



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
06.07.2022 Bulletin 2022/27

(21) Application number: **20217540.2**

(22) Date of filing: **29.12.2020**

(51) International Patent Classification (IPC):

E05B 15/10 ^(2006.01) **E05C 9/04** ^(2006.01)
E05B 65/10 ^(2006.01) **E05B 55/00** ^(2006.01)
E05B 55/12 ^(2006.01) **E05B 63/02** ^(2006.01)
E05C 1/00 ^(2006.01) **E05C 1/06** ^(2006.01)
E05B 59/00 ^(2006.01) **E05C 9/18** ^(2006.01)
E05B 63/00 ^(2006.01)

(52) Cooperative Patent Classification (CPC):

E05B 15/10; E05B 59/00; E05C 1/002; E05C 1/06;
E05C 9/041; E05C 9/042; E05C 9/1841;
E05B 63/0056

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

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(54) **DIVERTER ASSEMBLY FOR SECURITY LOCKS AND RELATED LOCK**

(57) Diverter assembly (100, 200, 200', 300) for locks (400, 500) and lock (400, 500) comprising said diverter assembly (100, 200, 200', 300), said diverter assembly comprising: a casing (11, 21, 31), at least one bolt (13, 14, 23, 24, 33, 34, 33', 34') comprising: a hollow cylinder (13, 23, 33, 33') configured to move from a first position wherein it is inside the casing (11, 21, 31) to a second position wherein it is at least partially outside the casing (11, 21, 31), and a pin (14, 24, 34, 34'); a slider (15, 25, 35) comprising a plate provided with at least one slot (16, 26, 36, 36') for each cylinder (13, 23, 33, 33'), in said slot (16, 26, 36, 36') being engaged the pin (14, 24, 34, 34') of the bolt (13, 23, 33, 33', 14, 24, 34, 34'), said slider (15, 25, 35) being configured to translate from a first position wherein the pin (14, 24, 34, 34') is positioned at a first end (16', 26', 136, 136') of the slot (16, 26, 36, 36') to a second position wherein the pin (14, 24, 34, 34') is positioned at a second end (16'', 26'', 236, 236'') of the slot (16, 26, 36, 36'); the lateral surface of the cylinder (13, 23, 33, 33') being provided with two longitudinal slits (18, 18') diametrically opposed one to the other and configured in such a way that the plate of the slider (15, 25, 35) can slide in their interior; and the pin (14, 24, 34, 34') being mounted inside the cylinder (13, 23, 33, 33') so as to be parallel to the base surfaces of the cylinder (13, 23, 33, 33'), the slits (18, 18') and the pin (14, 24, 34, 34') being positioned in such a way that, when the slider (15, 25, 35) is in its first position, the cylinder (13, 23, 33, 33') is in its first position and, when the slider (15, 25, 35) is

in its second position, the cylinder (13, 23, 33, 33') is in its second position.

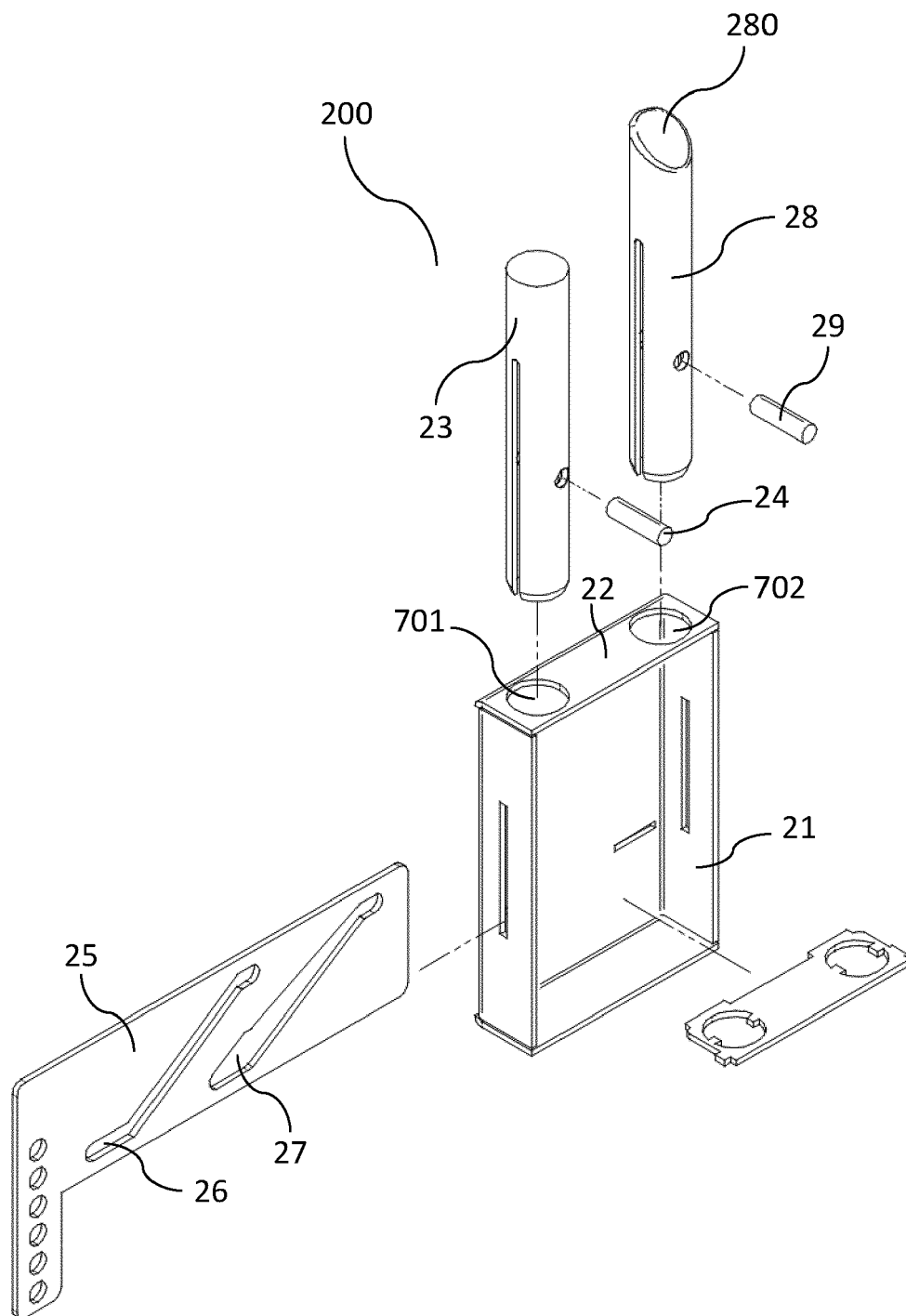


Fig.3

Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to a diverter assembly for security locks, such as those mounted on armoured doors, as well as to a security lock comprising such a diverter assembly. Here it is specified that the diverter assembly of the present invention can be fitted with both automatic closure safety locks and fully manual closure safety locks.

STATE OF THE ART

[0002] In the field of door and window frames, elements are known that are called diverter elements, or diverter assemblies, which integrate the basic structure of locks mounted on armoured doors, in order to increase their security level. To this end, the diverter assemblies comprise an additional bolt with respect to that of the lock itself, which, being mechanically connected to the lock by means of special rods, provides additional anchorage points to the door frame, in addition to those available with the lock alone. In particular, state-of-the-art diverter assemblies comprise a casing with front holes and pins mounted on it, a slider and a bolt. The bolt is usually made up of a plurality of metal cylinders and a plate provided with a slot, inside which a pin of the casing is hinged. The bolt plate is, in turn, provided with its own pin capable of co-operating with the slider, which consists of a metal plate provided with a slot enabling the slider to co-operate with the pin of the bolt. This slot consists of at least one oblique section in which the pin of the bolt plate can translate and a vertical section for the end of the stroke of the pin itself.

[0003] The diverter assemblies are, therefore, configured to pass from an opening configuration, in which the cylinders of the bolt are inside the casing, to a locking configuration, in which the cylinders are at least partially protruded through the holes of the casing, and vice versa. The transition from the opening configuration to the locking configuration, and vice versa, takes place thanks to the vertical translation of the slider, which is, in turn, controlled by the movement of handle pawls or toothed cams forming part of a so-called handle body, which constitutes the lock proper, and, as mentioned above, is connected by rods to the slider of the diverter assembly/assemblies. The handle body is, in turn, equipped with a slider which can be made to translate by the action of a handle and/or a key or, in the case of automatic locks, by the action of a pressure switch latch. The translatory movement of the slider of the handle body is then transmitted by the rods to the slider(s) of the deviator(s) itself/themselves. The downward translation of the slider of the diverter causes the pin of the bolt that co-operates with the slot of the slider to translate horizontally causing the horizontal translation of the plate of the bolt towards the outside of the casing and, therefore, the exiting of said cylinders

from the casing, with the consequent passage of the diverter assembly from the opening configuration to the locking configuration. On the contrary, the upward translation of the slider causes the pin of the bolt that co-operates with the slot of the slider to translate horizontally, causing the horizontal translation of the plate of the bolt towards the inside of the casing and, therefore, the re-entry of said cylinders in the casing, with the consequent passage of the diverter assembly from the locking configuration to the opening configuration. The opening/closing mechanism of the diverters is based, therefore, on the transfer of the movement of the slider to the plate of the bolt and, therefore, to the cylinders of the latter. The vertical, or axial, translatory movement of the slider is then transformed into a horizontal, or transverse, movement of the plate of the bolt and, therefore, of the cylinders of the same, thanks to the movement of the pin of the bolt plate in the slot of the slider. More particularly, the movement of the slider, which has only an axial component, is transformed into a movement of the pin of the bolt plate in the oblique part of the slot. The movement of said pin will therefore have two components: a vertical one and a horizontal one and as the pin moves into the oblique slot the vertical component gradually decreases, giving way to the horizontal one. The motion of the bolt pin is thus transmitted, however, not directly to the cylinders, but to the plate, which, in turn, transmits it to the cylinders. A torque is thus generated on the cylinders of the bolt. The torsional movement of the cylinders, if there is insufficient lubrication, makes it difficult to slide the cylinders in the holes in the casing and, therefore, the operations of opening and closure of the diverter, up to and including, due to friction, the seizing of the diverter in the case of complete absence of lubricating means. State-of-the-art diverter assemblies, configured as described above, therefore need to be lubricated at least annually, if not every six months. A second limitation of the state-of-the-art diverter assemblies consists in the possibility of forcing opening thereof by bending of the pin of the bolt plate. Through this bending the plate itself and consequently the cylinders can be translated horizontally. Finally, a further potentially disadvantageous feature of state-of-the-art diverters is the need to weld the various components of the diverter itself and the consequent impossibility of selling and replacing the individual components.

OBJECTS AND SUMMARY OF THE INVENTION

[0004] The object of the present invention is, therefore, to provide a diverter assembly and relative lock, in which the friction between the components is limited, so as to reduce, if not eliminate, the frequency with which lubrication is necessary, compared to the frequency with state-of-the-art diverters.

[0005] This object is achieved by a diverter assembly, or by a lock comprising a diverter assembly, said diverter assembly, in turn, comprising:

- a casing comprising a front plate provided with at least one hole;
- at least one bolt comprising:
- a hollow cylinder configured to traverse the hole of the front plate passing from a first position in which it is inside the casing to a second position in which it is at least partially outside the casing, and vice versa; and
 - a pin;
 - a slider comprising a plate provided with at least one slot for each cylinder, said slot having the bolt pin engaged therein, said slider being configured to translate from a first position in which the pin is positioned at a first end of the slot to a second position in which the pin is positioned at a second end of the slot, and vice versa.

[0006] The lateral surface of the cylinder is provided with two longitudinal slits diametrically opposed one to the other and configured in such a way that the plate of the slider can slide in their interior. The pin is mounted inside the cylinder so as to be parallel to the base surfaces of the cylinder, the slits and the pin being positioned in such a way that, when the slider is in its first position, the cylinder is in its first position and when the slider is in its second position, the cylinder is in its second position.

[0007] Unlike diverter assemblies of the state of the art, wherein the bolt is formed by cylinders welded to a plate provided with a pin co-operating with the slider, the present invention provides a bolt formed only by one or more cylinders. Therefore, in the bolt of the diverter assembly of the present invention, no plate is present and the co-operation between the individual cylinder and the slider is operated by a pin which is mounted inside the cylinder and which moves in a slot of the slider which, in turn, translates in the slits of the cylinder. The transmission of motion from pin to cylinders takes place therefore directly, without any intermediate means. In this way, there is no generation of torque on the cylinders of the bolt and the cylinders can slide without any difficulty in the holes of the casing. In this way, all the problems of friction and seizing mentioned in the preceding paragraph relating to the state of the art are eliminated, and the need for lubrication is thus reduced, if not totally eliminated.

[0008] A second object of the present invention is, moreover, to provide a diverter assembly and relative lock that does not require welds during assembly, so as to allow an easy and cost-effective replacement of the individual components.

[0009] Unlike state-of-the-art diverter assemblies, which provide for welding of the cylinders to the plate, the diverter assembly of the present invention does not require any welding but can also be assembled by the end user. The components such as slider, cylinders and pins of the bolt can, in fact, be mounted only by inserting the slider into the slits of the cylinders, inserting the pin

into the holes provided in the cylinders and then screwing the pin through the slot of the slider. Without any welding, it is therefore possible to assemble the entire diverter assembly and, if necessary, replace a defective component without having to replace the entire assembly for this reason.

[0010] A third object of the present invention is to improve the safety of the diverters and, therefore, of the locks for state-of-the-art armoured doors by making the operations of breaking-in by malicious persons less easy.

[0011] As mentioned above, in state-of-the-art diverter assemblies, the bolt plate constitutes the weak point of the assembly, in that by bending the pin of said plate, it is possible to force the translation of the slider and, consequently, the opening of the bolt. In the diverter assembly and, therefore, in the lock of the present invention, the absence of the plate determines the elimination of this weak point, which is usually used by malicious persons to force the opening of the lock.

[0012] These and further features of the present invention will be made clearer by the reading of the following detailed description, relating to some preferred embodiments of the present invention, to be considered by way of a non-limiting example of the more general concepts claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The following description refers to the accompanying drawings, in which:

- Figure 1 is a front view of a state-of-the-art diverter assembly;
- Figure 2 is a blown-up view of a first embodiment of the diverter assembly of the present invention without a cover plate;
- Figure 3 is a blown-up view of a second embodiment of the diverter assembly of the present invention without a cover plate;
- Figure 4a is a perspective view of a detail of the first embodiment of the diverter assembly of the present invention constituted by the cylinder of the bolt;
- Figure 4b is a perspective view of a detail of the second embodiment of the diverter assembly of the present invention constituted by the cylinder of the latch;
- Figure 5a is a front view of a first embodiment of the diverter assembly of the present invention without a cover plate, in its first configuration, or opening configuration;
- Figure 5b is a front view of a first embodiment of the diverter assembly of the present invention without a cover plate, in its second configuration, or locking configuration;
- Figure 6a is a front view of a second embodiment of the diverter assembly of the present invention without a cover plate, in its first configuration, or opening configuration;

- Figure 6b is a front view of a second embodiment of the diverter assembly of the present invention without a cover plate, in its second configuration, or locking configuration;
- Figure 6c is a front view of a second embodiment of the diverter assembly of the present invention without a cover plate, in its third configuration, or locking configuration;
- Figure 7 is a front view of a third embodiment of the diverter assembly of the present invention without a cover plate, in its first configuration, or opening configuration;
- Figure 8 is a front view of a third embodiment of the diverter assembly of the present invention without a cover plate, in its second configuration, or locking configuration;
- Figure 9 is a front view of a third embodiment of the diverter assembly of the present invention without a cover plate, in its third configuration, or locking configuration;
- Figure 10 is a front view of a first embodiment of a lock comprising the third embodiment of the diverter assembly of the present invention without a cover plate, said lock being in its closure configuration;
- Figure 11 is a front view of a first embodiment of a lock comprising the third embodiment of the diverter assembly of the present invention without a cover plate, said lock being in the locking configuration;
- Figure 12 is a front view of a first embodiment of a lock comprising the third embodiment of the diverter assembly of the present invention without a cover plate during opening by means of a key;
- Figure 13 is a front view of a first embodiment of a lock comprising the third embodiment of the diverter assembly of the present invention without a cover plate during opening by means of a handle;
- Figure 14 is a front view of a second embodiment of a lock comprising the second embodiment of the diverter assembly of the present invention without a cover plate, said lock being in its closure configuration;
- Figure 15 is a front view of a second embodiment of a lock comprising the second embodiment of the diverter assembly of the present invention without a cover plate, said lock being in its locking configuration;
- Figure 16 is a front view of a second embodiment of a lock comprising the second embodiment of the diverter assembly of the present invention without a cover plate during opening by means of a key;
- Figure 17 is a front view of a second embodiment of a lock comprising the second embodiment of the diverter assembly of the present invention without a cover plate during opening by means of a handle; and
- Figures 18a and 18b are two front views of the second embodiment of a lock that show different possibilities of mounting of the same and, in particular,

the different relative positions in which the diverter assemblies can be mounted with respect to the handle body of the lock.

