(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
27 September 2012 (27.09.2012)

WIPO | PCT

(10) International Publication Number
WO 2012/126039 A1

(51) International Patent Classification:
E05B 63/08 (2006.01) *E05B 47/00* (2006.01)
E05B 47/06 (2006.01) *E05B 63/10* (2006.01)

(21) International Application Number:
PCT/AU2012/000262

(22) International Filing Date:
15 March 2012 (15.03.2012)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2011900990 18 March 2011 (18.03.2011) AU

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,

[Continued on next page]

(54) Title: ELECTRICALLY CONTROLLED MORTICE LOCK ASSEMBLY

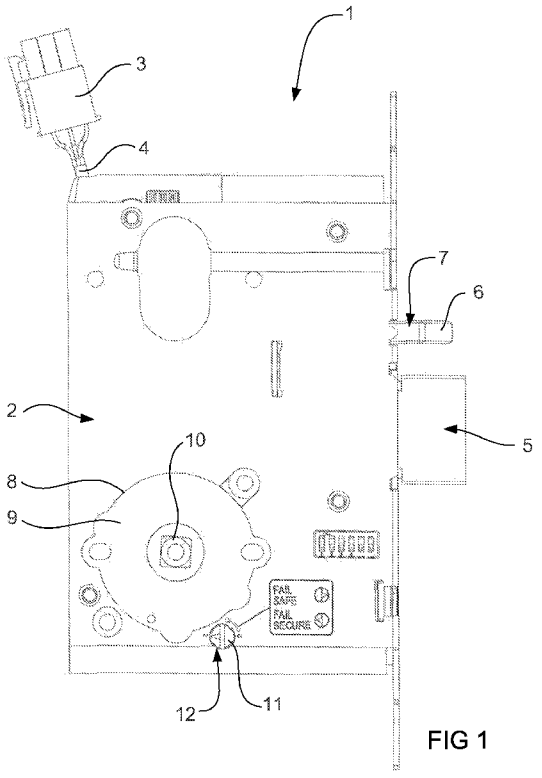


FIG 1

(57) Abstract: This invention relates to a mortice lock assembly (1) including a lock means (39) having a powered actuator (40) that is operable in a failsafe condition or a failsecure condition. The assembly (1) also includes a selector (12) for adjusting the condition of the lock means whereby the selector includes a rotatable member (11) that is rotatable through no more than 360° to adjust the condition of the selector.

WO 2012/126039 A1

SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

ELECTRICALLY CONTROLLED MORTICE LOCK ASSEMBLY

This invention relates to a mortice lock assembly for use with a door. Locks of this kind are often used for securing doors and the like in a closed position and it will be convenient to hereinafter describe the invention with reference to this application. It should be appreciated however that the invention may have other applications.

A mortice lock assembly includes a housing with a bolt that is movable relative to the housing. When the mortice lock assembly is installed the bolt is considered to be in an extended position when it projects from an edge of the door. When the bolt is in the extended position and the door is closed the bolt engages a strike on the door frame, which retains the door in a closed position. Door furniture is located on opposing faces of the door panel, on the inner and outer side, and generally includes a hand engagable member such as a turn knob or lever handle. Each knob or handle (hereinafter referred to generally as handle) interacts with a rotatable hub located within the housing whereby rotation of the hub results in retraction of the bolt from the extended position. A locking means is provided that, when in a locked condition, prevents the bolt from being moved from the extended position when the door is closed. The locking means often interacts with the hub to achieve this function.

The locking means may be electrically powered and include a powered actuator such as solenoid or motor that when energised adjusts the condition of the locking means. Naturally the failure in the supply of power to the locking means will have implications that vary depending upon the environment in which the lock assembly is installed. In some environments it will be desirable that the lock means adopt a locked condition when there is a power failure, whereas in other environments it will be desirable that the lock means adopt an unlocked condition when there is a power failure. Where the one lock assembly is adjustable to satisfy both requirements such locks are considered to be operating in a failsecure mode and failsafe mode respectively.

It is generally desirable that if adjustments need to be made to lock assemblies, those adjustments can be made relatively easily. The lock assembly may be supplied with factory settings that are not applicable for the environment in which the lock assembly is to be installed, and as such they will need to be adjusted by the installer. The adjustments often need to be made on site where the lock assembly is being installed, and it is desirable that the adjustments be able to be made with tools likely to be found on site. Furthermore whilst it is possible to make fine adjustments to the lock assembly when on the locksmiths premises, or in the factory, it can be difficult to make fine adjustments when on site. This is particularly the case when the adjustments involve small elements of the lock that are often difficult to grasp and easy to loose in the environment of a building site. This is a problem with the type of adjustments that involve disconnection of small fasteners, such as screws, and the relocation of those screws to change the function.

The inner workings of a lock assembly are generally intricate, and this is particularly the case where a powered actuator is involved. Electrically controlled locks generally include the electronic circuitry to control the lock within the lock assembly casing. The circuitry is designed with the understanding that it will be protected within the housing, and has a low tolerance to mistreatment. It is therefore preferable that once a lock assembly has been assembled in the factory, the housing remains closed. Lock manufacturers often provide a warranty on the basis that it is voided if the housing is opened. Accordingly it is also desirable that if adjustments need to be made to the lock function of the assembly, those adjustments can be made without opening the housing.

It is therefore desirable to provide a lock assembly that is easily adjustable. It is also preferably desirable that the lock assembly be easily adjustable between a failsafe condition and a failsecure condition.

A reference herein to a patent document or other matter which is given as prior art is not to be taken as an admission that that document or matter was, in

Australia, known or that the information it contains was part of the common general knowledge as at the priority date of any of the claims.

According to this invention there is provided a mortice lock assembly for use with a door including a housing for location at least partially within a cavity formed in the door, a bolt movable relative to an extended position whereby it extends out a front face of the housing, an inner hub and an outer hub that interact with the bolt and are manually rotatable from an inner side and an outer side respectively to move the bolt from the extended position, a lock means including a detent means and a powered actuator for adjusting a condition of the detent means between an active condition and an inactive condition whereby the bolt is prevented and not prevented from moving from the extended position respectively, a selector means that is adjustable between a failsafe condition and a failsecure condition whereby in the event of failure of supply of power to the powered actuator the detent adopts the inactive condition and the active condition respectively, the selector means including a rotatable member that is rotated through no more than 360° to adjust the condition of the selector means.

It is preferred that the housing includes an opening for providing access to the rotatable member allowing for adjustment of the selector means. It is further preferred that the opening is on a side of the housing.

The mortice lock assembly preferably includes the detent means which interacts with the inner hub and outer hub so that when the detent is in the active condition the inner hub and or outer hub is prevented from rotation. It is preferred that the detent means includes an inner pawl and an outer pawl that interact with the inner hub and outer hub respectively, the inner pawl and outer pawl preventing rotation of the inner hub and outer hub respectively when the detent means is in the active condition. It is further preferred that the powered actuator interacts with the detent means indirectly by a transmission means. It is further preferred that the transmission means includes a rack member and a pinion member whereby the rack member is moved on a substantially liner path on operation of the powered actuator so as to rotate the pinion member. It is

further preferred that the rotatable member acts as a guide when the rack member is moved along the liner path. It is still further preferred that the transmission means includes a link member for linking the pinion to the detent means. It is still further preferred that the link member is a bar that is movable in a direction substantially perpendicular to the direction of movement of the rack when moving along the liner path.

It is preferred that the rotatable member is manually rotated less than 360º to adjust the condition of the selector means. It is further preferred that the rotatable member engages the with the rack member to act as a guide along the liner path. It is still further preferred that the rotatable member includes a cam surface that engages the rack member whereby rotation of the rotatable member causes the rack member to move along an arcuate path as the selector means adjusts between failsafe condition and the failsecure condition. Alternatively it is preferred that the mortice lock assembly include a rotated member that is driven by the rotatable member to rotate therewith, the rotatable member having a cam surface that engages the rack member whereby rotation of the rotated member causes the rack member to move along the arcuate path as the selector means adjusts between failsafe condition and the failsecure condition. It is preferred that the rotatable member drives the rotated member indirectly by an idler gear.

It is preferred that the powered actuator includes a solenoid and a plunger that is movable in response to supply of power to the solenoid.

It is preferred that the selector means is operable from outside the housing. It is further preferred that the housing includes an aperture that provides access to the rotatable member. It is still further preferred that the aperture is formed in a side wall of the housing. It is still further preferred that the rotatable member includes a formation that is accessible from a side of the housing, said formation facilitating rotation of the rotatable member. It is still further preferred that the formation is at least one groove in a face of the rotatable member to facilitate transmission of torque to the rotatable member. It is still further

preferred that the rotatable member remains captured during adjustment of the selector means.

It will be convenient to hereinafter describe the invention, according to various aspects, by reference to a particular form of lock assembly including a linearly movable latchbolt. Each aspect of the invention is also applicable to other forms lock assemblies, including but not limited to a swing bolt.

Embodiments of the invention are described in detail in the following passages of the specification which refer to the accompanying drawings. The drawings, however, are merely illustrative of how the invention might be put into effect, so that the specific form and arrangement of the various features shown is not to be understood as limiting on the invention.

Figure 1 is a side elevation view of a standard back set mortice lock assembly according to one embodiment of this invention.

Figure 2 is the mortice lock assembly from Figure 1 in an exploded view.

Figure 3 is the actuator subassembly from Figure 2 illustrated in an exploded view.

Figure 4 is a side elevation view of the actuator subassembly from Figure 2 with at least part of the casing removed to show the detent in an inactive condition and the selector in a failsafe condition.

Figure 5 is an isometric view of the actuator subassembly from Figure 4.

Figure 6 is a side elevation view of the actuator subassembly from Figure 4 with the detent in the active condition and the selector means in the failsafe condition.

Figure 7 is an isometric view of the actuator subassembly from Figure 6.

Figure 8 is a side elevation view of the actuator subassembly from Figure 4 with the detent in the inactive condition and the selector means in a failsecure condition.

Figure 9 is an isometric view of the actuator subassembly from Figure 8.

Figure 10 is a side elevation view of the actuator subassembly from Figure 8 with the detent in an active condition and the selector means in a failsecure condition.

Figure 11 is an isometric view of the actuator subassembly from Figure 10.

Figure 12 is a side elevation view of a short back set mortice lock assembly according to another aspect of this invention.

Figure 13 is the mortice lock assembly from Figure 12 in an exploded view.

Figure 14 is the actuator subassembly from Figure 13 in an exploded view.

Figure 15 is a side elevation view of the actuator subassembly from Figure 13 with at least part of the casing removed to show the detent in an inactive condition and the selector in a failsafe condition.

Figure 16 is an isometric view of the actuator subassembly from Figure 15.

Figure 17 is a side elevation view of the actuator subassembly from Figure 15 with the detent in the active condition and the selector means in the failsafe condition.

Figure 18 is an isometric view of the actuator subassembly from Figure 17.

Figure 19 is a side elevation view of the actuator subassembly from Figure 15 with the detent in the inactive condition and the selector means in a failsecure condition.

Figure 20 is an isometric view of the actuator subassembly from Figure 19.

Figure 21 is a side elevation view of the actuator subassembly from Figure 15 with the detent in an active condition and the selector means in a failsecure condition.

Figure 22 is an isometric view of the actuator subassembly from Figure 21.

The lock assembly 1 illustrated in Figure 1 is a mortice lock assembly 1, and in particular an electrically controlled standard back set mortice lock assembly. The assembly 1 includes a housing 2 which is intended to be located within a mortice cavity formed within a side edge of a door (not shown). A plug 3 and cable 4 arrangement is illustrated at the top left hand corner of the housing 2 which is intended to be connected with a power supply (not shown) and access control arrangement (not shown) located remote from the lock assembly 1. The access control arrangement may take any suitable form including proximity card readers or like devices. Such devices send a signal to the lock assembly 1 when access is to be granted so as to adjust the condition of the lock assembly. This adjustment will be explained in greater detail with reference to latter illustrations.

Figure 1 illustrates a primary bolt head 5 (hereinafter bolt) extending out from a front face of the housing 2 which is intended to interact with a strike (not shown) installed in a door frame surrounding the door. The bolt forms part of a bolt sub-assembly which will be described in greater detail with reference to Figure 2. Figure 1 also illustrates an auxiliary bolt 6 which forms part of a deadlocking subassembly 7 which interacts with the bolt 5 and operates in a manner that will be understood by those in the industry.

The lock assembly housing 2 includes an aperture 8 in a lower left hand region which exposes part of an actuator subassembly 9. In particular a spindle recess 10 formed in the actuator subassembly 9 is exposed. The spindle recess 10 is formed to receive a spindle (not shown) associated with door

furniture including a turn knob or handle, which in use is operable on an inner or outer side of the door. The shape and location of the spindle recess 10 may vary from that illustrated, and in particular a variation in location will be described in greater detail with reference to Figure 12 later in the specification.

Figure 1 also illustrates a member 11 adjacent the aperture 8 which forms part of a selector means 12 for selecting the way the lock assembly 1 functions in the event of failure of supply of power to the lock assembly 1. The member 11 illustrated includes a slotted face for interacting with a flathead screwdriver or the like so as to facilitate adjustment of the member. The member 11is rotatable between a failsafe condition and a failsecure condition, which in the event of a power failure results in the lock assembly adopting an unlocked and locked condition respectively. The rotatable member 11 includes an arrowhead on the face to provide a visual indication of the condition of the selector means 12. It is intended that the rotatable member 11 illustrated rotate through 180° when adjusting the condition so that the arrow head points towards a front or rear of the housing 2. The use of the arrowhead and degree of rotation is merely preferred in that the rotatable member 11 could achieve a similar function without the same degree of rotation. It is preferred however that the degree of rotation be less the 360°, and the rotatable member 11 remains captured during adjustment as this ensures the adjustment is relatively simple.

