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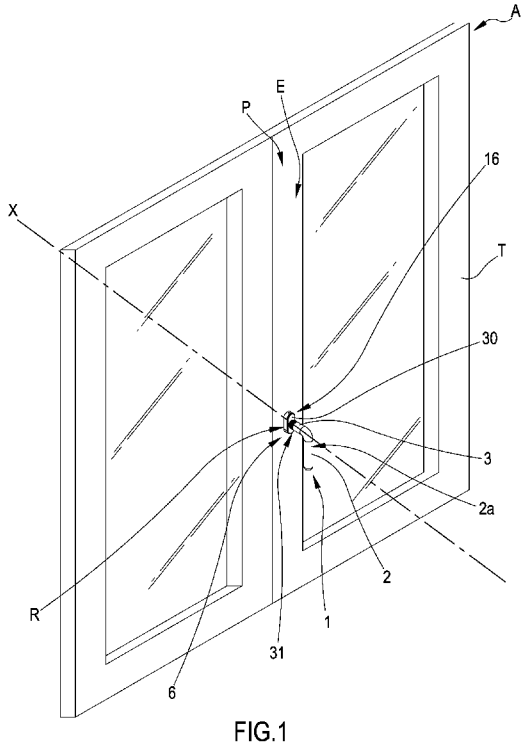

FIG.1

(57) Abstract: An anti-burglary handle (1; 350) comprising a front grip (2; 351) which can be handled by the user from the inside of a room of a building, provided with a neck (3; 352) axially and revolvingly coupled with a linear portion (P) of a perimetrical frame (T) of a panel (A) belonging to a window or to a door, a polygonal bar (4) defining a linear axis (X), revolvingly coupled with the front grip (2; 351) and partly and inserted into the linear portion (P) of the perimetrical frame (T) from which it projects towards the inside of the room by a predefined initial stretch (5; 354), and a locking mechanism (6; 355) operatively connecting the polygonal bar (4; 353) with the front grip (2; 351) so that the locking mechanism (6; 355) on one side, as a result of the handling of the front grip (2) performed by the user from the inside of the room, allows to transmit a torque to the polygonal bar (4; 353) and, on the other side, prevents to transmit a torque from the polygonal bar (4; 353) to the front grip (2; 351), the locking mechanism (6; 105; 305) taking a work position, in which rotation of the polygonal bar (4; 353) and of the front grip (2; 351) around the linear axis (X) is forbidden, and a release position, in which rotation of the polygonal bar (4; 353) around the linear axis (X) is allowed, caused by the user by rotating the front grip (2; 351) from the inside of the room. In particular, locking mechanism (6; 355) includes graft means (7) operable by actuation means in axial sliding along the linear axis (X) by means of a pressure or traction exerted by the actuation means on the outer surface (2a; 351a) of the front grip (2; 351) which places the locking mechanism (6; 355) temporarily in the release position, disengaging the graft means (7; 356) and allowing the rotation of the polygonal bar (4; 353), and a counterthrust, contrary to the aforesaid

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pressure or traction, exerted automatically, as soon as the actuation means release the front grip (2; 351), by repulsion means (8; 357) cooperating with the graft means (7; 356), which places the locking mechanism (6) in the work position, engaging the graft means (7) and preventing the rotation of the polygonal bar (4; 353).

IMPROVED ANTI-BURGLARY HANDLE

DESCRIPTION

The present invention concerns an improved anti-burglary or anti-intrusion handle, adapted to be applied in particular to the inner face of a perimetrical frame of a window or of a door mounted in a room of a building and having safety functions against forced and destructive openings le aperture possibly done from the outside by malicious people who want to sneak into the room.

By way of completeness and technical information, it is immediately stated precisely that the improved anti-burglary or anti-intrusion handle of the present invention is commonly defined or referred to in the relevant sector with the wording "DK handle " (where "DK" is the acronym of the English wording "dry-keep") or even with the word "martellina".

As known, particular handles, often defined, even inappropriately, as "DK" or martelline, are currently available in the sector related to windows or doors, applied to the revolving shutter or plate used for the closing or the traditional at least partial opening of the room of the building which the window, the balcony or the door, to be understood as a whole, is coupled with.

Normally, a handle of the type considered herein, defined as "DK", is provided with an always operative anti-intrusion or anti-burglary system performing its function when the shutter, the plate or in general a generic panel to which it is applied closes the room.

Unlike other traditional handles available on the market, even if some malicious person attempted to destructively force a window, a balcony or a door from the outside – by drilling a hole in the fixture and introducing any shaped tool – to sneak in the room, he would fail, indeed, because the rotation of the handle equipped with the so-called "DK" system is inhibited.

Typically, an anti-burglary "DK" handle, belonging to the known art, comprises a front grip at user's availability who accesses it from the inside of a room of a building and is provided with a neck suitable to be axially stably and revolvingly coupled with a linear portion of a perimetrical frame belonging to a panel of a window, a door or a balcony.

An anti-burglary handle of known type also includes a polygonal bar which defines a linear axis, is revolvingly coupled with the front grip and is suitable to be partly and

frontally inserted into the linear portion of the perimetrical frame from which it protrudes towards the inside of the room by a predefined initial stretch.

Finally, another essential element of an anti-intrusion handle of the prior art is constituted by the locking mechanism which operatively connects the polygonal bar with the front grip in such a way that the locking mechanism on one side, as a result of the handling of the front grip carried out by the user from the inside of the room, allows to transmit a torque to the polygonal bar and, on the other side, prevents any person to transmit a torque from the polygonal bar to the front grip: specifically, the locking mechanism takes a work position, in which the rotation of the polygonal bar and of the front grip integral with it around the linear axis is inhibited, and at least a release position, in which the rotation of the polygonal bar around the linear axis is allowed, caused by the user by rotating the front grip from the inside of the room.

Most of the "DK" anti-burglary handles currently available on the market is specifically constructed for this purpose, in the sense that the front grip of these known handles, which can be handled by the user to move the revolving panel in closing and/or partly opening the room, is of specific and dedicated construction, so that the "DK" handles are constructively different, as well as from manufacturer to manufacturer, also from all the others in relation to the front grip, to all disadvantage of the production efficiency due to lack of optimization of the scale economies right at the production stage.

In particular, some "DK" handles of known type provide a special button available to the user and arranged on the outer surface of the front grip: when necessary, the user presses such a button to position the locking mechanism introduced above in the release position starting from the work position and releases it in order that the locking mechanism resumes the work position.

Moreover, such a button inevitably impacts negatively on the aesthetic effect of the handle as a whole, contrasting with the needs for linearity, continuity and structural homogeneity of the (preferably minimum) components in view increasingly requested by the market also in this sector.

Another, most probably more significant, embodiment of such "DK" handles of known type is shown in the European Patent EP1121501 B1, in which, in any case, the handle

presents a rather complex and articulated locking mechanism under a constructive point of view, which complicates its production and in particular and also in this case installation, increasing in relevant and unwanted way the relative costs (the other factors involved in the calculation of production costs or installation costs, such as manpower and materials used being equal).

Therefore, from what has just been said, it appears evident that the handles of the prior art herein considered have some recognized drawbacks.

Starting therefore from the knowledge of the aforementioned main drawbacks of the prior art, the present invention proposes to overcome them in a complete and effective way.

In particular, main purpose of the present invention is to provide an improved anti-burglary (or anti-intrusion) handle which allows to keep substantially unchanged, with respect to the traditional handles, the constructive design, the external shape and the aesthetic appearance of the front grip which can be operated by the user to open even only partly and close the room through the generic panel to which the handle is applied.

In other words, main purpose of the invention is to provide an improved anti-burglary handle in which, contrary to the prevailing prior art, the front grip available to the user presents a global standard and traditional construction concept, substantially equivalent to that one of other not necessarily anti-burglary handles, and does not require a specific and specifically designed production in order to be equipped with an anti-burglary function.

Within this scope, it is consequent task of the invention to devise an improved anti-burglary handle which allows the manufacturer to achieve scale economies in the production of handles greater than the prior art.

It is another task of the invention to provide an improved anti-burglary handle which can be manufactured and installed and, above all, assembled in a way simpler and quicker than the equivalent known handles similar and comparable to it.

It is a further task of the present invention to indicate an improved anti-burglary handle which has a particularly competitive production cost and broadly comparable if not lower than that one of the anti-burglary handles of the prior art, the cost of the general factors involved in the calculation of the overall cost of the finished product such as the

manpower employed and the cost for the raw materials used being equal.

In the cognitive sphere of the main purpose, it is also task of the invention to provide an improved anti-burglary handle which has a more homogeneous, uniform and continuous aesthetic impact than the to most of the equivalent handles of known type.

A second purpose of the present invention is to provide an improved anti-burglary handle particularly reliable both in the common use of moving the panel which it is associated with and in the anti-burglary function to which it is intended.

Said purposes are achieved by means of an improved anti-burglary handle according to the claim 1 attached herein, as hereinafter referred for the sake of brevity of exposition.

Further technical features of detail of the improved anti-burglary handle of the invention are included in the related dependent claims.

The aforementioned claims, hereinafter specifically and concretely defined, are integral part of the present description.

Advantageously, the improved anti-burglary handle of the invention presents a construction concept simpler than the equivalent handles of the current state of the art with respect to which it is also more reliable in exerting the anti-burglary function and in the transition from the conditions of absolute locking to the conditions of free rotation of the front grip which can be operated by the user and vice versa.

This is due to the fact that, in the handle of the invention, the locking mechanism includes graft means which can be operated by actuation means in axial sliding along the linear axis by means of a pressure or traction exerted by the actuation means on the outer surface of the front grip which places the locking mechanism temporarily in the release position, disengaging the graft means and thus allowing rotation of the polygonal bar, and by means of a counterthrust, contrary to the aforesaid pressure or traction, exerted spontaneously, as soon as the actuation means release the front grip, by repulsion or contrast means, cooperating with the graft means, which places the locking mechanism steadily in the work position, engaging the graft means and preventing rotation of the polygonal bar.

Still advantageously, the improved anti-burglary (or anti-intrusion) handle of the invention can be assembled more quickly and easily than the equivalent handles of the

prior art with respect to which it is constructively less complex and articulated, to the full advantage of its production cost.

Equally advantageously, the improved anti-burglary handle of the invention has a more uniform and homogeneous aesthetic impact, without visible points of discontinuity (especially at the front grip), and therefore more pleasant and appreciated by the market than similar known anti-burglary handles, while providing a number of constructive components, also not in sight, lower than these ones.

Equally advantageously, the improved anti-burglary handle of the present invention comprises a front grip of standard type, used also for handles of traditional type and depict of the anti-burglary function, with the consequence of generating advantageous scale economies at the production stage.

Said purposes and advantages, as well as other ones that will emerge later in the course of the exposure, will appear to a greater extent from the following description, concerning some preferred embodiments of the improved anti-burglary handle of the invention given by indicative and illustrative, but not limitative, way with reference to the attached tables of drawings in which:

- figure 1 is an assonometric view and in applicative conditions of a first embodiment of the improved anti-burglary handle of the invention;
- figures 2 and 3 are two distinct assonometric views of the handle of figure 1 with the locking mechanism in the work (or operating) position;
- figure 4 is a front view of the handle of figures 2 and 3;
- figure 5 is a top plan view of the handle of figures 2 and 3;
- figure 6 is a view of figure 5 according to the cutting plane VI-VI;
- figure 7 is a partly cutaway assonometric view of a first constructive detail of the handle of figures 2 and 3;
- figure 8 is a simplified and partly cutaway assonometric view of a second constructive detail of the handle of figures 2 and 3;
- figures 9 and 10 are two separate assonometric, partly broken, views of a third constructive detail of the handle of figures 2 and 3 which show in sequence the operation of the auxiliary locking and safety means of the handle of figures 2 and 3;

- figure 11 is an assonometric view of the handle of figure 1, with the locking mechanism still in the work (or operating) position but with the auxiliary locking and safety means in the operative position (or active position);
- Figure 12 is a top plan view of the handle of figure 11;
- figure 13 is a view of figure 12 according to the cutting plane XIII-XIII;
- figure 14 is an assonometric truncated and partly broken view of the handle of figure 11;
- figures 15 and 16 are two distinct assonometric views of the handle of figure 11, with the locking mechanism in the release (or non-operating) position;
- figure 17 is the top plan view of the handle of figures 15 and 16;
- figure 18 is a view of figure 17 according to the cutting plane XVIII-XVIII;
- figures 19 and 20 are two distinct assonometric views of the handle of figures 15 and 16, with the locking mechanism still in the work (or operating) position;
- figure 21 is the side view of the handle of figures 19 and 20;
- figures 22 and 23 are two distinct assonometric exploded views of the handle of figures 1-20;
- figures 24 and 25 are two distinct enlarged assonometric views of a first constructive detail of figures 22 and 23;
- figure 26 is an enlarged assonometric view of a second construction detail of figures 22 and 23;
- figures 27 and 28 are two distinct enlarged assonometric views of a third construction detail of figures 22 and 23;
- figure 29 is the front view of the detail of figures 27 and 28;
- figure 30 is an enlarged assonometric view of a fourth construction detail of figures 22 and 23;
- figures 31-38 are different assonometric views of the handle of figures 1 and 2 in as many different and sequential positions of the front grip available to the user;
- figure 39 is a sectional view of a second embodiment of the improved anti-burglary handle of the invention, with the locking mechanism always in work (or operating) position;

- figure 39A is an enlargement of a detail of figure 39;
- figure 40 is the view of figure 39 but with the locking mechanism in the release (or non-operating) position;
- Figure 40A is an enlargement of a detail of figure 40;
- figure 41 is a front view of a third embodiment of the improved anti-burglary handle of the invention with the locking mechanism in the work position;
- figure 42 is the top plan view of the handle of figure 41;
- figure 42A is an enlargement of a detail of figure 42;
- figure 43 is a view of figure 39 but with the locking mechanism in the operating position;
- figure 44 is a top plan view of the handle of figure 43;
- figure 44A is an enlargement of a detail of figure 44;
- figure 45 is an assonometric view of a fourth embodiment of the improved anti-burglary handle of the invention, with the locking mechanism in the release (or non-operating) position;
- figure 45A is an enlargement of a detail of figure 45;
- figure 46 is the side view of the handle of figure 45;
- figure 46A is an enlargement of a detail of figure 46;
- figure 47 is the view of figure 45 but with the locking mechanism in the work (or operative) position;
- figure 47A is an enlargement of a detail of figure 47;
- figure 48 is the side view of the handle of figure 47;
- figure 48A is an enlargement of a detail of figure 48;
- figure 49 is a simplified and partial assonometric view of a fifth embodiment of the improved anti-burglary handle of the invention with the locking mechanism in work (or operating) position;
- figures 51 and 52 are two distinct assonometric views of a sixth embodiment of the improved anti-burglary handle of the invention, the second of which is purely indicative and not associated with any specific position of the locking mechanism;
- figures 53 and 54 are two distinct assonometric views of a seventh embodiment of the

improved anti-burglary handle of the invention, with the locking mechanism in the work (or operating) position;

- figure 55 is the side view of the handle of figures 53 and 54;
- figure 56 is the front view of the handle of figures 53 and 54;
- figure 57 is the view of figure 56 according to the cutting plane LVII-LVII;
- figure 57A is an enlargement of a detail of figure 57;
- figures 58 and 59 are two distinct assonometric views of the handle of figures 53 and 54, with the locking mechanism in the release (or non-operating) position;
- figure 60 is the side view of the handle of figures 58 and 59;
- figure 61 is the cross-sectional view of the handle of figures 58 and 59;
- figure 61A is an enlargement of a detail of figure 61;
- figure 62 is an assonometric view of the handle of figures 58 and 59, with the locking mechanism still in work (or operating) position;
- figure 63 is a side view of figure 62;
- figures 64 and 65 are two distinct assonometric exploded views of the handle of figures 53-63;
- figures 66-73 are different assonometric views of the handle of figures 53 and 54 in different and sequential positions of the front grip available to the user.

The improved anti-burglary handle of the invention is shown in figure 1, where it is globally indicated with 1, under applicative conditions, i.e. installed to a linear portion P (generally vertical) of a perimetrical frame T of a panel A belonging to a window or to a door of a building, such as an office or a house.

As it can be seen, the improved anti-burglary handle 1 comprises:

- a front grip 2 at user's availability who accesses it from the inside of a room of a building, provided with a terminal neck 3 suitable to be be axially, stably and revolvingly coupled with the linear portion P of the perimetrical frame T of the panel A belonging to a window or a door;
- a polygonal bar 4, visible starting from figure 2, defining a linear axis X, revolvingly coupled with the front grip 2 and suitable to be partly and frontally inserted into the linear portion P of the perimetrical frame T, from which it projects by a predefined

initial stretch 5 towards the inside of said room of the building;

– a locking mechanism, in the assembly indicated with 6 and operatively connecting the polygonal bar 4 with the front grip 2 in such a way that the locking mechanism 6 on one side, as a result of the handling of the front grip 2 itself carried out by the user from the inside of the room, allows to transmit a torque to the polygonal bar 4 and, on the other side, prevents to transmit a torque from the polygonal bar 4 to the front grip 2, the locking mechanism 6 taking a work position (see figures 3 and 4), in which the rotation of the polygonal bar 4 and of the front grip 2 around the linear axis X is inhibited, and at least a release position (see figures 15 and 16), in which the rotation of the polygonal bar 4 around the linear axis X is allowed, caused by the user by rotating the front grip 2 from the inside of the room.

According to the invention, the locking mechanism 6 comprises graft means, generally numbered with 7, operable by actuation means in axial sliding along the linear axis X by:

- a pressure or traction exerted by the actuation means on the outer surface 2a of the front grip 2 which places the locking mechanism 6 temporarily in the release position, disengaging the graft means 7 and thus allowing rotation of the polygonal bar 4;
- a counterthrust, contrary to the action of pressure or traction defined above, exerted spontaneously, as soon as the actuation means release the front grip 2, by repulsion or contrast means, overall numbered with 8, cooperating with the grasp means 7, and which places the locking mechanism 6 firmly in the work position, engaging the graft means 7 and preventing rotation of the polygonal bar 4.

In particular, the predefined initial stretch 5 of the polygonal bar 4 is inserted into an axial slot with a polygonal profile 9 made along the terminal neck 3 of the front grip 2 in such a way as to define an axial inner gap 10 useful for constructive purposes.

Figures 4 and 6 show that the polygonal bar 4 is made integral with the locking mechanism 6 and the terminal neck 3 of the front handle 2 through coupling means, as a whole numbered with 11 and comprising, for instance, squared surfaces which delimit an axial (or central) through hole made in at least one of the components of the locking mechanism 6 which are conjugated with the squared surfaces of the polygonal bar 4: this is therefore a coupling comparable, in an extensive sense, to that one which in technical

industrial drawing is known as "key coupling".

In addition, as it can be seen again in the first figure 1 attached, the linear axis X defined by the polygonal bar 4 is substantially orthogonal to the plane defined by the linear portion P, facing the room of the building, of the perimetrical frame T of the panel A.

