherein the first target direction is in an opposite direction to the second target direction; and
at a third time point, turning the second handle in a third target direction to bring the bolt out of the housing to lock the bolt and place the bolt in the locked state, wherein the first target direction is the same direction as the third target direction.

9. The actuation method of claim 8, wherein the first target handle is an indoor handle, and the second target handle is an outdoor handle.

10. The actuation method of claim 8, wherein the first target handle is an outdoor handle, and the second target handle is an indoor handle.

11. The actuation method of claim 10, further comprising using a target key to manipulate the lockset between the first time point and the second time point.

12. The actuation method of claim 8, further comprising using a target key to manipulate the lockset.

13. The actuation method of claim 8, wherein the first target direction is an upward direction in which the first target handle is turned.

14. The actuation method of claim 8, wherein the second target direction is a downward direction in which the first target handle is turned.

15. The actuation method of claim 8, wherein the third target direction is an upward direction in which the second target handle is turned.

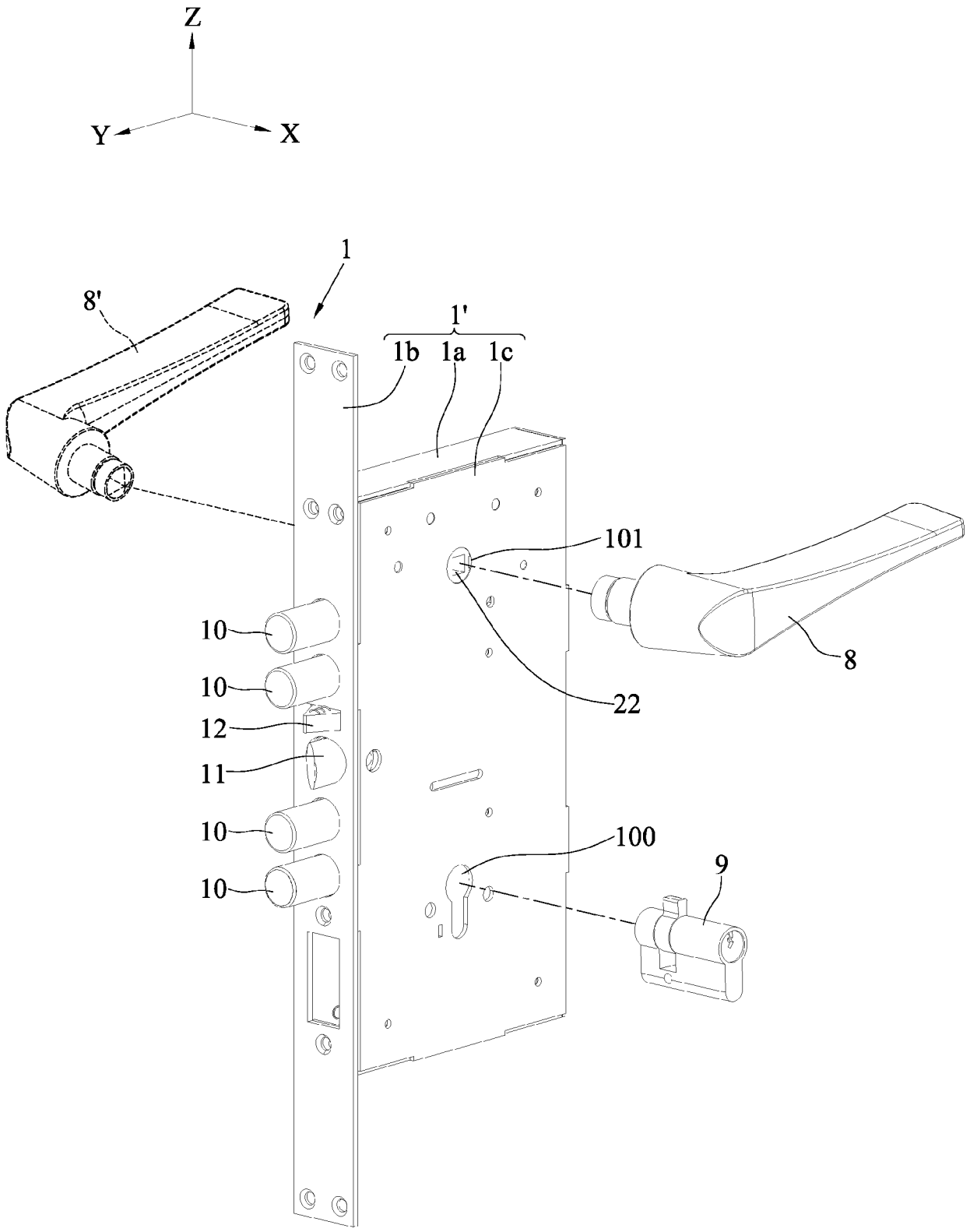


FIG. 1A

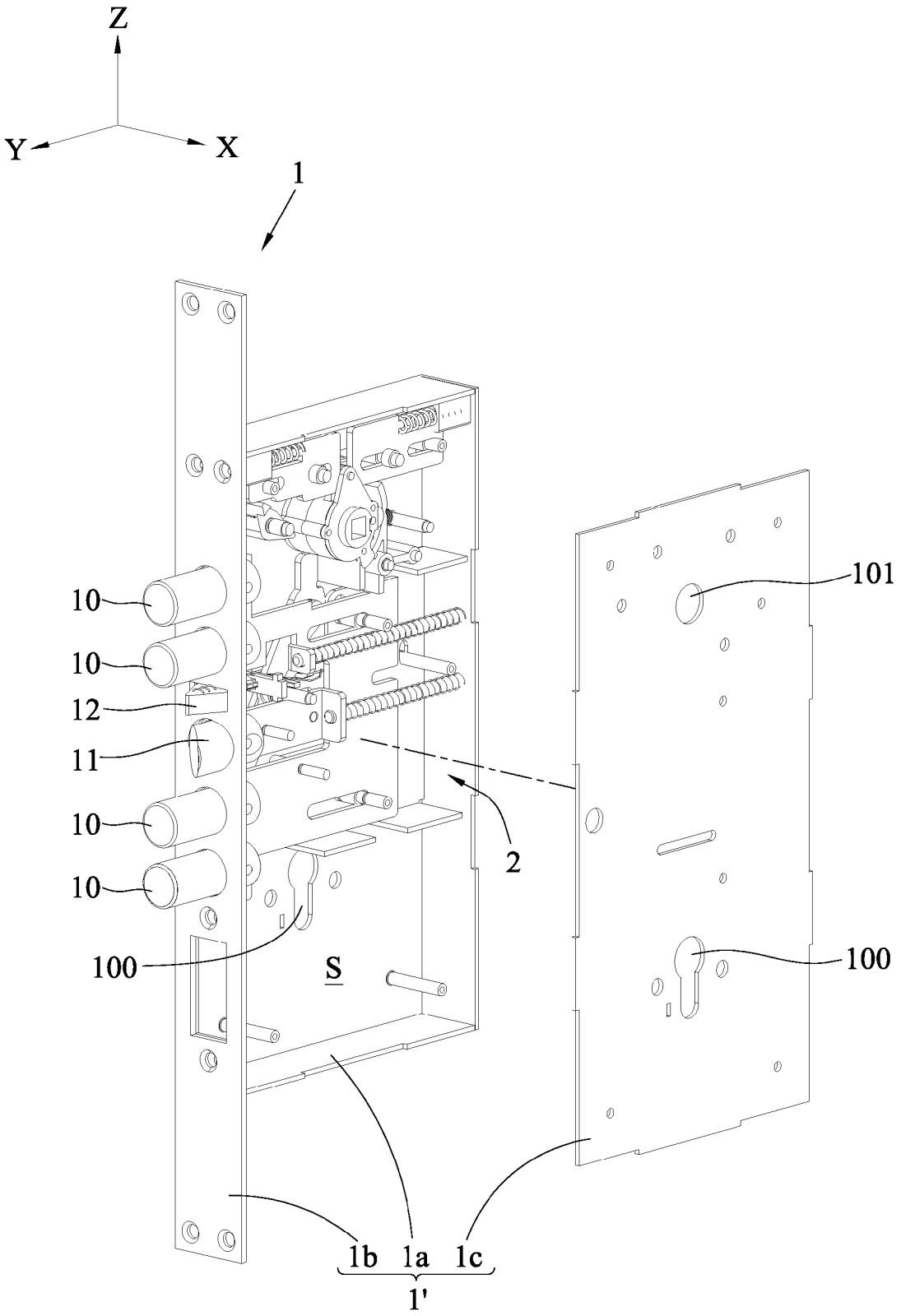


FIG. 1B

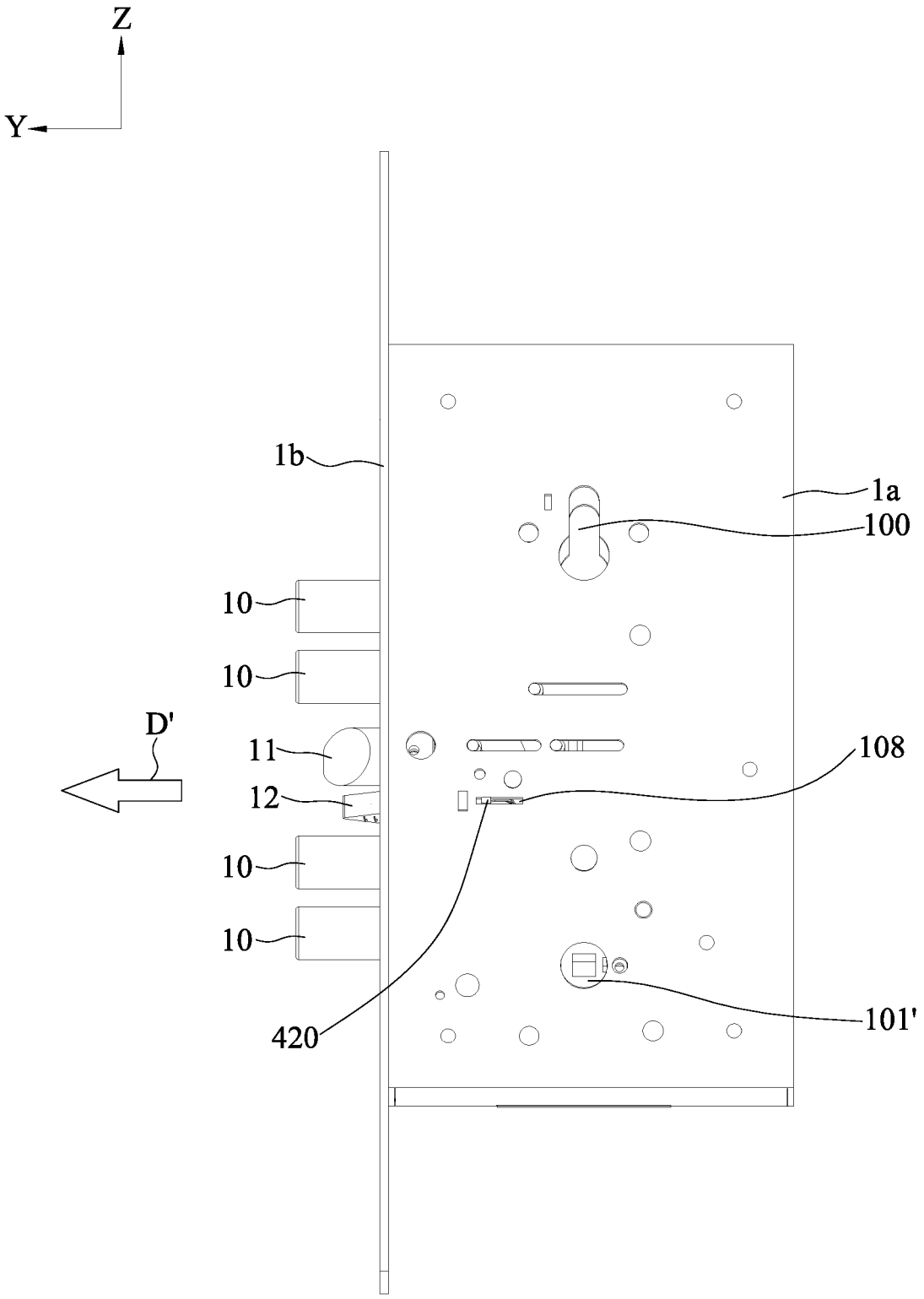


FIG. 1C

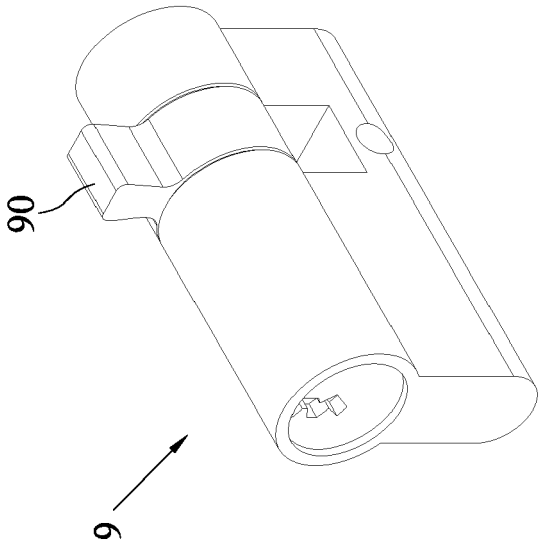
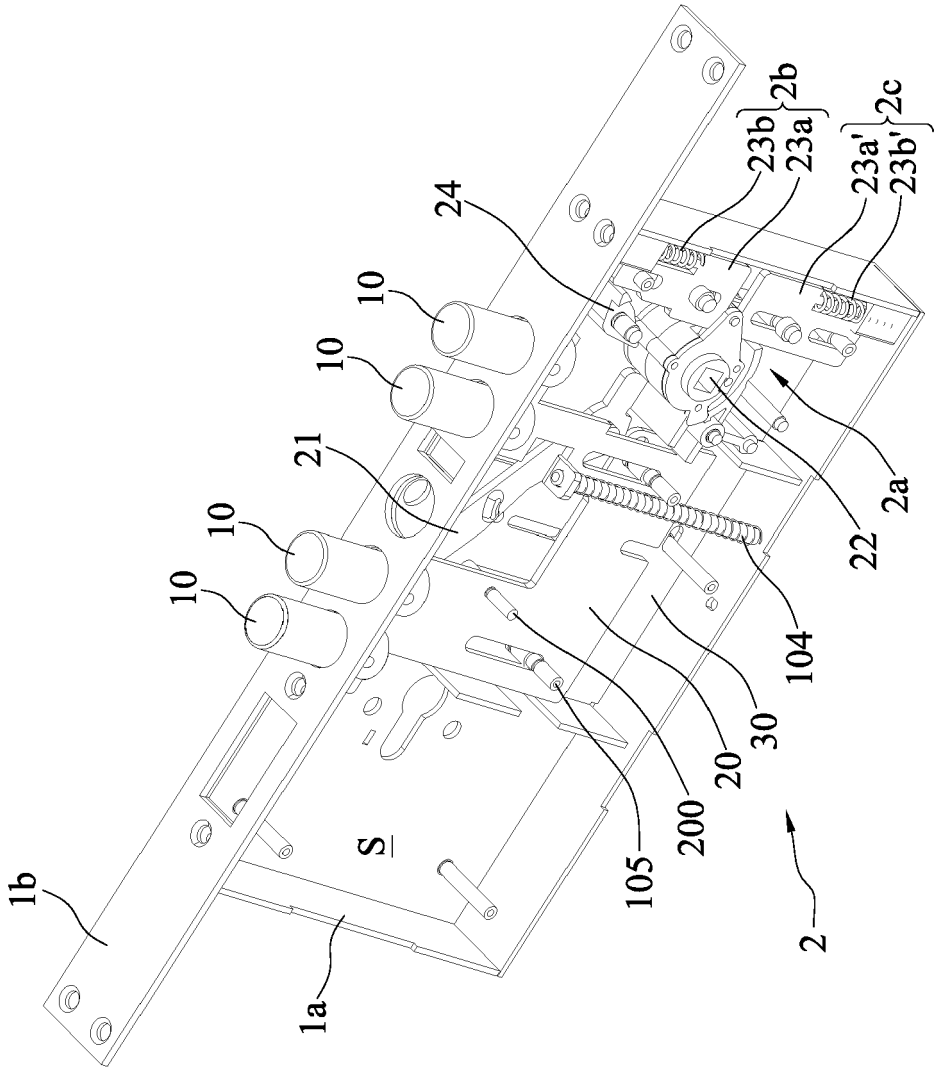


FIG. 1D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1a
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10
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10
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24
23b
23a
2b
23a'
23b'
2c
2a
22
104
30
20
200
105
2

FIG. 2A

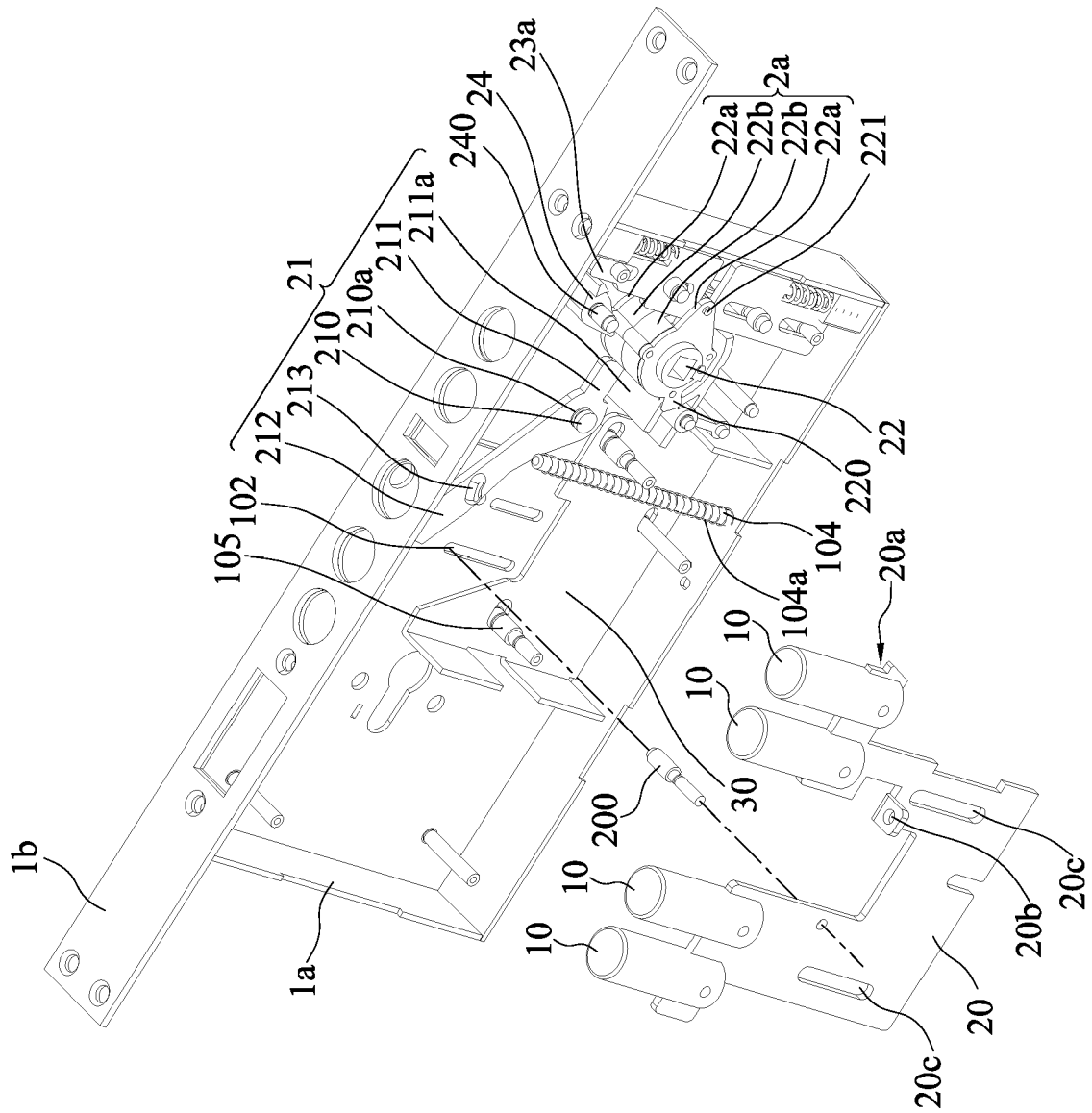
1b
1a
105
102
212
213
210
210a
211
211a
21
240
24
23a
2a
22a
22b
22b
22a
221
22
220
104
104a
20a
10
10
10
10
200
30
20c
20b
20
20c

FIG. 2B

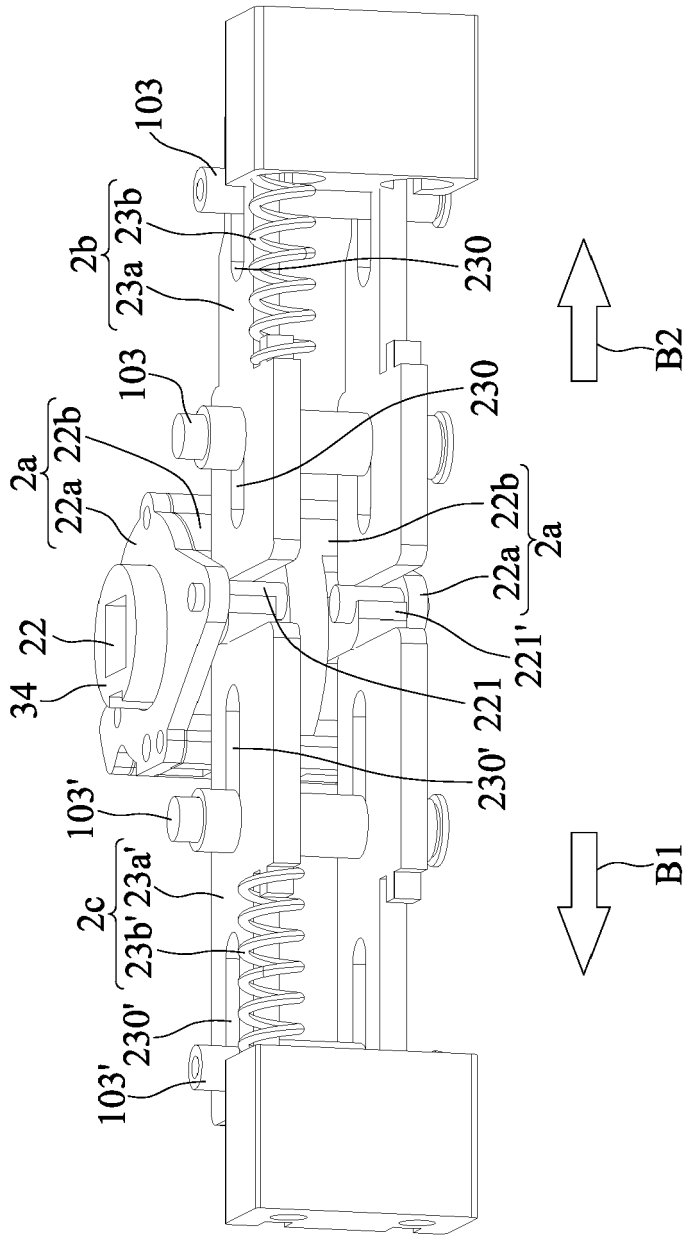
103
2b
23b
23a
230
B2
103
230
2a
22b
22a
22
34
221'
221
230'
103'
2c
23a'
23b'
230'
103'
B1

FIG. 2B'

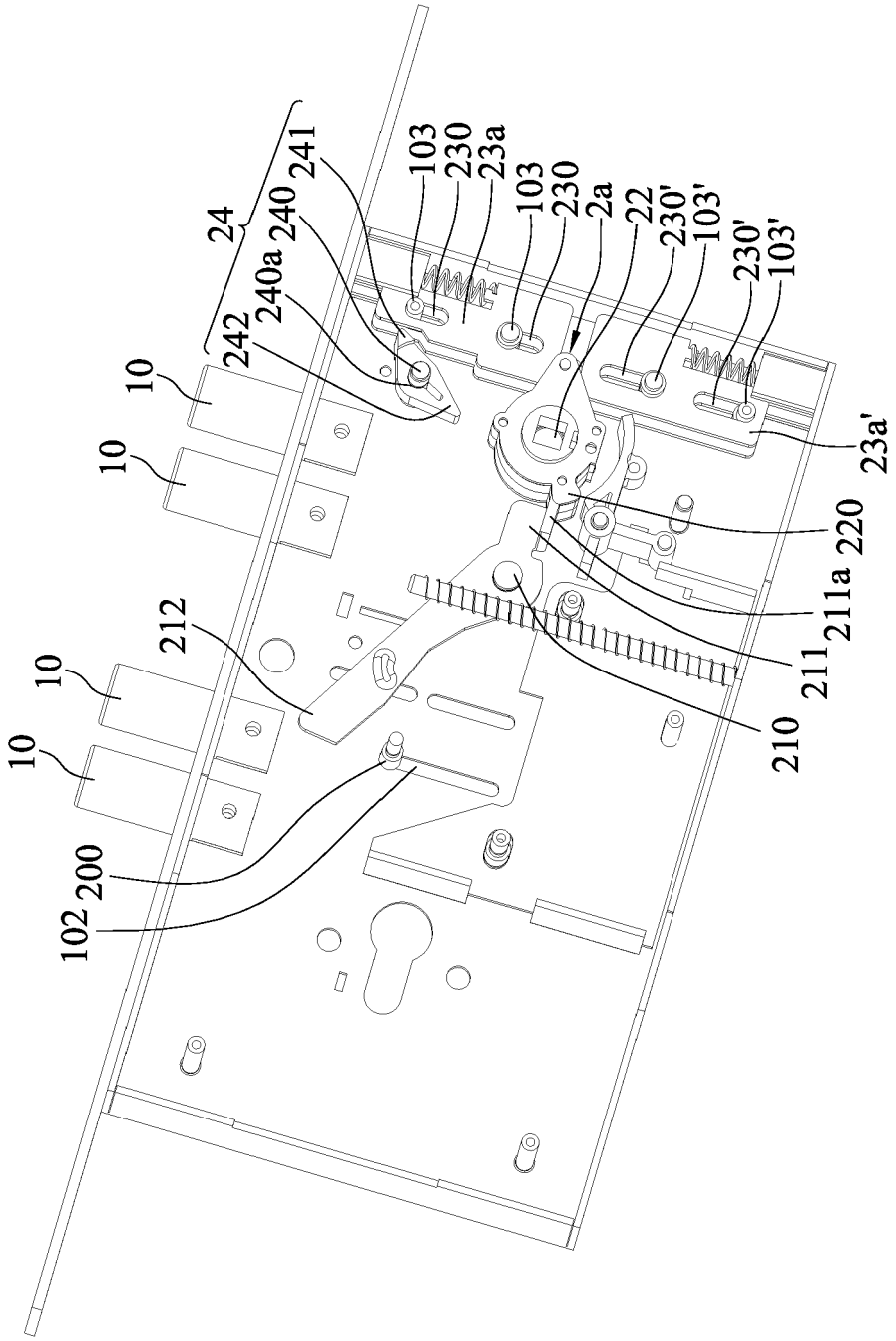
24
241
240
240a
242
103
230
23a
103
230
2a
22
230'
103'
230'
103'
23a'
10
10
10
10
10
212
220
211a
211
210
200
102