- 5 **[0014]** In Figures 7 to 13, the dotted lines indicate that the casing and the slider of the diverter assembly may have a variable length and that the slider may also have additional slots in order to co-operate with additional latches and bolts, in addition to those mentioned in the description here below, there being no maximum limit to the number of the latter.

DETAILED DESCRIPTION OF THE INVENTION

- 15 **[0015]** Referring to Figure 1, a diverter assembly (600) of the state of the art comprises a casing (602) with front holes, not shown in the drawing, and pins (603, 603') mounted thereon, a slider (606) and a bolt (601, 601', 604, 607). The bolt (601, 601', 604, 607) is made up of a plurality of metal cylinders (601, 601') and a plate (607) provided with a slot (608), inside of which a pin (603) of the casing (602) is pivoted. The plate (607) of the bolt (601, 601', 604, 607) is then, in turn, provided with its own pin (604) able to co-operate with the slider (606). The latter is nothing more than a metal plate provided with a slot (605), inside of which the pin (604) of the bolt (601, 601', 604, 607) can translate. A diverter assembly (600) of the state of the art is configured to change from an opening configuration, wherein the cylinders (601, 601') of the bolt (601, 601', 604, 607) are inside the casing (602) to a locking configuration, wherein the cylinders (601, 601') are at least partially protruded through the holes of the casing (602) and vice versa. More particularly, the transition from the opening configuration to the locking configuration takes place due to the downward translation of the slider (606), which causes the translation of the pin (604) of the bolt (601, 601', 604, 607) in the slot (605) of the slider (606). The movement of the pin (604) of the bolt (601, 601', 604, 607) determines, in turn, the horizontal translation of the plate (607) of the bolt (601, 601', 604, 607) towards the exterior of the casing (602) and, therefore, the exiting of the cylinders (601, 601') from the front plate (609) of the casing (602) itself. The passage from the locking configuration to the opening configuration takes place in reverse, as a consequence of the upward translation of the slider (606), which causes the pin (604) of the bolt (601, 601', 604, 607) to translate in the slot (605), causing the horizontal translation of the plate (607) of the bolt (601, 601', 604, 607) towards the interior of the casing (602) and, therefore, the return of the cylinders (601, 601') into the casing (602) itself.

- 45 **[0016]** Referring to Figures 2, 4a, 5a and 5b, a first embodiment of the diverter assembly (100) of the present invention comprises:

- a casing (11) comprising a front plate (12) provided with a hole (700);

- a bolt (13,14) comprising:
 - a hollow cylinder (13) configured to traverse the hole (700) of the front plate (12) by moving from a first position in which it is inside the casing (11) to a second position in which it is at least partially outside the casing (11), and vice versa; and
 - a pin (14);
- a slider (15) comprising a plate provided with a slot (16) in which the pin (14) of the bolt (13,14) is engaged, said slider (15) being configured to translate from a first position in which the pin (14,) is positioned at a first end (16') of the slot (16) to a second position in which the pin (14) is positioned at a second end (16'') of the slot (16), and vice versa.

[0017] The lateral surface of the cylinder (13) is provided with two longitudinal slits (18,18') diametrically opposed one to the other and configured in such a way that the plate of the slider (15) can slide inside them. For the purposes of this description, the term "longitudinal" is intended to refer to a direction parallel to the axis of the cylinder (13) of the bolt (13,14).

[0018] The pin (14) is mounted inside the cylinder (13) so as to be parallel to the base surfaces of the cylinder (13), the slits (18, 18') and the pin (14) being positioned in such a way that, when the slider (15) is in its first position, the cylinder (13) is in its first position and, when the slider (15) is in its second position, the cylinder (13) is in its second position.

[0019] On the basis of what is described above and from the terminology introduced so far, the functioning of the first embodiment of the diverter assembly (100) of the present invention is described here below. The diverter assembly (100), in its first embodiment, is configured to change from an opening configuration, wherein the cylinder (13) of the bolt (13, 14) is inside the casing (11), to a locking configuration, wherein the cylinder (13) is at least partially protruded through the holes of the casing (11) and vice versa. The transition from the opening configuration to the locking configuration takes place as a result of the translation of the slider (15) from its first position to its second position. When the slider (15) translates downwards through the two longitudinal slits (18, 18') of the lateral surface of the cylinder (13), the movement of said slider (15) causes the translation of the pin (14) of the bolt (13,14) in the slot (16) of the slider (15), said pin (14) moving from the first end (16') to the second end (16'') of said slot (16).

[0020] The movement of the pin (14) of the bolt (13, 14) determines, in turn, the horizontal translation of the cylinder (13) of the bolt (13,14) towards the exterior of the casing (11) and, therefore, its exiting, at least partially, from the hole (700) of the casing (11) itself. The passage from the locking configuration to the opening configuration takes place in reverse, as a consequence of the upward translation of the slider (15) from its second position

to its first position. When the slider (15), translates upwards through the two longitudinal slits (18, 18') of the lateral surface of the cylinder (13), the movement of said slider (15) causes the translation of the pin (14) of the bolt (13,14) into the slot (16) of the slider (15), said pin (14) moving from the second end (16'') to the first end (16') of said slot (16). The movement of the pin (14) of the bolt (13, 14) determines, in turn, the horizontal translation of the cylinder (13) of the bolt (13,14) towards the interior of the casing (11) and, therefore, its re-entry into the casing (11) itself.

[0021] Referring to Figures 3, 4b, 6a, 6b and 6c, a second embodiment of the diverter assembly (200) of the present invention comprises:

- a casing (21) comprising a front plate (22) provided with two holes (701, 702);
- a bolt (23, 24) comprising:
 - a hollow cylinder (23) configured to traverse a first hole (701) of the front plate (22) by moving from a first position in which it is inside the casing (21) to a second position in which it is at least partially outside the casing (21), and vice versa; and
 - a pin (24);
- a latch (28, 280, 29) comprising:
 - a solid body (28, 280) formed by a chamfered head (280) and a cylinder (28), said solid body (28) being configured to:
 - traverse a second hole (702) of the front plate (22) moving from a first position in which the head (280) is inside the casing (21) to a second position in which the head (280) is outside the casing (21) and the cylinder (28) of the solid body (28, 280) is inside the casing (21), and vice versa; and
 - traverse the second hole (702) of the front plate (22) moving from the second position to a third position in which the cylinder (28) of the latch (28, 280, 29) is at least partially outside the casing (21), and vice versa; and
 - a pin (29) mounted inside the cylinder (28) of the solid body (28, 280), so as to be parallel to the base surfaces of the cylinder (28) of the solid body (28, 280), said cylinder (28) of the solid body (28, 280) being hollow.

[0022] The second embodiment of the diverter assembly further comprises also a slider (25), in turn comprising: a plate provided with a first slot (26) in which the pin (24) of the bolt (23, 24) is engaged. The slider (25) is configured to translate from a first position in which the pin (24) of the bolt (23, 24) is positioned at a first end (26') of the

first slot (26), to a second position in which the pin (24) of the bolt (23, 24) is positioned at a second end (26'') of the first slot (26).

[0023] The lateral surface of the cylinder (23) of the bolt (23, 24) is provided with two longitudinal slits diametrically opposed one to the other and configured in such a way that the plate of the slider (25) can slide in their interior.

[0024] The pin (24) of the bolt (23, 24) is mounted inside the cylinder (23) of the bolt (23, 24), so as to be parallel to the base surfaces of the cylinder (23) of the bolt (23, 24), the slits and the pin (24) of the bolt (23, 24) being positioned in such a way that, when the slider (25) is in its first position, the cylinder (23) of the bolt (23, 24) is in its first position and, when the slider (25) is in its second position, the cylinder (23) of the bolt (23, 24) is in its second position.

[0025] The lateral surface of the cylinder (28) of the solid body (28, 280) of the latch (28, 280, 29) is also provided with two longitudinal slits (118, 118') diametrically opposed one to the other and configured in such a way that, in their interior, the plate of the slider (25) can slide. The latter is, in fact, provided with a second slot (27) in which the pin (29) of the latch (28, 280, 29) is engaged. The second slot (27) is configured in such a way that, when the slider (25) is in its first position, the pin (29) of the latch (28, 280, 29) is positioned at a first end (27') of the second slot (27) and, when the slider (25) is in its second position, the pin (29) of the latch (28, 280, 29) is positioned at a second end (27'') of the second slot (27). The slider (25) is further configured to translate from its first position to a third position in which the pin (29) of the latch (28, 280, 29) is positioned at a recess (27''') of the second slot (27), said recess (27''') being placed between the first end (27') and the second end (27'') of the second slot (27), and wherein the pin (24) of the bolt (23, 24) is positioned at an intermediate position (26''') of the first slot (26), placed between the first end (26') and the second end (26'') of the first slot (26).

[0026] The slider (25) is, then, configured to translate from its second position to its third position, and vice versa.

[0027] The slits (118, 118') of the cylinder (28) of the solid body (28, 280) of the latch (28, 280, 29) and the pin (29) of the latch (28, 280, 29) are positioned in such a way that:

- the solid body (28, 280) of the latch (28, 280, 29) is in its first position, when the slider (25) is in its first position;
- the solid body (28, 280) of the latch (28, 280, 29) is in its third position, when the slider (25) is in its second position; and
- the solid body (28, 280) of the latch (28, 280, 29) is in its second position, when the slider (25) is in its third position.

[0028] In addition, the slits and the pin (24) of the bolt

(23, 24) are positioned in such a way that, when the slider (25) is in its third position, the cylinder (23) of the bolt (23, 24) is in its first position.

[0029] On the basis of what is described above and from the terminology introduced so far, the functioning of the second embodiment of the diverter assembly (200) of the present invention is described here below.

[0030] When the second embodiment of the diverter assembly (200) of the present invention is in its rest configuration, or closure configuration, the cylinder (23) of the bolt (23, 24) is inside the casing (21), the head (280) of the solid body (28, 280) of the latch (28, 280, 29) is outside the casing (21), the cylinder (28) of the solid body (28, 280) of the latch (28, 280) is inside the casing (21), and the slider (25) is in its third position with the pin (29) of the latch (28, 280, 29) positioned at the recess (27''') of the second slot (27) and with the pin (24) of the bolt (23, 24) positioned at the intermediate position (26''') of the first slot (26).

[0031] When, on the other hand, the diverter assembly (200) is in the opening configuration, both the cylinder (23) of the bolt (23, 24) and the chamfered head (280) of the solid body (28, 280) of the latch (28, 280, 29) are inside the casing (21) and the slider (25) is in its first position, with the pin (24) of the bolt (23, 24) positioned at the first end (26') of the first slot (26) and with the pin (29) of the latch (28, 280, 29) positioned at the first end (27') of the second slot (27).

[0032] When the door on which the diverter assembly (200) is mounted, in resting or closure configuration, is brought close to the jamb, the latch (28) on contact with said jamb is pushed inside the casing (21) and the diverter assembly passes to its opening configuration, to then return to its resting or closure configuration, when the door is aligned with the jamb, according to the mechanism known from common slide latches. In the latter situation, the head (280) of the solid body (28, 280) of the latch (28, 280, 29) will be outside the casing (21), so as to enter the special housing, which is normally provided for accommodating the latch (28, 280, 29) in the common strike plates, or counter plates, mounted on the jambs.

[0033] More specifically, when the door is brought close to the jamb, the head (280) of the solid body (28, 280) of the latch (28, 280, 29) receives a push from the jamb itself and the retraction of said head (280) in the casing (21) causes the translation of the pin (29) of the latch (28, 280, 29), in the second slot (27) of the slider (25), as far as the first end (27'). The translation of the pin (29) of the latch (28, 280, 29), in turn, causes the upward translation of the slider (25) and its consequent transition from its third position to its first position. Once the head (280) of the latch (28, 280, 29) has passed the edge of the jamb, it enters the special housing provided in the counter plate and, by means of a spring connecting the cylinder (28) of the latch (28, 280, 29) with the bottom of the casing (21), the head (280) of the latch (28, 280, 29) exits again from the casing (21) and the latch (28,

280, 29) returns to its second position, with the head (280) outside the casing (21) and the cylinder (28, 280, 29) inside the latter (21). The pin (29) of the latch (28, 280, 29) then moves into the recess (27'') of the second slot (27), and, consequently, the slider (25) moves downwards again, returning to its third position.

[0034] The passage of the diverter assembly from its closure configuration to its locking configuration, as well as the passage from the locking configuration to the opening configuration, takes place, instead, thanks to the action of a key and of relative mechanisms.

[0035] Similarly, the passage from the closure configuration to the opening configuration can also take place thanks to the action of a handle pawl and relative mechanisms.

[0036] Finally, the passage from the closure configuration to the locking configuration can also take place automatically, following the interaction with the door jamb, thanks to the presence of a pressure switch latch, such as the one described in patent application IT02016000103226.

[0037] The handle pawl, the mechanisms for opening/closing by means of a key, as well as the pressure switch latch can be included in a casing external to the diverter assembly so as to form a so-called handle unit external to the diverter assembly itself and connected to the same by means of appropriate rods, the diverter assembly, the handle unit and the rods forming a lock, as will be explained in more detail here below.

[0038] Referring to Figures 7, 8 and 9, a third embodiment of the diverter assembly (300) of the present invention comprises:

- a casing (31) comprising a front plate (32) provided with five holes;
- a first latch (38, 380, 39) comprising:
 - a solid body (38, 380) formed by a chamfered head (380) and a cylinder (38), said solid body (38) being configured to:
 - traverse a first hole of the front plate (32), moving from a first position in which the head (380) is inside the casing (31) to a second position in which the head (380) is outside the casing (31) and the cylinder (38) of the solid body (38, 380) is inside the casing (31), and vice versa; and
 - traverse the first hole of the front plate (32), moving from the second position to a third position in which the cylinder (38) of the first latch (38, 380, 39) is at least partially outside the casing (31), and vice versa; and
 - a pin (39) mounted inside the cylinder (38) of the solid body (38, 380), so as to be parallel to the base surfaces of the cylinder (38) of the solid body (38, 380), said cylinder (38) of the solid

body (38, 380) being hollow;

- a first bolt (33, 34) comprising:
 - a hollow cylinder (33) configured to traverse a second hole of the front plate (32), moving from a first position in which it is inside the casing (31) to a second position in which it is at least partially outside the casing (31), and vice versa; and
 - a pin (34);
- a second latch (38', 380', 39') comprising:
 - a solid body (38', 380') formed by a chamfered head (380') and by a cylinder (38'), said solid body (38') being configured to:
 - traverse a third hole of the front plate (32), moving from a first position in which the head (380') is inside the casing (31) to a second position in which the head (380') is outside the casing (31) and the cylinder (38') of the solid body (38', 380') is inside the casing (31), and vice versa; and
 - traverse the third hole of the front plate (32), moving from the second position to a third position in which the cylinder (38') of the first latch (38', 380', 39') is at least partially outside the casing (31), and vice versa; and
 - a pin (39') mounted inside the cylinder (38') of the solid body (38', 380'), so as to be parallel to the base surfaces of the cylinder (38') of the solid body (38', 380'), said cylinder (38') of the solid body (38', 380') being hollow;
- a second bolt (33', 34') comprising:
 - a hollow cylinder (33) configured to traverse a fourth hole of the front plate (32), moving from a first position in which it is inside the casing (31) to a second position in which it is at least partially outside the body (31), and vice versa; and
 - a pin (34');
- a third latch (38'', 380'', 39'') comprising:
 - a solid body (38'', 380'') formed by a chamfered head (380'') and by a cylinder (38''), said solid body (38'') being configured to:
 - traverse a fifth hole of the front plate (32), moving from a first position in which the head (380'') is inside the casing (31) to a second position in which the head (380'') is outside the casing (31) and the cylinder (38'') of the solid body (38'', 380'') is inside

- the casing (31), and vice versa; and
- traverse the fifth hole of the front plate (32), moving from the second position to a third position in which the cylinder (38") of the first latch (38", 380", 39") is at least partially outside the casing (31), and vice versa; and
 - a pin (39") mounted inside the cylinder (38") of the solid body (38", 380"), so as to be parallel to the base surfaces of the cylinder (38") of the solid body (38", 380"), said cylinder (38") of the solid body (38", 380") being hollow.

