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(54) **Electric lock for sliding doors or shutters**

(57) An electric lock (10) for sliding doors or shutters, comprising an element (11) to be engaged which is adapted to protrude from an edge (12) of a sliding door or shutter (13) and is intended to be engaged and retained reversibly, in a stroke limit position for the door or shutter (13), by a reversible device (14) for automatic engagement and locking, which is fixed to the frame (15) of the sliding door or shutter (13).

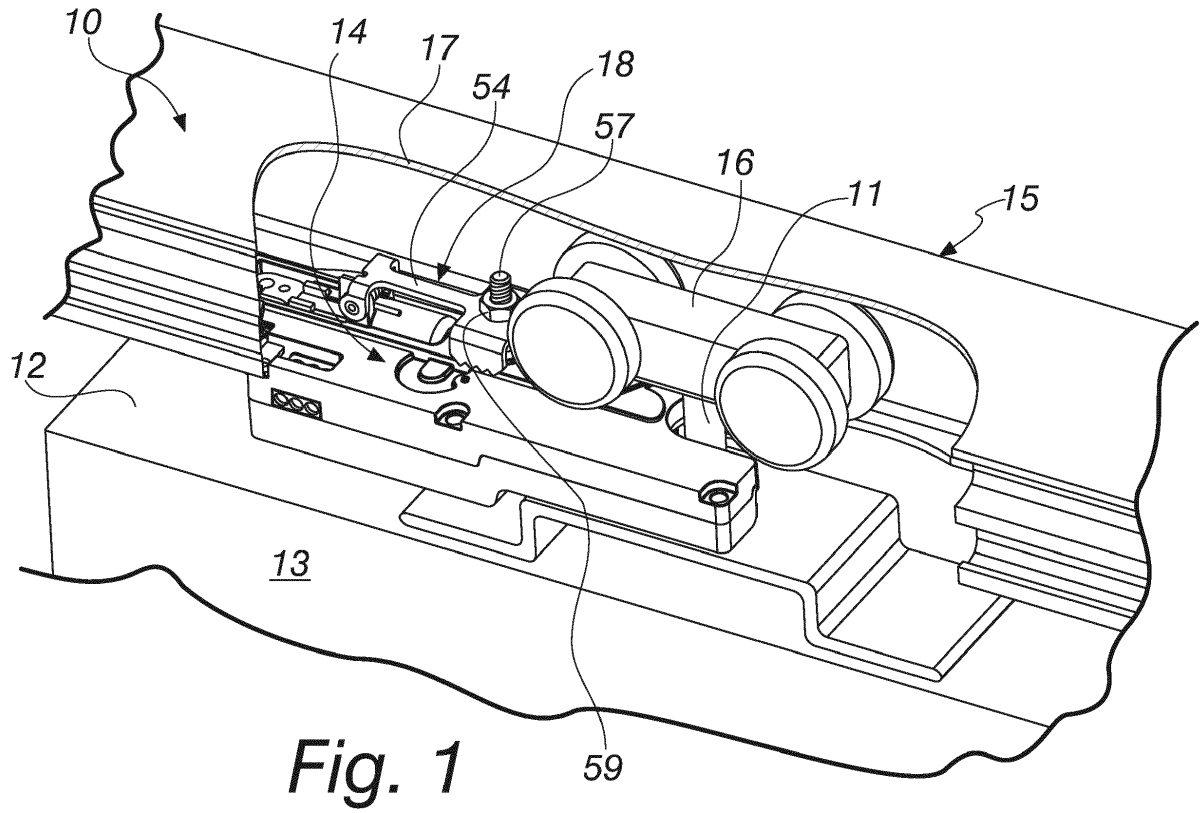


Fig. 1

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Description

[0001] The present invention relates to an electric lock for sliding doors or shutters.

[0002] Currently, so-called in-wall sliding doors are increasingly widespread both in work environments and in homes and are appreciated due to the absence of space occupation caused by the door or shutter in the open configuration.

[0003] In the field of automation of homes and living spaces in general, the use of actuators to open and close sliding translating doors, so-called in-wall sliding doors, is becoming increasingly popular but is currently rare, since said translating in-wall doors are usually installed to be moved manually and a subsequent fitting of actuation means to automate the translation of the door or shutter is relatively complicated and inconvenient.

[0004] In order to obviate these drawbacks, linear actuators, particularly for moving sliding doors or shutters, have been provided which comprise a box-like body, to be fixed by way of corresponding fixing means between the two jambs of a door or window, the box-like body accommodating an electric motor which drives a rotor that is adapted to interact, by means of an opening formed in the box-like body, with a driven track, which is fixed to a door or shutter to be translated, the box-like body being coupled to the driven track by means of a slider that is coupled to the track in order to allow relative sliding between the box-like body and said track.

[0005] Similar linear actuators and details thereof are described and claimed for example in EPA 11195402.0, EPA 12164117.9, EPA 12164114.6, EPA 11195400.4 and EPA 12167423.8 in the name of TOPP S.p.A.

[0006] Although the electric actuation of said in-wall sliding doors is becoming widespread, the locking of said doors in the closed configuration is still entrusted to manual locks of the traditional type, therefore with an engagement mechanism that is recessed within the wing, which is movable, and with an abutment that is associated with the jamb of the door and therefore is fixed.

[0007] The logic of actuating automatically and remotely the wing of a sliding door seems to clash with the need to approach physically said door in order to close it stably, for example with a turn of the key.

[0008] Automating, and therefore providing with an electrical actuation, the mechanism of a lock of the traditional type is a very complex operation, since the power supply cord of the electric motor must translate with the door or shutter.

[0009] Such a configuration requires the design and production of doors or shutters and frames that are conceived and manufactured specifically, with scarcely advantageous costs and times to market.

[0010] In any case, even installing the engagement mechanism on the jamb instead of on the door or shutter and mounting the abutment on the door or shutter requires the availability of a space in the jamb that is greater than what can be provided with frames of the known type.

[0011] The aim of the present invention is to provide an electric lock for sliding doors or shutters that is capable of obviating the limitations of the cited background art.

[0012] Within this aim, an object of the invention is to provide an electric lock that is easy to install without modifications neither for the door or shutter nor for the frame.

[0013] Another object of the invention is to provide a lock that is simple to install even for a technician who does not have particular prior teachings.

[0014] A further object of the invention is therefore to provide an electric lock that can be installed even on in-wall sliding doors of a per se known type and already fitted.

[0015] Another object of the invention is to provide an electric lock that can be installed in a manner that is substantially invisible to a user and therefore does not affect the visual impact and the aesthetic content of the in-wall sliding door.

[0016] Another object of the invention is to provide an electric lock for sliding doors or shutters that can be provided by means of per se known systems and technologies.

[0017] This aim, as well as these and other objects that will become better apparent hereinafter, are achieved by an electric lock for sliding doors or shutters, characterized in that it comprises an element to be engaged, which is intended to be engaged and retained reversibly by a reversible device for automatic engagement and locking.

[0018] Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment of the electric lock according to the invention, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of an electric lock according to the invention;

Figures 2, 3, 4, 7, 8 and 9 are each a view of a step of the assembly of the engagement and locking device of the electric lock according to the invention;

Figure 5 is an exploded view of a first detail of the engagement and locking device according to the invention;

Figure 5a is a view of an alternative variation of the first detail of Figure 5;

Figure 6 is an exploded view of a second detail of the engagement and locking device according to the invention;

Figures 10 to 17 are schematic exemplifying views of the operation of the automatic engagement and locking device according to the invention;

Figures 18 to 21 are views of a first constructive variation of the automatic engagement and locking device according to the invention;

Figures 22 and 23 are views of a second constructive variation of the automatic engagement and locking device according to the invention;

Figure 24 is a view of a third constructive variation

of the automatic engagement and locking device according to the invention;

Figures 25, 26 and 27 are each a view of a step of the assembly of the engagement and locking device according to the invention;

Figure 28 is a perspective view of a device according to the invention;

Figure 29 is a perspective view of a device according to the invention with respect to a wing of a door with which it is associated;

Figure 30 is a sectional view of a sliding door of a known type with a device according to the invention installed.

[0019] With reference to the figures, an electric lock for in-wall sliding doors or shutters is generally designated by the reference numeral 10.

[0020] The electric lock 10 comprises an element to be engaged 11, which protrudes from an edge 12 of a generic sliding door or shutter 13, and is designed to be engaged and retained reversibly, in a stroke limit position for the door or shutter 13, by a reversible device 14 for automatic engagement and locking, which is fixed to the frame 15 of said sliding door or shutter 13.

[0021] In the embodiment described herein by way of nonlimiting example of the invention, the element to be engaged 11 is constituted by a bar for hanging the door or shutter 13 to a sliding carriage 16, which is arranged so as to slide within a sliding profile 17, which is the upper crossmember of said frame 15.

[0022] The reversible engagement and locking device 14 is fixed to said sliding profile 17 by way of quick fixing means 18, which are described in greater detail hereinafter, and is preferably arranged so as to retract between the covering trims of the frame 15.

[0023] In the constructive example described herein, which is nonlimiting of the invention, the reversible engagement and locking device 14 comprises, inside a box-like body 19,

- an engagement element 20, constituted by a flat body that comprises a first hook-shaped portion 21 and a second portion 22 that is pivoted to a first half-shell 23 of the box-like body 19,
- a lever 24, also pivoted to the first half-shell 33, for stopping the engagement element 20 either in a first configuration in which the hook-shaped portion 21 is extracted, so as to surround the element to be engaged 11, or in a second configuration, in which the hook-shaped portion 21 is retracted into the box-like body 19, according to the operation described hereinafter,
- an electric motor 25, which is associated with a switch 26 for switching it on and off,
- and a mechanism 27 for transmitting the motion from the pinion 28 of the shaft of the electric motor 25 to the engagement element 20.

[0024] In a constructive variation, the reversible engagement and locking device 14 does not have a switch 26, and the starting and stopping of the electric motor 25 are established by an electronic control unit that is provided with means for reading the current absorbed by the electric motor 25, or other similar and equivalent control systems; the electronic control unit automatically removes power from the motor whenever the mechanism 27 locks because a stroke limit has been reached by its end element, for example a pusher arm 36 described hereafter, so that the pinion 28 also is locked and so is the shaft of the electric motor with it.

[0025] The switch 26 is used to determine the open or closed state of the device 14 by interaction with a more advanced electronic control system.

[0026] The reversible engagement and locking device 14 also comprises means 29 for the manual movement of the engagement element 20, which are described hereafter.

[0027] The mechanism 27 comprises a series of gears 30, 31 and 32 that are adapted to transmit the torque generated by the electric motor to a gear with elastic return 33, i.e., pivoted with the interposition of a torsion spring 34 which, when the electric motor is switched off, returns said elastic return gear 33 to a preset initial position.

[0028] The elastic return gear meshes with a toothed half-disc 35, to which a pusher arm 36 is pivoted which is preset to act alternately on an adapted first raised portion 37 that protrudes from the second portion 22 of the engagement element 20 and on an adapted second raised portion 38 that protrudes from said lever 24.

[0029] Elastic means for temporary retention of the pusher arm 36 in a preset initial position are interposed between the pusher arm 36 and the toothed half-disc 35.

[0030] The elastic means are constituted, for example, as shown in Figure 5, by a ball 39 that is pushed by a helical pusher spring 40 against a recess 41 that is defined on the surface of the pusher arm 36 that is directed toward the toothed half-disc 35, the helical pusher spring 40 being arranged in an adapted seat that is defined on the toothed half-disc 35 and is open on the pusher arm 36.

[0031] Figure 5a illustrates a constructive variation of the group of components with the pusher arm 136 and the toothed half-disc 135.

[0032] The pivot 163 is constituted by a cylindrical insert with an extraction-preventing head 163a at a first end and a slot 163b for a locking ring of the snap type 163e, at the opposite end.

[0033] The pivot 163 is adapted to be inserted so as to pass first through the toothed half-disc 135 and then through the underlying pusher arm 136, with the interposition of a first center bearing 163c between the toothed half-disc and the arm and a second center bearing 163d between the arm and the locking ring 163e.

[0034] A cambered washer 163f is interposed between the second center bearing 163d and the pusher arm 135 and is adapted to keep the arm 136 and the half-disc 135

packed.

[0035] A traction spring 43 is arranged between the first raised portion 37 and the second raised portion 38 and is adapted to retain stably the engagement element 20 and the lever 24 against each other either in the configuration in which the hook-shaped portion is extracted or in the configuration in which the hook-shaped portion is retracted.

[0036] As clearly visible in Figures 11 to 17, the second portion 22 of the engagement element 20 has a cam-shaped lateral tab 48 that is adapted to allow relative sliding between the engagement element 20 and the lever 24.

[0037] The lever 24 is provided with a coupling recess 49 that is contoured to accommodate said cam-shaped lateral tab 48, and a contiguous sliding tooth 50, which is adapted to slide on the edge 51 of the cam-shaped tab 48 during relative motion in contact between the engagement element 20 and the lever 24.

[0038] The switch 26 is arranged so as to be actuated by the movement either of said engagement element 20 or of said lever 24.

[0039] In the present constructive example, the switch 26 is actuated by the thrust of the second raised portion 38 of the lever 24.

[0040] Operation of the engagement and locking device 14 is described hereinafter.

[0041] Figures 8 and 9 illustrate the reversible engagement and locking device 14 complete and closed within the box-like body 19, composed of the first half-shell 23 and the second half-shell 52.

[0042] The box-like body 19 is contoured so as to have, at the engagement element 20, a recess 53 for encountering the element to be engaged 11 by the door or shutter 13, inside which the element to be engaged 11 is locked by the protrusion of the hook-shaped portion 21 of the engagement element 20.

[0043] Such recess 53 must have such dimensions as to allow the accommodation of the element to be engaged 11, for example a screw, with its corresponding bolt for fixing to a plate which in turn is fixed to the door or shutter.

[0044] The quick fixing means 18 of the reversible engagement and locking device 14, clearly visible in Figure 9, provide for a jaw 54, for grip within the sliding profile 17, that is pivoted to the box-like body 19 and is intended to close onto said box-like body 19 with the interposition of the edges 55 of the longitudinal opening 56, see Figures 25 to 27, for the passage of the element to be engaged 11, which is constituted, as mentioned, by the bar for hanging the door or shutter 13 to the carriage 16.