FIG. 2C

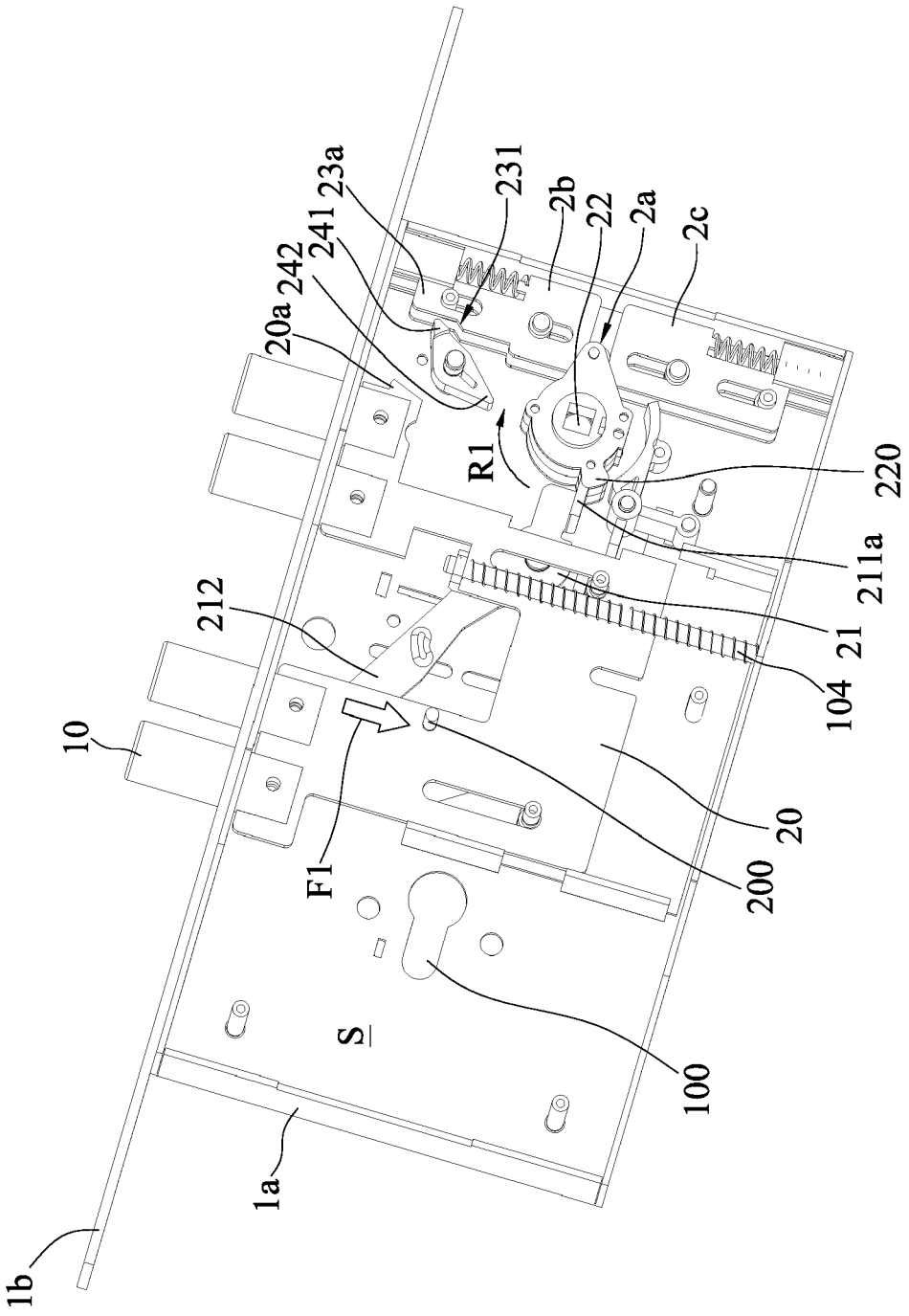
23a
231
2b
22
2a
2c
241
242
20a
R1
220
211a
21
104
212
10
20
F1
200
S
100
1a
1b

FIG. 2D

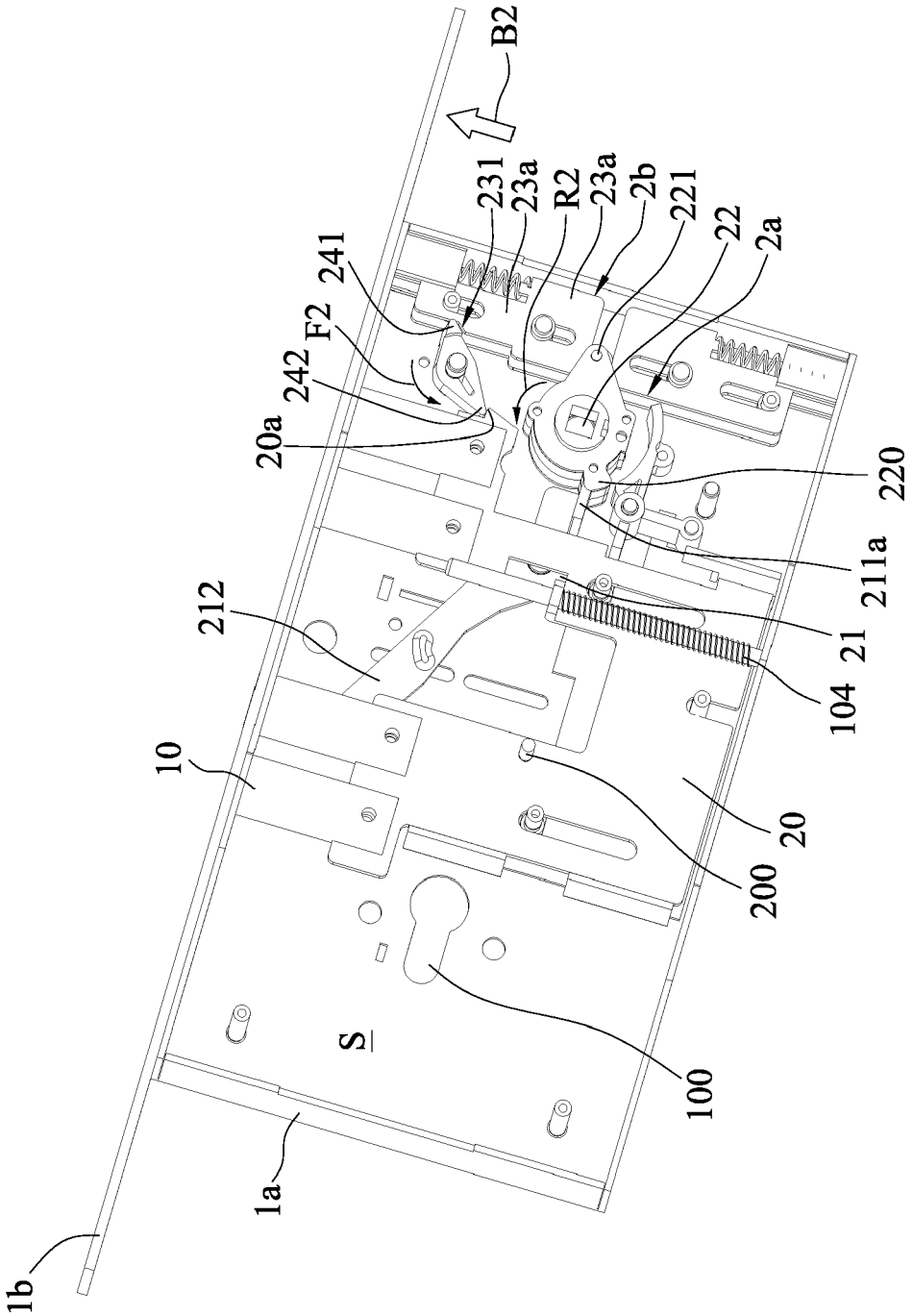
B2
231
23a
R2
23a
2b
221
22
2a
241
F2
242
20a
220
211a
212
21
104
10
20
200
100
1a
1b

FIG. 2D'

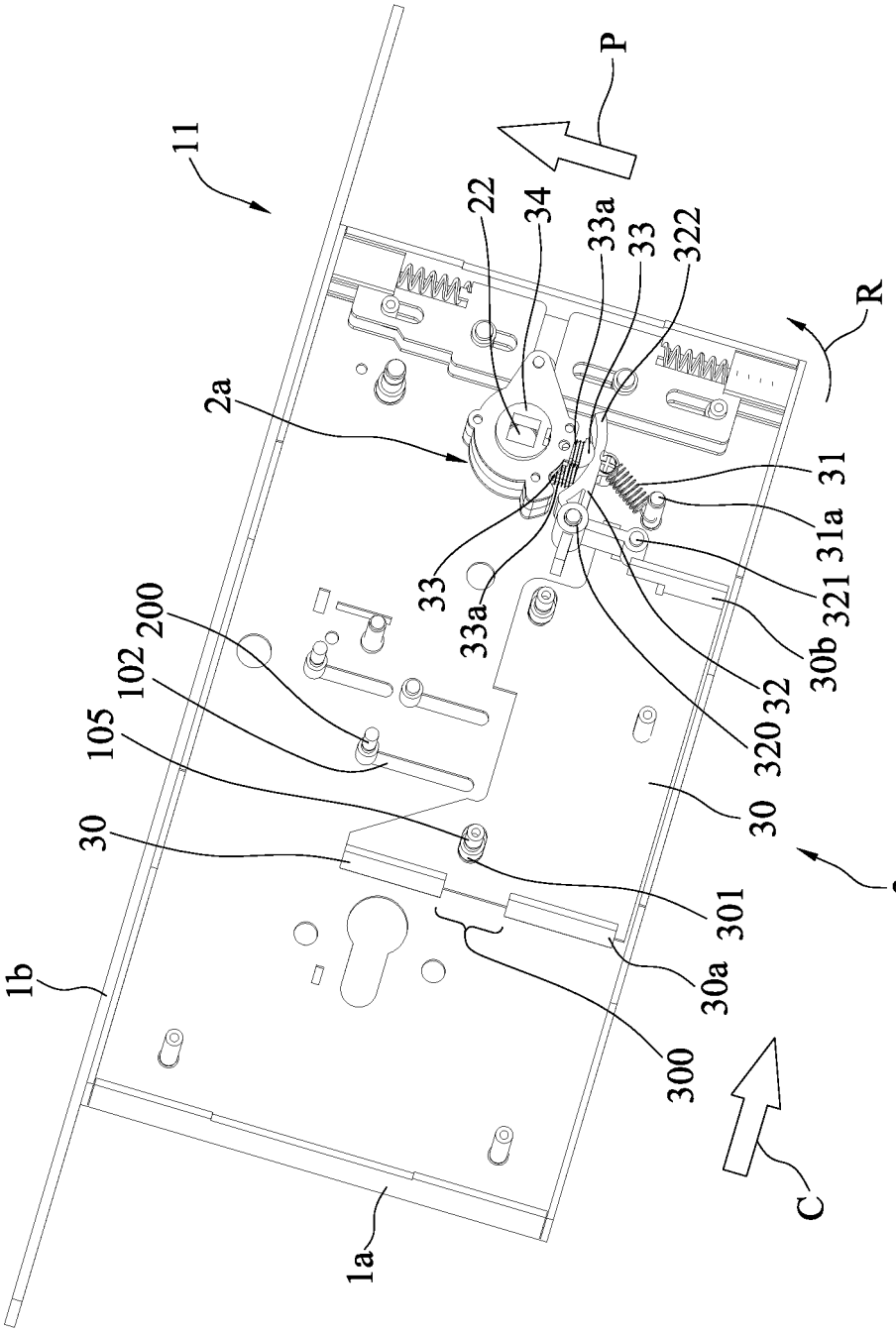
11
P
22
34
33a
33
322
R
2a
31
31a
321
30b
32
320
33
33a
200
102
105
30
301
30a
300
1b
1a
C
3

