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(54) **A SAFETY LOCK FOR A HINGED CLOSURE MEMBER**

(57) A safety lock (100) comprises: a lock assembly (102) having a latch bolt (104); a latch bolt actuating mechanism having two drivers (130, 132) on opposing sides of the lock assembly; and a blocking mechanism (134) configured to be selectively mounted on opposing sides of the lock assembly to prevent a respective driver from moving the latch bolt. The latch bolt actuating mechanism comprises: a first spindle (110) extending through the lock assembly and rotatable in an unlocking direction to unlatch the latch bolt, a second spindle (112) extending away from the first spindle and being unable to be rotated in the unblocking direction when the blocking mechanism is in a blocking state; spindle followers (114, 120) mounted on the adjacent ends of the spindles; and coupling means (118, 122) for coupling the spindle followers such that a rotation of the second spindle in said unlocking direction causes a rotation of the first spindle in said unlocking direction.

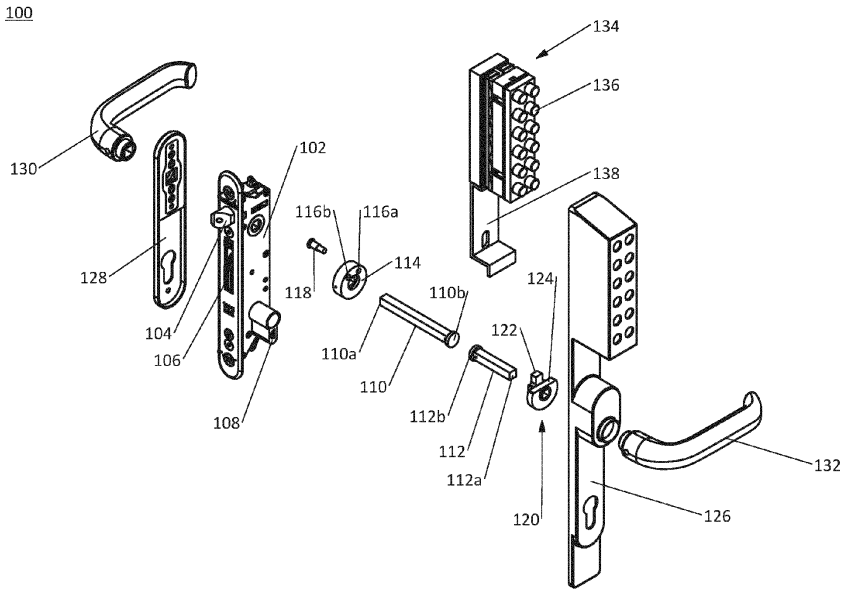

Fig. 3

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Description

Technical field

[0001] The present invention relates to a safety lock for a hinged closure member, such as a gate or door, especially for outdoors use.

Background art

[0002] A known safety lock comprises: a lock assembly configured to be mounted on the hinged closure member and comprising a latch bolt moveable between a latching position and an unlatching position; a latch bolt actuating mechanism configured to move the latch bolt from its latching position to its unlatching position, the latch bolt actuating mechanism comprising: a first driver mounted on a first side of the lock assembly; and a second driver mounted on a second side of the lock assembly, said second side being opposite said first side; and a blocking mechanism having a blocking state and an unblocking state, the blocking mechanism being configured to be selectively mounted in a first position on said first side of the lock assembly to prevent the first driver from moving the latch bolt to its unlatching position when the blocking mechanism is in its blocking state and in a second position on said second side of the lock assembly to prevent the second driver from moving the latch bolt to its unlatching position when the blocking mechanism is in its blocking state.

[0003] Such a free-exit safety lock is disclosed in EP 2 886 755 with a blocking mechanism being formed by a pushbutton combination mechanism. On the side of the lock assembly on which the pushbutton combination mechanism is mounted, the handle (i.e. the driver) drives a pivotable lever, by intermediary of a square spindle, which engages a first pin provided on the latch bolt. The free end of the pivotable lever extends above the latch bolt and may be engaged by the pushbutton combination mechanism. The pushbutton combination mechanism includes a check slider which engages the free end of the pivotable lever and which slides, when the correct code is entered using the pushbuttons, away from the pivotable lever thus allowing this lever to pivot to unlatch the latch bolt. On the free-exit side (i.e. the opposing side of the lock assembly), the handle (i.e. the driver) drives a pivotable lever, by intermediary of a spindle and a lever, which engages a second pin provided on the latch bolt, in particular on the opposing side of the latch bolt when compared to the first pin.

[0004] A downside of the known safety lock is that a series of steps are required in order to change the free-exit and non-free-exit side of the safety lock. More specifically, the pushbutton combination mechanism needs to be opened, removed from one side and replaced on the other side. At the same time, also the handles need to be reversed since the free-exit handle would otherwise be located at the side of the pushbutton combination mechanism.

[0005] Another downside of the known safety lock is the complex construction of the latch bolt actuating mechanism which relies on multiple moving elements with handles that are positioned at different heights along the lock assembly with the free-exit handle always being lower than the handle which may be blocked by the pushbutton combination mechanism. This is caused by the requirement that both spindles need to be accessible from both sides of the lock assembly to allow switching the roles of the handles.

Disclosure of the invention

[0006] It is an object of the present invention to provide a safety lock with a selectively placeable blocking mechanism which alleviates one or more of the above-mentioned downsides.

[0007] This object is achieved in that the latch bolt actuating mechanism comprises: a first spindle extending through the lock assembly and being rotatable about its longitudinal axis in an unlocking direction to move the latch bolt from its latching position to its unlatching position, the first spindle having a first end and a second end, the first driver being coupled to the first end of the first spindle when the blocking mechanism is in its second position and the second driver being coupled to the first end of the first spindle when the blocking mechanism is in its first position; a second spindle extending away from the first spindle and being rotatable about its longitudinal axis in said unlocking direction, the second spindle having a first end and a second end with the second end of the second spindle being adjacent the second end of the first spindle, the first driver being coupled to the first end of the second spindle when the blocking mechanism is in its first position and the second driver being coupled to the first end of the second spindle when the blocking mechanism is in its second position, the blocking mechanism, when in its blocking state, being configured to prevent a rotation of the second spindle; a first spindle follower fixed on the second end of the first spindle; a second spindle follower fixed on the second end of the second spindle; and coupling means for coupling the first spindle follower and the second spindle follower such that a rotation of the second spindle follower in said unlocking direction causes a rotation of the first spindle follower in said unlocking direction.

[0008] According to the present invention, the latch bolt actuating mechanism relies on a multi-part spindle with at least a part (i.e. the first spindle) which can rotate independently from the other part (i.e. the second spindle). This allows positioning the blocking mechanism to only prevent a rotation of the second spindle while allowing the first spindle to rotate freely. The driver coupled to the first spindle may thus form a free-exit while the driver coupled to the second spindle can only be operated after having unblocked the blocking mechanism.

[0009] The latch bolt actuating mechanism further

comprises a very limited number of moving elements, namely the multi-part spindle (typically two parts, although three parts may be required when blocking mechanisms are provided on both sides of the lock assembly) together with two followers (or four when blocking mechanisms are provided on both sides of the lock assembly) and one (or two) couplers. Furthermore, these elements do not require any sliding motion, which is known to be prone to problems in outdoors applications (e.g. due to water, dirt, etc. causing increased friction).

[0010] Another advantage of the latch bolt actuating mechanism is that all parts of the multi-part spindle are in line with one another thus allowing the drivers to be positioned at a same height on both sides of the lock assembly. Furthermore, all spindle parts undergo a same rotation when unlatching the latch bolt. As such, in case the drivers comprise a handle, the lock assembly may be unlatched by performing a same rotation of the handle on each side of the lock assembly.

[0011] In an embodiment of the present invention the first spindle is rotatable in the unlocking direction irrespective of the state of the blocking mechanism. This results in a free-exit side of the lock assembly, i.e. anyone can unlatch the latch bolt from the side of the lock assembly on which no blocking mechanism is present.

[0012] In an embodiment of the present invention the safety lock comprises a further blocking mechanism having a blocking state and an unblocking state, the further blocking mechanism being configured to be selectively mounted in a first position, when the blocking mechanism is in its first position, on said second side of the lock assembly to prevent the second driver from moving the latch bolt to its unlatching position when the further blocking mechanism is in its blocking state and in a second position, when the blocking mechanism is in its second position, on said first side of the lock assembly to prevent the first driver from moving the latch bolt to its unlatching position when the further blocking mechanism is in its blocking state, the latch bolt actuating mechanism further comprising: a third spindle extending away from the first spindle and being rotatable about its longitudinal axis in said unlocking direction, the third spindle having a first end and a second end with the second end of the third spindle being adjacent the first end of the first spindle, the second driver being coupled to the first end of the third spindle when the further blocking mechanism is in its first position and the first driver being coupled to the first end of the third spindle when the further blocking mechanism is in its second position, the further blocking mechanism, when in its blocking state, being configured to prevent a rotation of the third spindle; a third spindle follower fixed on the first end of the first spindle; a fourth spindle follower fixed on the second end of the third spindle; and further coupling means for coupling the third spindle follower and the fourth spindle follower such that a rotation of the fourth spindle follower in said unlocking direction causes a rotation of the third spindle follower in said unlocking direction.

[0013] In this embodiment a safety lock is provided with additional blocking mechanisms on both sides of the safety lock, while relying on a single multi-part spindle (i.e. at least three parts) to allow unlatching the latch bolt from either side of the safety lock independent from the other side. The advantages of a limited number of components, the absence of sliding parts, same height drivers, and same rotation handles are also obtained in this embodiment on both sides of the safety lock.

[0014] In an embodiment of the present invention the coupling means comprise a leader protrusion provided on the second spindle follower and a follower protrusion provided on the first spindle follower, the leader protrusion being configured to engage the follower protrusion to rotate the first spindle follower in said unlocking direction when the second spindle is rotated in said unlocking direction. The follower protrusion is preferably formed by a separate element mounted on first spindle follower in a first location when the blocking mechanism is in its second position and in a second location the blocking mechanism is in its first position, the first location and the second location being on opposite sides of the leader protrusion. Relying on a leader and follower is a simple and robust construction for transferring the rotation from the second spindle to the first spindle while allowing the first spindle to also rotate independently. Furthermore, since the unlocking direction is determined by the lock assembly itself and because, when changing the placement of the blocking mechanism, the second spindle is moved to the other side of the lock assembly, the coupling means need to be modified in order to enable transferring the rotation from the second spindle to the first spindle. Using a follower placeable in two positions provides a simple way to adapt the latch bolt actuating mechanism to the placement of the blocking mechanism.

[0015] In an embodiment of the present invention the blocking mechanism comprises a check slider which is moveable between a blocking position and an unblocking position, wherein the check slider, when in its blocking position, is configured to prevent a rotation of the second spindle. The check slider provides a reliable linkage between the blocking mechanism and the latch bolt actuating mechanism.

[0016] In a preferred embodiment of the present invention the second spindle follower has a non-cylindrical outer surface, the check slider, when in its blocking position, engaging said non-cylindrical outer surface. It is advantageous to use the second spindle follower to prevent rotation of the second spindle as this follower has an increased dimension (i.e. it is disposed around the second spindle) thus allowing a larger contact surface with the check slider, which reduces the malfunction risk.

