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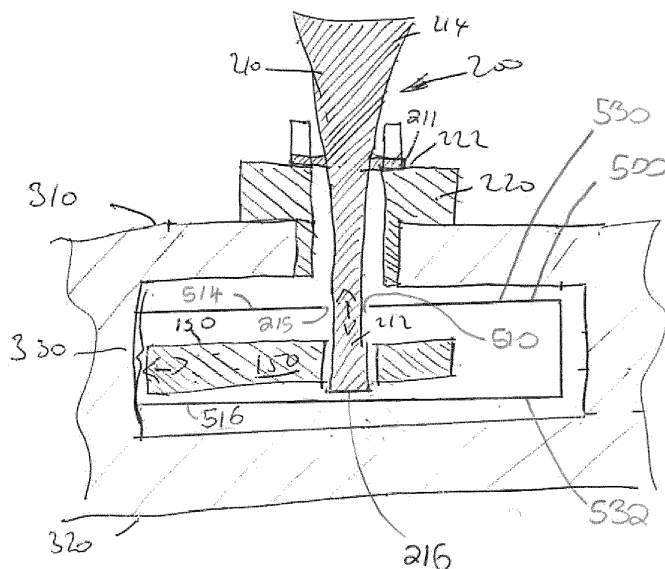
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(54) **IMPROVED DOOR LOCKING MECHANISM**

(57) There is provided a door lock system including a handle assembly and a secondary lock. The secondary lock is attachable to an inside of a door or door frame. The handle assembly is attachable to the door and is substantially in accordance with known handle assemblies, and includes a locking mechanism. The locking mechanism includes an internal mechanism and a bolting system that has one or more moving parts to engage and disengage the bolting system. The secondary lock comprises a bolt and activating mechanism, wherein the activating mechanism can be actuated to engage the bolt

with one of said moving parts of the locking mechanism. Here, the actuating mechanism has a reset position, wherein the bolt is restrained clear of the moving part, such that the handle assembly is normally operable, and an engaged position, wherein the bolt is engaged with the moving part such that engagement between the bolt and moving part prevents the moving part from moving. Thus, when the secondary lock is actuated to the engaged position, the handle assembly remains locked even when a cylinder lock that operationally locks and unlocks the locking mechanism is defeated.

FIGURE 6B



Description

[0001] The present invention relates to an improved door locking mechanism and in particular, to a door locking system and method of operating a door locking system that prevents the door locking system from being opened when an intruder attempts to defeat the door locking system without an operational key.

Background

[0002] Door locking systems having a handle assembly comprising a handle, locking mechanism and cylinder lock are known and are supplied in a wide variety of styles and operational procedures. Whilst a specific exemplary handle assembly will be described, it will be appreciated that the principals of the herein described invention can be readily adapted and applied to many known handle assemblies that operate using the same principals. Moreover, where handle assemblies are used to lock other entrances, for instance on windows or hatches or other lockable entrances; it will be appreciated that the invention can be adapted and applied to these assemblies also. However, the invention's primary purpose is to provide a deterrent to intruders attempting to break into a building such as a home or office through a locked door. Consequently, the background art and invention is herein described by reference to, but not, unless stated otherwise, limited to, door locking systems.

[0003] Door locking systems are a primary security function to prevent unauthorised entry to a building. For instance inevitably every home will have at least one, if not multiple, entrance doors that need to be locked to prevent unauthorised entry. Known door assemblies comprising a door and door locking system are provided in a variety of styles and structures. For instance, solid timber doors are known as are composite doors and metal doors. The doors are prefabricated or morticed post manufacture to receive hardware such as hinges and the door locking system.

[0004] Typically, the handle assembly includes a handle that is operational to act on a locking mechanism. Here, the locking mechanism includes a casing housing an internal mechanism that is housed in the casing, and a bolt system, wherein the bolt system includes the one or more bolts and the handle acts on the internal mechanism to engage and disengage the bolts with catch plates in the frame surrounding the door. Unless the bolts are disengaged from the frames, the door is prevented from opening by engagement in recesses in the door frame. For instance lifting a lever handle moves the bolts into a locked position wherein the bolts are engaged with the frame, and levering the handle downwards, moves the bolts to disengage the door frame so that the door opens.

[0005] Known handle assemblies include a cylinder lock that, when locked, prevents the handle from disengaging the bolts. Cylinder locks are known. Typically, the

cylinder lock includes a cam that is turned when an appropriate key is fitted into the cylinder and turned. Here, the cam is used to prevent movement of the handle directly or by preventing movement of the internal mechanism. Thus when the handle is attempted to be operated without unlocking the cylinder, the door remains locked

[0006] Whilst known door lock systems are designed to prevent attempts to defeat the handle assembly without using an appropriate key, it is known that, for instance, home intruders adapt to find methods of disabling the handle assembly and gaining access to the building. For instance, it is known that cylinder locks can be defeated by "lock snapping" wherein the cylinder lock is snapped allowing the cam to be manually moved to the unlocked position from the outside, which frees the handle to turn and disengage the bolts allowing access to the building.

[0007] Lock cylinders and handle assemblies are continually evolving and handle assemblies are known that attempt to prevent the cam from being moved once the cylinder lock is snapped. However, intruders also evolve and it is known to defeat the handle assembly using a blow torch. Though for obvious reasons a detailed explanation is not given here, the intruders use the blow torch to gain access to and disable the cam from preventing the handle from disengaging the bolts.

[0008] Although intruders gaining access to a building at any time often results in loss of possessions and property, it is particularly unwelcome when homeowners are inside the property. This often incites fear in the homeowner as intruders have contact with them to locate the desired possession or property. It would therefore be advantageous to provide a door lock system that can better prevent unauthorised access when locked from the inside. Moreover, it would be advantageous to provide a door lock system that can be quickly operated after the door is opened and often whilst the key holder is carrying items or distracted by other actions or priorities, for instance deactivating alarms or supervising pets or children.

[0009] It is therefore an aim of the present invention to overcome at least one of the above or other problems. It is a further aim to provide an improved lock system that prevents the lock system from being defeated and in particular, from being defeated when locked from the inside.

Summary

[0010] According to the present invention there is provided a lock system, a closure assembly including the lock system and a method of operating a lock system as set forth in the appended claims. Other features of the invention will be apparent from the dependent claims, and the description which follows.

[0011] According to a first aspect there is provided a lock system, such as a door lock system. According to an exemplary embodiment the door lock system includes a handle assembly and a secondary lock. The secondary lock is attachable to an inside of a door or door frame.

The handle assembly is attachable to the door and is substantially in accordance with known handle assemblies, and includes a locking mechanism. The locking mechanism includes an internal mechanism and a bolting system that has one or more moving parts to engage and disengage the bolting system. The secondary lock comprises a bolt and activating mechanism, wherein the activating mechanism can be actuated to engage the bolt with one of said moving parts of the locking mechanism. Here, the actuating mechanism has a reset position, wherein the bolt is restrained clear of the moving part, such that the handle assembly is normally operable, and an engaged position, wherein the bolt is engaged with the moving part such that engagement between the bolt and moving part prevents the moving part from moving. Thus, when the secondary lock is actuated to the engaged position, the handle assembly remains locked even when a cylinder lock that operationally locks and unlocks the locking mechanism is defeated.

[0012] Advantageously, because the secondary lock is separate to the handle assembly, the secondary lock can be quickly operated and operated without the cylinder lock key to provide quick and easy prevention of access. When the cylinder lock is also locked, the handle assembly remains locked even if an intruder manages to disable the cylinder and / or handle assembly.