FIG. 3A

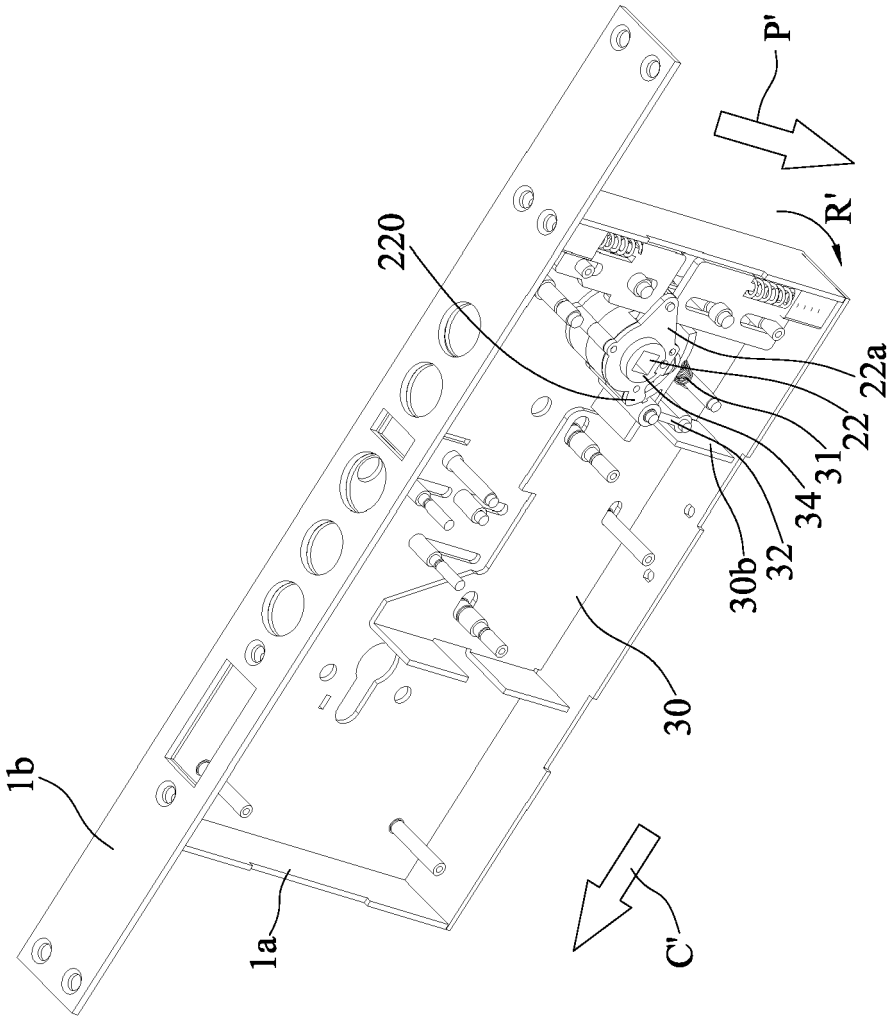

FIG. 3A'

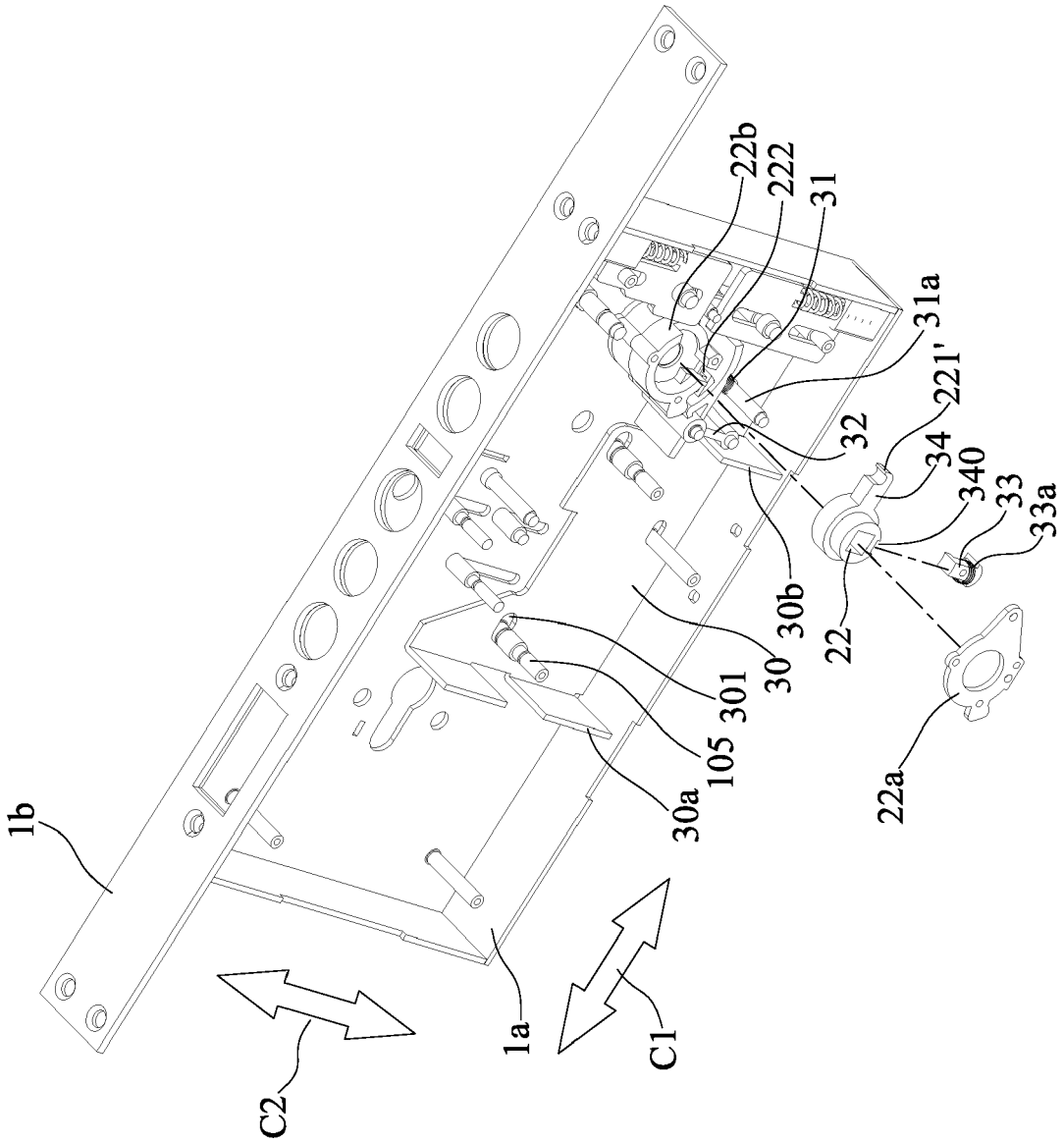
1b
C2
1a
C1
30a
105
301
30
30b
22
22a
22b
222
31
31a
221'
32
34
340
33
33a