[0017] In a preferred embodiment of the present invention the check slider is spring biased towards its unblocking position, the blocking mechanism further comprising an electrically operated lever moveable between an engaging position in which the lever engages the check slider to keep the check slider in its blocking position and

a releasing position. Providing an electrically operated lever allows the safety lock to be unblocked using a remote (i.e. a not physically connected) blocking mechanism.

[0018] In an embodiment of the present invention the blocking mechanism is user-operated to change between its blocking state and its unblocking state. This allows a user to locally unlatch the latch bolt when desired, which may not be the case when the blocking mechanism is controlled from a central command.

[0019] In an embodiment of the present invention the blocking mechanism comprises at least one of a mechanically operated mechanism, such as a key-operated mechanism or preferably a pushbutton combination locking mechanism, or an electrically operated mechanism, such as a card-reader, a fingerprint scanner, a wireless receiver, for example a Bluetooth receiver, configured to receive unlocking instructions (e.g. sent from a smartphone or the like), or preferably a pushbutton combination locking mechanism. This provides a design in flexibility and allows for the blocking mechanism to be chosen depending on the intended situation.

[0020] In an embodiment of the present invention each driver comprises a handle which is fixed to the first end of a respective one of the spindles. Handles are a common way to unlatch a latch bolt. Furthermore, fixing these directly to a respective spindle avoids the requirement of intermediary parts thus simplifying the design.

[0021] In an embodiment of the present invention the first spindle and/or the second spindle have a square cross-section which preferably has a side length of about 8 mm, the first end of the first spindle and/or the first end of the second spindle particularly comprising a slotted region. In this embodiment, one or both spindles are in conformity with European industry standards thus allowing them to be used with any desired handle. This also allows a user to use a same handle design on different closure members in the same area (e.g. as part of a same gated-off area or in a building) even though the safety lock is only used on one of the closure members.

[0022] In an embodiment of the present invention the lock assembly further comprises a dead bolt which is preferably key-operated. This allows locking the closure member irrespective of the blocking mechanism.

[0023] In an embodiment of the present invention the blocking mechanism, when in its unblocking position, does not prevent rotation of the second spindle.

[0024] The object according to the present invention is also achieved with a closure system comprising a support; a closure member, in particular a gate, hingedly mounted on the support; and the safety lock as described above. Preferably, the closure member comprises a hollow tubular member, the lock assembly being mounted inside the hollow tubular member. The lock assembly is thus preferably a morticed lock assembly which is aesthetically pleasing, which further improves the security as the lock assembly is not accessible from the outside, and which also is more space efficient than a surface mounted lock assembly.

[0025] In an embodiment of the present invention the closure system further comprises a latch keeper assembly mounted on the support, the latch keeper assembly comprising a closure member stop and the safety lock comprising an escutcheon mounted on a same side of the lock assembly as the blocking mechanism, the escutcheon comprising a stopping region configured to engage at least a part of said stop, said stopping region being preferably located between the driver on said same side of the lock assembly and an input means of the blocking mechanism. This has the advantage that the safety lock can be retrofitted onto an existing closure system without having to replace the keeper assembly. Furthermore, by using the escutcheon plate as an abutment surface, the safety lock can be fitted on a narrow closure member where there is not necessarily sufficient area of the closure member available adjacent the safety lock to act as a stopping surface. It further avoids having to provide an overly long closure member stop which extends beyond the total height of the safety lock which would be required if no part of the safety lock may be used as a stopping surface.

Brief description of the drawings

[0026] The invention will be further explained by means of the following description and the appended figures.

Figures 1A to 1C respectively show a front view, rear view and side view of a closure system comprising a safety lock according to the present invention with additional locking mechanisms on both sides of the lock.

Figures 2A to 2B show details of respective ones of figures 1A to 1B.

Figure 3 shows an exploded view of a first configuration of a first embodiment of a safety lock according to the present invention with an additional locking mechanism on one side of the lock.

Figure 4 shows an exploded view of a second configuration of the second embodiment of the safety lock shown in figure 3.

Figures 5A to 5B respectively show a front perspective view and rear perspective view of a closure system comprising a second embodiment a safety lock according to the present invention with an additional locking mechanisms on one side of the lock.

Figures 6A to 6B show details of respective ones of figures 5A to 5B.

Figure 7 shows an exploded view of a first configuration of the third embodiment of the safety lock shown in figures 6A to 6B.

Figures 8A and 8B show a longitudinal cross-section through the first configuration of the third embodiment of the safety lock shown in figures 6A to 6B in respectively the locked position and the unlatched position.

Figure 9 shows an exploded view of a second configuration of the third embodiment of the safety lock shown in figure 7.

Figure 10 shows an exploded view of a third embodiment of the safety lock according to the present invention.

Figure 11 shows an exploded view of a fourth embodiment of the safety lock according to the present invention.

Description of the invention

[0027] The present invention will be described with respect to particular embodiments and with reference to certain drawings but the invention is not limited thereto but only by the claims. The drawings described are only schematic and are non-limiting. In the drawings, the size of some of the elements may be exaggerated and not drawn on scale for illustrative purposes. The dimensions and the relative dimensions do not necessarily correspond to actual reductions to practice of the invention.

[0028] Furthermore, the terms first, second, third and the like in the description and in the claims, are used for distinguishing between similar elements and not necessarily for describing a sequential or chronological order. The terms are interchangeable under appropriate circumstances and the embodiments of the invention can operate in other sequences than described or illustrated herein.

[0029] Moreover, the terms top, bottom, over, under and the like in the description and the claims are used for descriptive purposes. The terms so used are interchangeable under appropriate circumstances and the embodiments of the invention described herein can operate in other orientations than described or illustrated herein.

[0030] Furthermore, the various embodiments, although referred to as "preferred" are to be construed as exemplary manners in which the invention may be implemented rather than as limiting the scope of the invention.

[0031] Figures 1A to 1C show different views of a closure system comprising a safety lock 40 according to the present invention. The closure system generally comprises a moveable closure member 20, such as a gate, a door, or a window, attached to a fixed support 10 such as a wall or a post. The closure system typically also includes a further fixed support 30 such as a wall or a post. The safety lock 40 is typically mounted on the moveable closure member 20 and a keeper assembly 48 is provided on the further fixed support 30, although the placement can also be reversed.

[0032] The keeper assembly 48 is shown in figures 2A and 2B and is configured for receiving a latch bolt and, optionally, a dead bolt of the safety lock 40. The keeper assembly 48 may be a surface-mounted keeper assembly disclosed in EP 3 239 440 or in EP 1 600 584. The keeper assembly 48 may also be a surface-mounted keeper assembly disclosed in European patent applications 21200493.1 or 21200445.1 which are not yet published. The keeper assembly 48 may also be a morticed keeper assembly fitted in the support 30 as disclosed in European patent application 22162702.9 which is not yet published.

[0033] Figures 2A and 2B further illustrate that the safety lock 40 may comprise multiple operating mechanisms, including, but not limited to, a pushbutton means 42, a handle means 44 and a key-cylinder 46. The key-cylinder 46 is optional in the context of the present invention and is usually only present in case the safety lock 40 is provided with a dead bolt. The remaining operating mechanisms, i.e. the pushbutton means 42 (in general a blocking mechanism) and the handle means 44 (in general drivers), are always present in the safety lock 40 according to the present invention and both operate on a latch bolt of the safety lock 40. Further details on these are described below.

[0034] A first embodiment of a safety lock according to the present invention is shown in exploded view in figure 3 in a first configuration 100 and in figure 4 in a second configuration 100'. The difference in configurations is to account for both right-handed and left-handed closure systems. More specifically, the configuration 100 shown in figure 3 is a safety lock for a right-handed closure system and the configuration 100' shown in figure 4 is a safety lock for a left-handed closure system. Both configurations of the safety lock rely on identical components and will be described jointly below.

[0035] The safety lock according to the present invention comprises a lock assembly 102. The lock assembly 102 may be a surface-mounted assembly disclosed in EP 1 118 559 or in EP 2 915 939. The lock assembly 102 may also be a surface-mounted assembly disclosed in European patent applications 21212439.0 or 21212440.8 which are not yet published. The lock assembly 102 may also be a morticed keeper assembly fitted in the closure member 20 as disclosed in EP 2 186 974 or in EP 3 216 953.

[0036] In the illustrated embodiment, the lock assembly 102 includes both a latch bolt 104 and a dead bolt 106. The dead bolt 106 is of a rotating type in the illustrated embodiment with a hook-shaped element. However, a dead bolt of the sliding type may be also be used. The dead bolt 106 is operated by means of a key cylinder 108 which is inserted through the lock assembly 102. Any conventional key cylinder 108 may be used, e.g. a single-barrel euro-profile cylinder as in the illustrated embodiment. Furthermore, as described above, the dead bolt 106 and key cylinder 108 may be omitted.

[0037] The latch bolt 104 of the lock assembly 102 is generally moveable between a latched position (shown in figures 3 and 4) and a retracted position. The safety lock comprises a latch bolt actuating mechanism configured to move the latch bolt 104 from its latching position to its unlatching position. In the illustrated embodiment, the latch bolt actuating mechanism includes a first handle

130 (i.e. a first driver) and a second handle 132 (i.e. a second driver) located on opposing sides of the lock assembly 102 that are coupled to the latch bolt 104 by means of multi-part spindle described in detail below. In the illustrated embodiment, each handle 130, 132 is mounted on an opposing end of the multi-part spindle. It will be readily appreciated that, in other embodiments, other components may be present between a handle and the multi-part spindle and/or that one or both handles are replaced with other drivers (e.g. a push bar, a button, or the like).

[0038] In the illustrated embodiment, the lock assembly is also provided with two escutcheons 126, 128 that are fixed to the closure member 20. The escutcheons 126, 128 provide a finish to the closure member 20 and aid in ensuring that any openings therein and any internal components of the safety lock are completely hidden and/or covered.

[0039] The safety lock according to the present invention further includes a blocking mechanism 134 that can be mounted on either side of the lock assembly 102 to block the operation of the handle on that side. Figure 3 illustrates the blocking mechanism 134 on a first side of the lock assembly 102 in which case the operation of handle 132 may be prevented, while figure 4 illustrates the blocking mechanism 134 on a second side (opposite the first side) of the lock assembly 102 in which case the operation of handle 132 may be prevented. The blocking mechanism 134 can for example be mounted on the outside of the closure system to prevent unauthorized access.

[0040] The multi-part spindle includes a first spindle 110 extending between a first end 110a and a second end 110b and a second spindle 112 extending between a first end 112a and a second end 112b. Both spindles 110, 112 are in line with one another with the second ends 110b, 112b being adjacent one another. The free first ends 110a, 112a are used to mount a respective handle 130, 132. The first spindle 110 extends through the lock assembly 102 and is rotatable in an unlocking direction (e.g. clockwise or counter clockwise depending on the lock assembly 102) to unlatch the latch bolt 104. The second spindle 112 is located on opposing sides of the lock assembly depending on the placement of the blocking mechanism 134. In other words, the second spindle 112 is always positioned on the side of the lock assembly 102 where the blocking mechanism 134 is present with the blocking mechanism 134 allowing to prevent a rotation of the second spindle 112.