Referring now to Figure 2 which illustrates the lock assembly 1 in an exploded form and in a reverse view from Figure 1. Figure 2 illustrates the housing 2 formed by three pieces namely a base 13, cover 14, and cap 15. The base 13 and cover 14 attach to one another by a plurality of screws 16 with the cap 15 detachably fitting to an upper side of the base 13 and cover 14. The cap 15 has a window for LED plugs and the cables 4 pass through it.

The lock assembly 1 includes an electronic subassembly 17 including a circuit board 18, the cables 4 and the plug 13 to at least provide power to the actuator subassembly 9. The electronic subassembly 17 may also provide additional functions which do not form part of the claimed invention.

The lock assembly 1 illustrated in Figure 2 includes the dead locking subassembly 7 and a bolt subassembly. The bolt subassembly includes the

bolt and a drawbar portion 20 with a biasing spring 21 acting between the drawbar potion 20 and the deadlocking subassembly 7. The manner in which the bolt subassembly 19 and dead latch subassembly 7 functions and operates within the mortice lock assembly 1 will be understood by those in the industry. In particular it will be understood that the bolt subassembly 19 is biased by the spring 21 to urge the bolt 5 towards an extended position when the bolt 5 is in the extended position it projects through an aperture 22 in a front wall 23 of the housing 2, and that the actuator subassembly 9 is operable to cause the bolt 5 to move from the extended position towards a retracted position. Once in the retracted position the bolt 5 is substantially within the housing 2. Whilst the invention is described with reference to a bolt that moves in a substantially rectilinearly path, it is to be understood that the invention may also be applicable to use with bolts that move along the path other than rectilinearly including but not limited to swing bolts. Furthermore whilst the invention is described and illustrated with reference to a latch bolt, it should be appreciated that the invention also applies to dead bolts.

Referring now to Figure 3 which illustrates the actuator subassembly 9 in an exploded form to illustrate a number of components between an inner casing portion 24 and an outer casing portion 25 (which combine to form the actuator casing). The components include an inner hub 26 and an outer hub 27 which each include a spindle recess 10 hereinbefore described with reference to Figure 1. The inner hub 26 and outer hub 27 are both formed with a boss 28 (only the inner hub boss is visible in Figure 3) which locate in an aperture 29 formed in the inner casing portion 24 and outer casing portion 25 respectively. Each boss 28 provides a bearing surface against which the inner hub 25 and outer hub 27 rotate relative to the inner casing portion 24 and outer casing portion 25.

The inner hub 26 and outer hub 27 are spaced by an annular disc 30 on which is located a hub lever 31. Both the inner hub 28 and outer hub 27 include a lug 32 (only the lug on the outer hub 27 is visible) which interacts with the hub lever 31, so that rotation of either the inner hub 26 or outer hub 27 causes rotation of the hub lever 31 about the annular disc 30. The hub lever 31 includes a free

end 33, and it can be appreciated from Figure 2 that the free end 33 projects outside the actuator casing. The free end 33 of the hub lever 33 interacts with the bolt subassembly so that movement of the free end results in engagement and movement of the drawbar 20 to retract the bolt subassembly within the lock assembly housing 2.

Figure 3 also illustrates a hub monitor PCB assembly 34 which is fixed in position relative to the inner casing portion 24 and outer casing portion 25. The monitor PCB 34 interacts with the hubs 26, 27 to monitor the position of the lever 31 relative to the inner casing portion 24 and outer casing portion 25 so as to indicate whether the inner hub 26 or outer hub 27 has retracted the bolt assembly 19.

Figure 3 also illustrates a guide block 35 that locates within a zone 36 formed between the inner casing portion 24 and outer casing portion 25. The guide block 35 is urged to act against a toe portion 37 of the inner hub 26 and outer hub 27 via the influence of a spring 38. This urges the inner hub 26 and outer hub 27, and as a result the lever 31 to adopt an at rest position as illustrated in Figure 2.

The lock assembly 1 according to the invention includes a lock means 39 to prevent movement of the bolt 5 from the extended position. The lock means may take any form, and the lock means illustrated is merely preferred. The lock means illustrated includes a powered actuator 40 in the form of a solenoid. The powered actuator 40 may take a form other than a solenoid. The solenoid 40 illustrated includes a plunger 41 which is biased towards an extended position via a solenoid spring 42, and caused to move to a retracted position when power is suppled to a solenoid body 43. The form of solenoid 40 and in particular its response to power may vary.

The lock means 39 also includes a detent means 44 that interacts with the inner hub 26 and outer hub 27. The detent means 44 illustrated includes an inner pawl 45 and outer pawl 46 that interact with the inner hub 26 and outer hub 27

respectively. The manner in which they interact will be described in greater detail with reference to later illustrations.

The inner pawl 45 and outer pawl 46 preferably pivot between an active position and inactive position whereby they prevent and do not prevent rotation of the inner hub 26 and outer hub 27 respectively. This pivoting action may be achieved in any suitable manner and in the embodiment illustrated in Figure 3 each of the inner pawl 45 and outer pawl 46 include an aperture 47 for locating each pawl 45, 46 on a shaft 48 formed with the lower casing portion 25. A leaf spring 49 is provided for urging each of the inner pawl 45 and outer pawl 46 to rotate in an anticlockwise direction. This urges the inner pawl 45 and outer pawl 46 to interact with a locking bar 50. More specifically each of the inner pawl 45 and outer pawl 46 includes a toe portion 51 which is locatable within a recess 52 formed in the locking bar 50. This will enable the inner pawl 45 or outer pawl 46 to rotate about the shaft 48 when the locking bar 50 is slid relative to the casing 24, 25.

It is preferred that the power actuator 40 interact with the detent means 44 indirectly by a transmission means 53. Any form of transmission means 53 may be suitable and the embodiment illustrated is merely one derived form. The transmission means illustrated in includes a rack member 54 and a pinion member 55. The rack member 54 is moveable in a rectilinear motion by operation of the powered actuator 40. The pinion member 55 is rotatable about the shaft 48 supporting the inner pawl 45 and outer pawl 46. The rack member 54 and pinion member 55 include a gear train so that rectilinear movement of the rack 54 causes rotational movement of the pinion 55. The gear train will be described in greater detail with reference to better illustration. The pinion 55 includes a toe portion 56 which locates within the recess 52 formed in the locking bar 50 so that rotation of the pinion member 55 causes the locking bar 50 to slide. Whilst the locking bar 50 illustrated is acting in the form of a link member between the pinion 55 and the detent 44, the shape and type of movement of the locking bar 50 may vary, provided it provides a link between the pinion 55 and the detent means 44.

Figure 3 also illustrates the rotatable member 11, which is locatable in the aperture 57.

Figure 4 is a side elevation view of the actuator subassembly 9 shown in a partially assembled view. In particular it should be noted that the guide block, 35 biasing spring 38, monitor PCB 34, inner pawl 45 and the inner casing portion 24 have been removed to more easily explain the operation of the remaining components. Figure 4 illustrates the detent 44 in an inactive condition, and in which condition the inner hub 26 or outer hub 27 (obscured in Fig. 4) is freely rotatable in order to cause movement of the hub lever 31. In Figure 4 a shoulder portion 58 of the outer pawl is illustrated being distanced from a heel portion 59 of the outer hub 27 (see Fig. 5). In contrast Figure 6 illustrates the detent in an active condition whereby the shoulder 58 of the outer pawl 46 is positioned to engage the heel portion 49 of the outer hub 27. This prevents rotation of the outer hub 27. This rotation of the outer pawl 46 is achieved by retraction of the plunger 41 within the solenoid body 43 causing retraction of the rack 48. The gear train includes upper teeth 60 of the rack 54 engage upper teeth 61 on the pinion 55 to rotate the pinion 55 about the shaft 48. The toe 56 of the pinion 55 engages and slides the locking bar 50 to inturn cause the outer pawl 46 to rotate. It can be appreciated that when comparing Figures 5 and 7 that the toe portions 56, 51 of the pinion 55 and outer pawl 46 are located within the recess 52 formed in the locking bar 50.

It ought to be appreciated from Figures 4 to 7 that with the rack 54 positioned relative to the pinion 55 the detent 44 is moved to an inactive position when the supply of power to the solenoid body 43 ceases. As a result in the event of a power failure the detent 44 will move to an inactive position allowing either hub 26, 27 to be rotated to retract the bolt 5, and egress of persons through the doorway. The selector means 12 is considered to be in a failsafe condition when the lock means 39 is capable of operating in this manner.

In order to adjust the selector means 12 from the failsafe condition to a failsecure condition, the supply of power to solenoid 43 needs to cease so as to allow rotation of the rotatable member 11. This causes the rack 54 to travel

along a substantially arcuate path from the position illustrated in Figures 4 to 7 to adopt the position illustrated in Figures 8 to 11. In particular when comparing Figure 4 with Figure 8 it can be noted that the rotatable member 11 includes a cam surface 62 which engages the rack member 54 so that rotation of the rotatable member 11 causes the rack 54 to disengage from the teeth of the top of the pinion 61 and engage with teeth 63 on the bottom of the pinion 55. Once the rack 54 is in the position illustrated in Figures 8 to 11, the selector 12is considered to be in the failsecure position. More specifically it can be appreciated from Figure 10 and 11 that once power is ceased to be supplied to the solenoid 43 the rack 54 rotates the pinion 55 to move the detent 44 to an active position. Whereas the supply of power to the solenoid 43 as illustrated in Figures 8 and 9 causes movement of the rack 54 to rotate the pinion 55 to move the detent 44 to an inactive position.

It can be noted from Figures 8 and 10 that the rack 54 moves in a linear direction positioning response to operation of the solenoid 40. The rack 54 is guided in this linear movement by the cam surface 62 of the rotatable member 11 and an upper guide 64 or lower guide 65 depending upon whether the selector 12 is in the failsecure or failsafe condition respectively. Figure 8 illustrates the rack being guided by the upper guide 64, whereas Figure 4 illustrates the rack being guided by the lower guide 65.

Referring now to Figure 12 which illustrates another embodiment according to the invention. The description of this embodiment will use like reference numerals with the prefix of “10” to describe like features from the previous embodiment illustrated in Figures 1 to 11. Figure 12 illustrates a short backset mortice lock assembly 101 including failsafe/failsecure selector 112 and spindle recess 112 closer to the front wall 123 of the housing 102. The difference being with this embodiment the depth of the housing 102 is less than the previous embodiment so as to allow the lock assembly 101 to fit in a door having a limited space for backset. In particular a short backset lock assembly 101 may be used in a door framed with aluminium extruded section which tend to be relatively short in depth.

Referring now to Figure 13 which illustrates in summary a housing 102 being formed from a cover 114, a base 113 and a cap 115. The housing houses an electronic subassembly 117, an actuator subassembly 109, a deadlock subassembly 107 and a bolt assembly 119. It should be noted from Figure 13 that the length of the drawbar 120 of the bolt assembly 119 is substantially shorter than the drawbar 120 on the standard backset lock assembly 1 and the casing of the actuator subassembly 109is of less width than the casing in the actuator subassembly 9 of the standard backset lock assembly 1. However the features as illustrated in figure 13 operate in substantially the same manner as described with reference to the standard backset mortice lock assembly 1, with the exception of the way the selector means interacts with the detent means which will be described in greater detail with reference to later illustrations.

Figure 14 illustrates an inner casing portion 124 and an outer casing portion 125 with the inner hub 126, hub lever 131, hub spacer 130, outer hub, biasing spring 138, guide head 135, inner pawl 145, pinion 155, outer pawl 146, leaf spring 149, locking bar 150, powered actuator 140and monitor PCB 134 all operating in the same manner as described with reference to the standard backset mortice lock assembly 1 illustrated in Figure 2. However given that the inner casing portion 124 and outer casing portion 125 are of shorter depth than the standard backset mortice lock assembly 1, the way in which the detent 144 interacts with the powered actuator 140 needs to be adjusted. Furthermore adjustments have been made to the selector means 112 so as to achieve the same function in a shorter depth casing.

It can be noted from Figure 12 that only a single rotatable member 111 is visible from the side of the housing 102. The rotatable member 111 has the same groove formation formed in its face to facilitate rotation thereof. However the selector means 112 in this embodiment also includes a rotated member 166 and an idler gear 167 acting between the rotated member 166 and rotatable member 111 (see Figure 14). The rotatable member 111 and rotated member 166 both include a cam surfaces 162 located on a shaft portion which locates within openings 168 on the left and right hand side of the rack 145 respectively.

Referring now to Figures 15 and 16 which illustrates the actuator assembly 108 in the same condition to that illustrated in Figures 4 and 5 with the selector means in a failsafe condition and the detent 144 in an inactive condition. The solenoid 140 in Figure 15 has the plunger 141 extended to the right hand side as there is no power supply to the body 143 of the solenoid 140. This in turn has forced the rack 154 to the right hand side, rotated the pinion 155to slide the locking bar down 150, and draw the outer pawl shoulder 158 away from the heel 159 of the outer hub 127. In contrast, Figures 17 and 18 illustrate the plunger 141 of the solenoid 140 retracted as a result of power being supplied to the solenoid body 143. This moves the rack 154 to the left hand side, rotates the pinion 155 which in turn slides the locking bar 150 up, to rotate the shoulder 158 of the outer pawl 146 into the path of rotation of the outer hub 127.

