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(54) **HANDLE ASSEMBLY FOR OPERATING A LOCK FOR DOORS WITH ELECTRONIC OPERATION CONTROL**

(57) The invention relates to a handle assembly (100; 100'; 200) for operating a lock (101A; 201A) for doors (PV; PL), particularly glass doors. The handle assembly comprises:

- a first handle (103) operatively associated with a first surface (S1) of a door;
- a second handle (102) operatively associated with a second surface (S2) of the door, parallel to and opposing said first surface;
- a first lock housing (104; 104') and a second lock housing (101; 201) including a latch (105; 205); the door and such first and second lock housings are interposed between the first and the second handles;
- a shaft (13) extending along a shaft axis (X) orthogonally to said first surface, in which said shaft has a first shaft end (13'), connected in a non-rotatable manner to the first handle, and a second shaft end (13''), such a shaft coupling the first handle to the first lock housing and the second lock housing;
- electromechanical means (3, 5, 14, 43, 45, 48) movable between a first fixed position and a second fixed position, and vice versa; in the first fixed position, such electromechanical means enable a direct connection of the second handle with the second shaft end and the first

handle, in an unlocked lock configuration; in the second fixed position, the electromechanical means inhibit the direct connection of the second handle with the second shaft end and the first handle, in a locked lock configuration;

the first handle is configured to control the latch during the manual operation of the lock in both the unlocked lock configuration and the locked lock configuration;

in the unlocked lock configuration, the second handle is connected to the first handle in a non-rotatable manner to control the latch during the manual operation of the lock through the second handle, in the locked lock configuration, the second handle is "idly" rotatable with respect to the first handle to inhibit the manual operation of the lock by the second handle.

The handle assembly further comprises electronic control means (7, 58) configured to control the movement of the electromechanical means between the first fixed position and the second fixed position following the reception of a control signal (IA), such electronic control means comprise a first electronic circuit housed in the first handle and a second electronic circuit housed in the first lock housing and electrically connected to the first electronic circuit.

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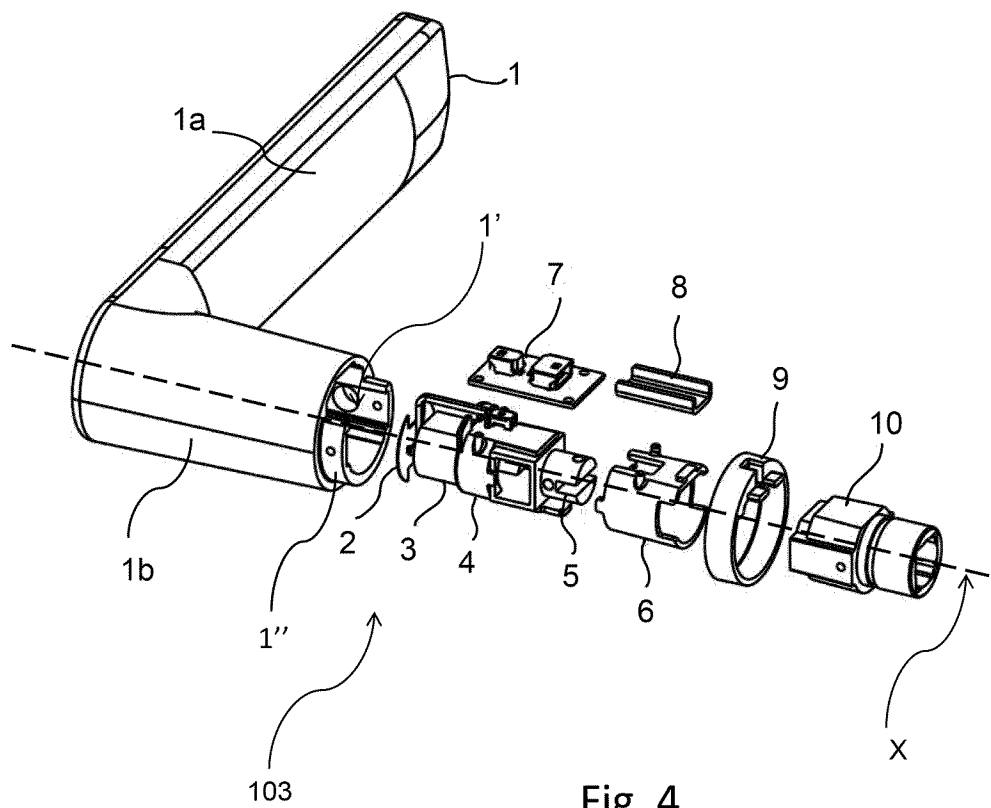


Fig. 4

Description**TECHNOLOGICAL BACKGROUND OF THE INVENTION**Field of application

[0001] The present invention generally relates to systems for operating electronically controlled locks. In particular, the invention relates to a handle assembly for operating a lock for doors, particularly, but not restrictively, glass doors, including an electronic operation control.

Prior art

[0002] In order to facilitate opening and closing door locks, it is known to employ electromechanical-type lock systems. Such lock systems comprise handle assemblies for operating the locks and electronic systems for controlling the access to a door.

[0003] An electromechanical lock system for doors of the known type comprises a handle assembly and a housing for the lock, for example. The lock housing can be provided with an actuator, such as an electric motor, for bringing a lock latch, which slides inside such a housing, from a closing or locked position of the lock to an unlocking position. Such an actuator can be controlled, for example, in a wireless manner by means of an electronic control module associated with the lock.

[0004] The lock of a door can thus be unlocked without requiring a physical key. In place of the physical key, for example, an electronic signal transmitter can be used, such as a smartphone, for example, which can send an unlock signal to the electronic control module. Therefore, for example, the operation of such a signal transmitter can be remotely managed automatically by means of communication with a server, for example.

[0005] However, the handle assembly and the lock housing of the electromechanical lock system of the known type are generally shaped as monobloc structures having significant weights and volumes which make them inadequate for glass door applications.

[0006] Therefore, the need is increasingly felt to provide a system for operating locks for doors, including an electronic operation control, which is particularly suitable for being applied to glass doors.

SUMMARY OF THE INVENTION

[0007] Therefore, it is the object of the present invention to provide a handle assembly for a lock for doors particularly, but not restrictively, glass doors, which allows at least partially obviating the drawbacks described with reference to the solutions of electromechanical lock systems of the known type.

[0008] This object is achieved by a handle assembly for operating a lock for doors according to claim 1, comprising:

ing:

- a first handle (103) operatively associated with a first surface (S1) of a door (PV; PL);
- a second handle (102) operatively associated with a second surface (S2) of the door, parallel to and opposing said first surface (S1);
- a first lock housing (104; 104') and a second lock housing (101; 201) including a latch (105; 205), said door (PV; PL) and said first (104; 104') and second (101; 201) lock housings being interposed between the first (103) and the second (102) handles;
- a shaft (13) extending along a shaft axis (X) orthogonally to said first surface (S1), in which said shaft (13) has a first shaft end (13'), connected in a non-rotatable manner to the first handle (103), and a second shaft end (13''), said shaft (13) coupling the first handle (103) to the first lock housing (104; 104') and the second lock housing (101; 201);
- electromechanical means (3, 5, 14, 42, 43, 45, 48) movable between a first fixed position and a second fixed position, and vice versa,

in said first fixed position, said electromechanical means enabling a direct connection of the second handle (102) with the second shaft end (13'') and the first handle (103), in an unlocked lock configuration, in said second fixed position, said electromechanical means inhibiting the direct connection of the second handle (102) with the second shaft end (13'') and the first handle (103), in a locked lock configuration; the first handle (103) being configured to control said latch (105; 205) during the manual operation of the lock in both the unlocked lock configuration and the locked lock configuration; in said unlocked lock configuration, the second handle (102) being connected to the first handle (103) in a non-rotatable manner to control the latch during the manual operation of the lock through the second handle (102), in said locked lock configuration, the second handle (102) being "idly" rotatable with respect to the first handle (103) to inhibit the manual operation of the lock by said second handle.

[0009] The handle assembly further comprises:

- electronic control means (7, 58) configured to control the movement of the electromechanical means (5, 14, 42, 43, 45, 48) between the first fixed position and the second fixed position following the reception of a control signal (IA),

in which said electronic control means (7, 58) comprise a first electronic circuit (7) housed in the first handle (103) and a second electronic circuit (58) housed in the first lock housing (104; 104') and electrically connected to the first electronic circuit (7).

[0010] Alternative preferred and advantageous embodiments of the handle assembly for operating a lock are the subject of the dependent claims.

[0011] In particular, it is a task of the invention to provide a handle assembly for a lock having a modular structure, comprising an electromechanical handle and a mechanical handle. The electromechanical handle is configured, in a first example, to be fastened on a first surface of the door by means of a box-shaped housing of electromechanical components, of the handle assembly connected to such an electromechanical handle. In such a first example, the mechanical handle is configured to be fastened to a second surface of the door, opposing the first surface, through a box-shaped housing of mechanical components of the handle assembly, which includes a latch.

[0012] In a second example of the handle assembly, the electromechanical handle is configured to be fastened on the first surface of the door through the box-shaped housing of mechanical components which includes the latch. In such a second example, the mechanical handle is fastened on the second surface of the door by means of a respective box-shaped housing of electromechanical components of the handle assembly, connected to such a mechanical handle.

[0013] It is a further task of the invention to provide a handle assembly of a lock for doors in which the electromechanical handle is provided with a first electronic control circuit which includes magnetic field sensors adapted to detect a first and second fixed position reached by a rod of the handle assembly following the locking/unlocking of the lock by means of a user-portable electronic device or by means of a mechanical key. Such positions are representative of a condition of open or closed handle assembly, respectively.

[0014] It is a further task of the invention to provide a handle assembly of a lock for doors in which the housing of electromechanical components of the handle assembly comprises a second electronic control circuit of the handle assembly configured to house a third magnetic field sensor adapted to detect a manual operation of the electromechanical handle.

[0015] It is a further task of the invention to provide a handle assembly of a lock for doors in which the box-shaped housing of electromechanical components is configured to house a power supply source of the handle assembly, in particular a battery, separated from the external environment by means of a magnetically fastened cover removably connected to the box-shaped housing of the electromechanical components.