[0013] In the exemplary embodiments, the bolt of the secondary lock is moveable substantially perpendicularly to an inside face of the door. Here, the bolt moves linearly. Suitably, the locking mechanism is arranged in a recess (or cavity) within the door so that the mechanism is hidden from an inside and an outside of the door. Here, the secondary lock is arranged on an inside of the door or frame and arranged so that the secondary lock extends through an inside area of the door or frame in order to engage said moving part.

[0014] Whilst the bolt of the secondary lock may abut an edge surface of said moveable part, in the exemplary embodiments, the bolt of the secondary lock engages a recess (or aperture) formed in said moveable part. Here the recess/aperture becomes aligned with the bolt of the secondary lock when said moveable part is in a position wherein the bolting system is engaged with the door frame. Suitably, the recess is an aperture through said moveable part. In this case, it is advantageous if the bolt of secondary lock penetrates (i.e. extends) through the aperture as the deeper the bolt of the secondary lock engages through the moveable part, the stronger the secondary lock is to resist shear stresses generated when the handle assembly is operated in an attempt to move said part to open the door. Moreover, preferably, a distal tip of the bolt of the secondary lock penetrates the door or door frame such that tip is supported in a recess (i.e. a location feature provided as a bolt tip engagement space). Thus, the bolt is provided with greater resistance to bending forces generated when the moving part is urged to move away from the locked position.

[0015] In the exemplary embodiments, the secondary

lock includes a casing to house the bolt and actuator. Suitably, the housing arranges the actuator so as to be accessible from the inside. In a preferred embodiment, the secondary lock is installed on an inside face of the door. Here an aperture is machined into the inside face of the door and the lock casing attached to the door so that the casing and / or the bolt extend through the aperture to engage said moving part. It is known to use a jig to machine the recesses and holes in the frame to fit a particular style of handle assembly, and it is envisaged the jig will be adapted to include an appropriate guide to machine the aperture for the secondary lock in order that when fitted, the secondary lock is appropriately aligned with the handle assembly such that the bolt of the secondary lock is correctly aligned with the recess/aperture of the moving part.

[0016] In one exemplary embodiment, the secondary lock acts on the internal mechanism of the locking mechanism. Here, suitably a moveable part of the internal mechanism includes the recess or abutment surface. In an alternative exemplary embodiment, the secondary lock acts on the bolting system. Here, suitably a moveable part of the internal mechanism includes the recess or abutment surface. In exemplary embodiments, the bolting system includes a deadbolt that extends from a casing surrounding the internal mechanism. Suitably, the deadbolt includes a recess in which the bolt of the secondary lock. However, in exemplary embodiments, the bolting system additionally or alternatively includes multiple bolts as part of a multipoint locking system. Here, the secondary lock may act on one of the bolts spaced from the casing housing the lock cylinder. Alternatively, in a multipoint locking system wherein a drive rail is provided to actuate the multiple bolts, preferably the secondary lock acts on the drive rail and suitably on the drive rail at a location spaced from the cylinder locks.

[0017] Advantageously, by arranging the secondary lock to be located spaced from the cylinder lock, even if the intruder gains access to the internal area of the door around the cylinder lock, the secondary lock remain inaccessible from the outside.

[0018] In the exemplary embodiments wherein the secondary lock acts on the drive rail, the drive rail of a known handle assembly is adapted to include a lug. The lug extends parallel to the inside and outside faces of the door. Here, a recess is formed in the door to receive the lug wherein the recess is sized to allow the lug to slide in the vertical direction of the door when the lug is moved by the drive rail. When the drive rail is in position to have thrown the bolts to the locked position, a recess in the lug is caused to be aligned with the bolt of the secondary lock such that if the secondary lock is activated, the bolt engages the recess. Once engaged, the engagement between the bolt and recess prevents the lug from sliding and therefore prevents the drive rail from moving away from the position engaging the bolts. Thus, even if the cylinder lock is defeated or not engaged, the handle assembly is not able to be activated to open the door.

[0019] In one exemplary embodiment, the secondary lock includes a biasing means that biases the bolt towards the position in which it engages the moving part. Here the biasing means, such as a spring or other resilient member suitably acts between the casing and bolt. Preferably, the bolt is restrained in the reset position by the actuating member unless manually operated from the inside of the door. For instance, the bolt is withdrawn to the reset position by pulling the bolt against the bias. Once the bolt is clear of the moving part, a secondary operation, engages the actuating mechanism, for instance by twisting the bolt to engage a stop, acts to prevent the bolt from moving with the bias once the manual force has been removed. To activate the secondary lock, the actuating mechanism is released, for instance by rotating the bolt to disengage the stop.

[0020] In one exemplary embodiment the actuating mechanism is electronically controlled, wherein a solenoid or the like is used to control movement of the bolt between the reset position and the engaged position. Advantageously, this allows the secondary lock to be located in less accessible positions. Moreover, the secondary lock can be operated from the external side so that the secondary lock can be used when the homeowner leaves the property as well as when locked from the inside. For instance, suitably a key fob carried by the key holder transmits a signal to cause the actuator to engage or release the secondary lock.

[0021] According to a further aspect, there is provided a door assembly comprising a door and a door lock system as herein described.

[0022] According to a yet further aspect, there is provided a method of opening and locking a door assembly of the previous aspect. The method comprises activating a handle assembly to throw one or more bolts in order to prevent or allow opening of a door. The method comprises locking a cylinder lock and causing a cam of the cylinder lock to lock or unlock movement of a locking mechanism. Wherein the method comprises activating or deactivating a secondary lock, wherein the secondary lock is activated or deactivated by causing a bolt of the secondary lock to engage or disengage a moveable part of the locking mechanism, and such that when the bolt is engaged with said moveable part, the locking mechanism is not able to be moved to disengage the bolts.

Brief Description of the Drawings

[0023] For a better understanding of the invention, and to show how embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings in which:

Figure 1 is a split perspective view of an exemplary locking mechanism;

Figure 2 is a side view of an alternative exemplary

locking mechanism;

Figure 3 is a partial perspective view of a door lock system according to an exemplary embodiment;

Figure 4 is a partial side view of an exemplary locking mechanism;

Figure 5a and 5b are cross-sectional views through a first example of a secondary lock in a reset and engaged position respectively;

Figure 6a and 6b are cross-sectional views through a second example of a secondary lock in a reset and engaged position respectively;

Figure 7 is a partial exploded view of a lug and lug housing according to an example of the present disclosure;

Figure 8 is a perspective view of the lug housing shown in Figure 7;

Figure 9 shows a remotely operable actuator and bolt in a reset position according to an example of the present disclosure; and

Figure 10 shows the arrangement of Figure 9 in an engaged position.

Detailed Description

[0024] According to an exemplary embodiment, a door assembly comprises a door and a door lock system. Doors are widely known and a detailed description is not therefore herein given. Typically the door is rectangular and has an inside face and an outside face. One long edge face is morticed to receive hardware such as hinges. The opposed long edge is morticed to allow the door lock system to throw a bolt across the gap between the door and surrounding door frame.