[0045] The closure of the jaw 54 on the edges 55 is stabilized by a screw 57 that passes through a hole 58 that is defined in the box-like body 19 and is preset for screwing to a corresponding nut 59 that is incorporated within the jaw 54.

[0046] The closure of the jaw 54 on the edges 55 of the longitudinal opening 56 is assisted by a helical spring 60 that is arranged so as to surround the pivot 61 of the jaw 54.

[0047] Operation of the reversible engagement and locking device 14 is clearly shown in Figures 10 to 17.

[0048] Figure 10 shows a plan view of the engagement and locking device 14 in the open configuration, i.e., with the hook-shaped portion 21 retracted within the box-like body 19.

[0049] In this open configuration, the pusher arm 36 is retained in the position for disengagement on the part of the protrusions 37 and 38 by way of the stable inactive angular position determined by the torsion spring 34, which is adapted to return the gear 33 to the preset initial angular position, such return motion being transmitted also to the toothed half-disc 35 and to the pusher arm 36 that is pivoted thereto.

[0050] In this open configuration, the sliding tooth 50 is pressed against the edge 51 of the cam-shaped lateral tab 48 by way of the traction spring 43 between the two raised portions 37 and 38, said configuration being therefore in a stable equilibrium.

[0051] Figure 11 shows the first step of the operations for closing the device 14.

[0052] Following the entry of the element to be engaged 11, which is not shown for the sake of greater clarity, in the recess 53 of the box-like body 19, the conditions for starting the motor 25 by means of a remote control and management unit are produced.

[0053] The remote control and management unit can be for example preset to detect and control continuously the position of the door or shutter.

[0054] The controlled rotation of the pinion 28 causes, by means of the cascade of gears 30, 31, 32 and 33, a first rotation of the half-disc 35 until the pusher arm 36 rests against the first protrusion 37, which is constituted for example by a cylindrical element that protrudes at right angles to the second portion 22 of the engagement element 20.

[0055] The pusher arm 36 has the end 62 that is substantially fork-shaped, so as to guide with continuity the movement of the first raised portion 37 and therefore the rotation of the engagement element 20 of which the first raised portion 37 is a part.

[0056] Figure 12 illustrates a transient and not yet stable closure step of the device 14, with the engagement element 20 rotated as a consequence of the action of the pusher arm 36 on the first raised portion 37.

[0057] This rotation causes the extraction of the hook-shaped portion 21 from the box-like body 19 and the elongation of the helical spring 43 until the sliding tooth 50 remains in contact with the edge 51 of the cam-shaped lateral tab 48.

[0058] The pusher arm 36 is rotated about its own pivot 63 with respect to the half-disc 35 with the ball 39 that has exited from the recess 41 and is free to slide, being pushed by the spring 40, against the surface of the pusher arm 36.

[0059] Figure 13 shows the stable closed configuration of the device 14, in which the sliding tooth 50 is no longer

in contact with the edge 51 of the cam-shaped lateral tab 48, and the tab snaps, due to the traction force imposed on the lever 24 by the spring 43 by means of the second raised portion 38, within the coupling recess 49 defined in said lever 24.

[0060] By way of the rotary motion of the lever 24, the second raised portion 38 is no longer in contact with the switch 26, which changes state.

[0061] Figure 14 shows how, when the motor 25 is off, the torsion spring 34 can act on the elastic return gear 33, which, by rotating through a preset angle, under the thrust of the torsion spring 34, causes the opposite rotation of the half-disc 35 and therefore the retraction of the pusher arm 36, the fork-shaped end 62 of which disengages from the first raised portion protrusion 37, while the ball 39 returns into the respective recess 41 and the pusher arm 36 resumes a stable position with respect to the half-disc 35 to which it is pivoted.

[0062] The retracting motion of the pusher arm 36 is guided by a deflecting side wall 82, which is defined so as to extend inwardly from the edge of the first half-shell 23, as shown in Figures 12 to 15, the deflecting side wall 82 being adapted to cooperate with a corresponding contoured edge 83 of the pusher arm 36.

[0063] The sliding of the contoured edge 83 on the deflecting side wall 82 guides the pusher arm 36 to the initial position, with the ball 39 returning into its recess 41.

[0064] Figure 15 shows a first step of the opening motion of the mechanism of the device 14.

[0065] In the first step, as a consequence of an opening signal sent to the device 14, the motor 25 rotates the pinion 28 in the same direction with respect to the operation for closing the device 14.

[0066] This rotation of the pinion 28 again rotates, also in the same direction with respect to the closure operation, the half-disc 35 and with it the pusher arm 3 6.

[0067] As shown in Figure 15, the pusher arm 36 does not affect the first raised portion 37 as in the operation for closing the device 14, but acts on the second protrusion 38.

[0068] Figure 16 illustrates an intermediate step of the operation for opening the device 14, in which the pusher arm 36, by means of the second raised portion 38, turns the lever 24 about its fulcrum 68, moving it away from the engagement element 20.

[0069] The engagement element 20 does not rotate about its own fulcrum 69 until the sliding tooth 50 is in contact with the side 90 of the cam-shaped lateral tab 48, preventing said rotation.

[0070] The motionlessness of the engagement element 20 and the rotation of the lever 24 cause the elongation of the spring 43.

[0071] The lever 24 rotates about its own fulcrum 68 until the tooth 50 moves beyond the side 90 of the cam-shaped lateral tab 48; at this point the engagement element 20 also is free to rotate about its own fulcrum 69, turned by the traction of the spring 43, with the tooth 50 of the lever sliding on the edge 51 of the cam-shaped lateral tab 48.

[0072] In this position, which is visible in Figure 17, the second raised portion 38 has made contact with the switch 26, causing the halting of the motor 25.

[0073] The torsion spring 34 returns the gear 33 and therefore the half-disc 35 with the pusher arm 36 to the inactive position of Figure 10.

[0074] The means 29 for the manual movement of the engagement element 20 in case of electric power failure are constituted, in a first constructive variation thereof, by a plate 70 with a cam-shaped slot 71 that is arranged so as to translate on the bottom of the first half-shell 23, as shown in Figure 2.

[0075] The cam-shaped slot 71 is adapted to act on a third raised portion 38a, which is visible in Figure 18 and is coaxial with respect to the second raised portion 38 but protrudes from the opposite face of the lever 24, in order to rotate the lever 24 in the opening direction of the device 14.

[0076] The plate 70 is arranged so as to translate in a corresponding guide 72 that is defined on the first half-shell 23 and is translated by traction means constituted by a bar 75 with a wider end 76 that is engaged with an engagement tab 77 of a rotation cylinder 78, which is adapted to be rotated about its own main axis by means of a maneuvering bar 79 that is inserted in a complementarily shaped hole 80 that is open in an axial direction on the rotation cylinder 78; a contrast pusher spring 74 is present which is adapted to push the plate 70 to return it to the normal inactive position.

[0077] In Figure 18, the means 29 for the manual movement of the engagement element 20 are in a normal closed configuration of the reversible automatic engagement and locking device 14, while in Figure 19 the means 29 are in the actuation configuration and the engagement element 20 is in the open configuration.

[0078] Figures 20 and 21 exemplify the application of the first constructive variation of the device 14 with the manual movement means 29 with the maneuvering bar 79 and two opposite knobs 95 and 96 for the rotation of the maneuvering bar 79.

[0079] The figures show schematically a jamb 105 and two masking elements 106 and 107 of the sliding profile, i.e., the upper crossmember of the frame, for the sliding carriage associated with the door or shutter.

[0080] Figures 22 and 23 exemplify a second constructive variation of the means 129 for the manual movement of the engagement element 20; in the manual movement means 129, the plate 70 is translated by wire traction means 173 with a traction knob 195 available on one side of the door.

[0081] Figure 24 illustrates a third constructive variation of the means 229 for manual movement of the engagement element 20; in the manual movement means 229, the plate 70 is translated from one side with wire traction means 273, with a traction knob 295 available on one side of the door, and on the opposite side by way of means with a maneuvering bar 279 and a rotation knob

296.

[0082] The wire traction means are simple to guide to a height of the door where they can be maneuvered even by a person of limited height, for example a child, while the solution with the maneuvering bar can be installed only at the device 14 and therefore in a high position that can be accessed only by a very tall person.

[0083] Figures 25 to 27 exemplify some steps of the assembly of the device 14 on a sliding profile 17.

[0084] Figure 25 illustrates the sliding profile 17 with the passage opening 80, provided for the passage of the sliding carriage 16, which is adapted to allow the insertion within the sliding profile 17 of the jaw 54 in the open configuration with respect to the box-like body 19.

[0085] The passage opening 80 is of course wider than the longitudinal opening 56 for the passage of the bar for hanging the door or shutter 13, i.e., the element to be engaged 11, and in particular has such a width as to allow the passage of the toothed portion of the jaw 54 that is preset to bite the edges 55 of the longitudinal opening 56.

[0086] Figure 26 illustrates an intermediate step with the jaw 54 partially inserted in the profile 17 and inclined toward the edges 55.

[0087] Figure 27 illustrates the final step of fixing, with the jaw 54 lowered and in contact with the edges 55, and the screw 57 to be screwed into the nut 59 so as to render stable the fixing and placement of the device 14.

[0088] The reversible engagement and locking device 14 is fixed to said sliding profile 17 in a position that depends on the position of the sliding carriage that supports the door or shutter.

[0089] The activation of the device 14 provides for a low-voltage control both for closure and for opening, without the need to reverse its polarity, and this occurs thanks to the particular configuration of the gears.

[0090] Retention in the stable closed or stable open configuration does not require power.

[0091] In the absence of power, the permanence of the configuration assumed by the device 14 is therefore ensured; this could not occur if a system with an electromagnet were used which would require a constant electric power supply for one of the two configurations, the open one or the closed one.

[0092] Figure 28 illustrates the device 14 according to the invention, indicating its reference dimensions X1, height, X2, width, and X3, length.

[0093] The device 14 is provided in particular with such dimensions as to be inserted in the spaces available within the frames of in-wall sliding doors of a per se known type, for example of the type manufactured by the companies Scrigno and Eclisse.

[0094] Even more particularly:

- the height X1 is comprised between 15 mm and 25 mm and is preferably 19 mm,
- the width X2 is comprised between 36 mm and 46 mm and is preferably 46 mm;
- the length X3 is comprised between 105 mm and 115 mm and is preferably 109 mm.

[0095] Figure 29 clearly shows how the device 14 is compatible with the space occupations of the elements for anchoring the door or shutter 13 to the carriage.

[0096] The sectional view of Figure 30 clearly shows how the device 14 according to the invention arranges itself conveniently between two covering elements 306 and 307 of the upper edge of a wing 13, shown in broken lines, of an in-wall sliding door of a per se known type.

[0097] In practice it has been found that the invention achieves the intended aim and objects.

[0098] In particular, the invention provides an electric lock that is easy to install without modifications for the door or shutter or for the frame, since it is sufficient to use the passage opening 80 for the sliding carriage 16 in order to insert therein the jaw 54 of the device 14 in addition to the provision of the electric power supply.

[0099] Therefore, the invention provides a lock that is simple to install even for a technician who does not have particular prior teachings.

[0100] Moreover, the invention provides an electric lock that can be installed also on in-wall sliding doors of a per se known type that are already installed.

[0101] Furthermore, the invention provides an electric lock that can be installed in a manner that is substantially invisible to a user and therefore does not affect the visual impact and the aesthetic content of the in-wall door.

[0102] Not least, the invention provides an electric lock for sliding doors or shutters that can be provided by means of per se known systems and technologies.

[0103] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

[0104] In practice, the materials used, so long as they are compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to requirements and to the state of the art.

[0105] The disclosures in Italian Patent Application No. PD2013A000043 from which this application claims priority are incorporated herein by reference.

[0106] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. An electric lock (10) for sliding doors or shutters, **characterized in that** it comprises an element (11) to be engaged which is intended to be engaged and retained reversibly by a reversible device (14) for

automatic engagement and locking.

2. The electric lock according to claim 1, **characterized in that** said element to be engaged (11) is constituted by a bar for hanging a door or shutter (13) to a sliding carriage (16), said element to be engaged (11) being arranged so as to protrude from an edge (12) of said door or shutter (13), said sliding carriage (16) being arranged so as to slide inside a sliding profile (17), which is the upper cross-member of a frame (15) of said door or shutter (13), said reversible engagement and locking device (14) being fixed to said sliding profile (17) by quick fixing means (18).

3. The electric lock according to one or more of the preceding claims, **characterized in that** said reversible engagement and locking device (14) comprises, inside a box-like body (19),

- an engagement element (20), constituted by a flat body that comprises a first hook-shaped portion (21) and a second portion (22) that is pivoted to a first half-shell (23) of the box-like body (19),
- a lever (24), also pivoted to the first half-shell (33), for stopping the engagement element (20) either in a first configuration in which the hook-shaped portion (21) is extracted, so as to surround the element to be engaged (11), or in a second configuration, in which the hook-shaped portion (21) is retracted into the box-like body (19),
- an electric motor (25),
- and a mechanism (27) for transmitting the motion from the pinion (28) of the shaft of the electric motor (25) to said engagement element (20).

4. The lock according to one or more of the preceding claims, **characterized in that** a switch (26) is associated with said electric motor (25) to switch it on and off, said switch (26) being presettable in order to determine the open or closed state of the device (14) by interaction with an electronic control system.

5. The electric lock according to one or more of the preceding claims, **characterized in that** said reversible engagement and locking device (14) comprises means (29) for the manual movement of the engagement element (20).

6. The electric lock according to one or more of the preceding claims, **characterized in that** said mechanism (27) comprises a series of gears (30, 31, 32) adapted to transmit the torque generated by the electric motor to a gear with elastic return (33), which is pivoted with the interposition of a torsion spring (34) which, when the electric motor is switched off, returns said elastic return gear (33) to a preset initial position thereof, said gear with elastic return meshing with a toothed half-disc (35) to which a pusher arm (36) is pivoted and is intended to act alternately on an adapted first raised portion (37) that protrudes from said second portion (22) of the engagement element (20) and on an adapted second raised portion (38) that protrudes from said lever (24).

7. The electric lock according to one or more of the preceding claims, **characterized in that** elastic means for temporary retention of the pusher arm (36) in a preset initial position are interposed between said pusher arm (36) and the toothed half-disc (35).