[0039] The third embodiment of the diverter assembly further comprises a slider (35), in turn comprising: a plate provided with a first slot (36) in which the pin (34) of the first bolt (33, 34) is engaged, and a second slot (36') in which the pin (34') of the second bolt (33', 34') is engaged. The slider (35) is configured to translate from a first position in which the pin (34) of the first bolt (33, 34) is positioned at a first end (136) of the first slot (36) and the pin (34') of the second bolt (33, 34) is positioned at a first end (136') of the second slot (36'), to a second position in which the pin (34) of the first bolt (33, 34) is positioned at a second end (236) of the first slot (36) and the pin (34') of the second bolt (33', 34') is positioned at a second end (236') of the second slot (36').

[0040] The lateral surface of the cylinder (33) of the first bolt (33, 34), as well as the lateral surface of the cylinder (33') of the second bolt (33', 34'), are each provided with two longitudinal slits, diametrically opposed one to the other and configured in such a way that the plate of the slider (35) can slide in their interior.

[0041] The pin (34) of the first bolt (33, 34) and the pin (34') of the second bolt (33', 34') are mounted inside the cylinder (33) of the first bolt (33, 34) and the cylinder (33') of the second bolt (33', 34'), respectively, so as to be parallel to the base surfaces of the cylinder (33) of the first bolt (33, 34) and of the cylinder (33') of the second bolt (33', 34').

[0042] The slits and the pin (34) of the first bolt (33, 34) and the slits and the pin (34') of the second bolt (33', 34') are positioned in such a way that, when the slider (35) is in its first position, the cylinder (33) of the first bolt (33, 34) and the cylinder (34') of the second bolt (33', 34') are in their first position and, when the slider (35) is in its second position, the cylinder (33) of the first bolt (33, 34) and the cylinder (33') of the second bolt (33', 34') are in their second position.

[0043] The lateral surface of the cylinder (38) of the solid body (38, 380) of the first latch (38, 380, 39), as well as the lateral surface of the cylinder (38') of the solid body (38', 380') of the second latch (38', 380', 39') and the lateral surface of the cylinder (38") of the solid body (38", 380") of the third latch (38", 380", 39"), are each provided with two longitudinal slits diametrically opposed one to the other and configured in such a way that, in their interior, the plate of the slider (35) can slide. The latter is,

in fact, provided with a third slot (37) in which the pin (39) of the first latch (38, 380, 39) is engaged, with a fourth slot (37') in which the pin (39') of the second latch (38', 380', 39') is engaged and with a fifth slot (37") in which the pin (39") of the third latch (38", 380", 39") is engaged. The third slot (37), the fourth slot (37') and the fifth slot (37") are configured in such a way that, when the slider (35) is in its first position, the pin (39) of the first latch (38, 380, 39) is positioned at a first end (137) of the third slot (37), the pin (39') of the second latch (38', 380', 39') is positioned at a first end (137') of the fourth slot (37') and, the pin (39") of the third latch (38", 380", 39") is positioned at a first end (137") of the fifth slot (37"). When the slider (35) is instead in its second position, the pin (39) of the first latch (38, 380, 39) is positioned at a second end (237) of the third slot (37), the pin (39') of the second latch (38', 380', 39') is positioned at a second end (237') of the fourth slot (37') and the pin (39") of the third latch (38", 380", 39") is positioned at a second end (237") of the fifth slot (37"). The slider (35) is further configured to translate from its first position to a third position, and vice versa. When the slider (35) is in said third position, the pin (39) of the first latch (38, 380, 39) is positioned at a recess (337) of the third slot (37), said recess (337) being placed between the first end (137) and the second end (237) of the second slot (37), the pin (39') of the second latch (38', 380', 39') is positioned at a recess (337') of the fourth slot (37'), said recess (337') being placed between the first end (137') and the second end (237') of the fourth slot (37'), the pin (39") of the third latch (38", 380", 39") is positioned at a recess (337") of the fifth slot (37"), said recess (337") being placed between the first end (137") and the second end (237") of the fifth slot (37"), the pin (34) of the first bolt (33, 34) is positioned at an intermediate position between the first end (136) and the second end (236) of the first slot (36), and the pin (34') of the second bolt (33', 34') is positioned in an intermediate position between the first end (136') and the second end (236') of the second slot (36'). The slider (35) is, then, configured to translate from its second position to its third position, and vice versa.

[0044] The slits of the cylinder (38) of the solid body (38, 380) of the first latch (38, 380, 39) and the pin (39) of the first latch (38, 380, 39) are positioned in such a way that:

- the solid body (38, 380) of the first latch (38, 380, 39) is in its first position, when the slider (35) is in its first position;
- the solid body (38, 380) of the first latch (38, 380, 39) is in its third position, when the slider (35) is in its second position; and
- the solid body (38, 380) of the first latch (38, 380, 39) is in its second position, when the slider (35) is in its third position.

[0045] The slits of the cylinder (38') of the solid body (38', 380') of the second latch (38', 380', 39') and the pin

(39') of the second latch (38', 380', 39') are positioned in such a way that:

- the solid body (38', 380') of the second latch (38', 380', 39') is in its first position, when the slider (35) is in its first position;
- the solid body (38', 380') of the second latch (38', 380', 39') is in its third position, when the slider (35) is in its second position; and
- the solid body (38', 380') of the second latch (38', 380', 39') is in its second position, when the slider (35) is in its third position.

[0046] The slits of the cylinder (38") of the solid body (38", 380") of the third latch (38", 380", 39") and the pin (39") of the third latch (38", 380", 39") are positioned in such a way that:

- the solid body (38", 380") of the third latch (38", 380", 39") is in its first position, when the slider (35) is in its first position;
- the solid body (38", 380") of the third latch (38", 380", 39") is in its third position, when the slider (35) is in its second position; and
- the solid body (38", 380") of the third latch (38", 380", 39") is in its second position, when the slider (35) is in its third position.

[0047] Furthermore, the slits and pin (34) of the first bolt (33, 34) as well as the slits and pin (34') of the second bolt (33', 34') are positioned in such a way that, when the slider (35) is in its third position, the cylinder (33) of the first bolt (33, 34) and the cylinder (33') of the second bolt (33', 34') are in their first position.

[0048] On the basis of what is described above and from the terminology introduced so far, the functioning of the third embodiment of the diverter assembly (300) of the present invention is described below.

[0049] When the third embodiment of the diverter assembly (300) of the present invention is in its rest configuration, or closure configuration, shown in Figure 9, the cylinder (33) of the first bolt (33, 34) and the cylinder (33') of the second bolt (33', 34') are inside the casing (31), the head (380) of the solid body (38, 380) of the first latch (38, 380, 39), the head (380') of the solid body (38', 380') of the second latch (38', 380', 39') and the head (380") of the solid body (38", 380") of the third latch (38", 380", 39') are outside the casing (31), the cylinder (38) of the solid body (38, 380) of the first latch (38, 380) the cylinder (38') of the solid body (38', 380') of the second latch (38', 380', 39') and the cylinder (38") of the solid body (38", 380") of the third latch (38", 380", 39') are inside the casing (31). In this situation, the slider (35) is in its third position with the pin (39) of the first latch (38, 380, 39) positioned at the recess (337) of the third slot (37), the pin (39') of the second latch (38', 380', 39') positioned at the recess (337') of the fourth slot (37'), the pin (39") of the third latch (38", 380", 39') positioned at

the recess (337") of the fifth slot (37"), the pin (33) of the first bolt (33, 34) positioned at the intermediate position of the first slot (36) and, finally, the pin (33') of the second bolt (33', 34') positioned at the intermediate position of the second slot (36').

[0050] When, on the other hand, the diverter assembly (300) is in the opening configuration, shown in Figure 7, both the cylinder (33) of the first bolt (33, 34) and the cylinder (33') of the second bolt (33', 34') are inside the casing (31). Furthermore, the chamfered head (380) of the solid body (38, 380) of the first latch (38, 380, 39) as well as the chamfered head (380') of the solid body (38', 380') of the second latch (38', 380', 39') and the chamfered head (380") of the solid body (38", 380") of the third latch (38", 380", 39') are also inside the casing (31). In this situation, the slider (35) is in its first position, with the pin (34) of the first bolt (33, 34) and the pin (34') of the second bolt (33', 34') positioned at the first end (136) of the first slot (36), and the first end (136') of the second slot (36'), respectively; the pin (39) of the first latch (38, 380, 39), the pin (39') of the second latch (38', 380', 39') and the pin (39") of the third latch (38", 380", 39'), positioned at the first end (137) of the third slot (37), the first end (137') of the fourth slot (37') and the first end (137") of the fifth slot (37"), respectively.

[0051] When the door on which the diverter assembly (300) is mounted, in rest or closure configuration, is brought close to the jamb, the latches (38, 380, 39, 38', 380', 39', 38", 380", 39"), on contact with said jamb, are pushed inside the casing (31) and the diverter assembly passes to its opening configuration, and then returns to its rest, or closure, configuration, when the door is aligned with the jamb. In the latter situation, the head (380) of the first latch (38, 380, 39), as well as the head (380') of the second latch (38', 380', 39') and the head (380") of the third latch (38", 380", 39') will be outside the casing (31), so as to enter the special housing, which is normally provided for accommodating the latch (38, 380, 39, 38', 380', 39', 38", 380", 39") in the common striker plates or counter plates mounted on the jambs.

[0052] More particularly, when the door is brought close to the jamb, the head (380) of the solid body (38, 380) of the latch (38, 380, 39), as well as the head (380') of the second latch (38', 380', 39') and the head (380") of the third latch (38", 380", 39') receive a push from the jamb itself and the retraction of the heads (380, 380', 380") in the casing (31) causes the translation of the pins (39, 39', 39") of the latches (38, 380, 39, 38', 380', 39', 38", 380", 39") into the third (37), fourth (37') and fifth slots (37"), respectively, said pins (39, 39', 39") of the latches (38, 380, 39, 38', 380', 39', 38", 380", 39") translating from the recesses (337, 337', 337") to the first ends (137, 137', 137"). The translation of the pins (39, 39', 39") of the latches (38, 380, 39, 38', 380', 39', 38", 380", 39"), in turn, causes the translation of the slider (35) upwards and its consequent passage from its third position to its first position. Once the head (380) of the first latch (38, 380, 39), the head (380') of the second latch (38', 380', 39'),

380', 39') and the head (380") of the third latch (38", 380", 39") have passed the edge of the jamb, they enter the special housings provided in the counter plate and, thanks to the action of springs that connect the cylinders (38, 38', 38") of the latches (38, 380, 39, 38', 380', 39', 38", 380", 39") with the bottom of the casing (31), the head (380) of the latch (38, 380, 39), the head (380') of the second latch (38', 380', 39') and the head (38") of the third latch (38", 380", 39") again emerge from the casing (31) and the latches (38, 380, 39, 38', 380', 39, 38", 380", 39") return to their second position, with the heads (380, 380', 380") outside the casing (31) and the cylinders (38, 38', 38") inside the latter (31). The pins (39, 39', 39") of the first (38, 380, 39), second (38', 380', 39') and third latch (38", 380", 39") move, therefore, again into the recesses (337, 337', 337") of the third (37), fourth (37') and fifth (37") slots and, consequently, the slider (35) moves downwards again returning to its third position. As stated above, with respect to the second embodiment of the diverter assembly of the present invention, also with the third embodiment the passage of the diverter assembly from its closure configuration to its locking configuration, shown in Figure 8, as well as the passage from the locking configuration to the opening configuration takes place, instead, thanks to the action of a key and of relative mechanisms. Similarly, the passage from the closure configuration to the opening configuration can also take place thanks to the action of a handle pawl and relative mechanisms. Finally, the passage from the closure to the locking configuration can also take place automatically following the interaction with the door jamb thanks to the presence of a pressure switch latch.

[0053] The handle pawl, the mechanisms for opening/closing by means of a key, as well as the pressure switch latch can be mounted inside the same casing in which the slide, the latches and the bolts of the diverter assembly are placed so as to form a single lock. Referring to Figures 7, 8, 9, 10, 11, 12, and 13, a first embodiment of a lock (400) according to the present invention comprises:

- a diverter assembly (300) according to its third embodiment described above;
- a cylinder for key provided with a first toothed cam (404);
- a toothed element (403) housed in the casing (31) of the diverter assembly (300); and
- a handle pawl (406) housed in the casing (31) of the diverter assembly.

[0054] The toothed element (403) is configured to co-operate with the toothed cam (404) of the cylinder for key, directly, or indirectly by means of a second toothed cam (405), said first toothed cam (404) being rotatable by means of a key. The toothed element (403) is, moreover, configured to co-operate with the slider (35) in such a way that: the slider (35) translates from its third position to its second position, when the toothed element (403)

rotates in an anticlockwise direction (with reference to the accompanying drawings); and the slider (35) translates from its second position to its third position, as well as from its third position to its first position, when the toothed element (403) rotates in a clockwise direction.

[0055] The handle pawl (406) is configured to co-operate with the slider (35) in such a way that the slider (35) translates from its third position to its first position, when the handle pawl (406) rotates in a clockwise direction.

[0056] On the basis of what is described above and from the terminology introduced so far, the functioning of the first embodiment (400) of the lock of the present invention is described here below.

[0057] When the first embodiment of the lock (400) of the present invention is in its rest configuration, or closure configuration, shown in Figure 10, the diverter assembly is also in its rest configuration, shown in Figure 9 and described above with respect to the third embodiment of the diverter assembly.

[0058] When, instead, the first embodiment of the lock (400) is in the opening configuration, shown in Figure 12, the diverter assembly (300) is in the opening configuration, shown in Figure 7 and described above with respect to the third embodiment of the diverter assembly.

[0059] When the door on which the first embodiment of the lock (400) is mounted, which is in the rest configuration (Figure 10), is brought close to the jamb, the diverter assembly (300) passes from its rest configuration (Figure 9) to the opening configuration (Figure 7) to then return to its rest configuration (Figure 9) once the contact has been made and with door closed, according to the mechanism described above in detail with respect to the third embodiment of the diverter assembly.

[0060] Once the door is closed, it is possible to open it by passing the lock (400) from the closure configuration to the opening configuration by means of the handle pawl (406), as shown in Figure 13. The latter can be moved either by means of a classic handle or electrically by a battery. In the first case, the handle pawl (406) comprises an opening for the housing of the handle and a tooth configured to co-operate with the slider (35) of the diverter assembly (300). By turning a handle (not shown in the drawings), in a clockwise direction (with respect to the accompanying drawings), the tooth of the pawl (406) also rotates in a clockwise direction. The rotation of the tooth of the pawl (406) causes the upward translation of the slider (35), which moves from its third position in which:

- the pins (39, 39', 39") of the latches (38, 380, 39, 38', 380', 39', 38", 380", 39") are positioned, respectively, at the recess (337) of the third slot (37), the recess (337') of the fourth slot (37'), and the recess (337") of the fifth slot (37"); and
- the pins (33, 33') of the bolts (33, 34, 33', 34') are positioned at the intermediate position of the first slot (36) and the intermediate position of the second slot (36'), respectively;

to its first position in which:

- the pins (39, 39', 39'') of the latches (38, 380, 39, 38', 380', 39', 38'', 380'', 39'') are positioned, respectively, at the first end (137) of the third slot (37), the first end (137') of the fourth slot (37') and the first end (137'') of the fifth slot (37''); and
- the pins (34, 34') of the bolts (33, 34, 33', 34') are positioned at the first end (136) of the first slot (36), and the first end (136') of the second slot (36'), respectively.

[0061] The passage of the slider (35) from its third to its first position determines the re-entry of the chamfered heads (380, 380', 380'') of the latches (38, 380, 39, 38', 380', 39', 38'', 380'', 39'') into the casing, therefore the opening of the lock (400) itself.

[0062] Once the door is closed, it is possible to open it by switching the lock (400) from the closure configuration to the opening configuration, not only by means of the handle pawl (406), but also by means of the use of a key and of the relative mechanisms that can be moved by the latter mentioned above, as shown in Figure 12.