Preferably, but not necessarily, the actuation means comprise in this case the terminal neck 3 of the front grip 2, operated in axial sliding by the user's hand by means of a thrust action exerted on the outer surface 2a of the front grip 2 in such a manner as to cause the axial sliding of the graft means 7 and the passage of the locking mechanism 6 from the work position to the release position.

For their part, the repulsion means 8 previously introduced include any of the mechanical systems able to cause a spontaneous movement of the element which they cooperate with by contact, selected from the group consisting of elastic recovery means, magnetic means having the same polarity which generate a spontaneous bumper or repulsive action and/or the like: in this case, figures 6 and 8-10 show that the repulsion means 8 comprise in this case, on a purely preferred but not binding basis, elastic recovery means 12, such as a helical spring.

More in detail, the repulsion means 8 are hidden from view and, as it can be seen in figures 5 and 6, are arranged near the free end 3b of the terminal neck 3 of the front grip 2, internally or externally to the terminal neck 3 itself.

In general, the graft means 7 which, in the invention, determine the locking mechanism 6, comprise a gear, generally indicated with 13 and belonging to:

- partly to a main movable body 19 axially sliding along a first direction F (shown in figure 17), under the impulse transmitted by the actuation means to the front grip 2, and along a second direction G (shown in figure 21 and oriented towards the room), opposite to the first direction F, as a result of the action of reaction, return and recovery transmitted by the repulsion means 8;
- partly to a fixed auxiliary body 16 suitable to be fixed to the linear portion P of the perimetrical frame T of the panel A.

Even more specifically, the graft means 7 at least partly belong to a fixed base block 16 – which, in the specific case, therefore constitutes the aforesaid fixed auxiliary body –

suitable to be applied through fastening means, as a whole indicated with 14 and only partly visible in the attached figures being of the type per se known to the man skilled in the art, to the linear portion P of the perimetrical frame T at a structural through opening R made in the linear portion P itself and shaped in such a way as to define an inner central room 28 and a first axial through opening 29 coaxial to the terminal neck 3: the polygonal bar 4 orthogonally crosses the fixed base block 16 in such a way that a predetermined final stretch (for simplicity, not identified with a numerical reference in the accompanying figures and opposite to the predetermined initial stretch 5) of the second end 4b of the polygonal bar 4 soaks in the perimetrical frame T up to interfere with movement mechanisms of the panel A which notoriously cause opening/closing of the window, balcony or door.

In a preferred but not essential manner, the graft means 7 are arranged at least partly inside a central portion 17 of the fixed base block 16 and are therefore hidden from view, protected from always harmful and contraindicated accidental bumps by external stranger bodies who could even irreparably compromise their structural integrity or from unseemly and unwanted external agents that could cause their slow but inexorable wear, with the obvious disadvantages that would result for their function.

According to the preferred embodiment described herein of the invention, the graft means 7 comprise, according to what is visible in the sections of the figures 6, 13 and 18 and with greater precision in the exploded views of figures 22 and 23:

- a plurality of shaped teeth 18 protruding from the outer side surface 19a of a movable operating peg 19 – which, in the specific case, therefore constitutes the movable main body – having an axial through hole 20 into which the polygonal bar 4 is inserted, according to linear axis X, and which always protrudes from the operating peg 19 for a prefixed portion 15 comprising a second end 4b opposite to a first end 4a contained into the terminal neck 3 of the front grip 2;
- a plurality of counter-shaped seats 21, made in the inner wall 16a of the base block 16 and present in a number equal to the shaped teeth 18.

The shaped teeth 18, in this case preferably present in a number of eight, are in particular:

- in a number equal to the operating positions (of complete closing and partial opening,

for example at tilt-and-turn shutter, and again of complete opening of the through room made in the wall of the building and which receives the panel A) allowed for the front grip 2 as a result of the rotation of the latter and of the polygonal bar 4 around the linear axis X impressed by the actuation means;

- conjugated and inserted into the counter-shaped seats 21 of the base block 16 when the locking mechanism 6 takes the work position (see figure 3 and figure 20);

decoupled and spaced apart from the counter-shaped seats 21 when the locking mechanism 6 takes the release position in order to allow rotation of the polygonal bar 4 and, with it, of the front grip 2 around the linear axis X (see in this regard figure 16).

It is understood that in other embodiments of the improved anti-burglary handle of the invention, not shown, the graft means could include a number of shaped teeth – associated with the movable operating peg – and of corresponding counter-shaped seats associated with the fixed base block – different from that one already indicated, visible in the attached figures, this number being able to vary depending on the construction choices or customer needs, starting from one.

Figures 22 and 23 show that, preferably, the shaped teeth 18 are arranged at a first end 19b of the movable operating peg 19 and, when they are present in at least two elements, are uniformly distributed on the outer side surface 19a of the operating peg 19 itself.

Moreover, as better illustrated in figure 26, the axial through hole 20 presents a squared or polygonal profile (in the specific case, square), equivalent to that one of the polygonal bar 4 which is therefore inserted or conjugated in the movable operating peg 19.

Particularly, the movable operating peg 19 includes between each pair of shaped teeth 18 an abutment septum 22 provided with an inner strike wall 23 which acts as end-of-stroke of the axial movement of the graft means 7 – notably of the movable operating peg 19 and in the direction given by the arrow G of figure 21 – as against it a counter-shaped dent 24 contrasts, better visible in figure 25, arranged between each pair of counter-shaped seats 21 of the fixed base block 16 when the locking mechanism 6 takes the work position.

Each of the shaped teeth 18 and the abutment septum 22 have substantially the same profile in cross section, as well as each of the counter-shaped seats 21 and the counter-shaped dent 24 have substantially the same profile in cross section.

In a more detailed manner, each of the shaped teeth 18, the abutment plate 22, each of the counter-shaped seats 21 and the counter-shaped dent 24 have in cross section a tapered, frusto-conical or in the shape of an isosceles trapezium provided with an arched-profile larger base and smaller base, in which the arched smaller base of each of the shaped teeth 18 and of the abutment plate 22 is arranged against the outer side surface 19a of the movable operating peg 19, and in which the arched smaller base of each of the counter-shaped seats 21 and of the counter-shaped dent 24 is located close to the inner wall 16a of the base block 16.

At preferred and advantageous but not binding title, the upper outer surface 22a of the abutment septum 22 is concave, in order to ease rotation of the movable operating peg 19 (whose main body 48 preferably has a cylindrical shape, as it can be clearly seen in figure 26) integral with the polygonal bar 4.

Moreover, the aforesaid upper outer surface 22a is separated from the upper convex outer wall 18a of the shaped teeth 18 adjacent thereto through a sharp edge 25 which ensures, by interfering with a pair of opposite convex ribs 26, 27 projecting from the inner wall 16a of the fixed base block 16, the emission of a slight snap noise, but clearly perceptible by the user when the front grip 2 is rotated around the linear axis X to take one of its possible operative positions.

In particular, the opposite convex ribs 26, 27 are axially adjacent to the counter-shaped dent 24 in between each pair of counter-shaped seats 21, in an inner central room 28 defined in the fixed base block 16.

Preferably, the improved anti-burglary handle 1 of the invention also comprises a laminar finishing plate 30, visible in figures 22-25 and on its own in figure 30, coupled externally with the fixed base block 16 in such a manner that, when the handle grip 2 is in applicative conditions (that is coupled with the perimetrical frame T of the panel A), it is placed near the outer surface E belonging to the linear portion P of such a perimetrical frame T and surrounds the previously introduced structural through opening R, housing at least part of the fixed base block 16.

Preferably not necessarily, many of the figures cited above but with greater detail figures 7-10 and 14 show that the improved anti-burglary handle 1 of the present invention

comprises, in this specific case, auxiliary locking and safety means, as a whole numbered with 31, operable by the user only from the inside of the room and normally at least partly in view, coupled with the locking mechanism 6 and with the terminal neck 3 of the front grip 2 between which they are interposed, in such a way as to alternately define:

- an operative position, in which the auxiliary locking and safety means 31 prevent the actuation means to make the graft means 7 sliding axially and move the front grip 2, and with it the polygonal bar 4, in sliding and rotation;
- a non-operative position, in which the auxiliary locking and safety means 31 allow the actuation means to make the graft means 7 sliding axially and to move the front grip 2 and the polygonal bar 4 in sliding and rotation.

In this embodiment, the auxiliary locking and safety means 31 comprise:

- a positioning ring 32, visible on its own in figures 27-29, arranged coaxial to the terminal neck 3 of the front gripe 2 and to the polygonal bar 4 which crosses it, which can be freely handled in rotation by the user around the linear axis X for defining the operative position of the auxiliary locking and safety means 31, in which the positioning nut 32 is disposed close to the side edge 3a of the terminal neck 3 and axially spaced apart from the outer front part of the locking mechanism 6 (notably from the front face 16b of the fixed block base 16), and the non-operative position of the auxiliary locking and safety means 31, in which the positioning nut 32 is disposed close to the outer front part of the locking mechanism 6 and axially spaced apart from the side edge 3a of the terminal neck 3: it should be noted in particular that the positioning ring 32 is provided on the inner wall 32a with a pair of protruding teeth 33, 34 symmetrically arranged with respect to the linear axis X;
- a tubular body 35, arranged internally coaxial to the positioning ring 32, integral with the front face 16b of the fixed base block 16 and provided with a free side edge 35a on which the protruding teeth 33, 34 rest and in which two inclined surfaces 36, 37 are identified which are crossed by the protruding teeth 33, 34 during the rotation of the positioning ring 32 around the linear axis X determining its axial progress or retraction which places the auxiliary locking and safety means 31 in the non-operative position starting from the operative position and vice versa, respectively.

In summary, the axial progress or retraction of the positioning ring 32, obtained by rotation around the linear axis X, causes in this case the corresponding positioning of the locking and safety means 31 in the non-operative position and in the operative position.

More in detail, the positioning ring 32 describes an angle of 90° passing from the operative position to the non-operative position and vice versa of the auxiliary locking and safety means 31, with rotations occurring in verses opposite each other, as figure 11 specifically demonstrates.

Preferably but not exclusively, the positioning ring 32 is provided laterally with a tubular element 38 which:

- is coaxial to the positioning ring 32 with respect to which presents a smaller diameter;
- is inserted into an axial groove 39 made in the front grip 2 starting from the side edge 3a and from the free end 3b of the terminal neck 3 until the side edge 3a itself interferes with a first lateral edge 32b of the positioning ring 32;
- defines with the movable operating peg 19 an annular chamber 40 that houses always at least partly the repulsion means 8 (such as, for example, the helical spring 12).

Constructively, the axial groove 39 conveniently presents larger dimensions with respect to the axial slot with a polygonal profile 9 which houses the predefined initial stretch 5 of the polygonal bar 4: this in order to allow a correct housing of the repulsion means 8.

Advantageously and preferably, the rotation of the positioning ring 32 around the linear axis X when the auxiliary locking and safety means 31 pass from the aforesaid operating position to the aforesaid non-operative position and vice versa is stopped by end-of-stroke means, indicated as a whole with 41 and better visible in figure 24, associated with the free side edge 35a of the tubular body 35.

Preferably, the end-of-stroke means 41 comprise, in the example described herein, two pairs of orthogonal flat walls 42, 43, defining a plane parallel to the linear axis X and arranged on the free side edge 35a of the tubular body 35, the protruding teeth 33, 34 of the positioning ring 32 striking against a pair of these orthogonal flat walls 42, 43 when the auxiliary locking and safety means 31 take the operative position or non-operative position.

Figure 24 also shows that, on the free side edge 35a of the tubular body 35, each of the

orthogonal flat walls 42, 43 defines, advantageously though not necessarily, together with a transversal flat wall 44 defining a plane perpendicular to the linear axis X, a lateral housing 45 adjacent to each of the inclined surfaces 36, 37: in such a lateral housing 45 one of the protruding teeth 33, 34 is then removably positioned when the auxiliary locking and safety means 31 take the operative position or non-operative position.

Preferably but not mandatorily, each of the protruding teeth 33, 34 is at least partly firmly kept in the lateral housing 45 by means of a raised edge 46 which separates the lateral housing 45 from each of the inclined surfaces 36, 37 and is suitable to prevent an accidental separation of each of the protruding teeth 33, 34 from the lateral housing 45 itself and their consequent fortuitous and unwanted sliding on the inclined surfaces 36, 37, with the evident advantages that follow in terms of operation of the improved handle 1 and of its handling by the user.

As it can be seen in particular in figure 24, the tubular body 35 is made in a single body with the fixed base block 16, just as the tubular element 38 is made in a single body with the positioning ring 32.

The preferred, however important and proper, presence of the finishing laminar plate 30, for protection purposes from the external environment of the locking mechanism 6 as well as of the overall aesthetics of the improved handle 1, requires that the positioning ring 32 inevitably arranges close to the outer face 30a of the finishing laminar plate 30 itself which, for this purpose, presents a second axial through opening 47 which is coaxial with the first axial through opening 29 of the fixed base block 16 and in which the tubular body 35 of the positioning ring 32 and the polygonal bar 4 are arranged passerby.

Operation of the improved anti-burglary handle 1 of the invention described above is obtained with precision and accuracy from figures 1-21 already almost all used to describe the constructive components of the item which is the object of exclusive claim.

In particular, starting from the conditions of maximum safety in the locking of the improved anti-burglary handle 1 of the invention shown in figures 2-6, in which the locking mechanism 6 is in the work position and the auxiliary means 31 locking and safety are in the operative position (this giving substance to the substantial impossibility for a malicious person to force from the outside the improved anti-burglary handle 1 of

the invention not only easily but also with the help of tools of various kind), if the user wants to move the panel A to open even only party the room of the window, balcony or door, he first positions the locking and safety means 31 in the non-operative position, by rotating the positioning ring 32 around the linear axis X (for example in clockwise direction, according to what highlighted by the arrow K in figure 11), up to place its second side edge 32c close to the outer face 30a of the finishing laminar plate 30 (which in this case shields the outer front part of the locking mechanism 6), spacing it axially from the side edge 3a of the terminal neck 3 by the same distance from which the second side edge 32c has been previously (while the auxiliary locking and safety means 31 are in the operating position) spaced apart from the front face 30a of the laminar finishing plate 30.

Once the auxiliary locking and safety means 31 are placed in this position (shown in figures 11, 12, 13 and 14), a part of the graft means 7 is free to slide along the linear axis X, which occurs as soon as the user exerts a pushing action on the front grip 2 (according to the direction of the arrow F of figure 17) which places the side edge 3a of the terminal neck 3 of the improved handle 1 close to the first side edge 3b: see in this respect figures 15, 16, 17 and 18.

In this way, the shaped teeth 18 of the movable operating peg 19 disengage, release and separate from the counter-shaped seats 21 of the fixed base block 16, so that the locking mechanism 6 takes the release position.

In this exact position, the user can therefore rotate at will the front grip 2, and with it the polygonal bar 4, around the linear axis X, causing the simultaneous rotation of the movable operating peg 19 of the graft means 7: in this rotation, the upper outer wall 18a of the shaped teeth 18 and above all the sharp edge 25 intercept the opposite convex ribs 26, 27 causing a noise clearly perceptible by the user who can thus appreciate the effective rotation of the system under the corresponding action he exerts with his hand on the front grip 2.

When the user has thus placed the panel A in the desired position by rotating the front grip 2, the user himself releases the handling of the latter: in return, the repulsion means 8 release the mechanical energy accumulated during the previous pushing phase on the front grip 2 by the user, determining the automatic and spontaneous axial return of the

movable operating peg 19 according to the direction given by the arrow G of figure 21, until the shaped teeth 18 again conjugate with the counter-shaped seats 21 and every counter-shaped dent 24 contrasts with the inner strike wall 23 which represents the end-o-stroke point of the axial movement of the graft means 7.

Figures 19, 20 and 21 show this phase of the axial movement allowed by the improved anti-burglary handle 1 of the invention and which shows the locking mechanism 6 (notably the particular graft means 7 which, in the invention, distinguish them) in the work position.

If desired, although not essential for the purposes of the present invention, the user at this point rotates the positioning ring 32 in a direction opposite to the previous one (for example counterclockwise, as shown by the arrow W of figure 11), returning it to the operating condition of figures 2- 6, so that the auxiliary locking and safety means 31 retake the operative condition.

Figures 31 to 38 show, by way of example only, the possible operative positions (in number of eight in total) that the front grip 2 can take by means of the specific embodiment described herein of the improved anti-burglary handle 1 of the invention.

The following figures 39 and 40 show a second possible embodiment of the current invention in which the improved anti-burglary handle, now globally numbered with 100, differs from that one just described and indicated with 1 only for the repulsion means, generally indicated with 107: in figure 39, the auxiliary locking and safety means, indicated as a whole with 115, are in the operative position and in figure 40 auxiliary these locking and safety means 115 are in the non-operative position, whereas in both the figures just mentioned the locking mechanism, numbered as a whole with 105, is in the work position.

Indeed, in this embodiment, the repulsion means 107 comprise in this case magnetic means 108 having the same polarity (for example positive) which, opposite each other, generate a spontaneous bumper or repulsive action.

These magnetic means 108 are still housed in the annular chamber 110 defined at the free end 102b of the terminal neck 102 of the front grip 101 by the tubular element 112, which the positioning ring 111 is axially and laterally provided with and which is inserted into

the axial groove 113 made in the terminal neck 102, and by the movable operating peg 114, which is also inserted for a second end 114b into such an axial groove 113, as it is better derived by the details of figures 39A and 40A.

Figures 41-44 illustrate another possible alternative embodiment of the invention in which the improved anti-burglary handle, now globally numbered with 150, differs from those ones just described and indicated with 1 and 100 this time for the auxiliary locking and safety means, as a whole indicated with 160.

In figures 41 and 42 and in the enlargement of figure 42A, the auxiliary locking and safety means 160 are in the non-operative position and in figures 43 and 44 and in the enlargement of figure 44A, the auxiliary locking and safety means 160 are in operative position, whereas in these figures 41-44 the locking mechanism, not visible and therefore not numbered, is always in the work position.

In this case, indeed, the auxiliary locking and safety means 160 comprise a lock system, generally indicated with 161, available to the user who, if necessary, handles it to alternately introduce and extract a transverse pin 167 in and by a side recess 168 made at the free end 152b of the terminal neck 152 of the front grip 151 when the auxiliary locking and safety means 160 alternately take the aforesaid operative position and the aforesaid non-operative position.

The lock system 160 is operable by the user manually, through a proper key 169, or electronically through an activation card (or badge), according to the customer's requests.

Figures 45-48 highlight a further embodiment of the invention in which the improved anti-burglary handle, here globally numbered with 200, differs from those ones previously described and indicated with 1, 100 and 150 again for the auxiliary locking and safety means which are numbered as a whole with 210.