[0025] In the exemplary embodiments, the door lock system comprises a handle assembly 102 and a secondary lock. The secondary lock is described in more detail below. The handle assembly 102 is substantially in accordance with known handle assemblies except where it is adapted to cooperate with the secondary lock. In general though, the handle assembly 102 comprises a handle, a locking mechanism and a cylinder lock. The handle is used to actuate the locking mechanism, for instance by raising or lowering the handle to pivot. Here, said pivotal movement is arranged to control the locking mechanism. The cylinder lock is arranged to cause a cam to engage and disengage the locking mechanism, wherein when engaged the locking mechanism is prevented from moving. However, as will be appreciated, the exact construction of the handle assembly 102 is open to a number of equivalents.

[0026] An exemplary locking mechanism 100 is described in relation to Figure 1. The locking mechanism 100 comprises a casing 120 that houses an internal mechanism (not visible). The casing has a handle hole 122 and cylinder hole 124 for receiving the handle or handle spindle and cylinder lock respectively. The internal mechanism is controlled by the handle to move a bolting system 130. In figure 1 the bolting system 130 comprises a deadbolt 132, a latch bolt 134 and top and bottom shootbolts 136, 138. In Figure 1 the latch bolt 134 and deadbolt 132 extend from the casing 120 and can therefore be directly driven between a locked position where the bolts extend or further from the door and an unlocked position, wherein the bolts are housed or further housed within the casing. A drive rail 140 is provided as part of the bolting position in order to drive the shootbolts 136, 138. The drive rail is typically provided in upper and lower parts, wherein the internal mechanism drives the upper and lower sections simultaneously to slide along the edge of the door, for instance in the vertical direction. The upper section slides upwards and the lower section slides downwards to activate the shootbolts 136, 138 in to the locked position. In Figure 1 a faceplate 142 is provided to cover the sliding drive rail 140.

[0027] An alternative locking mechanism 100 is shown in Figure 2, by way of example to illustrate some of the numerous design options of a locking mechanism 100. The same reference numerals have been used to refer to equivalent parts. The casing 120 has a handle hole 122 and cylinder hole 124. A deadbolt 132 and latch bolt 134, which form part of the bolting system 130, extend from the casing and are directly operated by the internal mechanism. The bolting system 130 also includes a drive rail 140 that slides along the edge face of the door to activate the further multiple point locking bolts. In this embodiment, the bolting system 130 includes upper and lower hook bolts 135. Rather than sliding linearly across the gap between the door and frame, the hook bolts pivot about a horizontal axis. The bolting system 130 further includes cam locks 139. The cam locks are slid into a locking position by the drive rail. In Figure 2, the upper cam is shown as a mushroom cam and the lower cam is shown as a roller cam.

[0028] According to the exemplary embodiments, the secondary lock 200 is separate to the handle assembly 102. Here, the secondary lock 200 is activated to engage a moving part of the lock mechanism and specifically a moving part of the internal mechanism or the bolting system 130. In Figure 3, the secondary lock 200 is shown arranged to engage the deadbolt 132. Here, the secondary lock 200 includes a bolt 210 that moves into and out of engagement with the deadbolt 132. The bolt 210 may engage a distal edge of the deadbolt, preventing movement of the deadbolt away from its locked position. Alternatively, a recess or aperture is formed in the deadbolt 132 to engage with the bolt 210 of the secondary lock 200 when the deadbolt 132 is in a locked position and the secondary lock 200 is activated. It will be appreciated

that as well as the addition of the secondary lock 200, the handle assembly 102 will need to be modified from a standard handle assembly 102 to include an aperture through the casing 120 to allow the secondary lock 200 access to the deadbolt 132, or in an alternative embodiment part of the internal mechanism. Moreover, where the moving part, in this case the deadbolt 132, is to include a recess or aperture, the bolting system 130 or internal mechanism will need to be adapted from a standard embodiment to include the recess or aperture.

[0029] Whilst figure 3 shows the secondary lock 200 acting on the bolting system 130 by engaging the deadbolt, it will be appreciated that by appropriate adaption of the bolting system 130 and arrangement of the secondary lock 200, the secondary lock 200 could also act on the bolting system 130 through the other bolts of the bolting system 130, for instance the shootbolts or the hook bolts 135. Indeed, figure 4 shows an alternative embodiment wherein the secondary lock 200 (not shown) is arranged to act on a lug 150 that is formed on the drive rail 140 of the bolting system 130. That is to say, the drive rail 140 of the bolting system 130 and the moving part may comprise a lug 150 affixed to, and moveable with, the drive rail 140.

[0030] Referring to Figure 4, the locking mechanism 100 is shown with a handle aperture (which can be turned by a spindle and lever such as a handle or wrench - not shown), a cylinder hole 124 and a casing housing the internal mechanism. The bolting system 130 is shown with a deadbolt 132 and a latch bolt 134. The bolting system 130 also includes a drive rail 140 and a cover 142. Attached fast to the drive rail 140 is a lug 150, and this is the only adaptation to the otherwise standard bolting system 130. The lug 150 is shown as an appropriately sized rectangle. The lug 150 is secured fast to the drive rail in any suitable manner, for instance welding or mechanical fix. The lug 150 is shown with an aperture 152. The aperture 152 extends through the lug 150, but could also be a recess. That is to say the aperture 152 may be an opening provided as a through hole or as a depression configured to receive the bolt 210. It will be appreciated that the aperture 152 is arranged to engage the bolt 210 of the secondary lock 200, when the drive rail and therefore lug 150 have been actuated to the locking position and the secondary lock 200 actuated. Thus, the lug 150 is arranged within a mortice formed in the edge of the door and sized appropriately to allow the full travel of movement of the lug 150.

[0031] Referring to Figures 5A, 5B, the operation of the secondary lock 200 is shown in relation to the previous embodiment wherein the secondary lock 200 acts on a lug 150. In this instance, the lug 150 slides vertically. In the alternative embodiments, wherein the secondary lock 200 acts on bolts, the bolts may slide horizontally or may pivot. In any event, the principal remains the same that the bolt of the secondary lock 200 moves in a direction other than the direction of the moving part, in the exemplary embodiments perpendicular to the inside face

of the door, and when engaged with the recess or aperture, prevents movement of the part in the opposed, un-locking direction.

[0032] As shown in Figures 5A, 5B, a door 300 has an inside face 310, an outside face 320 and a recess (or cavity) 330 to accommodate the moving part of the bolting system 130. The lug 150 is shown having slid along a length of the door between an unlocked position wherein the bolts of the bolting system 130 are not thrown (Figure 5A) and a locked position wherein the bolts of the bolting system 130 are thrown (Figure 5B). In the unlocked position (Figure 5A), the aperture 152 of the lug 150 is not aligned with the secondary lock 200. In the locked position (Figure 5B), the aperture 152 is aligned with the secondary lock 200. As shown, in an exemplary embodiment the secondary lock 200 comprises a bolt 210 and a housing 220. The housing 220 includes fixings (for example screws) to attach securely to the inside face of the door. The housing 220 restrains the bolt 210 to the door and provides the reaction to resist movement of the lug 150 moving past. The secondary lock 200 includes an actuator 218 (i.e. a mechanism) to allow the bolt 210 to be actuated between a bolted position (Figure 5B) and a reset position (Figure 5A). In Figures 5A, 5B, the actuator 218 is shown as comprising a guide slot 221 and stop 222 in the housing 220 and a cooperating protrusion 211 on the bolt 210. The actuator 218 allows the bolt 210 to slide in one angular rotation, but when in an alternative angular orientation prevents the bolt from being engaged. Although not shown, a biasing member such as a spring may be arranged to urge the bolt 210 towards the bolted position. The bolt 210 includes a pin 212 that engages and penetrates the aperture 152, and a handle portion 214 that can be used to manually operate the secondary lock 200. For instance, to withdraw the pin 212 of the bolt 210 from the aperture 152 against the bias of the spring and to twist the bolt so as to engage the actuator 218 holding the bolt in the reset position. Likewise, the handle 214 can be used to twist the bolt 210 to disengage the actuator 218 and bolt the secondary lock 200.