FIG. 3B

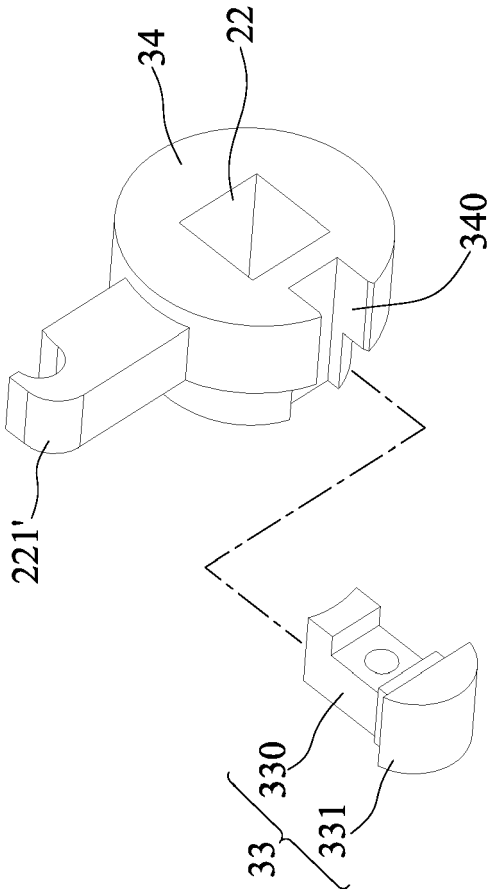

FIG. 3C

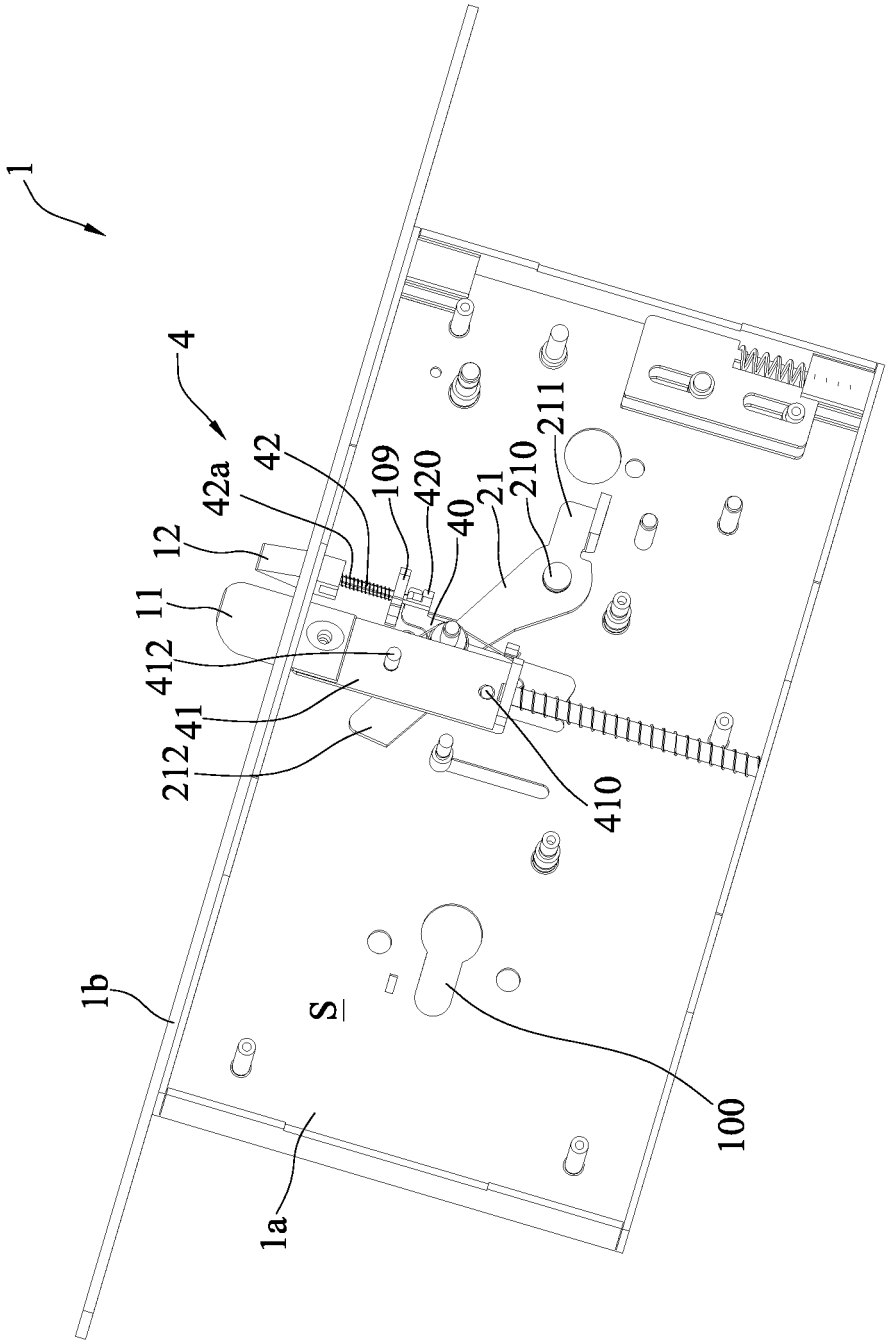

FIG. 4A

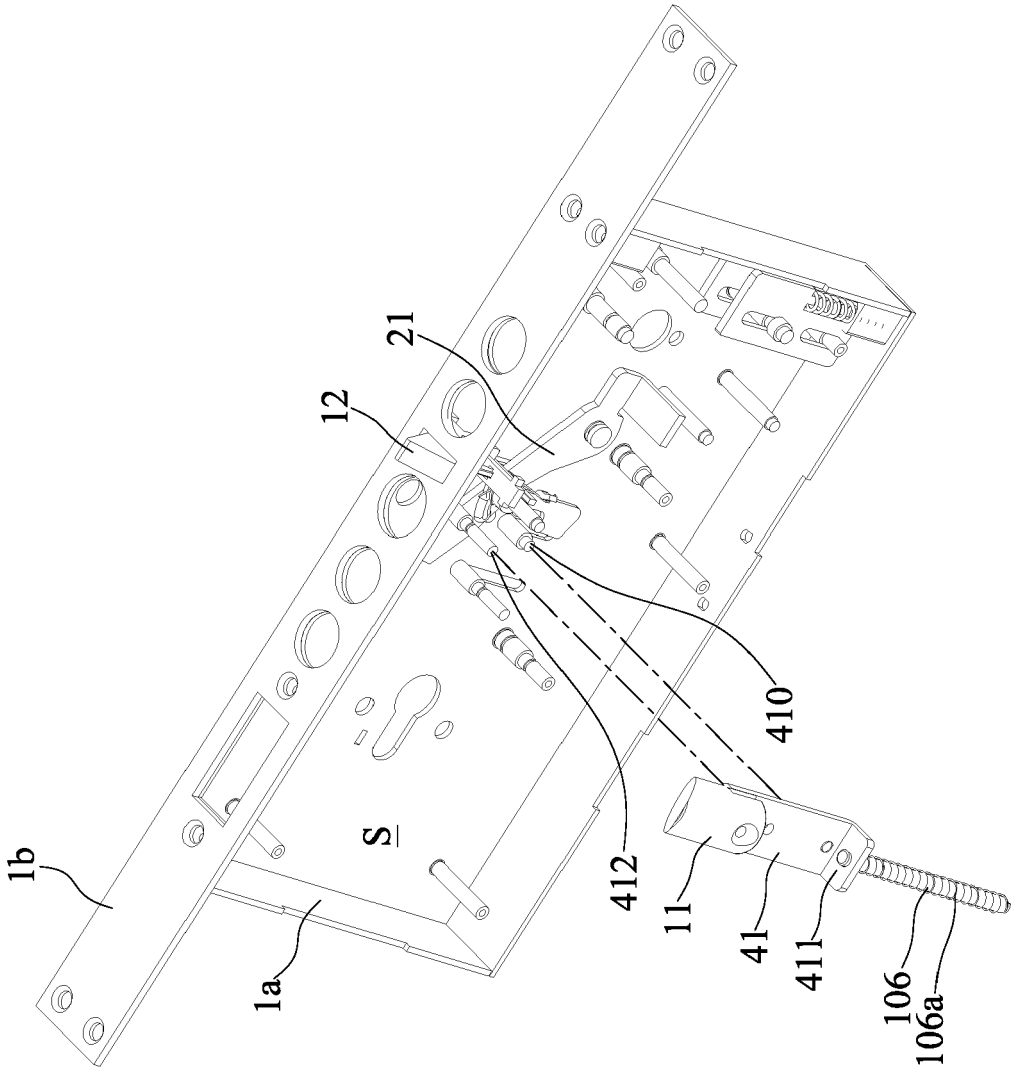

FIG. 4B

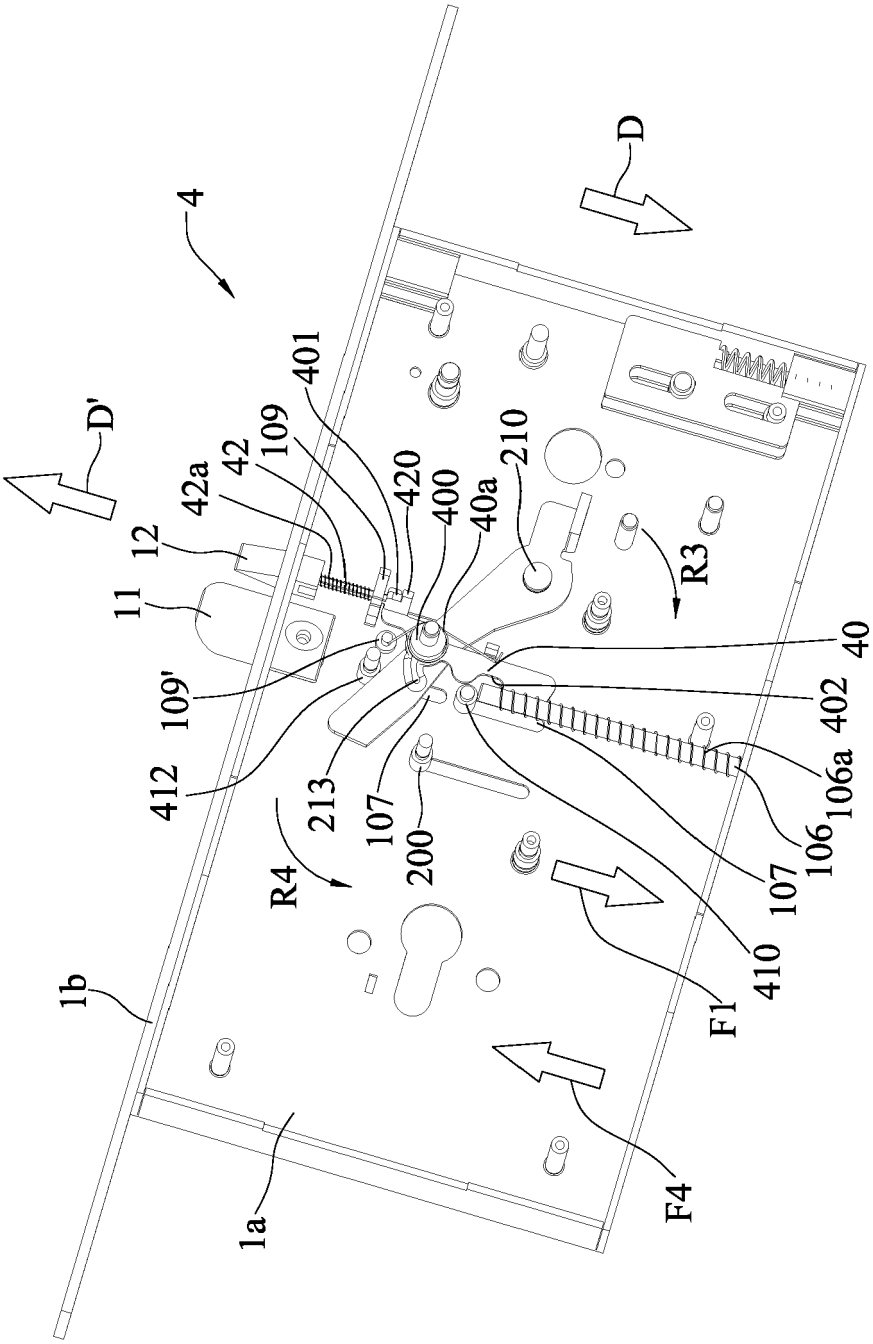
4
D
D'
401
109
42
42a
12
11
420
400
40a
210
R3
40
109'
412
213
107
200
R4
402
106a
106
107
410
F1
F4
1b
1a

FIG. 4C

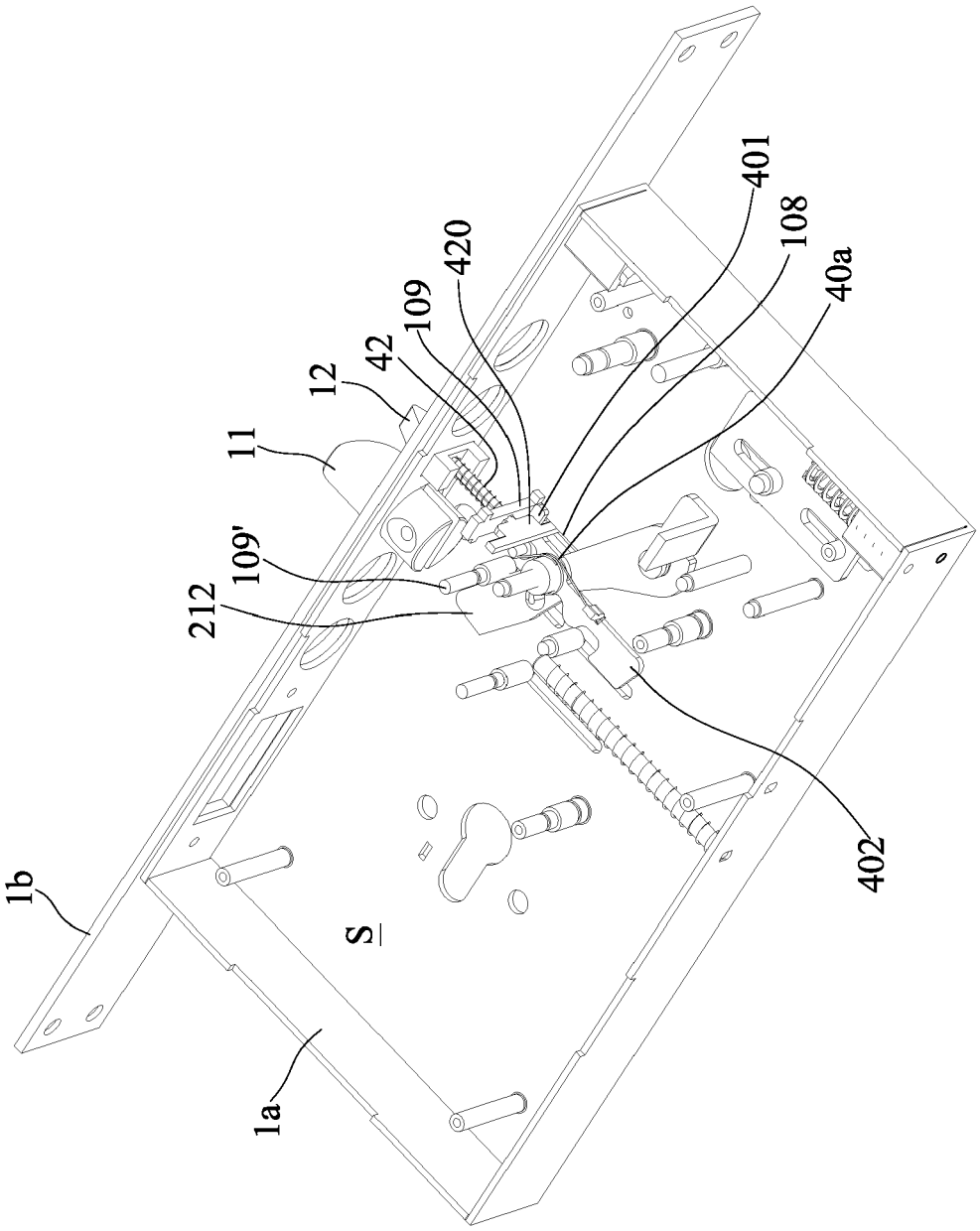

FIG. 4D

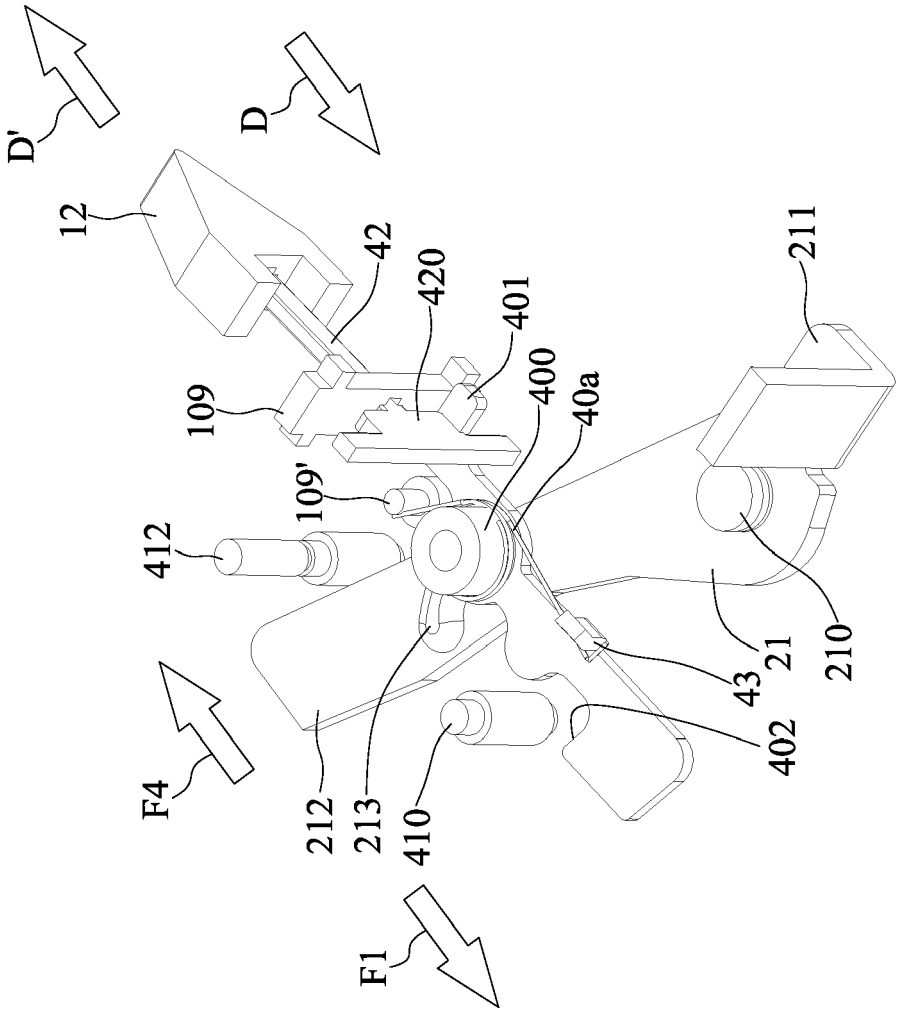
D'
D
12
42
420
401
211
109
400
40a
109'
412
210
21
43
F4
212
213
410
402
F1