[0063] By turning a key inside the key cylinder in a clockwise direction, the toothed cam (404) of the key cylinder is also rotated in a clockwise direction. The rotation of the toothed cam (404) of the key cylinder causes the rotation of the second toothed cam (405) in an anticlockwise direction, which in turn causes the rotation of the toothed element (403) in a clockwise direction. The latter is provided with a tooth which co-operates with the slider (35) and, when the toothed element rotates in a clockwise direction, this tooth pushes the slider (35) upwards, which moves from its third position in which:

- the pins (39, 39', 39'') of the latches (38, 380, 39, 38', 380', 39', 38'', 380'', 39'') are positioned, respectively, at the recess (337) of the third slot (37), the recess (337') of the fourth slot (37') and the recess (337'') of the fifth slot (37''); and
- the pins (33, 33') of the bolts (33, 34, 33', 34') are positioned at the intermediate position of the first slot (36) and the intermediate position of the second slot (36'), respectively;

to its first position in which:

- the pins (39, 39', 39'') of the latches (38, 380, 39, 38', 380', 39', 38'', 380'', 39'') are positioned, respectively, at the first end (137) of the third slot (37), the first end (137') of the fourth slot (37') and the first end (137'') of the fifth slot (37''); and
- the pins (34, 34') of the bolts (33, 34, 33', 34') are positioned at the first end (136) of the first slot (36), and the first end (136') of the second slot (36'), respectively.

[0064] The passage of the slider (35) from its third to

its first position determines the re-entry of the chamfered heads (380, 380', 380'') of the latches (38, 380, 39, 38', 380', 39', 38'', 380'', 39'') into the casing, therefore the opening of the lock (400) itself.

[0065] Thanks to the action of a key, it is also possible to lock the lock (400), making it go from the closure configuration, shown in Figure 10, to the locking configuration, shown in Figure 11.

[0066] By turning a key inside the key cylinder in an anticlockwise direction, the toothed cam (404) of the key cylinder is also turned anticlockwise. The rotation of the toothed cam (404) of the key cylinder causes the second toothed cam (405) to rotate in a clockwise direction, which in turn causes the rotation of the toothed element (403) anticlockwise. The latter is provided with a tooth which co-operates with the slider (35) and, when the toothed element (403) rotates in a clockwise direction, the slider (35), which was previously held in its third position by the tooth of the toothed element (403), moves downwards by gravity, thus passing from its third position in which:

- the pins (39, 39', 39'') of the latches (38, 380, 39, 38', 380', 39', 38'', 380'', 39'') are positioned, respectively, at the recess (337) of the third slot (37), the recess (337') of the fourth slot (37') and the recess (337'') of the fifth slot (37''); and
- the pins (34, 34') of the latches (33, 34, 33', 34') are positioned at the intermediate position of the first slot (36) and the intermediate position of the second slot (36'), respectively;

to its second position in which:

- the pins (39, 39', 39'') of the latches (38, 380, 39, 38', 380', 39', 38'', 380'', 39'') are positioned, respectively, at the second end (237) of the third slot (37), the second end (237') of the fourth slot (37') and the second end (237'') of the fifth slot (37''); and
- the pins (34, 34') of the latches (33, 34, 33', 34') are positioned at the second end (236) of the first slot (36) and the second end (236') of the second slot (36'), respectively. The passage of the slider (35) from its third to its second position determines the exiting from the casing of the cylinders (38, 38', 38'') of the latches (38, 380, 39, 38', 380', 39', 38'', 380'', 39'') as well as the cylinders (33, 33') of the bolts (33, 34, 33', 34'), thus locking the lock (400) itself.

[0067] Referring to Figures 6a, 6b, 6c, 14, 15, 16, and 17, a second embodiment of a lock (500) according to the present invention comprises:

- a first diverter assembly (200) and a second diverter assembly (200') both according to the second embodiment of the diverter assembly described above;
- a handle body (501), separate from the at least one diverter assembly (200, 200').

[0068] The handle body (501) comprises:

- a casing (511);
- a slider (55);
- a toothed element (503);
- a key cylinder fitted with a toothed cam (504);
- a handle pawl (506);
- a first rod (512), for connecting the slider (55) of the handle body (501) with the slider (25) of the first diverter assembly (200); and
- a second rod (512'), connecting the slider (55) of the handle body (501) with the slider (25') of the second diverter assembly (200').

[0069] The slider (55) comprises a plate provided with a row of at least two holes (57', 57", 58', 58"), said slider (55) being able to translate:

- from a first position to a second position, and vice versa;
- from the first position to a third position, and vice versa; and
- from the second position to the third position, and vice versa;

in such a way that:

- the slider (25) of the first diverter assembly (200) and the slider (25') of the second diverter assembly (200') are in their first position, when the slider (55) of the handle body (501) is in its first position;
- the slider (25) of the first diverter assembly (200) and the slider (25') of the second diverter assembly (200') are in their second position, when the slider (55) of the handle body (501) is in its second position; and
- the slider (25) of the first diverter assembly (200) and the slider (25') of the second diverter assembly (200') are in their third position, when the slider (55) of the handle body (501) is in its third position.

[0070] The toothed element (503) is configured to co-operate with the toothed cam (504) of the key cylinder, either directly, or indirectly by means of a second toothed cam (505). The toothed element (503) is configured to co-operate with the slider (55) of the handle body (501) in such a way that:

- the slider (55) of the handle body (501) translates from its third position to its second position, when the toothed element (503) rotates in an anticlockwise direction; and
- the slider (55) of the handle body (501) moves from its second position to its third position, and from its third position to its first position, when the toothed element (503) rotates in a clockwise direction.

[0071] The handle pawl (506) is configured to co-operate with the slider (55) of the handle body (501) in such

a way that the slider (55) of the handle body (501) translates from its third position to its first position, when the handle pawl (506) rotates in a clockwise direction.

[0072] On the basis of what is described above and from the terminology introduced so far, the functioning of the second embodiment (500) of the lock of the present invention is described here below.

[0073] When the second embodiment of the lock (500) of the present invention is in its rest configuration, or closure configuration, shown in Figure 14, the first diverter assembly (200) and the second diverter assembly (200') are also in their rest configuration, shown in Figure 6c and described above in relation to the second embodiment of the diverter assembly.

[0074] When, instead, the second embodiment of the lock (500) is in the opening configuration, shown in Figure 16, the first diverter assembly (200) as well as the second diverter assembly (200') are in their opening configuration, shown in Figure 6a and described above in relation to the second diverter assembly realisation.

[0075] When the door on which the second embodiment (500) of the lock of the present invention is mounted, which is in the rest configuration (Figure 14), is brought close to the jamb, the diverter assemblies (200, 200') switch from their rest configuration (Figure 6c) to the opening configuration (Figure 6a) to then return to their rest configuration (Figure 6c) once contact has been made and the door is closed, according to the mechanism described in detail with respect to the second embodiment of the diverter assembly.

[0076] Once the door is closed, it is possible to open it by passing the lock (500) from the closure configuration to the opening configuration by means of the handle pawl (506), as shown in Figure 17. The latter can be moved either by means of a classic handle, or electrically by a battery. In the former case, the handle pawl (506) comprises an opening for housing the handle and a tooth configured to co-operate with the slider (55) of the handle body (501). By turning a handle (not shown in the drawings) clockwise (with respect to the accompanying drawings), the tooth of the pawl (506) also rotates clockwise. The rotation of the tooth of the pawl (506) causes the translation of the slider (55) upwards, which moves from its third position to its first position. Consequently, thanks to the first rod (512), the slider (25) of the first diverter assembly (200) moves from its third position to its first position and, at the same time, the slider (25') of the second diverter assembly (200'), thanks to the action of the second rod (512') which connects it to the slider (55) of the handle body, also translates from its third position to its first position. Therefore, when the pawl (506) rotates in a clockwise direction, the pins of the latches of the first (200) and of the second (200') diverter assembly translate into the second slots, passing at the same time from the recesses to the first ends, of the sliders (25, 25') of the first (200) and of the second (200') diverter assembly, determining the simultaneous re-entry of the chamfered heads of the latches of both diverter assemblies (200,

200') into their respective casings and, therefore, the opening of the lock.

[0077] In addition, when the pawl (506) rotates in a clockwise direction, the pins of the bolts of the first (200) and of the second (200') diverter assemblies translate into the first slots, simultaneously moving from the intermediate positions to the first ends of the sliders (25, 25') of the first (200) and second (200') diverter assemblies.

[0078] Once the door is closed, it is possible to open it by passing the lock (500) from the closure configuration to the opening configuration, not only by means of the handle pawl (506), but also by using a key and the relative mechanisms that can be moved by the latter, as shown in Figure 16.

[0079] By turning a key inside the key cylinder clockwise, the toothed cam (504) of the key cylinder is also turned clockwise. The rotation of the toothed cam (504) of the key cylinder causes the rotation in an anticlockwise direction of the second toothed cam (505) which in turn causes the clockwise rotation of the toothed element (503). The latter is provided with a tooth which co-operates with the slider (55) and, when the toothed element (503) rotates clockwise, this tooth pushes the slider (55) upwards, which passes from its third position to its first position. Consequently, thanks to the first rod (512), the slider (25) of the first diverter assembly (200) moves from its third position to its first position and, at the same time, the slider (25') of the second diverter assembly (200'), thanks to the action of the second rod (512') which connects it to the slider (55) of the handle body, also translates from its third position to its first position. Therefore, when the toothed element (503) rotates clockwise, the pins of the latches of the first (200) and of the second (200') diverter assembly translate into the second slots, passing, at the same time, from the recesses at the first ends of the sliders (25, 25') of the diverter assemblies (200, 200'), determining the simultaneous re-entry of the chamfered heads of the latches of both diverter assemblies (200, 200') into their respective casings and, therefore, the opening of the lock.

[0080] When the toothed element (503) rotates in a clockwise direction, then, the pins of the bolts of the first (200) and of the second (200') diverter assemblies simultaneously pass from the intermediate positions to the first ends of the first slots of the slider (25) of the first diverter assembly (200) and of the slider of the second diverter assembly (200'), respectively.

[0081] Thanks to the action of a key, it is also possible to lock the lock (500), making it pass from the closure configuration, shown in Figure 14, to the locking configuration, shown in Figure 15.

[0082] Turning a key inside the key cylinder anticlockwise also rotates the toothed cam (504) of the key cylinder anticlockwise. The rotation of the toothed cam (504) of the key cylinder causes the rotation of the second toothed cam (505) clockwise, which in turn causes the rotation of the toothed element (503) anticlockwise. The latter is provided with a tooth which co-operates with the

slider (55), and, when the toothed element (503) rotates anticlockwise, the slider (55), which was previously held in its third position by the tooth of the toothed element (503), translates downwards, by gravity, thus passing from its third position to its second position.

[0083] Consequently, thanks to the first rod (512), the slider (25) of the first diverter assembly (200) moves from its third position to its second position and, at the same time, the slider (25') of the second diverter assembly (200'), thanks to the action of the second rod (512'), which connects it to the slider (55) of the handle body, also translates from its third position to its second position. Therefore, when the toothed element (503) rotates anticlockwise, the pins of the latches, as well as the pins of the bolts of the first (200) and of the second (200') diverter assemblies, translate, at the same time, until they are positioned at the second ends of the second and first slots, of the sliders (25, 25') of the diverter assemblies (200, 200'), causing the cylinders of the latches and the cylinders of the bolts of both diverter assemblies (200, 200') to simultaneously exit from their respective casings and, therefore, causing the lock (500) to lock.

[0084] Finally, referring to Figures 18a and 18b, the presence of a plurality of holes (57', 57", 58, 58") in the slider (55) of the handle body (501) and of a plurality of holes (59', 59", 60', 60") in the sliders (25, 25') of both diverter assemblies (200, 200'), allows the rods (512, 512') to be mounted in different positions, thus varying the relative position of the handle body (501) with respect to the same diverter assemblies (200, 200'). In this way, as mentioned above, it is possible to mount the lock of the present invention also on pre-existing doors without altering the position of the keyhole already present. In fact, it will be sufficient to mount the handle body (501) at the pre-existing keyhole and to mount the diverter assemblies in any position, according to the spaces available.

40 Claims

1. Diverter assembly (100, 200, 200', 300) for locks (400, 500) comprising:

- a casing (11, 21, 31) comprising a front plate (12, 22, 32) provided with at least one hole (700, 701, 702);
- at least one bolt (13, 14, 23, 24, 33, 34, 33', 34') comprising:

- a hollow cylinder (13, 23, 33, 33') configured to traverse the hole (700, 701) of the front plate (12, 22, 32), moving from a first position in which it is inside the casing (11, 21, 31) to a second position in which it is at least partially outside the casing (11, 21, 31), and vice versa; and
- a pin (14, 24, 34, 34');

- a slider (15, 25, 35) comprising a plate provided with at least one slot (16, 26, 36, 36') for each cylinder (13, 23, 33, 33'), in said slot (16, 26, 36, 36') being engaged the pin (14, 24, 34, 34') of the bolt (13, 23, 33, 33', 14, 24, 34, 34'), said slider (15, 25, 35) being configured to translate from a first position in which the pin (14, 24, 34, 34') is positioned at a first end (16', 26', 36', 36') of the slot (16, 26, 36, 36') to a second position in which the pin (14, 24, 34, 34') is positioned at a second end (16'', 26'', 36'', 36'') of the slot (16, 26, 36, 36'), and vice versa;

characterised in that:

- the lateral surface of the cylinder (13, 23, 33, 33') is provided with two longitudinal slits (18, 18') diametrically opposed one to the other and configured in such a way that the plate of the slider (15, 25, 35) can slide in their interior; and
 - the pin (14, 24, 34, 34') is mounted inside the cylinder (13, 23, 33, 33') so as to be parallel to the base surfaces of the cylinder (13, 23, 33, 33'), the slits (18, 18') and the pin (14, 24, 34, 34') being positioned in such a way that, when the slider (15, 25, 35) is in its first position, the cylinder (13, 23, 33, 33') is in its first position and, when the slider (15, 25, 35) is in its second position, the cylinder (13, 23, 33, 33') is in its second position.

2. Diverter assembly (200, 200', 300) according to claim 1, comprising at least one slide latch (28, 38, 38', 38'', 280, 380, 380', 380'', 29, 39, 39', 39'') comprising: a solid body (28, 38, 38', 38'', 280, 380, 380', 380'') formed by a chamfered head (280, 380, 380', 380'') and a cylinder (28, 38, 38', 38''), said solid body (28, 38, 38', 38'', 280, 380, 380', 380'') being configured to traverse a second hole (702) of the front plate (22, 32) passing from a first position in which the head (280, 380, 380', 380'') is inside the casing (21, 31) to a second position in which the head (280, 380, 380', 380'') is outside the casing (21, 31) and the cylinder (28, 38, 38', 38'') of the solid body (28, 38, 38', 38'', 280, 380, 380', 380'') is inside the casing (21, 31), and vice versa.

3. Diverter assembly (200, 200', 300) according to claim 2, wherein the solid body (28, 38, 38', 38'', 280, 380, 380', 380'') of the latch (28, 38, 38', 38'', 280, 380, 380', 380'') is further configured to traverse the second hole (702) of the front plate (22, 32) moving from the second position to a third position in which the cylinder (28, 38, 38', 38'') of the latch (28, 38, 38', 38'', 280, 380, 380', 380'') is at least partially outside the casing (21, 31), and vice versa.

4. Diverter assembly (200, 200', 300) according to claim 3, wherein the latch (28, 38, 38', 38'', 280, 380, 380', 380'', 29, 39, 39', 39'') comprises a pin (29, 39, 39', 39'') mounted inside the cylinder (28, 38, 38', 38'') of the solid body (28, 38, 38', 38'', 280, 380, 380', 380''), so as to be parallel to the base surfaces of the cylinder (28, 38, 38', 38'') of the solid body (28, 38, 38', 38'', 280, 380, 380', 380''), said cylinder (28, 38, 38', 38'') of the solid body (28, 38, 38', 38'', 280, 380, 380', 380'') being hollow.

5. Diverter assembly (200, 200', 300) according to claim 4, wherein the lateral surface of the cylinder (28, 38, 38', 38'') of the solid body (28, 38, 38', 38'', 280, 380, 380', 380'') is provided with two longitudinal slits (118, 118') diametrically opposed one to the other and configured in such a way that, in their interior, the plate of the slider (25, 35) can slide.

6. Diverter assembly (200, 200', 300) according to claim 5, wherein the slider (25, 35) is provided with a second slot (27, 37, 37', 37'') configured in such a way that: the pin (29, 39, 39', 39'') of the latch (28, 38, 38', 38'', 280, 380, 380', 380'', 29, 39, 39', 39'') is positioned at a first end (27', 137, 137', 137'') of the second slot (27, 37, 37', 37''), when the slider (25, 35) is in its first position; and the pin (29, 39, 39', 39'') of the latch (28, 38, 38', 38'', 280, 380, 380', 380'', 29, 39, 39', 39'') is positioned at a second end (27'', 237, 237', 237'') of the second slot (27, 37, 37', 37''), when the slider (25, 35) is in its second position.