8. The electric lock according to one or more of the preceding claims, **characterized in that** said elastic means for temporary retention of the pusher arm (36) in a preset initial position are constituted by a ball (39) that is pushed by a helical spring (40) against a recess (41) that is defined on the surface of the pusher arm (36) that is directed toward the toothed half-disc (35), said helical pusher spring (40) being arranged in a corresponding seat that is defined on the toothed half-disc (35) and is open onto the pusher arm (36), the retracting motion of the pusher arm (36) being guided by a deflecting side wall (82) that is defined so as to be extended toward the inside from the edge of the first half-shell (23), said deflecting side wall (82) being adapted to cooperate with a corresponding contoured edge (83) of the pusher arm (36).

9. The electric lock according to one or more of the preceding claims, **characterized in that** a traction spring (43) is arranged between the first raised portion (37) and the second raised portion (38) and is adapted to retain stably the engagement element (20) and the lever (24) against each other either in the configuration in which the hook-shaped portion (21) is extracted, or in the configuration in which the hook-shaped portion (21) is retracted.

10. The electric lock according to one or more of the preceding claims, **characterized in that** said second portion (22) of the engagement element (20) has a cam-shaped lateral tab (48) that is adapted to allow relative sliding between the engagement element (20) and the lever (24), said lever (24) having a coupling recess (49) that is contoured to accommodate said cam-shaped lateral tab (48), and a contiguous sliding tooth (50) that is adapted to slide on the edge (51) of the cam-shaped tab (48) during the relative motion in contact between the engagement element (20) and the lever (24).

11. The electric lock according to one or more of the preceding claims, **characterized in that** said box-like body (19) is contoured so as to have, at the engagement element (20), a recess (53) for meeting

up with the element to be engaged (11) from the door or shutter (13), inside which said element (11) to be engaged is blocked by the exit of the hook-shaped portion (21) of the engagement element (20).

12. The electric lock according to one or more of the preceding claims, **characterized in that** said quick fixing means (18) of the reversible engagement and locking device (14) comprise a jaw (54), for grip inside the sliding profile (17), which is pivoted to the box-like body (19) and is designed to close itself onto said box-like body (19) with the interposition of the edges (55) of the longitudinal opening (56) for the passage of the element to be engaged (11), i.e., of the bar for hanging the door or shutter (13) to the carriage (16).

13. A reversible engagement and locking device (14) for an electric lock (10) particularly for sliding doors, **characterized in that** it comprises, within a box-like body (19):

- an engagement element (20), constituted by a flat body that comprises a first hook-shaped portion (21) and a second portion (22) that is pivoted to a first half-shell (23) of the box-like body (19),
- a lever (24), which is also pivoted to the first half-shell (23), for stopping the engagement element (20) either in a first configuration, in which the hook-shaped portion (21) is extracted, so as to surround an element to be engaged (11), or in a second configuration, in which the hook-shaped portion (21) is retracted into the box-like body (19),
- an electric motor (25),
- and a mechanism (27) for transmitting motion from the pinion (28) of the shaft of the electric motor (25) to said engagement element (20).

14. The device according to claim 13, **characterized in that** a switch (26) is associated with said electric motor (25) to switch it on and off, said switch (25) being presettable to determine the open or closed state of the device (14) by interaction with an electronic control system.

15. The device according to claim 13, **characterized in that** it comprises means (29) for the manual movement of the engagement element (20).

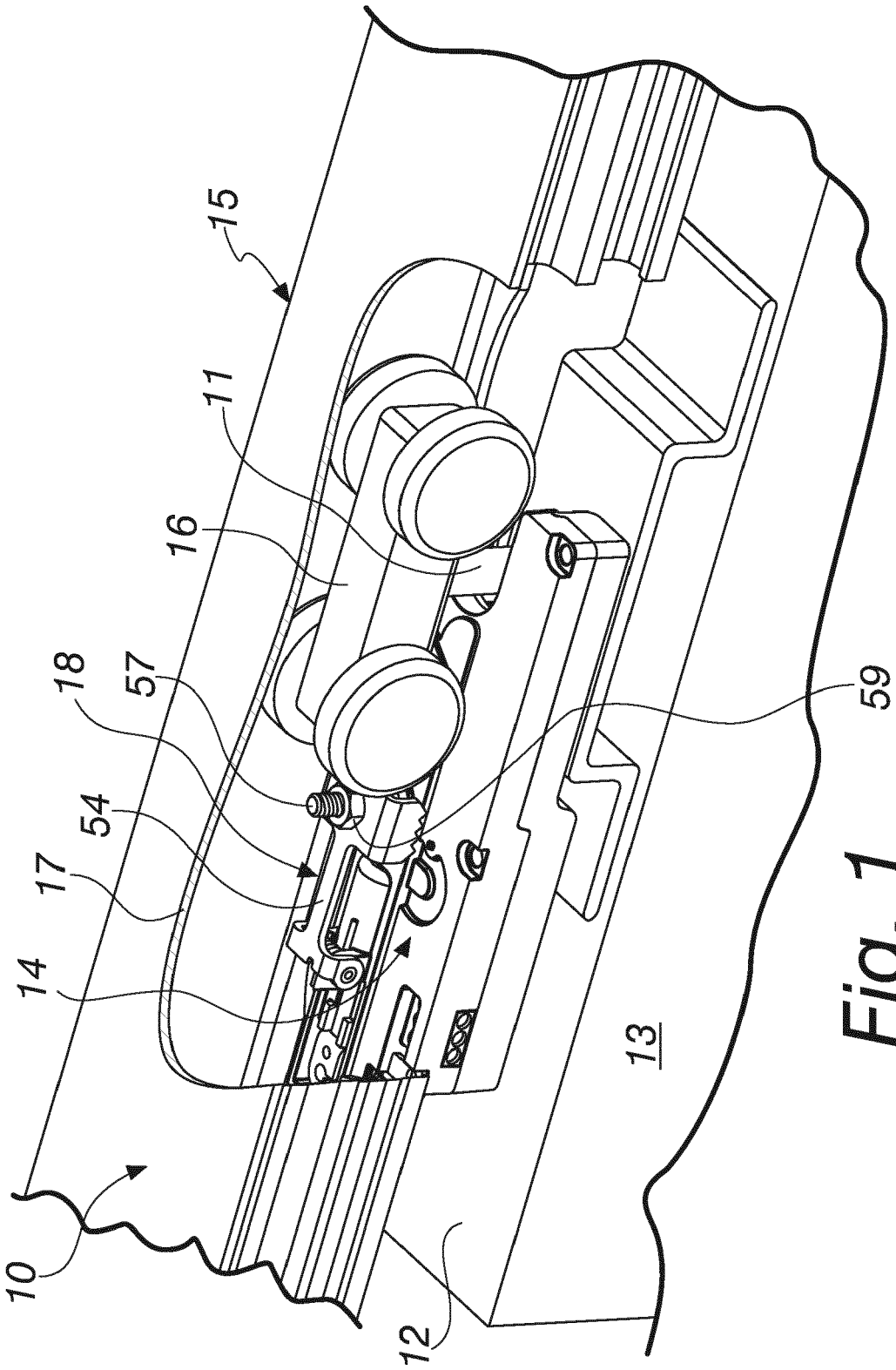


Fig. 1

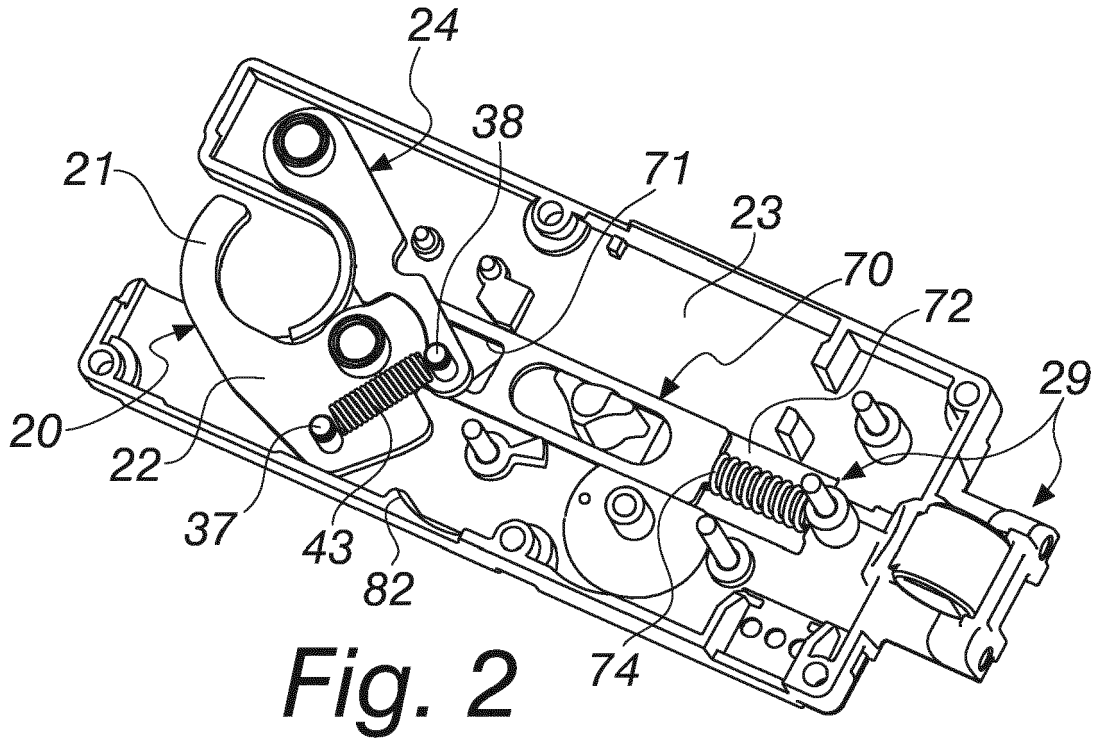

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Fig. 2

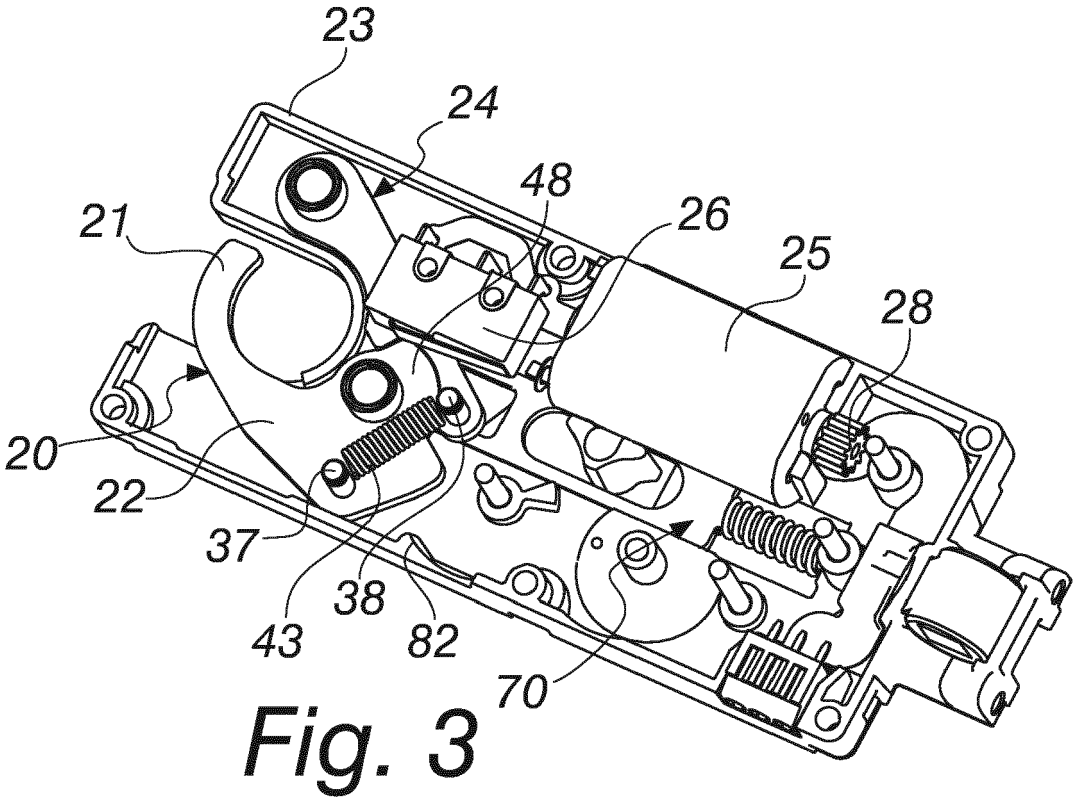

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Fig. 3

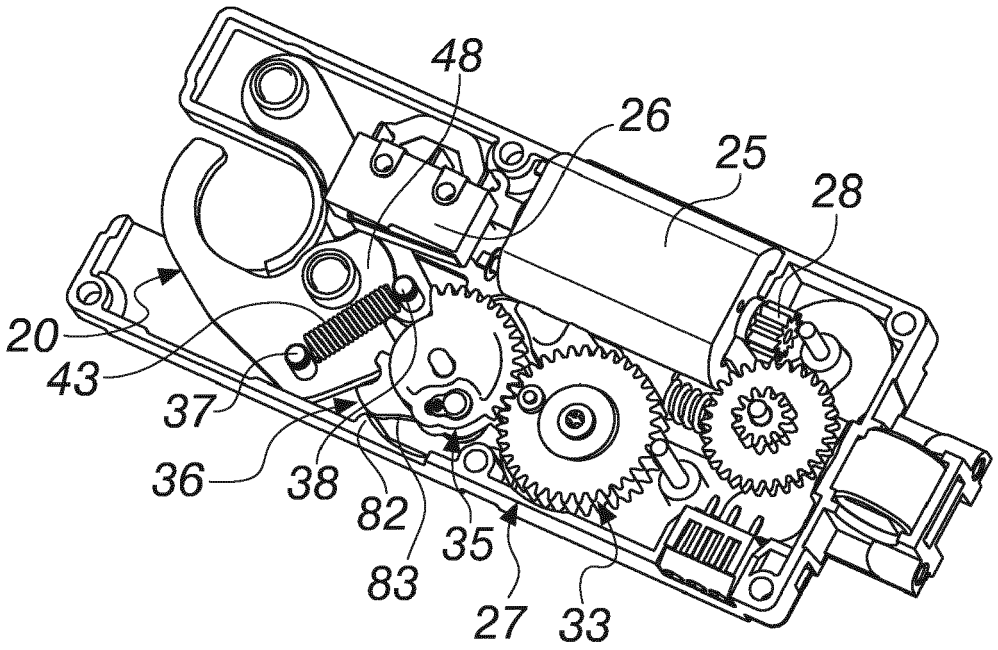


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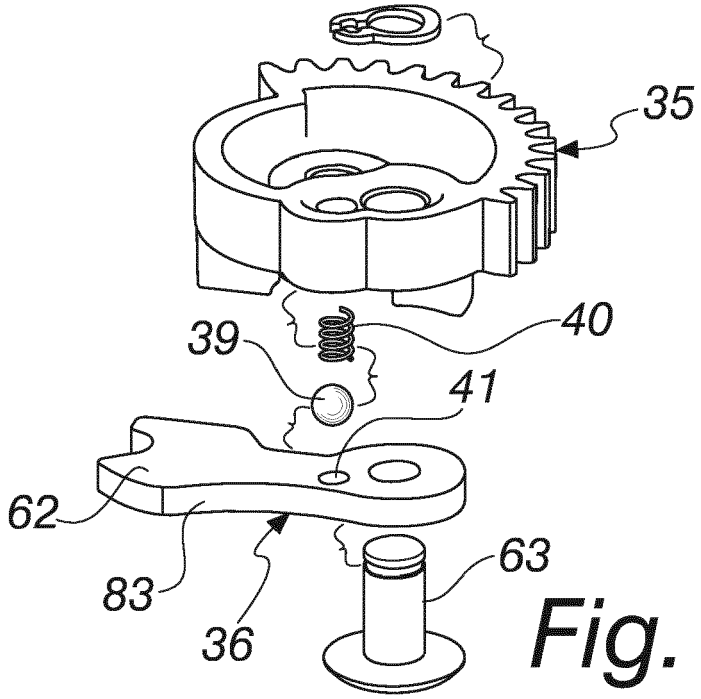