FIG. 4E

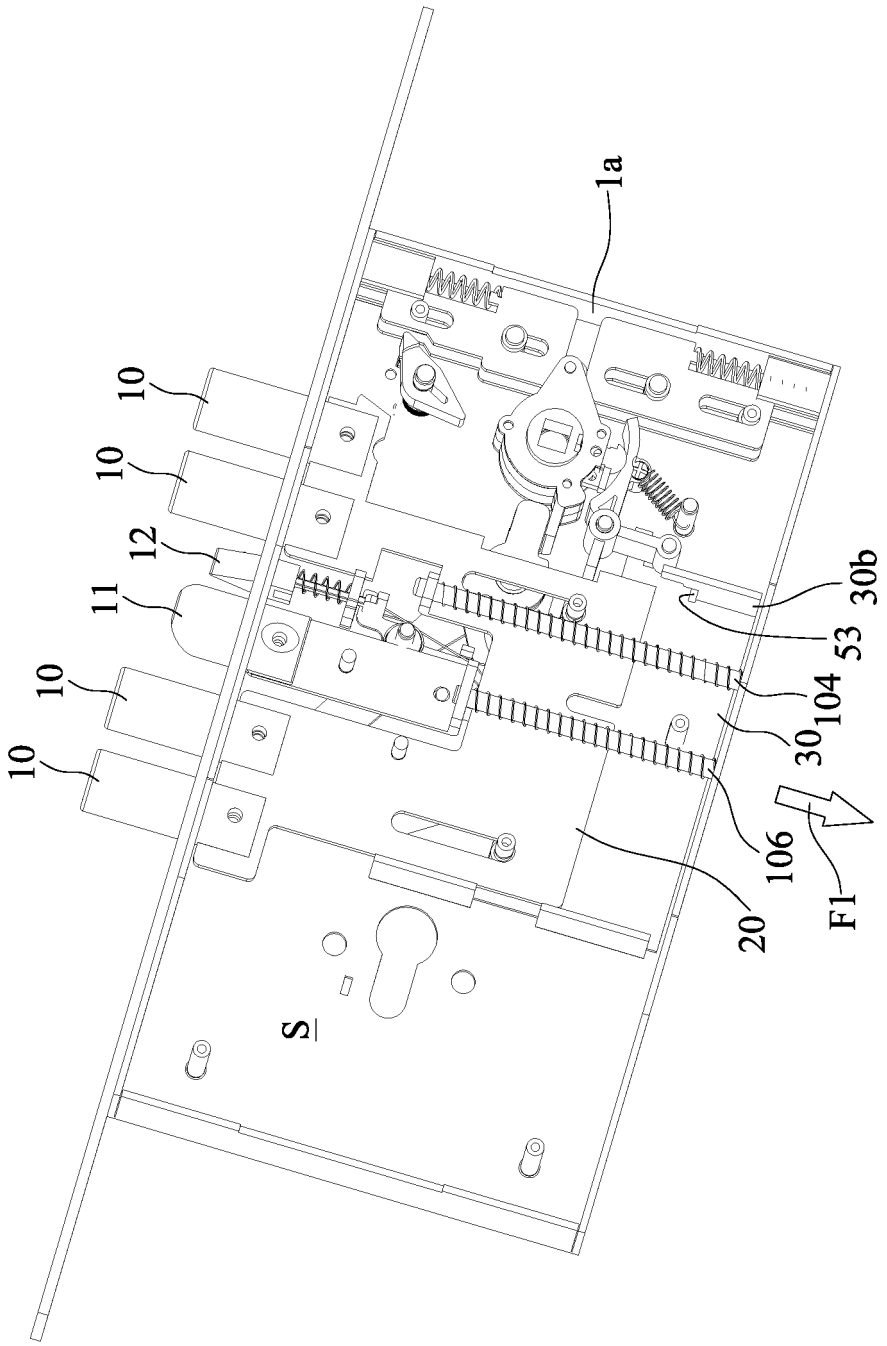

FIG. 5A

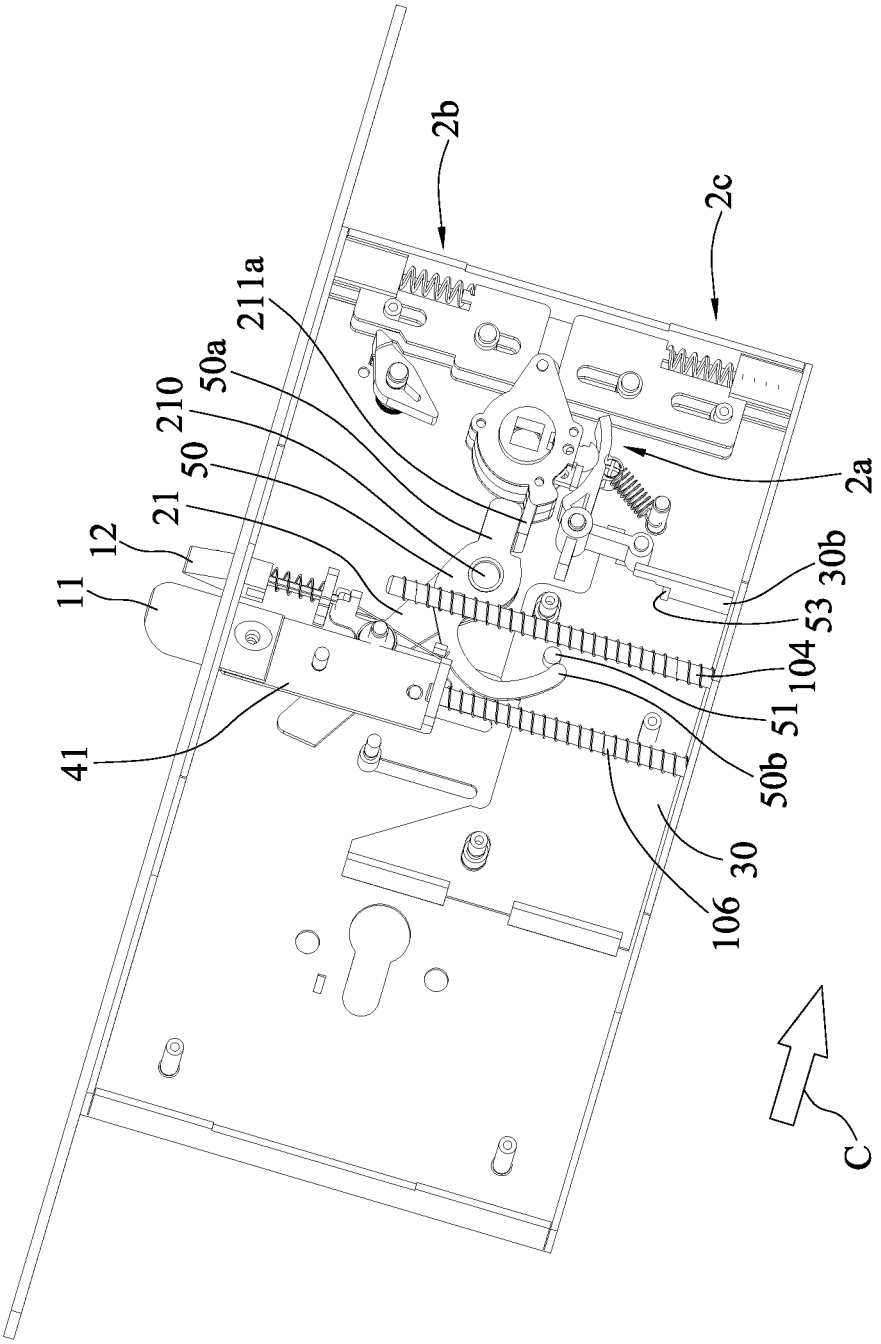

FIG. 5B

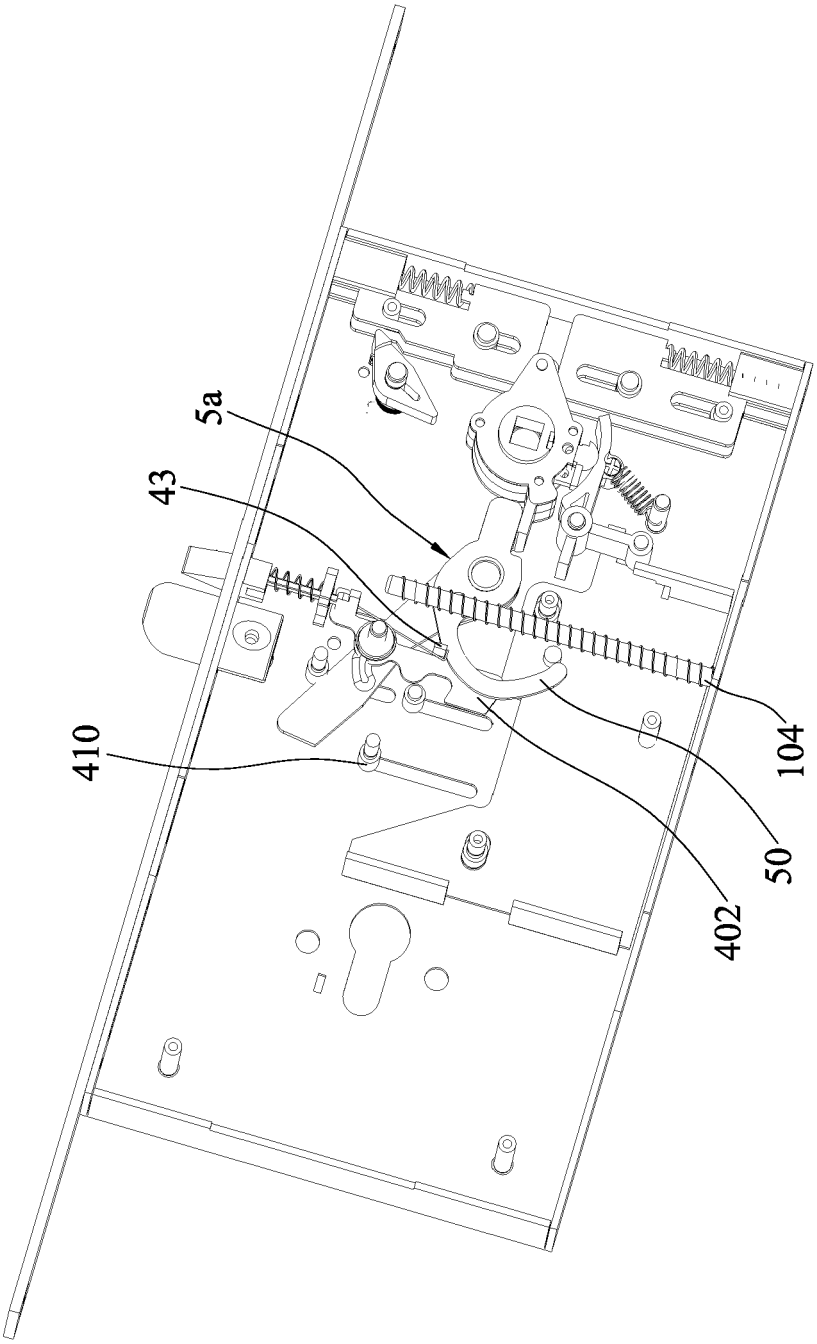

FIG. 5C

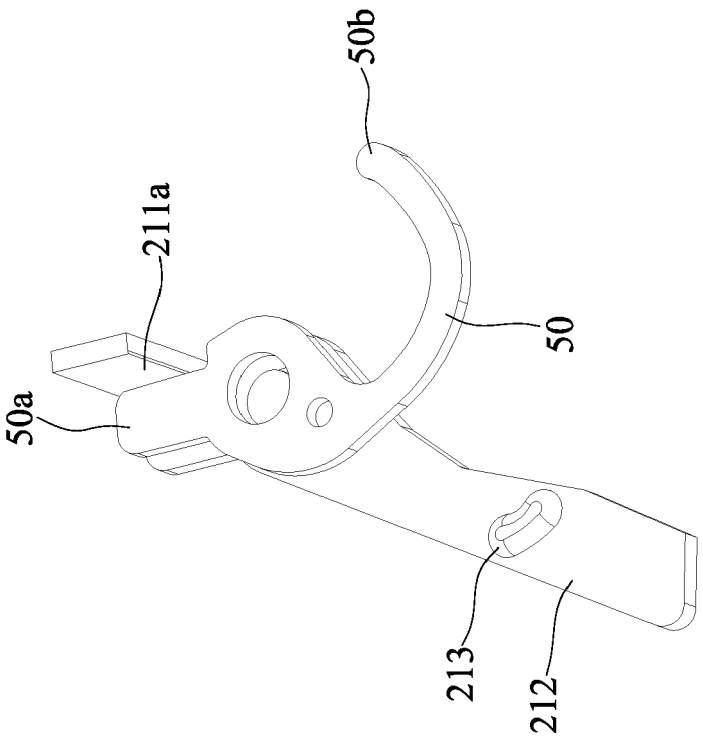

FIG. 5D

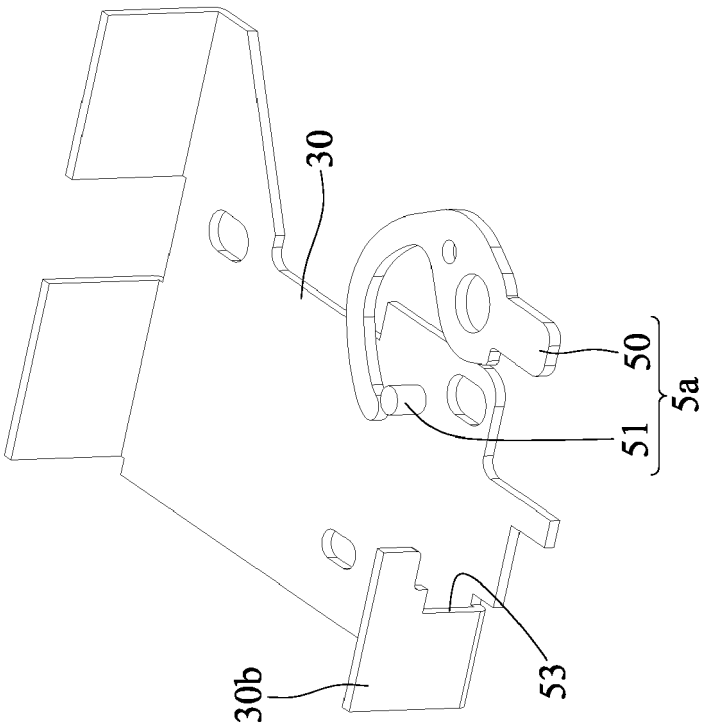

FIG. 5E

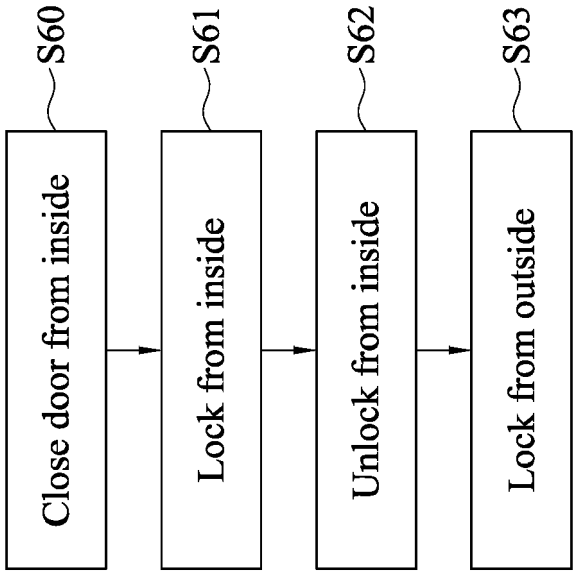
S60
Close door from inside
S61
Lock from inside
S62
Unlock from inside
S63