[0016] The present invention further relates to an electronic control system for controlling the handle assembly of the invention, according to claim 12.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Further features and advantages of the handle assembly for operating a lock for doors, particularly glass

doors, according to the invention will become apparent from the following description of preferred embodiments, given by way of non-limiting indication, with reference to the accompanying drawings, in which:

- 5 - **Figure 1** shows a top view of a handle assembly, according to the invention, including a mechanical handle and an electromechanical handle, for operating a lock for a glass door, in a first embodiment;
- 10 - **Figure 2** shows a top view of a handle assembly, according to the invention, including a mechanical handle and an electromechanical handle, for operating a lock for a glass door, in a second embodiment;
- 15 - **Figure 3** shows a front view of a handle assembly, according to the invention, including a mechanical handle and an electromechanical handle, for operating a lock for a wood door;
- 20 - **Figure 4** shows an exploded perspective view of an example of electromechanical handle in Figures 1-3;
- **Figure 5A** shows an exploded perspective view of a first embodiment of a housing of electromechanical components of the handle assembly in Figure 2;
- 25 - **Figure 5B** shows an exploded perspective view of a second embodiment of a housing of electromechanical components of the handle assembly in Figures 1 and 3;
- **Figure 6** shows an exploded perspective view of an example of mechanical handle in Figures 1-3;
- 30 - **Figure 7** shows a sectional view of the handle assembly in Figure 1;
- **Figure 8** shows a sectional view of the handle assembly in Figure 2;
- 35 - **Figure 9** shows a sectional view of the handle assembly in Figure 3;
- **Figure 10** shows an enlarged perspective view of a portion of gear motor included in the electromechanical handle in Figure 4;
- 40 - **Figures 11A-11B** show longitudinal and enlarged sectional views of a portion of the electromechanical handle of the handle assembly in Figure 8, with a rod constrained to the gear motor, in a first fixed position, corresponding to the open lock condition and in a second fixed position, corresponding to the closed lock condition, respectively;
- 45 - **Figure 12** diagrammatically shows an electronic control system of the handle assembly of the present invention;
- 50 - **Figures 13A-13B** show perspective views, partially sectional and enlarged, of a portion of the mechanical handle in Figure 6, in which a cam takes a first fixed position, corresponding to the open lock condition and a second fixed position, corresponding to the closed lock condition, respectively, following the change in position of the rod in Figures 11A-11B.
- 55

[0018] Similar or equivalent elements in the aforesaid

figures are indicated by the same reference numerals.

DETAILED DESCRIPTION

[0019] With reference to the drawings, a handle assembly for operating a lock 101A, 201A for doors PV, PL, according to the present invention, is indicated by reference numerals 100, 100', 200 in three embodiments.

[0020] Although the solution of the handle assembly 100, 100' of the invention is particularly advantageous for application to a glass door PV, as in the examples in Figures 1-2, in an embodiment such a handle assembly 200 is also applicable to a wood door PL.

[0021] With reference to the embodiment in Figure 1, the handle assembly 100 comprises a first handle 103, in particular an electromechanical handle according to the present invention, operatively associated with a first surface S1 of the glass door PV. In greater detail, the first handle 103 is connected to a first lock housing 104 fastened to the first surface S1 of the glass door PV. Such a first lock housing 104 is configured to house electromechanical components of the handle assembly 100, as clarified below.

[0022] The handle assembly 100 further comprises a second handle 102, in particular a mechanical handle, operatively associated with a second surface S2 of the glass door PV opposing the first surface S1. In greater detail, such a second handle 102 is connected to a second lock housing 101 fastened to the aforesaid second surface S2 of the glass door PV. Such a second lock housing 101 comprises, in particular, a latch 105 that can slide inside the housing and further mechanical components of the lock of the known type. For such a reason, such a second lock housing 101 is not described in detail below. The aforesaid second handle 102 includes a respective lock cylinder 106 (shown in Figure 6) operable by means of a key 107.

[0023] With reference to the embodiment in Figure 2, the handle assembly 100' comprises the aforesaid first handle 103, in particular, an electromechanical handle according to the present invention, operatively associated with the first surface S1 of the glass door PV.

[0024] In greater detail, the first handle 103 is connected to the aforesaid second lock housing 101 fastened to the aforesaid first surface S1 of the glass door PV. Such a second lock housing 101, similar to the one described with reference to Figure 1, comprises a latch 105 that can slide inside the housing.

[0025] The handle assembly 100' further comprises a second handle 102, in particular a mechanical handle, operatively associated with the second surface S2 of the glass door PV opposing the first surface S1. In greater detail, such a second handle 102 is connected to a respective first lock housing 104' fastened to the second surface S2 of the glass door PV. Such a first lock housing 104', similarly to the aforesaid housing 104, is configured to house electromechanical components of the handle assembly 100', as clarified below.

The second handle 102 includes a respective lock cylinder 106 (shown in Figure 6) operable by means of a key 107.

[0026] With reference to the embodiment in Figure 3, the handle assembly 200 comprises the first handle 103, in particular an electromechanical handle according to the present invention, operatively associated with a first surface S1 of the wood door PL. In greater detail, the first handle 103 is connected to the first lock housing 104 fastened to the first surface S1 of the wood door PL and configured to house electromechanical components of the handle assembly 200.

[0027] The handle assembly 200 further comprises the second handle 102, in particular a mechanical handle, operatively associated with a second surface S2 of the wood door PL opposing the first surface S1. In greater detail, the second handle 102 is connected to a further second lock housing 201 having a first housing portion fastened to the aforesaid second surface S2 of the wood door PL and a second portion housed inside door PL itself. Such a second lock housing 201 comprises a respective latch 205 that can slide inside the second housing portion. The aforesaid second handle 102 includes a respective lock cylinder 106 (shown in Figure 6) operable by means of a key 107.

[0028] Note that in the examples in Figures 1-3, the second surface S2 of the glass door PV or wood door PL is the surface facing outwards (outer side) of an environment, e.g., a hotel room or an office, which can be accessed through door PV or PL. Instead, the first surface S1 of the glass door PV or wood door PL faces the interior (inner side) of such an environment, room or office. In other words, the first handle 103 of the invention is the handle configured to be operated manually by a user to leave the aforesaid room or office.

[0029] The first handle 103 of the electromechanical type according to the present invention is described in greater detail with reference to the example in Figure 4.

[0030] Such a first handle 103 comprises a handle body 1, made of aluminum, for example, comprising a first body portion 1a, or grip portion, protruding orthogonally from a second body portion 1b, for the connection of the first handle 103 with the aforesaid first 104 or second 101 lock housings.

[0031] The second body portion 1b of handle 103 is shaped to delimit a respective, substantially cylindrical-shaped housing compartment 1'.

The first handle 103 comprises, inside the aforesaid cylindrical housing compartment 1', an insulating washer 2 and a gear motor 3 connected to a first gear motor half-shell 4. Such a first half-shell 4 is provided with a gear motor shaft or joint 5 reversibly rotatable from a first fixed position, corresponding to the unlocked or open lock configuration, to a second fixed position, corresponding to the locked or closed lock configuration.

[0032] For example, the rotation of joint 5 from the first fixed position to the second fixed position corresponds to a rotation of joint 5 of about 90° in counterclockwise

direction. The inverse rotation, from the second fixed position to the first fixed position, corresponds to a rotation of joint 5 of about 90° in clockwise direction.

[0033] In particular, with reference to Figure 10, the first handle 103 comprises detection means 71, 72, 95, 96 of the aforesaid first and second fixed positions reached by joint 5 following the aforesaid rotations. Such detection means are embodied by a first 71 and second 72 magnetic field sensor housed in a first electronic circuit 7 of the first handle 103. Such magnetic field sensors 71, 72 are actuable by a first 95 and second 96 permanent magnet, respectively, fastened on an outer surface of joint 5 so as to be at an angular distance of 90° from each other. When one of the two sensors 71, 72 thus detects the presence of the respective magnet 95, 96, the other sensor is in a distal position from the magnet associated therewith and, therefore, is not excited.

[0034] The first handle 103 further comprises a second gear motor half-shell 6 adapted to be fitted onto said first half-shell 4 and a bushing 10, having a first end adapted to engage the second half-shell 6 and an opposing second end adapted to engage a shaft 13, in particular, a square shaft of the lock, shown in Figures 6, 7 or 8, for example.

[0035] Note that the first handle 103 is connected in a non-rotatable manner to the aforesaid shaft 13 and is couplable to the first 104, and to the second 101 lock housing to control, by means of such a shaft 13, latch 105, 205 following the manual rotation of the handle by a user, allowing the operation of the lock both in the open lock configuration and in the closed lock configuration.

[0036] Additionally, the first handle 103 comprises first electronic control means 7, in particular, a first electronic circuit 7 of the printed type (Printed Circuit Board or PCB) mentioned above, adapted to control the operation of the gear motor 3 and detect the rotation of joint 5 from the first fixed position to the second fixed position, and vice versa.

[0037] The first handle 103 further comprises a fairlead element 8 configured to facilitate the wiring of power cables of the first electronic circuit 7 and an annular bushing 9 adapted to engage a coupling edge 1" of the second body portion 1b of handle body 103 for connecting such a second portion 1b with the first 104 or second 101 lock housing.

[0038] Further details of the handle assembly 100, 100', 200 and such a first handle 103 of the invention are described with reference to Figures 6, 7, 8, 9. In particular, the handle assembly 100, 100', 200 comprises the aforesaid shaft 13 extending along a shaft axis X, orthogonally to the first S1 and second S2 surface of door PV, PL. Such a shaft 13 has a first end 13' connected to bushing 10 of the first handle 103 to be integral with the first handle and to rotate always integrally with such a handle. Moreover, shaft 13 has a second end 13" adapted to engage a mechanism M of the second handle 102, which is described below with reference to Figure 6.

[0039] Moreover, the handle assembly 100, 100', 200 comprises a rod 14 fitted inside shaft 13 along axis X to be

coaxial with such a shaft. Such a rod 14 has a respective first end 14' fastened to joint 5 of the first handle 103 to rotate reversibly with such a joint 5 from the first fixed position, corresponding to the open lock configuration, to the second fixed position, corresponding to the closed lock configuration, and vice versa.

[0040] In this respect, Figure 11A shows rod 14 connected to joint 5 in the aforesaid first fixed position, or "vertical rod", corresponding to the open lock configuration. Figure 11B shows rod 14 connected to joint 5 in the second fixed position, or "horizontal rod", corresponding to the closed lock configuration.

[0041] Moreover, in the aforesaid open lock configuration, a second end 14" of rod 14, in particular, T-shaped, is adapted to engage mechanical components 42, 43, 45 and 48 of mechanism M of the second handle 102 to enable a direct connection of the second handle 102 with shaft 13, and therefore with the first handle 103. In such an open lock configuration, the second handle 102 is rotatable integrally with the first handle 103 to operate latch 105, 205 of the lock. Instead, in the closed lock configuration, following the rotation of rod 14 from the first to the second fixed position, such a second end 14" of rod 14 is adapted to disengage the mechanical components 42, 43, 45 and 48 of the aforesaid mechanism M of the second handle 102 to disconnect the second handle 102 from shaft 13, and, therefore, from the first handle 103. In such a configuration, the operation of latch 105, 205 of the lock is inhibited following the rotation of the second handle 102 by a user.

[0042] With reference to Figure 6, below is a description in greater detail of an embodiment of the aforesaid handle 102. Note that the second handle 102 comprises the aforesaid mechanism M consisting of a plurality of mechanical components.