Fig. 5

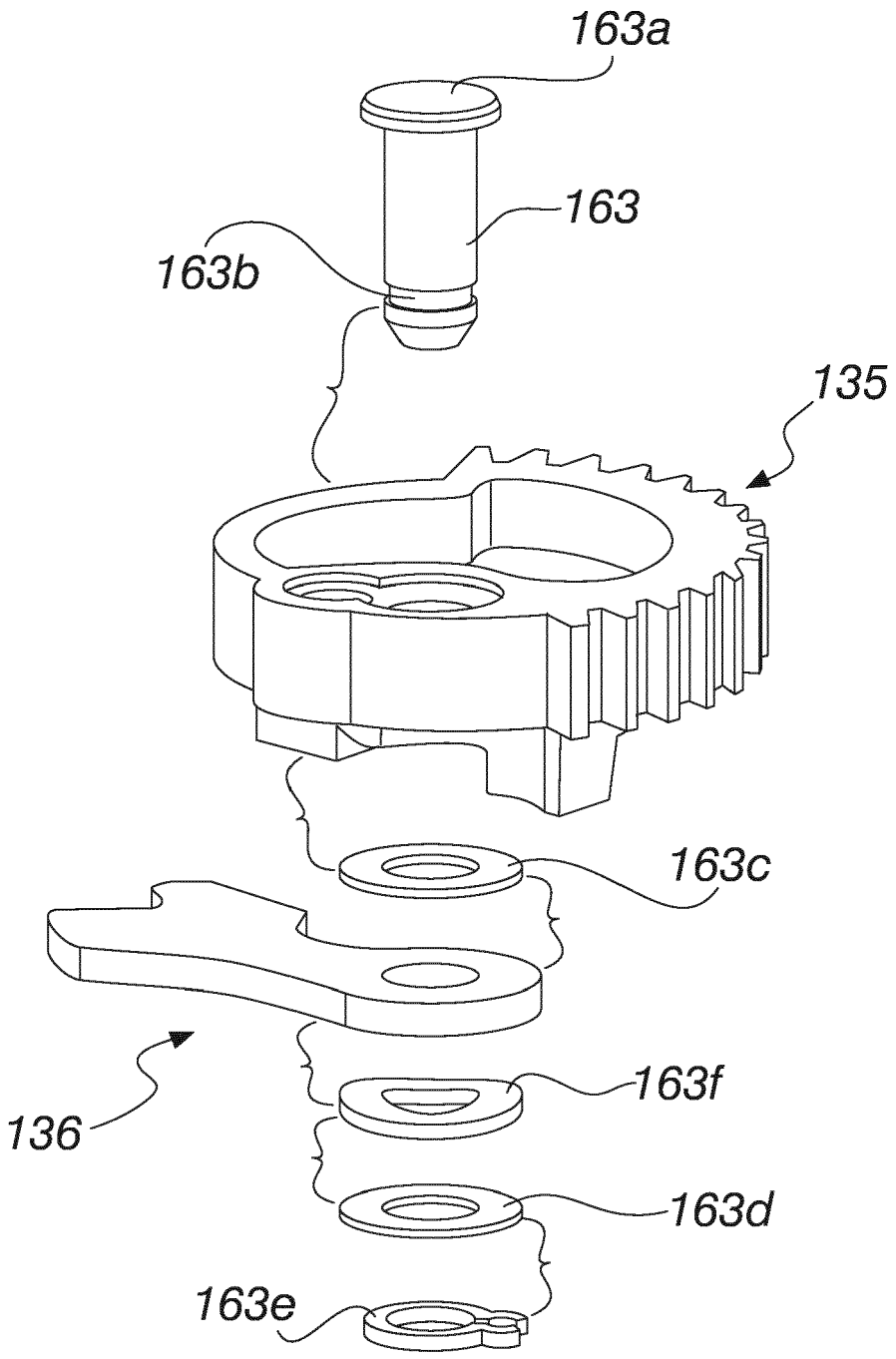


Fig. 5a

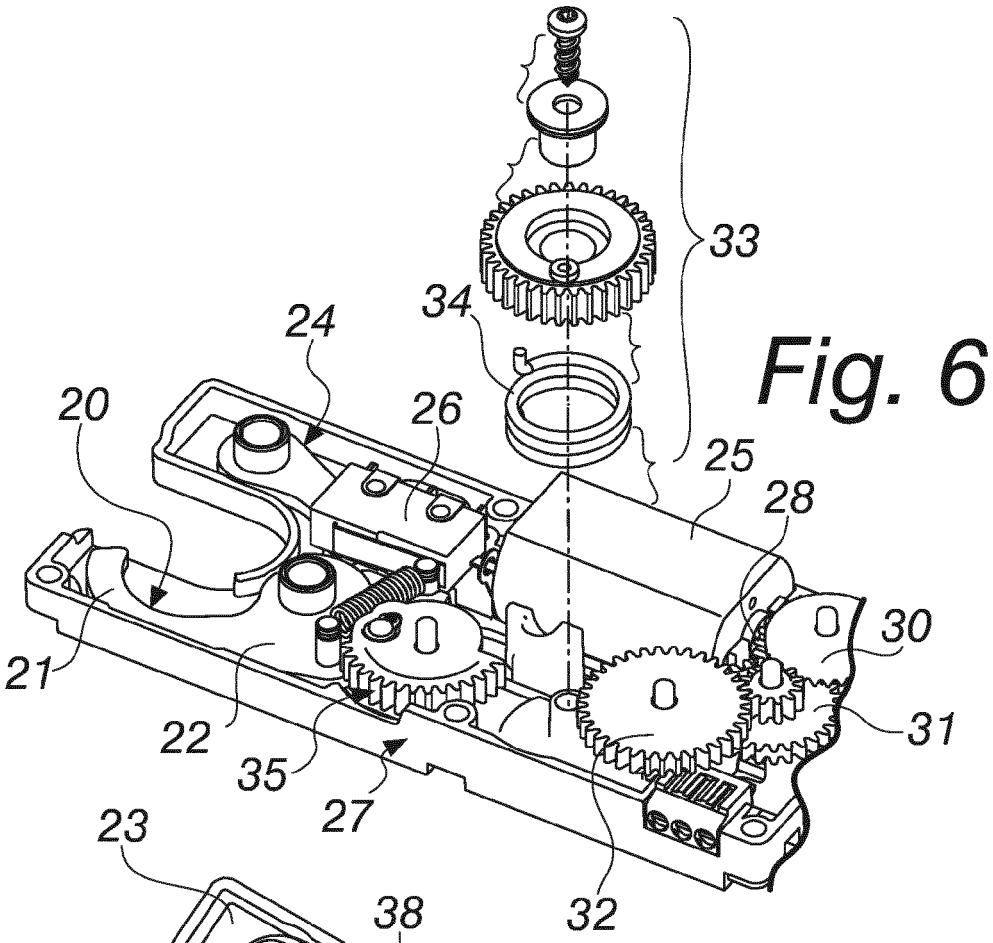

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Fig. 6

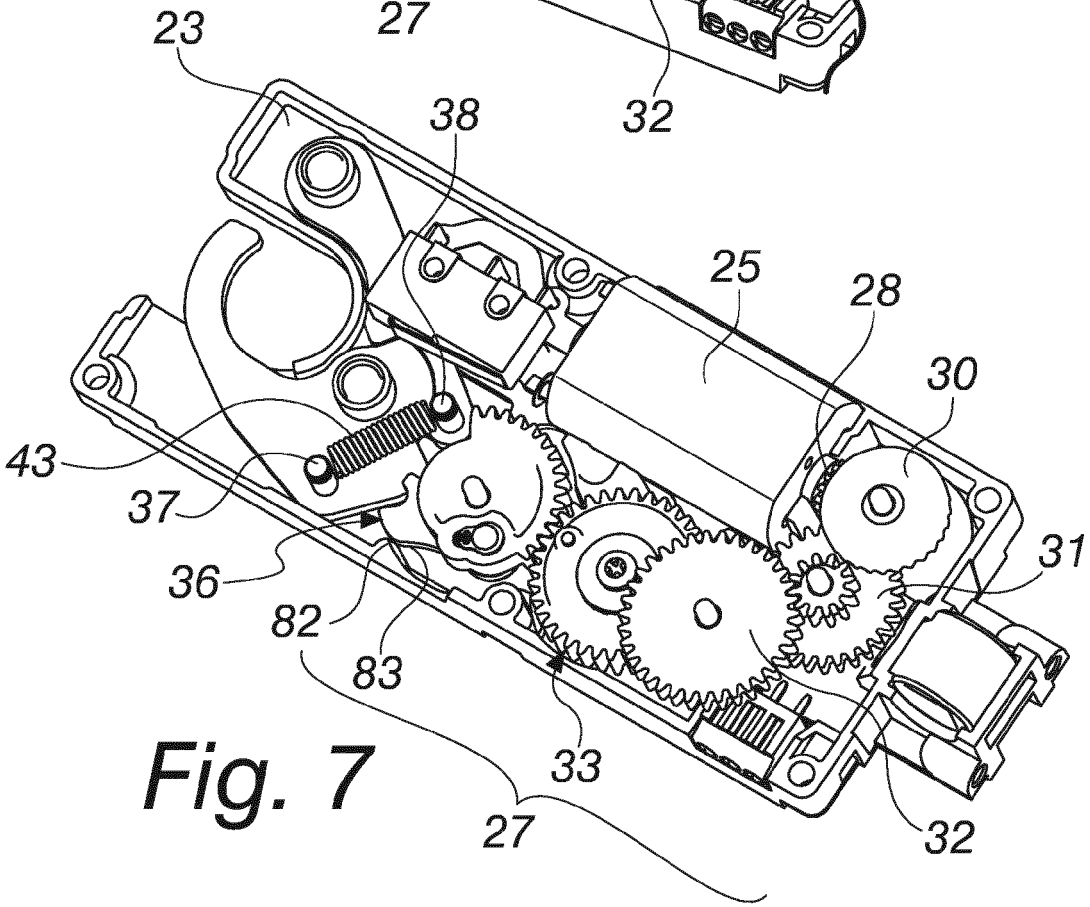

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Fig. 7

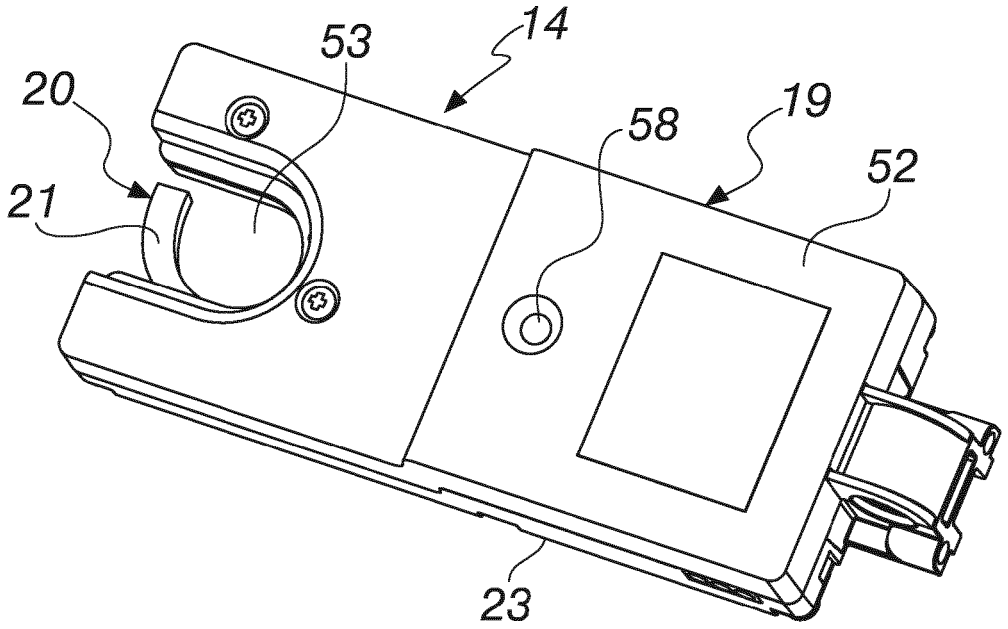


Fig. 8

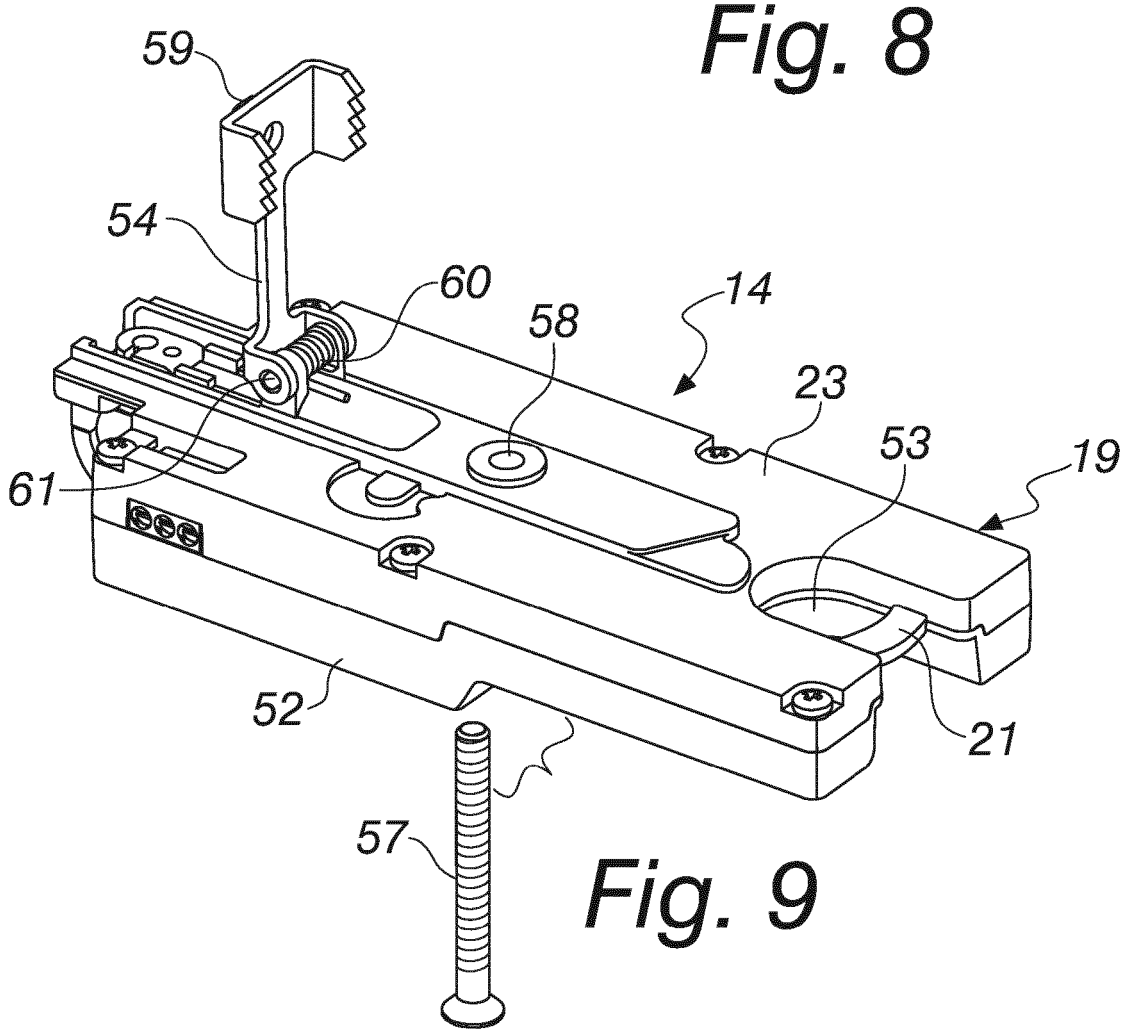


Fig. 9

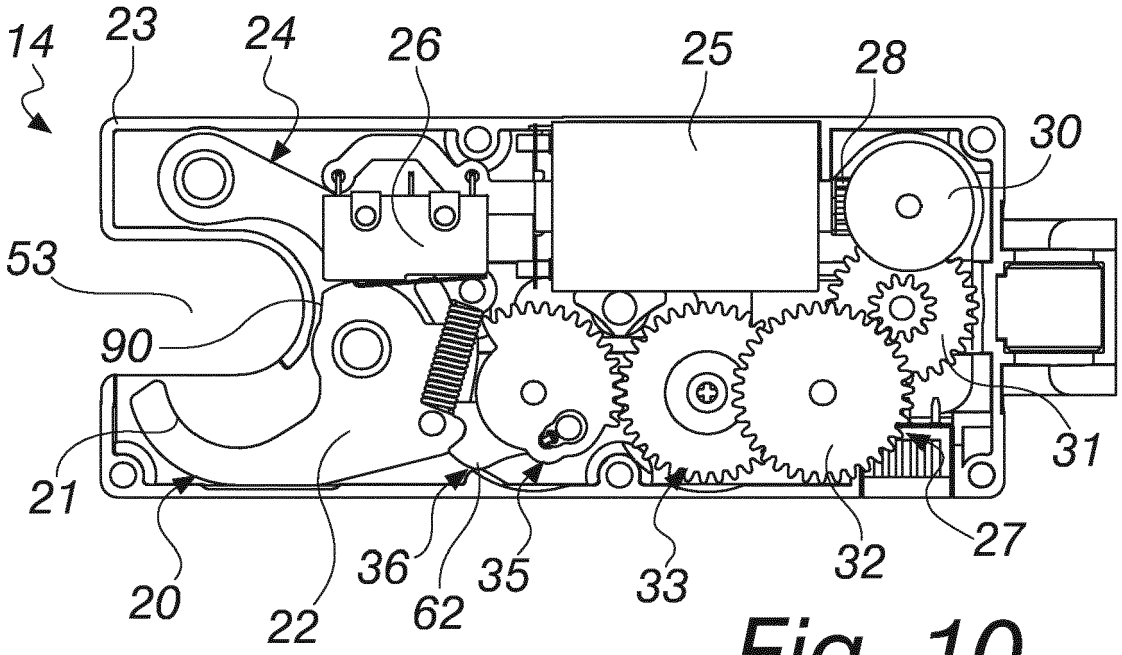

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Fig. 10

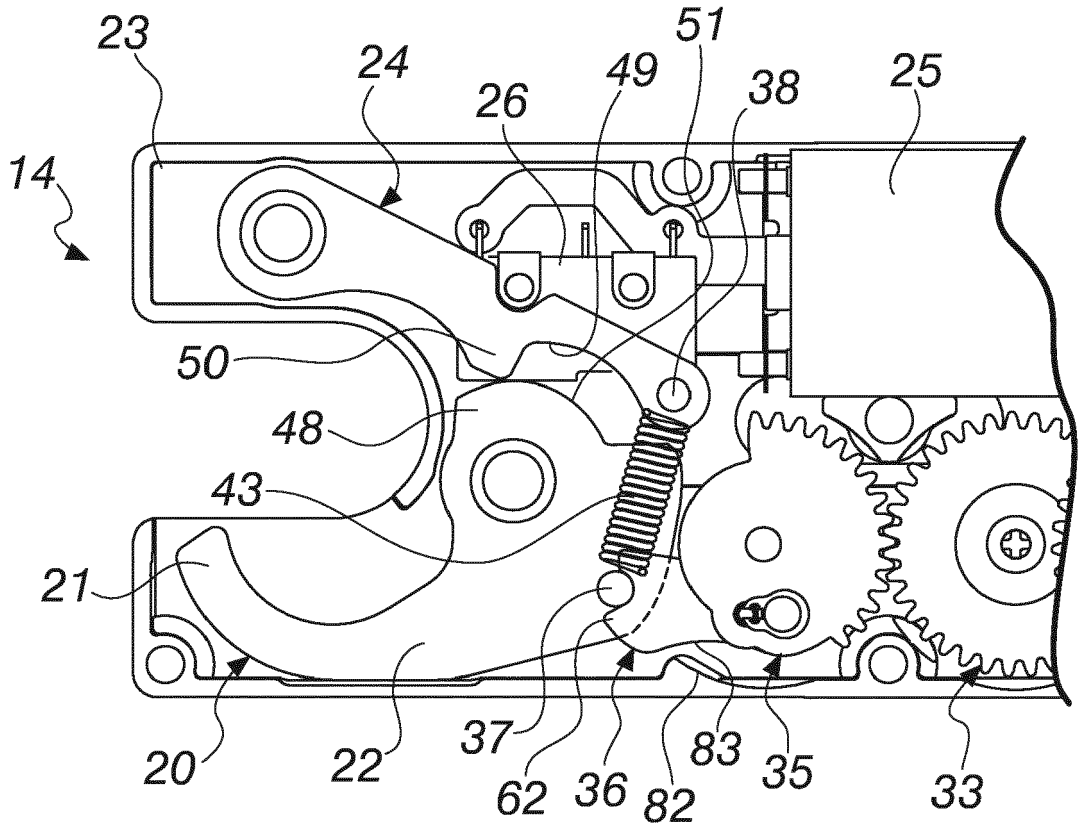

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Fig. 11

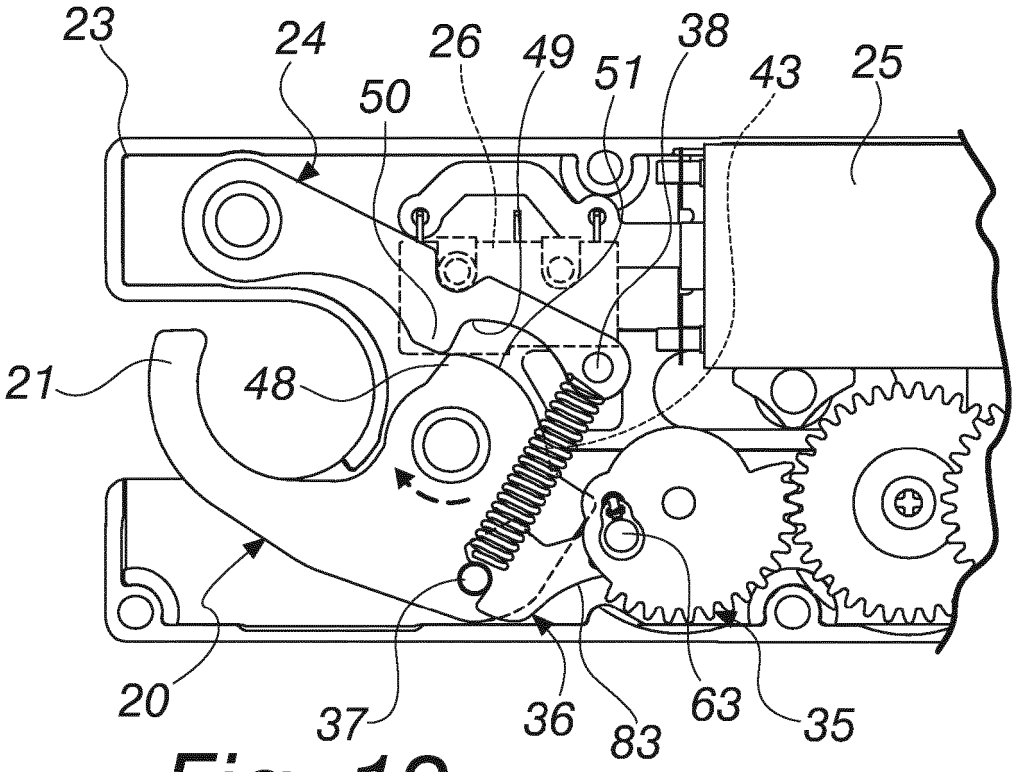

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Fig. 12

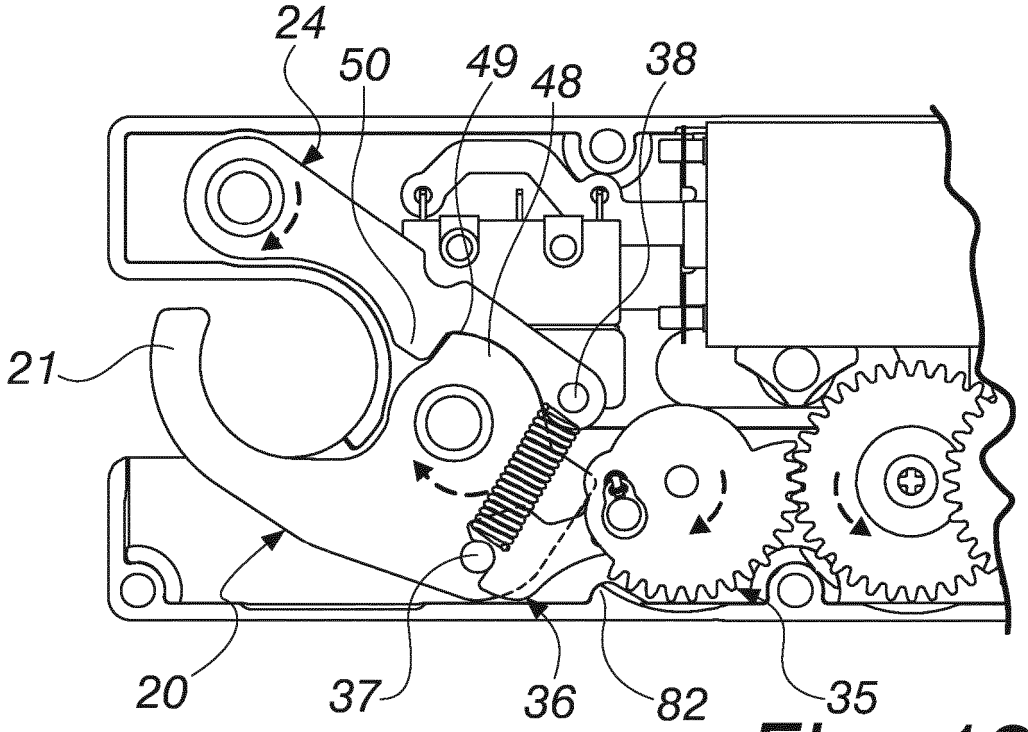

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Fig. 13