When comparing Figures 15 to 18 with Figure 19 to 22 it can be noted that the selector means 112 has been adjusted to the failsecure condition. In particular rotation of the rotatable member 111 has caused rotation of the rotated member 166 via the idler gear (obscured) to cause the cam surface of each of the rotatable member 111 and rotated members 168 to engage and move the rack 154 up. This causes the rack 154 to disengage from the gear teeth 161 on the top of the pinion 155 (see Figure 15) and engage with the gear teeth on the bottom of the pinion 155 (see Figure 19). Once the gear change has been made, the detent 144 can be adjusted in the same manner as described with reference to Figures 15 to 18.

It ought to be appreciated from the foregoing description that the lock assembly as hereinbefore described allows for a relatively simple adjustment to achieve alteration of the condition of the lock assembly between a failsafe condition and a failsecure condition. It is particularly advantageous that this adjustment can be made without having to disassemble the lock assembly, and that the components required to be adjusted remain captured during the alteration process.

Various alternations and/or additions may be introduced to the mortice lock assemblies as hereinbefore described without departing from the spirit or ambit of the invention.

Future patent applications may be filed in Australia or overseas on the basis of or claiming priority from the present application. It is to be understood that the following provisional claims are provided by way of example only, and are not intended to limit the scope of what may be claimed in any such future application. Features may be added to or omitted from the provisional claims at a later date so as to further define or re-define the invention.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A mortice lock assembly for use with a door including a housing for location at least partially within a cavity formed in the door, a bolt movable relative to an extended position whereby it extends out a front face of the housing, an inner hub and an outer hub that interact with the bolt and are manually rotatable from an inner side and an outer side respectively to move the bolt from the extended position, a lock means including a detent means and a powered actuator for adjusting a condition of the detent means between an active condition and an inactive condition whereby the bolt is prevented and not prevented from moving from the extended position respectively, a selector means that is adjustable between a failsafe condition and a failsecure condition whereby in the event of failure of supply of power to the powered actuator the detent adopts the inactive condition and the active condition respectively, the selector means including a rotatable member that is rotated through no more than 360º to adjust the condition of the selector means.

2. A mortice lock assembly according to claim 1 where the housing includes an opening for providing access to the rotatable member allowing for adjustment of the selector means.

3. A mortice lock assembly according to claim 2 wherein the opening is on a side of the housing.

4. A mortice lock assembly according to any one of the preceding claims wherein the detent means interacts with the inner hub and outer hub so that when the detent is in the active condition the inner hub and or outer hub is prevented from rotation..

5. A mortice lock assembly according to claim 4 wherein the detent means includes an inner pawl and an outer pawl that interact with the inner hub and outer hub respectively, the inner pawl and outer pawl preventing rotation of the

inner hub and outer hub respectively when the detent means is in the active condition.

6. A mortice lock assembly according to any one of the preceding claims wherein the powered actuator interacts with the detent means indirectly by a transmission means.

7. A mortice lock assembly according to claim 6 wherein the transmission means includes a rack member and a pinion member whereby the rack member is moved on a substantially liner path on operation of the powered actuator so as to rotate the pinion member.

8. A mortice lock assembly according to claim 7 wherein the rotatable member acts as a guide when the rack member is moved along the liner path.

9. A mortice lock assembly according to claim 7 or 8 wherein the transmission means includes a link member for linking the pinion to the detent means.

10. A mortice lock assembly according to claim 9 wherein the link member is a bar that is movable in a direction substantially perpendicular to the direction of movement of the rack when moving along the liner path.

11. A mortice lock assembly according to any one of the preceding claims wherein the rotatable member is manually rotated less than 360º to adjust the condition of the selector means.

12. A mortice lock assembly according to any one of the preceding claims wherein the rotatable member engages the with the rack member to act as a guide along the liner path.

13. A mortice lock assembly according to claim 12 wherein the rotatable member includes a cam surface that engages the rack member whereby rotation of the rotatable member causes the rack member to move along an

arcuate path as the selector means adjusts between failsafe condition and the failsecure condition.

14. A mortice lock assembly according to any one of the preceding claims including a rotated member that is driven by the rotatable member to rotate therewith, the rotatable member having a cam surface that engages the rack member whereby rotation of the rotated member causes the rack member to move along the arcuate path as the selector means adjusts between failsafe condition and the failsecure condition.

15. A mortice lock assembly according to claim 14 wherein the rotatable member drives the rotated member indirectly by an idler gear.

16. A mortice lock assembly according to any one of the preceding claims wherein the powered actuator includes a solenoid and a plunger that is movable in response to supply of power to the solenoid.

17. A mortice lock assembly according to any one of the preceding claims wherein the selector means is operable from outside the housing.

18. A mortice lock assembly according to claim 17 wherein the housing includes an aperture that provides access to the rotatable member.

19. A mortice lock assembly according to claim 18 wherein the aperture is formed in a side wall of the housing.

20. A mortice lock assembly according to any one of the preceding claims wherein the rotatable member includes a formation that is accessible from a side of the housing, said formation facilitating rotation of the rotatable member.

21. A mortice lock assembly according to claim 20 wherein the formation is at least one groove in a face of the rotatable member to facilitate transmission of torque to the rotatable member.

22. A mortice lock assembly according to any one of the preceding claims wherein the rotatable member remains captured during adjustment of the selector means.

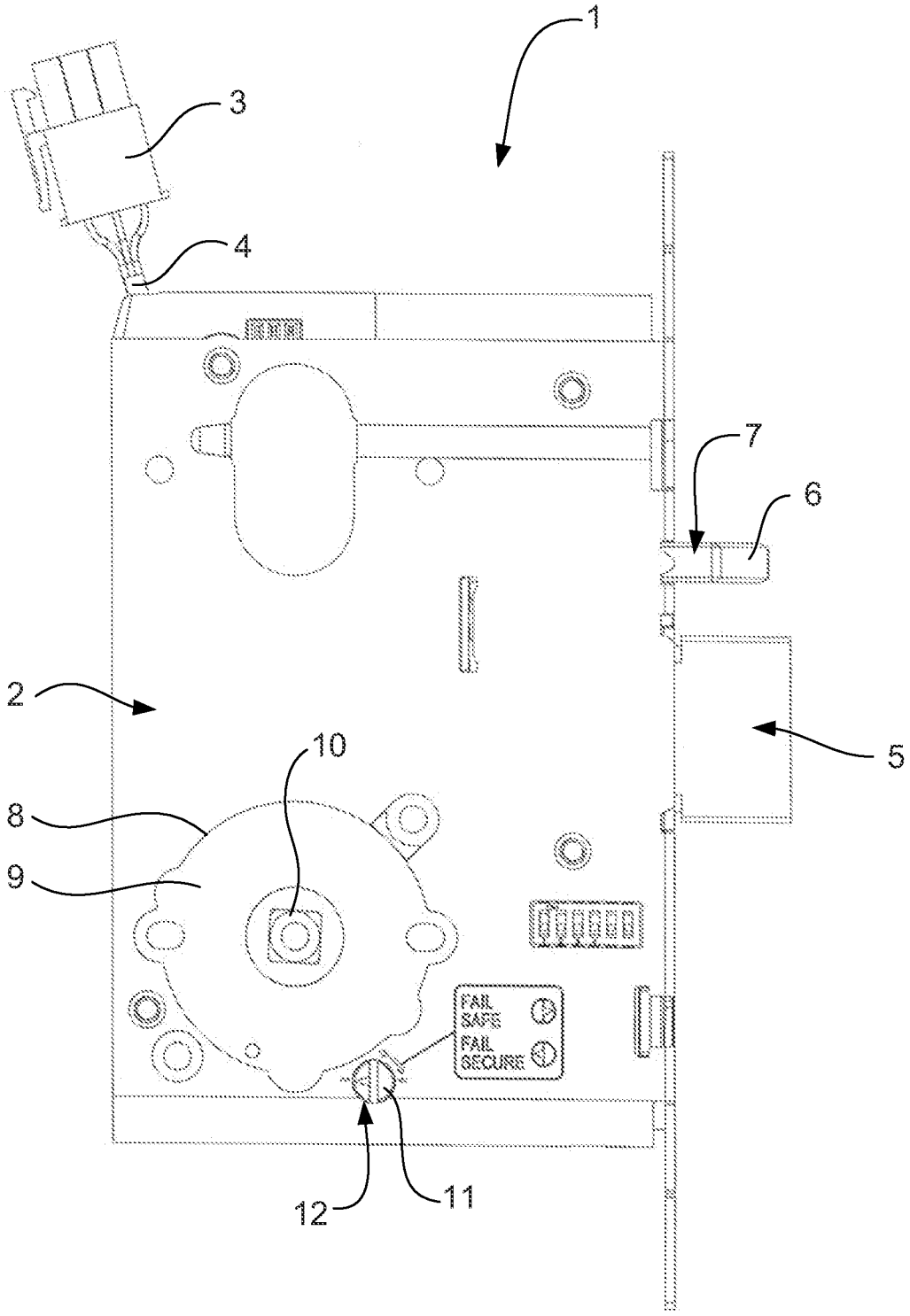


FIG 1

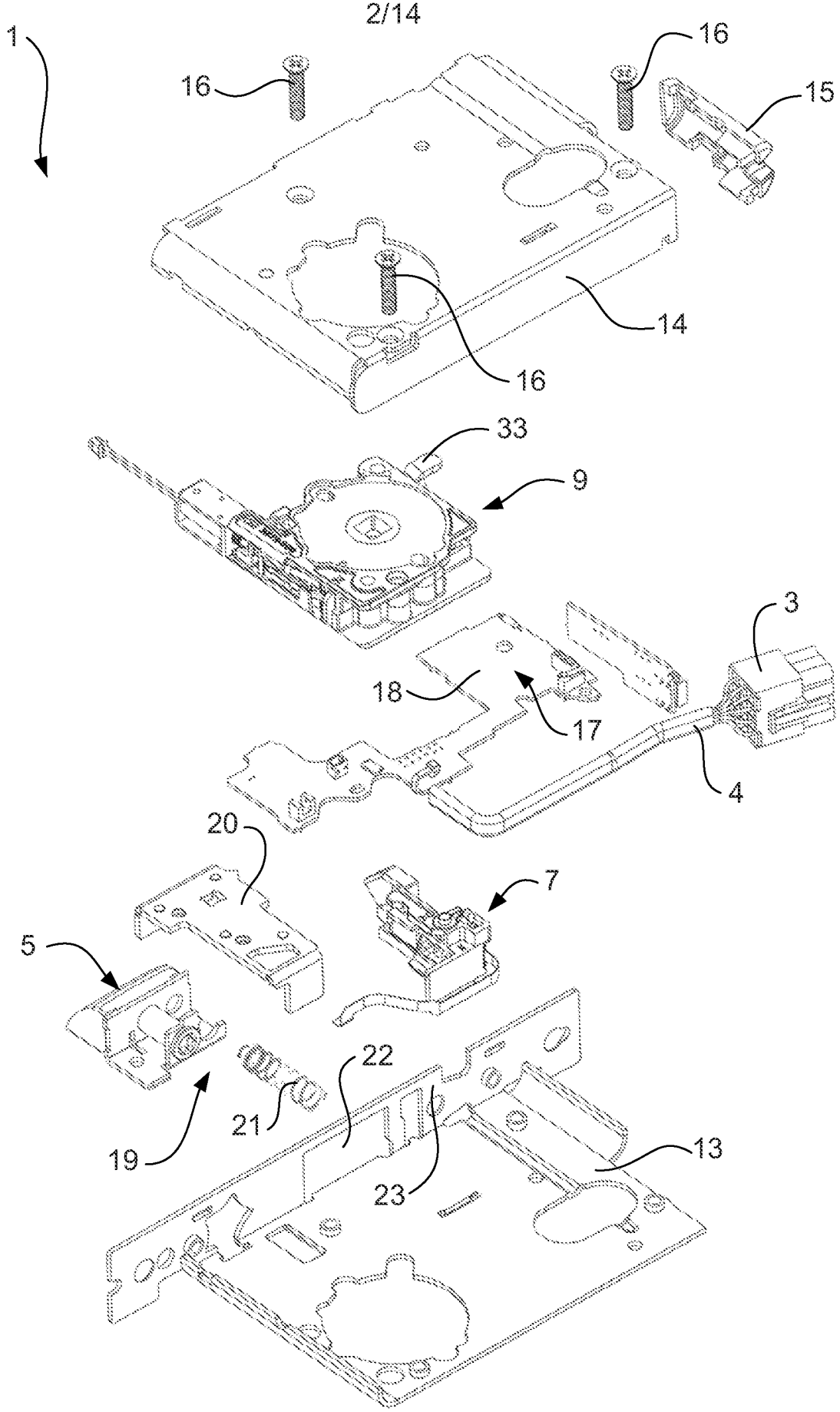
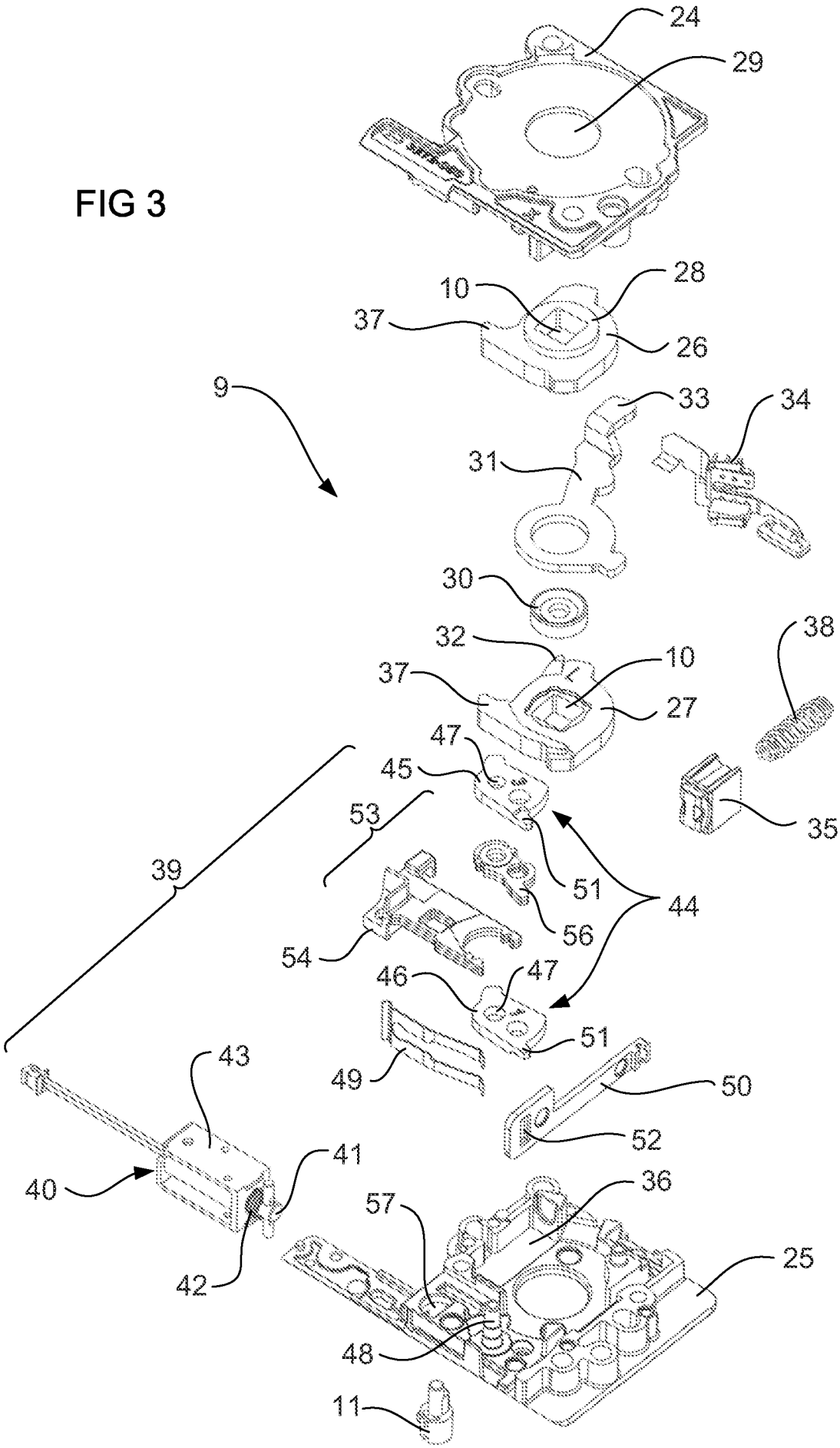