7. Diverter assembly (200, 200', 300) according to claim 6, wherein the slider (25, 35) is further configured:

- to translate from its first position to a third position wherein the pin (29, 39, 39', 39'') of the latch (28, 38, 38', 38'', 280, 380, 380', 380'', 29, 39, 39', 39'') is positioned at a recess (27''', 337, 337', 337'') of the second slot (27, 37, 37', 37''), said recess (27''', 337, 337', 337'') being placed between the first end (27', 137, 137', 137'') and the second end (27'', 237, 237', 237'') of the second slot (27, 37, 37', 37''), and vice versa; and
 - to translate from its second position to its third position, and vice versa.

8. Diverter assembly (200, 200', 300) according to claim 7, wherein the slits (118, 118') of the cylinder (28, 38, 38', 38'') of the solid body (28, 38, 38', 38'', 280, 380, 380', 380'') and the pin (29, 39, 39', 39'') of the latch (28, 38, 38', 38'', 280, 380, 380', 380'', 29, 39, 39', 39'') are positioned in such a way that:

- the solid body (28, 38, 38', 38'', 280, 380, 380', 380'') of the latch (28, 38, 38', 38'', 280, 380, 380', 380'')

- 380', 380", 29, 39, 39', 39") is in its first position, when the slider (25, 35) is in its first position;
 - the solid body (28, 38, 38', 38", 280, 380, 380', 380") of the latch (28, 38, 38', 38", 280, 380, 380', 380", 29, 39, 39', 39") is in its third position, when the slider (15, 25, 35) is in its second position; and
 - the solid body (28, 38, 38', 38", 280, 380, 380', 380") of the latch (28, 38, 38', 38", 280, 380, 380', 29, 39, 39', 39") is in its second position, when the slider (15, 25, 35) is in its third position.
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9. Lock (400) comprising:
- a diverter assembly (300) according to any one of claims 2 to 8; and
 - a key cylinder provided with a first toothed cam (404);
 - a toothed element (403) housed in the casing (31) of the diverter assembly (300); wherein said toothed element (403) is configured to co-operate with the first toothed cam (404).
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10. Lock (400) according to claim 9, wherein the toothed element (403) is configured to co-operate with the slider (35) in such a way that:
- the slider (25, 35) translates from its third position to its second position, when the toothed element (403) rotates in a first direction; and
 - the slider (25, 35) translates from its second position to its first position, when the toothed element (403) rotates in a second direction, opposite to the first direction.
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11. Lock (400) according to claim 10, comprising a handle pawl (406) housed in the casing (31) of the diverter assembly (300) and configured to co-operate with the slider (35) in such a way that the slider (25, 35) translates from its third position to its first position, when the handle pawl (406) rotates in the second direction.
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12. Lock (500) comprising:
- at least one diverter assembly (200, 200') according to any one of claims 2 to 8;
 - a handle body (501), separate from the at least one diverter assembly (200, 200'), said handle body (501) comprising:
 - a casing (511);
 - a key cylinder provided with a first toothed cam (504);
 - a toothed element (503) configured to co-operate with the first toothed cam (504);
 - a slider (55), comprising a plate provided
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- with a row of at least two holes (57', 57", 58', 58"), said slider (55) being able to translate:
- from a first position to a second position, and vice versa;
 - from the first position to a third position, and vice versa; and
 - from the second position to the third position, and vice versa;
- at least one rod (512, 512') for each diverter assembly (200, 200'), apt to connect the slider (55) of the handle body (501) with the slider (25, 25') of at least one diverter assembly (200, 200') in such a way that:
- the slider (25, 25') of at least one diverter assembly (200, 200') is in its first position, when the slider (55) of the handle body (501) is in its first position;
 - the slider (25, 25') of the at least one diverter assembly (200, 200') is in its second position, when the slider (55) of the handle body (501) is in its second position; and
 - the slider (25, 25') of the at least one diverter assembly (200, 200') is in its third position, when the slider (55) of the handle body (501) is in its third position.
13. Lock (500) according to claim 12, wherein the slider (25, 25') of the at least one diverter assembly (200, 200') comprises a plate provided with a row of at least two holes (59', 59", 60', 60").
14. Lock (500) according to claim 12 or 13, wherein the toothed element (504) is configured to co-operate with the slider (55) of the handle body (501) in such a way that:
- the slider (55) of the handle body (501) translates from its third position to its second position, when the toothed element (504) rotates in a first direction; and
 - the slider (55) of the handle body (501) translates from its second position to its first position, when the toothed element (504) rotates in a second direction, opposite to the first direction.
15. Lock (500) according to claim 14, wherein the handle body (501) comprises a handle pawl (506) configured to co-operate with the slider (55) of the handle body (501) in such a way that the slider (55) of the handle body (501) translates from its third position to its first position, when the handle pawl (506) rotates in the second direction.