In detail, figures 45 and 46 and the relative enlargements 45A and 46A show the auxiliary locking and safety means 210 in the non-operative position, while in figures 47 and 48 and the enlargements 47A and 48A relating to them the auxiliary locking and safety means 210 are in the operative position, whereas in these figures the locking mechanism, as a whole numbered with 205, is in the work position.

In the specific case, the auxiliary locking and safety means 210 comprise:

- a pair of shape protrusions 211, 212 opposite each other, symmetrically arranged with respect to the linear axis X and projecting from the outer side wall 202c of the terminal neck 202 of the front grip 201 at the free end 202b of the terminal neck 202;
- a pair of counter-shaped (not necessarily passing) slots 213, 214 made in the front finishing plate 209 and/or in the outer front part of the locking mechanism, generally indicated with 205.

Specifically, the shaped protrusions 211, 212 are conjugated, engaged or coupled with the respective counter-shaped slots 213, 214 when the auxiliary locking and safety means 210 take the non-operative position, while the shaped protrusions 211, 212 are uncoupled, separated or disengaged from the counter-shaped slots 213, 214, arranged close to the outer face 209a of such a finishing front plate 209 and/or of such an outer front part of the locking mechanism 205 when the locking and safety auxiliary means 210 take the operative position.

It is understood that in other embodiments of the improved anti-burglary handle of the present invention, not accompanied by reference figures in the attached drawings, the auxiliary locking and safety means of the type shown in figures 45-48 could comprise a number of shaped protrusions and of corresponding counter-shaped slots different from that one just described and illustrated in the enclosed drawings, such a number being able to vary according to the constructive choices starting from one.

The subsequent figures 49 and 50 highlight another embodiment of the invention in which the improved anti-burglary handle, now numbered as a whole with 250, differs from those ones described above for the graft means, as a whole indicated with 256, in which in the invention the locking mechanism, globally indicated with 255, materializes.

In particular, in this embodiment, the graft means 256 comprise:

- a pair of side arms 258 projecting from the outer wall 253d of the polygonal bar 253 which is axially movable;
- a pair of open profile openings 259, made in the inner wall 266a of a fixed base block 266 and present in a number equal to the side arms 258.

In this case, the side arms 258 are:

- in a number equal to the operating positions allowed for the front grip, not shown for

simplicity, as a result of its and of the polygonal bar 253 rotation around the linear axis X;

- conjugated and inserted into the open profile openings 259 when the locking mechanism 255 takes the aforesaid work position, as well shown by figures 49 and 50;
- decoupled and spaced apart from the open profile openings 259 when the locking mechanism 255 takes the aforesaid release position in order to allow rotation of the polygonal bar 253 and with it of the front grip around the linear axis X.

In this case, the side arms 258 are, on a preferred but not binding basis, made in single piece, monolithic, with the polygonal bar 253.

Also for this embodiment of the invention alternative optional solutions, not shown in the following, could exist in which the graft means comprise a number of side arms and of corresponding open profile openings different from that one just described and visible in the attached figures, such a number being able to vary according to the constructive choices or the customer's needs, starting from one.

Figures 51 and 52 show a further embodiment according to the invention, in which the improved anti-burglary handle, now globally signalled with 300, differs from those ones described so far in that the finishing laminar plate 309 (optional component anyway in the invention) is externally coupled with the fixed base block 308 of the locking mechanism, overall indicated with 305, by a simple support of its inner face 309b to the outer front part of the latter: this is due to the fact that the finishing laminar plate 309 is preferably monolithic (made of a piece) with the terminal neck 302 of the front grip 301, at the height of the free end 302b and of the side edge 302a of the terminal neck 302 itself.

Finally, the attached figures 53 and 54 show another embodiment of the invention in which the improved anti-burglary handle, now globally indicated with 350, differs from those ones presented up to this point of the description, first of all for the actuation means and subsequently for the graft means, as a whole indicated with 356.

Both the actuation means and the graft means 356 confer to the embodiment of improved anti-burglary handle 350 described herein of the invention the possibility of remedying any eventual but sometimes verifiable, during installation, misalignments with respect to the polygonal bar 353 of the movement mechanisms inside the panel A and which the

polygonal bar 353 itself couples with.

Indeed, as it will be better explained shortly, the displacement of the locking mechanism 355 towards components of the improved handle 350 closer to the front grip 351, with respect to the embodiments of the improved handle 1, 100, 150, 200, 250 and 300 of the invention described above, allows to avoid that in the return, retrieval or recovery movement of the graft means 356 along the linear axis X determined by the repulsion means, as a whole numbered with 357 and visible in figure 57 and in its enlargement of figure 57A, the elements which form the graft means 356 do not conjugate or do not perfectly and regularly engage each other as a result of the aforesaid misalignments, causing the dangerous and unwanted jamming or rubbing of the locking mechanism 355 which would deteriorate if not irreparably jeopardize the effective operation and/or the easy handling of the improved anti-burglary handle 350 of the invention.

According to the preferred embodiment described herein of the invention, the actuation means comprise an operating lever 358 cooperating (even only indirectly) with the front grip 351 and projecting downwardly near a side edge 352a of the terminal neck 352 of the front grip 351 and operated by the user in axial sliding by at least one finger of the hand with which the user imparts a traction action on the outer wall 358a of the operating lever 358 in such a manner as to cause axial sliding of the graft means 356 and the passage of the locking mechanism 355 from the work position to the release position.

The outer wall 358a of the operating lever 358 on which the user's hand acts, in essence, faces the locking mechanism 355, the finishing laminar plate 360 or the linear portion P of the perimetrical frame T of the panel A, looking frontally at the front grip 351 of the improved anti-burglary handle 350 of the invention.

Preferably but not necessarily, the operating lever 358 belongs to or is coupled with a movable intermediate sleeve 359 coaxial to the terminal neck 352, comprising inside part of the graft means 356 and, as figure 53 better shows, remaining protruding from the finishing laminar plate 360 and, more generally, from the linear portion P of the perimetrical frame T when the front grip 351 is in applicative conditions.

Figures 64 and 65 show that, in this preferred embodiment of the invention, the graft means 356 therefore comprise first of all a plurality of shaped teeth 362 contained in the

movable intermediate sleeve 359 which:

- is coaxial with the terminal neck 352 of the front grip 351, as already mentioned;
- is interposed between the terminal neck 352 and a fixed base block 365 suitable to be applied by fastening means, generally indicated with 370 and still only partly visible in the attached figures, to the linear portion P of the perimetrical frame T of the panel A at the usual structural through opening R made in the linear portion P itself;
- presents an axial through hole 366 inside which is inserted, according to the linear axis X, the polygonal bar 353 which axially projects from the movable intermediate sleeve 359 towards the interior of the room of the building and for the predefine initial stretch 354 contained into the terminal neck 352 of the front grip 351, as it can be derived from the section of figure 57 and from its enlargement of figure 57A.

The graft means 356 also comprise a plurality of counter-shaped seats 363, made in a central portion 367 which the base block 365 is provided with and present in a number equal to the shaped teeth 362.

Specifically, the shaped teeth 362 (in this case, by way of pure example, in number of eight) are:

- in a number equal to the operating positions allowed for the front grip 351 as a result of its rotation, as well as of the polygonal bar 353, around the linear axis X;
- conjugated and inserted into the counter-shaped seats 363 when the locking mechanism, generally indicated with 355, takes the work position;
- decoupled and spaced apart from the counter-shaped seats 363 when the locking mechanism 355 takes the release position in order to allow rotation of the polygonal bar 353 and with it of the front grip 351 around the linear axis X and the positioning of the front grip 351 and, consequently, of the panel A in the operating position desired at that moment.

As still illustrated in figures 64 and 65, the shaped teeth 362 are arranged projecting from an inner core 361 of the movable intermediate sleeve 359, made integral with the polygonal bar 353 through coupling means, as a whole numbered with 368 and of the type already previously described for the improved anti-burglary handle 1 where they are overall indicated with 11, which in any case allow reciprocal axial sliding thereof (in

particular of the inner core 361 on the polygonal bar 353).

The inner core 361 also presents at least a first portion of the axial through hole 366 having a size smaller than a second portion of such an axial through hole 366 of the movable intermediate sleeve 359.

In particular, the second portion of the axial through hole 366 of the intermediate sleeve 359, the larger one, houses the repulsion means 357, which even in this case are preferably constituted by a helical spring 380, as figures 64 and 65 highlight.

In a preferred but not binding manner, the central portion 367 of the fixed base block 365 is tubular, facing the movable intermediate sleeve 359 which is grafted or inserted in coaxially, and is provided with an inner annular rim 367a in which the counter-shaped seats 363 are made and which act as end-of-stroke of the axial movement of the graft means 365 since the shaped teeth 362 strike against such an inner annular rim 367a when the abovementioned locking mechanism 355 takes the work position.

Figures 53 and 56 in particular show that the inner central room 369 of the fixed base block 365 houses a service disc 371 which presents an axial through hole 372 into which the polygonal bar 353 is inserted and an annular outer surface 371a provided with a series of concave sections 373, in general as many as the shaped teeth 362 of the intermediate sleeve 359 and the counter-shaped seats 363 of the central portion 367 are.

These concave sections 373 have the function of favouring the rotation of the service disc 371 integrally with the polygonal bar 353.

In addition, each of the concave sections 373 is separated from convex sections 374 of the annular outer surface 371a adjacent thereto through a sharp corner 375 which ensures, by interfering with a pair of opposite convex ribs 376, 377 protruding from an inner wall 365a which delimits the inner central room 369 of the fixed base block 365, the emission of a slight snap noise but clearly perceptible by the user when the front grip 361 is rotated around the linear axis X in order to take one of its possible operative positions, satisfying thus the demands of the handles market in general, and of the anti-burglary ones in particular.

Under the constructive point of view, the axial through hole 372 of the service disc 371 is coaxial to:

- the first through opening 382 of the fixed base block 365;
- the central through hole 381 of the central portion 367 of the fixed base block 365;
- the second through opening 378 of the finishing front plate 360;
- the axial through hole 366 of the movable intermediate sleeve 359;
- the axial slot with a polygonal profile 379 of the terminal neck 352 of the front grip 351.

It follows, therefore, that in the embodiment of the improved anti-burglary handle of the invention indicated with 350 the graft means 356 are arranged:

- in the movable intermediate sleeve 359 which remains outside the linear portion P of the perimetrical frame T of the panel A when the handle 350 is in applicative conditions;
- in the tubular central portion 367 of the fixed base block 365 axially in front of the movable intermediate sleeve 359,

while in the embodiment of improved anti-burglary handle of the invention indicated with 1 the graft means 7 are arranged:

- in the movable operating peg 19 which is partly contained into the terminal neck 3 of the handle 1, partly in the fixed base block 16 to protrude therefrom, together with the polygonal bar 4, when the locking mechanism 6 takes the release condition;
- in the inner wall 16a of the fixed base block 16.

The constructive arrangement according to which the graft means 356 are more axially displaced, both from a constructive point of view and from a functional point of view, towards the front grip 351 with respect to the graft means 7, slightly differentiates the graft means 356 from the graft means 7 in that it allows the improved anti-burglary handle 350 to reach the advantageous result indicated above, consisting in favouring a correct coupling of the graft means 356 in their return phase towards the work position, i.e. locking the rotation of the front grip 351, even in the presence of misalignments of the movement mechanisms of the panel A with respect to the polygonal bar 353.

Finally, figures from 66 to 73 show, on a purely preferred but not binding basis, the possible operating positions (in total of eight, in this case too) that the front grip 351 can take through the specific embodiment described herein of improved anti-burglary handle

350 of the invention, as a result of its rotation around the linear axis X made by the user when the locking mechanism 355 (notably, the graft means 356, in the invention) take the release position.

From an operative point of view, functioning of the improved anti-burglary handle 350 of the invention is different from that one of the improved anti-burglary handle 1 previously described only for the mode of implementation of the graft means 356 by the user.

Indeed, in this case, the user exerts a traction action on the operating lever 358 (arrow Z in figure 60) in such a manner as to cause the axial sliding of the graft means 356 not towards the linear portion P of the perimetrical frame T (as in the case of the graft means 7 of the improved handle 1 of the invention) but inevitably towards the user and the room in which the improved handle 350 is projecting, causing the consequent passage of the locking mechanism 355 from the work position to the release position that allows rotation of the polygonal bar 353 and, with it, of the front grip 351 around the linear axis X.

The reset of the operating position of the locking mechanism 355 (notably of the graft means 356 in the invention, it is repeated) occurs by the user by releasing the operating lever 358 and thanks to the elastic recovery of the repulsion means 357 which axially move the movable intermediate sleeve 359 towards the fixed base block 365 until the shaped teeth 362 of the first are perfectly engaged and conjugated in the counter-shaped seats 363 of the second.

On the basis of the description just given, it is understood, therefore, that the improved anti-burglary handle of the present invention, in the numerous embodiments described herein, achieves the purposes and reaches the advantages yet previously mentioned.

All the embodiments of the improved anti-burglary handle of the invention previously described, many of which are also illustrated in the attached drawings, as well as other ones not shown but which nevertheless are inspired by the inventive technical concept expressed in the following claims (in particular in claim 1) provide a homogeneous, uniform, linear up to almost minimal construction concept of the external shape of the front grip, to the advantage of its aesthetic appeal and above all of its constructive simplicity and its mass production, thus allowing to achieve a relevant improvement in scale economies related to the manufacture of this item.

Upon execution, changes could be made to the improved anti-burglary handle of the present invention, consisting, for example, in graft means of the locking mechanism having a constructive conception different from those ones visible in the attached figures and previously described.

It is stated precisely that the front grip, when the locking mechanism, and in particular the graft means which distinguish it in the invention, takes the work position, could be arranged in any number of operating conditions, according to the design choices and the needs of the end customer, and this following its rotation around the linear axis of the polygonal bar allowed by the positioning of the locking mechanism in the release position.

Beyond that, other alternative embodiments of the improved anti-burglary handle exclusively claimed herein could exist, not shown in the following, in which the actuation means are different from those ones previously described, which does not affect the advantage brought by the present invention.

It is, finally, clear that several other changes could be made to the improved anti-burglary handle concerned, without departing from the principle of novelty intrinsic in the inventive idea expressed herein, as it is clear that, in the practical implementation of the invention, materials, shapes and sizes of the illustrated details could be changed, as needed, and replaced with others technically equivalent.

Where the constructive features and techniques mentioned in the following claims are followed by reference numbers or signs, those reference signs have been introduced with the sole objective of increasing the intelligibility of the claims themselves and therefore they have no limiting effect on the interpretation of each element identified, by way of example only, by these reference signs.

CLAIMS

1. Improved anti-burglary handle (1; 100; 150; 200; 250; 300; 350) comprising at least:

- a front grip (2; 351) at user's availability who accesses it from the inside of a room of a building, provided with a terminal neck (3; 102; 152; 202; 352) suitable to be axially, firmly and revolvingly coupled with a linear portion (P) of a perimetrical frame (T) of a panel (A) belonging to a window or to a door;
- a polygonal bar (4; 353) defining a linear axis (X), revolvingly coupled with said front grip (2; 101; 151; 201; 301; 351) and suitable to be partly and frontally inserted into said linear portion (P) of said perimetrical frame (T), from which it projects towards the inside of said room by a predefined initial stretch (5; 354);
- a locking mechanism (6; 355) operatively connecting said polygonal bar (4) with said front grip (2) so that said locking mechanism (6) on one side, as a result of the handling of said front grip (2) performed by said user from the inside of said room, allows to transmit a torque to said polygonal bar (4; 353) and, on the other side, prevents to transmit a torque from said polygonal bar (4; 353) to said front grip (2; 351), said locking mechanism (6; 105; 305) taking a work position, in which rotation of said polygonal bar (4) and of said front grip (2; 351) around said linear axis (X) is forbidden, and a release position, in which said rotation of said polygonal bar (4; 353) around said linear axis (X) is allowed, caused by said user by rotating said front grip (2; 351) from the inside of said room,

characterized in that said locking mechanism (6; 355) includes graft means (7) operable by actuation means in axial sliding along said linear axis (X) by means of:

- a pressure or traction exerted by said actuation means on the outer surface (2a; 351a) of said front grip (2; 351) which places said locking mechanism (6; 105; 355) temporarily in said release position, disengaging said graft means (7; 356) and allowing said rotation of said polygonal bar (4; 353);
- a counterthrust, contrary to said pressure or traction, exerted automatically, as soon as said actuation means release said front grip (2; 351), by repulsion means (8; 357) cooperating with said graft means (7; 356), and which places said locking mechanism

(6; 105; 305) in said work position, engaging said graft means (7; 356) and preventing said rotation of said polygonal bar (4; 353).

2. Handle (1; 100; 150; 200; 250; 300; 350) according to claim 1), characterized in that said predefined initial portion (5) of said polygonal bar (4; 353) is inserted into an axial slot with a polygonal profile (9; 379) made along said terminal neck (3; 102; 152; 202; 302; 352) of said front grip (2; 101; 151; 201; 301; 351) in such a way as to define an axial inner gap (10).

3. Handle (1; 100; 150; 200; 250; 300; 350) according to any of the preceding claims, characterized in that said polygonal bar (4; 353) is made integral with said locking mechanism (6; 105; 205; 255; 355) and said terminal neck (3; 102; 152; 202) through coupling means (11).

4. Handle (1; 100; 150; 200; 250) according to any of the preceding claims, characterized in that said actuation means comprise said terminal neck (3; 102; 152; 202) of said front grip (2; 101; 151; 201), operated in axial sliding by the user's hand by means of a thrust action exerted on said outer surface (2a) of said front grip (2; 101; 151; 201) in such a manner as to cause said axial sliding of said graft means (7) and the passage of said locking mechanism (6; 105; 205) from said work position to said release position.

5. Handle (350) according to any of the claims 1) to 3), characterized in that said actuation means comprise an operating lever (108) cooperating with said front grip (351) and projecting downwardly near to a side edge (352a) of said terminal neck (352) of said front grip (351) and is operated by the user in axial sliding by at least one finger of the hand with which he imprints a traction action on the outer wall (358a) of said operating lever (358) in such a way as to cause said axial sliding of said graft means (356) and the passage of said locking mechanism (355) from said work position to said release position.

6. Handle (350) according to claim 5), characterized in that said operating lever (358) belongs to or is coupled with an intermediate sleeve (359) coaxial to said terminal neck (352), comprising part of said graft means (356) and suitable to stay outside said linear portion (P) of said perimetrical frame (T) when said front grip (351) is in applicative conditions.

7. Handle (1; 100; 150; 200; 250; 350) according to any of the preceding claims, characterized in that said repulsion means (8; 107; 357) include any of the mechanical systems able to cause a spontaneous movement of the element which they cooperate with by contact, selected from the group consisting of elastic recovery means (12; 380), magnetic means (108) having the same polarity that generates a spontaneous bumper or repulsive action and/or the like.