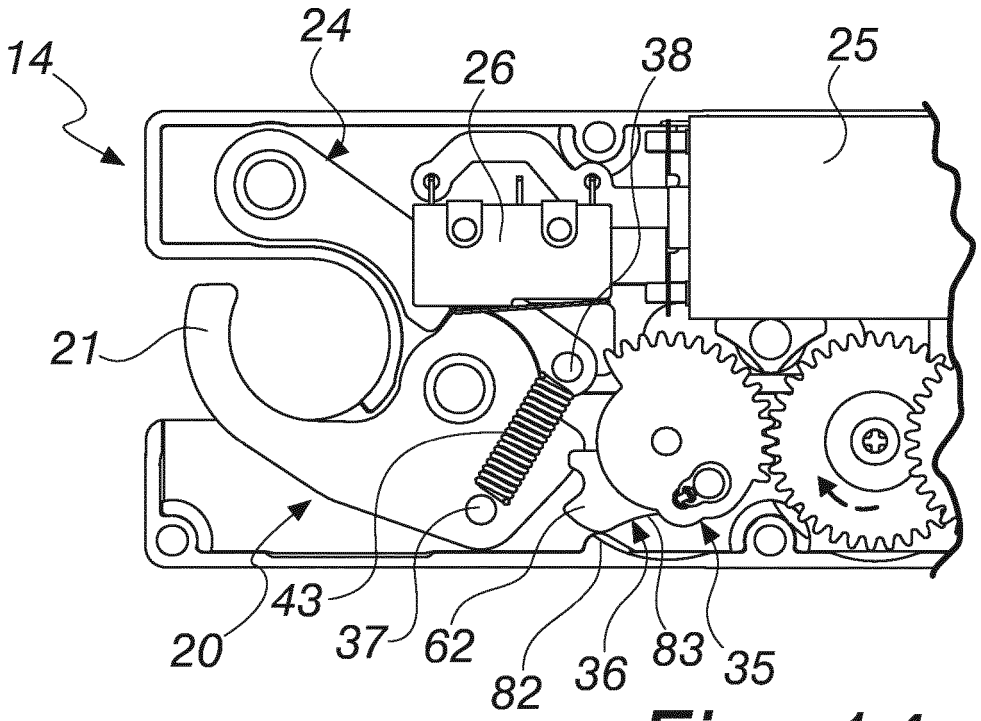

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Fig. 14

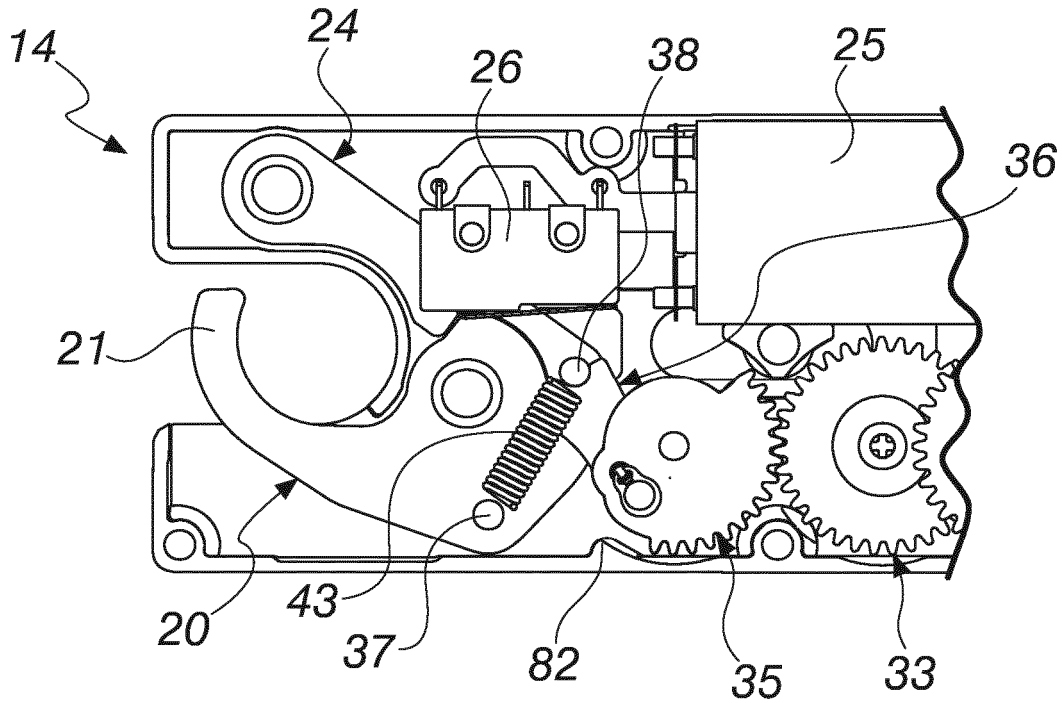

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Fig. 15

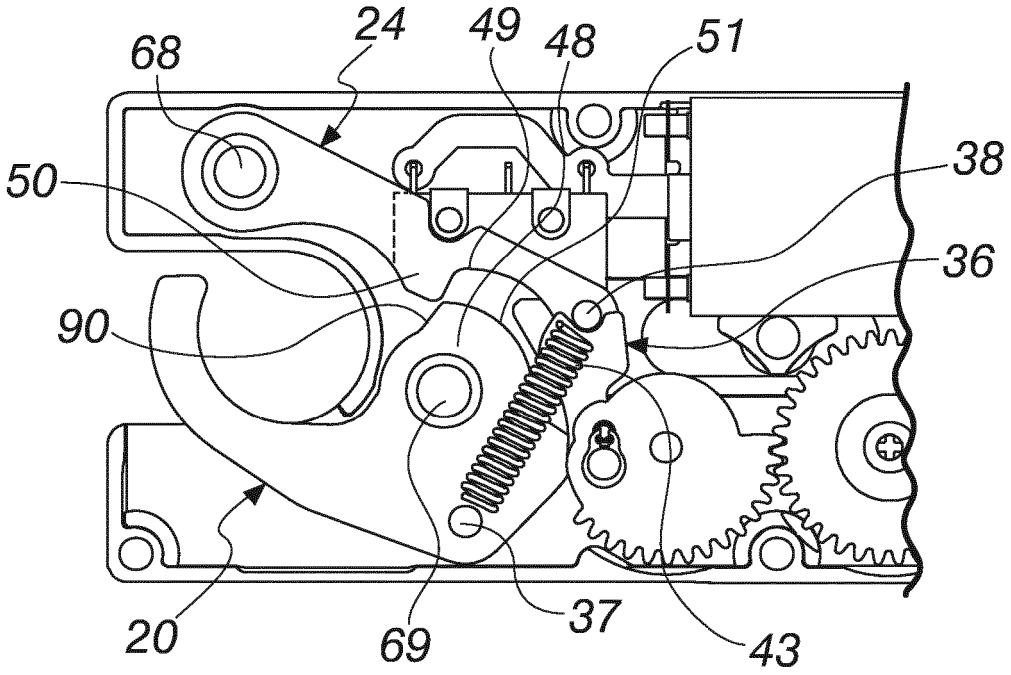


Fig. 16

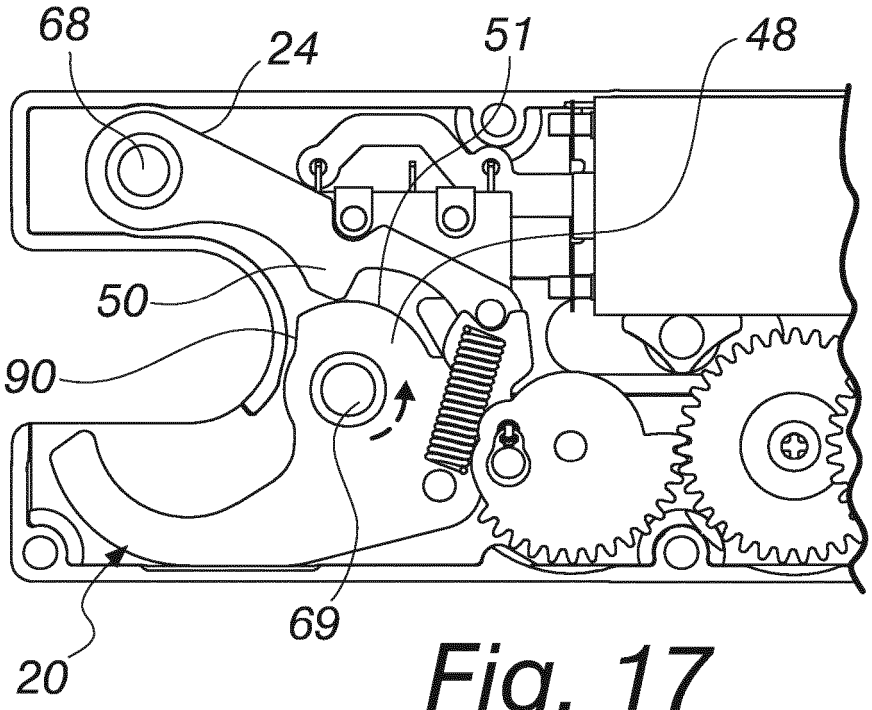


Fig. 17

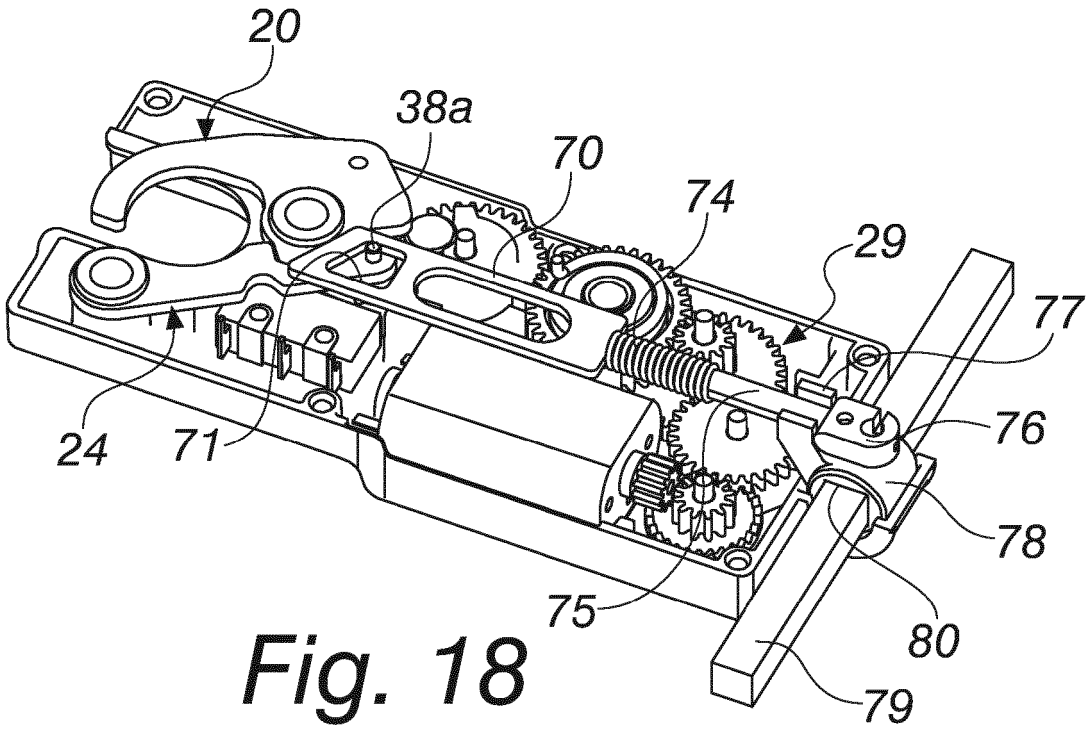

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Fig. 18

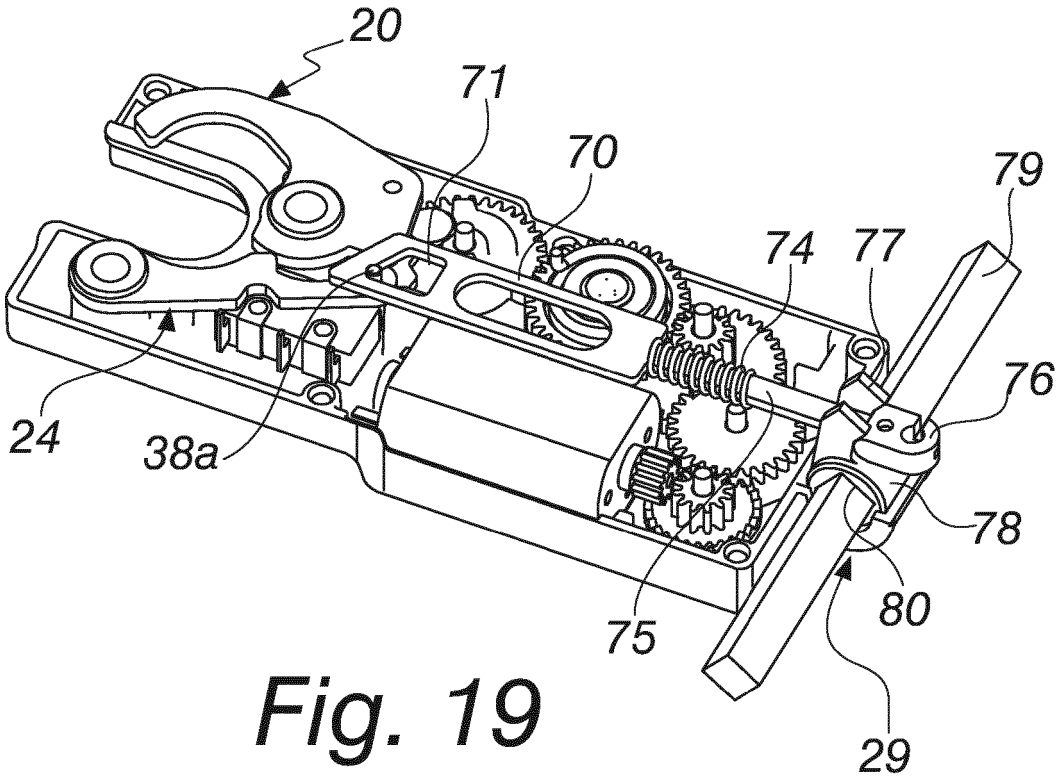

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Fig. 19

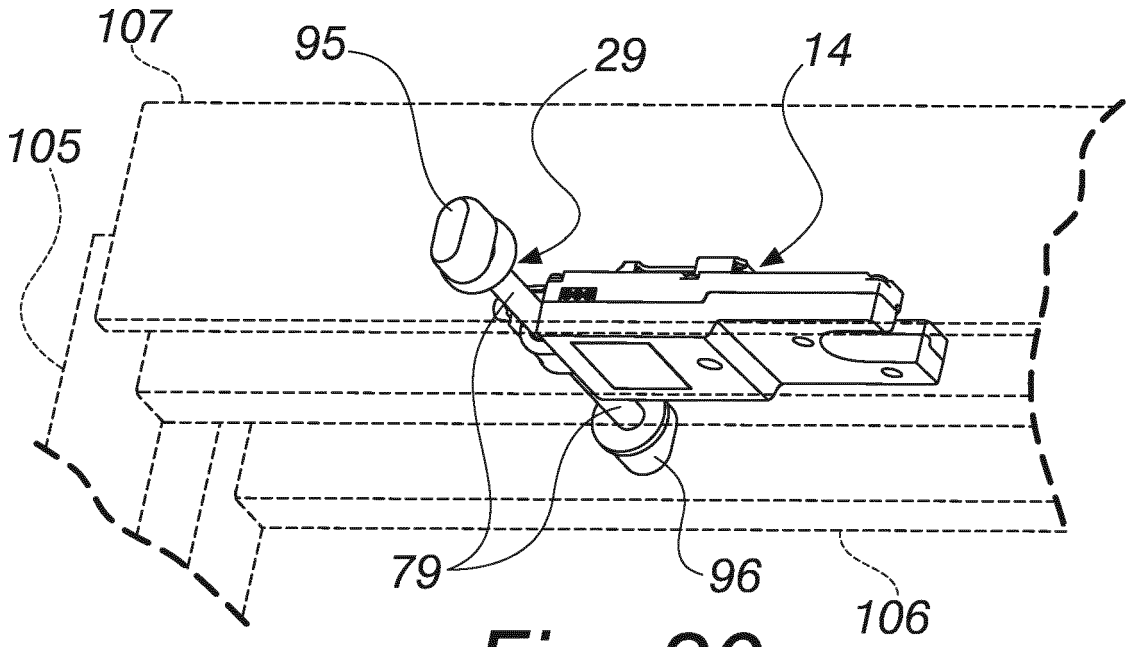


Fig. 20

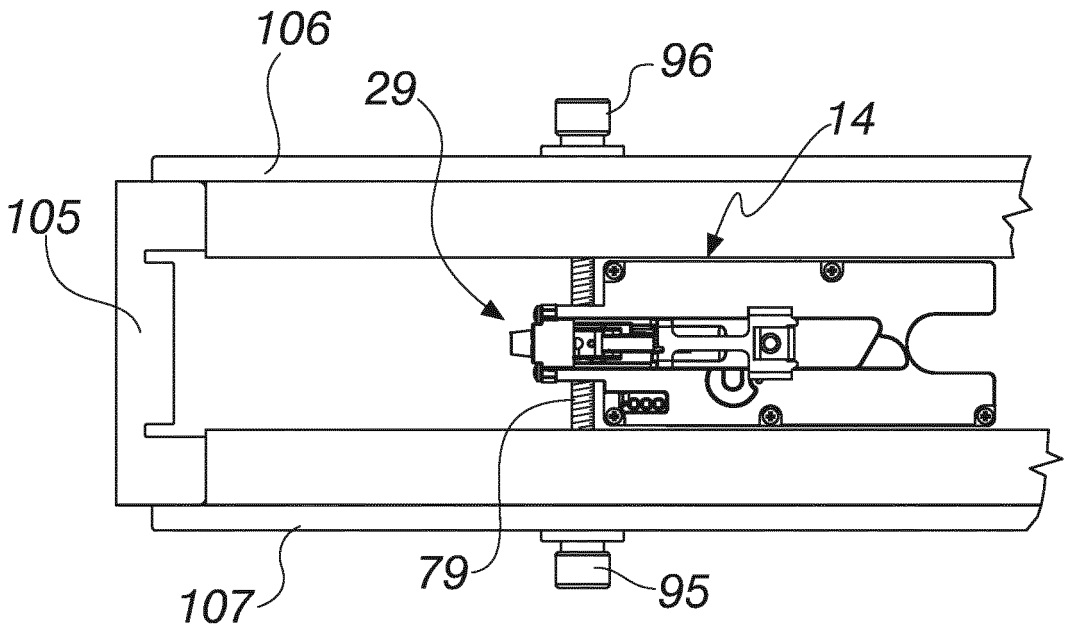


Fig. 21

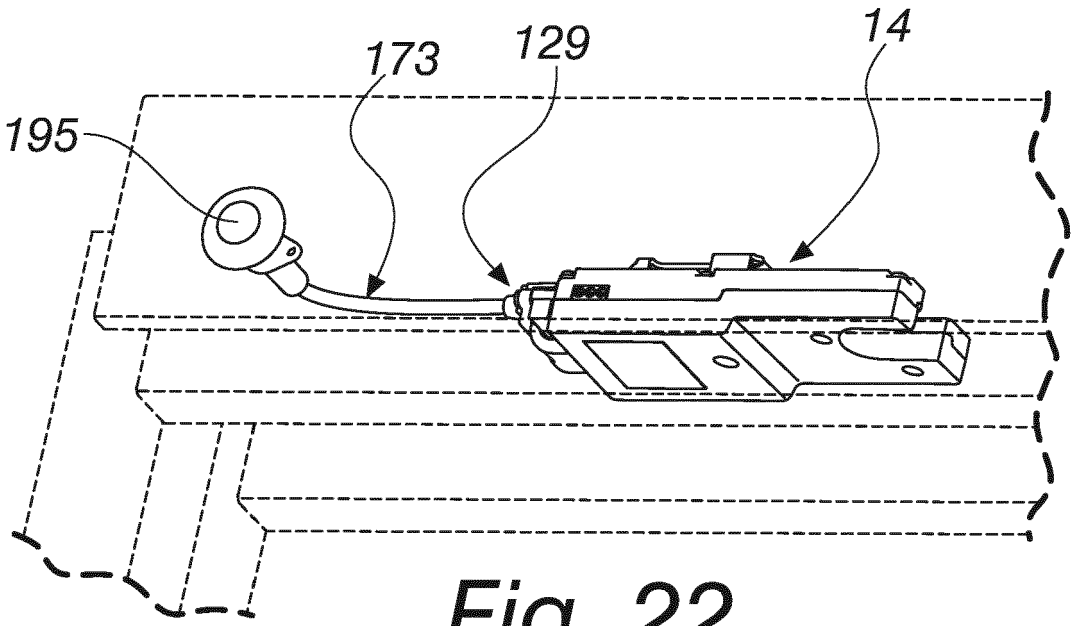


Fig. 22

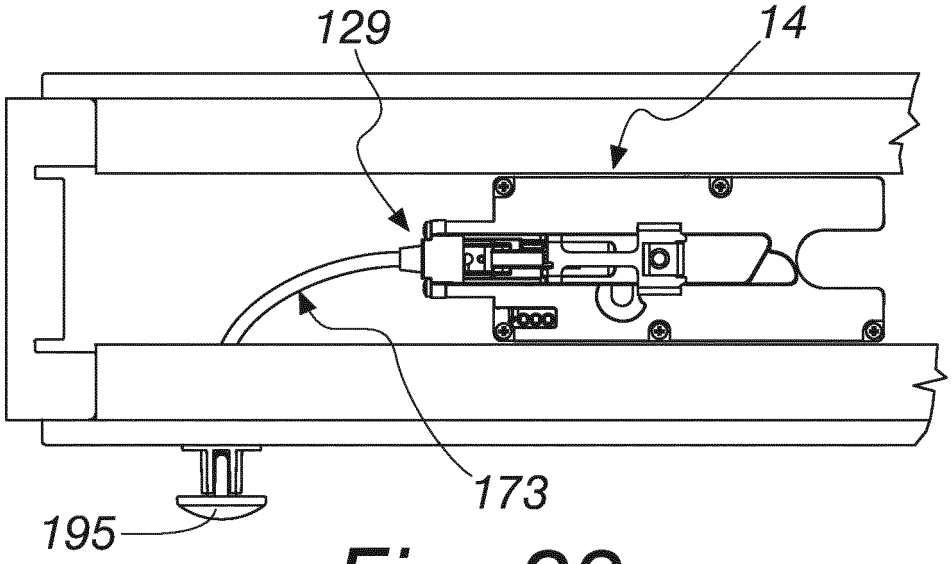


Fig. 23

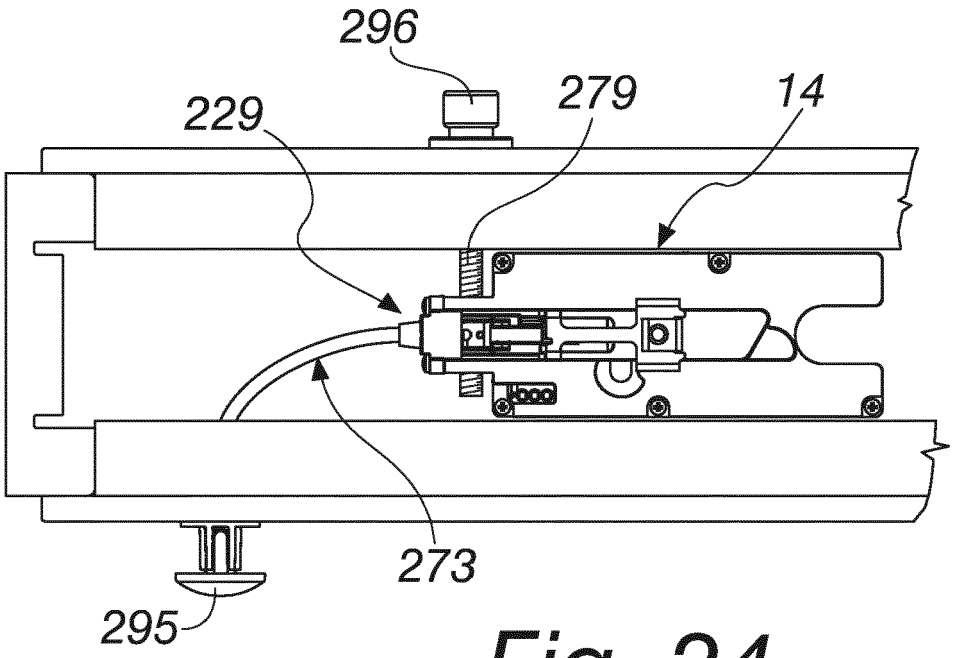


Fig. 24

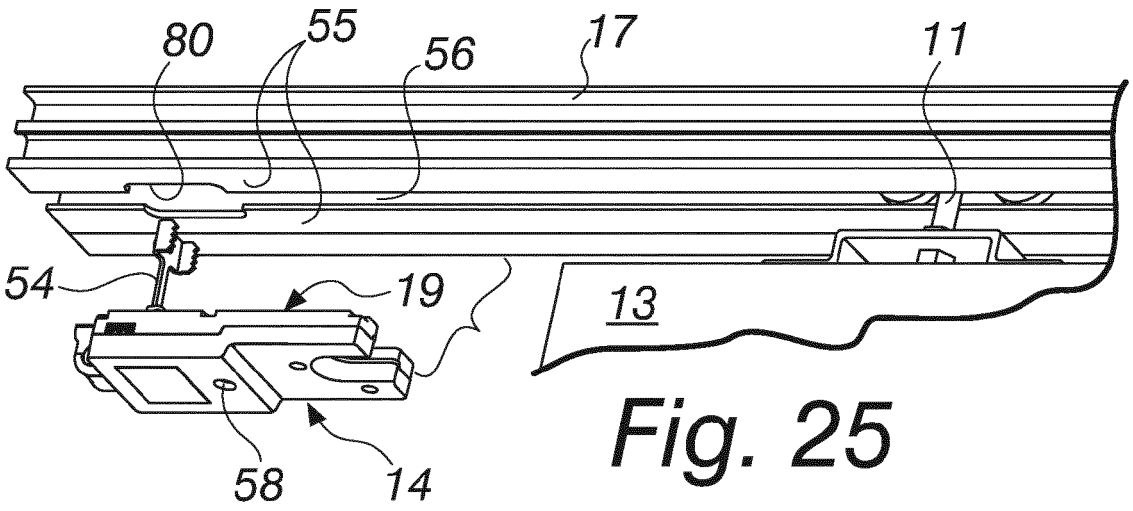