[0043] In particular, the second handle 102 comprises a handle rotation shaft 42 connected to the second end of the square shaft 13. Such a handle rotation shaft 42 includes an anti-friction bushing 47 provided with a See-ger ring 46. In particular, the aforesaid anti-friction bushing 47 is configured to be fitted onto the handle rotation shaft 42 by surrounding it. Note that the handle rotation shaft 42 and the anti-friction bushing 47 are configured to engage a coupling edge 41' of a respective cylindrical housing compartment, of the through type, of body 41 of the second handle 102.

[0044] The second handle 102 further comprises a respective lifter shaft 43 configured to engage the second end 14" of rod 14 when the latter is inserted into shaft 13. Such a lifter shaft 43 is fitted inside the handle rotation shaft 42 together with a cylindrical cam 45 and a translating cam 48.

[0045] Additionally, the second handle 102 comprises a respective joint 44 associated with an actuator pin element 50, which are located inside the cylindrical housing of the handle body 41. A spring 49, a helical spring in particular, is interposed between such a joint 44 and the translating cam 48.

[0046] The second handle 102 further comprises the lock cylinder 106 operable by means of key 107 and housed in the cylindrical compartment of the handle body 41 in a position opposing the coupling edge 41'.

[0047] Note that when rod 14 is in the first fixed position, in which the lock is in open configuration, such a rod 14 engages, with the respective second end 14'', the lifter shaft 43 fitted inside the handle rotation shaft 42 so that the translating cam 48 of mechanism M is retracted into such a handle rotation shaft 42, as shown in Figure 13A. Vice versa, when rod 14 is in the second fixed position, in which the lock is in closed or locked configuration, such a rod 14 engages, with the respective second end 14'', the lifter shaft 43 so that the translating cam 48 is extracted from the handle rotation shaft 42, as shown in Figure 13B, and compresses spring 49.

[0048] Note that a rotation of the lock cylinder 106 by means of key 107 is configured to act on the aforesaid mechanical components of the second handle 102 to mechanically rotate rod 14 from the second fixed position, in which the lock is in closed configuration, to the first position, i.e., in open configuration. Such an operation by means of key 107 is also usable to bring rod 14 back to the second fixed position, i.e., to close the lock again.

[0049] With reference to Figure 5B, below is a description of a first embodiment of the first lock housing 104 according to the present invention. In particular, such a first lock housing 104 is configured to be connected to the first handle 103, i.e., to the electromechanical handle, of the handle assembly 100, 200 in Figures 1 and 3.

[0050] Such a first lock housing 104, which is box-shaped, comprises a base wall 51, for example made of aluminum, fastenable to the first surface S1 of door PV, PL by means of fastening screws 52. Such a base wall 51 is adapted to be coupled to a cover element 63 of the first housing 104, for example made of aluminum, comprising a bottom wall 63a, opposing the base wall 51, and connected in one piece to two first side walls 63b protruding orthogonally from the bottom wall 63a towards the base wall 51 and joined to each other by a second side wall 63c.

[0051] The cover element 63 is configured to delimit, with the bottom wall 51, a respective compartment of the first lock housing 104 which includes the components described below.

[0052] In particular, the first lock housing 104 comprises a diaphragm element 55 adapted to be coupled, for example in a snap-fit manner, to the base wall 51, and an elastic element 53, e.g., a torsional spring, interposed between the base wall 51 and the diaphragm element 55.

[0053] The first lock housing 104 further comprises second electronic control means 58, in particular, a second electronic circuit 58 of the printed type (PCB) fastenable to the diaphragm element 55 by means of further screws 54.

[0054] The first housing 104 further comprises a respective tubular bushing 57, interposed between the second printed electronic circuit 58 and the diaphragm

element 55. Such a tubular bushing 57 is provided with two opposing protrusions 57a in radial direction. At least one of such protrusions 57a is configured to house a third permanent magnet 57' adapted to cooperate with a third magnetic field sensor 58' associated with the second printed electronic circuit 58 (shown in Figure 12). The aforesaid tubular bushing 57 is rotatable integrally with the first handle 103 and allows detecting, following the angular displacement of the third permanent magnet 57' with respect to sensor 58', the operation of the first handle 103 by a user. The first lock housing 104 further comprises a fairlead cap 61.

[0055] The first lock housing 104 further comprises power supply means 59, 60 of the handle assembly 100, 200, in particular, of the second electronic circuit 58 housed in the first lock housing 104, and of the first electronic circuit 7 housed in the first handle 103.

In particular, such power supply means are embodied in a battery 60, e.g., a CR123A battery, insertable into a flexible tab 59 for inserting/removing battery 60. Such a flexible tab 59 is shaped to be coupled to the diaphragm element 55. In particular, protruding portions 55' of diaphragm 55 (two protruding portions) are configured to engage slots 59' obtained in tab 59 (two slots). The flexible tab 59 is configured to isolate an electrical contact element 56, provided in the diaphragm element 55, from the metal cover 63 of the first lock housing 104.

[0056] The first lock housing 104 further comprises a magnetic fastening cover 65 configured to be connected to the cover element 63 of housing 104 to oppose the second side wall 63c. In particular, the magnetic cover 65 is adapted to close again the housing compartment of battery 60 in the first housing 104, separating such a battery from the external environment. Note, in particular, that the magnetic cover 65 is separable from the first lock housing 104 by employing a dedicated tool which allows overcoming the magnetic attraction linking cover 65 with the first housing 104.

[0057] With reference to Figure 5A, below is the description of a second embodiment of the first lock housing 104' according to the present invention. In particular, such a first lock housing 104' is configured to be connected to the second handle 102, i.e., to the mechanical handle, of the handle assembly 100' in Figure 2.

[0058] Hereinafter, the components of housing 104' which are equal or similar to those described for the example of housing 104 are indicated by means of the same reference numerals.

[0059] Such a first box-shaped lock housing 104' comprises a base wall 51, for example made of aluminum, fastenable to the second surface S2 of door PV, PL by means of fastening screws 52. Such a base wall 51 is adapted to be coupled to a cover element 63 of the first housing 104', for example made of aluminum, comprising a bottom wall 63a, opposing the base wall 51, and connected in one piece to two first side walls 63b protruding orthogonally from the bottom wall 63a towards the base wall 51 and joined to each other by a second side wall

63c.

[0060] The cover element 63 is configured to delimit, with the bottom wall 51, a respective compartment of the first lock housing 104' which includes the components described below.

[0061] In particular, the first lock housing 104' comprises a diaphragm element 55 adapted to be coupled, for example in a snap-fit manner, to the base wall 51, and an elastic element 53, e.g., a torsional spring, interposed between the base wall 51 and the diaphragm element 55.

[0062] The first lock housing 104' further comprises second electronic control means 58, in particular, a second electronic circuit of the printed type (PCB) fastenable to the diaphragm element 55 by means of further screws 54.

[0063] The first housing 104' further comprises a respective tubular bushing 57 interposed between the second printed electronic circuit 58 and the diaphragm element 55. Such a tubular bushing 57 is provided with a radial protrusion 57a configured to house a third permanent magnet 57' adapted to cooperate with a third magnetic field sensor 58' associated with the second printed electronic circuit 58 (shown in Figure 12). The aforesaid tubular bushing 57 is rotatable integrally with the first handle 103 and allows detecting, following the angular displacement of the third permanent magnet 57' with respect to sensor 58', the operation of the first handle 103 by a user.

[0064] The first lock housing 104' further comprises power supply means 59, 60 of the handle assembly 100', in particular, of the second electronic circuit 58 housed in the first lock housing 104' and of the first electronic circuit 7 housed in the first handle 103.

In particular, such power supply means are embodied in a battery 60, e.g., a CR123A battery, insertable into a flexible tab 59 for inserting/removing battery 60. Such a flexible tab 59 is shaped to be coupled to the diaphragm element 55. In particular, protruding portions 55' of such a diaphragm 55 (two protruding portions) are configured to engage slots 59' obtained in tab 59 (two slots). The flexible tab 59 is configured to isolate an electrical contact element 56, provided in the diaphragm element 55, from the metal cover 63 of the first housing 104'.

[0065] The first housing 104' further comprises a magnetic fastening cover 65 configured to be connected to the cover element 63 of housing 104' to oppose the second side wall 63c. In particular, the magnetic cover 65 is adapted to close again the housing compartment of battery 60, separating such a battery from the external environment. Note, in particular, that the magnetic cover 65 is separable from the first lock housing 104' by employing a dedicated tool which allows overcoming the magnetic attraction linking cover 65 with the first housing.

[0066] In addition, the first housing 104' comprises an annular anti-rotation bushing 64 for a mechanical handle for advantageously promoting the connection of the second handle 102 to the first lock housing 104'. Moreover, the first housing 104' comprises an annular-shaped tor-

sional spring for a mechanical handle 66 and a spring cam 67, being also annular, which are interposed between the second electronic circuit 58 and the bottom wall 63a of the cover element 63.

[0067] Note that the base wall 51, the diaphragm element 55, the elastic element 53, the second electronic circuit 58 and the cover element 63 of the first lock housing 104 or 104' each comprise a respective through hole F coaxial to axis X. As shown in Figures 7, 8, and 9, such mutually coaxial through holes are adapted to promote the insertion of the square shaft 13 into the lock housing 104, 104' to connect the first handle 103 to the second handle 102.

[0068] An electronic control system of the handle assembly 100, 100', 200 of the invention is indicated by reference numeral 600 and is described in relation to Figure 12. Such an electronic system 600 comprises the handle assembly 100, 100', 200 according to the present invention. In particular, such a system 600 comprises the gear motor 3 drivable to move, through the rotation of joint 5, rod 14 of the handle assembly 100, 100', 200 from the first fixed position to the second fixed position, and vice versa.

[0069] Such an electronic control system 600 comprises the first electronic circuit 7 housed in the first handle 103 and the second electronic circuit 58 housed in the first lock housing 104, 104'.

[0070] The electronic control system 600 further comprises the aforesaid battery 60 adapted to provide the second electronic circuit 58 with a supply voltage AL, e.g., 3 Volts, for supplying the electronic circuits of such a second circuit 58 and those of the first electronic circuit 7.

[0071] In particular, the first electronic circuit 7 is adapted to transfer the aforesaid power supply voltage AL to the gear motor 3 to drive it. The first electronic circuit 7 is adapted to receive, through the magnetic field sensors 71, 72, a position status signal IPMot of the gear motor 3. In particular, such a signal IPMot is representative of the position rod 14 takes in the open or closed lock configuration. In other words, through the signal IPMot, the first control circuit 7 is adapted to know, at every instant, the status of the lock, whether it is operated electronically through the first 7 and the second 58 electronic circuit, or it is maneuvered through key 107.