FIG 2

FIG 3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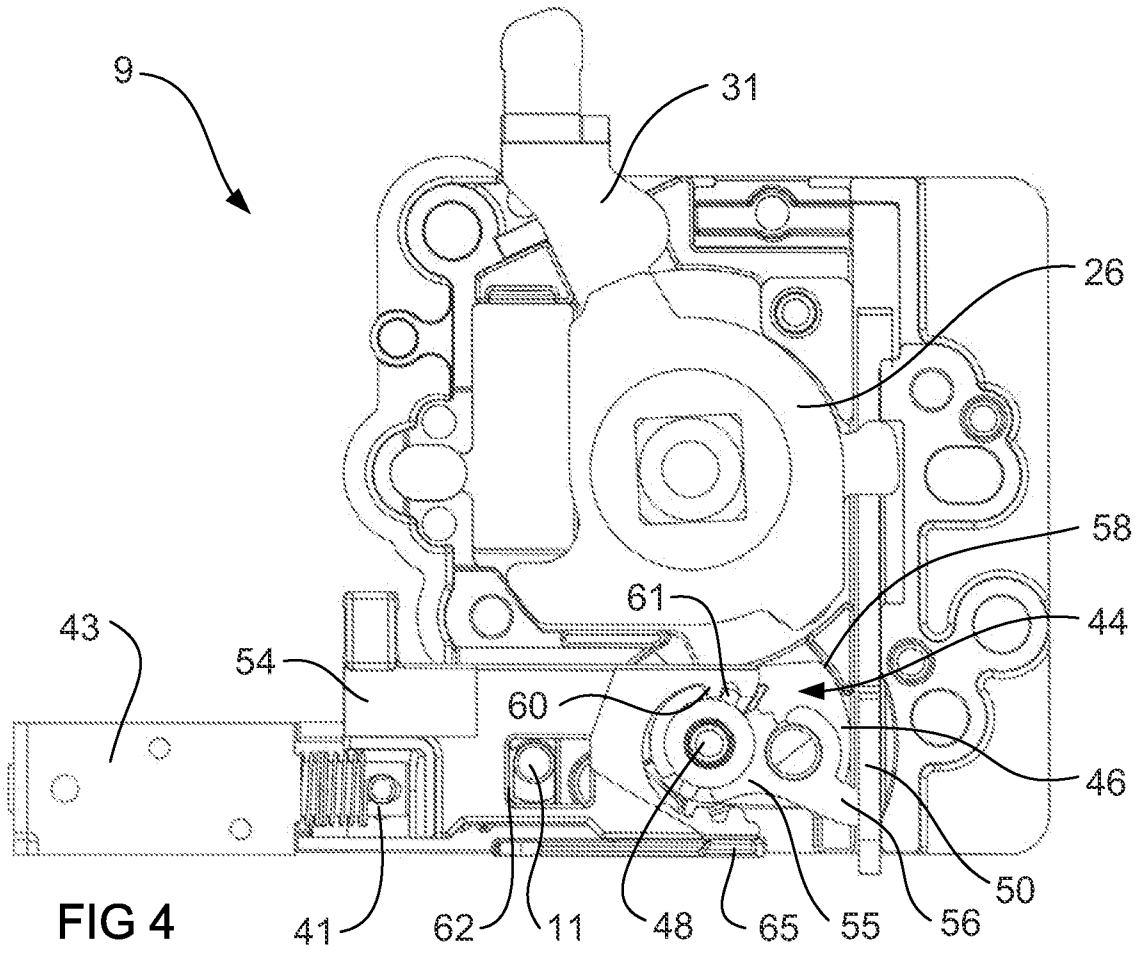
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FIG 4

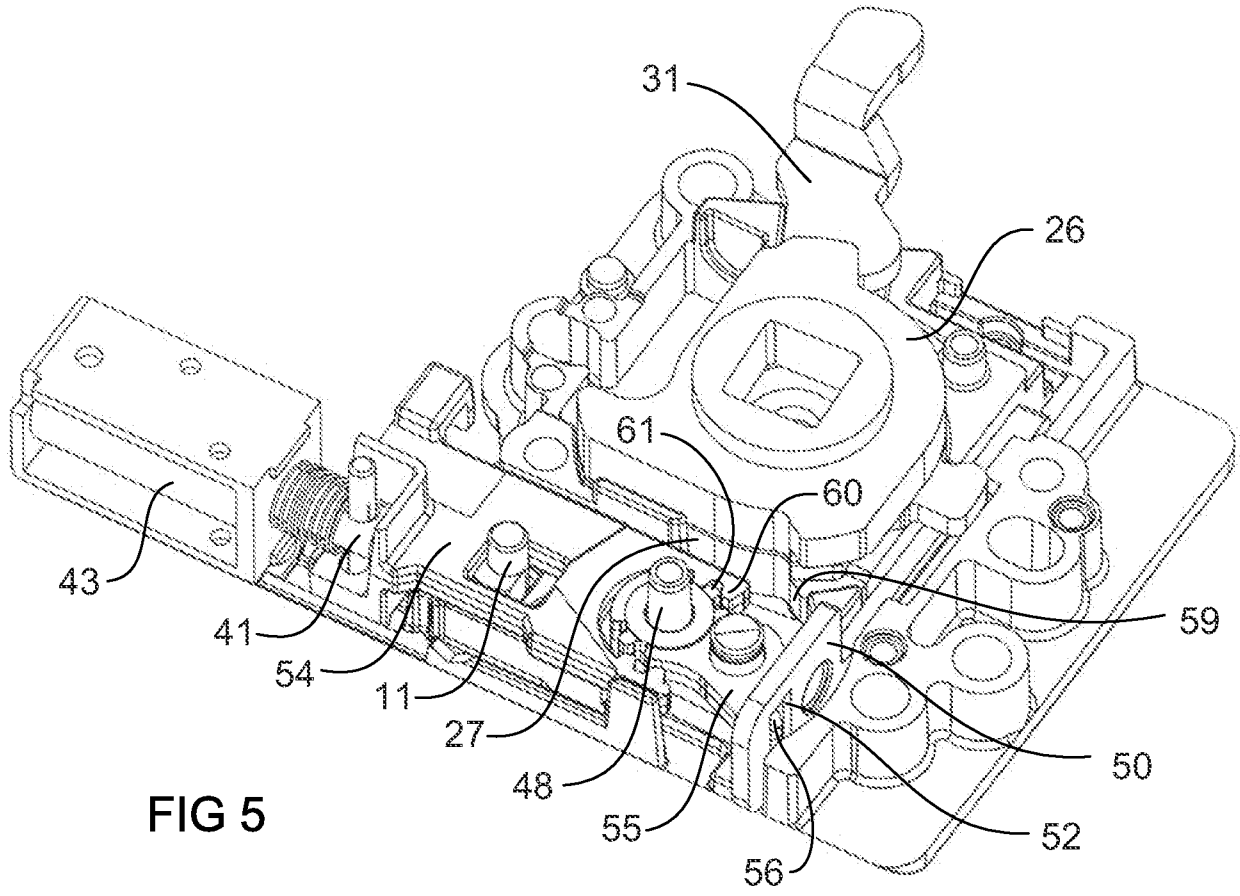
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FIG 5

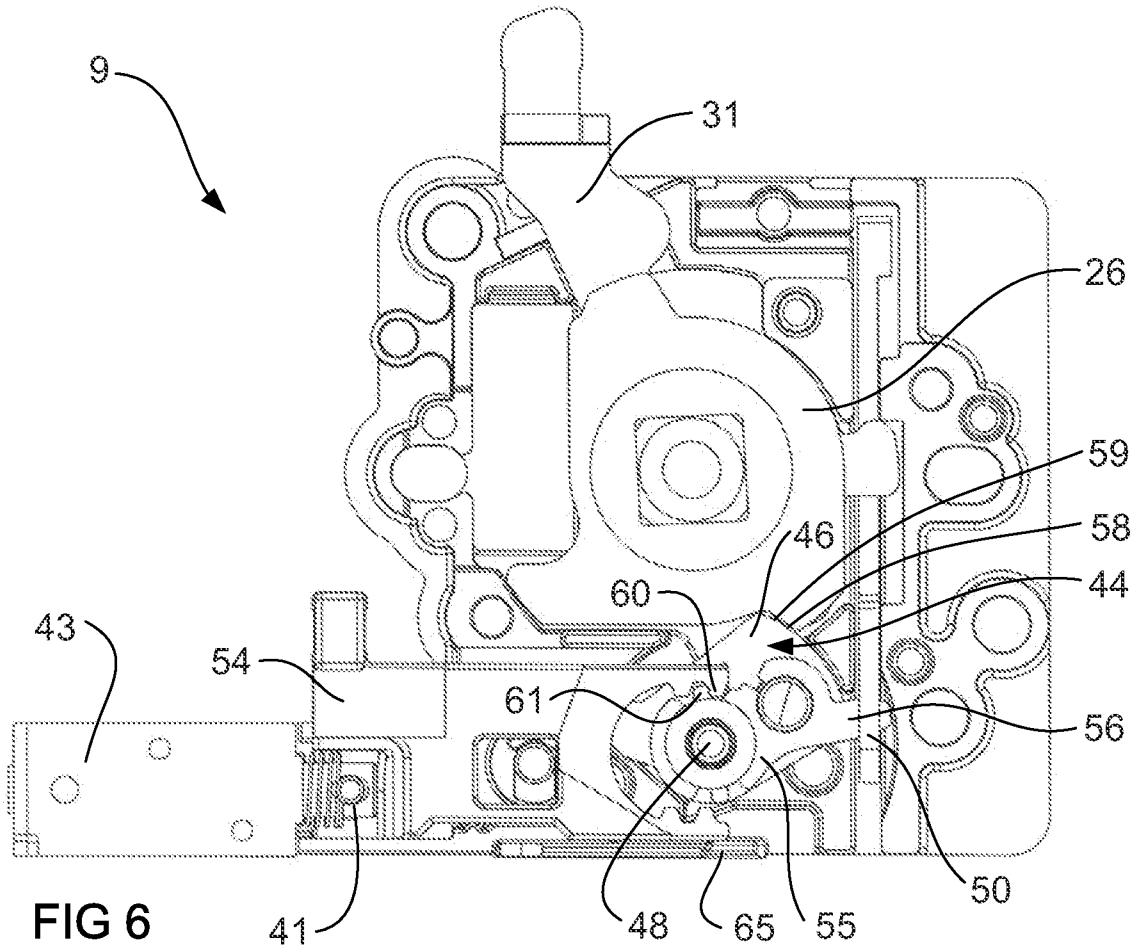
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FIG 6