8. Handle (1; 100; 150; 200; 250; 350) according to any of the preceding claims, characterized in that said repulsion means (8; 107; 356) are hidden from view and arranged near the free end (3b; 102b; 152b; 202b) of said terminal neck (3; 102; 152; 202; 352) of said front grip (2; 101; 151; 201; 351), internally or externally to said terminal neck (3; 102; 152; 202; 352).

9. Handle (1; 100; 150; 200; 250; 350) according to any of the preceding claims, characterized in that said graft means (7; 356) of said locking mechanism (6; 105; 205; 355) comprise a gear (13; 411) belonging:

- partly to a main movable body (19; 114) axially sliding along a first direction (F) under the impulse transmitted by said actuation means to said front grip (2; 101; 151; 201; 351), and along a second direction (G), opposite to said first direction (F), as a result of the reaction or recovery action transmitted by said repulsion means (8; 107; 357);
- partly to a fixed auxiliary body (16) suitable to be fixed to said linear portion (P) of said perimetrical frame (T) of said panel (A).

10. Handle (1; 100; 150; 200; 250; 350) according to any of the preceding claims, characterized in that said graft means (7; 356) at least partly belong to a fixed base block (16; 365) suitable to be applied through fastening means (26) to said linear portion (P) of said perimetrical frame (T) at a structural through opening (R) made in said linear portion (P) and shaped in such a way such as to define an inner central room (28) and a first axial through opening (29) coaxial to said terminal neck (3; 102; 152; 202), said polygonal bar (4; 353) orthogonally crossing said fixed base block (16) in such a way that a predetermined final stretch of said polygonal bar (4; 353) soaks in said perimetrical frame (T) up to

interfere with the movement mechanisms of said panel (A) which cause the opening/closing of said window or door.

11. Handle (1; 100; 150; 200; 250; 350) according to claim 10), characterized in that said graft means (7; 356) are arranged at least partly inside a central portion (17; 367) of said fixed base block (16; 365).

12. Handle (1; 100; 150; 200; 250) according to any of the preceding claims, characterized in that said graft means (7) include:

- one or more shaped teeth (18) protruding from the outer side surface (19a) of a movable operating peg (19; 114) having an axial through hole (20) into which said polygonal bar (4) is inserted, according to said linear axis (X), and which protrudes from said movable operating peg (19; 114) for a prefixed portion (15) comprising a second end (4b) opposite to a first end (4a) contained into said terminal neck (3; 102; 152; 202) of said front grip (2; 101; 151; 201);
- one or more counter-shaped seats (21), made in the inner wall (16a) of a fixed base block (16) and present in a number equal to said shaped teeth (18),

said shaped teeth (18) being:

- in a number equal to the operating positions allowed for said front grip (2; 101; 151; 201) as a result of its and said polygonal bar (4) rotation around said linear axis (X);
- conjugated and inserted into said counter-shaped seats (21) when said locking mechanism (6; 105; 205) takes said work position;
- decoupled and spaced apart from said counter-shaped seats (21) when said locking mechanism (6) takes said release position in order to allow rotation of said polygonal bar (4) and with it of said front grip (2; 101; 151; 201) around said linear axis (X).

13. Handle (1; 100; 150; 200; 250) according to claim 12), characterized in that said movable operating peg (19; 114) comprises between each pair of said shaped teeth (18) an abutment septum (22) provided with an inner strike wall (23) which acts as end-of-stoke of said axial movement of said graft means (7) as against it a counter-shaped dent (24) contrasts arranged between each pair of said counter-shaped seats (21) when said locking mechanism (6; 105; 205) takes said work position.

14. Handle (1; 100; 150; 200; 250) according to claim 13), characterized in that each of said shaped teeth (18) and said abutment septum (22) have substantially the same cross-sectional profile, so as each of said counter-shaped seats (21) and said counter-shaped dent (24) have substantially the same cross-sectional profile.

15. Handle (1; 100; 150; 200; 250) according to claim 13) or 14), characterized in that each of said shaped teeth (18), said abutment septum (22), each of said counter-shaped seats (21) and said counter-shaped dent (24) have in cross section a tapered, frusto-conical or in the shape of an isosceles trapezium profile provided with an arched-profile larger base and smaller base, in which said arched smaller base of each of said shaped teeth (18) and said abutment septum (22) is arranged adjacent to said outer side surface (19a) of said movable operating peg (19), and in which said arched smaller base of each of said counter-shaped seats (21) and said counter-shaped dent (24) is arranged adjacent to said inner wall (16a) of said fixed base block (16).

16. Handle (1; 100; 150; 200; 250) according to any of the claims 13) to 15), characterized in that the upper outer surface (22a) of said abutment septum (22) is concave, in order to ease rotation of said operating peg (19) integral with said polygonal bar (4), and is separated from the upper convex outer wall (18a) of said shaped teeth (18) adjacent thereto through a sharp edge (25) which ensures, by interfering with a pair of opposite convex ribs (26, 27) projecting from said inner wall (16a) of said base block (16), the emission of a snap noise clearly perceptible by said user when said front grip (2; 101 ; 151; 201) is rotated around said linear axis (X) in order to take one of said operative positions.

17. Handle (1; 100; 150; 200; 250) according to claim 16), characterized in that said opposite convex ribs (27) are axially adjacent to said counter-shaped dent (34) in between each pair of said counter-shaped seats (21), in an inner central room (28) defined in said base block (16).

18. Handle (1; 100; 150; 200; 250; 350) according to claim 10), 11) or 12), characterized in that it comprises a finishing laminar plate (30; 209; 309; 360) coupled externally with said fixed base block (16; 365) in such a manner that, when said front grip (2; 101; 151; 201 351) is in applicative conditions, said finishing laminar plate (30; 209; 309; 360) is placed near to the outer surface (E) that belongs to said linear portion (P) of said perimetrical frame (T)

of said panel (A) and surrounds a structural through opening (R) made in said linear portion (P) and housing at least part of said base block (16).

19. Handle (1; 100) according to any of the preceding claims, characterized in that it comprises auxiliary locking and safety means (31; 115) operable by the user only from said room and normally at least partly in view, coupled with said locking mechanism (6; 105) and said terminal neck (3; 102) of said front grip (2), between which they are interposed, in such a way as to alternately define:

- an operative position, in which said auxiliary locking and safety means (31) prevent said actuation means to make said graft means (7) sliding axially and to move in sliding and rotate said front grip (2);
- a non-operative position, in which said auxiliary locking and safety means (31) allow said actuation means to make said graft means (7) sliding axially and to move in sliding and rotate said front grip (2).

20. Handle (1; 100) according to claim 19) when dependent on claims 18) and 12), characterized in that said auxiliary locking and safety means (31) comprise:

- a positioning ring (32; 111), arranged coaxially to said terminal neck (3) of said front grip (2; 101) and said polygonal bar (4) that crosses it, which can be freely handled in rotation by said user around said axis linear (X) to define said operative position of said auxiliary locking and safety means (31), in which it is disposed close to the side edge (3a) of said terminal neck (3; 102) and axially spaced apart from the outer front part of said locking mechanism (6), and said non-operative position of said auxiliary locking and safety means (31), in which it is disposed close to said outer front part of said locking mechanism (6) and axially spaced apart from said edge side (3a) of said terminal neck (3; 102), said positioning ring (32; 111) being provided on the inner wall (32a) with a pair of protruding teeth (33, 34) symmetrically arranged with respect to said linear axis (X);
- a tubular body (35), arranged internally coaxial to said positioning ring (32; 111), integral with the front face (16b) of said base block (16) and provided with a free side edge (35a) on which said protruding teeth (33, 34) rest and in which two inclined surfaces (36, 37) are identified which are crossed by said protruding teeth (33, 34)

during rotation of said positioning ring (32; 111) around said linear axis (X) for placing said auxiliary locking and safety means (31) in said non-operative position starting from said operative position and vice versa.

21. Handle (1; 100) according to claim 20), characterized in that said positioning ring (32; 111) describes an angle of 90° passing from said operative position to said non-operative position and vice versa of said auxiliary locking means and safety (31; 115), with rotations occurring in verses opposite each other.

22. Handle (1; 100) according to claim 20) or 21), characterized in that said positioning ring (32; 111) is provided with a tubular element (38; 112) which:

- is coaxial to said positioning ring (32) with respect to which presents a smaller diameter;
- is inserted into an axial groove (39; 113) made in said front grip (2; 102) starting from said side edge (3a) of said terminal neck (3) until said side edge (3a) of said terminal neck (3; 102) interferes with a first lateral edge (32b) of said positioning ring (32; 111);
- defines with said movable operating peg (19) an annular chamber (40) which houses said repulsion means (8).

23. Handle (1; 100) according to any of the claims 20) to 22), characterized in that said positioning ring (32) comprises end-of-stroke means (41), associated with said free side edge (35a) of said tubular body (35), provided in such a way as to stop the rotation of said positioning ring (32) around said linear axis (X) when said auxiliary locking and safety means (31) pass from said operative position to said non-operative position and vice versa.

24. Handle (1; 100) according to claim 23), characterized in that said end-of-stroke means (41) comprise two pairs of orthogonal flat walls (42, 43), defining a plane parallel to said linear axis (X) and arranged on said free side edge (35a) of said tubular body (35), said protruding teeth (33, 34) of said positioning ring (32) striking against a pair of said orthogonal flat walls (42, 43) in said operative position or said non-operative position of said auxiliary means locking and safety (31).

25. Handle (1; 100) according to claim 24), characterized in that, on said free side edge (35a) of said tubular body (35), each of said orthogonal flat walls (42, 43) defines, with at

least a transversal flat wall (44) defining a plane perpendicular to said linear axis (X), a lateral housing (45), adjacent to each of said inclined surfaces (36, 37), which receives in a removable manner one of said protruding teeth (33, 34) when said auxiliary locking and safety means (31) takes said operative position or said non-operative position.

26. Handle (1; 100) according to claim 25), characterized in that each of said protruding teeth (33, 34) is at least partly stably kept in said lateral housing (45) by means of a raised edge (46) separating said lateral housing (45) from each of said inclined surfaces (36, 37) and suitable to prevent an accidental separation of each of said protruding teeth (33, 34) from said lateral housing (45) and their fortuitous and unwanted sliding on said inclined surfaces (36, 37).

27. Handle (1; 100) according to any of the claims 20) to 26), characterized in that said positioning ring (32) is arranged close to the outer face (30a) of said finishing laminar plate (30) which presents a second axial through opening (47) which is coaxial to said first axial through opening (29) of said fixed base block (16) and in which said tubular body (35) is arranged passerby.

28. Handle (150) according to claim 19), characterized in that said auxiliary locking and safety means (160) comprise a lock system (161) operable by said user to alternately introduce and extract a transverse pin (167) in and by a side recess (168) made at the free end (152b) of said terminal neck (152) of said front grip (151) when said auxiliary locking and safety means (160) alternately take said operative position and said non-operative position.

29. Handle (200) according to claim 19) when possibly dependent on claim 18), characterized in that said auxiliary locking and safety means (210) comprise:

- at least one shaped protrusion (211, 212) projecting from the outer side wall (202c) of said terminal neck (202) of said front grip (201) at the free end (202b) of said terminal neck (202);
- at least one counter-shaped slot (213, 214) made in said finishing front plate (209) and/or in the outer front part of said locking mechanism (205), said shaped protrusion (211, 212) being coupled to said counter-shaped slot (213, 214) when said auxiliary locking and safety means (210) take said non-operative position, and decoupled from

said counter-shaped slot (213, 214), arranged close to the outer face (209a) of said finishing front plate (209) and/or of said outer front part of said locking mechanism (205) when said auxiliary locking and safety means (210) takes said operative position.

30. Handle (250) according to any of the claims 1) to 11), characterized in that said graft means (256) include:

- one or more side arms (258) projecting from the outer wall (253d) of said polygonal bar (253);
- one or more open profile openings (259), made in the inner wall of a base block (257) and are present in a number equal to said side arms (258),

said side arms (258) being:

- in a number equal to the operating positions allowed for said front grip as a result of its and of said polygonal bar (253) rotation around said linear axis (X);
- conjugated and inserted into said open profile openings (259) when said locking mechanism (255) takes said work position;
- decoupled and spaced apart from said open profile openings (259) when said locking mechanism (255) takes said release position in order to allow the rotation of said polygonal bar (253) and with it of said front grip around said linear axis (X).

31. Handle (350) according to any of the claims 1) to 11), characterized in that said graft means (356) include:

- one or more shaped teeth (362) contained in a movable intermediate sleeve (359) which:
  - is coaxial to said terminal neck (352) of said front grip (351),
  - is interposed between said terminal neck (352) and a fixed base block (365) suitable to be applied by fastening means (370) to said linear portion (P) of said perimetrical frame (T) at a structural through opening (R) made in said linear portion (P);
  - presents an axial through hole (366) inside which said polygonal bar (353) is inserted, according to said linear axis (X), which projects axially from said movable intermediate sleeve (359) toward the interior of said room and contained

into said terminal neck (352) of said front grip (351) for said predefined initial stretch (354);

– one or more counter-shaped seats (363), made in a central portion (367) of said fixed base block (365) and present in a number equal to said shaped teeth (362),

said shaped teeth (362) being:

- in a number equal to the operating positions allowed for said front grip (351) as a result of its and said polygonal bar (353) rotation around said linear axis (X);
- conjugated and inserted into said counter-shaped seats (363) when said locking mechanism (355) takes said work position;
- decoupled and spaced apart from said counter-shaped seats (363) when said locking mechanism (355) takes said release position in order to allow the rotation of said polygonal bar (353) and with it of said front grip (351) around said linear axis (X).

32. Handle (350) according to claim 31), characterized in that said shaped teeth (362) are arranged projecting from an inner core of said movable intermediate sleeve (359), made integral with said polygonal bar (353) through coupling means (368) and presenting at least a first portion of said axial through hole (366) having a size smaller than a second portion of said axial through hole (366) of said intermediate sleeve (359).

33. Handle (350) according to claim 32), characterized in that said second portion of said axial through hole (366) of said movable intermediate sleeve (359) receives said repulsion means (357).

34. Handle (350) according to any of the claims 31) to 33), characterized in that said central portion (367) of said fixed base block (365) is tubular, coaxial to and facing said movable intermediate sleeve (359) which is grafted or inserted in, and is provided with an inner annular rim (367a) in which said counter-shaped seats (363) are made and which acts as end-of-stroke of said axial movement of said graft means (356) as against said inner annular rim (367a) said shaped teeth (362) strike when said locking mechanism (355) takes said work position.

35. Handle (350) according to claim 34) when dependent on claim 10), characterized in that said inner central room (369) of said fixed base block (365) houses a service disc (371) which presents an axial through hole (372), into which said polygonal bar (353) is

inserted, and an annular outer surface (371a) provided with one or more concave sections (373), as many as said shaped teeth (362) of said movable intermediate sleeve (359) and said counter-shaped seats (363) of said central portion (367) are, suitable to favour rotation of said service disc (371) integrally to said polygonal bar (353).

36. Handle (350) according to claim 35), characterized in that each of said concave sections (373) is separated from convex sections (374) of said annular outer surface (371a) adjacent thereto through a sharp edge (375) which ensures, by interfering with a pair of opposite convex ribs (376, 377) protruding from an inner wall (365a) which delimits said inner central room (369) of said fixed base block (365), the emission of a snap noise clearly perceptible by said user when said front grip (351) is rotated around said linear axis (X) in order to take one of its operating positions.

37. Handle (350) according to claim 35) or 36) when claim 10) depends on claim 2), characterized in that said axial through hole (372) of said disc service (371) is coaxial to:

- said first through opening (382) of said fixed base block (365);
- the central through-hole (381) of said central portion (367) of said fixed base block (365);
- said second through opening (378) of said finishing front plate (360);
- said axial through hole (366) of said movable intermediate sleeve (359);
- said axial slot with a polygonal profile (379) of said terminal neck (352) of said front grip (351).