[0072] The second electronic control circuit 58 of the electronic control system 600 is configured to house a main electronic control unit 90 (CPU) of the handle assembly 100, 100', 200, e.g., a microprocessor or microcontroller. Moreover, the second electronic control circuit 58 comprises a wireless communication module 91 to allow such a microprocessor 90 to communicate with a user-portable electronic device 80 of system 600, e.g., a smartphone. Such a communication with the smartphone occurs, for example, according to the Bluetooth standard.

[0073] The second electronic control circuit 58 further comprises the third magnetic field sensor 58', similar to the sensors 71, 72 associated with the first electronic control circuit 7 of the first handle 103, which allows

reading the position of handle 103, whether resting or operated, on the basis of a handle status input signal ISM.

[0074] The electronic control unit 90 of the second circuit 58 is configured to receive, in input from smartphone 80, a lock opening/closing control signal IA and to send an output signal OSM on the status of the first handle 103 to smartphone 80, on the basis of the information received from the first magnetic field sensor 58'.

[0075] Note that the first 7 and second 58 electronic control circuits of the electronic system 600 are connected to each other by suitable wiring for exchanging other information INF.

[0076] Operating examples of the handle assembly 100, 100', 200 of the invention are described in greater detail below. In particular, the handle assembly 100, 100', 200 can take two independent operating modes, selectable by a user through a software application executed on the smartphone 80 of the control system 600.

[0077] Note that in both operating modes described below, key 107 serves only as an emergency device in the case of any type of malfunction of the electronic components associated with the first 7 and/or second 58 electronic circuits or if the battery 60 is exhausted.

[0078] Moreover, the status of the handle assembly 100, 100', 200 and of the lock is constantly monitored by the three aforesaid magnetic field sensors 71, 72, 58': one (sensor 58') monitors if the first handle 103, i.e., the electromechanical handle, was operated by a user, i.e., was rotated from the resting position; the other two (sensors 71, 72) read alternatively if rod 14 is in the first or second fixed position.

[0079] Given that the first handle 103 is always the handle mounted on surface S1 of door PV, PL facing the interior of a room, a user will always be able to leave such a room, irrespective of the malfunctioning that can occur in the handle assembly. Indeed, the first handle 103 is always mechanically in direct contact with latch 105, 205 which allows opening door PL, PV.

[0080] A first operating mode ("office" mode) includes employing the handle assembly 100, 100', 200 and the related lock in a door PV, PL for accessing an office.

In such an operating mode, it is desired for lock 101, 201 to always be in open or unlocked configuration, unless it is the user to close it again voluntarily through the software application in execution on the smartphone 80.

[0081] With the lock in open configuration, a user is able to open door PV, PL by operating the first handle 103, from the inside of the room, or the second handle 102 from the outside.

[0082] When the user places the handle assembly in closed configuration (locked lock) through smartphone 80, by means of signal IA, it will not be possible to open door PV, PL from the outside by lowering the second handle 102 because the latter is disengaged from the first handle 103 and the square shaft 13. The second handle rotates "idly" and does not operate latch 105, 205.

[0083] When the user who closed the office door decides to leave, the user can both unlock the lock through

smartphone 80 and the related application, and then by operating the first handle 103, and leave directly by operating the first handle 103. In this latter case, the third magnetic field sensor 58' detects the change in status with the handle status signal ISM and the second electronic control circuit 58 is adapted to bring the lock to the unlocked configuration. The user can thus enter the office again, even immediately, from the outside. The lock remains open indefinitely until it is locked again through the application software and smartphone 80.

In this case, the user never runs the risk of remaining locked out of the office because the lock will not close automatically.

[0084] After the lock is locked by means of smartphone 80 as described above, anyone who is outside the room can open door PV, PL only through the software application and smartphone 80 or through the emergency key 107.

[0085] A second operating mode ("hospitality" mode) provides employing the handle assembly 100, 100', 200 and the related lock in a hotel or residential hotel room. In such an operating mode, it is desired for the lock to be always closed or locked.

[0086] A user wishing to attempt to enter the room from the outside would always find the lock locked because the second handle 102 would rotate "idly".

[0087] In this case, the user can enter the room only by selecting the open configuration (unlocked lock) for the lock by means of the software application and the smartphone 80 or with the emergency key 107.

[0088] In such an operating mode, the user can always leave the room by operating the first handle 103 from the inside of the hotel room because such a handle is always capable of operating the latch 105, 205. Alternatively, it is possible to unlock the lock through the application and then leave the room.

[0089] In particular, in such an operating mode, once the user places the lock in open configuration by means of smartphone 80 (unlocked lock), it is brought back automatically to locked configuration after a preset time interval, for example between 3 and 20 seconds, in programmable manner by the user.

Accordingly, under normal operating situations, the lock of the handle assembly 100, 100', 200 of the invention does not remain unlocked for a time greater than the aforesaid preset time interval.

[0090] If the user unlocks the lock with the application and smartphone 80 and lowers the second handle 102 (if the user is outside the room) or the first handle 103 (if the user is in the room), since the handles rotate integrally with each other, system 600 reads the movement of the first handle 103 (through sensor 58') and locks lock 101, 201 again without waiting for such a preset time interval to lapse.

[0091] In other words, in the "hospitality" mode, the handles 103, 102 can be operated only once to open door PV, PL when the lock is unlocked. Once operated, the lock is locked again and it will be necessary to unlock it by

means of the application and smartphone 80. This means, in particular, that the user can always close door PV, PL behind him/her with the certainty that the door will not be openable by anyone who does not have the required access rights.

[0092] If the user had to leave the room without bringing his/her smartphone 80 along, the user can access the room again only if someone else opens door PV, PL through the application, or with the emergency key 107.

[0093] The handle assembly 100, 100', 200 for operating a lock for doors of the present invention has various advantages and achieves the preset objects.

[0094] Indeed, the provision of a modular structure of the handle assembly, in which the control electronics are partly associated with the second electromechanical handle 103 and partly associated with the first lock housing 104, 104', on which the mechanical handle 102 is also fastenable, allows making such components of the handle assembly with small weights and volumes, compared to the solutions of conventional electromechanical locks. In other words, the handle assembly of the invention is advantageously applicable to glass door applications.

[0095] Moreover, a further reduction of the volume of the handle assembly 100, 100', 200 of the invention is obtained by employing the magnetic field sensors 71, 72, 58' associated with the related permanent magnets 95, 96, 57' with respect to other solutions of sensors of the known type.

[0096] In order to meet contingent needs, those skilled in the art may make changes and adaptations to the embodiments of the handle assembly described above or can replace elements with others which are functionally equivalent, without departing from the scope of the following claims. Each of the features described as belonging to a possible embodiment can be achieved irrespective of the other embodiments described.

REFERENCE SIGNS

[0097]

100, 100', 200	handle assembly
101A, 201A	lock
PV	glass door
PL	wood door
103	first handle
102	second handle
S1	first surface
S2	second surface
104, 104'	first lock housing
101, 201	second lock housing
105, 205	latch
106	lock cylinder
107	key
1	handle body
1a	first body portion
1b	second body portion
1'	housing compartment

	2
	3
	4
	5
5	7
	71/72
	95/96
	6
	10
10	13
	13'
	13''
	8
	9
15	1"
	X
	M
	14
	14'
20	14''
	42
	47
	46
	41
25	41'
	43
	45
	48
	44
30	50
	49
	51
	52
	63
35	63a
	63b
	63c
	55
	53
40	55'
	58
	54
	57
	57a
45	57'
	58'
	61
	59
	60
50	56
	65
	64
	66
	67
55	600
	AL
	IPMot
	90

insulating washer
gear motor
first gear motor half-shell
gear motor shaft or joint
first electronic control circuit
first/second magnetic sensor
first/second permanent magnet
second gear motor half-shell
bushing 10
square shaft
first shaft end
second shaft end
fairlead element
annular bushing
coupling edge
shaft axis
mechanism
rod
first rod end
second rod end
handle rotation shaft
anti-friction bushing
Seeger ring
body
coupling edge
lifter shaft
cylindrical cam
translating cam
joint
actuator pin element
spring
base wall
fastening screws
cover element
bottom wall
first side walls
second side wall
diaphragm element
elastic element
protruding diaphragm portion
second electronic control circuit
further screws
tubular bushing
radial protrusion
third permanent magnet
third magnetic field sensor
fairlead cap
flexible tab
battery
electrical contact element
magnetic cover
annular anti-rotation bushing
torsional spring for mechanical handle
spring cam
electronic control system
supply voltage
gear motor position status signal
a main electronic control unit

91	wireless communication module	
80	user-portable electronic device	
ISM	handle status input signal	
IA	lock opening/closing control signal	
OSM	first handle status output signal	5
INF	information exchange wiring	

Claims

1. A handle assembly (100; 100'; 200) for operating a lock (101A; 201A) for doors (PV; PL), particularly glass doors, comprising:

- a first handle (103) operatively associated with a first surface (S1) of a door (PV; PL);
- a second handle (102) operatively associated with a second surface (S2) of the door, parallel to and opposing said first surface (S1);
- a first lock housing (104; 104') and a second lock housing (101; 201) including a latch (105; 205), said door (PV; PL) and said first (104; 104') and second (101; 201) lock housings being interposed between the first (103) and the second (102) handles;
- a shaft (13) extending along a shaft axis (X) orthogonally to said first surface (S1), wherein said shaft (13) has a first shaft end (13'), connected in a non-rotatable manner to the first handle (103), and a second shaft end (13''), said shaft (13) coupling the first handle (103) to the first lock housing (104; 104') and the second lock housing (101; 201);
- electromechanical means (3, 5, 14, 42, 43, 45, 48) movable between a first fixed position and a second fixed position, and vice versa,

in said first fixed position, said electromechanical means enabling a direct connection of the second handle (102) with the second shaft end (13'') and the first handle (103), in an unlocked lock configuration, in said second fixed position, said electromechanical means inhibiting the direct connection of the second handle (102) with the second shaft end (13'') and the first handle (103), in a locked lock configuration; the first handle (103) being configured to control said latch (105; 205) during the manual operation of the lock in both the unlocked lock configuration and the locked lock configuration; in said unlocked lock configuration, the second handle (102) being connected to the first handle (103) in a non-rotatable manner to control the latch during the manual operation of the lock through the second handle (102), in said locked lock configuration, the sec-

ond handle (102) being "idly" rotatable with respect to the first handle (103) to inhibit the manual operation of the lock by said second handle;

the handle assembly further comprising:

- electronic control means (7, 58) configured to control the movement of the electromechanical means (5, 14, 42, 43, 45, 48) between the first fixed position and the second fixed position following the reception of a control signal (IA),

wherein said electronic control means (7, 58) comprise a first electronic circuit (7) housed in the first handle (103) and a second electronic circuit (58) housed in the first lock housing (104; 104') and electrically connected to the first electronic circuit (7).