Lock from outside

FIG. 6A

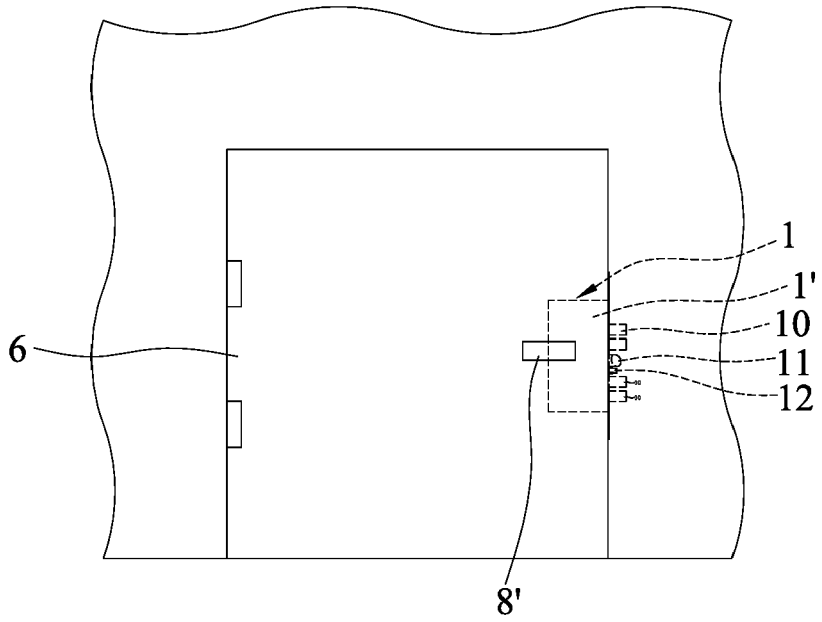

FIG. 6B

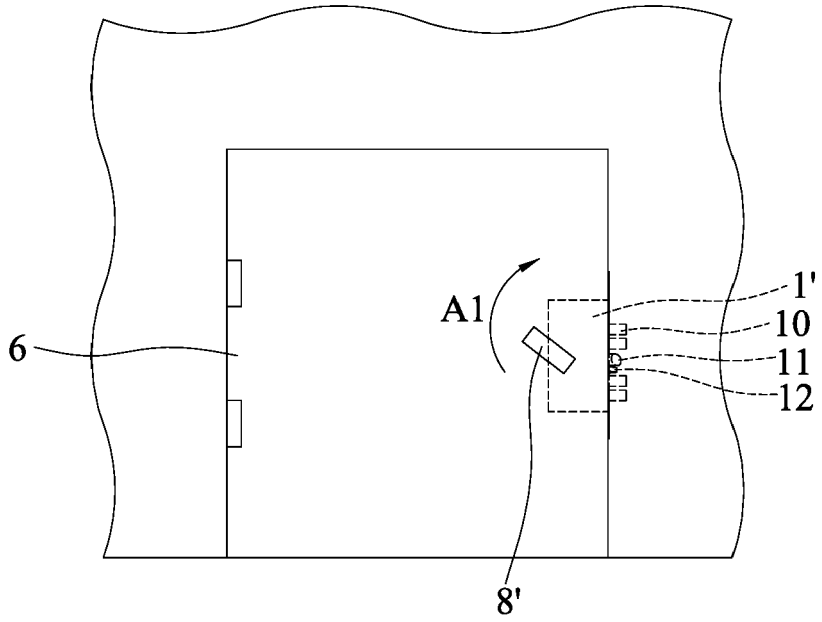

FIG. 6C

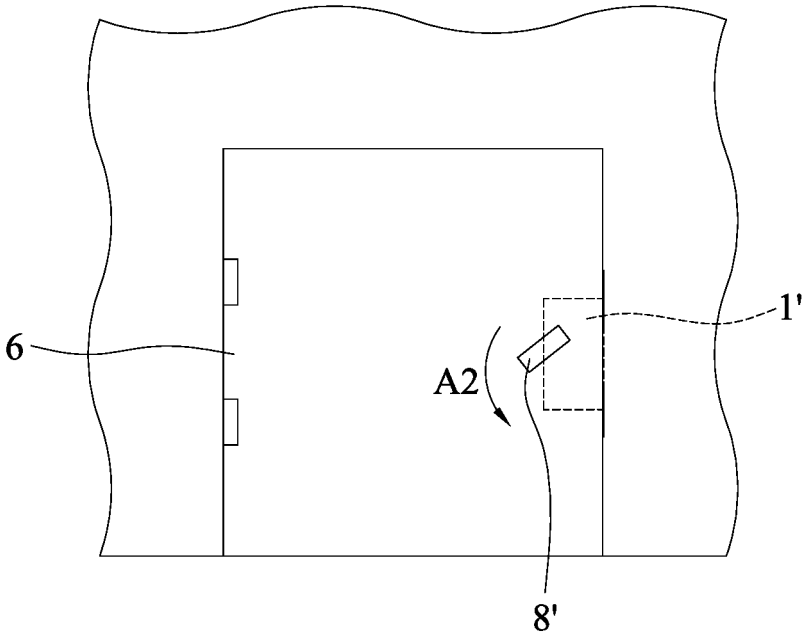

FIG. 6D

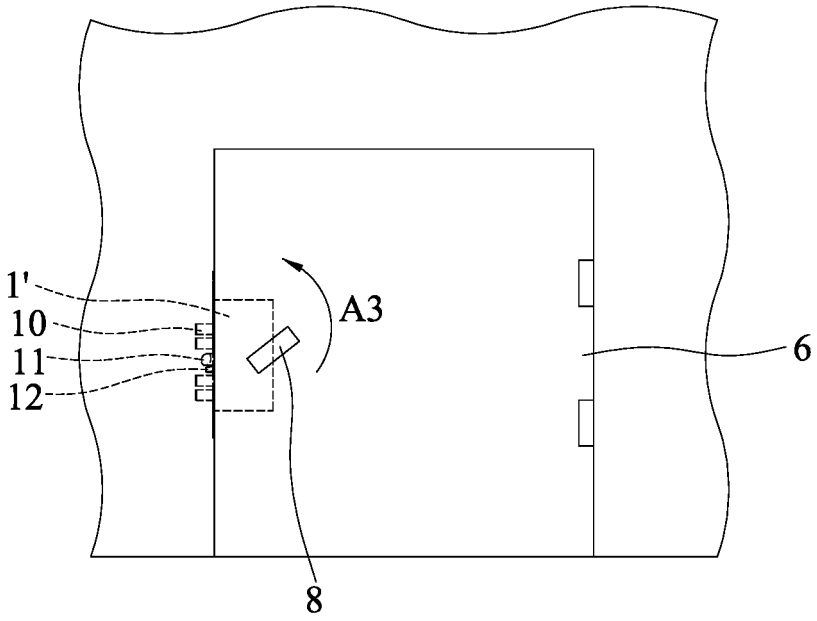

FIG. 6E

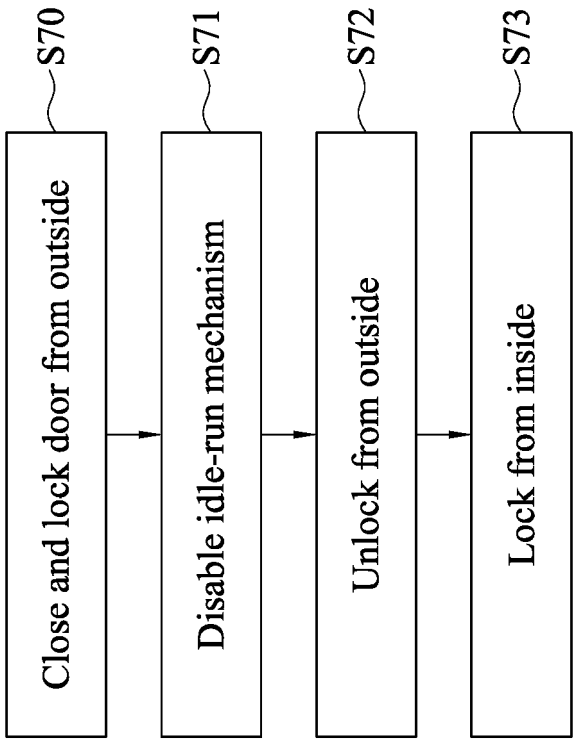
S70
Close and lock door from outside
S71
Disable idle-run mechanism
S72
Unlock from outside
S73
Lock from inside