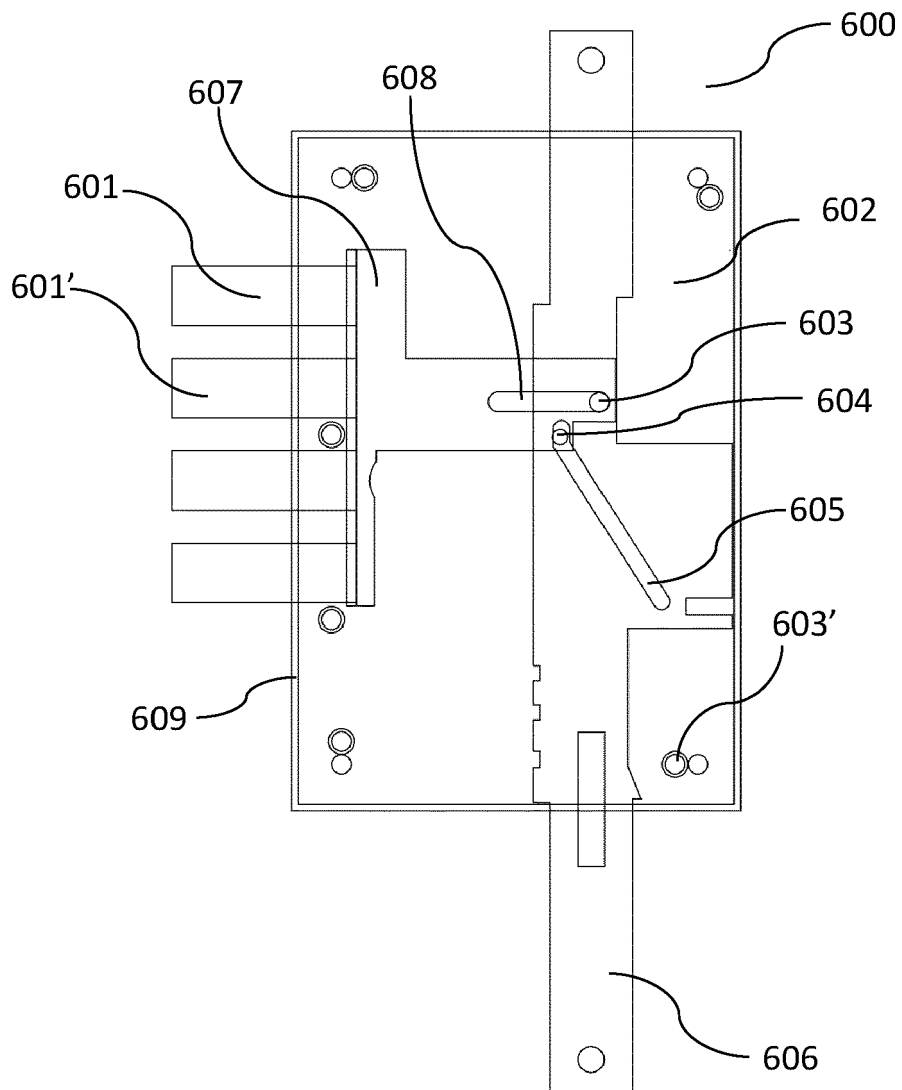


Fig.1

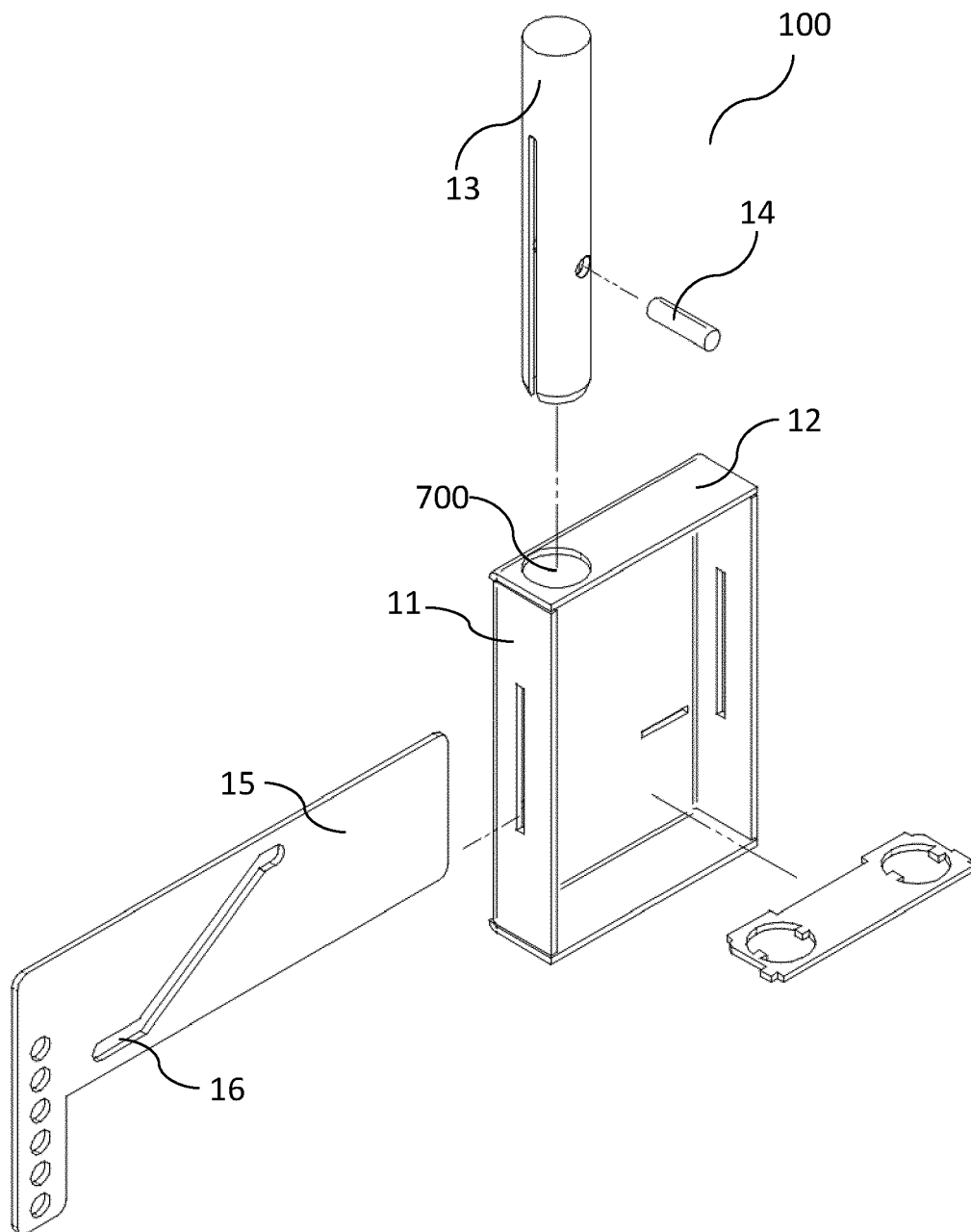


Fig.2

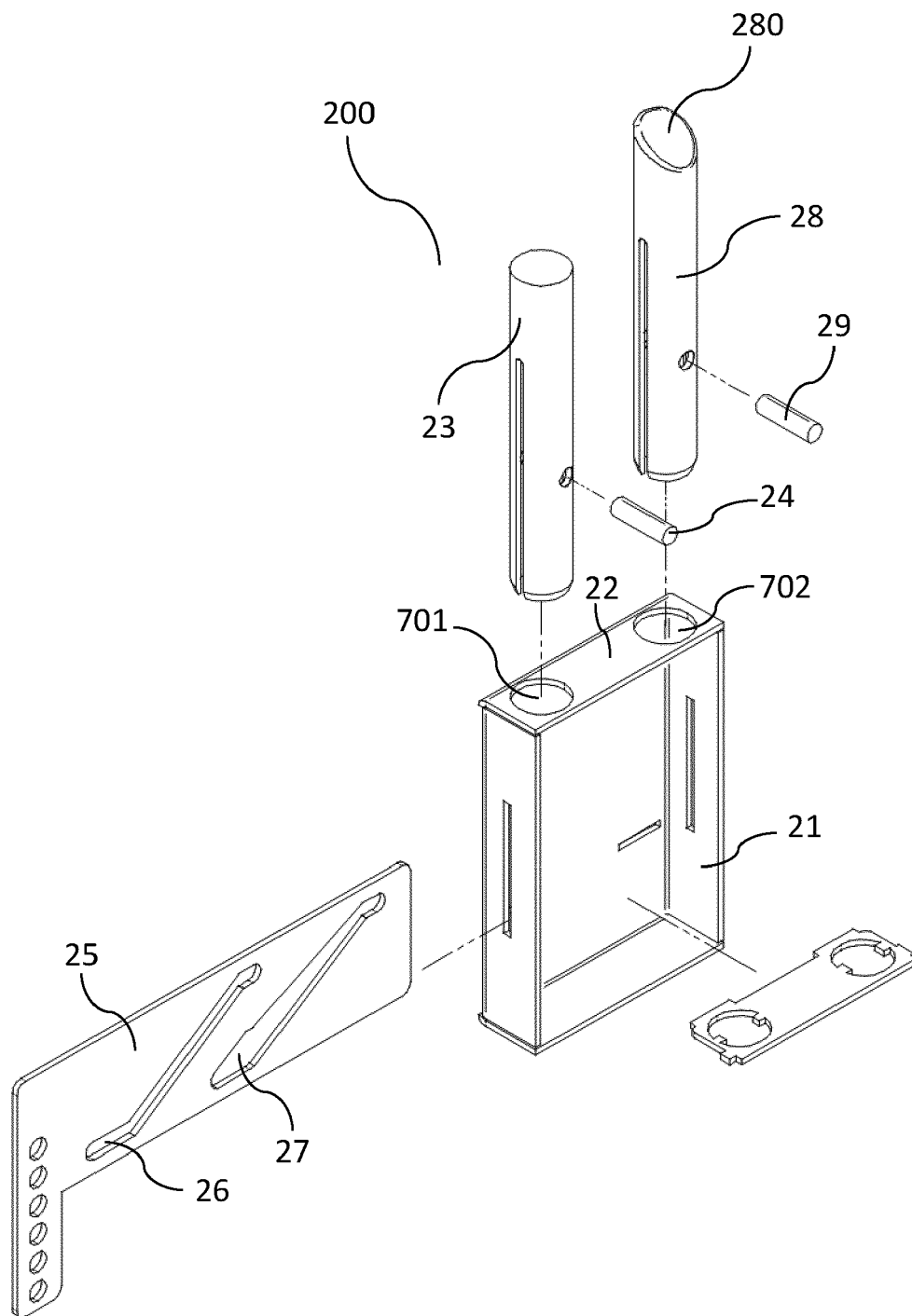


Fig.3

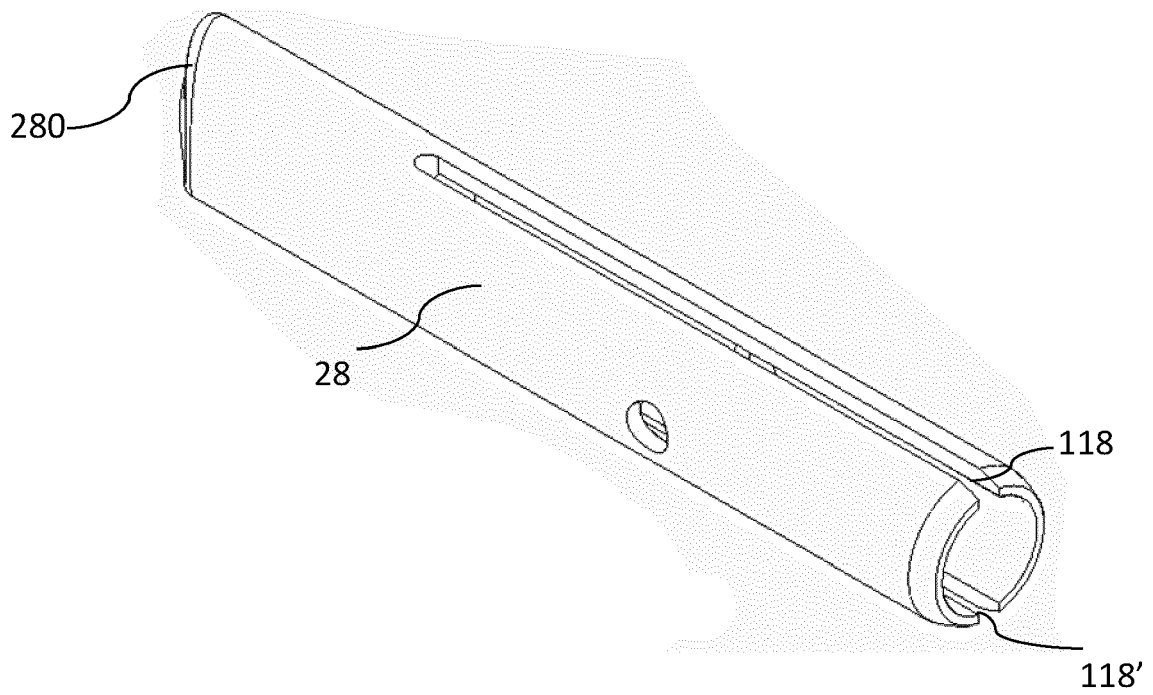
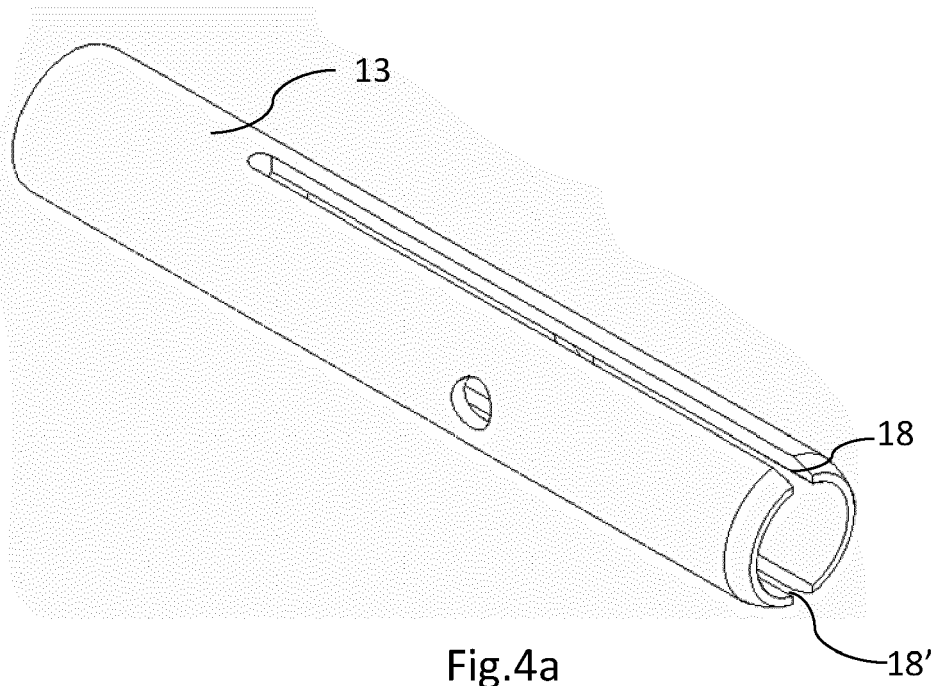