[0041] In order to couple the spindles 110, 112 two spindle followers are provided. A first spindle follower 114 is mounted on the second end 110b of the first spindle 110 and a second spindle follower 120 is mounted on the second end 112b of the second spindle 112. In the illustrated embodiment, the second spindle follower 120 is provided with a leader protrusion 122 and a follower protrusion 118 is mounted on the first spindle follower 114. More specifically, the first spindle follower 114 is provided with two mounting openings 116a, 116b and the follower protrusion 118 is mounted in one of these depending on the configuration 100, 100' of the safety lock. In particular, the follower protrusion 118 is mounted in opening 116a for a right-handed safety lock configuration 100 and in opening 116b for a left-handed safety lock configuration 100'. Due to this assembly, the first spindle 110 is free to rotate in the unlocking direction irrespective of the second spindle 112, while a rotation of the second spindle 112 causes a rotation of the first spindle 110 since the leader protrusion 122 engages the follower protrusion 118. The safety lock thus has a free exit side where anyone can unlatch the latch bolt 104 with a blocking mechanism 134 being present on the other side.

[0042] It will be readily appreciated that other coupling means (besides the leader 122 and follower 118) may be used to couple the spindles 110, 112 so that a rotation of the second spindle 112 causes a rotation of the first spindle 110. For example, instead of having a separate follower 118, it is possible to provide two different first spindle followers (one for each configuration) which are each integrally formed.

[0043] In the illustrated embodiment, both spindles 110, 112 are European industry standard spindles, i.e. they have a square cross-section with a side length of about 8 mm with their first ends 11a, 112a being slotted. The slotted ends enable to fix the handles 130, 132 to the spindles 110, 112 using a set screw (indicated in figures 10 and 11 with reference numbers 360, 360', 460, 460'). In this manner, the handles 130, 132 cannot be pulled from their spindle 110, 112.

[0044] The spindle follower 114 further prevents the handle 130 from being pulled from the closure system. More specifically, in the illustrated embodiment, the spindle follower 114 engages an outer surface of the closure member 20. As the second end 110b of the first spindle 110 is slightly larger than the opening through the first spindle 110 (this may be achieved by having conical surfaces for example to provide a flush end face), a pulling force exerted on the handle 130 is transferred, via the first spindle 110, to the follower 114 which engages the closure member 20. A similar principle is used for the second spindle 112 with a locally thickened second end 112b so that a pulling force exerted on the handle 132 is transferred to the follower 120 which engages an inner surface of the escutcheon 126 which is fixed to the closure member 20.

[0045] Advantageously, the length of the first spindle 110 (i.e. the distance between its opposing ends 110a, 110b) can be varied in order to account for thicker or smaller closure members 20.

[0046] In the embodiment illustrated in figures 3 and 4, the blocking mechanism 134 involves a pushbutton combination lock 136 and a check slider 138 which is slideable between a blocking state and an unlocking state. In the blocking state, the check slider 138, in particular a flat surface thereof, engages a flat surface 124

of the second spindle follower 120 thereby preventing a rotation of the second spindle follower 120. Entering a correct sequence in the pushbutton combination lock 136 causes the check slider 138 to move to its unlocking state (i.e. by sliding upwards in the illustrated embodiment) thus allowing a rotation of the second spindle follower 120. The skilled person is assumed familiar with the internal operation of a pushbutton combination lock an example of which is disclosed in EP 2 886 755.

[0047] It will be readily appreciated that other mechanical blocking mechanisms may be used instead of or in addition to the pushbutton combination lock 136 to operate the check slider 138, e.g. an additional key cylinder.

[0048] In the illustrated embodiment, the escutcheon plate 126 is specifically designed to be compatible with the keeper assembly 48 (in particular a keeper assembly as disclosed in EP 3 153 645) and a mechanical blocking mechanism 134. More specifically, the escutcheon plate 126 comprises the following regions (going from top to bottom in figures 3 and 4 - the regions have been indicated in figure 10): a pushbutton combination lock cover - region 'a'; a first abutment region - region 'b'; a second spindle cover with an opening for the handle 132 - region 'c'; a lock assembly cover - region 'd'; and a second abutment region - region 'e'. When closed, the abutment regions engage a stop provided as part of the keeper assembly 48, which, as described above, is advantageous to allow existing keeper assemblies to be used with the safety lock in particular on a narrow closure member.

[0049] A second embodiment of a safety lock according to the present invention will be described with respect to figures 5A to 9. Elements of the safety lock which are identical to or which have the same function as elements in the first embodiment will be designated with the same last two digits but preceded with a '2' and will not be described. The main difference between the first and second embodiments is the blocking mechanism. More specifically, where the first embodiment relied on a mechanical blocking mechanism, the second embodiment relies on an electrically operated blocking mechanism. A main advantage of using an electrically operated blocking mechanism is that no mechanical coupling is required between the blocking mechanism input means and the lock assembly, thus alleviating design requirements, e.g. the escutcheon can be simplified.

[0050] Figures 5A to 6B show outside views of a closure system comprising a safety lock 50 according to the present invention. The closure system generally comprises a moveable closure member 20, such as a gate, a door, or a window, attached to a fixed support 10 such as a wall or a post. The closure system typically also includes a further fixed support 30 such as a wall or a post. The safety lock 50 is typically mounted on the moveable closure member 20 and a keeper assembly 48 is provided on the further fixed support 30, although the placement can also be reversed. The safety lock 50 may comprise multiple operating mechanisms, including, but not limited to, a pushbutton means 42, a handle means 54 and a key-cylinder 46. The key-cylinder 46 is optional in the context of the present invention and is usually only present in case the safety lock 50 is provided with a dead bolt. The remaining operating mechanisms, i.e. the pushbutton means 42 (in general a blocking mechanism) and the handle means 54 (in general drivers), are always present in the safety lock 50 according to the present invention and both operate on a latch bolt of the safety lock 50. From these views, it is clear that the input means 42 of the blocking mechanism are located separately from the remainder of the safety lock.

[0051] The internal structure of the safety lock 50 is shown in figure 7 in a first configuration 200 and in figure 9 in a second configuration 200'. The blocking mechanism 234 of the second embodiment is shown with a pushbutton mechanism 236 powered on batteries 240 (or any other electrical power means). Upon entry of a correct sequence using the pushbutton mechanism 236 a signal is sent (either wirelessly or using a wire) to a control component 242 located in the safety lock. It will be readily appreciated that other input means, e.g. a card reader, a fingerprint or iris scanner, may be used instead of the pushbutton mechanism 236. Furthermore, the pushbutton mechanism 236 could be entirely absent in case a wireless receiver, for example a Bluetooth receiver, is coupled to the control component 242 and is configured to receive unlocking instructions from a remote terminal (e.g. a smartphone or other user terminal). Combinations of multiple input means are also possible.

[0052] As illustrated in figure 7 to 9, the control component 242 is coupled to a moveable lever 244, in particular a lever 244 which is pivotable about pivot 246 between an engaging position (shown in figure 8A) and a releasing position (shown in figure 8B). An electromagnet (not shown) may be used to control the lever 244. A check slider 238 is further provided which is spring-biased, by means of springs 254. The check slider 238 has a flat engagement surface 250 which abuts, in particular to top side thereof, against a flat surface 224 of the second spindle follower 220. The free end 248 of the pivotable lever 244 engages the flat engagement surface 250, in particular the bottom side thereof. A recessed region 252 is provided adjacent the engagement surface 250.

[0053] The operation is as follows. In the blocked state of the blocking mechanism (see figure 8A), the pivotable lever 244 engages the bottom of the check slider 238 thus preventing a sliding motion thereof. On the opposing side of the engagement surface 250, the second spindle follower 214 is also engaging the engagement surface 250. In this manner, the handle 232 cannot be rotated. When the correct sequence is input in the pushbutton mechanism 236 (or an unlocking signal is otherwise provided to the control component 242), the lever 244 is moved so that its free end 248 is positioned adjacent or in the recessed region 252. The lever 244 thus no longer prevents a sliding motion of the check slider 238. A rotation of the handle 252 will cause a rotation of the second spindle follower 220 thereby moving the check slider 238

downwards against the force of the springs 254.

[0054] It will be readily appreciated that other mechanisms are possible to allow preventing a rotation of the second spindle follower 220. For example, the check slider 238 could be omitted with the free end 248 directly engaging the second spindle follower 220, in particular the flat surface 224 thereof.

[0055] The safety locks described above in reference to figures 3 to 9 have a blocking mechanism on a single side of the closure system only. However, it is also possible to provide a safety lock 300 with two blocking mechanisms, i.e. one on each side of the closure system. Such an embodiment is illustrated in figures 1A to 2B. Figure 10 shows an exploded view of a safety lock with a mechanically operated double blocking mechanism, i.e. the blocking mechanism shown in figures 3 and 4 is present on both sides of the lock assembly. Figure 11 shows an exploded view of a safety lock with an electrically operated double blocking mechanism, i.e. the blocking mechanism shown in figures 7 and 9 is present on both sides of the lock assembly. Elements of the safety lock which are identical to or which have the same function as elements in the first and second embodiment will be designated with the same last two digits but preceded with a '3' (figure 10) and a '4' (figure 11) and will not be described.

[0056] The main difference in such a double blocking mechanism embodiment is that the multi-part spindle has three spindle elements 310, 312, 312' and 410, 412, 412' (reference numbers with a 'prime' in figures 10 and 11 designate identical components on opposing sides of the lock assembly 302, 402). More specifically, the construction of the second spindle with spindle follower is present on both side of the first spindle, which is thus also provided with spindle followers on each end. As such, the latch bolt actuating mechanism in such an embodiment comprises two outer spindles 312, 312', 412, 412' the rotation of which can be prevented by a respective blocking mechanism 334, 334', 434, 434' and an inner spindle 310, 410 extending through the lock assembly 302, 402. Due to the spindle followers 314, 314', 320, 320', 414, 414', 420, 420' with leader protrusions and follower protrusions, a rotation of either outer spindle causes a rotation of the inner spindle, which inner spindle is free to rotate irrespective of the outer spindles.

[0057] Although aspects of the present disclosure have been described with respect to specific embodiments, it will be readily appreciated that these aspects may be implemented in other forms within the scope of the invention as defined by the claims.