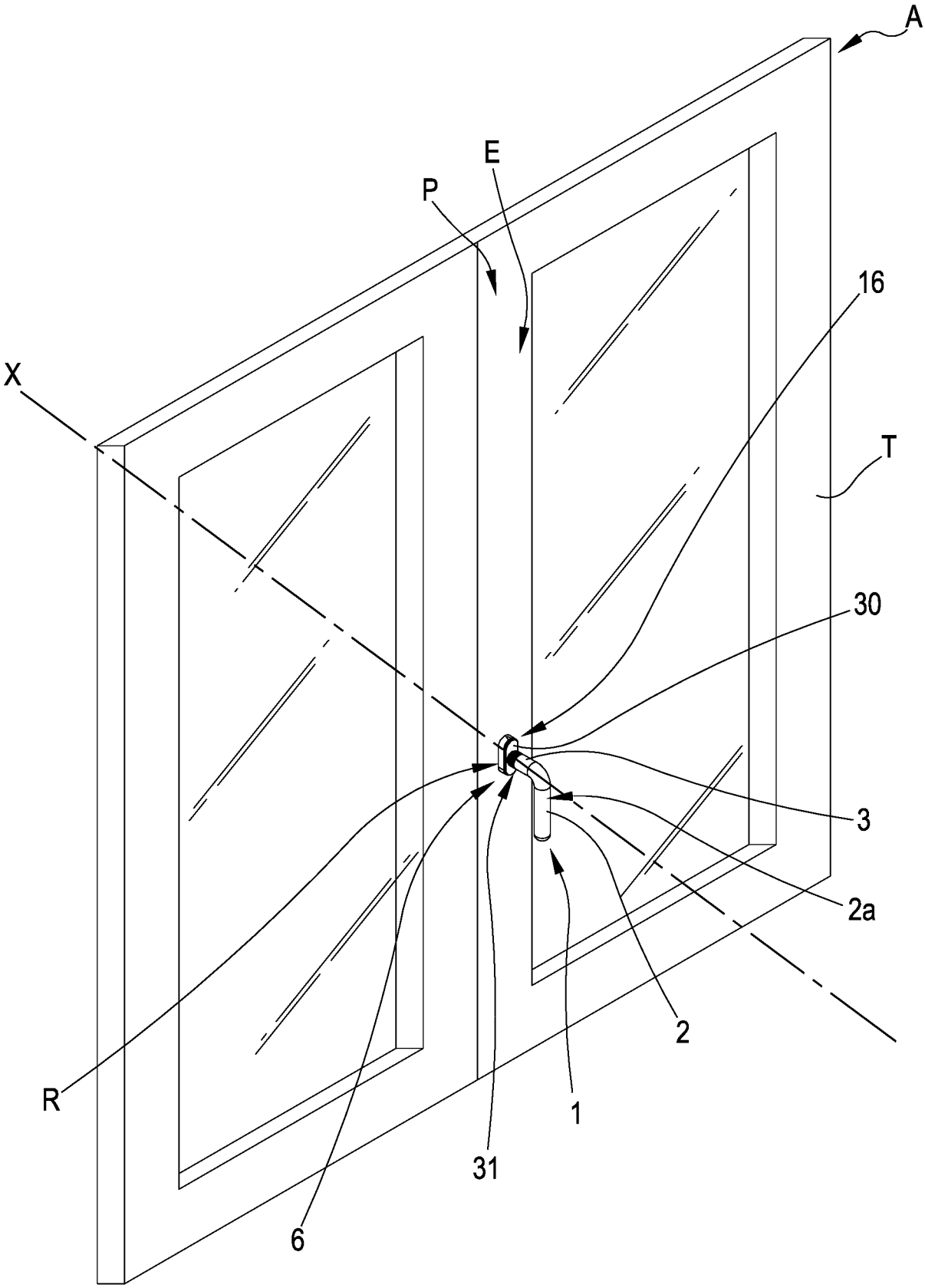


FIG.1

FIG.2

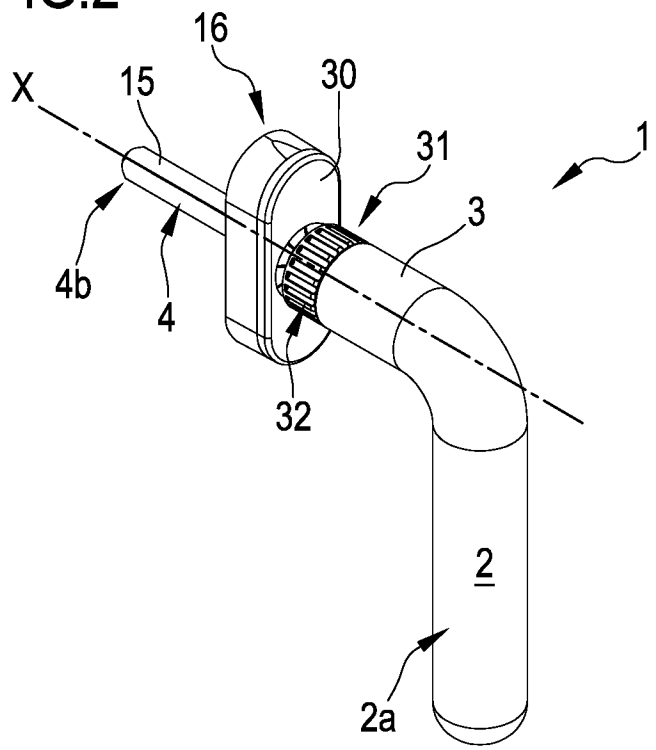
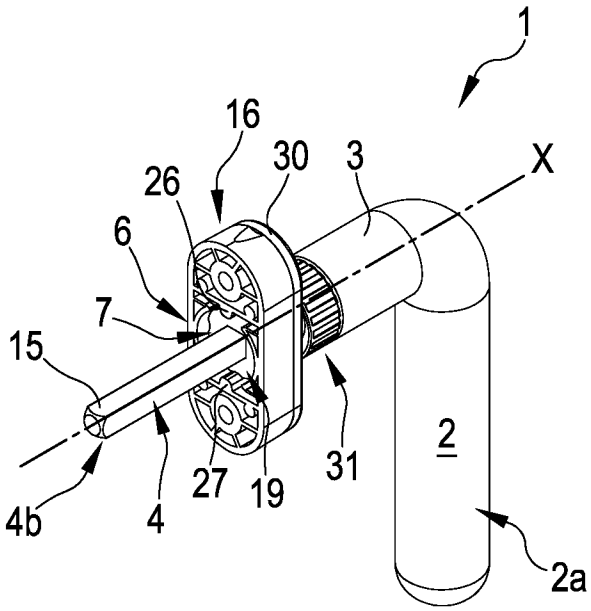


FIG.3



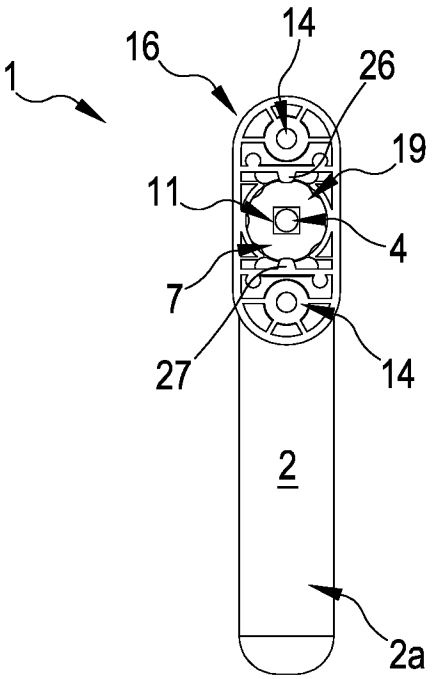
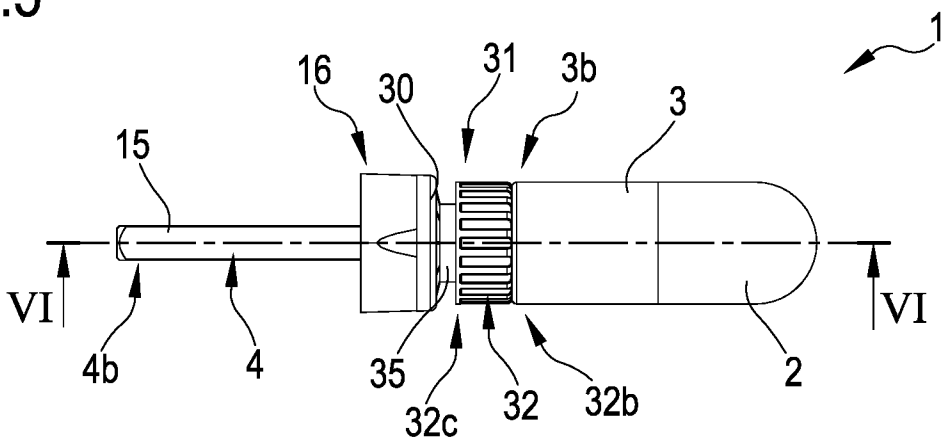


FIG.4

FIG.5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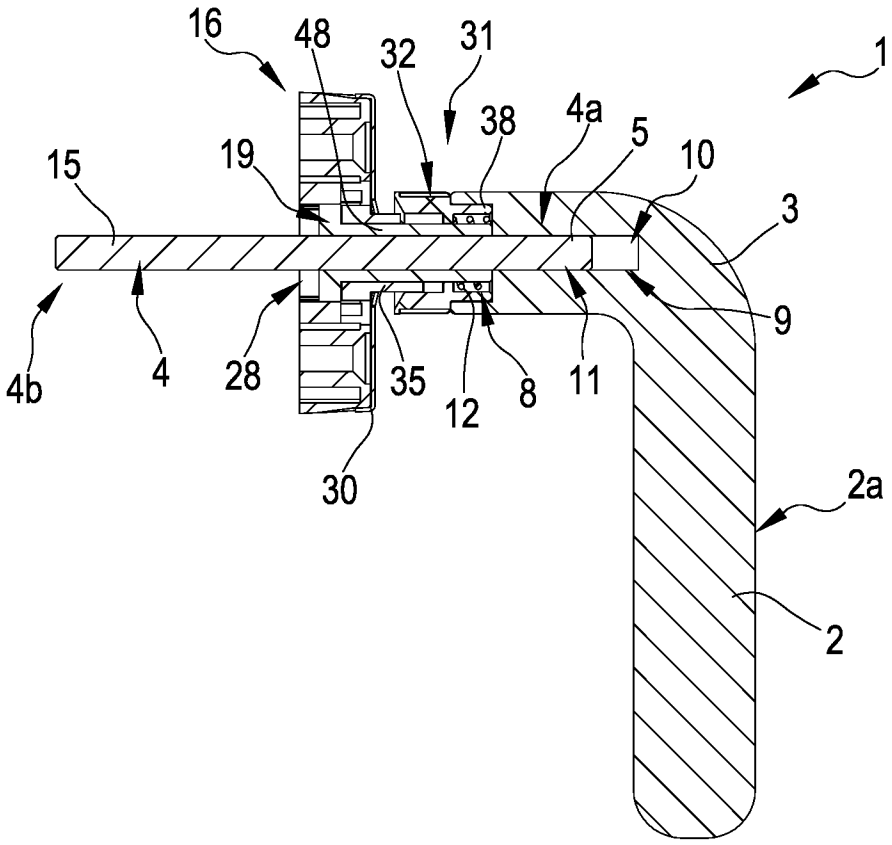
16
30
31
3b
3
15
VI
VI
4b
4
35
32c
32
32b
2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48
32
31
1
38
4a
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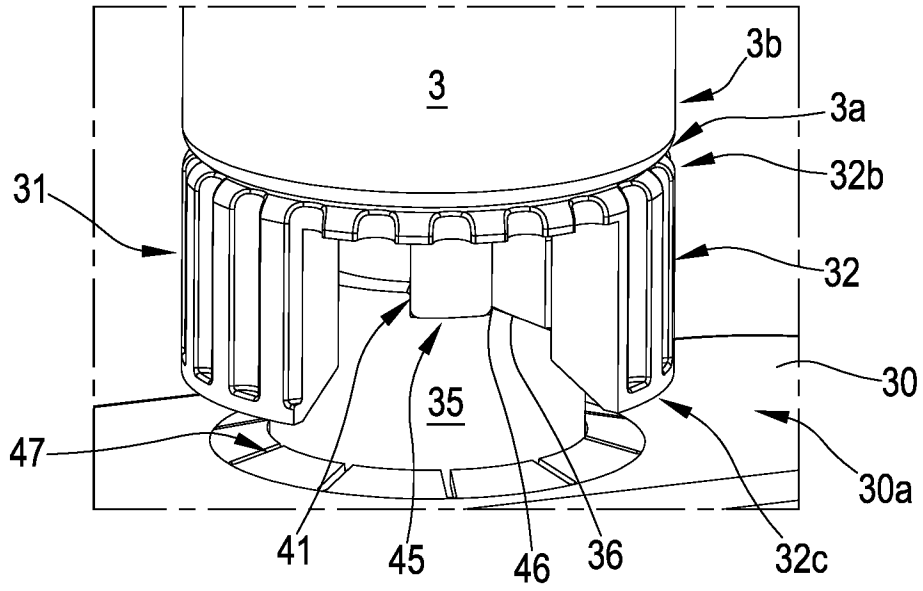
10
19
15
3
9
4b
4
28
35
12
8
11
30
2a
2

FIG.6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3a
32b
31
32
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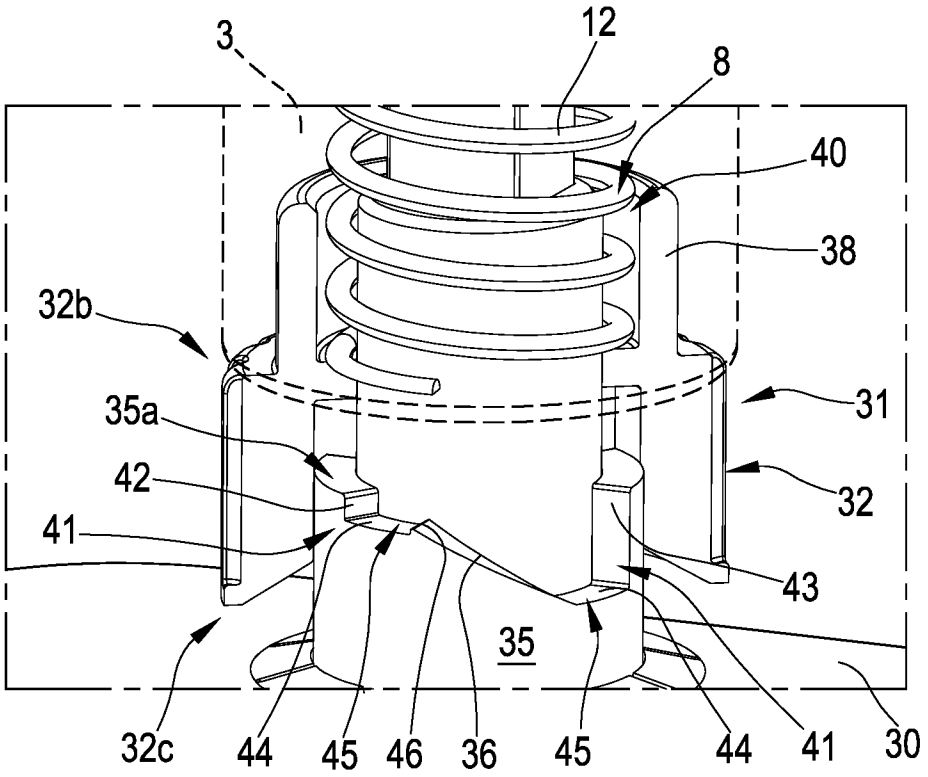
35
47
30a
41
45
46
36
32c

FIG.7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32c
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36
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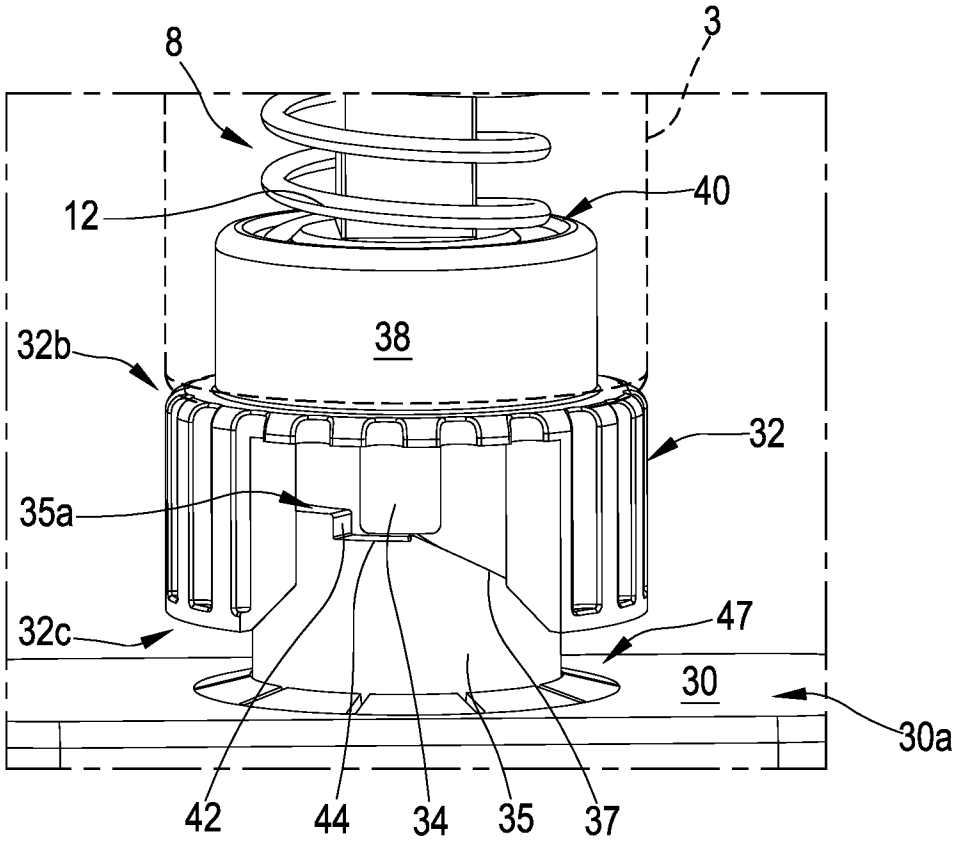
44
41
30

FIG.8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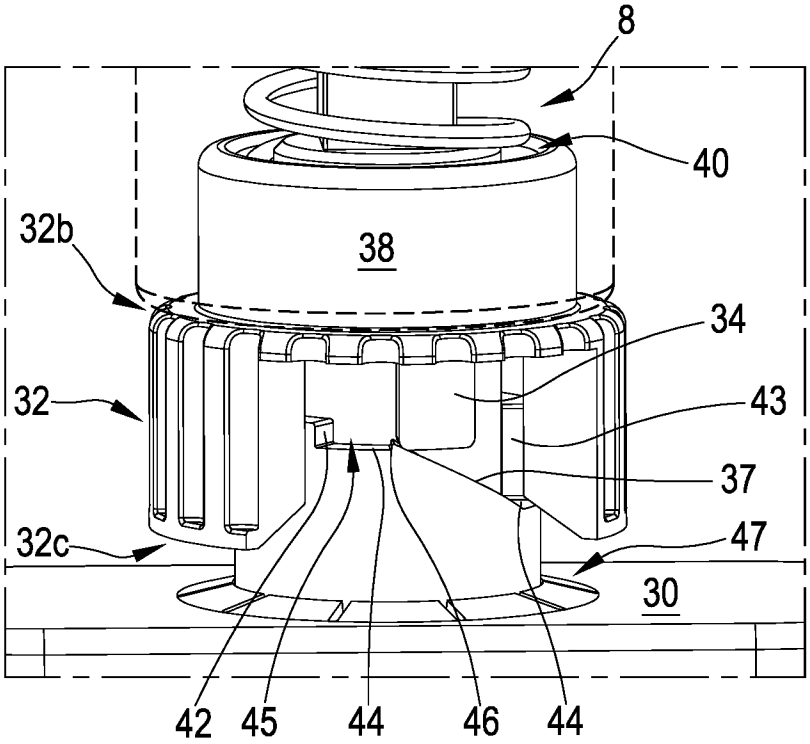
37

FIG.9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32c
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46
44