Fig. 4b

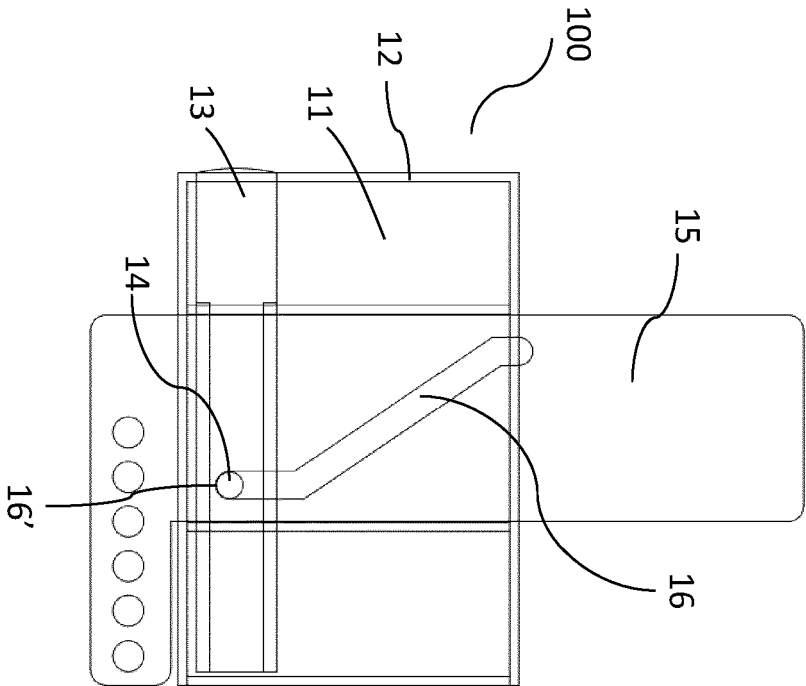


Fig. 5a

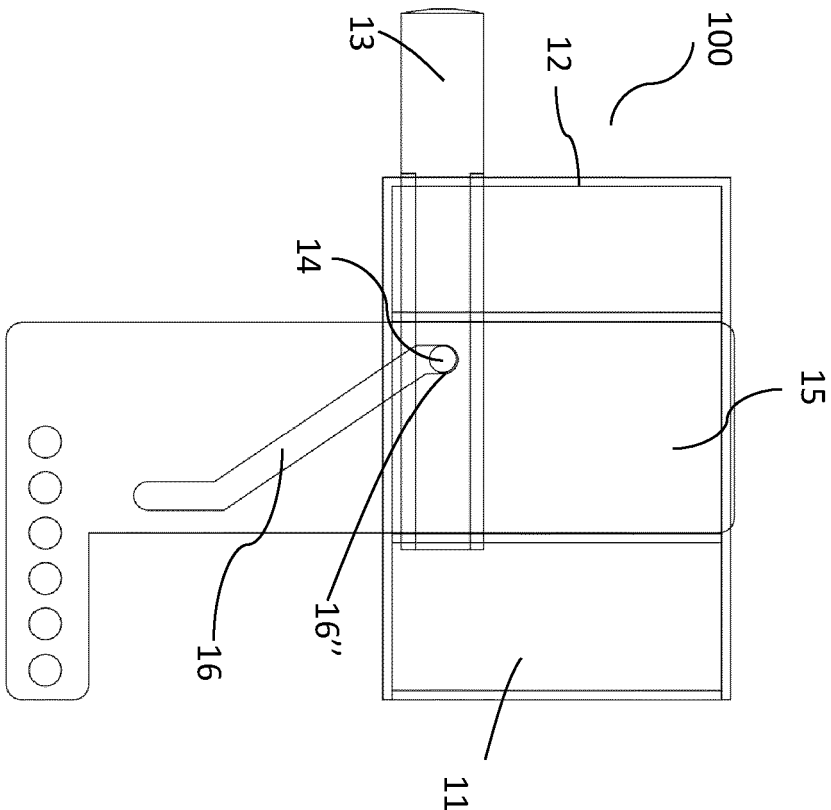


Fig. 5b

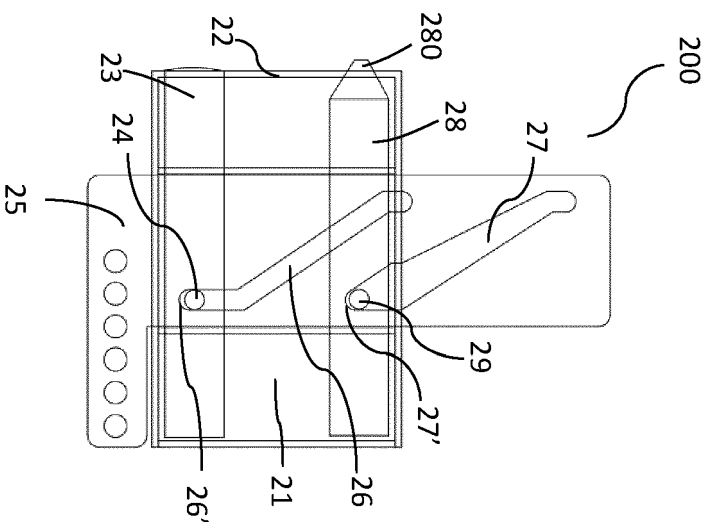


Fig. 6a

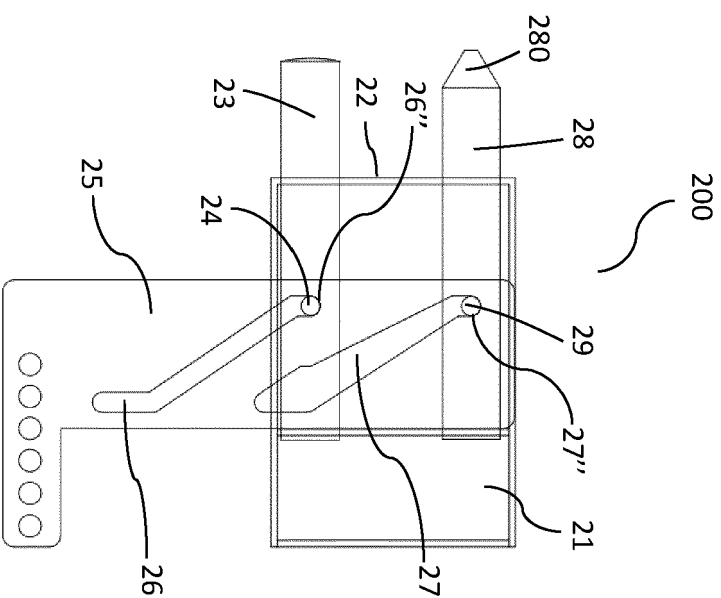


Fig. 6b

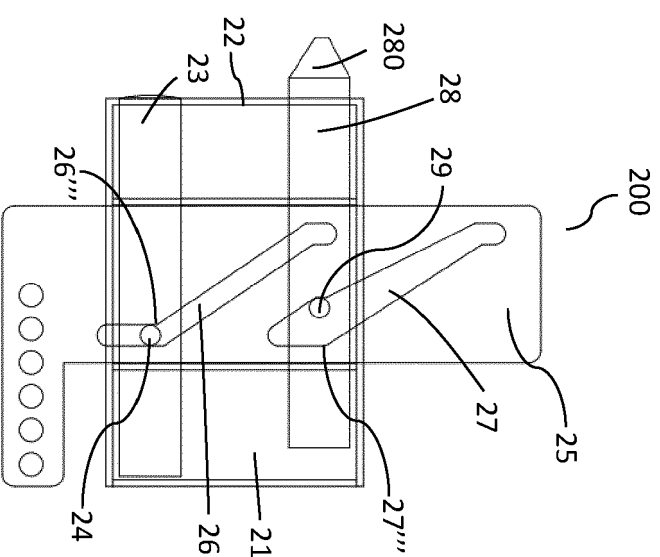


Fig. 6c

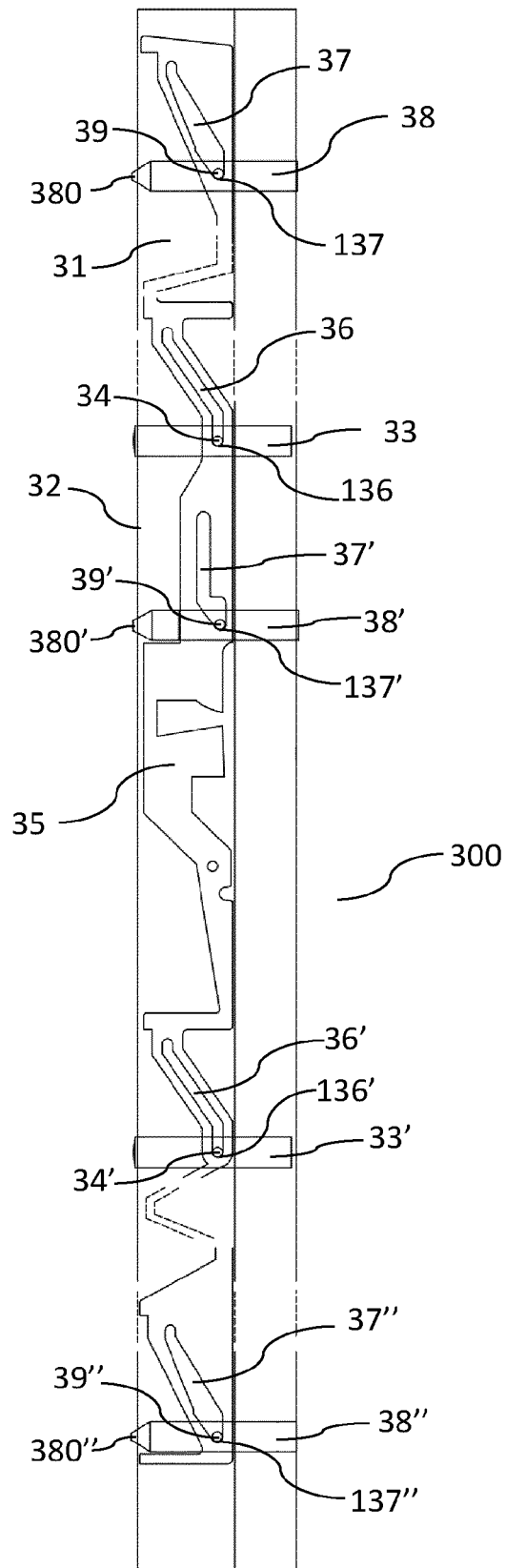


Fig.7

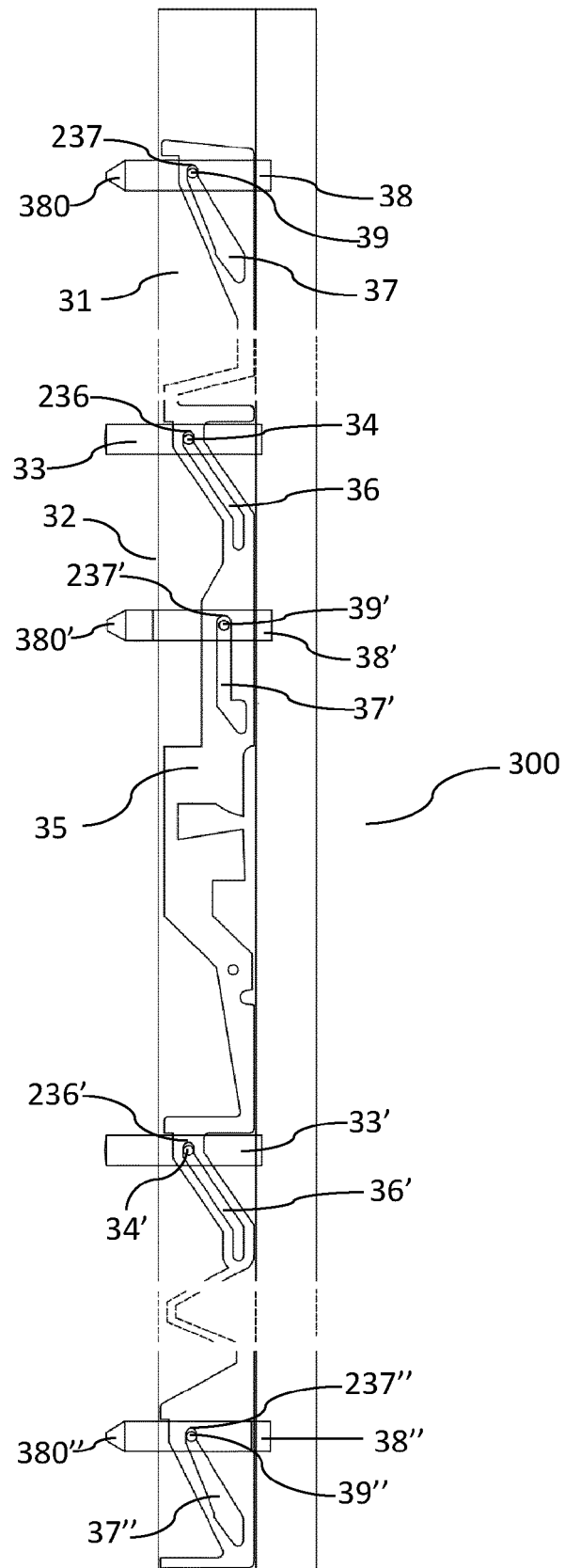


Fig.8

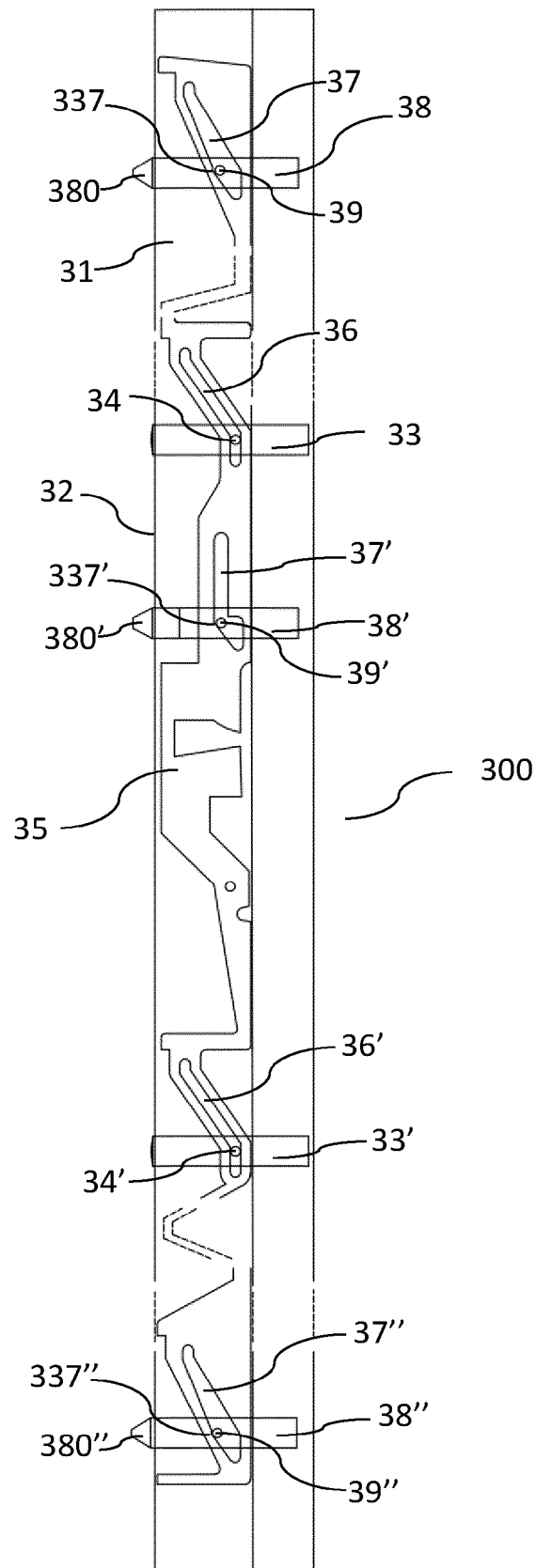


Fig.9

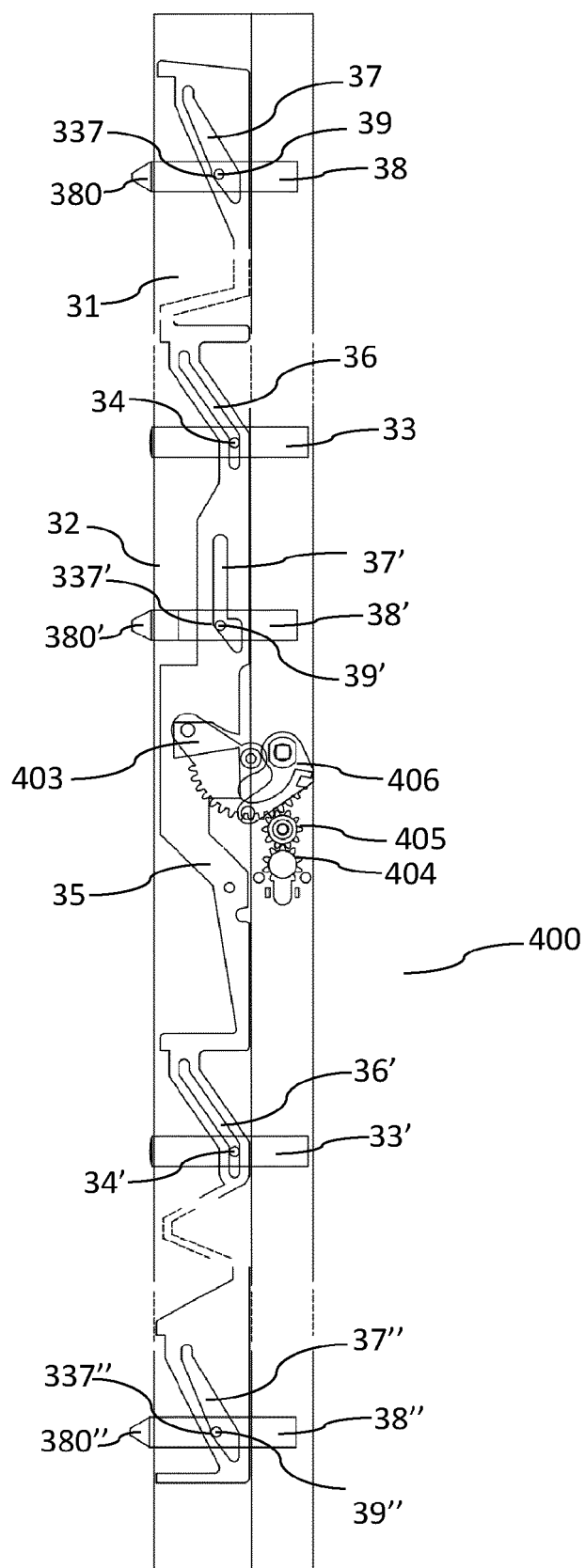


Fig.10

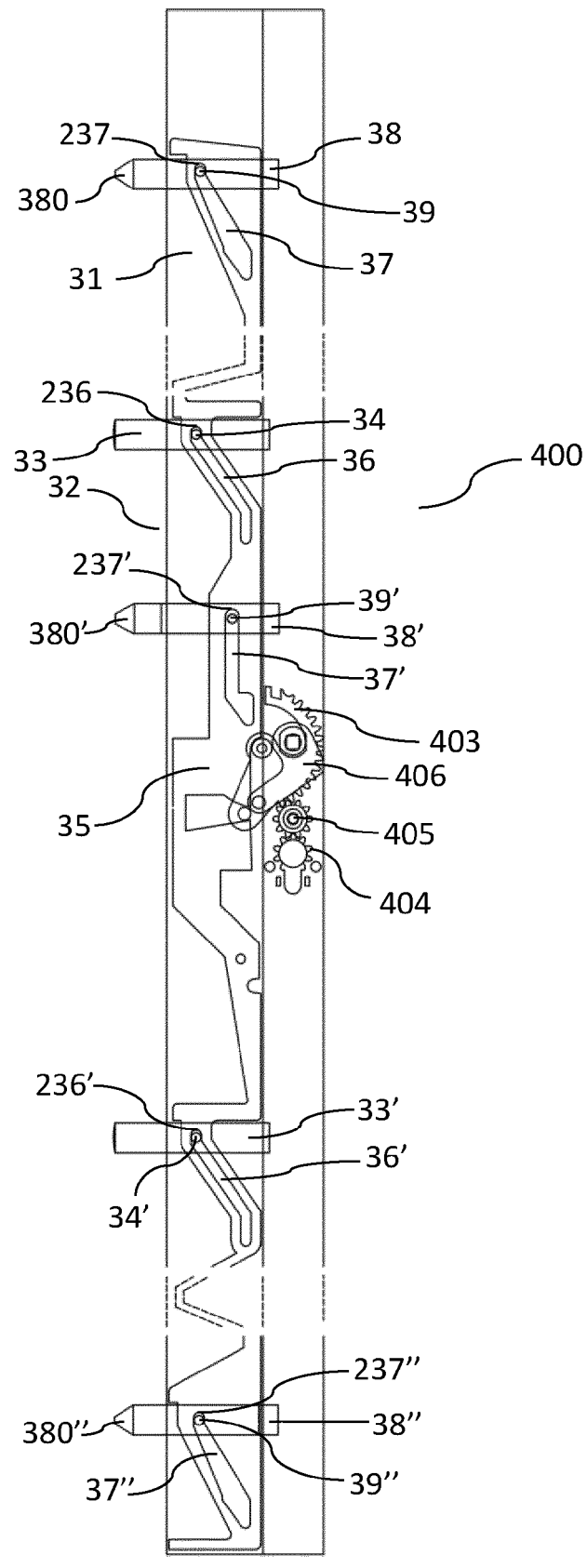


Fig.11

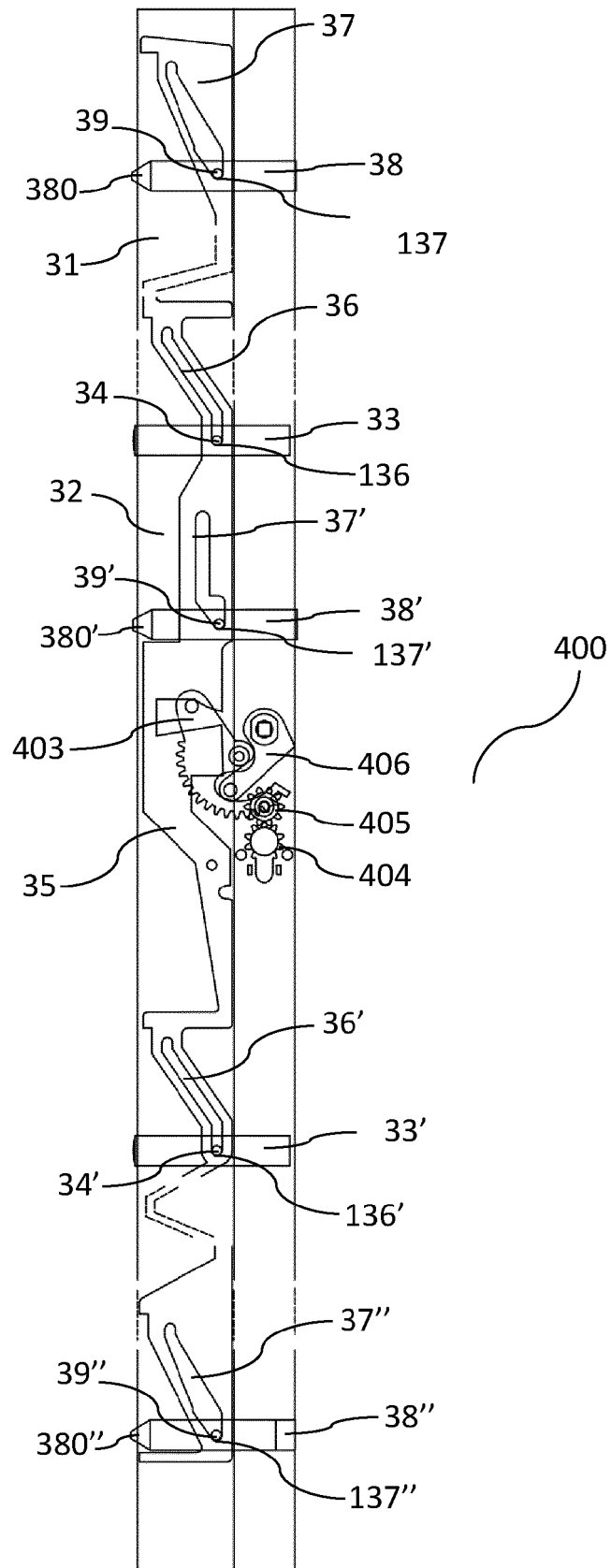


Fig.12

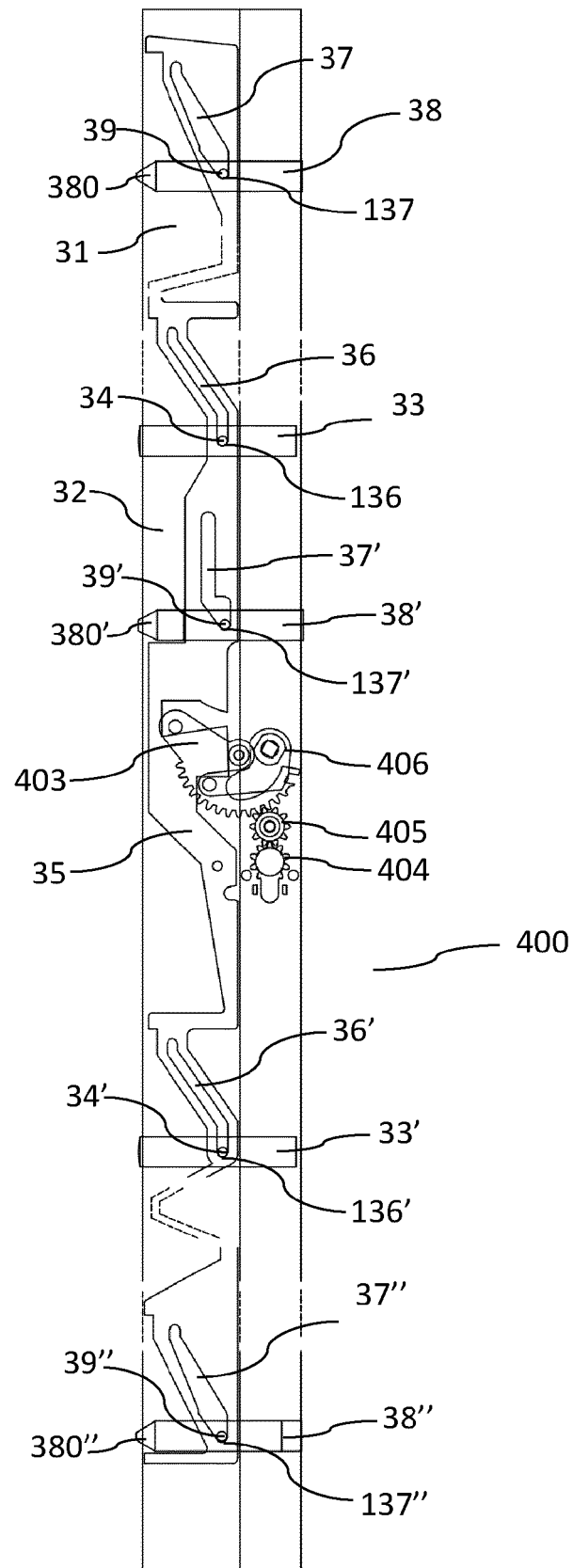


Fig.13

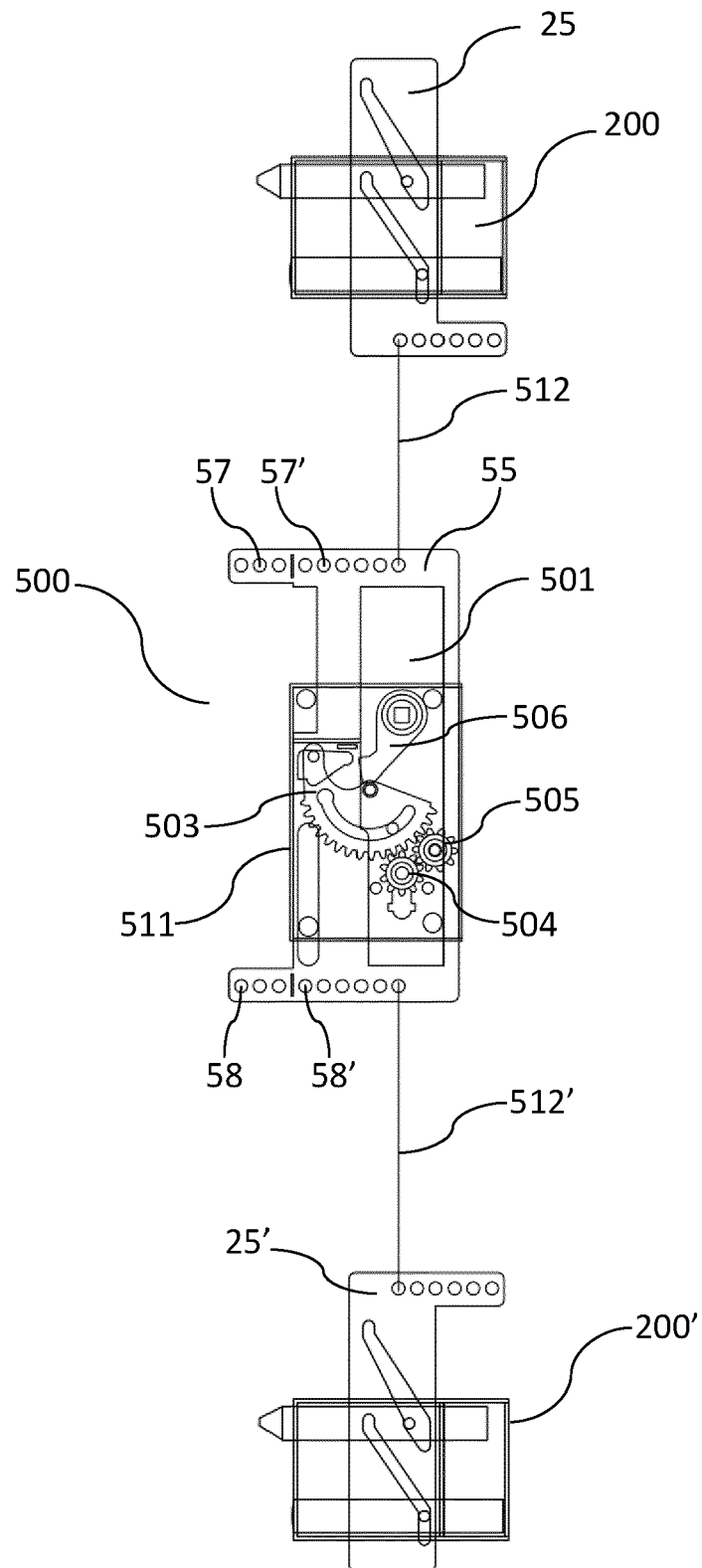