2. A handle assembly (100; 200) for operating a lock (101A; 201A) for doors (PV; PL) according to claim 1, wherein:

said first handle (103) is connected to said first lock housing (104) fastened to the first surface (S1) of the door (PV; PL);

said second handle (102) is connected to said second lock housing (101; 201) fastened to the second surface (S2) of the door (PV; PL).

3. A handle assembly (100') for operating a lock (101A) for doors (PV) according to claim 1, wherein:

- said first handle (103) is connected to said second lock housing (101) fastened to the first surface (S1) of the door (PV);

said second handle (102) is connected to said first lock housing (104') fastened to the second surface (S2) of the door (PV).

4. A handle assembly (100; 100'; 200) for operating a lock (101A; 201A) for doors (PV; PL) according to any one of the preceding claims, wherein said electromechanical means (3, 5, 14, 42, 43, 45, 48) comprise:

- a gear motor (3) housed in said first handle (103), connected in a non-rotatable manner to the first handle (103) and having a joint (5) reversibly rotatable from said first fixed position to said second fixed position, and vice versa;
- a rod (14) fitted inside the shaft (13) along the shaft axis (X) to be coaxial to said shaft, said rod (14) having a first end (14') fastened to said joint (5) and a second end (14''), said second end (14'') of the rod (14) being configured to:

engage mechanical components (42, 43,

- 45 and 48) of a mechanism (M) of the second handle (102) to enable the direct connection of the second handle (102) with the second shaft end (13''), in the unlocked lock configuration,
- disengage the mechanical components (42, 43, 45 and 48) of the mechanism (M) of the second handle (102) to disconnect the second handle (102) from the second shaft end (13''), in the locked lock configuration.
5. A handle assembly (100; 100'; 200) for operating a lock (101A; 201A) for doors (PV; PL) according to the preceding claim, wherein said mechanical components of the mechanism (M) of the second handle (102) comprise a lifter shaft (43) configured to engage the second end (14'') of the rod (14) when the latter is inserted into the shaft (13), said lifter shaft (43) being fitted inside a handle rotation shaft (42) together with a cylindrical cam (45) and a translating cam (48) of the mechanism (M),
when the rod (14) is in the first fixed position, following the rotation of the joint (5), said rod (14) engages, with said second end (14''), the lifter shaft (43) fitted inside the handle rotation shaft (42) so that the translating cam (48) is retracted into the handle rotation shaft (42), when the rod (14) is in the second fixed position, said rod (14) engages, with the second end (14''), the lifter shaft (43) so that the translating cam (48) is extracted from the handle rotation shaft (42).
 6. A handle assembly (100; 100'; 200) for operating a lock (101A; 201A) for doors (PV; PL) according to any one of the preceding claims, further comprising detection means (71, 72, 95, 96) for detecting the aforesaid first and second fixed positions reached by the electromechanical means.
 7. A handle assembly (100; 100'; 200) for operating a lock (101A; 201A) for doors (PV; PL) according to claim 6 when dependent on claim 4, wherein said detection means (71, 72, 95, 96) comprise a first (71) and a second (72) magnetic sensor housed in the first electronic circuit (7) associated with the first handle (103), said first and second magnetic sensors being actuatable by a first (95) and a second (96) permanent magnet, respectively, fastened on an outer surface of the joint (5) so as to be at an angular distance of 90° from each other.
 8. A handle assembly (100; 100'; 200) for operating a lock (101A; 201A) for doors (PV; PL) according to any one of the preceding claims, further comprising means (57', 58') for detecting a rotation of the first handle (103) by a user, said means comprising a third magnetic field sensor (58') associated with the second electronic circuit (58) and a third permanent magnet (57') fastened to a tubular bushing (57) housed in the first lock housing (104; 104'), said tubular bushing (57) being integrally rotatable with the first handle (103).
 9. A handle assembly (100; 100'; 200) for operating a lock (101A; 201A) for doors (PV; PL) according to any one of the preceding claims, wherein the first lock housing (104; 104') comprises power supply means (59, 60) of the second electronic circuit (58) housed in the first lock housing (104; 104') and of the first electronic circuit (7) housed in the first handle (103).
 10. A handle assembly (100; 100'; 200) for operating a lock (101A; 201A) for doors (PV; PL) according to the preceding claim, wherein said power supply means comprise a battery (60) and a flexible tab (59) for inserting/extracting the battery (60), said flexible tab (59) being shaped to be coupled to a diaphragm element (55) of the first housing (104; 104') to electrically isolate an electrical contact element (56) of the diaphragm element from a metal cover (63) of the first lock housing (104; 104').
 11. A handle assembly (100; 100'; 200) for operating a lock (101A; 201A) for doors (PV; PL) according to claim 10, wherein the first lock housing (104; 104') is box-shaped and comprises a base wall (51) fastenable to the first (S1)/second (S2) surface of the door (PV, PL) adapted to be coupled to said cover element (63) of the first housing (104; 104') comprising a bottom wall (63a) opposing the base wall (51) and connected in one piece to two first side walls (63b) protruding orthogonally from the bottom wall (63a) towards the base wall (51) and joined to each other by a second side wall (63c), said first lock housing (104; 104') further comprises a magnetic fastening cover (65) configured to be connected to the cover element (63) to be opposing the second side wall (63c).
 12. An electronic system (600) for controlling a handle assembly (100; 100'; 200) for operating a lock (101A; 201A) for doors (PV; PL), comprising:
 - a handle assembly (100; 100'; 200) according to claim 1;
 - a first electronic circuit (7) housed in a first handle (103) of said handle assembly (100; 100'; 200);
 - a second electronic circuit (58) housed in a first lock housing (104; 104') of said handle assembly (100; 100'; 200) and electrically connected to the first electronic circuit (7);
 - a gear motor (3) housed in the first handle (103) and drivable by the first electronic circuit (7) to

rotate a rod (14) of the handle assembly from a first fixed position, representative of an unlocked lock configuration, to a second fixed position representative of a locked lock configuration, and vice versa;

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- power supply means (60) housed in the first lock housing (104; 104') to provide the first (7) and second (58) electronic circuits with a power supply voltage (AL), said first electronic circuit (7) being configured to transfer said power supply voltage (AL) to the gear motor (3) to drive it;

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- a user-portable electronic device (80);

said second electronic circuit (58) comprising an electronic control unit (90) and a wireless communication module (91) to allow the electronic control unit (90) to communicate with said user-portable electronic device (80),

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said electronic control unit (90) being configured to receive a control signal (IA) from the user-portable electronic device (80) to drive, through the first electronic circuit (7), the gear motor (3) which rotates the rod (14) from the first fixed position to the second fixed position, and vice versa.

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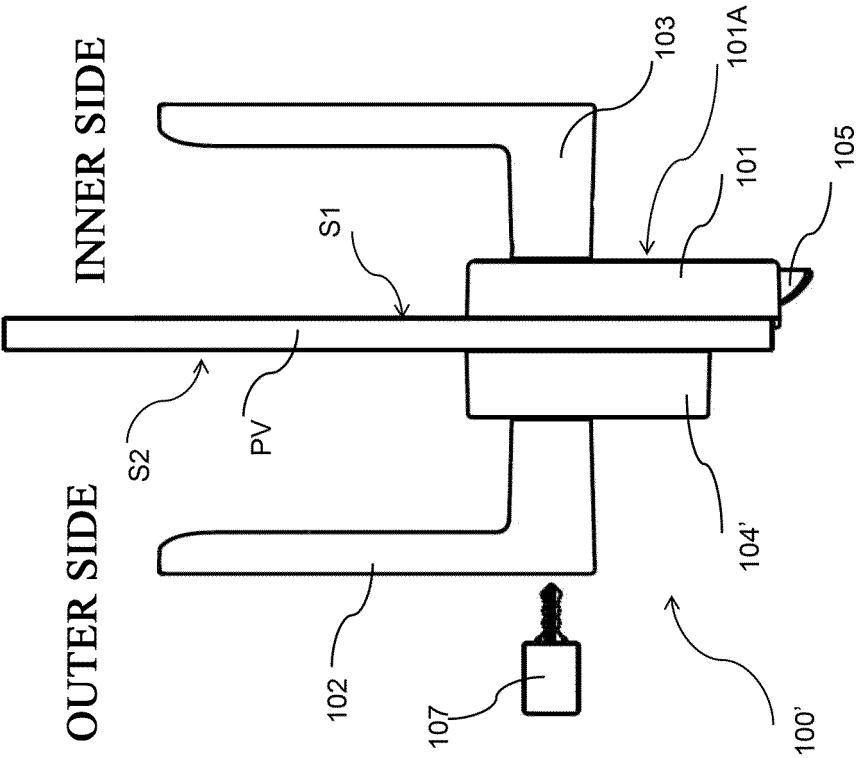