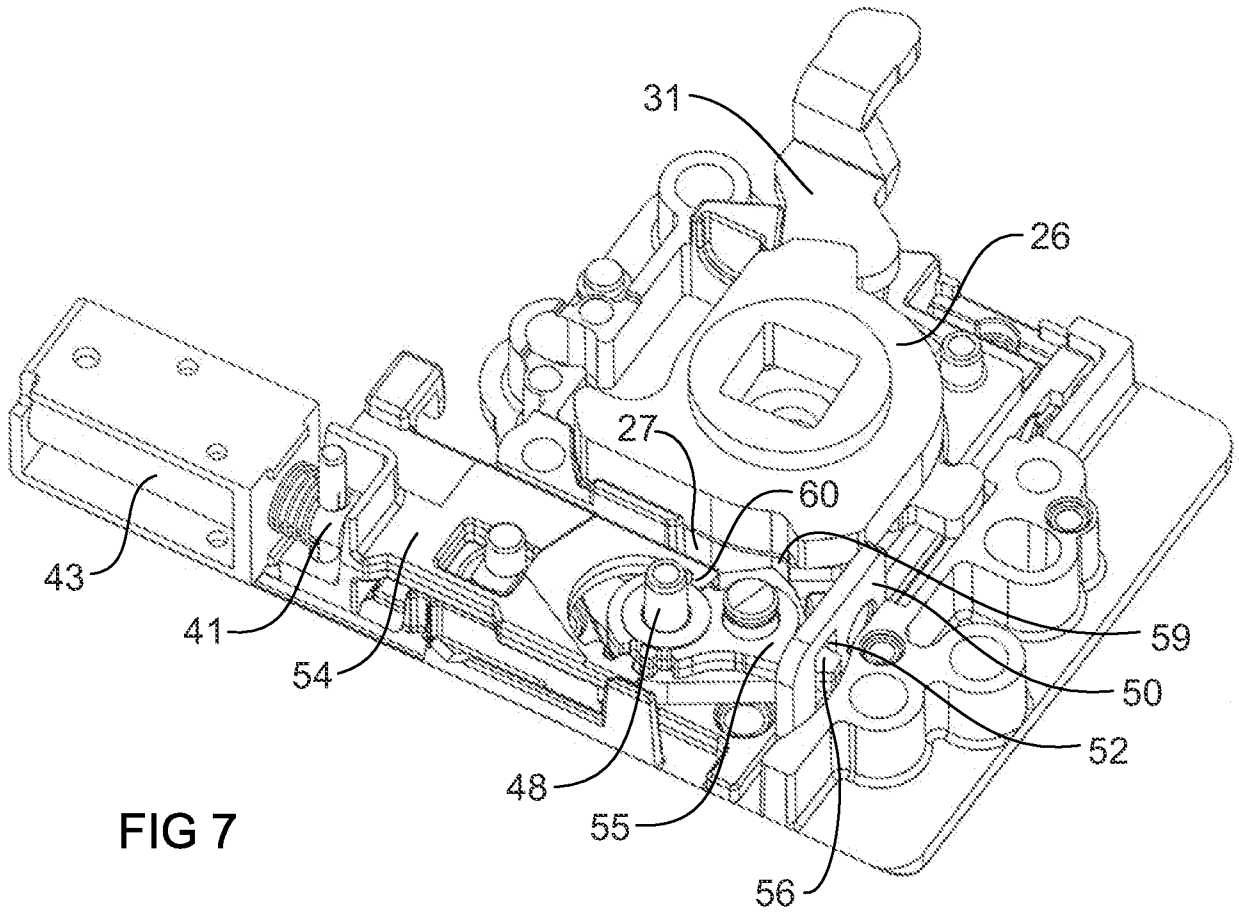
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FIG 7

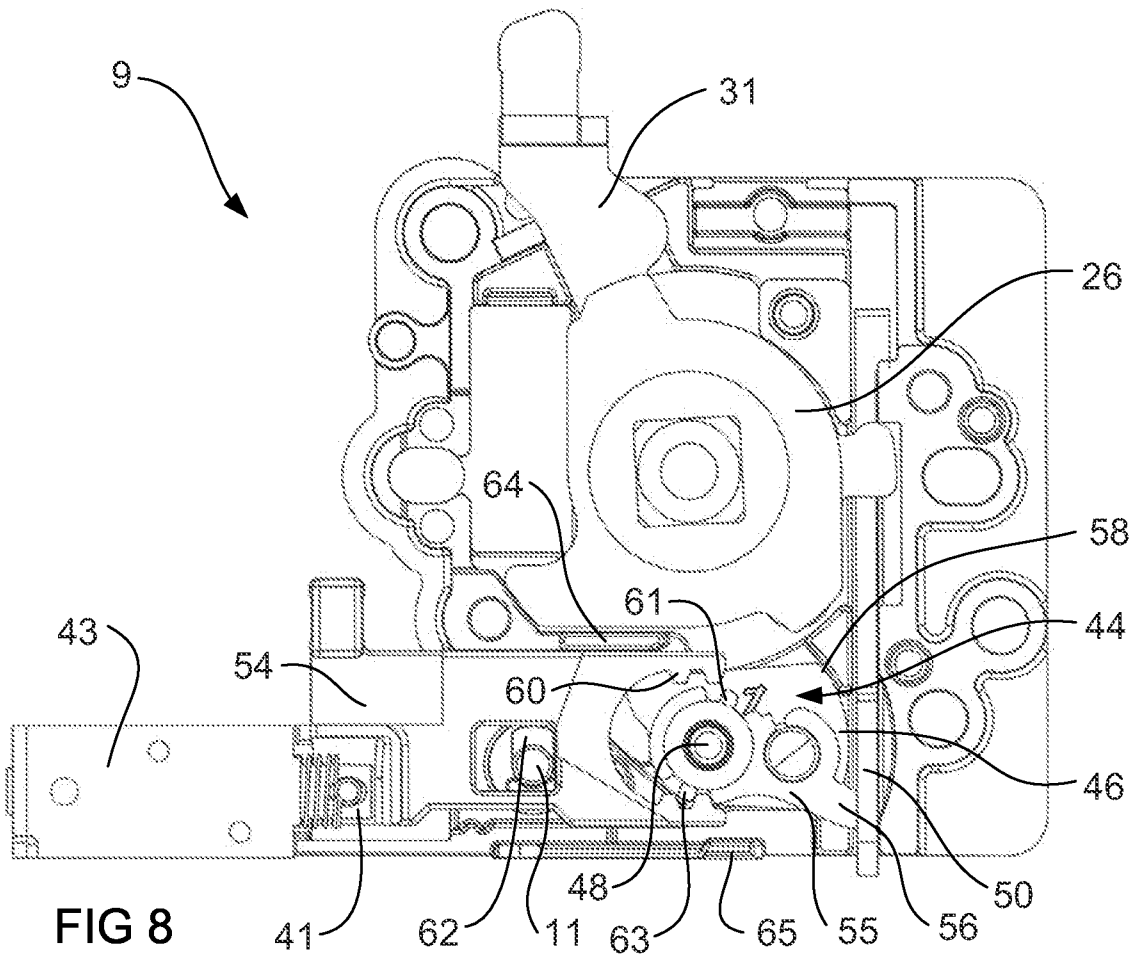
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FIG 8

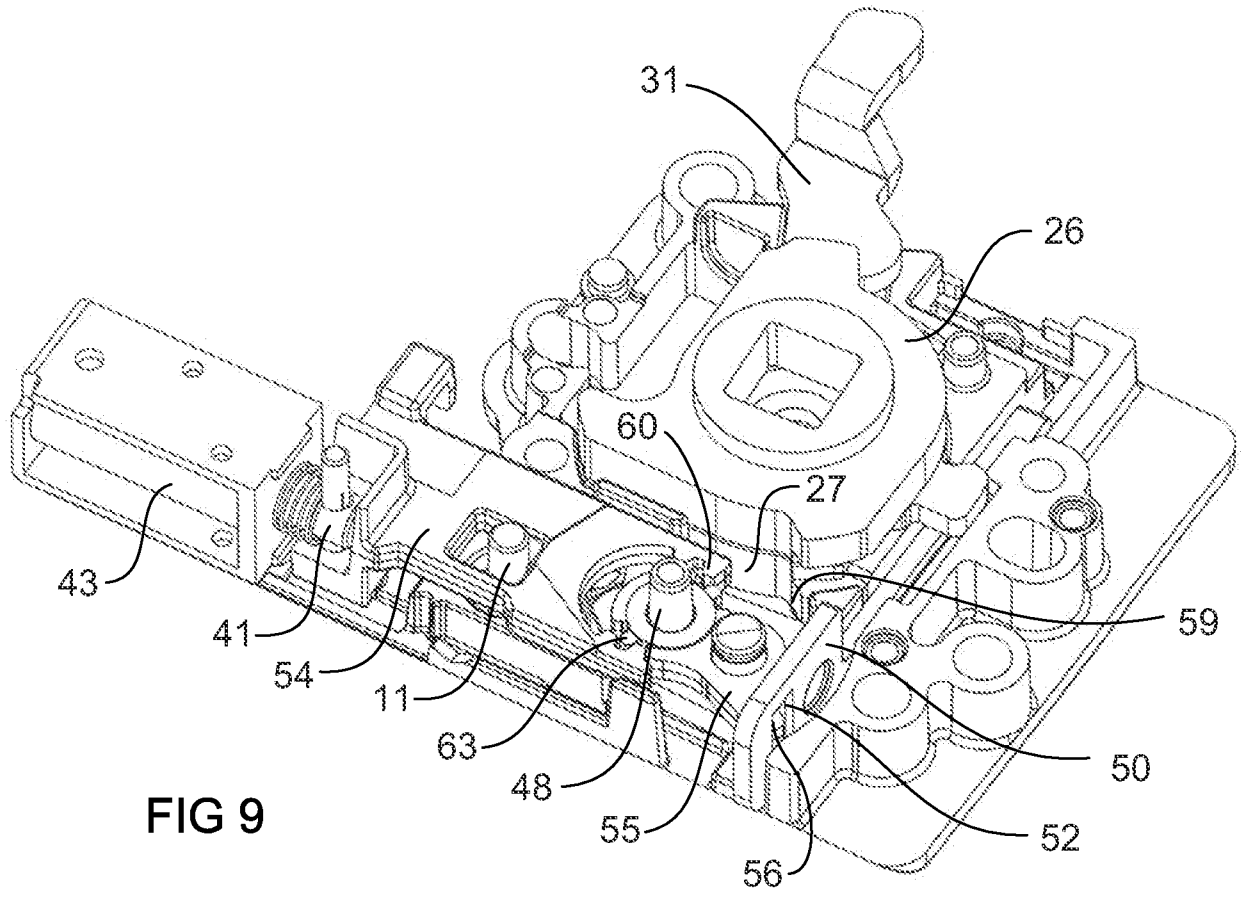
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FIG 9

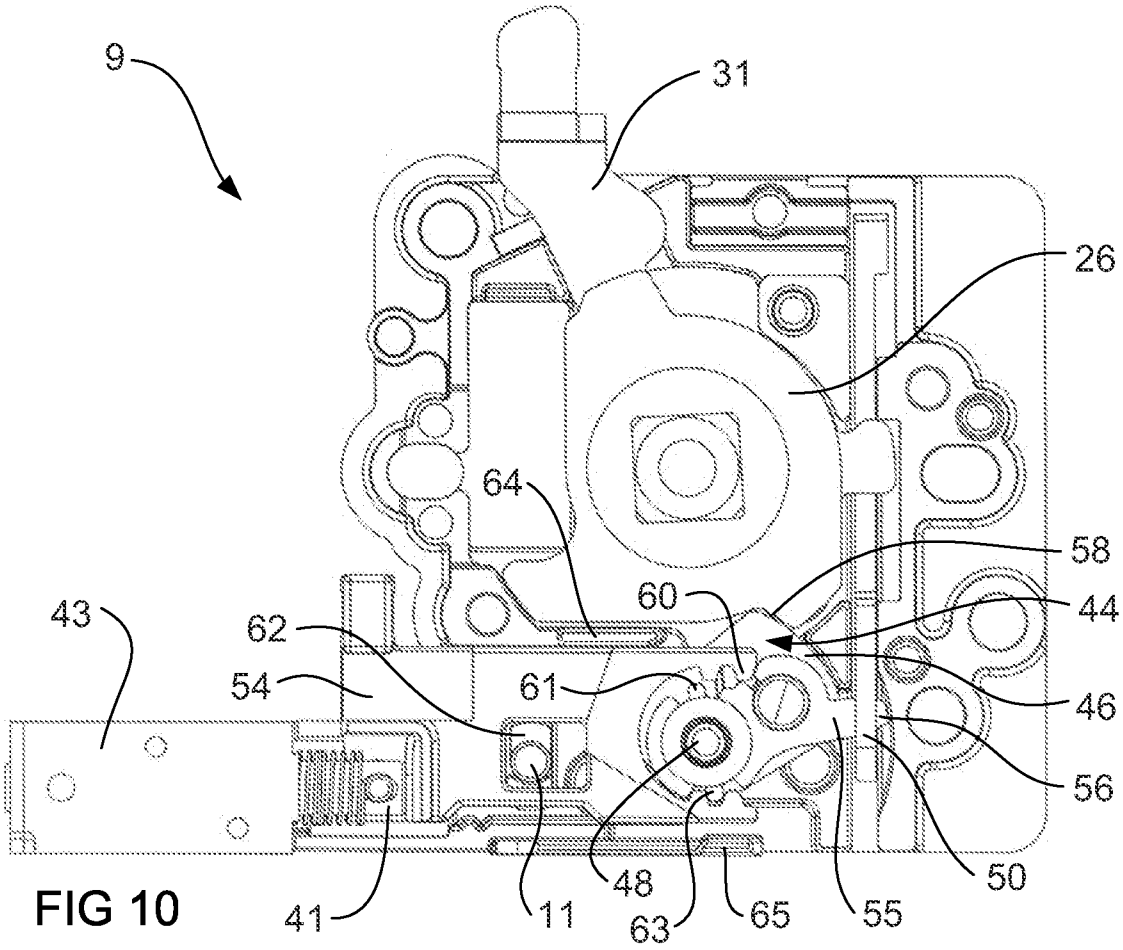
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FIG 10