Fig.14

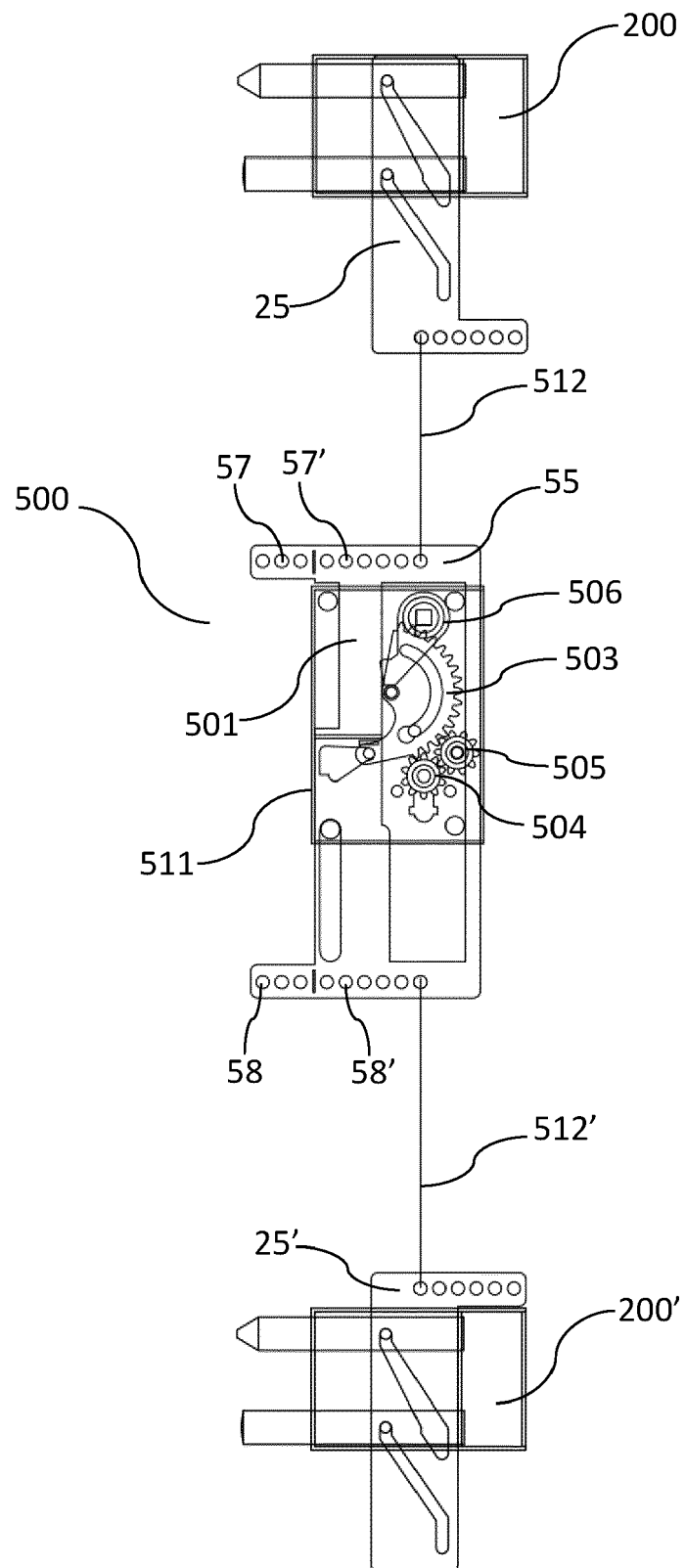


Fig.15

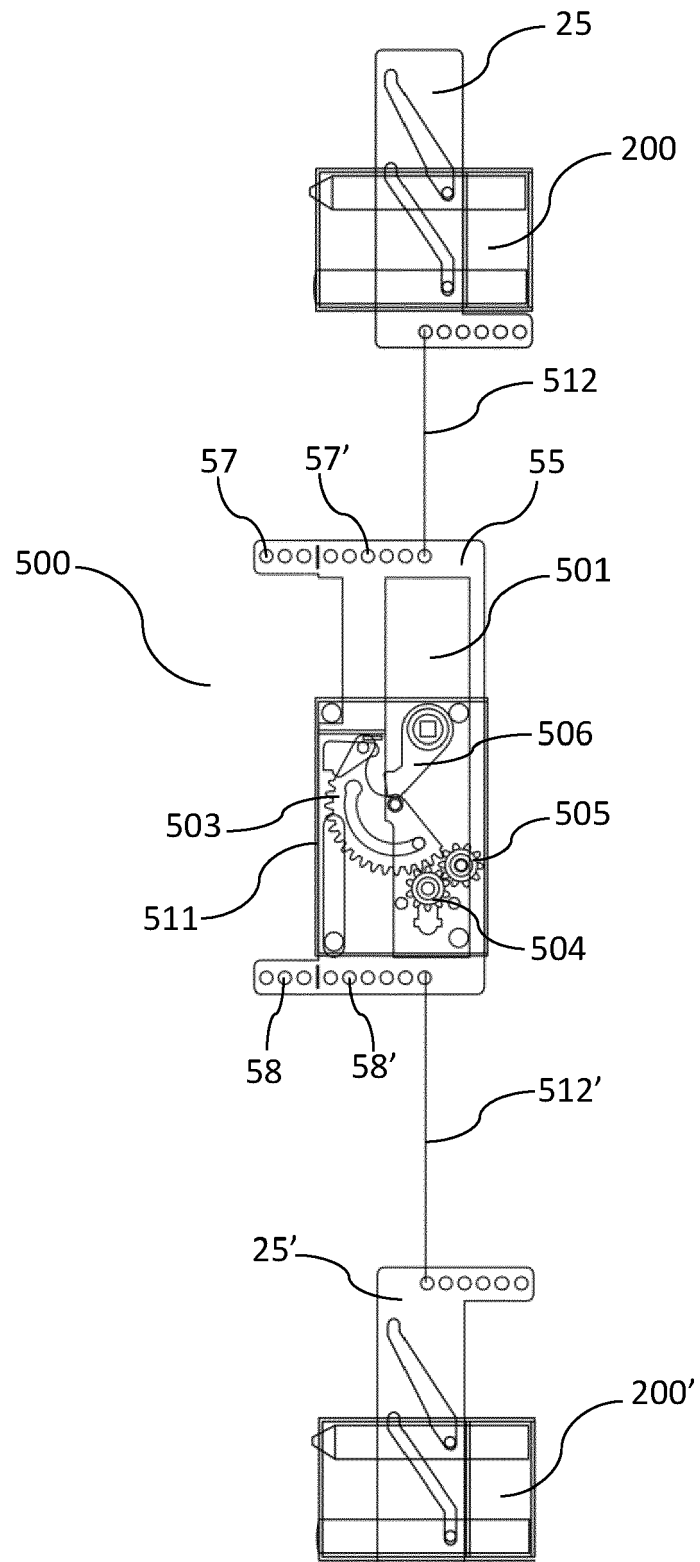


Fig.16

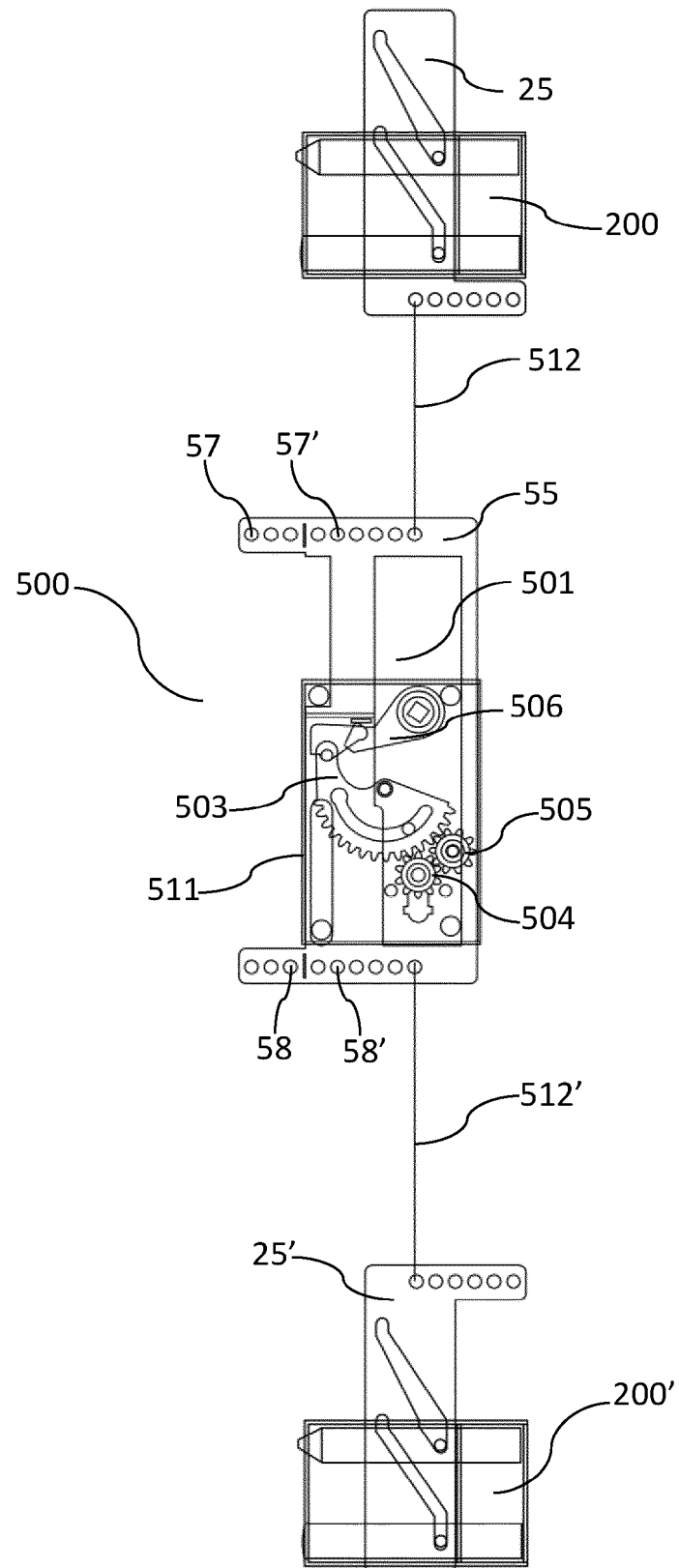


Fig.17

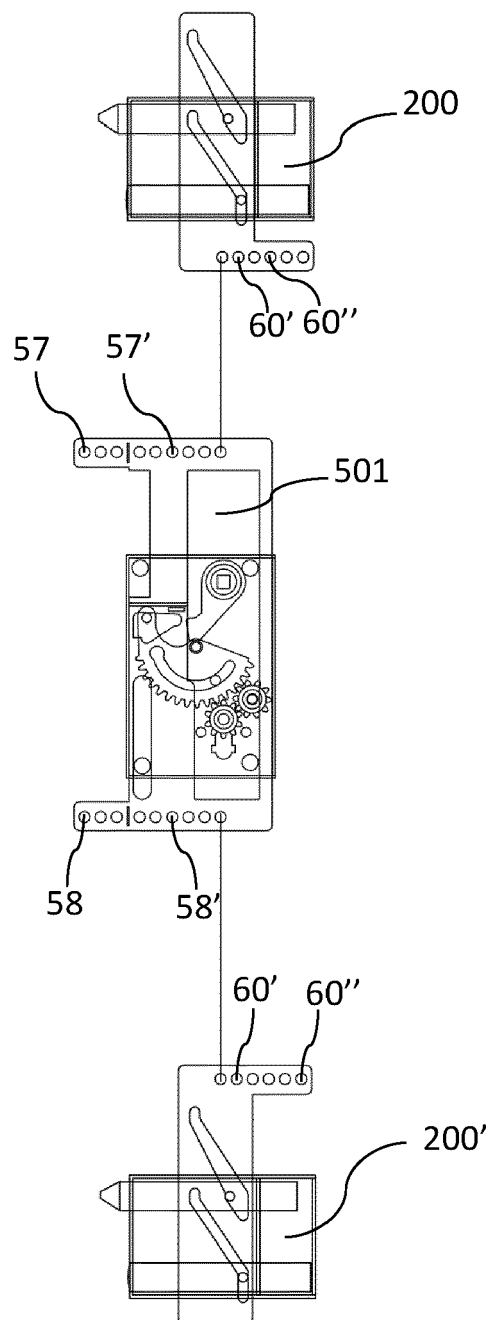


Fig.18a

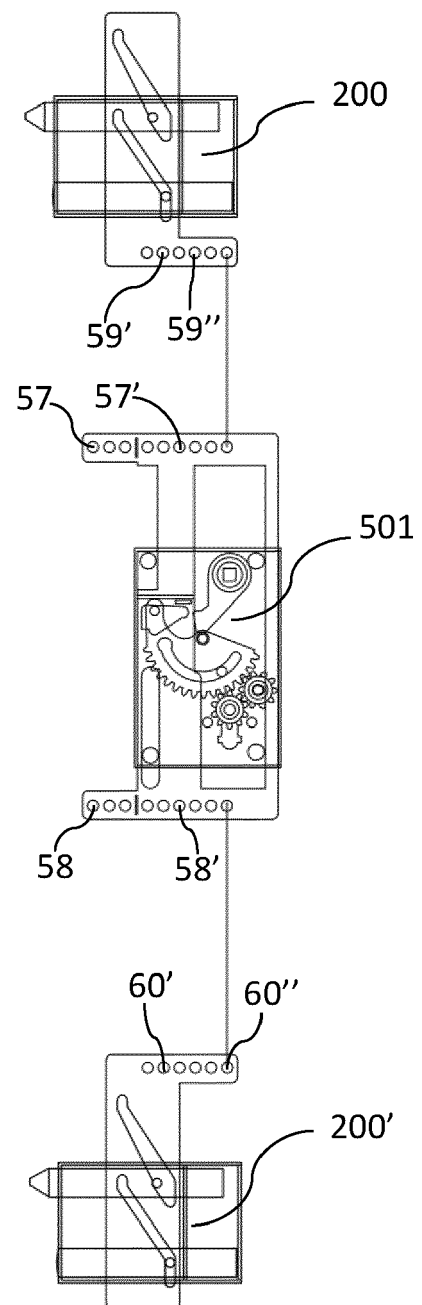


Fig.18b



EUROPEAN SEARCH REPORT

Application Number
EP 20 21 7540

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EPO FORM 1503 03.82 (P04C01)

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			E05B E05C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 30 June 2021	Examiner Cruyplant, Lieve
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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