Claims

1. A safety lock (100, 200, 300, 400) for a hinged closure member, the safety lock comprising:

- a lock assembly (102, 202, 302, 402) configured to be mounted on the hinged closure member and comprising a latch bolt (104, 204) moveable between a latching position and an unlatching position;
- a latch bolt actuating mechanism configured to move the latch bolt from its latching position to its unlatching position, the latch bolt actuating mechanism comprising:

  - a first driver (130, 230, 330, 430) mounted on a first side of the lock assembly; and
  - a second driver (132, 232, 332, 432) mounted on a second side of the lock assembly, said second side being opposite said first side; and

- a blocking mechanism (134, 234, 334, 434) having a blocking state and an unblocking state, the blocking mechanism being configured to be selectively mounted in a first position on said first side of the lock assembly to prevent the first driver from moving the latch bolt to its unlatching position when the blocking mechanism is in its blocking state and in a second position on said second side of the lock assembly to prevent the second driver from moving the latch bolt to its unlatching position when the blocking mechanism is in its blocking state,

characterized in that the latch bolt actuating mechanism comprises:

- a first spindle (110, 210, 310, 410) extending through the lock assembly and being rotatable about its longitudinal axis in an unlocking direction to move the latch bolt from its latching position to its unlatching position, the first spindle having a first end (110a, 210a) and a second end (110b, 210b), the first driver being coupled to the first end of the first spindle when the blocking mechanism is in its second position and the second driver being coupled to the first end of the first spindle when the blocking mechanism is in its first position;
- a second spindle (112, 212, 312, 412) extending away from the first spindle and being rotatable about its longitudinal axis in said unlocking direction, the second spindle having a first end (112a, 212a) and a second end (112b, 212b) with the second end of the second spindle being adjacent the second end of the first spindle, the first driver being coupled to the first end of the second spindle when the blocking mechanism is in its first position and the second driver being coupled to the first end of the second spindle when the blocking mechanism is in its second position, the blocking mechanism, when in its blocking state, being configured to prevent a ro-

tation of the second spindle;
- a first spindle follower (114, 214, 314, 414) fixed on the second end of the first spindle;
- a second spindle follower (120, 220, 320, 420) fixed on the second end of the second spindle; and
- coupling means for coupling the first spindle follower and the second spindle follower such that a rotation of the second spindle follower in said unlocking direction causes a rotation of the first spindle follower in said unlocking direction.

2. The safety lock according to claim 1, **characterized in that** the first spindle is rotatable in the unlocking direction irrespective of the state of the blocking mechanism.

3. The safety lock according to claim 1, **characterized in that** the safety lock comprises a further blocking mechanism (334', 434') having a blocking state and an unblocking state, the further blocking mechanism being configured to be selectively mounted in a first position, when the blocking mechanism is in its first position, on said second side of the lock assembly to prevent the second driver from moving the latch bolt to its unlatching position when the further blocking mechanism is in its blocking state and in a second position, when the blocking mechanism is in its second position, on said first side of the lock assembly to prevent the first driver from moving the latch bolt to its unlatching position when the further blocking mechanism is in its blocking state, and
in that the latch bolt actuating mechanism further comprises:

- a third spindle (312', 412') extending away from the first spindle and being rotatable about its longitudinal axis in said unlocking direction, the third spindle having a first end and a second end with the second end of the third spindle being adjacent the first end of the first spindle, the second driver being coupled to the first end of the third spindle when the further blocking mechanism is in its first position and the first driver being coupled to the first end of the third spindle when the further blocking mechanism is in its second position, the further blocking mechanism, when in its blocking state, being configured to prevent a rotation of the third spindle;
- a third spindle follower (314', 414') fixed on the first end of the first spindle;
- a fourth spindle follower (320', 420') fixed on the second end of the third spindle; and
- further coupling means for coupling the third spindle follower and the fourth spindle follower such that a rotation of the fourth spindle follower in said unlocking direction causes a rotation of the third spindle follower in said unlocking direction.

4. The safety lock according to any one of the preceding claims, **characterized in that** the coupling means comprise a leader protrusion (122, 222) provided on the second spindle follower and a follower protrusion (118, 218, 318, 418) provided on the first spindle follower, the leader protrusion being configured to engage the follower protrusion to rotate the first spindle follower in said unlocking direction when the second spindle is rotated in said unlocking direction.

5. The safety lock according to claim 4, **characterized in that** the follower protrusion is formed by a separate element mounted on first spindle follower in a first location (116a, 216a) when the blocking mechanism is in its second position and in a second location (116b, 216b) the blocking mechanism is in its first position, the first location and the second location being on opposite sides of the leader protrusion.

6. The safety lock according to any one of the preceding claims, **characterized in that** the blocking mechanism comprises a check slider (138, 238) which is moveable between a blocking position and an unblocking position, wherein the check slider, when in its blocking position, is configured to prevent a rotation of the second spindle.

7. The safety lock according to claim 6, **characterized in that** the second spindle follower has a non-cylindrical outer surface (124, 224), the check slider, when in its blocking position, engaging said non-cylindrical outer surface.

8. The safety lock according to claim 6 or 7, **characterized in that** the check slider is spring biased towards its unblocking position, the blocking mechanism further comprising an electrically operated lever (244) moveable between an engaging position in which the lever engages the check slider to keep the check slider in its blocking position and a releasing position.

9. The lock according to any one of the preceding claims, **characterized in that** the blocking mechanism comprises at least one of a mechanically operated mechanism, such as a key-operated mechanism or preferably a pushbutton combination locking mechanism, or an electrically operated mechanism, such as a card-reader, a fingerprint scanner, a wireless receiver, for example a Bluetooth receiver, configured to receive unlocking instructions, or preferably a pushbutton combination locking mechanism.

10. The lock according to any one of the preceding claims, **characterized in that** each driver comprises a handle which is fixed to the first end of a respective

one of the spindles.

11. The lock according to any one of the preceding claims, **characterized in that** the first spindle and/or the second spindle have a square cross-section which preferably has a side length of about 8 mm.

12. The lock according to any one of the preceding claims, **characterized in that** the first end of the first spindle and/or the first end of the second spindle comprises a slotted region.

13. A closure system comprising a support (10) and a closure member (20), in particular a gate, hingedly mounted on the support, **characterized in that** the closure system further comprises the safety lock (40, 50) according to any one of the preceding claims mounted on the closure member.

14. The closure system according to claim 13, **characterized in that** the closure member comprises a hollow tubular member, the lock assembly being mounted inside the hollow tubular member.

15. The closure system according to claim 14, **characterized in that** the closure system further comprises a latch keeper assembly (48) mounted on the support, the latch keeper assembly comprising a closure member stop and the safety lock comprising an escutcheon mounted on a same side of the lock assembly as the blocking mechanism, the escutcheon comprising a stopping region configured to engage at least a part of said stop, said stopping region being preferably located between the driver on said same side of the lock assembly and an input means of the blocking mechanism.