Fig. 25

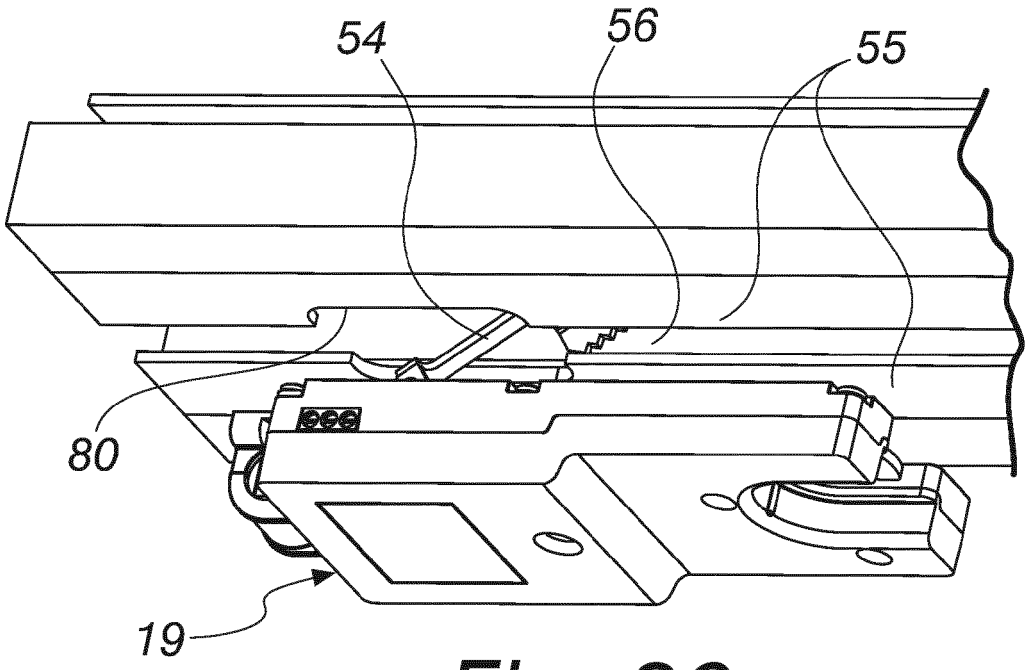


Fig. 26

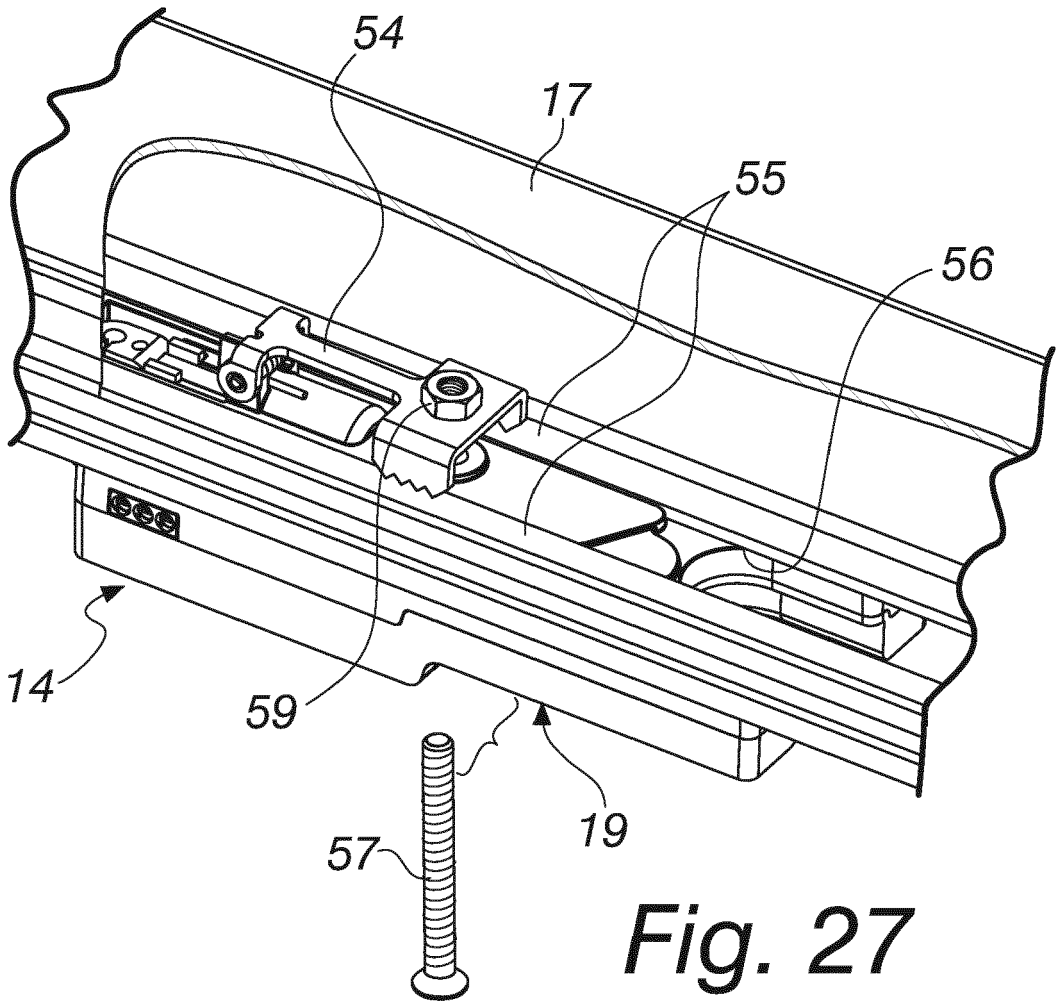


Fig. 27

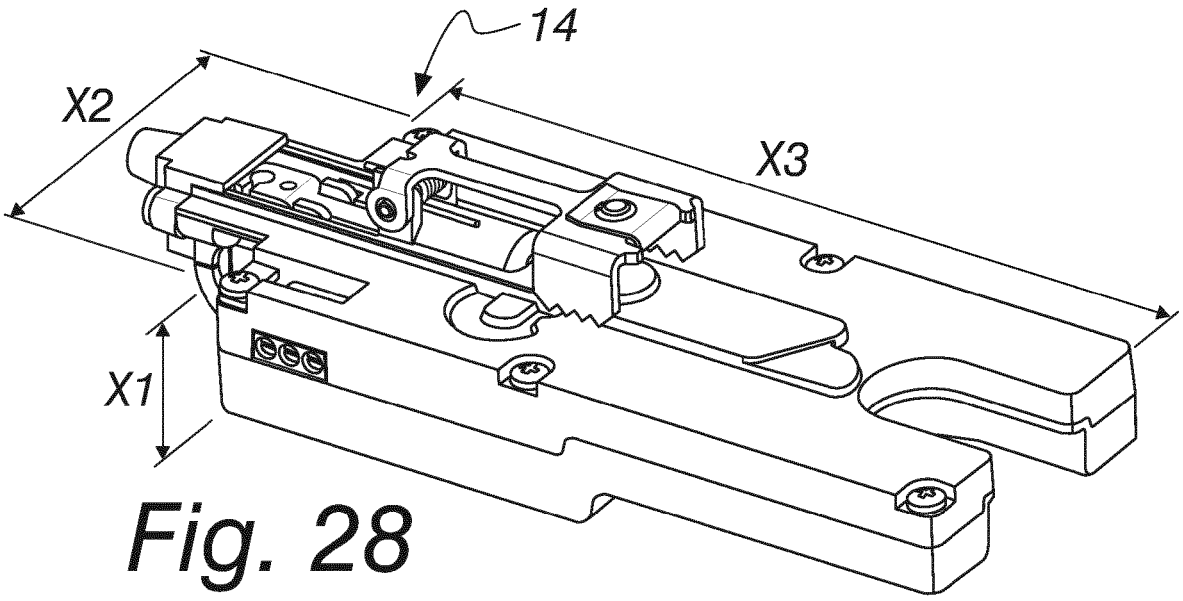


Fig. 28

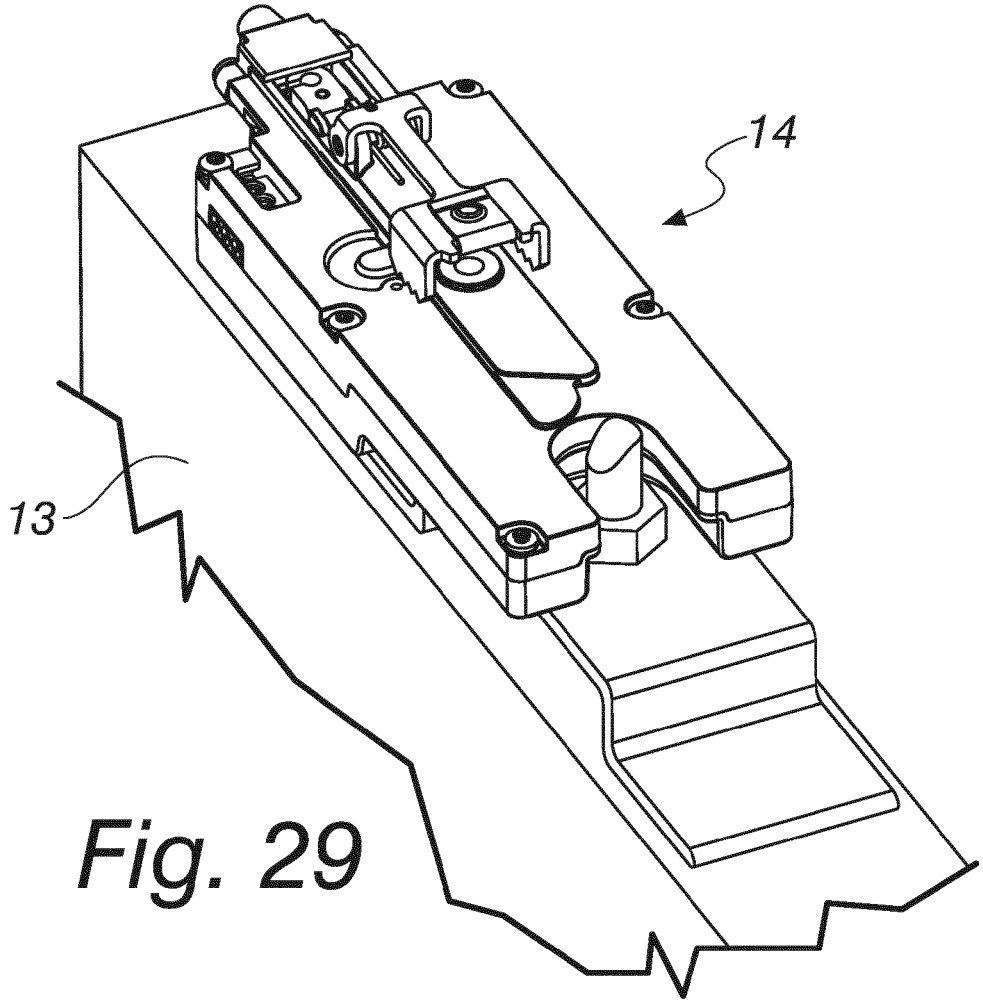


Fig. 29

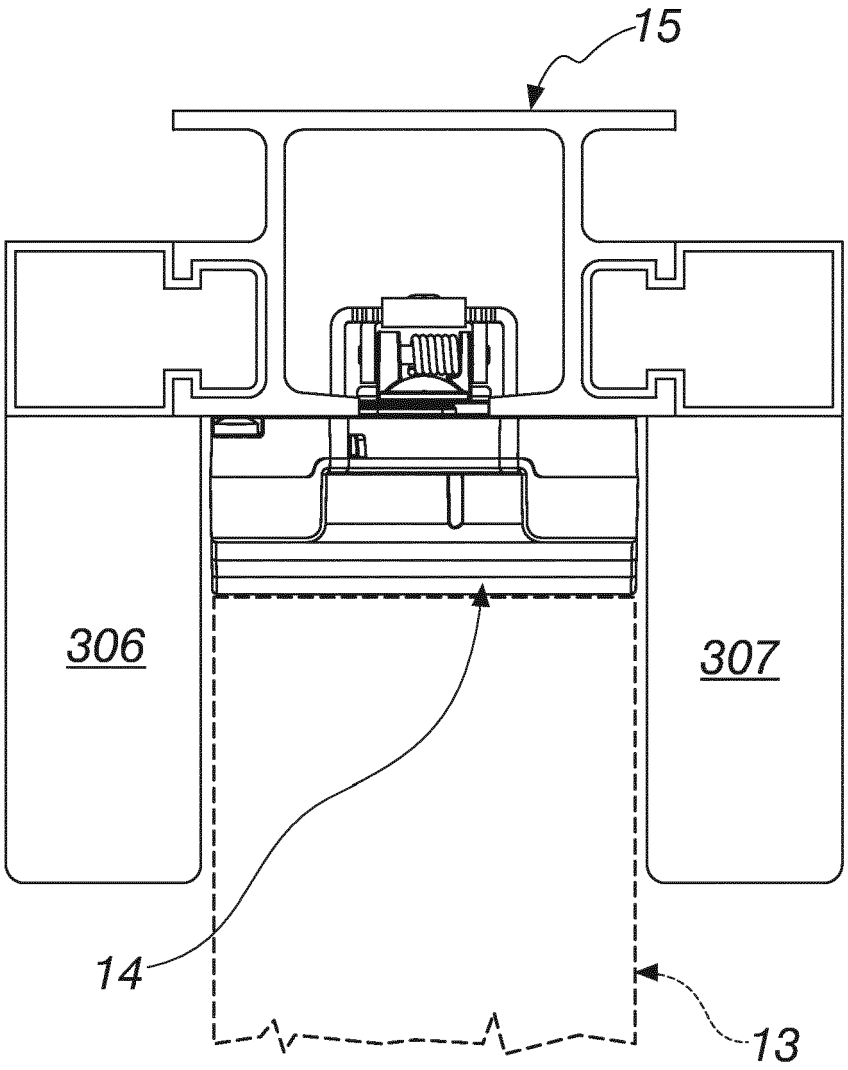


Fig. 30

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EUROPEAN SEARCH REPORT

Application Number
EP 14 15 6493

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2009/284024 A1 (DELEONARDIS PETER [US] ET AL) 19 November 2009 (2009-11-19)	1-5	INV. E05B65/08 E05B47/02 E05B47/06 E05D15/06
A	* paragraph [0022] - paragraph [0047]; figures 1-11 *	11-15	
X	EP 2 079 894 B1 (NABTESCO CORP [JP]) 15 August 2012 (2012-08-15)	1,2	
A	* paragraph [0042] - paragraph [0112]; figures 1-11 *	3,13	