[0033] With reference to Figures 5A, 5B and Figures 6A, 6B, a location feature 215 may be provided to receive the pin 212 of the bolt 210 to guide the pin 212 as it is extended into and out of the recess/aperture 152 and/or to provide greater resistance to bending forces generated when the lug 150 is urged to move away from the locked position (Figure 5B).

[0034] In one example, shown in Figures 5A, 5B, the location feature 215 is defined/provided in the door or door frame as an engagement space 217 (e.g. a recess), configured to receive a distal tip 216 of the bolt 210 (i.e. the end of the bolt 210 distal to the handle 214 of the bolt 210).

[0035] In an alternative example, for example as shown in Figures 6A, 6B, 7, 8 no location feature (e.g. recess) is provided in the door frame for receiving the tip 516 of the bolt 210. Instead a housing 500 (which may also be termed a box or keep) encases the lug 150, and

the housing 500 comprises a location feature 215 in the form of a passage 510 for receiving the bolt 210. The housing 500 may be fixed to the door.

[0036] As shown in Figures 6A, 6B, the housing 500 may comprise a first wall 530 spaced apart from a second wall 532, the lug 150 being located between the first wall 530 and second wall 532. Hence the first wall 530 is located between the housing 220 (and inner material of the door 600) and the lug 150. Hence where the housing 220 is located on an internal surface of a door 600, and consequently the bolt 210 is provided on the inside surface of the door 600, the second wall 532 is located closer to the external surface of the door 600 than the first wall 530.

[0037] As also shown in Figures 6A, 6B, a passage 510 may be provided in a face of the housing 500. The passage 510 may be provided as an aperture or hole in the first wall 530 of the housing 500. The passage 510 may be aligned with the recess/aperture 152 in the lug 150 when bolt 210 is in the bolted position. Hence the pin 212 of the bolt 210 may extend through the passage 510 in a first side 514 (i.e. the first wall 530) of the housing 500 and into the housing 510 to engage with the lug 150. However, there is no corresponding aperture in a second side (i.e. second wall 532) of the housing 500. Hence the bolt 210 is locatable by the housing 500 by virtue of the passage 510 in the first wall 530 of the housing 500, and the bolt's location is shielded from the outside surface of the door 600 by the second wall 532. Hence it is not possible, even by punching or drilling holes in the outside surface of the door 600, to gain access to the bolt 210.

[0038] As shown in the examples of Figures 3, 5A, 5B, 6A, 6B, the actuator 218 may be manually actuated. That is to say the actuator comprises a configuration and/or mechanism which is operable by a user twisting/pushing or otherwise urging the bolt to move from one position to another.

[0039] Figures 9, 10 show further example in which the actuator 218 comprises a motor 400 operable to translate the bolt 210 to the reset position (as shown in Figure 9) and/or the bolted position (as shown in Figure 10). The motor 400 may be provided as a linear or rotary solenoid mechanism, or some other form of electric motor. Hence the motor 400 may be operated by a user, for example by operating a control unit 520, to move the bolt 210 to either the reset or engaged/bolted position. The motor 400 and control unit 520 may be provided in a casing 410, and the casing 410, and hence the casing and/or motor 400 and/or control unit 520 may be mounted to a door 600. The control unit 520 may be operated via a manually operated switch 522, or via a remote control 524, where the remote control 524 and control unit 520 are operable to be in wireless communication with each other. Hence the actuator 218 may be remotely operable and/or manually operable.

[0040] The advantage of all of the examples of the present disclosure is that a user may engage the sec-

ondary lock 200 from one side of a door (i.e. normally inside of the building to which the door is attached). The remote control example (for example as shown in Figures 9, 10) provides an additional advantage that a user may securely lock a door 600 from both sides (e.g. inside and outside of the building to which the door attached).

[0041] Herein the terms inside, outside, vertical and horizontal and the like have been used in relation to the door when installed on a building. Typically, the door is installed in a vertical plane, and hinged in a vertical manner. It will though be appreciated that in other circumstances, the closure may be installed in different configurations, for instance the door may be horizontally opening or the door may be an internal door where both sides are inside. It will be appreciated that the terminology can be adapted to fit these circumstances, and in particular, the term inside is the side not being tampered from.

[0042] Although a few preferred embodiments have been shown and described, it will be appreciated by those skilled in the art that various changes and modifications might be made without departing from the scope of the invention, as defined in the appended claims.

Claims

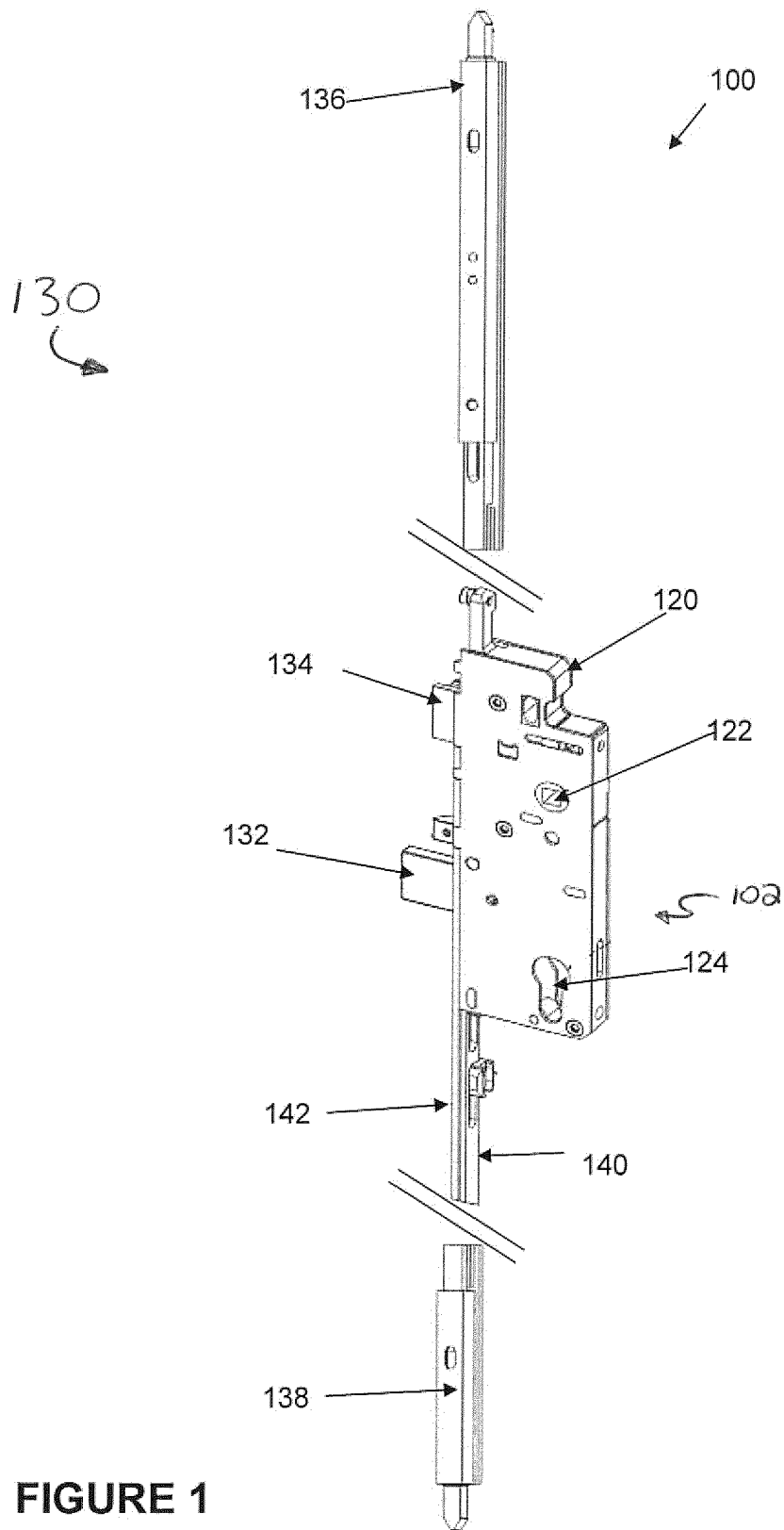
1. A door lock system comprising a handle assembly (102) and a separate secondary lock (200), the handle assembly (102) includes a locking mechanism (100) and is installable on a door, wherein:

the locking mechanism (100) includes a bolting system (130) and an internal mechanism, wherein the internal mechanism acts on the bolting system (130) to throw one or more bolts (132) of the bolting system (130) between open and closed positions, and
the secondary lock (200) is able to be actuated to act on a moving part of the bolting system (130) when the bolting system (130) is in the closed position and in order to restrain movement of the bolting system (130).

2. The door lock system of claim 1, wherein the secondary lock (200) includes a bolt (210) and said moving part of the bolting system (130) includes a recess (152), and the bolt (210) engages the recess (152) to provide said restraint of movement.
3. The door lock system of claim 2, wherein the recess (152) is an aperture (152) and the bolt (210) is arranged to penetrate through said moving part through the aperture (152).
4. The door lock system of any of claims 2 or 3, wherein the secondary lock (200) comprises an actuator (218) that is able to be operated to move the bolt (210) between a reset position, wherein the bolt

(210) does not engage the recess or aperture such that said moving part can move, and a bolted position wherein engagement of the bolt (210) and aperture (152) or recess (152) provides said restraint in movement of said moveable part.

5. The door lock system of claim 4, wherein the actuator (218) is manually actuated.
6. The door lock system of claim 4, wherein the actuator (218) is remotely operable.
7. The door lock system of claim 6, wherein the remotely operable actuator (218) comprises a motor (400) operable to translate the bolt (210) to the reset position and/or the bolted position.
8. The door lock system of any of claims 2 to 7, wherein the bolt (210) is moveable to engage the recess (152) or aperture (152) in a movement perpendicular to an inside face of a door.
9. The door lock system of claim 8, wherein the movement of the bolt (210) is a linear movement.
10. The door lock system of any preceding claim, wherein the bolting system (130) includes a drive rail (140) and the moving part comprises a lug (150) affixed to the drive rail (140) so as to move therewith, the recess/aperture (152) being provided in the lug (150), wherein the secondary lock (200) is arranged to act on the lug (150).
11. The door lock system of claim 10 wherein a housing (500) encases the lug (150), the housing (500) comprising a passage (510) for receiving the bolt (210), and the passage is aligned with the recess/aperture (152) when the bolt (210) is in the bolted position.
12. A door assembly comprising a door and a door lock system as claimed in any preceding claim.
13. A method of securing a door assembly, the method comprising closing a door and operating a door lock system to secure the door, wherein operating the door system includes using a handle assembly (102) of the door lock system to throw bolts (132) of a bolting system (130) and activating a secondary lock (200) of the door lock system to engage the secondary lock (200) with a moveable part of the bolting system (130), wherein the engagement prevents the bolting system (130) from being unsecured.
14. A closure lock system and a closure assembly including the closure lock system, wherein the closure lock system is the door lock system as claimed in any of claims 1 to 11.