FIG.10

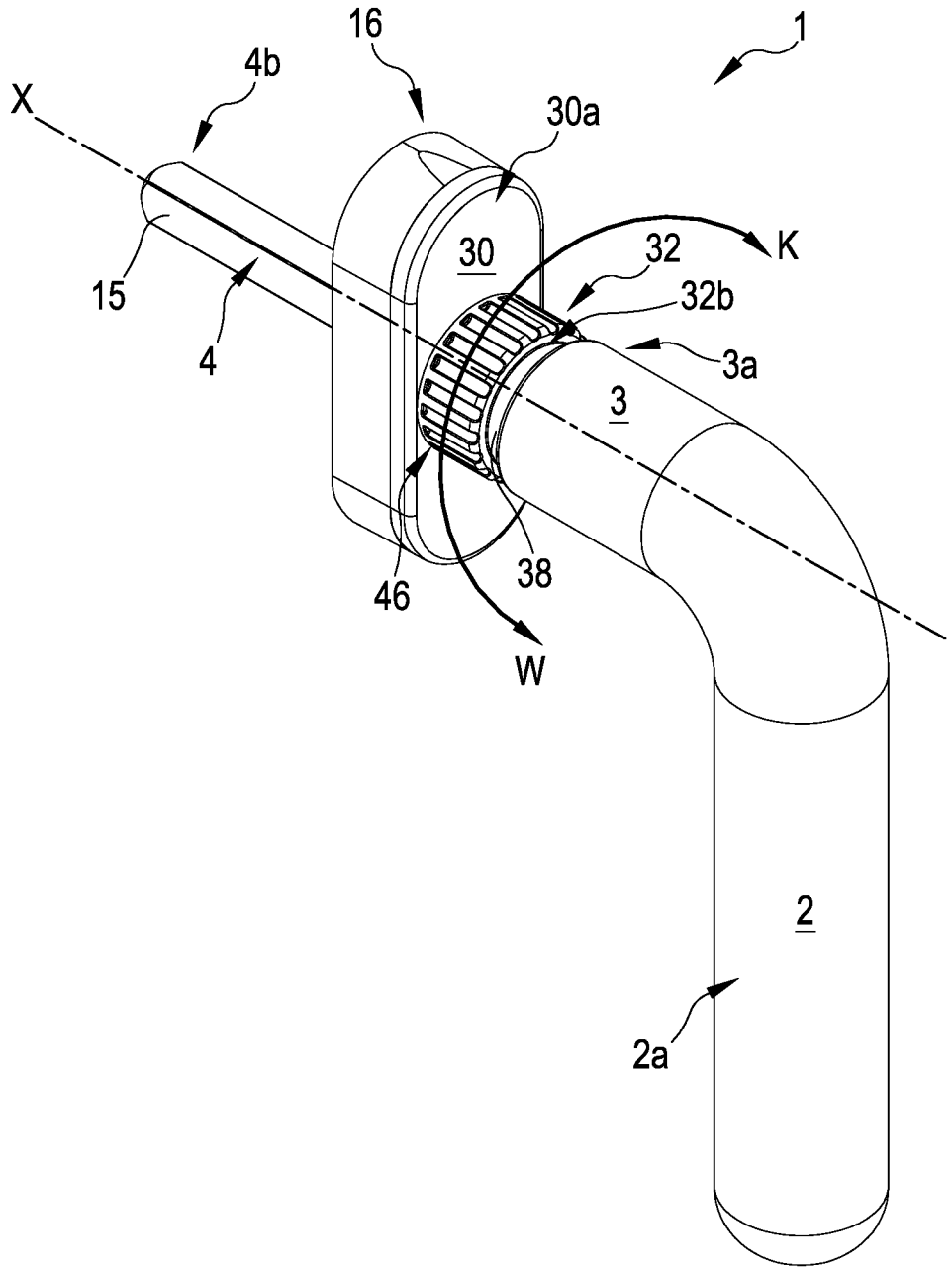
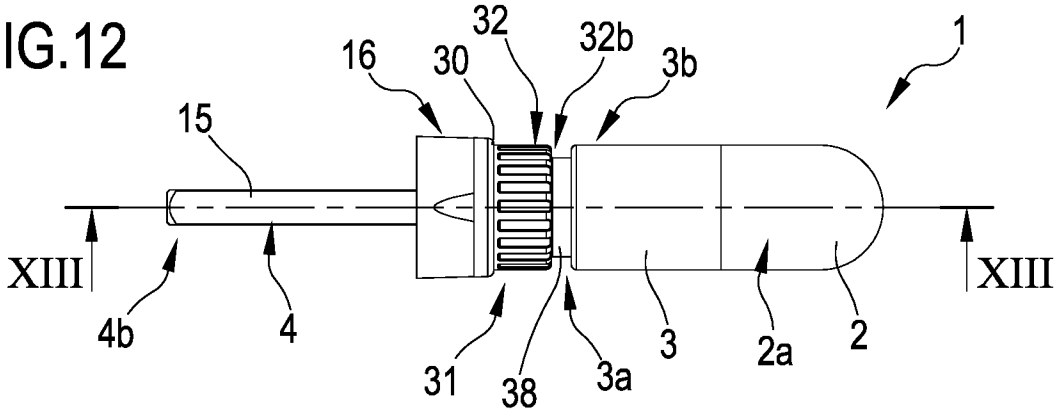


FIG.11

FIG.12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XIII
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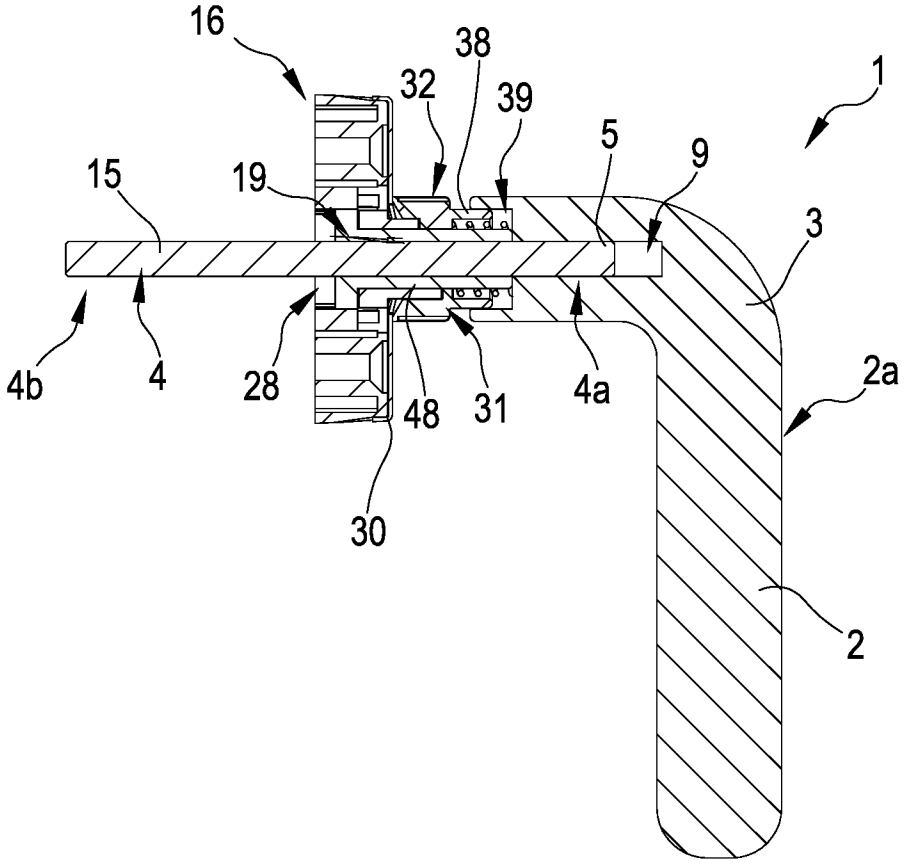
31
38
3a
3
2a
2
XIII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4b
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4a
2a
30
2

FIG.13

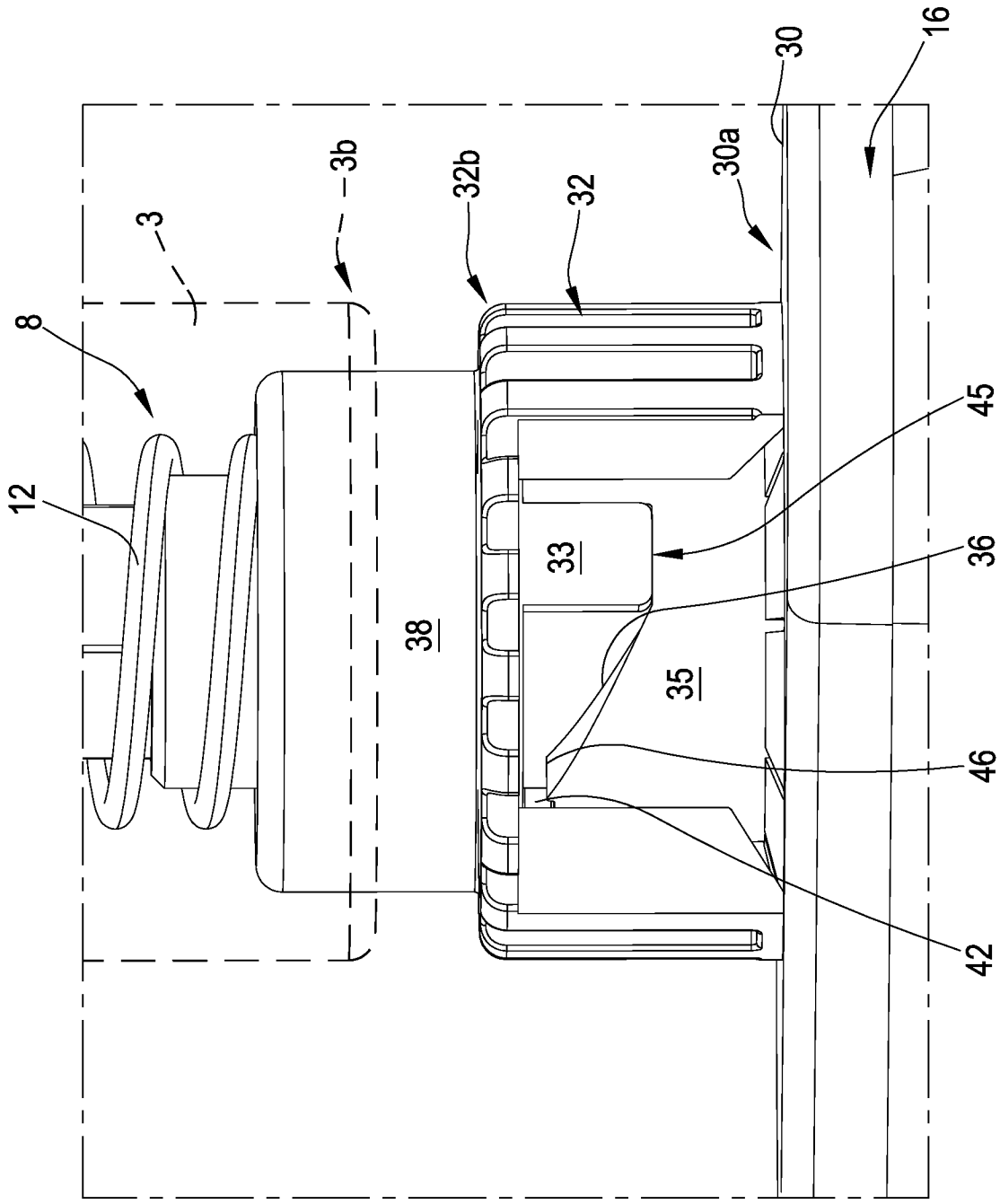


FIG.14

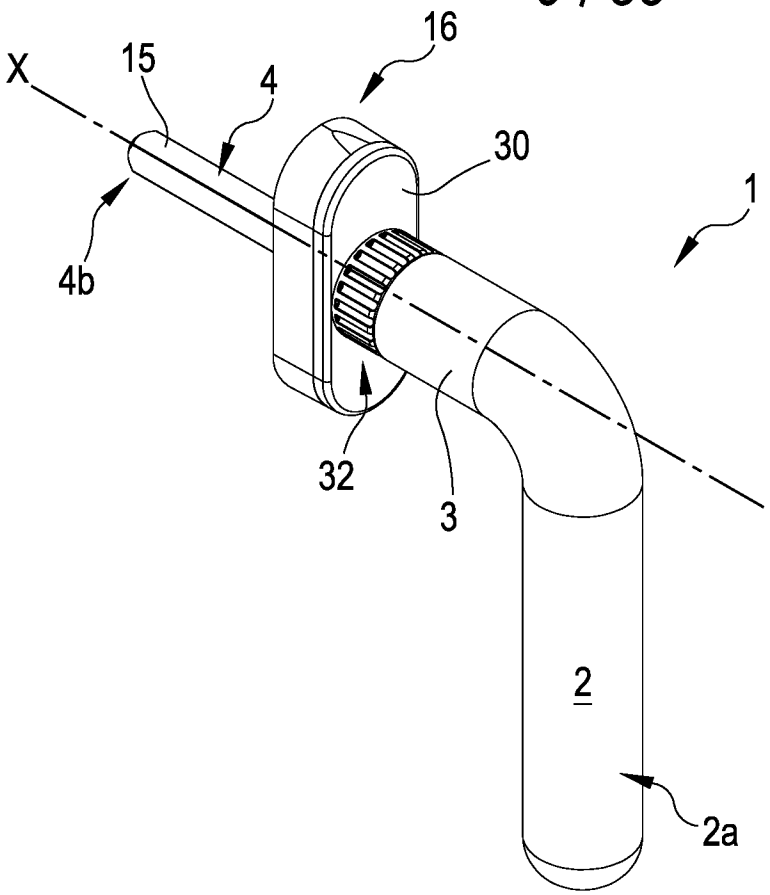


FIG.15

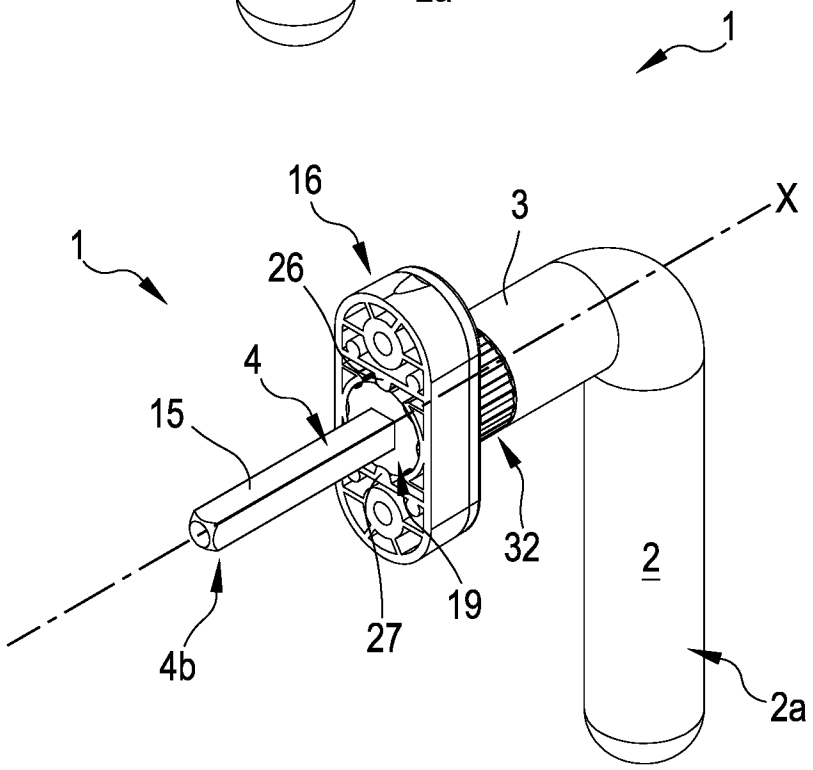
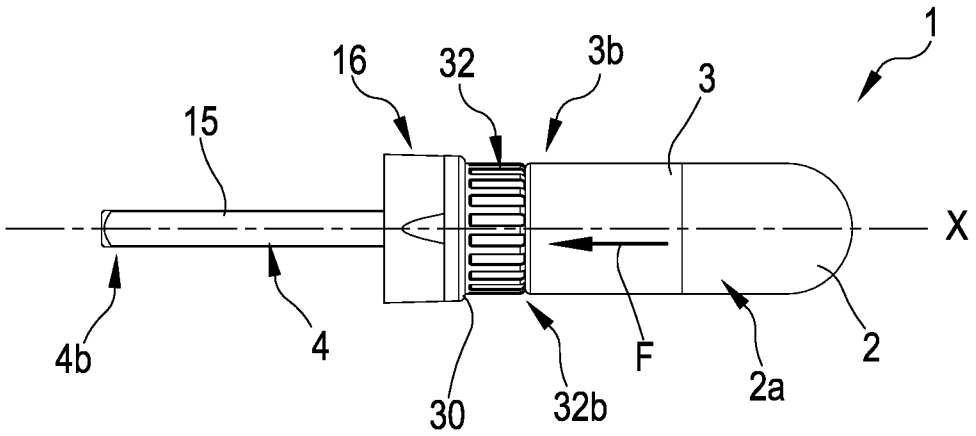