Fig. 2

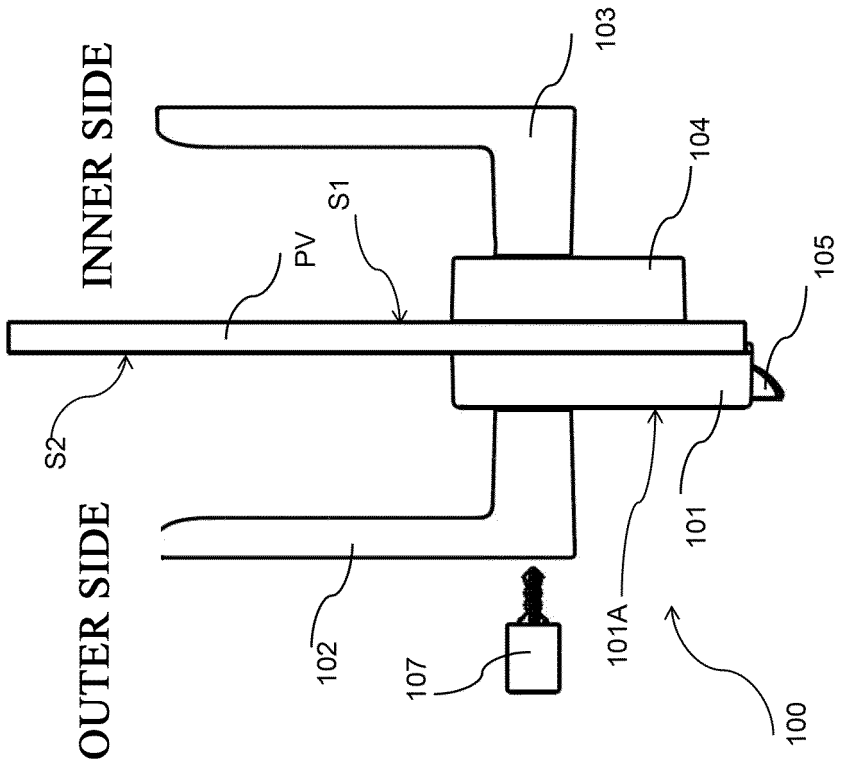


Fig. 1

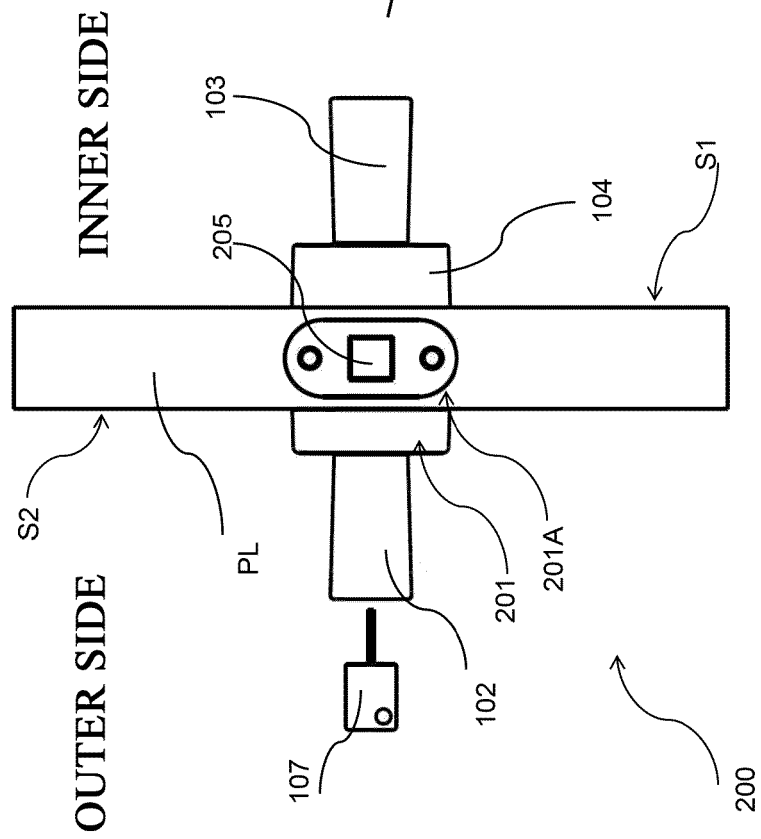


Fig. 3

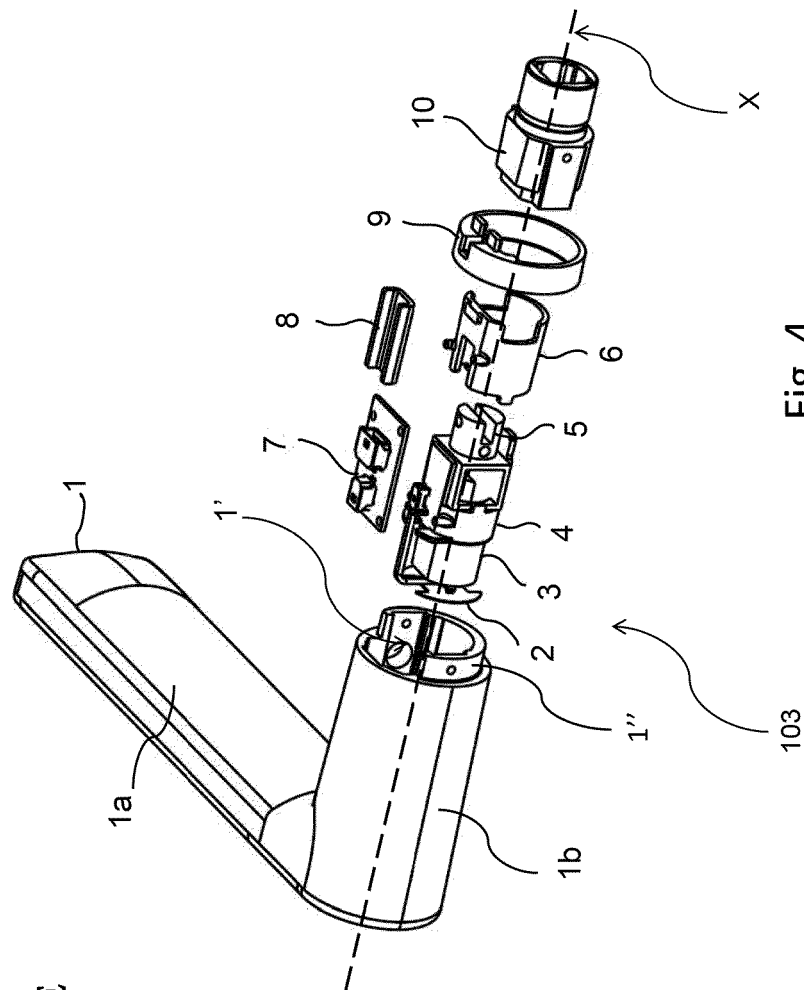


Fig. 4

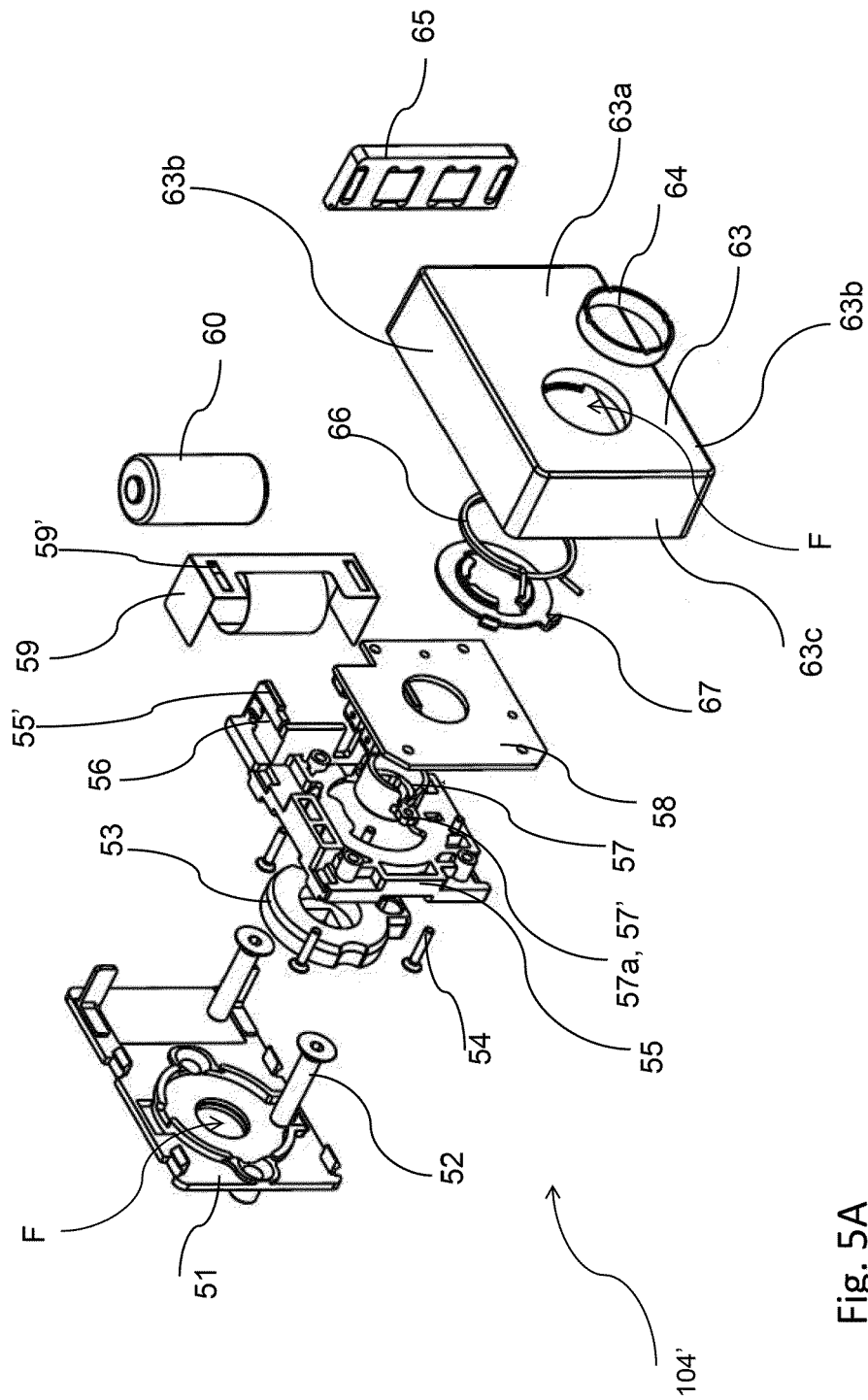


Fig. 5A

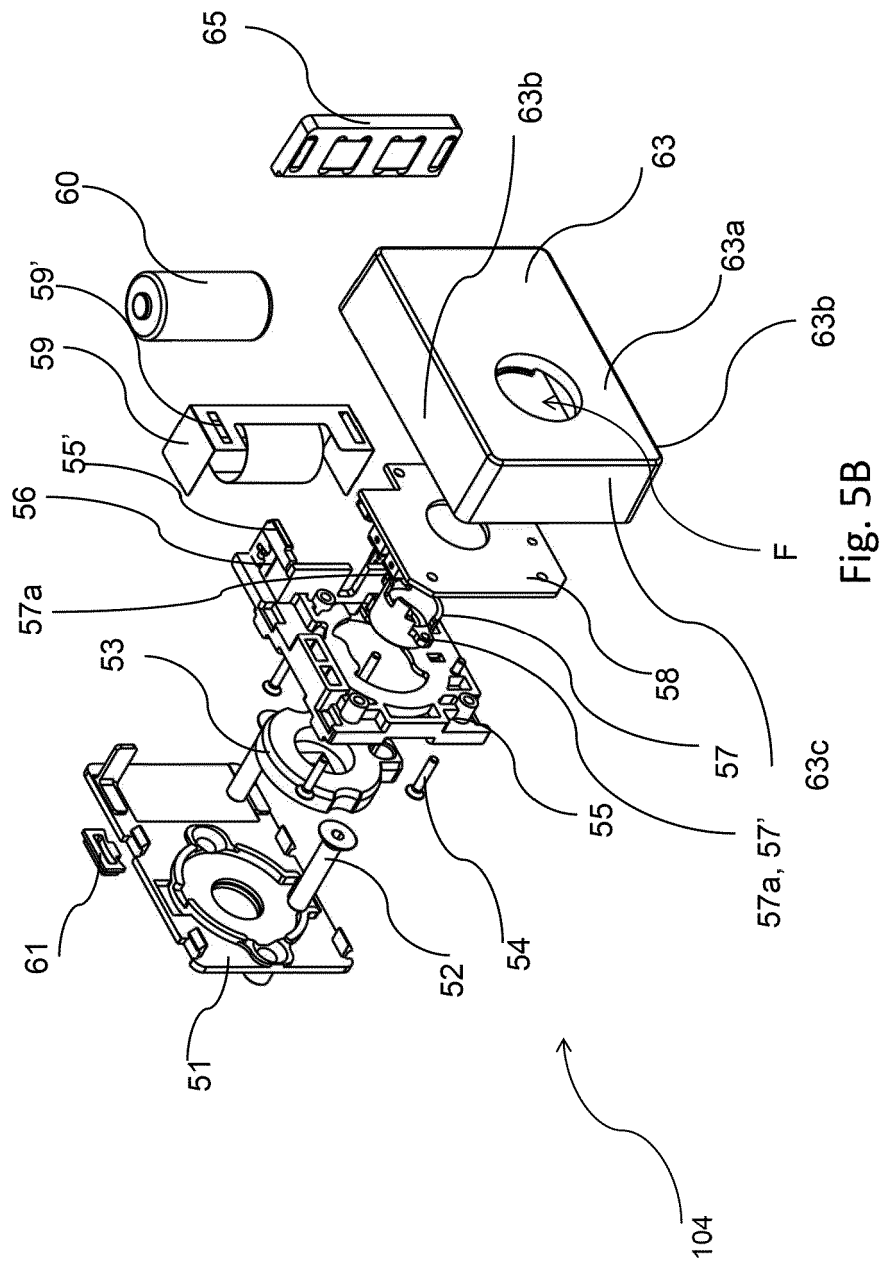


Fig. 5B

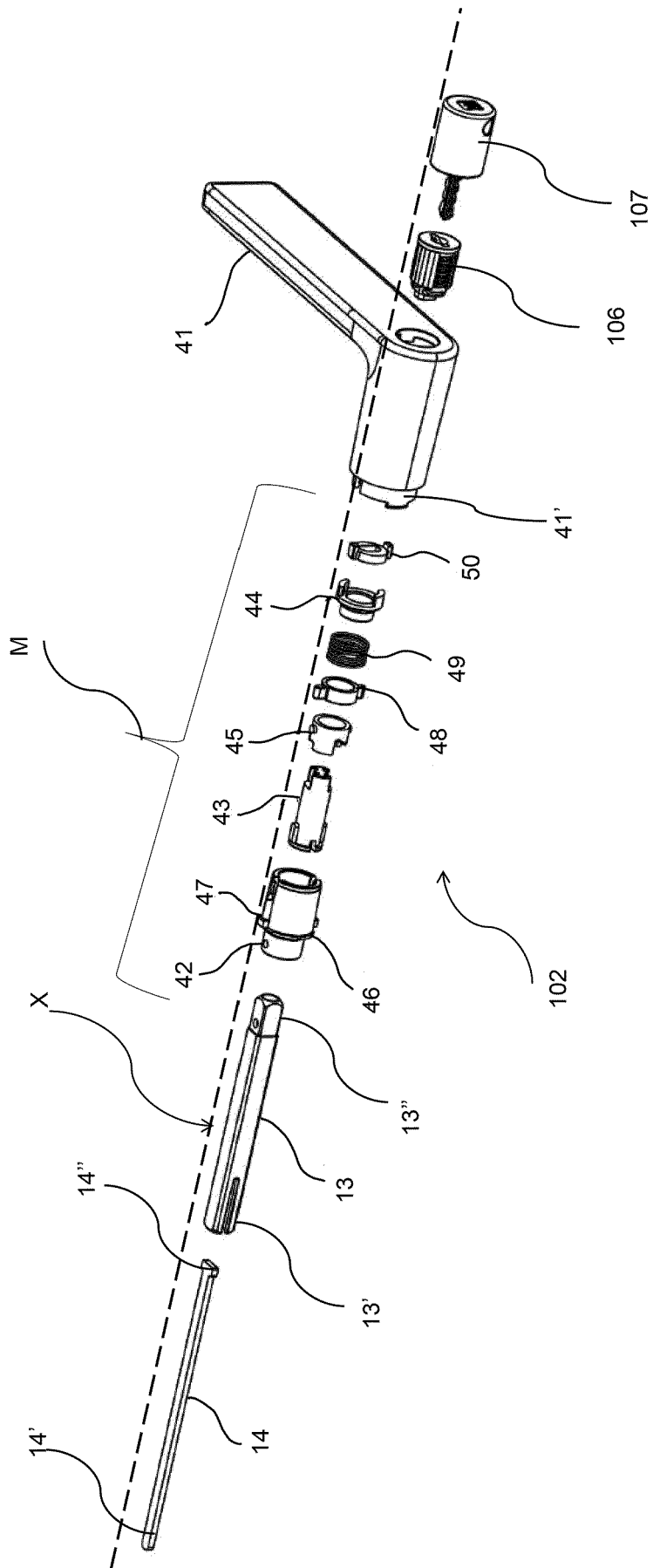


Fig. 6

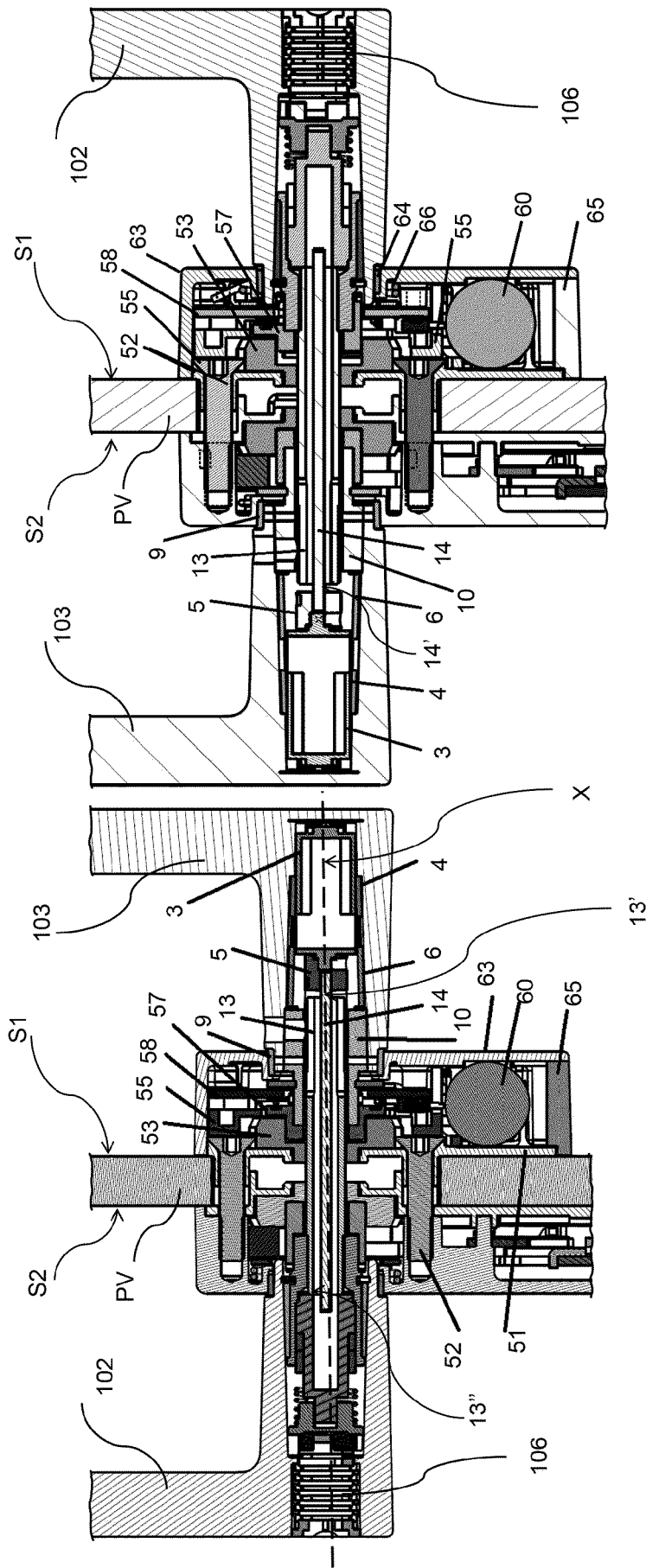


Fig. 8

Fig. 7

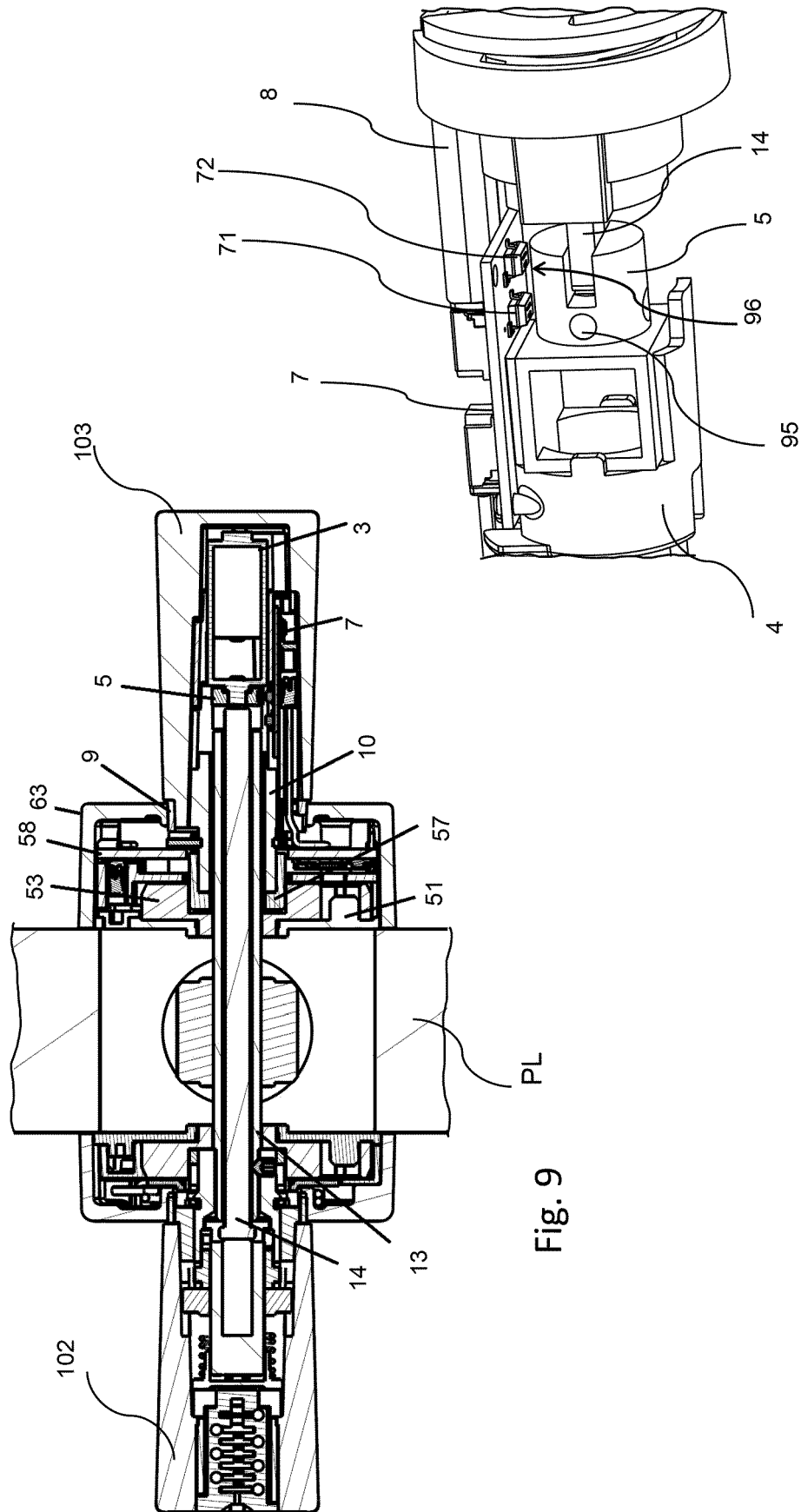


Fig. 10

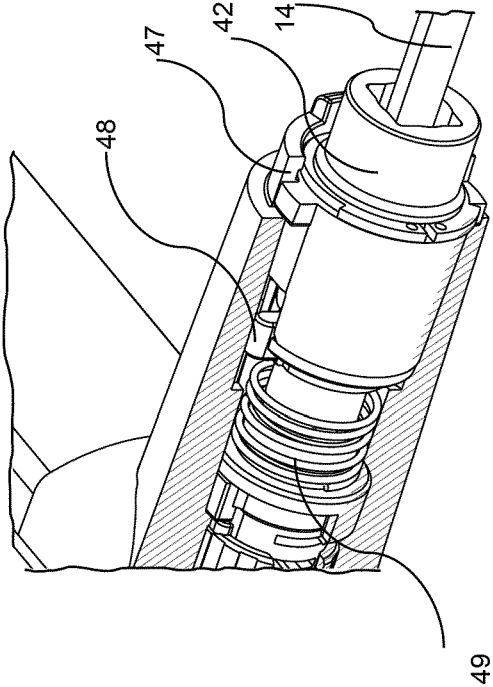


Fig. 13A

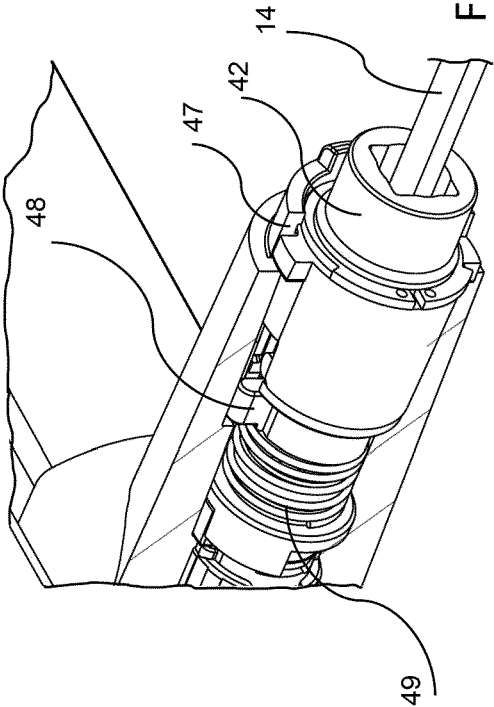


Fig. 13B

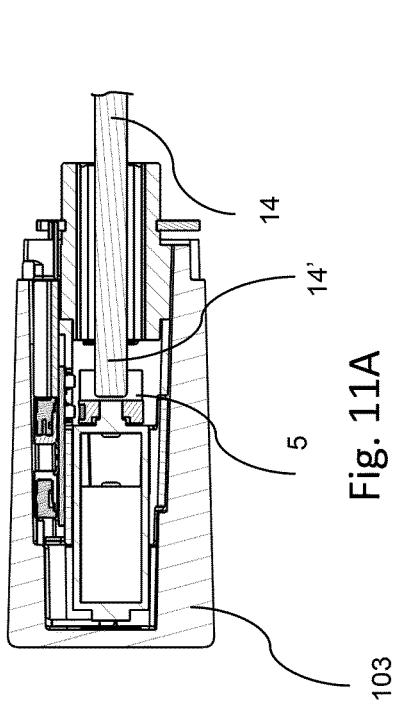


Fig. 11A

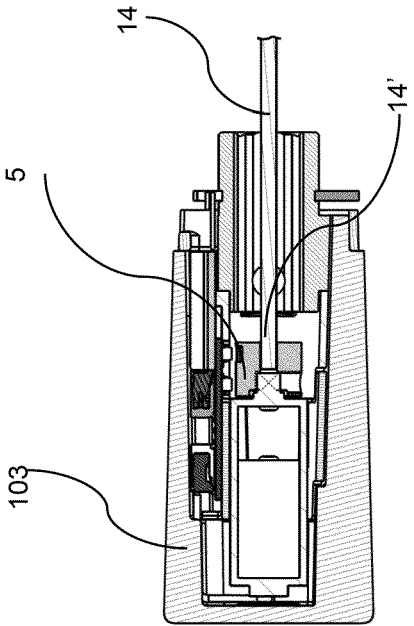


Fig. 11B

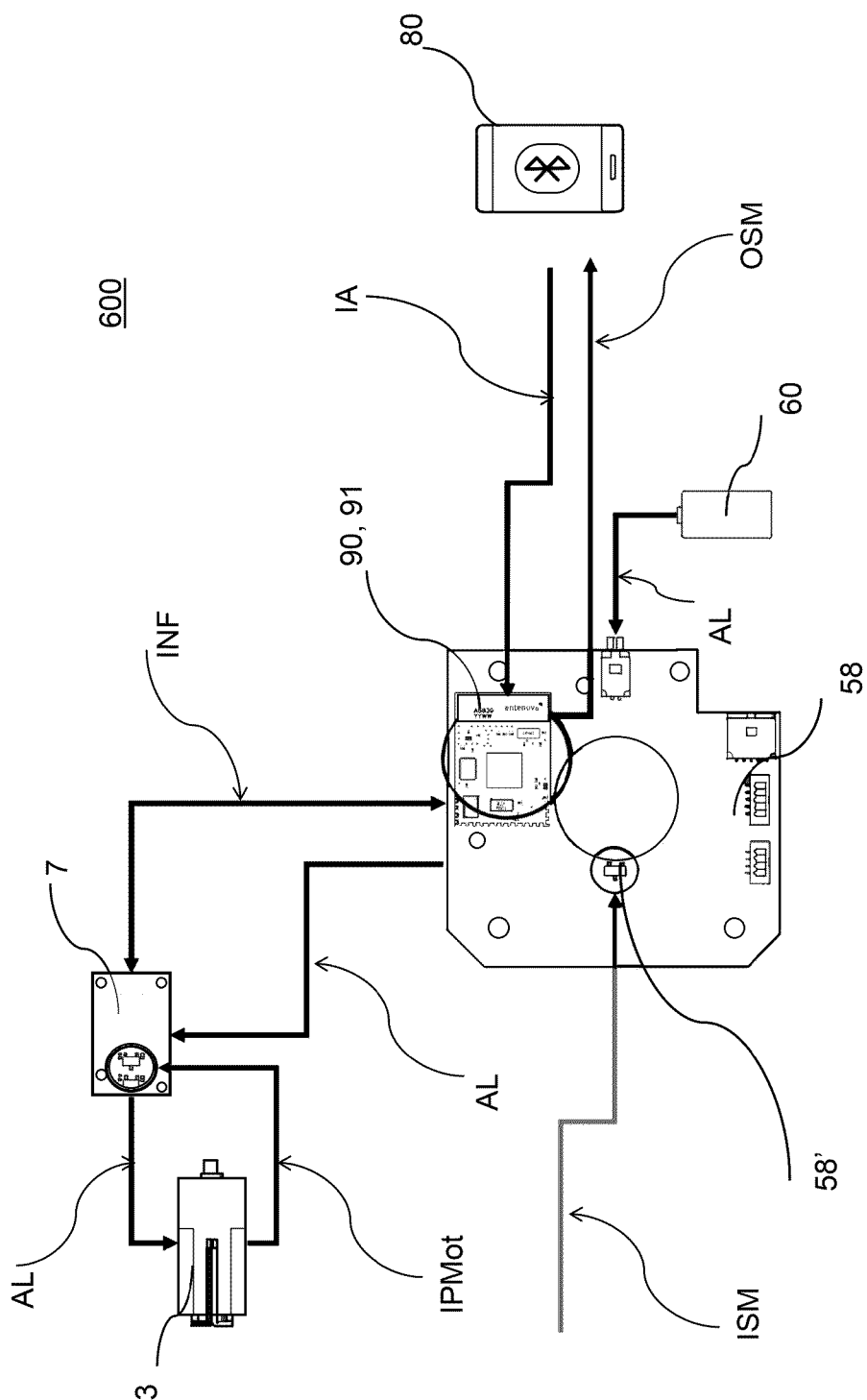


Fig. 12



EUROPEAN SEARCH REPORT