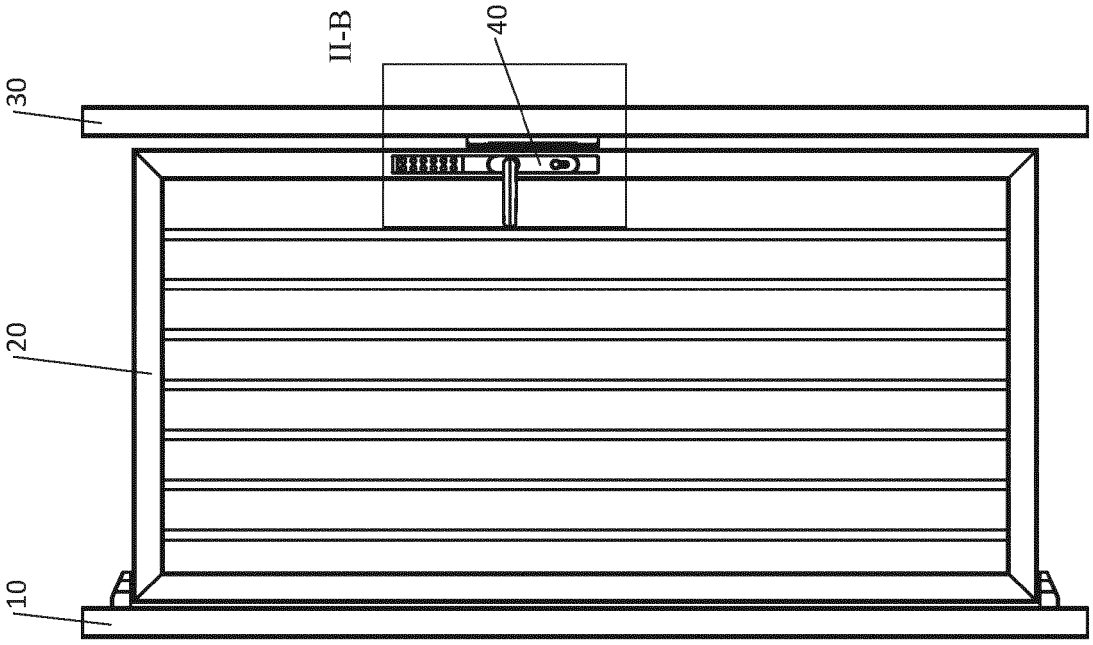


Fig. 1B

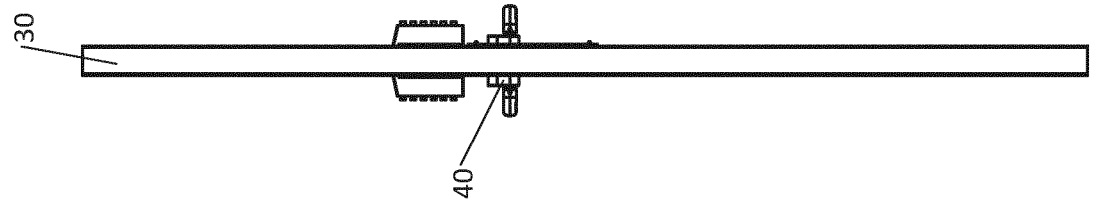


Fig. 1C

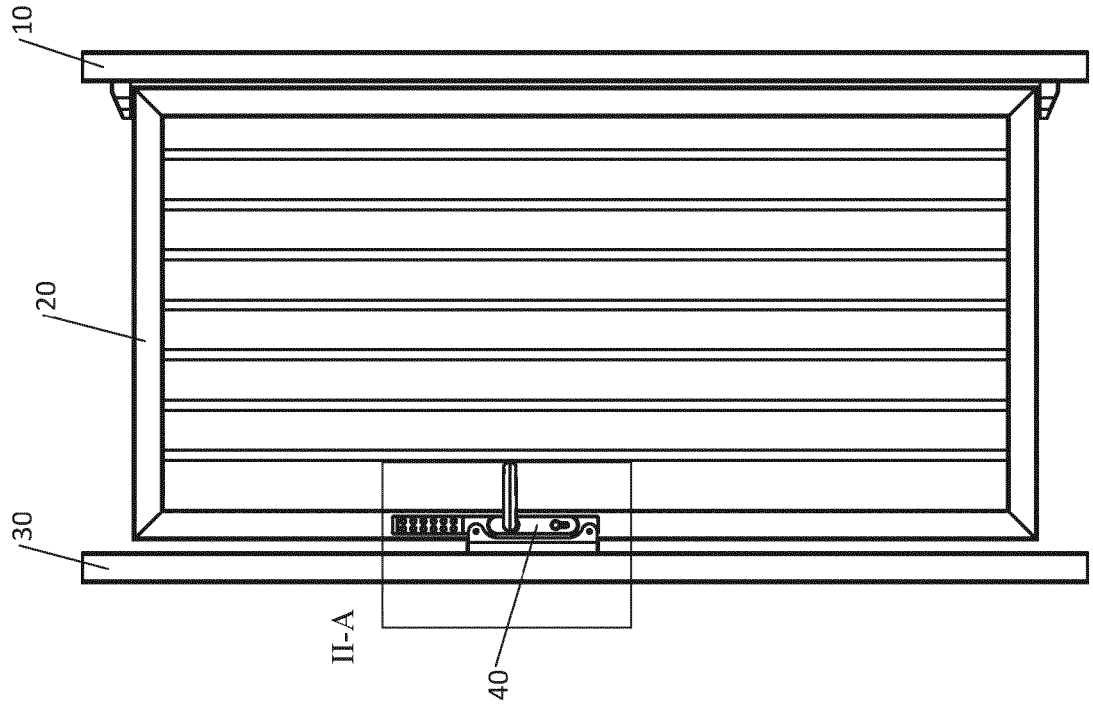


Fig. 1A

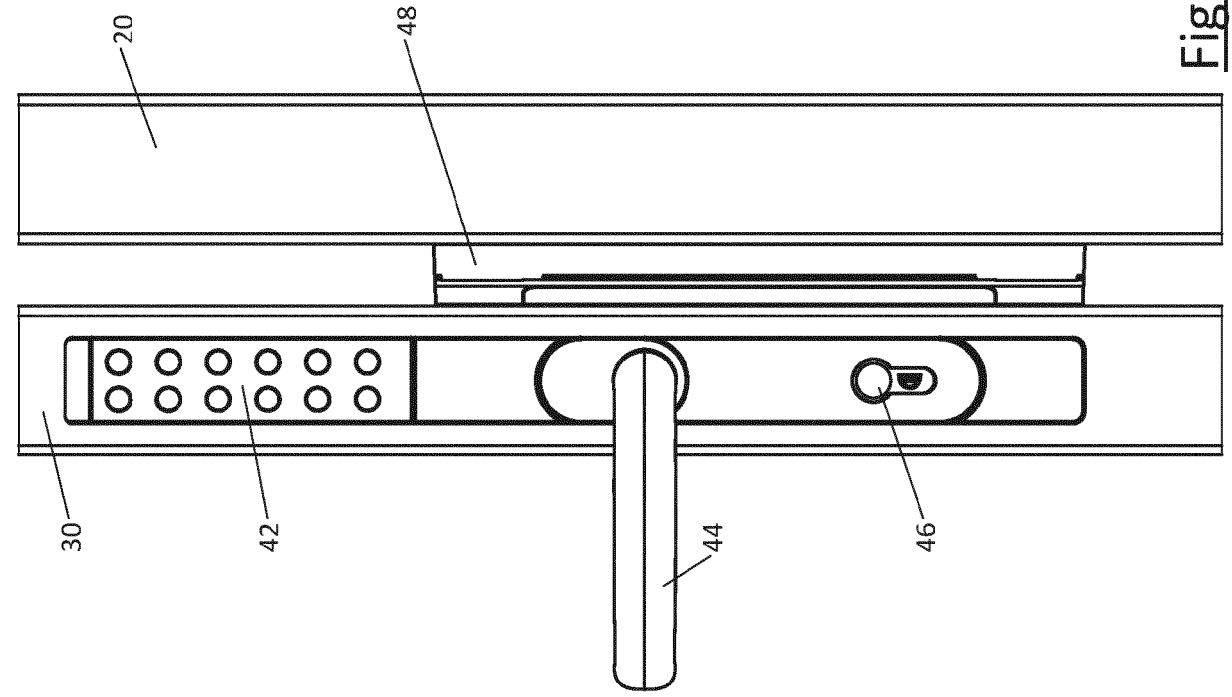


Fig. 2B

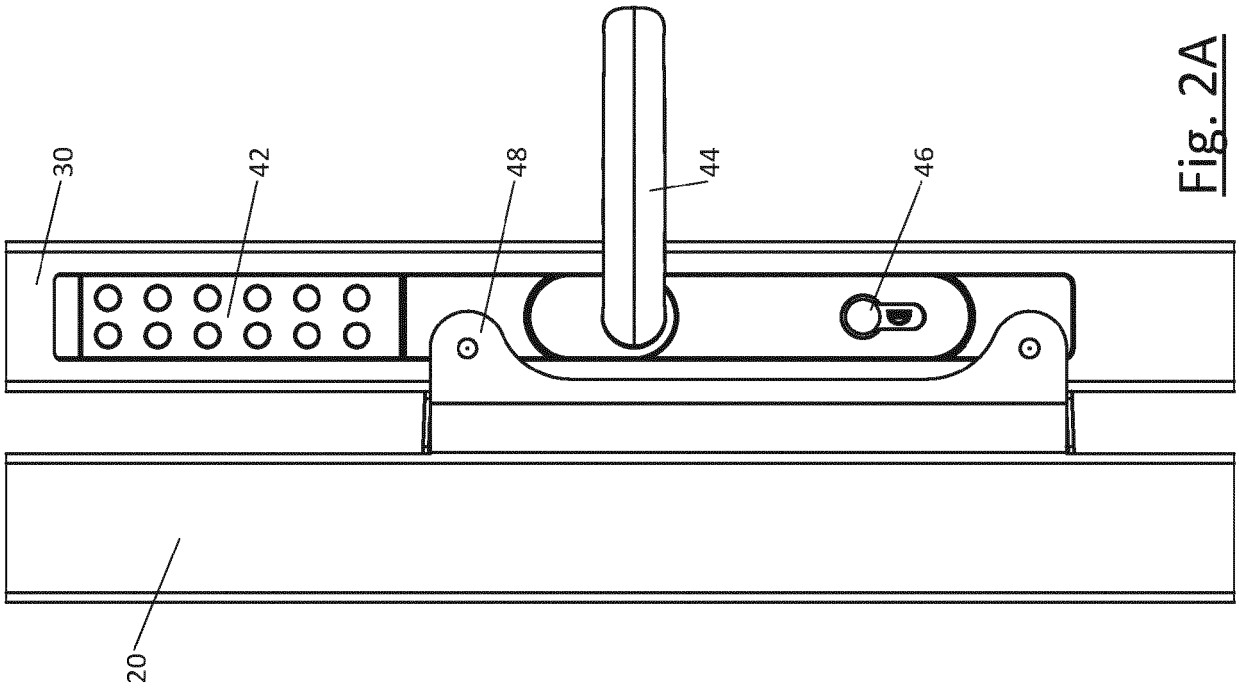
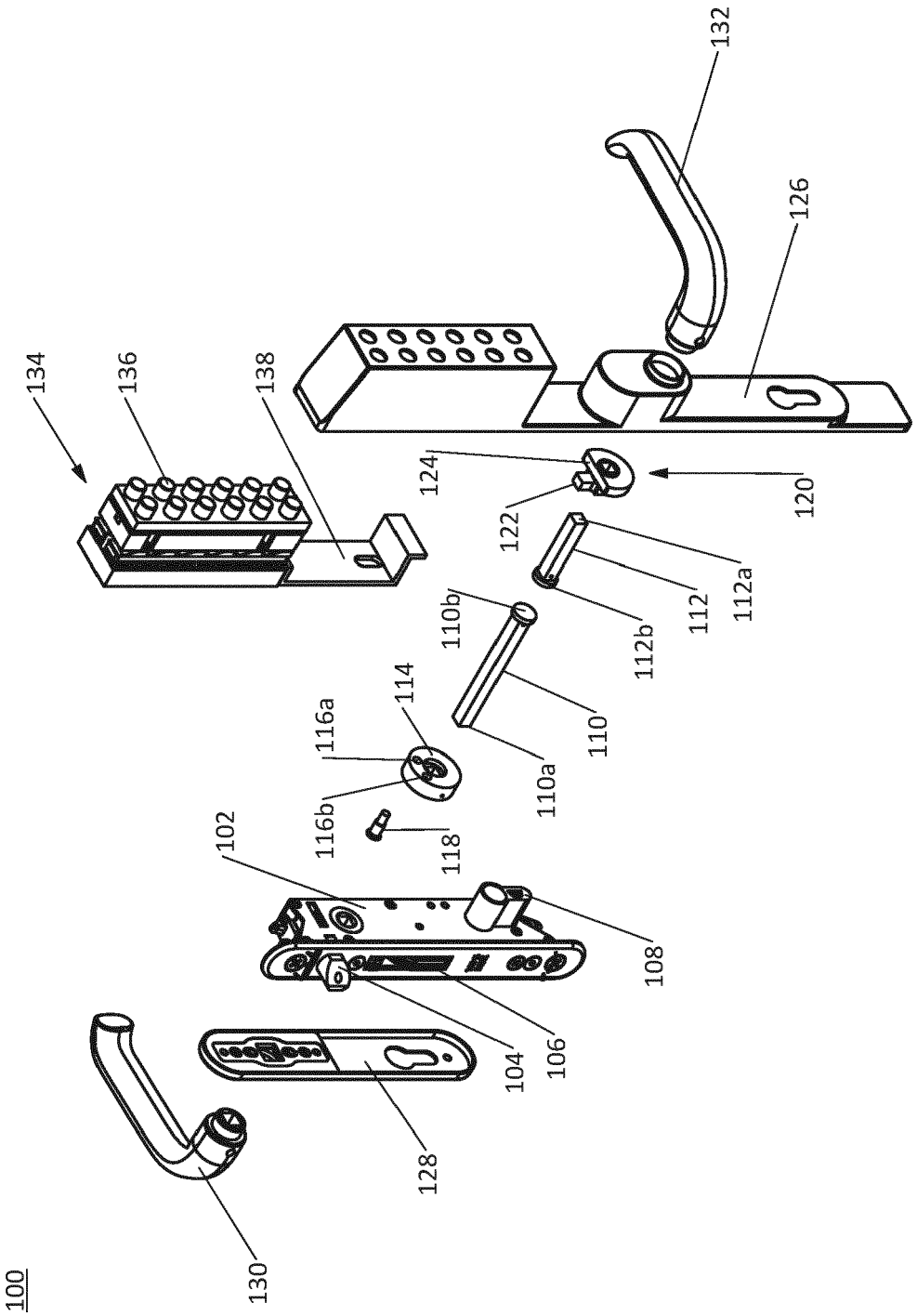