FIG.16

FIG.17



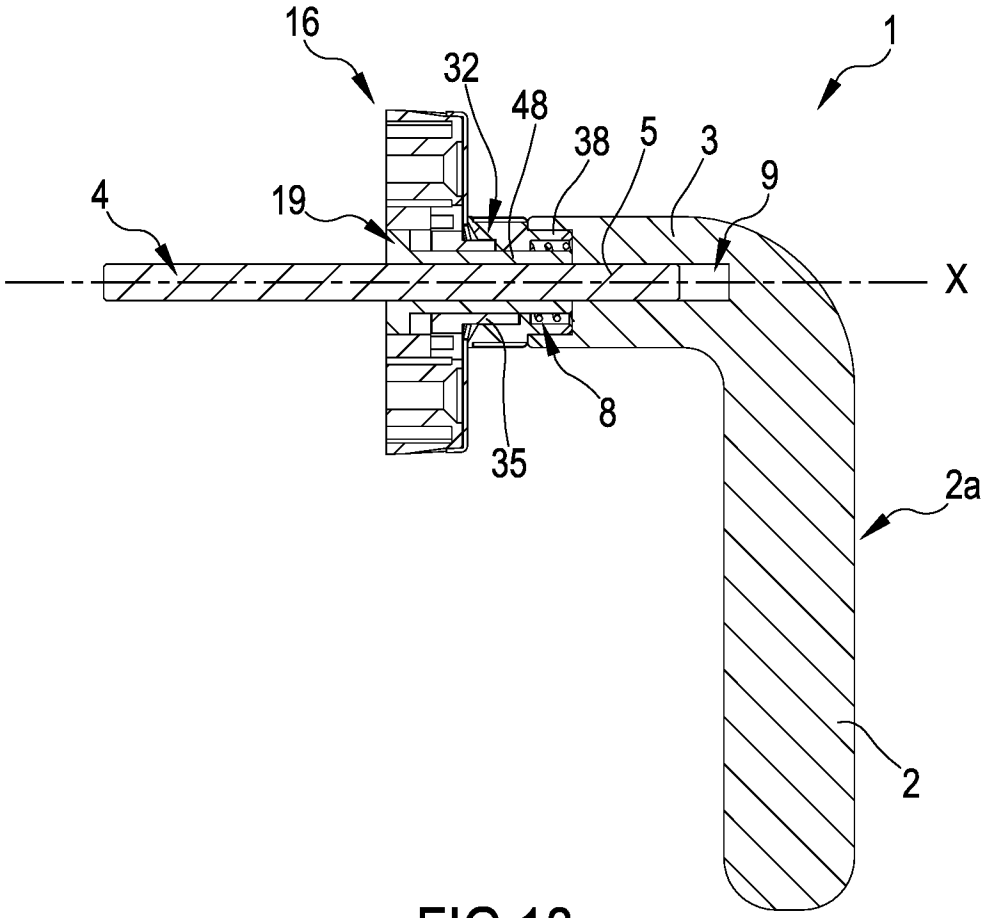


FIG.18

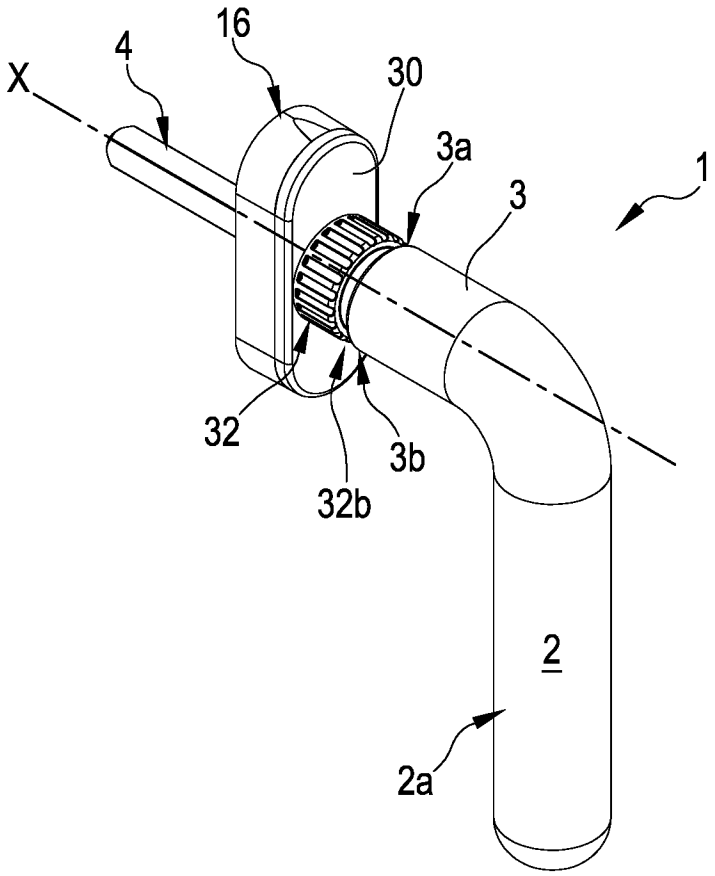


FIG.19

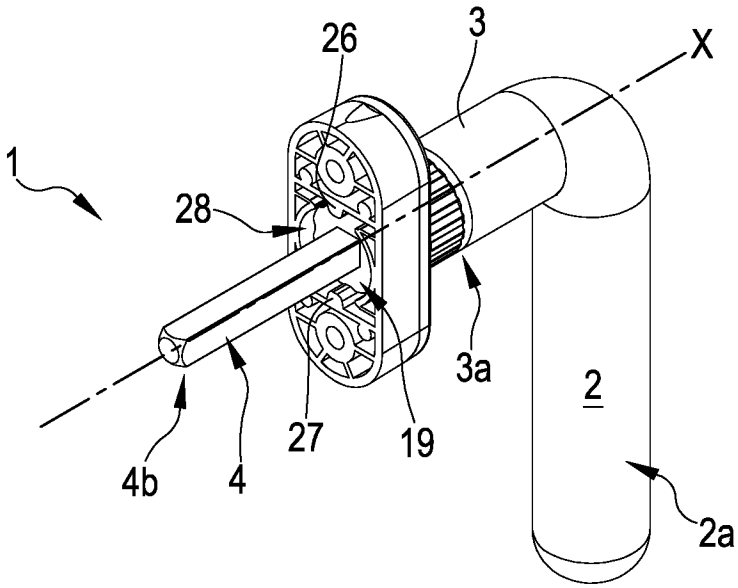


FIG.20

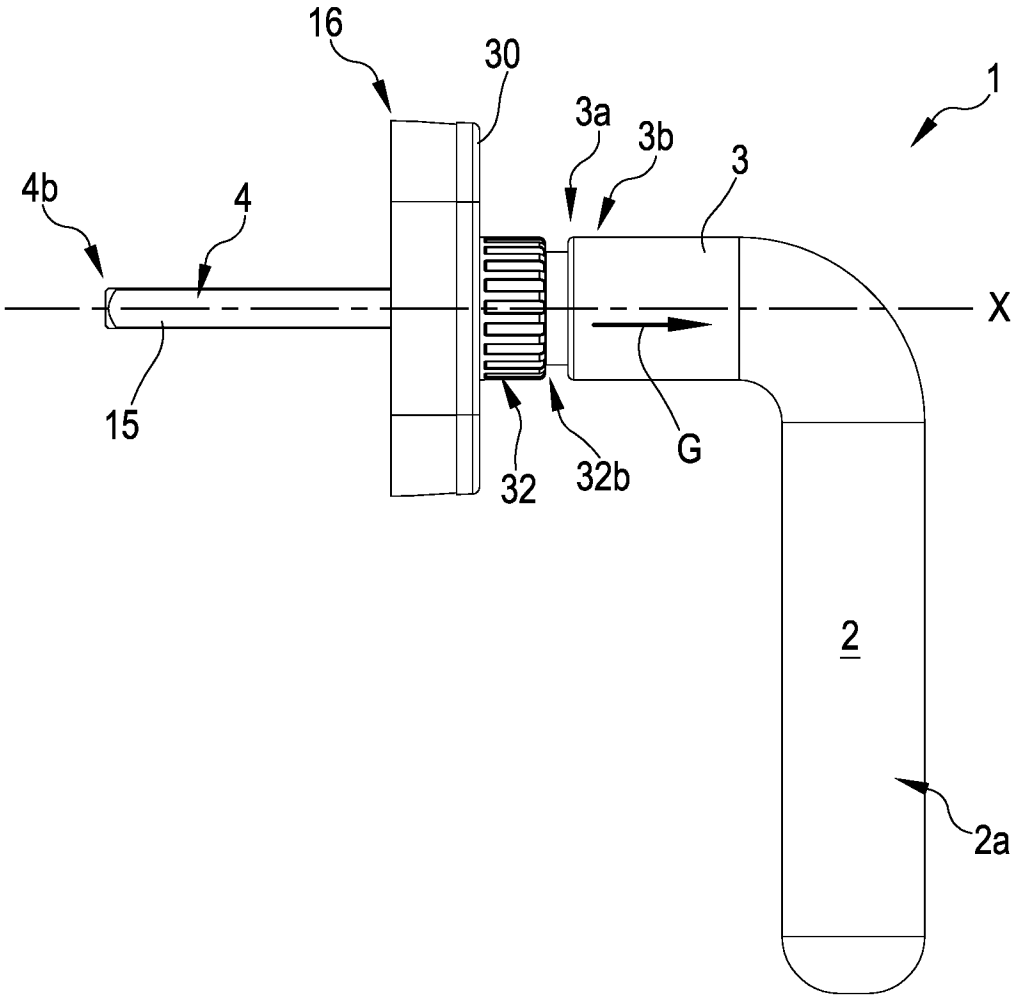


FIG.21

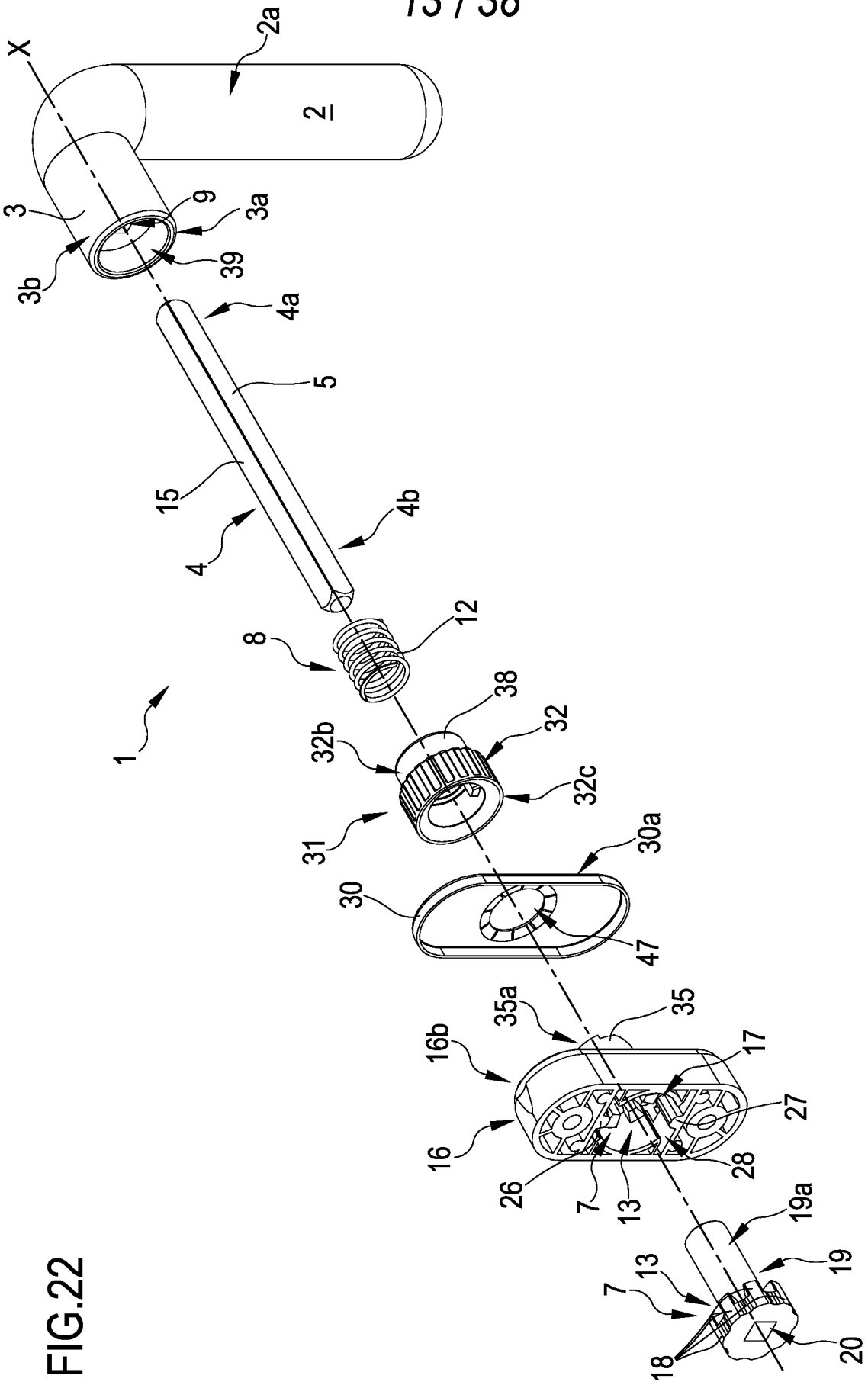

X
2a
2
3
9
3a
3b
39
4a
5
15
4
4b
8
12
1
38
32b
32
32c
31
30a
30
47
35a
35
16b
17
16
27
26
28
7
13
19a
19
7
13
18
20

FIG.22

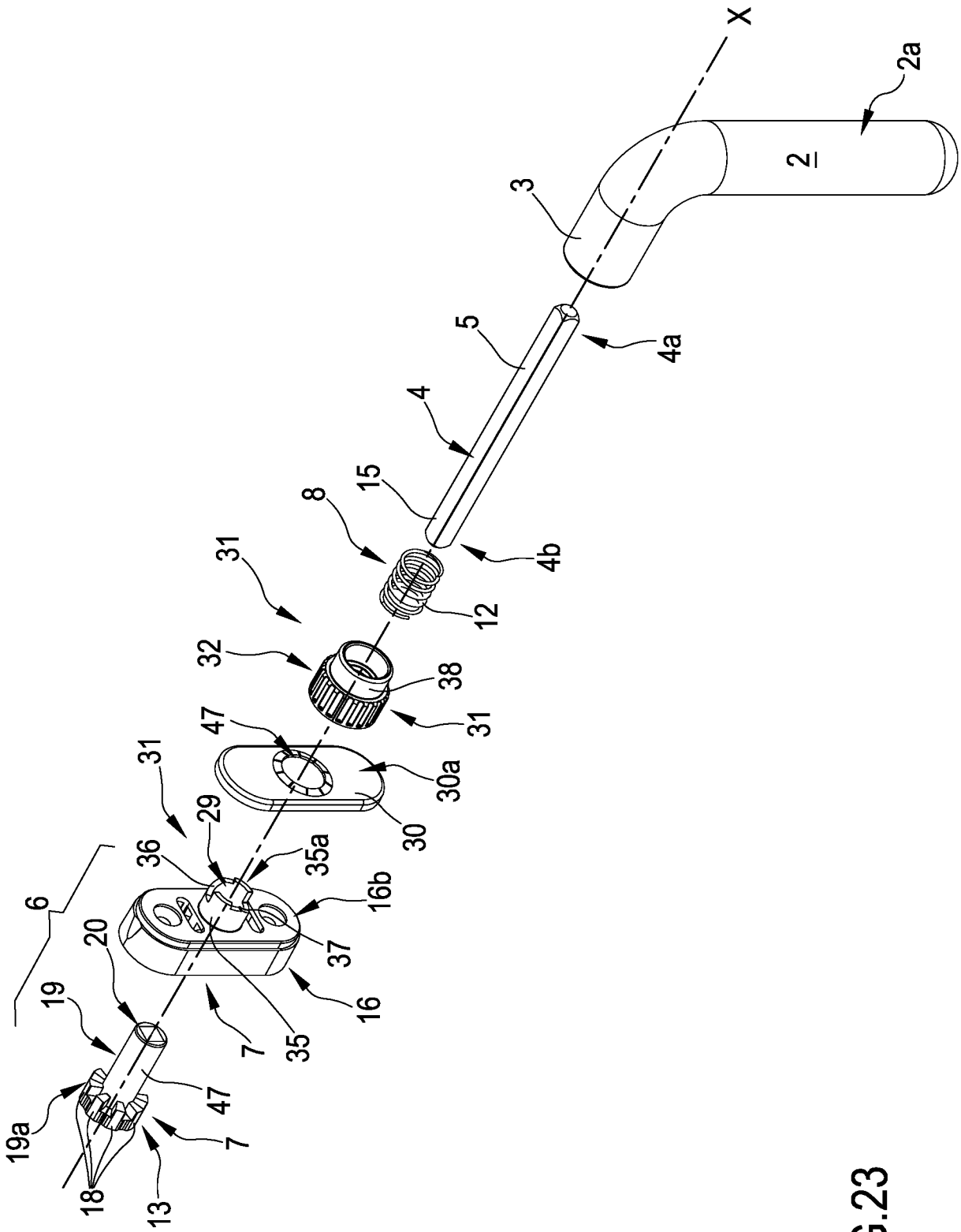

X
2a
2
3
5
4a
4
15
8
4b
31
12
32
38
31
47
30a
31
30
29
36
35a
16b
6
20
37
19
16
7
35
47
19a
7
18
13