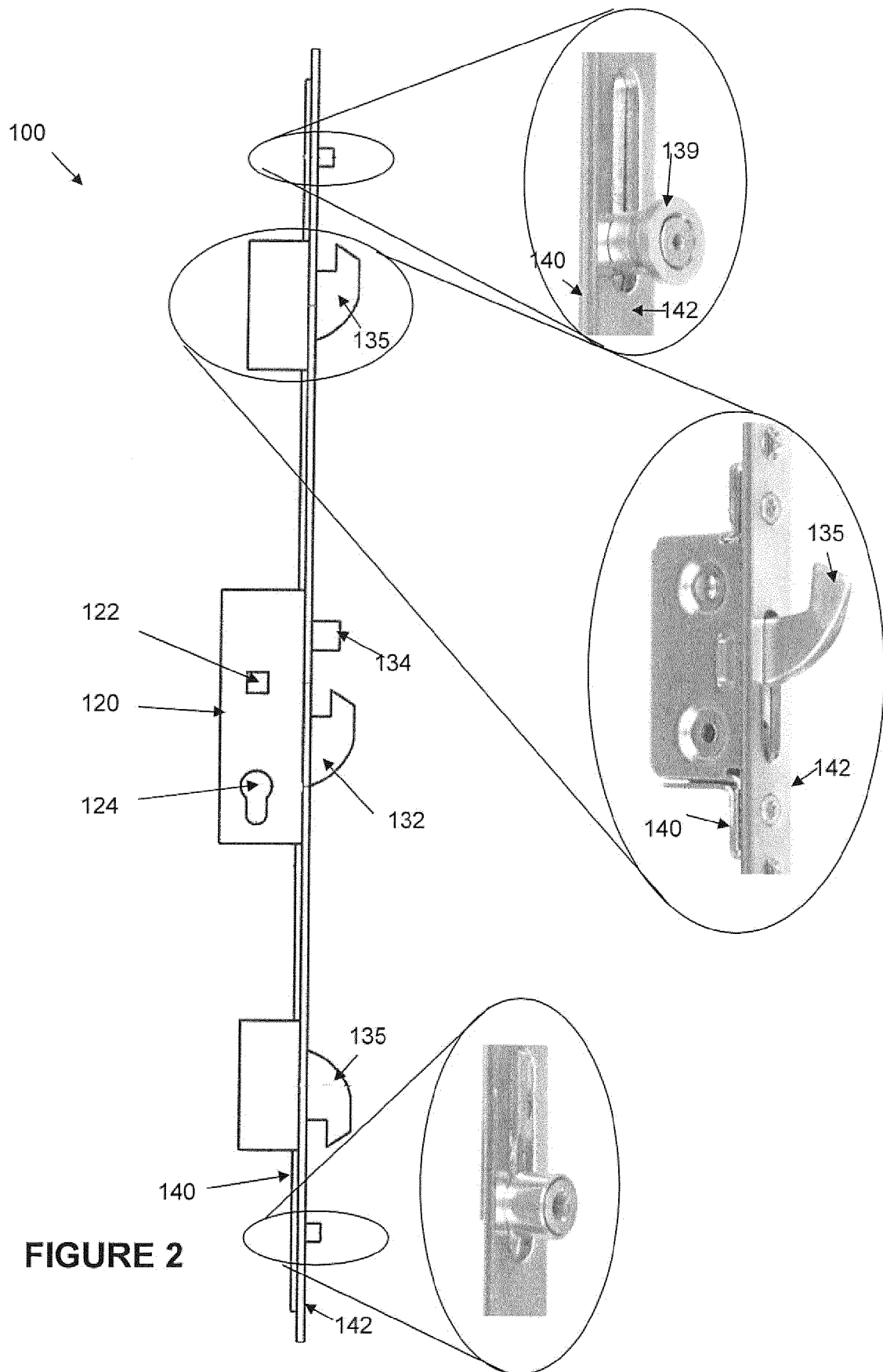


FIGURE 3

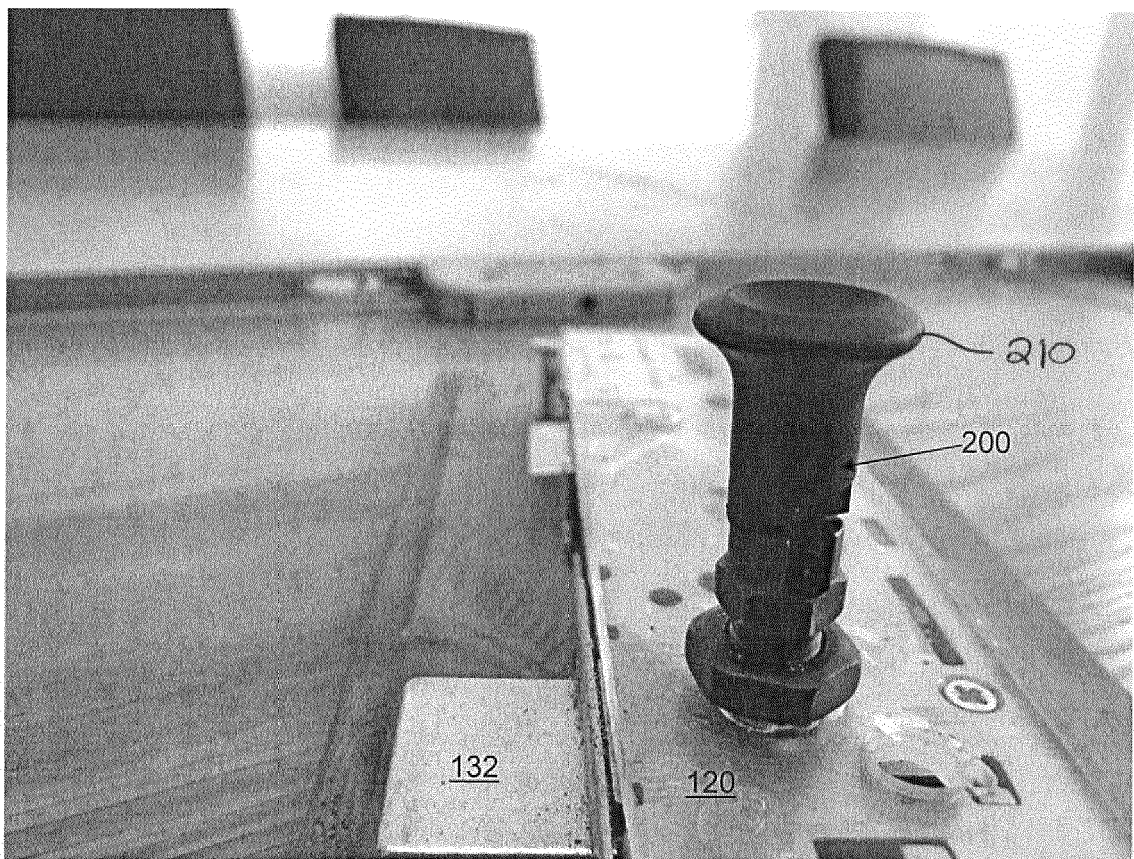


FIGURE 4

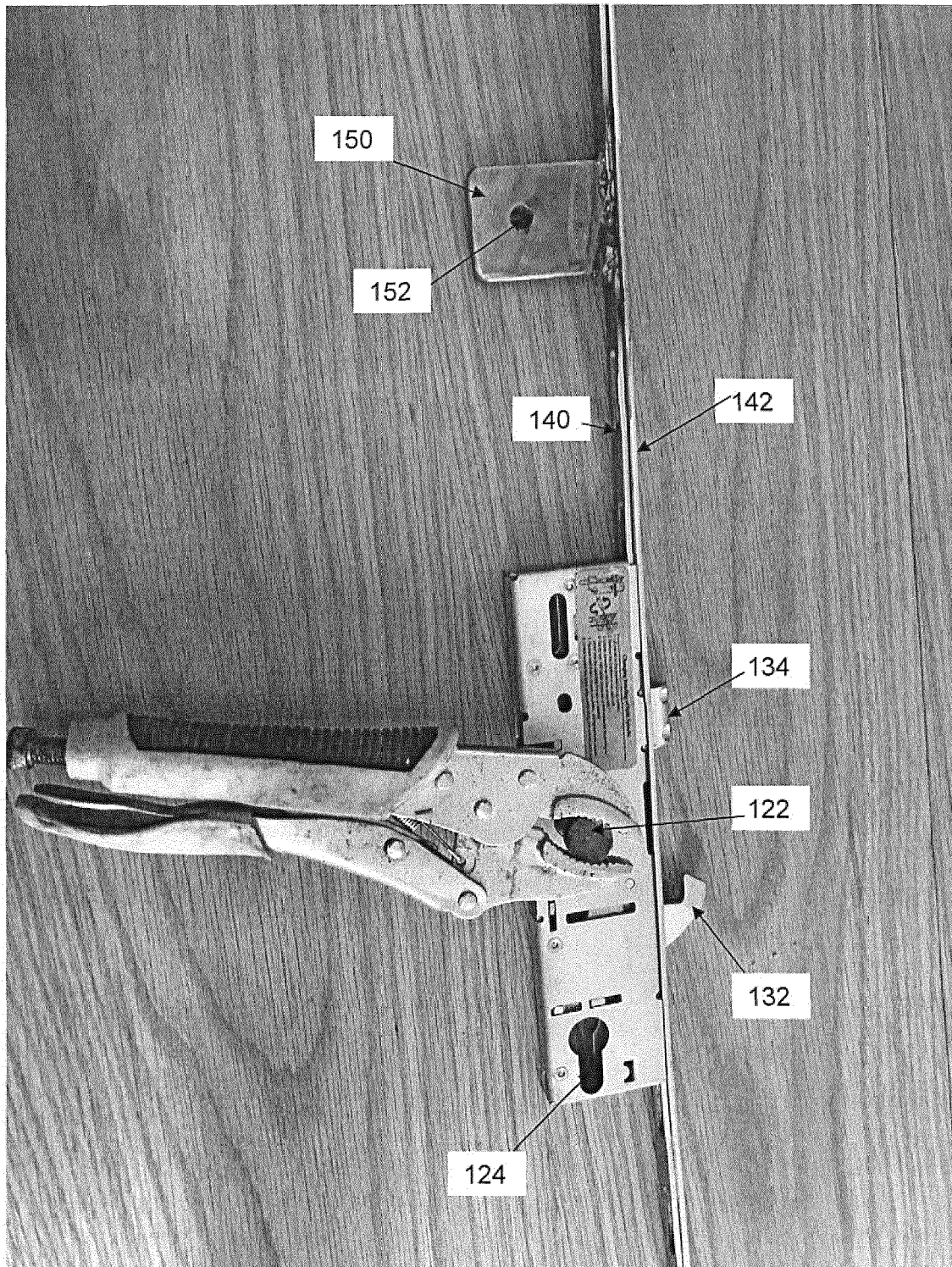


FIGURE 5A