X	DE 10 2011 089121 B3 (GEZE GMBH [DE]) 31 January 2013 (2013-01-31)	1	
A	* paragraph [0027] - paragraph [0040]; figures 1-8 *	2,3,13	
X	US 5 755 060 A (ZWEILI MARC [CA]) 26 May 1998 (1998-05-26)	1	
A	* column 2, line 44 - column 5, line 42; figures 1-7 *	2-4,13, 14	
X	EP 0 531 179 A1 (PEUGEOT [FR]; CITROEN SA [FR]) 10 March 1993 (1993-03-10)	1,2	TECHNICAL FIELDS SEARCHED (IPC)
	* column 2, line 16 - line 28; figure 3 *		E05B E05C
X	EP 1 433 893 A2 (BITRON SPA [IT]) 30 June 2004 (2004-06-30)	1,13-15	
A	* paragraph [0005] - paragraph [0108]; figures 1-41 *	3-5,10, 11	
X	US 4 703 960 A (LENSE ROBERT F [US]) 3 November 1987 (1987-11-03)	1,13-15	
A	* column 4, line 31 - column 7, line 44; figures 1-14 *	3-12	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 June 2014	Pérez Méndez, José F

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12-06-2014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009284024 A1	19-11-2009	NONE	
EP 2079894 B1	15-08-2012	CN 102864990 A	09-01-2013
		DK 2079894 T3	03-12-2012
		EP 2079894 A1	22-07-2009
		ES 2393008 T3	17-12-2012
		KR 20090069190 A	29-06-2009
		TW 200833931 A	16-08-2008
		WO 2008056620 A1	15-05-2008
DE 102011089121 B3	31-01-2013	DE 102011089121 B3	31-01-2013
		EP 2607580 A2	26-06-2013
US 5755060 A	26-05-1998	NONE	
EP 0531179 A1	10-03-1993	DE 69201615 D1	13-04-1995
		DE 69201615 T2	10-08-1995
		EP 0531179 A1	10-03-1993
		FR 2681013 A1	12-03-1993
EP 1433893 A2	30-06-2004	NONE	
US 4703960 A	03-11-1987	NONE	

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Patent documents cited in the description

- IT PD20130043 A **[0105]**