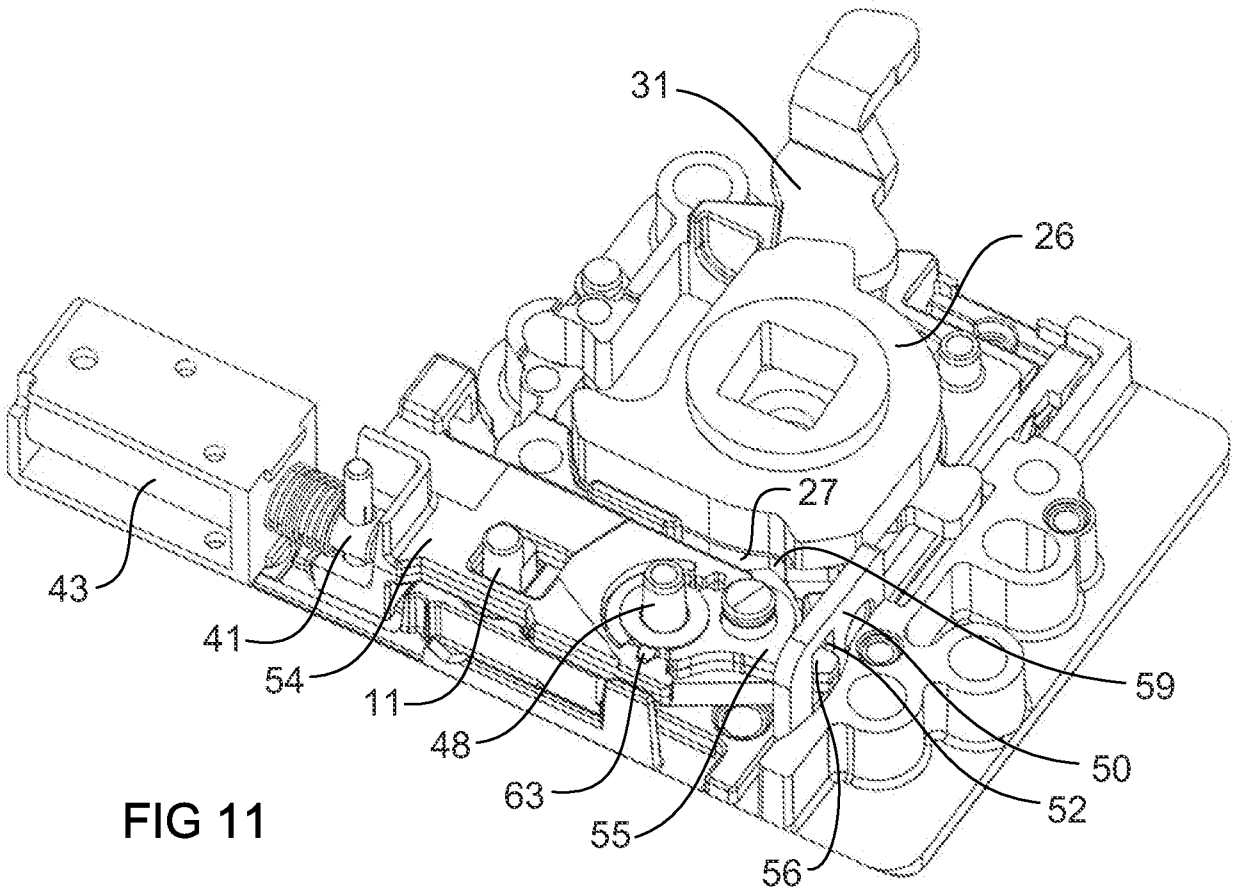
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FIG 11

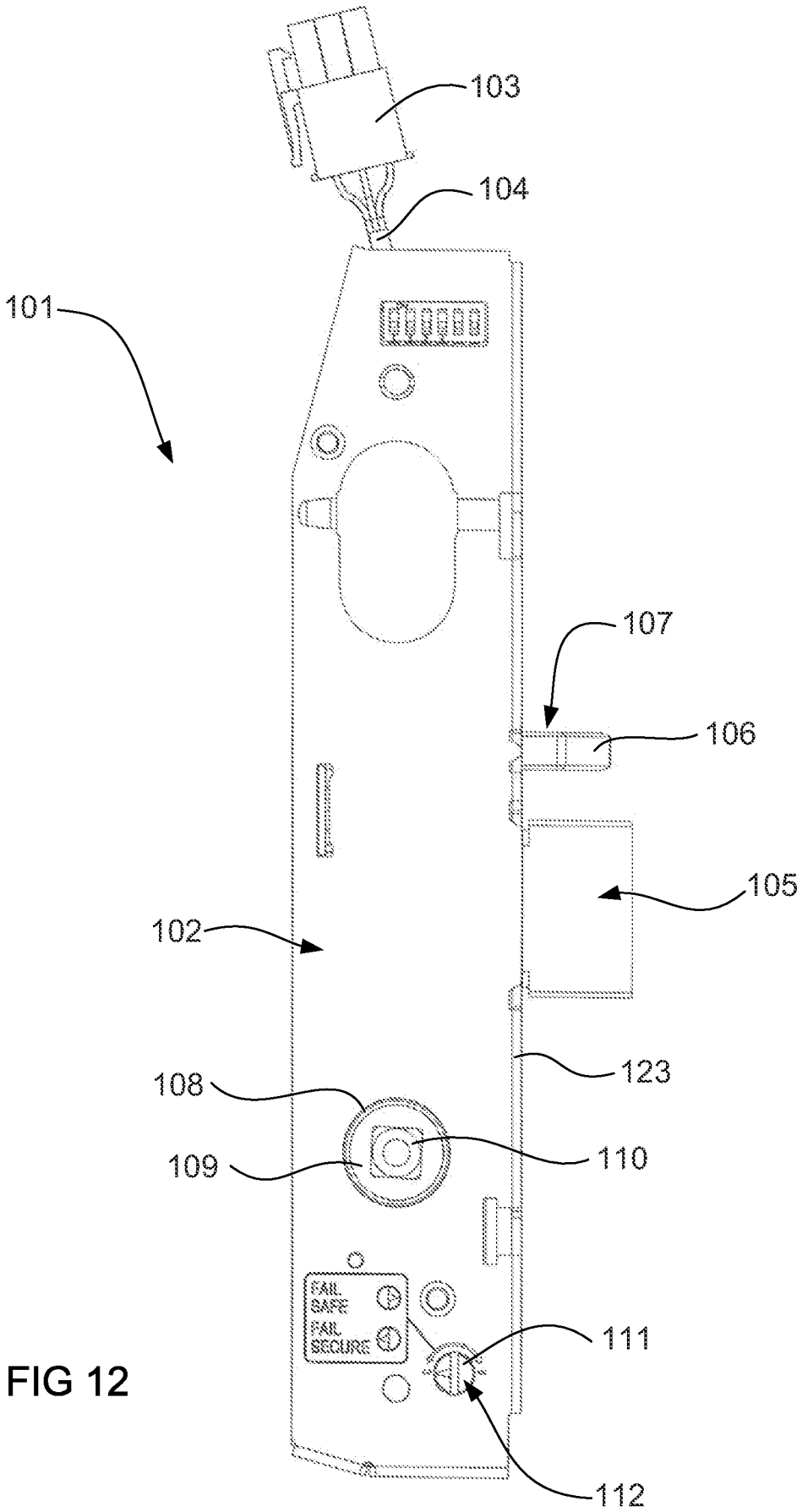
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FIG 12