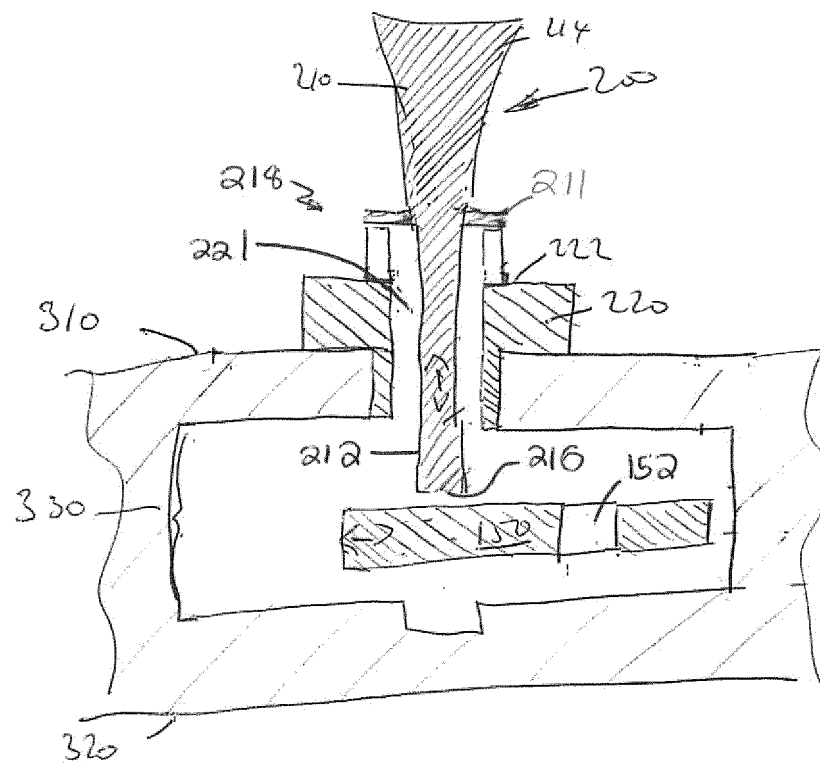


FIGURE 5B

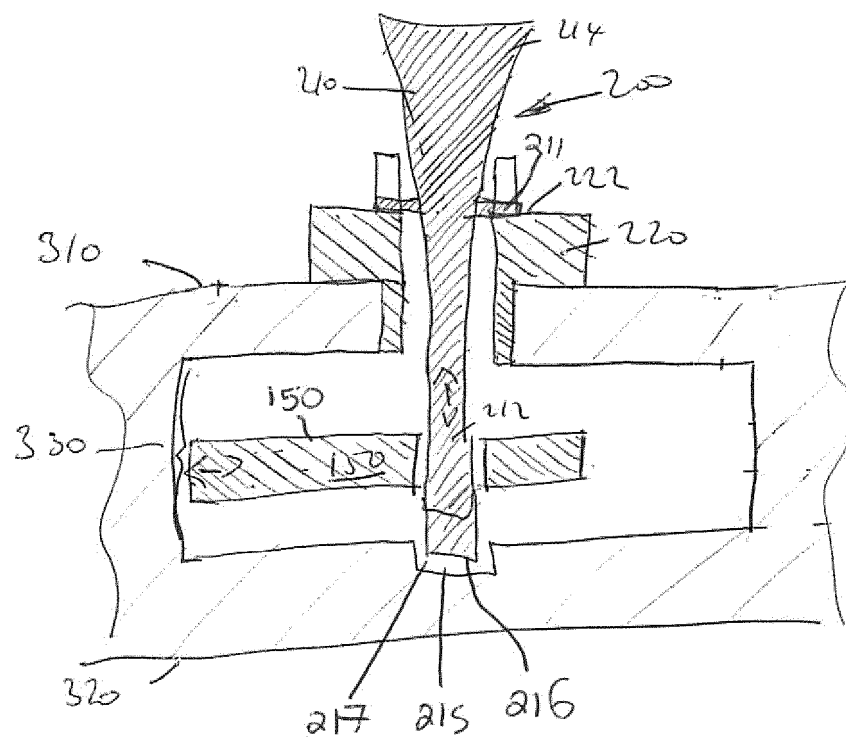


FIGURE 6A

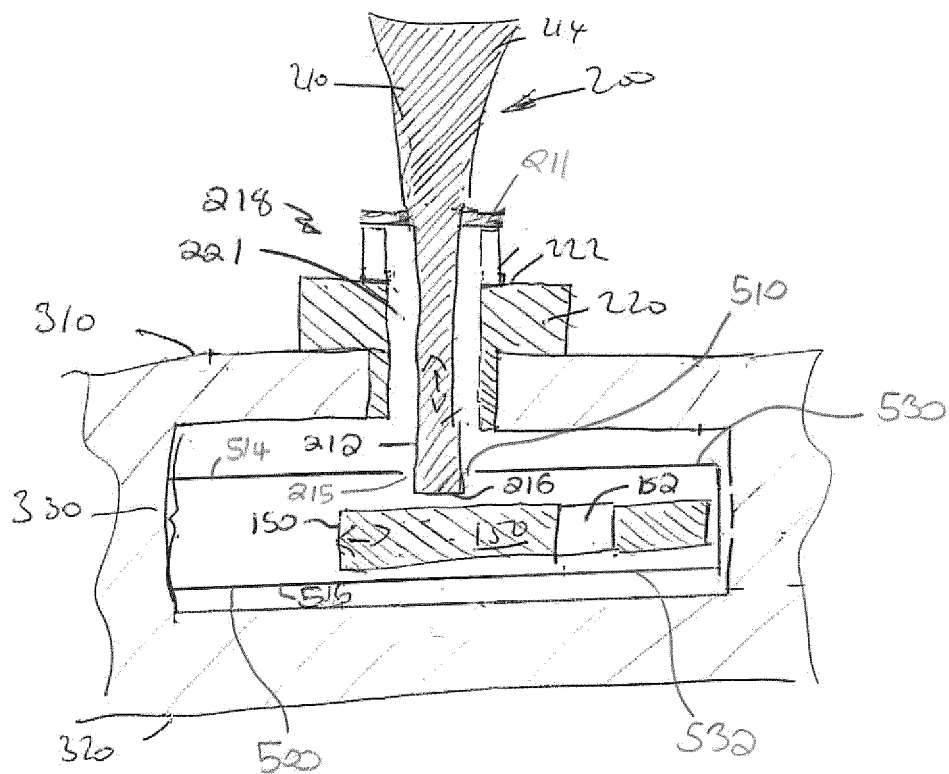
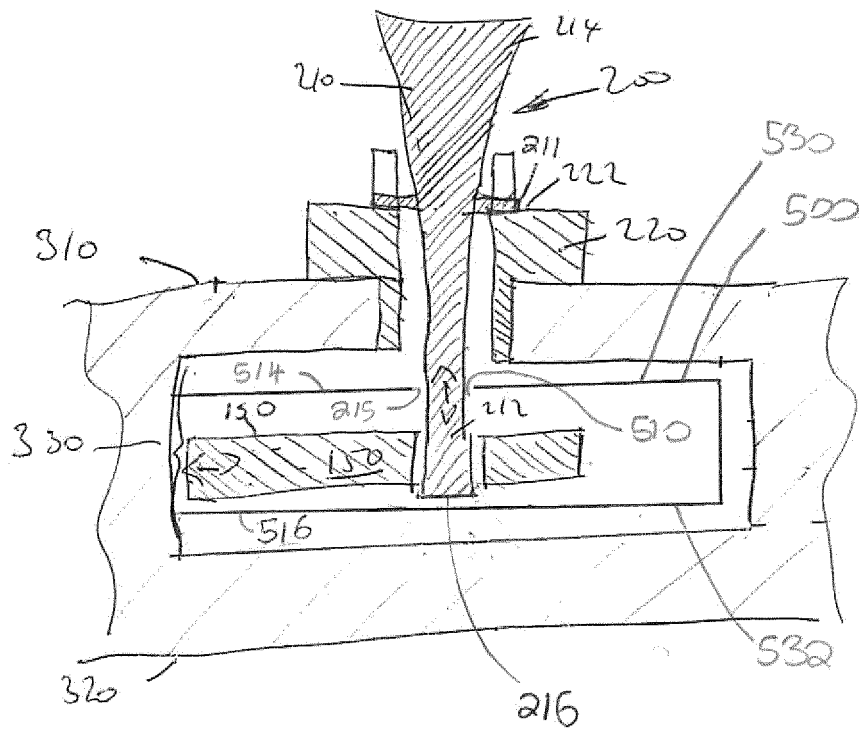