FIG. 7A

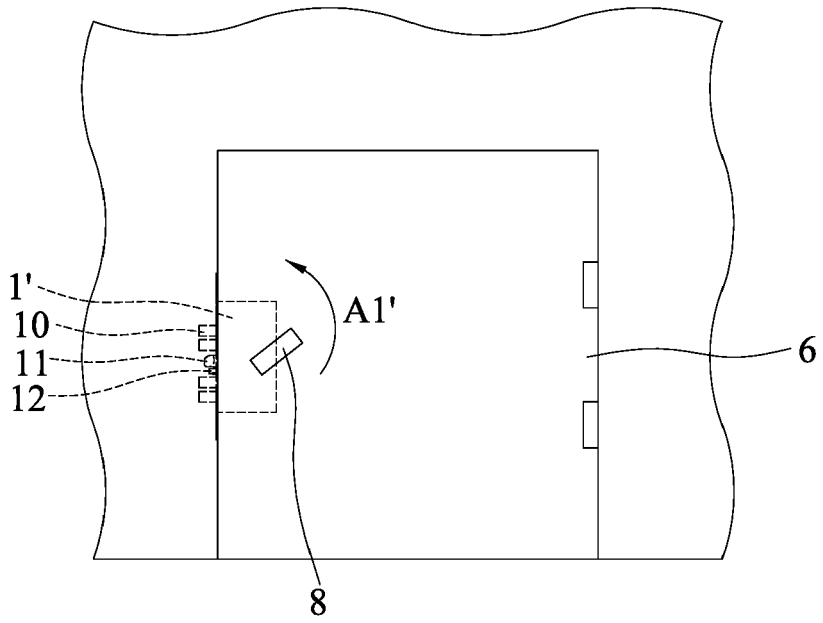

FIG. 7B

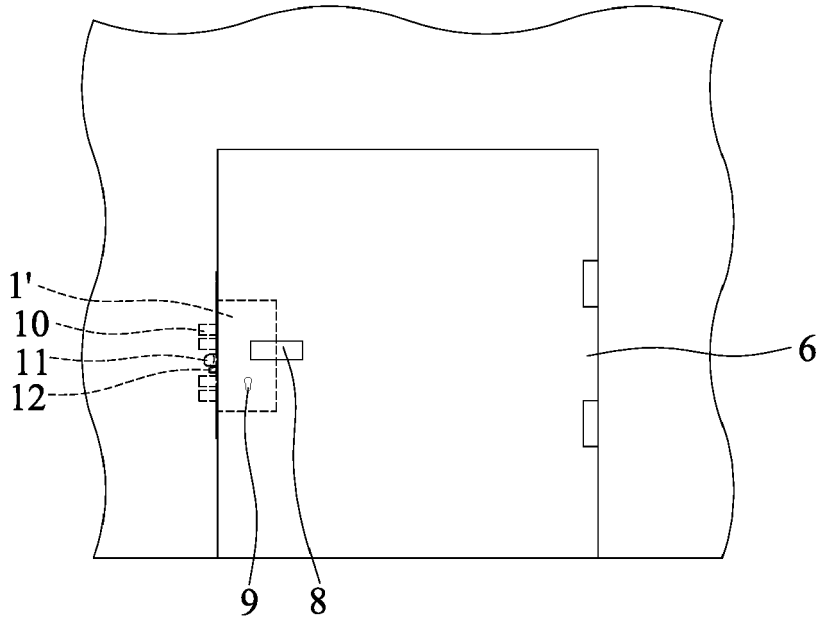

FIG. 7C

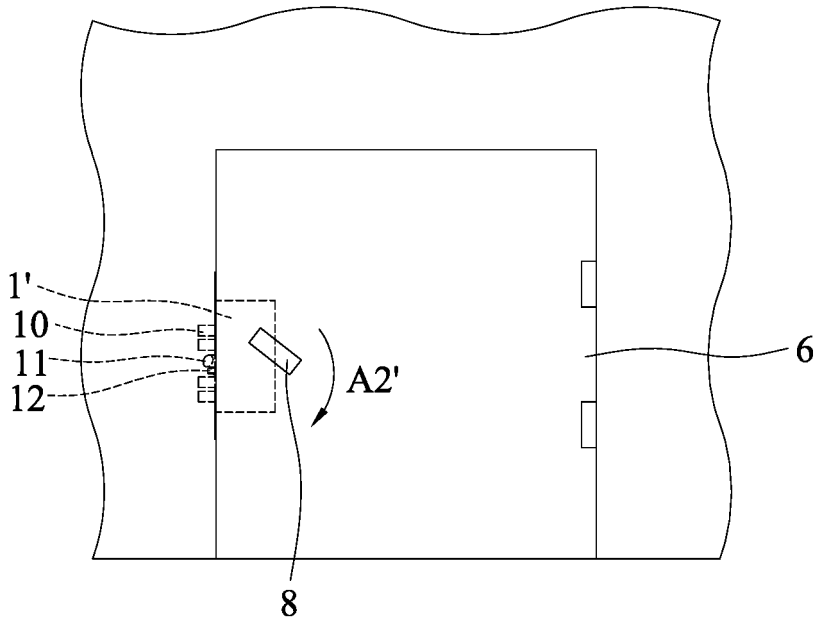

FIG. 7D

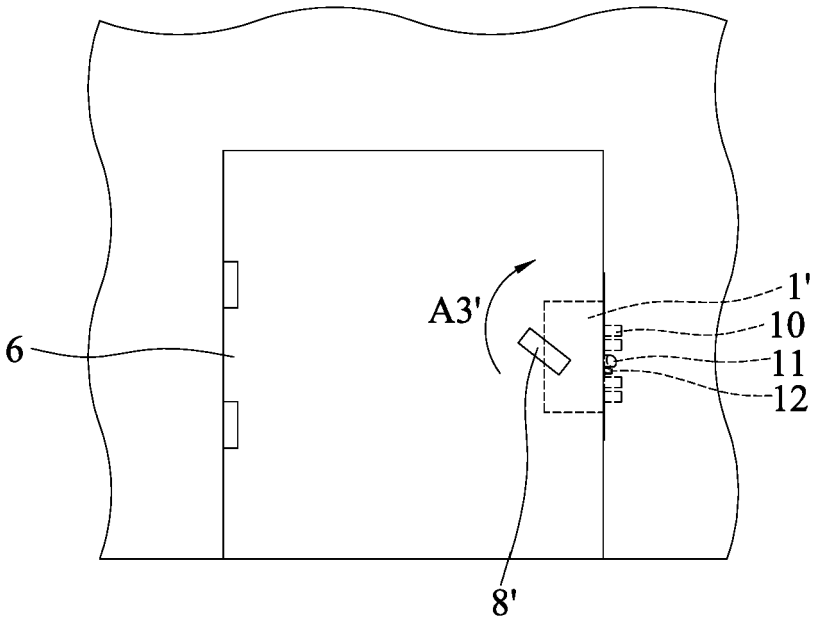

FIG. 7E

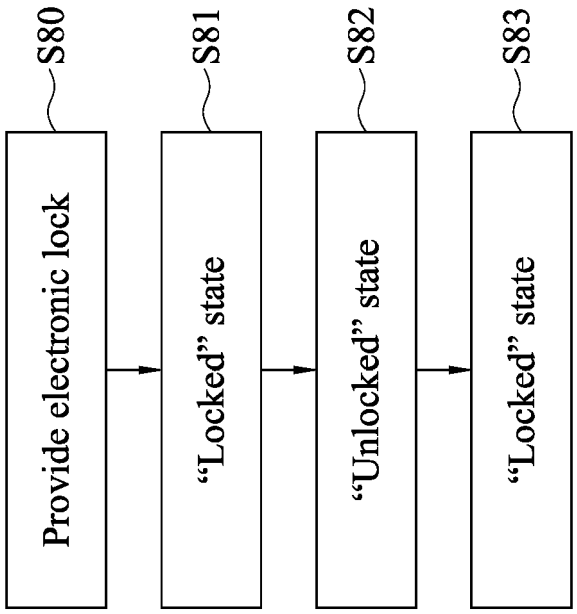
S80
Provide electronic lock
S81
"Locked" state
S82
"Unlocked" state
S83
"Locked" state

FIG. 8

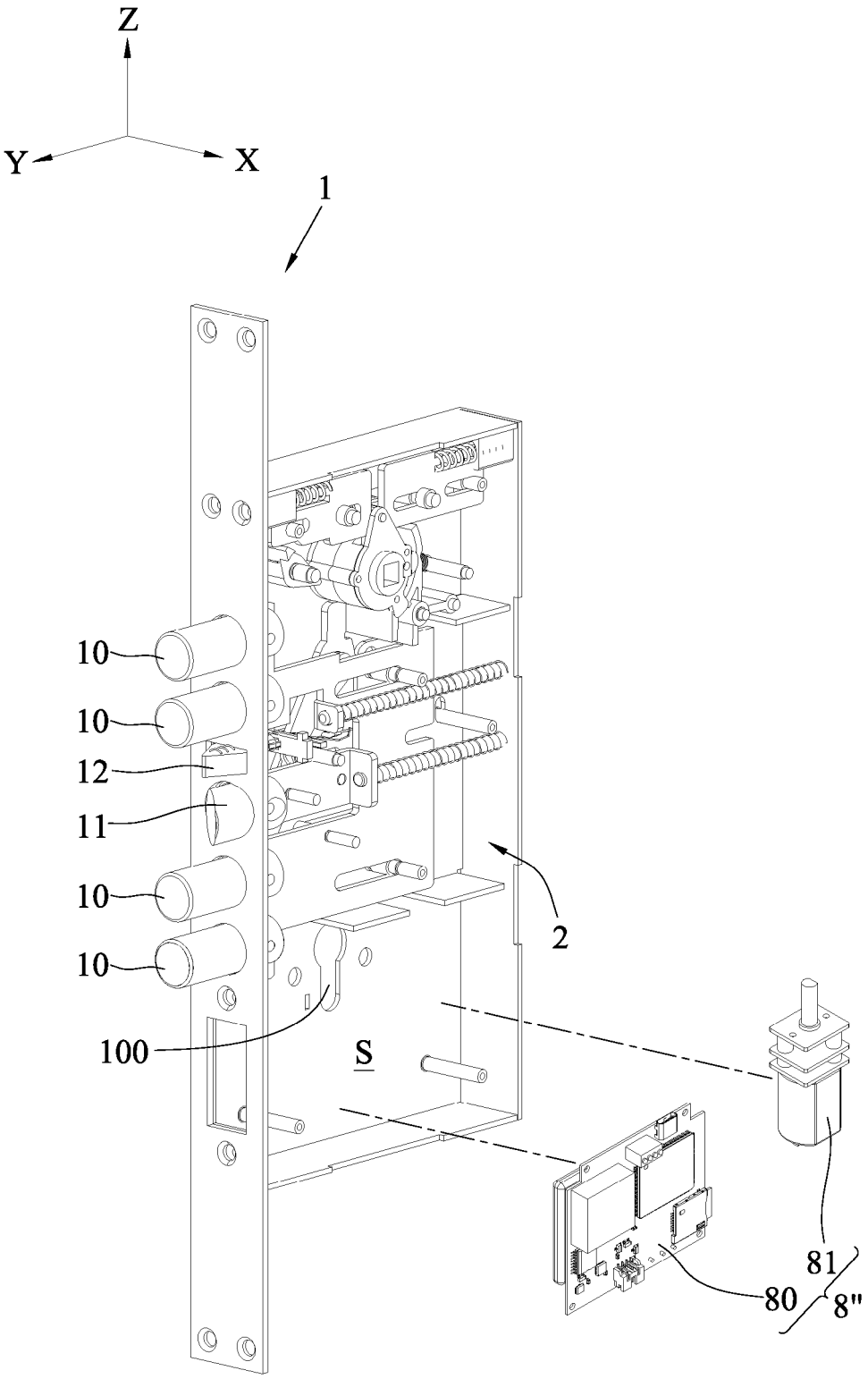

FIG. 8'

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EUROPEAN SEARCH REPORT

Application Number
EP 20 20 8073

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X A	US 10 526 816 B2 (TONG LUNG METAL IND CO LTD [TW]) 7 January 2020 (2020-01-07) * column 3, line 66 - column 9, line 40; figures 1-20 *	1-7 8-15	INV. E05B55/12 E05B59/00 E05B65/10
X	US 2008/184749 A1 (ALBER HELMUT [BZ] ET AL) 7 August 2008 (2008-08-07) * paragraph [0074] - paragraph [0152]; figures 1-31 *	1-15	
X A	EP 1 462 592 A2 (FULLEX LOCKS LTD [GB]) 29 September 2004 (2004-09-29) * paragraph [0017] - paragraph [0037]; figures 1-8 *	1-7 8-15	
X	EP 1 626 143 A1 (FULLEX LOCKS LTD [GB]) 15 February 2006 (2006-02-15) * paragraph [0021] - paragraph [0031]; figures 1-6A *	8-15	
			TECHNICAL FIELDS SEARCHED (IPC) E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 May 2021	Goddar, Claudia

CATEGORY OF CITED DOCUMENTS

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25-05-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 10526816 B2	07-01-2020	TW M521101 U	01-05-2016
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		GB 2400888 A	27-10-2004
EP 1626143 A1	15-02-2006	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82