Fig. 2A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138

Fig. 3

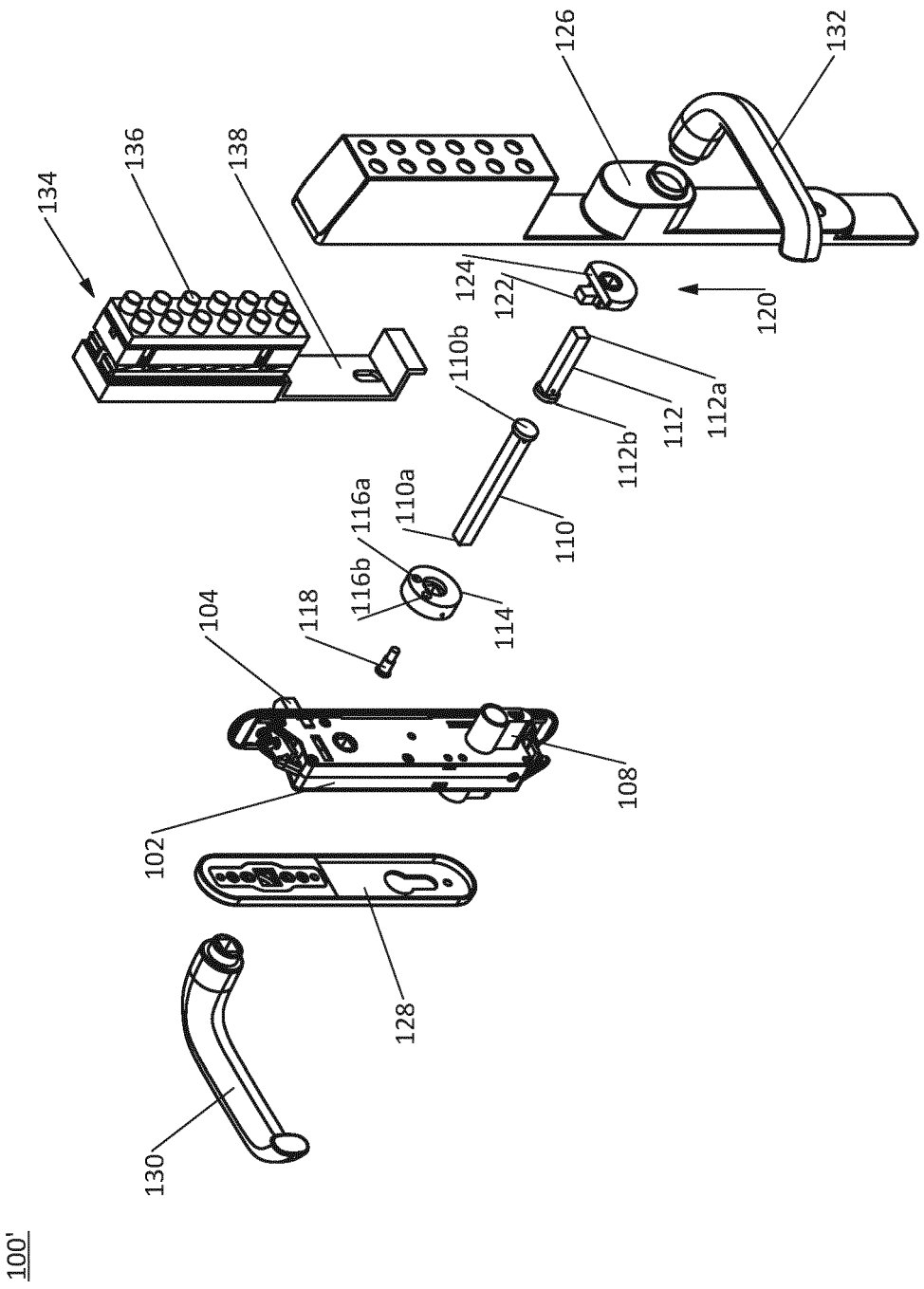
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Fig. 4