FIGURE 6B



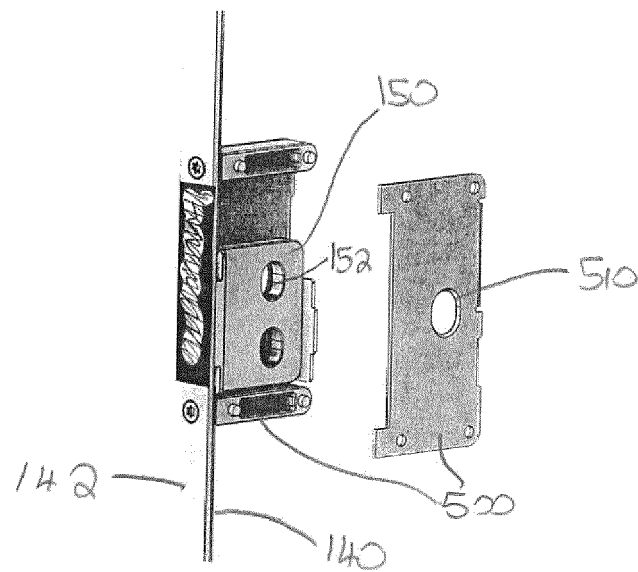


FIGURE 7

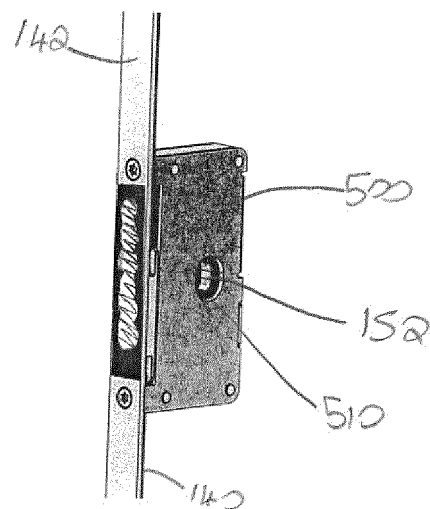


FIGURE 8

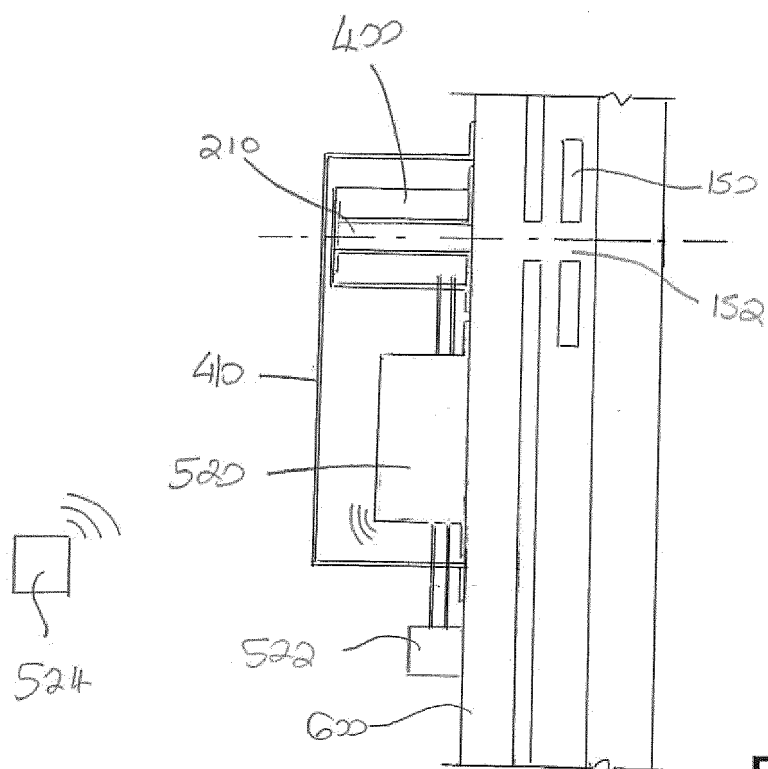


FIGURE 9

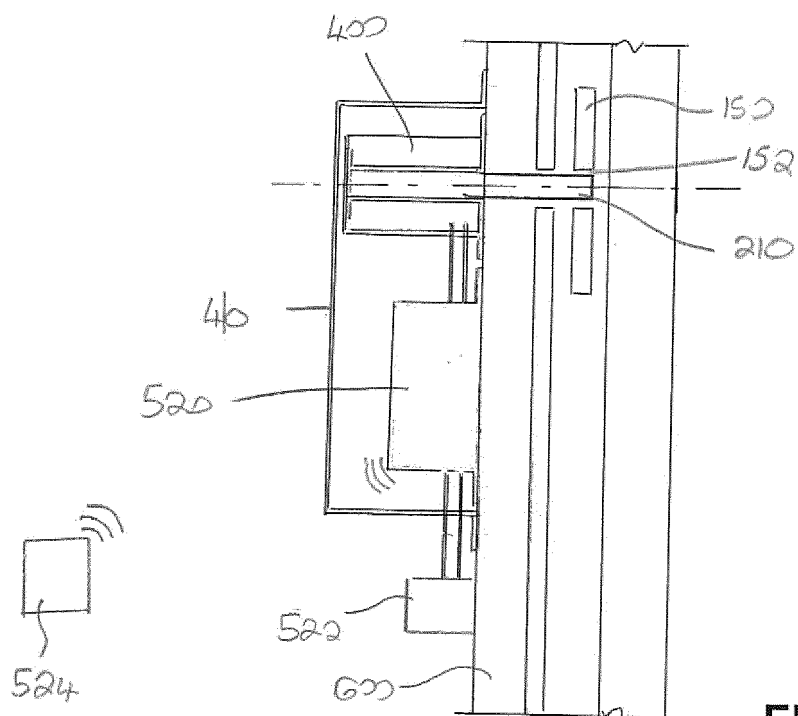


FIGURE 10



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