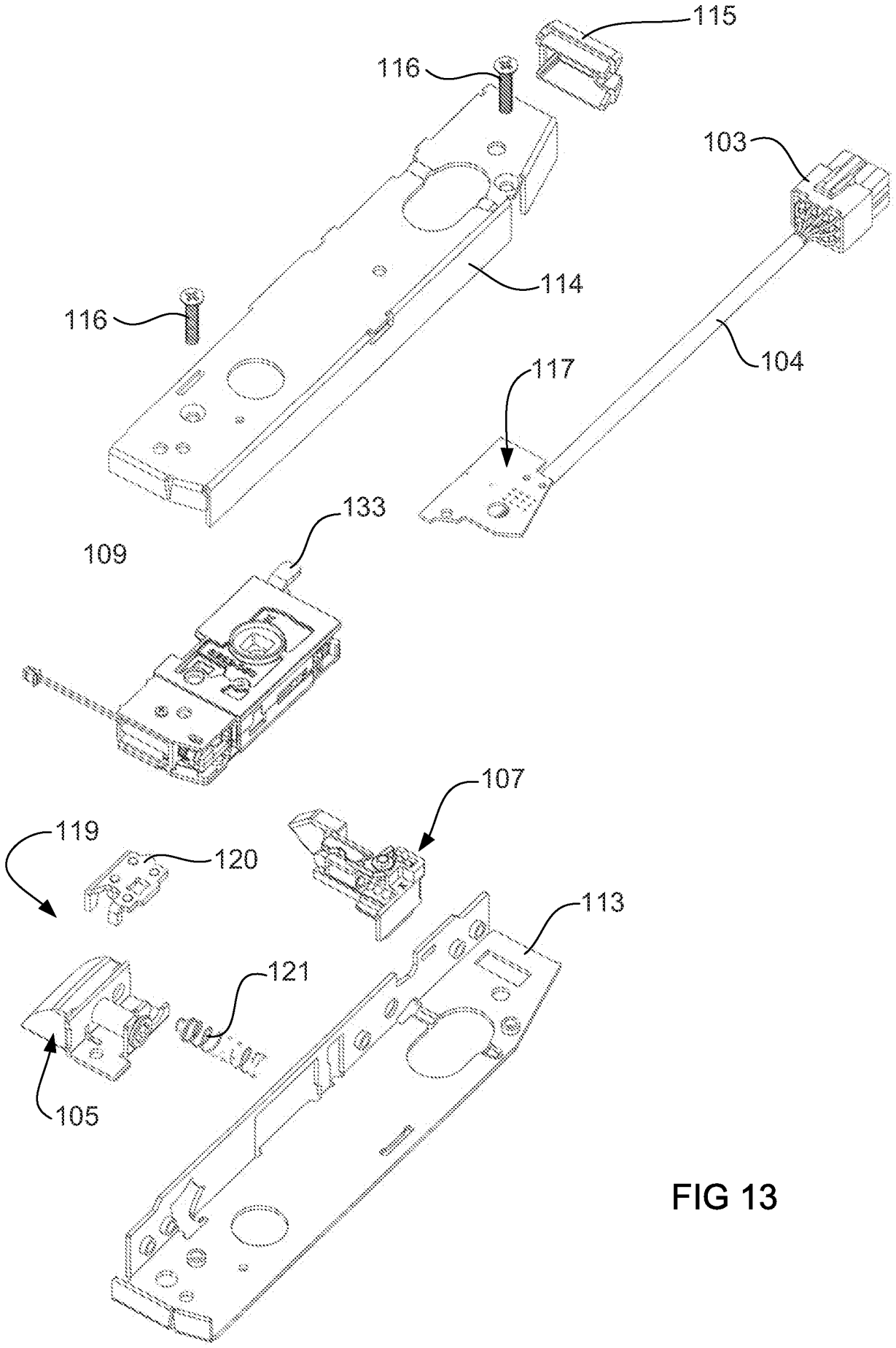

FIG 13

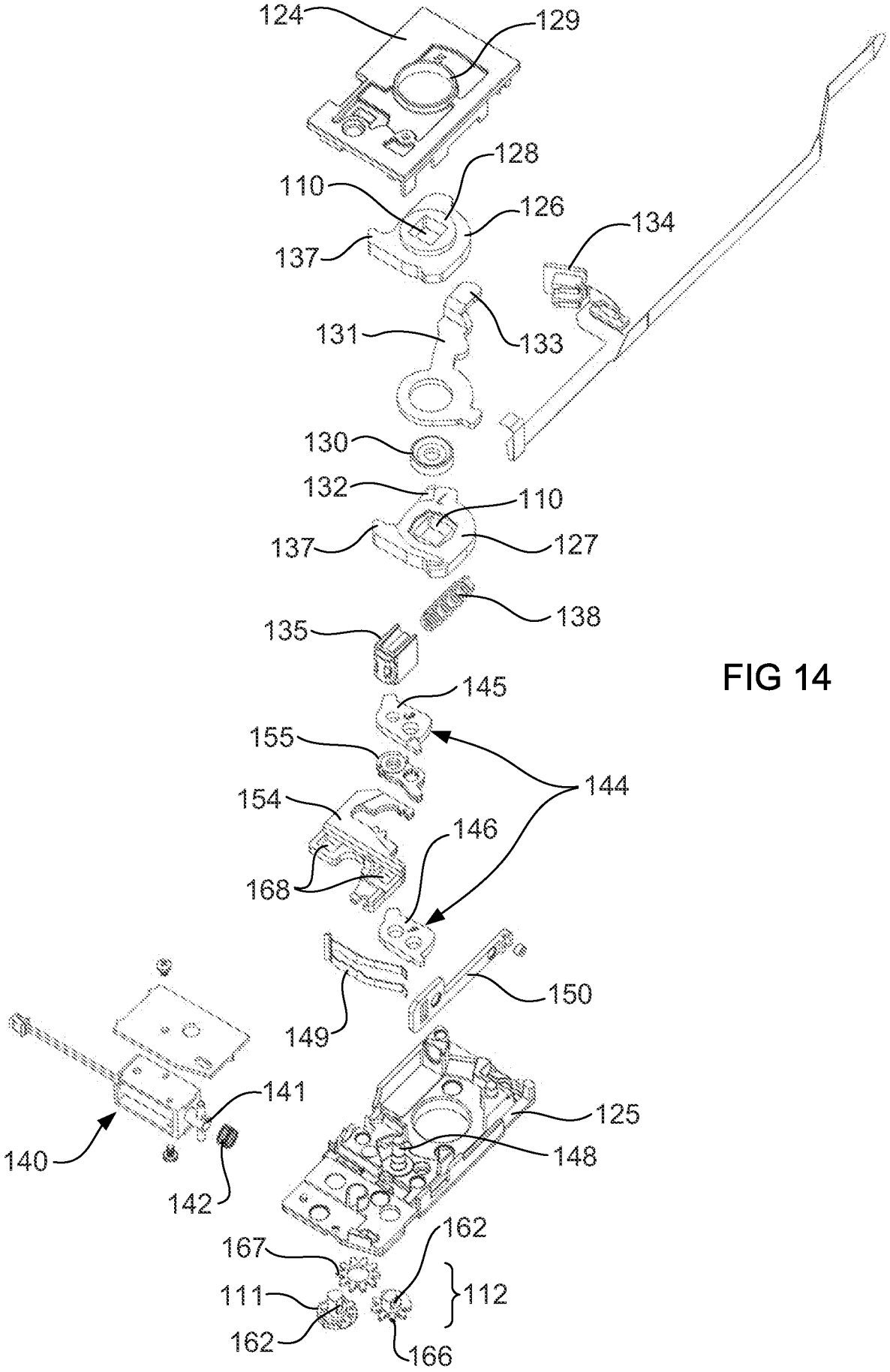
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FIG 14

FIG 15

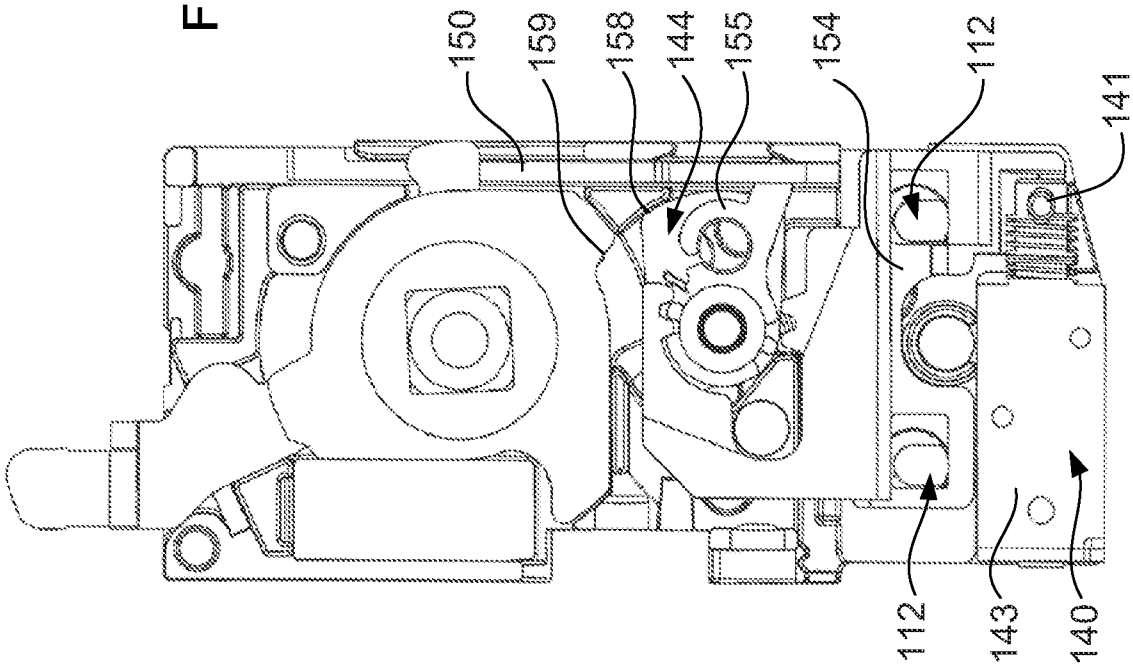
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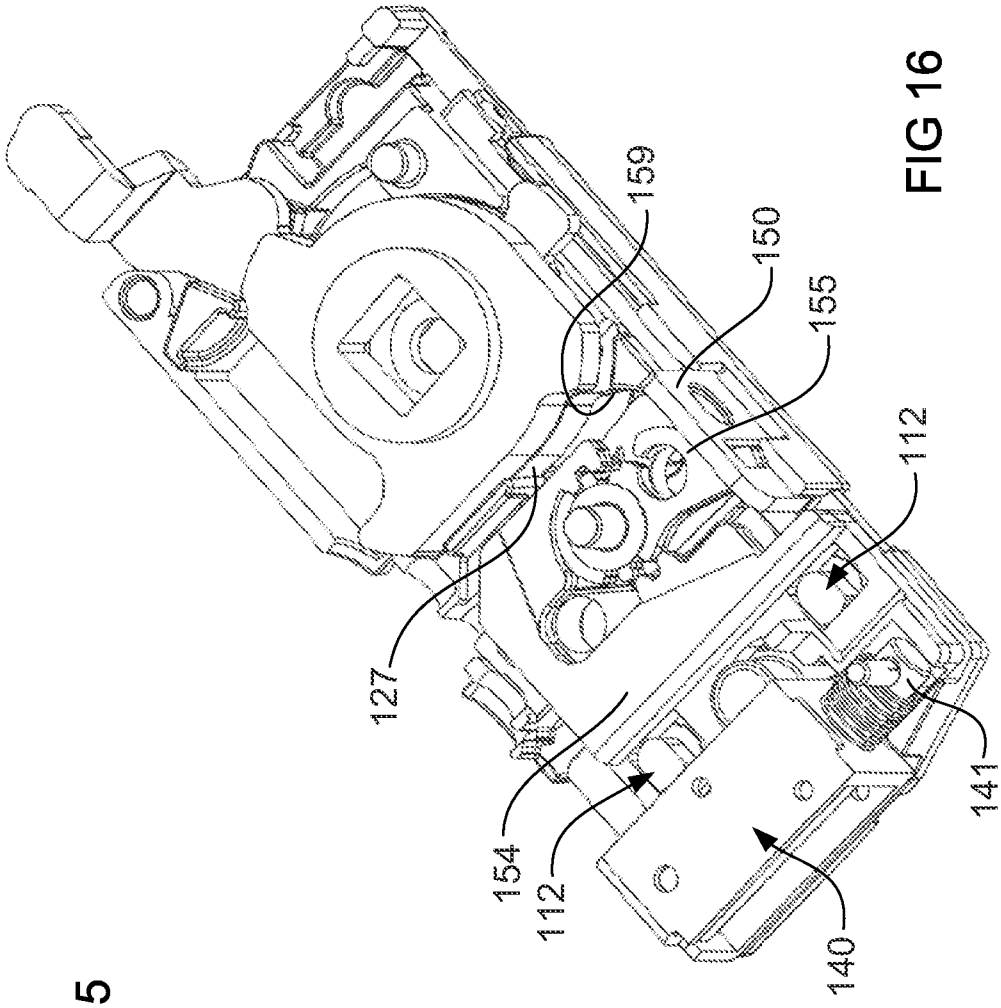
FIG 16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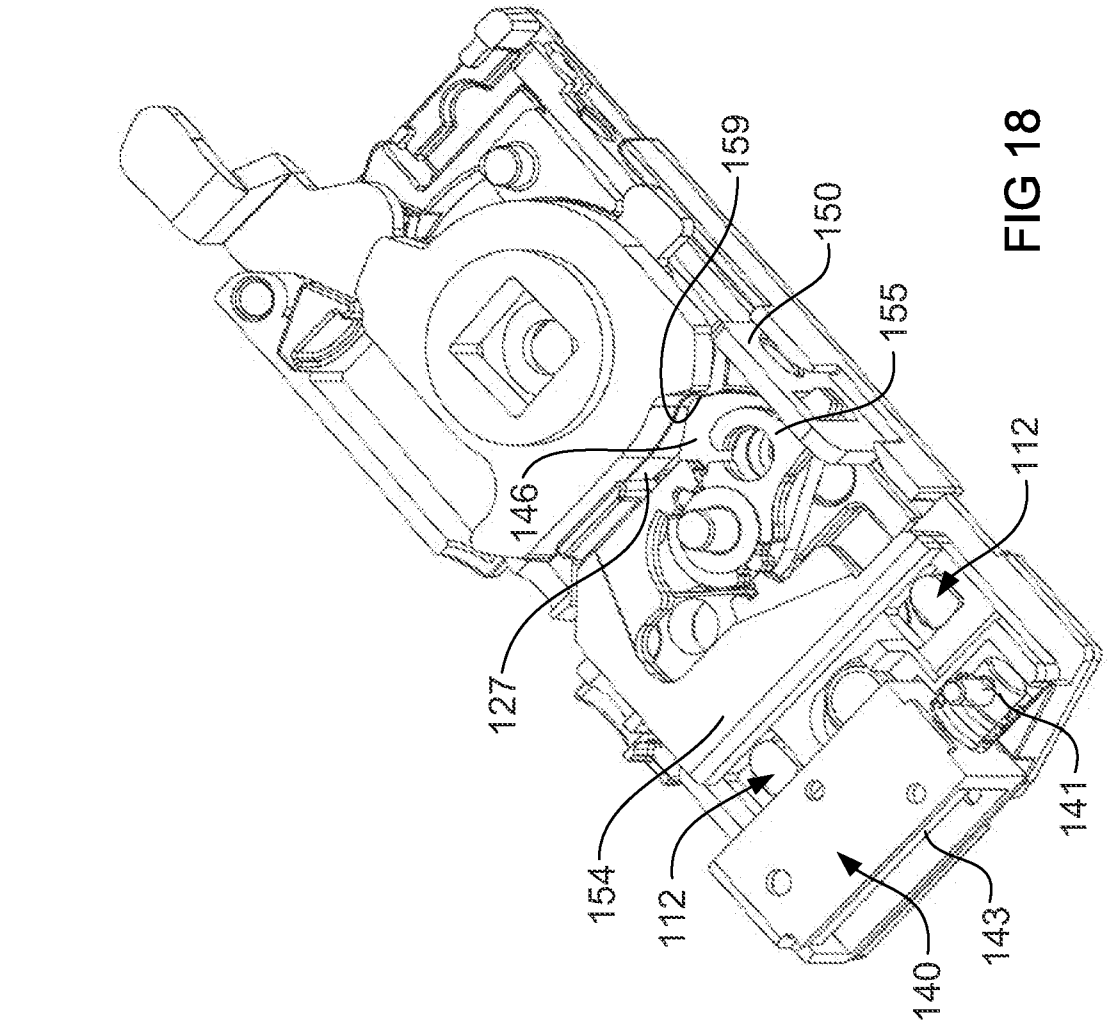
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FIG 18

FIG 17

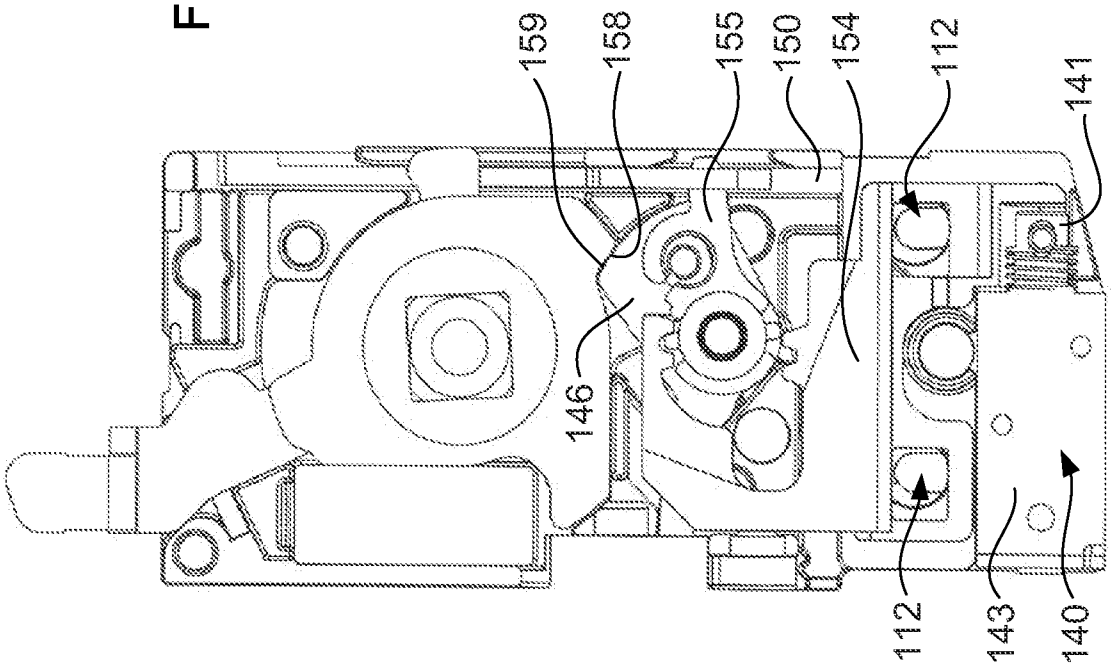
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FIG 19