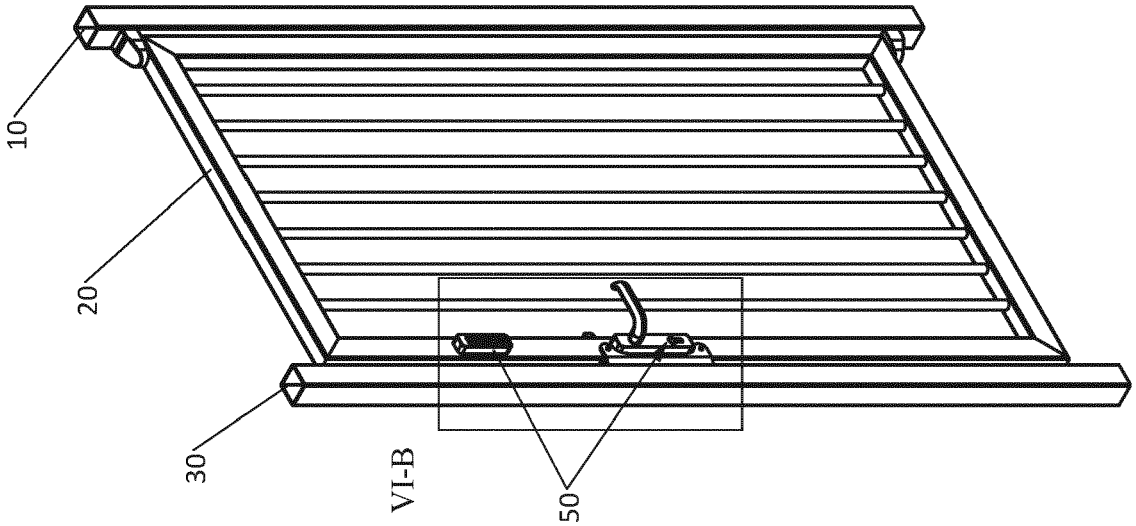

Fig. 5B

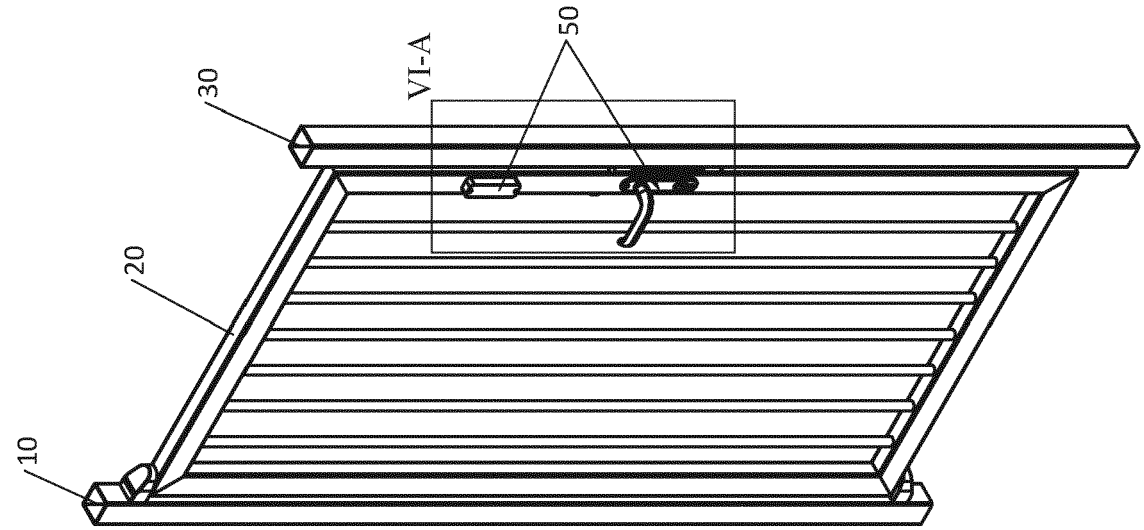

Fig. 5A

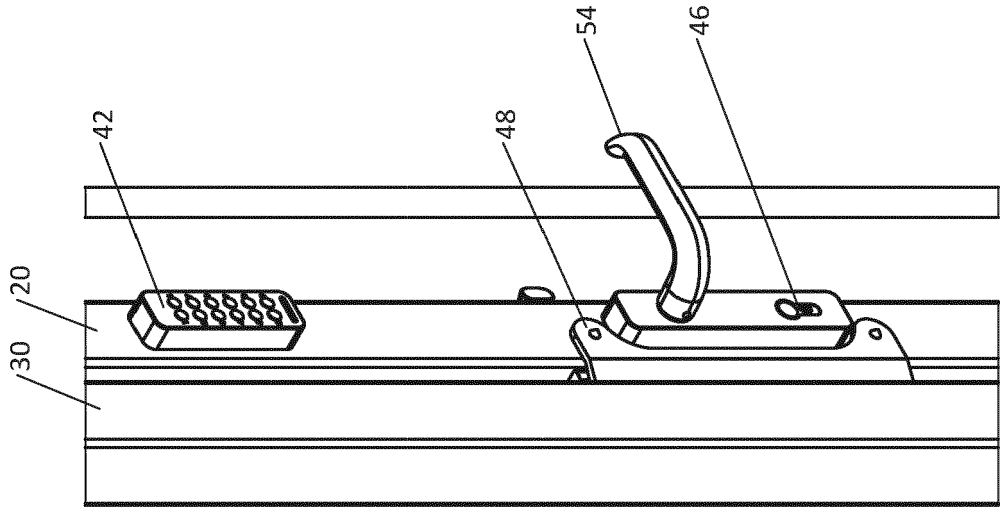

Fig. 6B

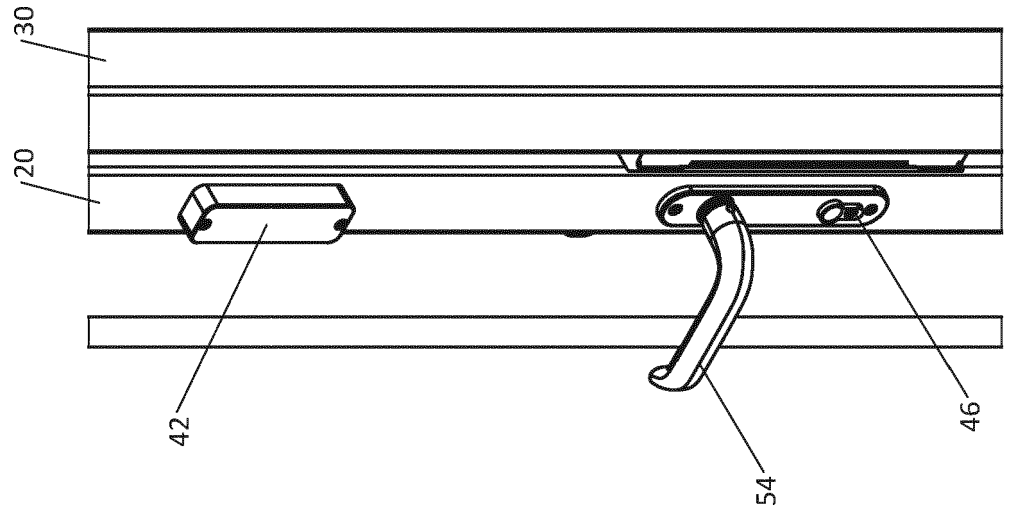

Fig. 6A

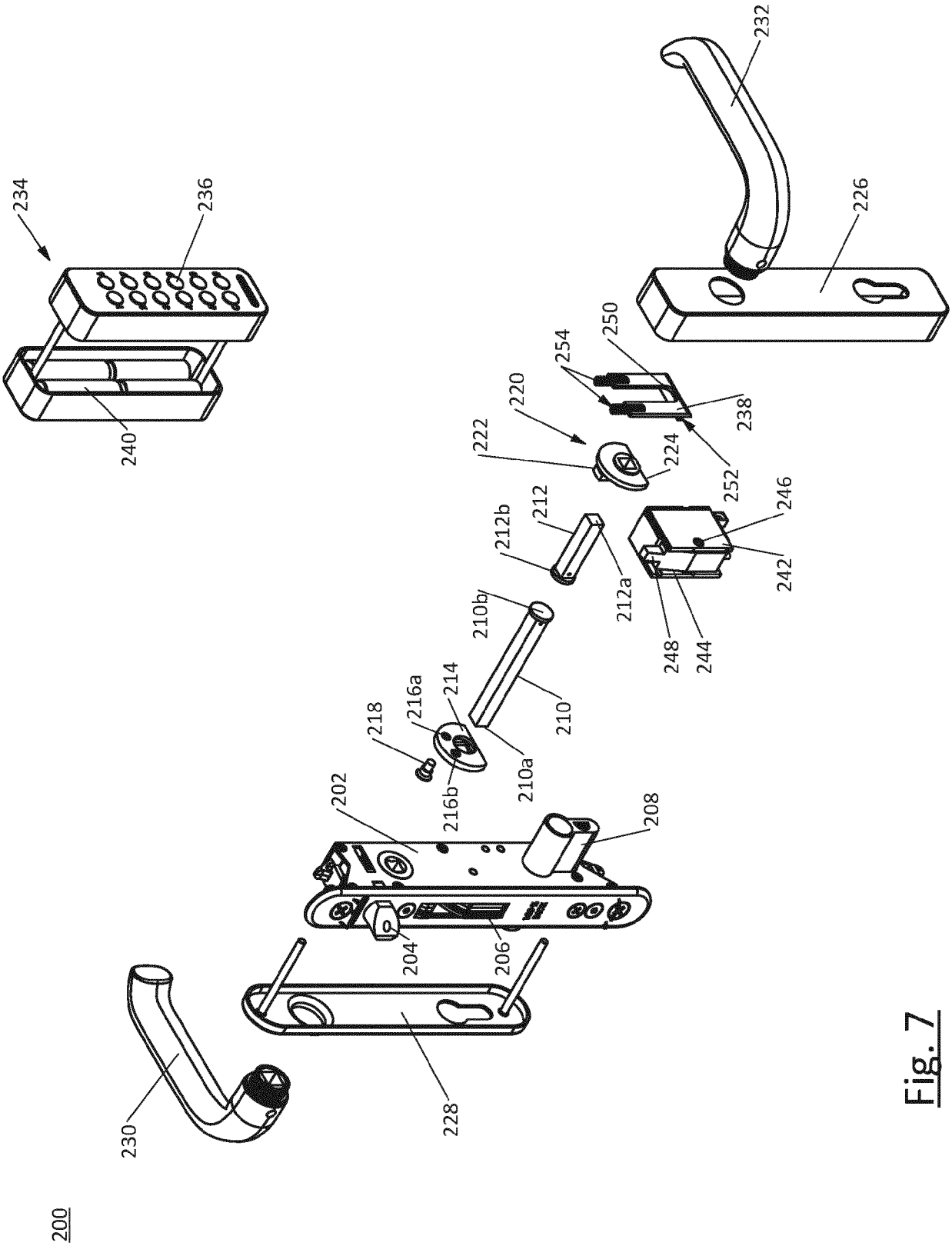
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Fig. 7