Application Number

EP 24 21 6275

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	EP 0 978 611 A2 (WILKE HEINRICH HEWI GMBH [DE]) 9 February 2000 (2000-02-09) * paragraph [0025] - paragraph [0032] * * paragraph [0039] - paragraph [0062] * * figure 1 *	1-12	INV. E05B47/00 E05B47/06 E05B65/00
A	WO 2021/092660 A1 (ASSA ABLOY AUSTRALIA PTY LTD [AU]) 20 May 2021 (2021-05-20) * paragraph [0063] - paragraph [0088] * * figures 1-8 *	1-12	ADD. E05B63/00
A	US 2014/165673 A1 (TYNER ANTHONY [US] ET AL) 19 June 2014 (2014-06-19) * paragraph [0053] - paragraph [0067] * * figures 1-14 *	4-8	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E05B
Place of search		Date of completion of the search	Examiner
The Hague		18 March 2025	Antonov, Ventseslav
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 24 21 6275

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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18-03-2025

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0978611 A2	09-02-2000	AT E278089 T1	15-10-2004
		DE 19834692 A1	03-02-2000
		DK 0978611 T3	31-01-2005
		EP 0978611 A2	09-02-2000
		ES 2224497 T3	01-03-2005
		JP 2000045583 A	15-02-2000

WO 2021092660 A1	20-05-2021	AU 2020381545 A1	02-06-2022
		WO 2021092660 A1	20-05-2021

US 2014165673 A1	19-06-2014	EP 2746498 A2	25-06-2014
		KR 20140079324 A	26-06-2014
		US 2014165673 A1	19-06-2014

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