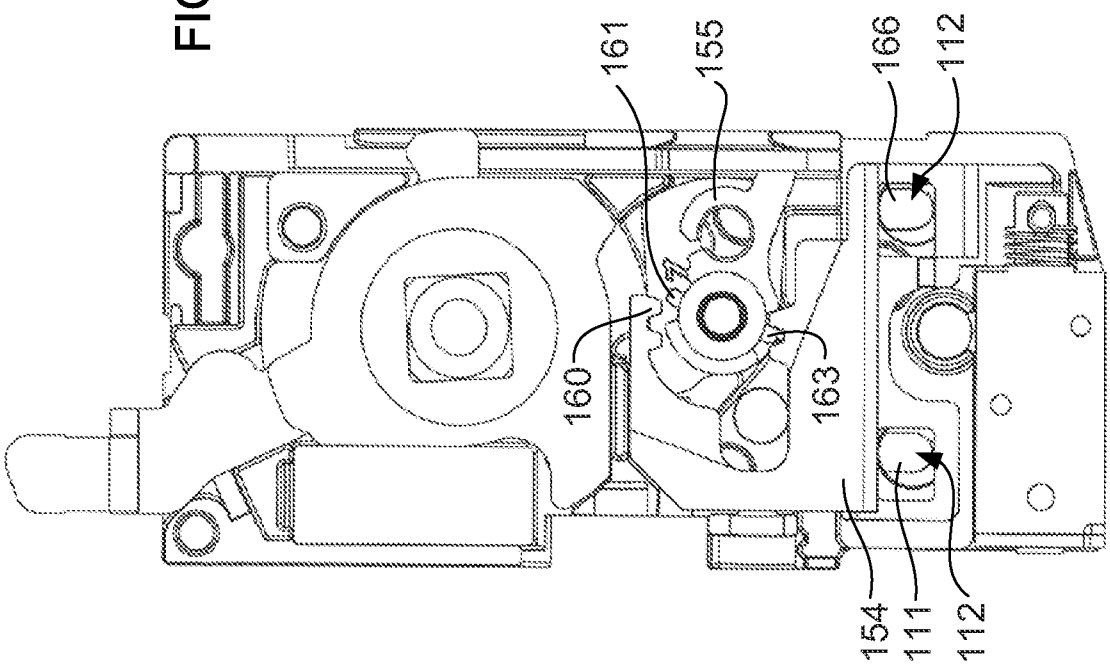
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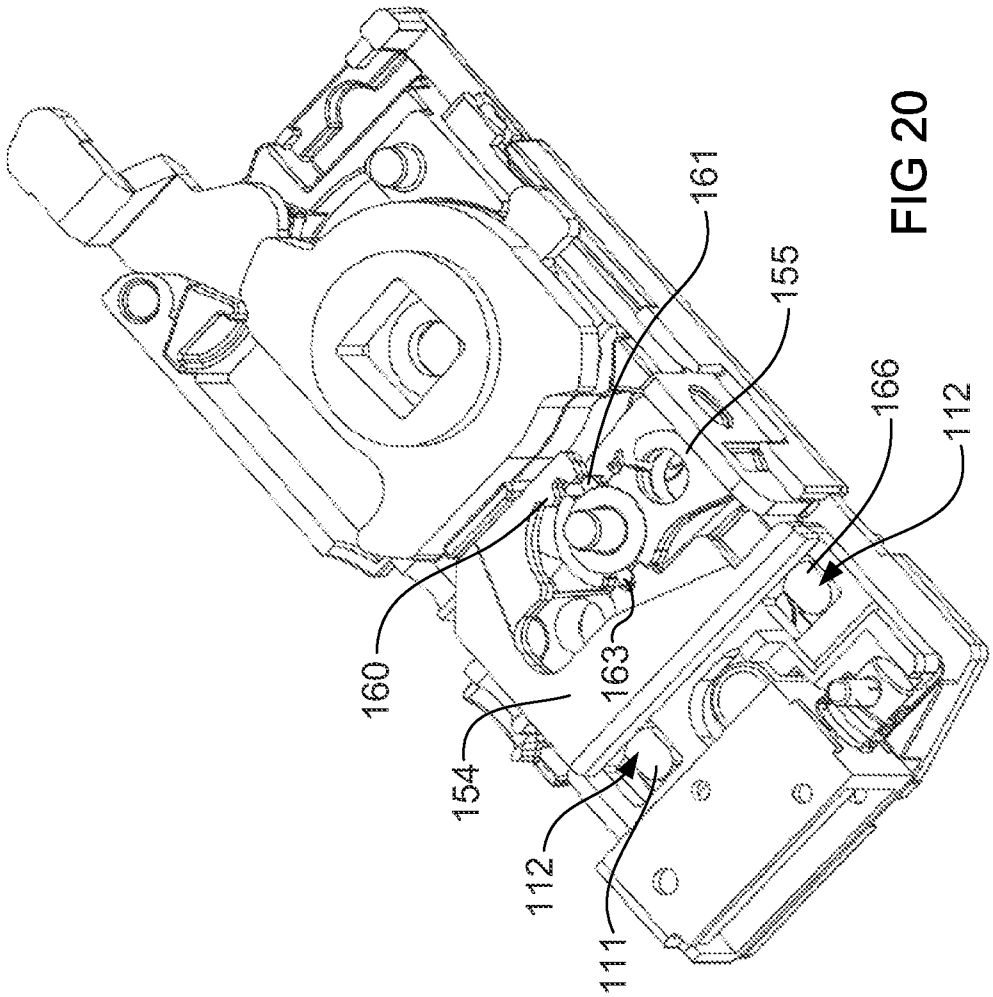
FIG 20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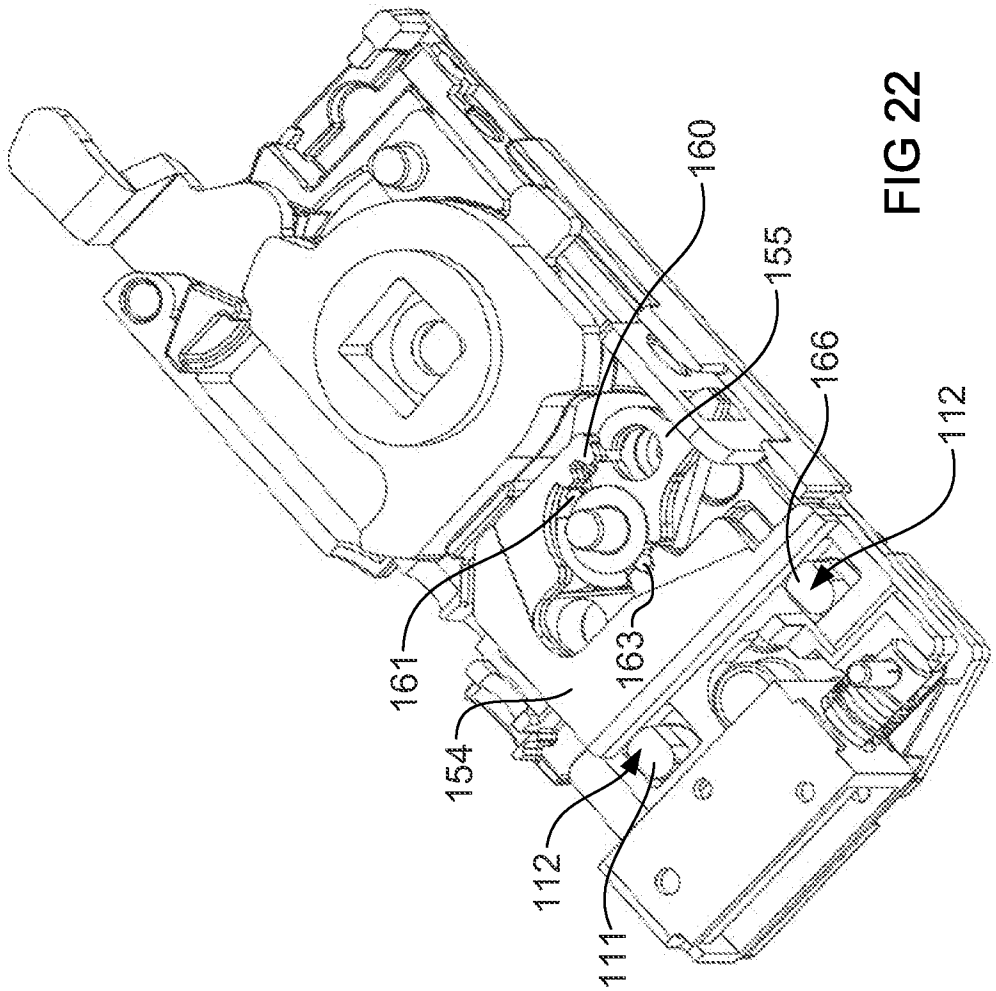
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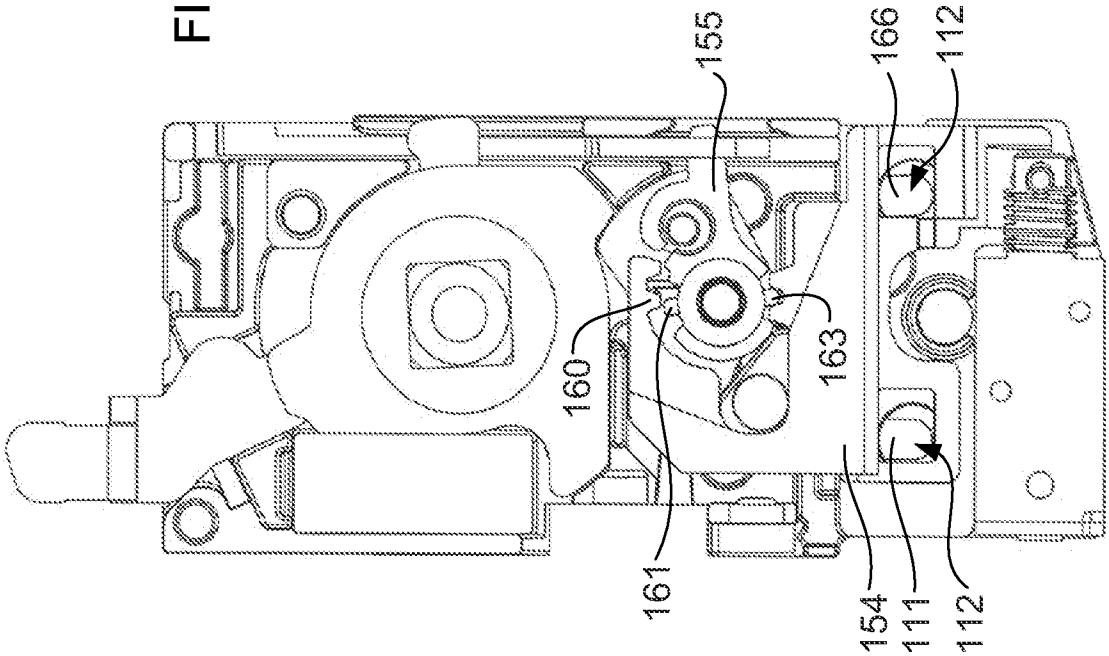
FIG 22

FIG 21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INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2012/000262

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. ***E05B 63/08*** (2006.01) ***E05B 47/06*** (2006.01)
E05B 47/00 (2006.01) ***E05B 63/10*** (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Derwent WPI, EPODOC – E05B 63/08, 63/10, 47/- and keywords – fail_safe+, fail_open+, fail_secur+, fail_lock+, power, electric, fail, interrupt, cut, loss, and like terms. Also, keyword search alone.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2005/054610 A1 (INGERSOLL-RAND ARCHITECTURAL HARDWARE Ltd) 16 June 2005. See page 11 lines 23-25 & page 12 lines 12-24.	
A	WO 2008/014542 A1 (ASSA ABLOY AUSTRALIA Pty Ltd) 7 February 2008. See figures 12, 13 (& 11), page 14 lines 21-31. Selector *assembly* includes pivotable/rotatable means.	
A	WO 1996/001355 A1 (LOCKWOOD AUSTRALIA Pty Ltd) 18 January 1996. See figs 5-7 & page 11.	
A	WO 2004/029391 A2 (RUTHERFORD CONTROLS INT'L CORP) 8 April 2004. Door strike, but same failsafe/failsecure mechanism. See Figs 11-19, Page 7 lines 11-28. Mode selector is the rotating, eccentric cam member pin 62. (two positions 180° apart)	

☐ Further documents are listed in the continuation of Box C ☒ See patent family annex

* Special categories of cited documents:
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"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 May 2012	21 May 2012
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. +61 2 6283 7999	Authorized officer **DAVID LEE** AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No : +61 2 6283 2107

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU2012/000262

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
WO	2005054610	AU	2004295641	AU	2007101222	AU	2008227060
		NZ	529951				
WO	2008014542	AU	2007281016	CN	101512086	GB	2454124
		KR	20090036145	NZ	574987	TW	200817570
		US	2010032969				
WO	9601355	AU	27800/95	GB	2304375	GB	2316440
		HK	1010460	MY	136340	NZ	288529
		NZ	329164	SG	71061		
WO	2004029391	AU	2003271459	AU	2008264219	CA	2405642
		CN	1697909	CN	101413362	EP	1546495
		JP	2006500492	MX	PA05004341	SG	148868
		US	2004061343	US	6874830	US	2005099024
		US	7144053				

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.

END OF ANNEX