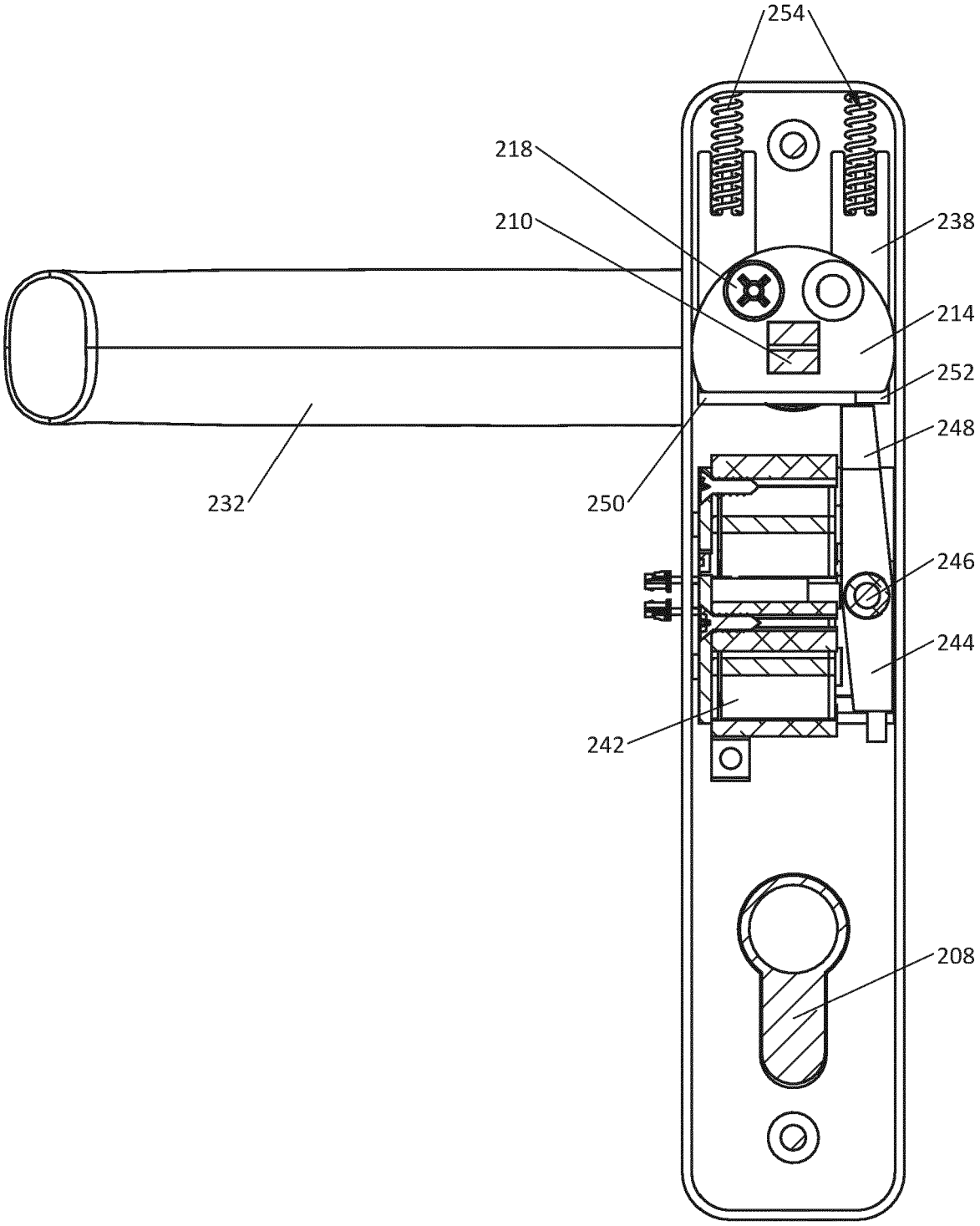

Fig. 8A

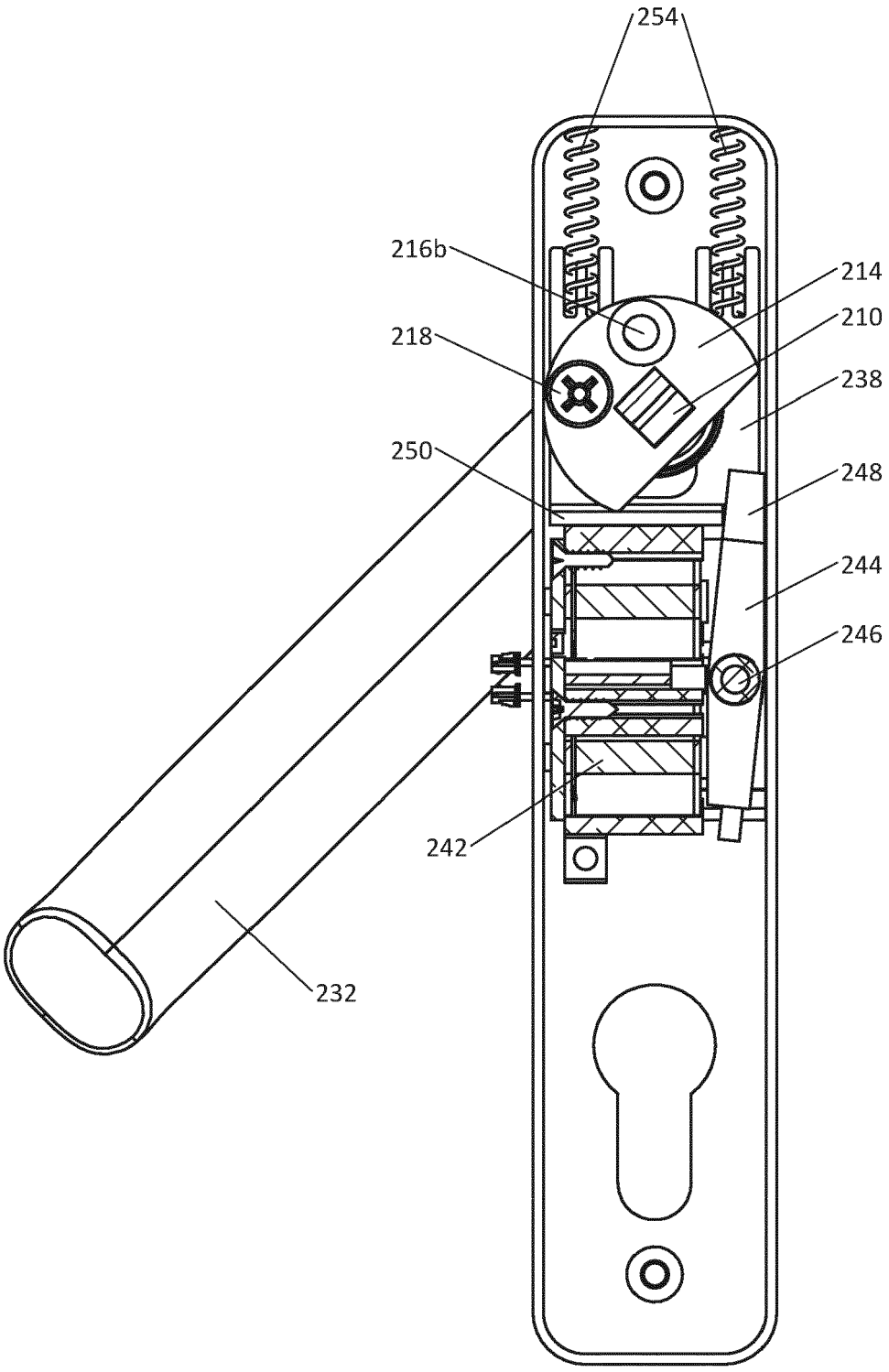

Fig. 8B

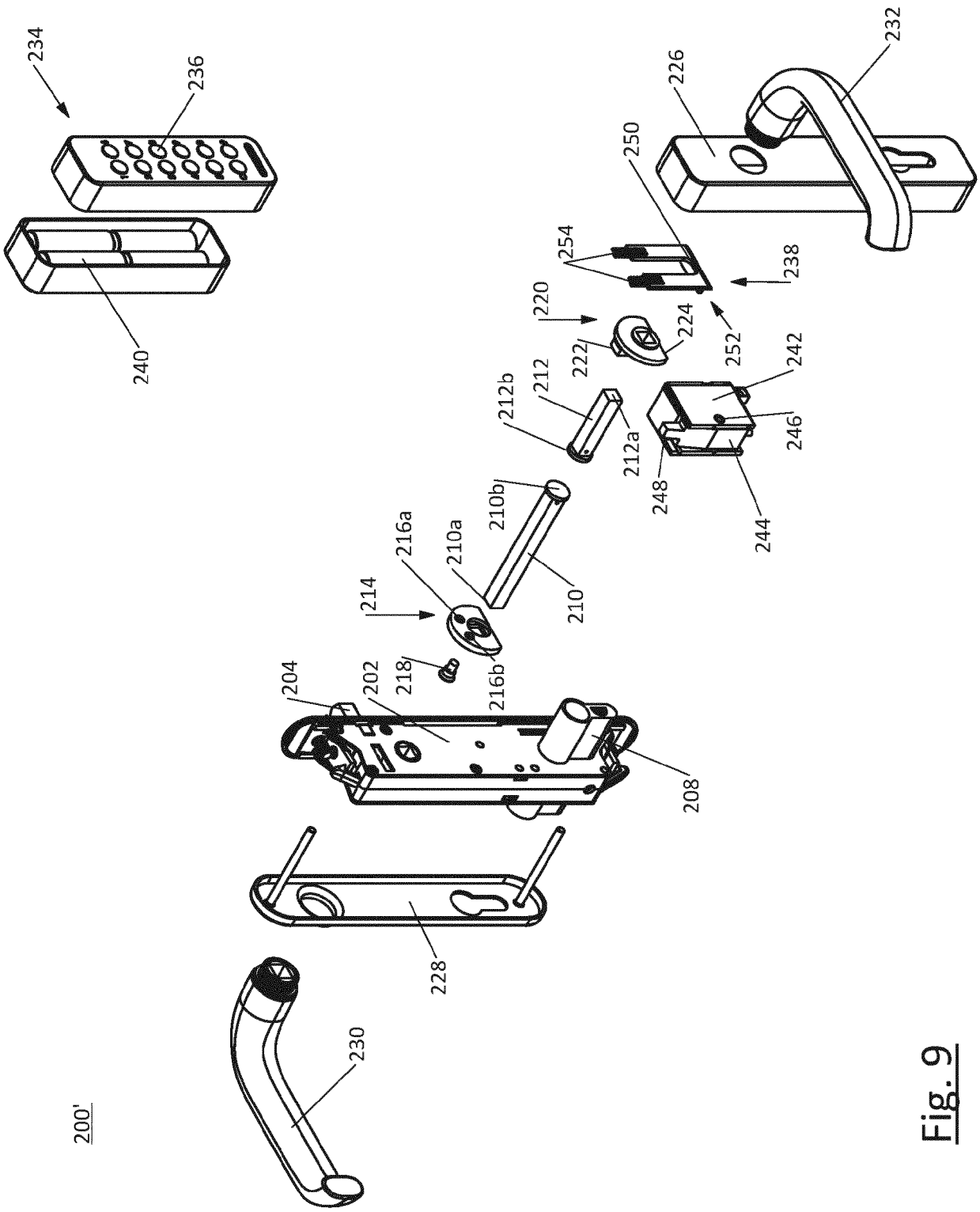
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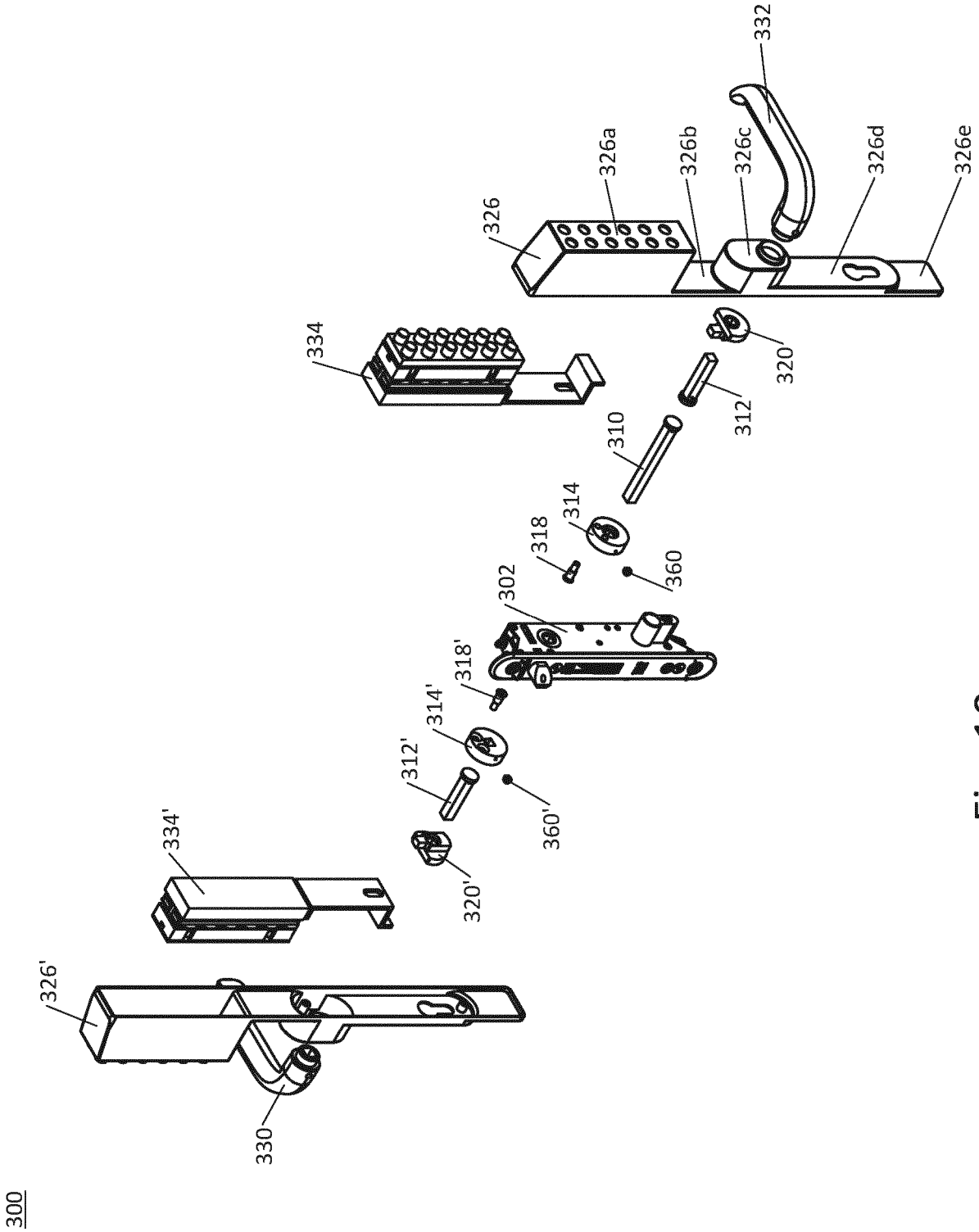
Fig. 9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320'
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314'
318'
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326a
326b
326c
326d
326e
332

Fig. 10

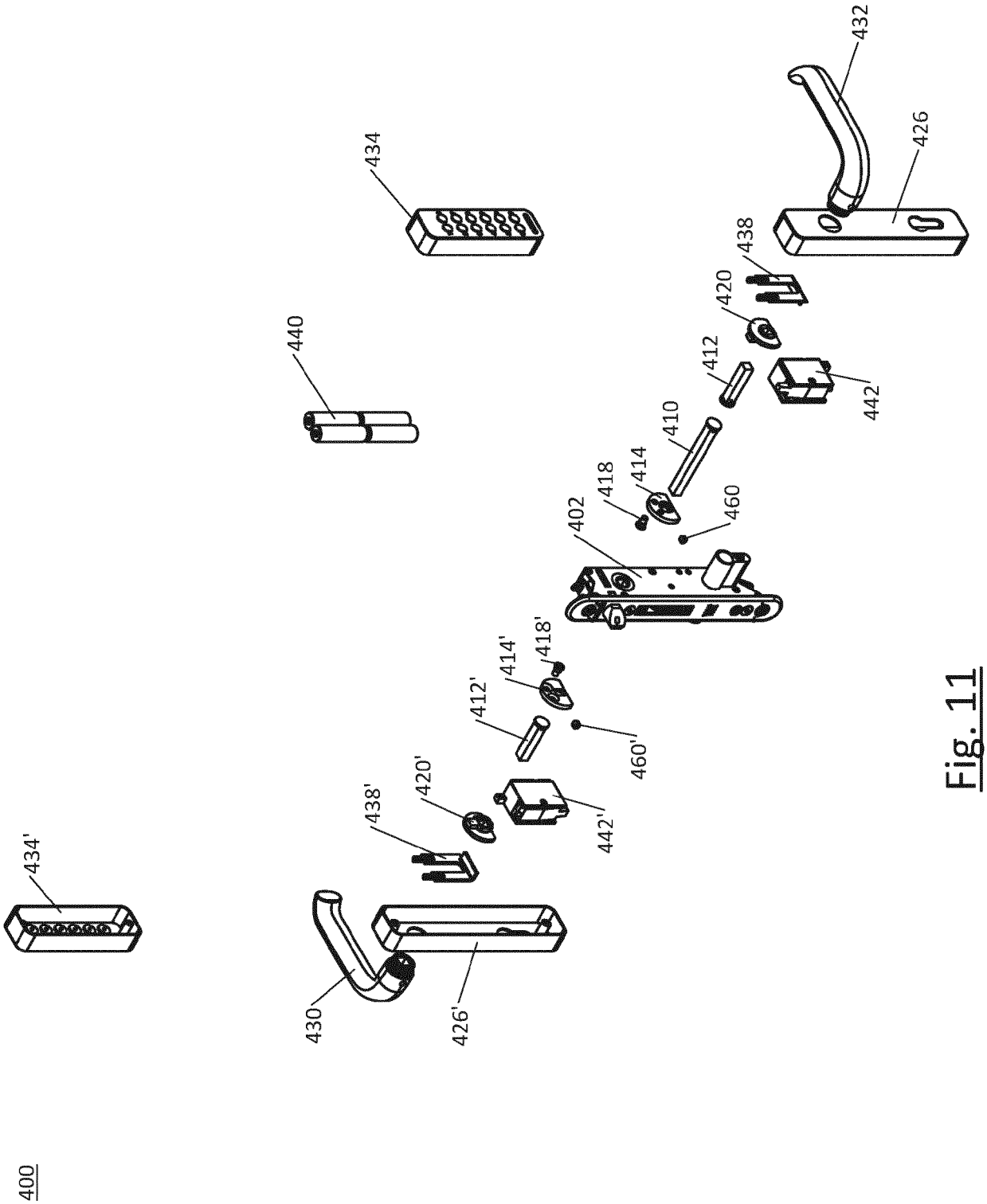
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Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
EP 22 18 6056

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 433 301 A1 (NYA SYSTEM & IDEER AB [SE]) 26 June 1991 (1991-06-26) * column 3, line 24 - column 5, line 10 * * column 6, line 3 - column 7, line 12 * * column 7, line 54 - line 58 * * column 8, line 30 - line 42 * * figures 3-14 *	1-15	INV. E05B13/00 E05B37/16 E05B47/06 E05B63/04 E05B63/16 E05B65/00
X	GB 2 314 118 A (VINGCARD AS [NO]) 17 December 1997 (1997-12-17) * page 6, line 2 - line 22 * * page 7, line 17 - page 8, line 35 * * claim 6 * * figures 1-4 *	1-15	ADD. E05B15/00 E05B63/00
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E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 January 2023	Antonov, Ventseslav

CATEGORY OF CITED DOCUMENTS

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16-01-2023

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