FIG.23

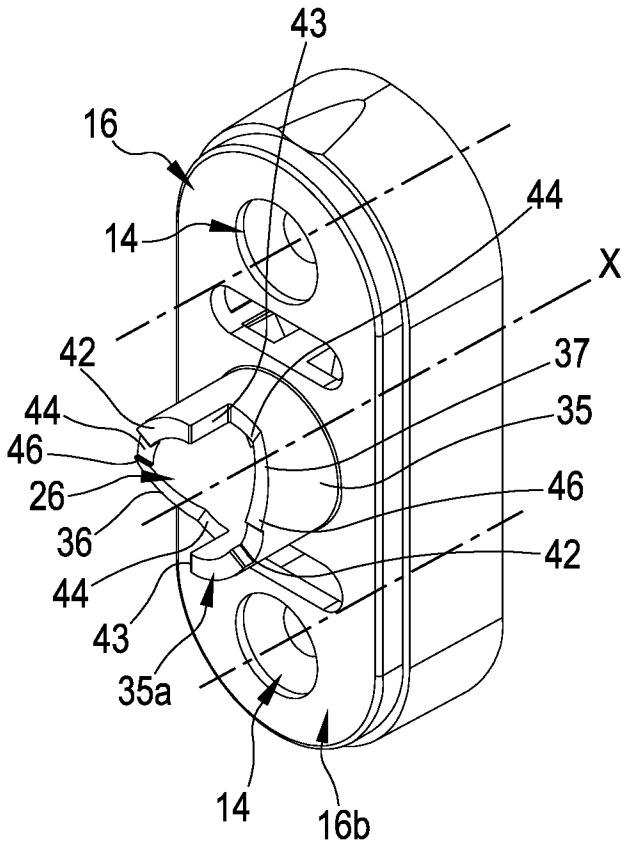

43
16
44
14
X
42
37
44
35
46
46
26
36
42
44
43
35a
14
16b

FIG.24

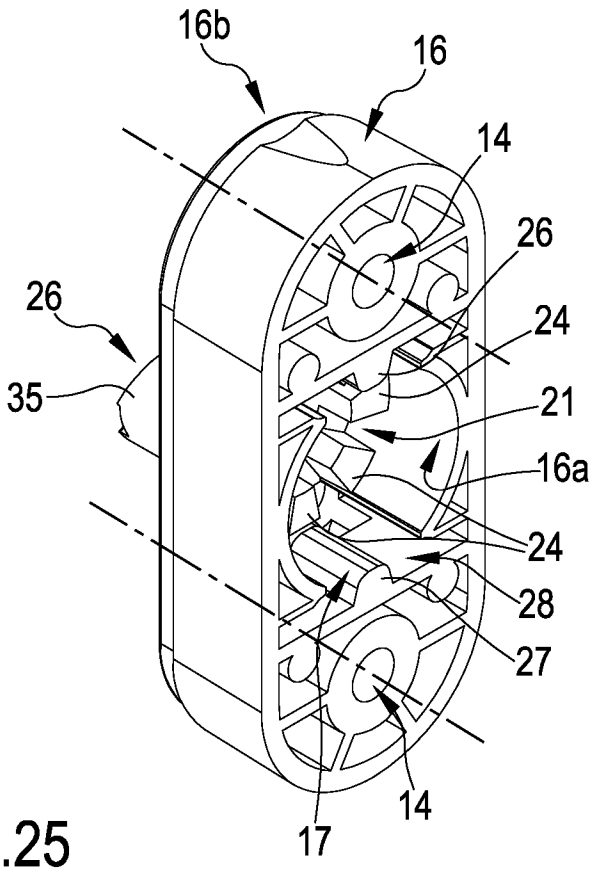

16b
16
14
26
26
24
35
21
16a
24
28
27
14
17

FIG.25

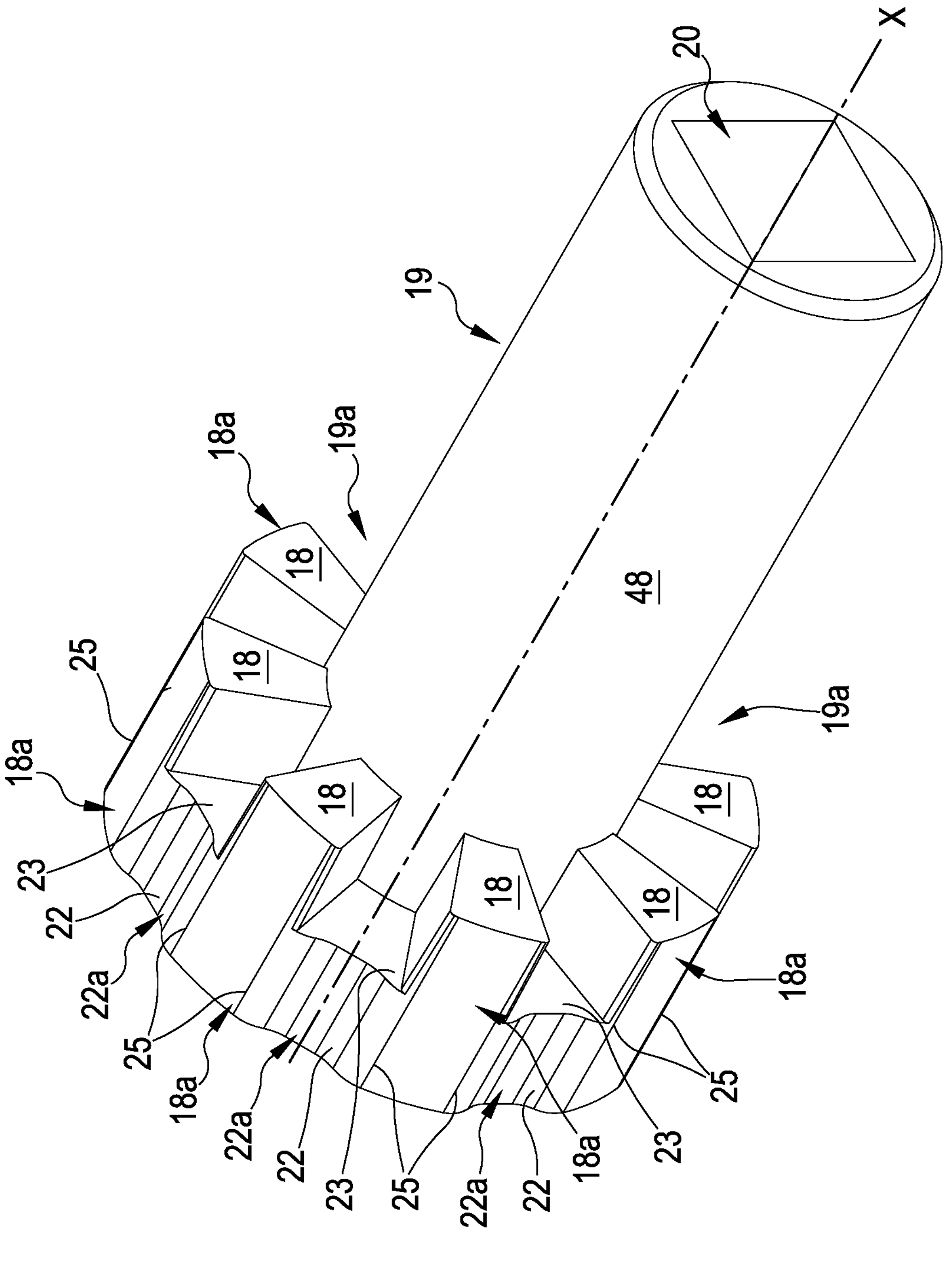

X
20
19
18a
19a
18
18
25
18a
18
48
19a
23
22
22a
18
18
18
18a
25
18a
22a
22
23
25
22a
22
18a
23
25

FIG.26

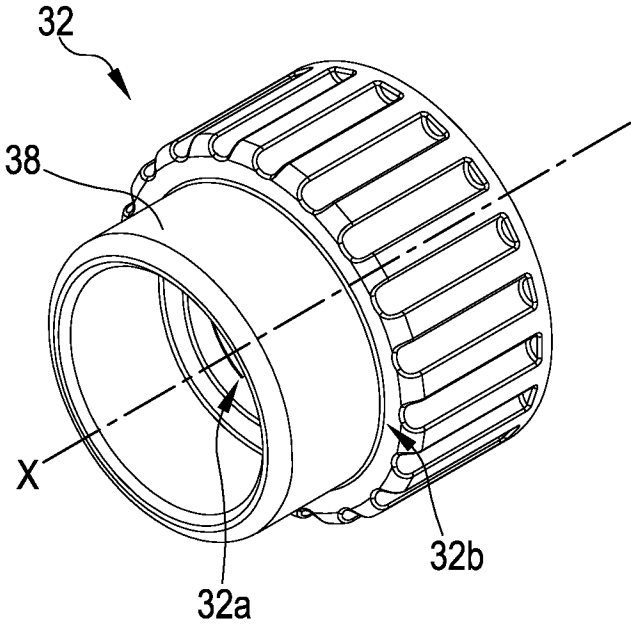


FIG.27

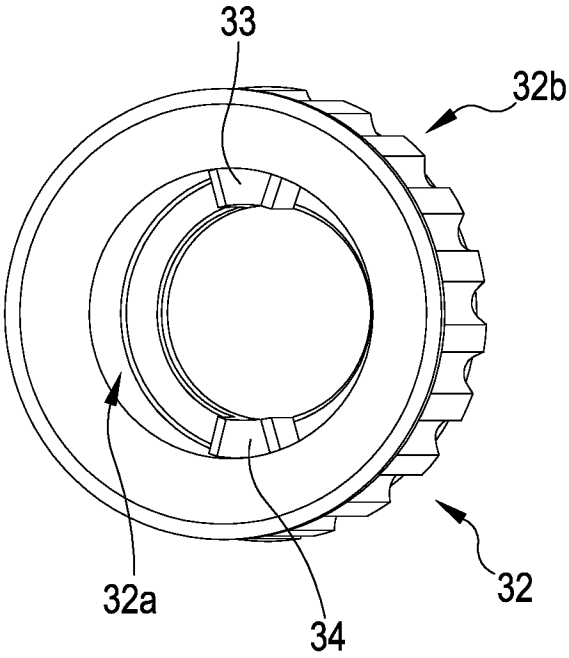


FIG.28

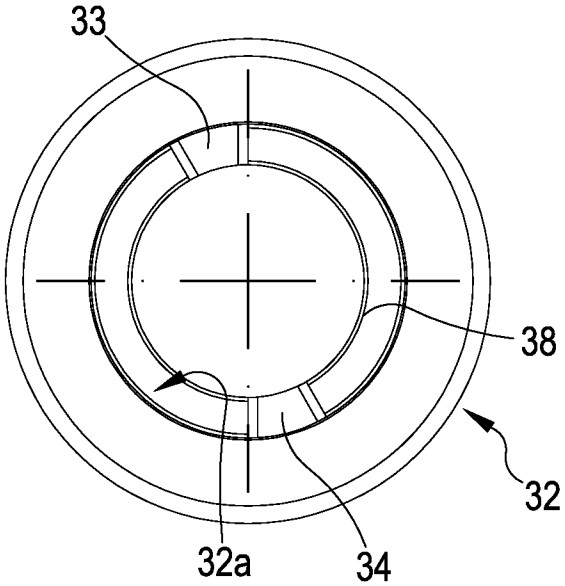


FIG.29

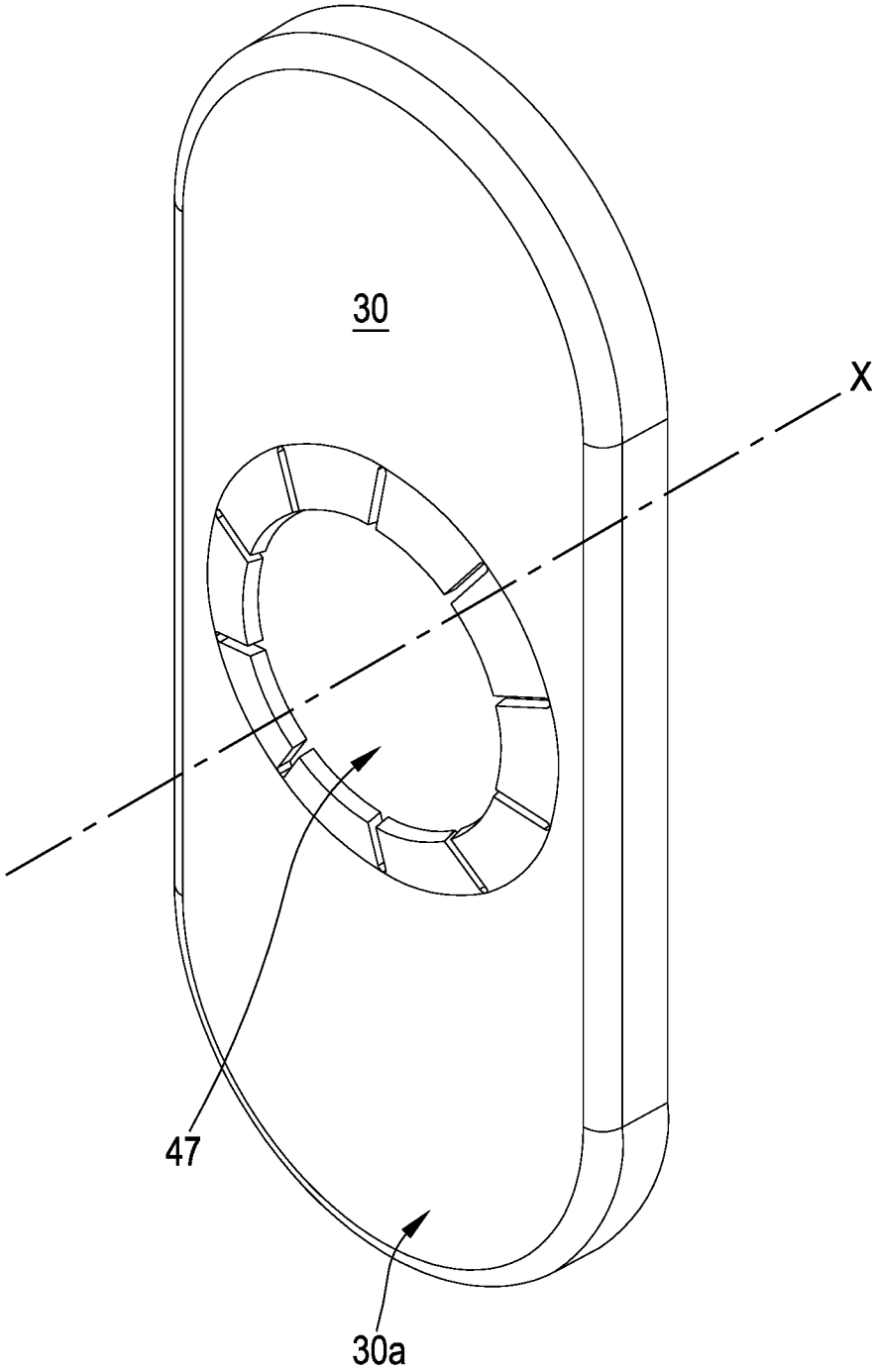


FIG.30

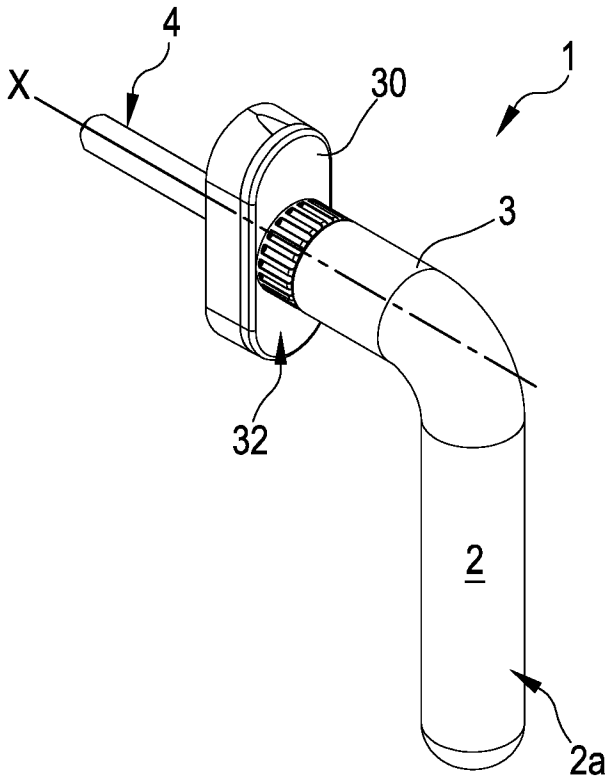
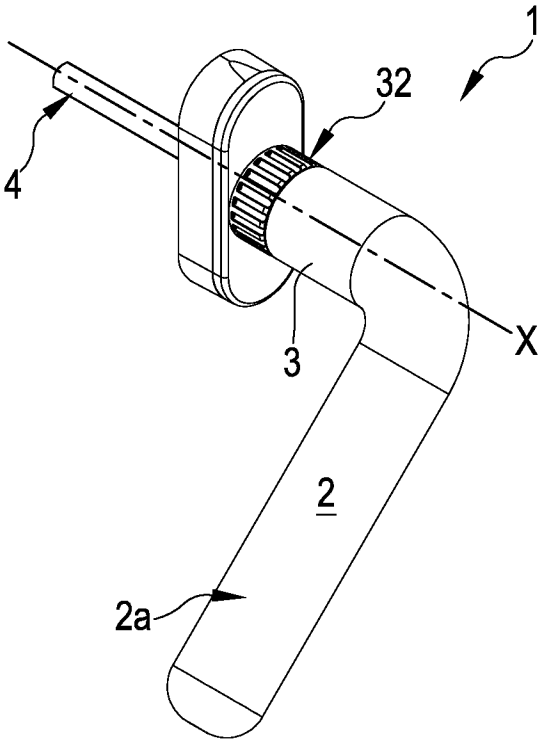


FIG.31



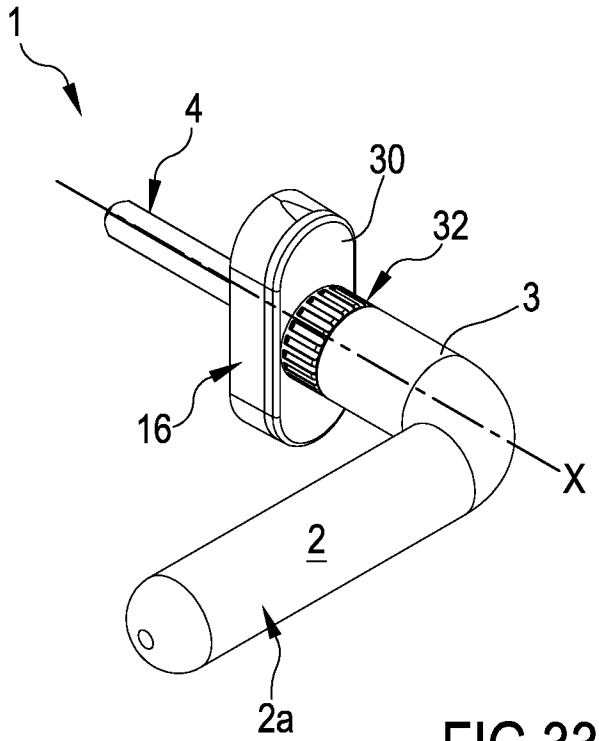


FIG.32

FIG.33

FIG.34

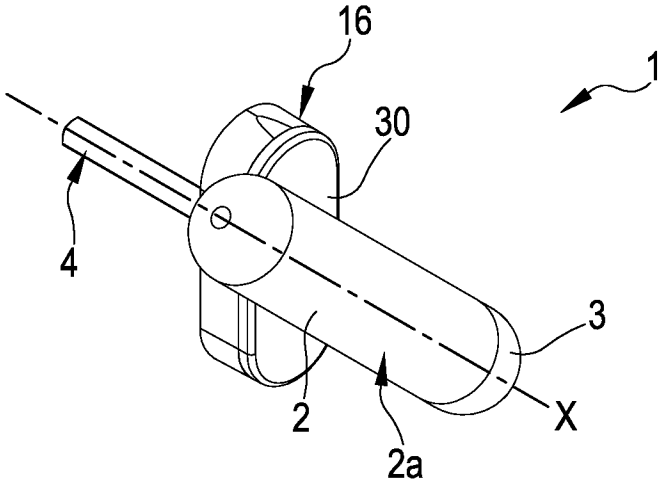
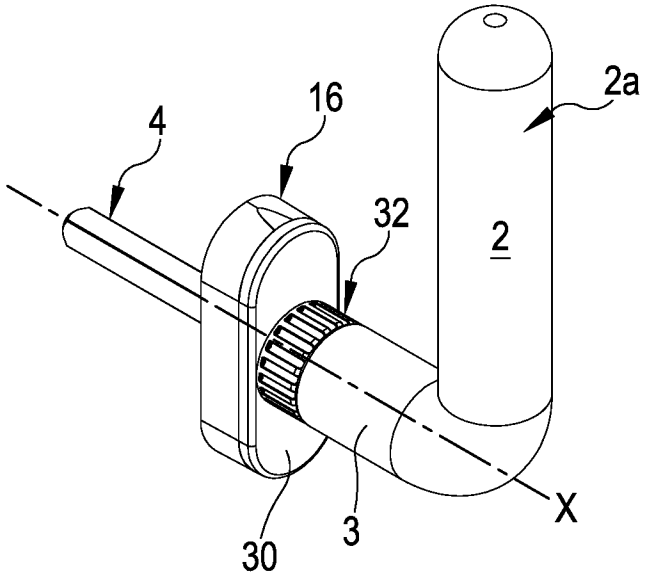


FIG.35



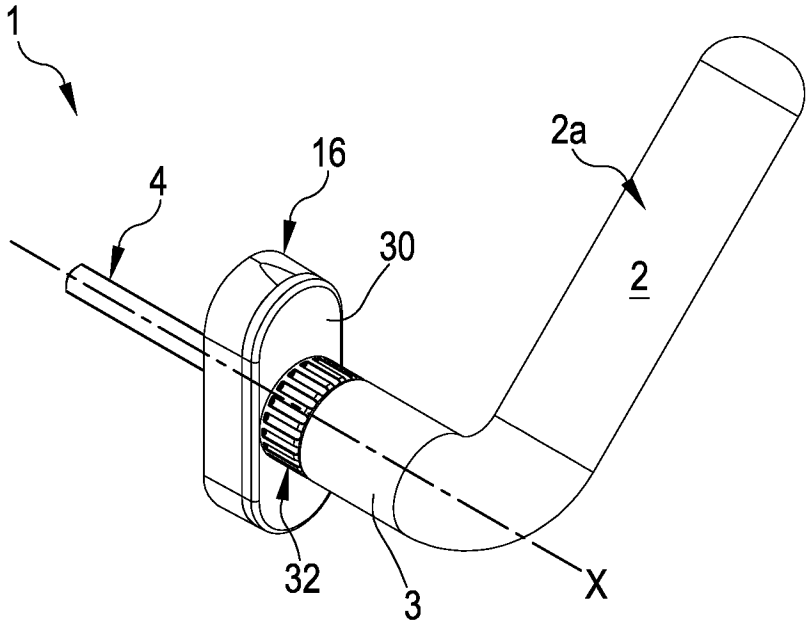


FIG.36

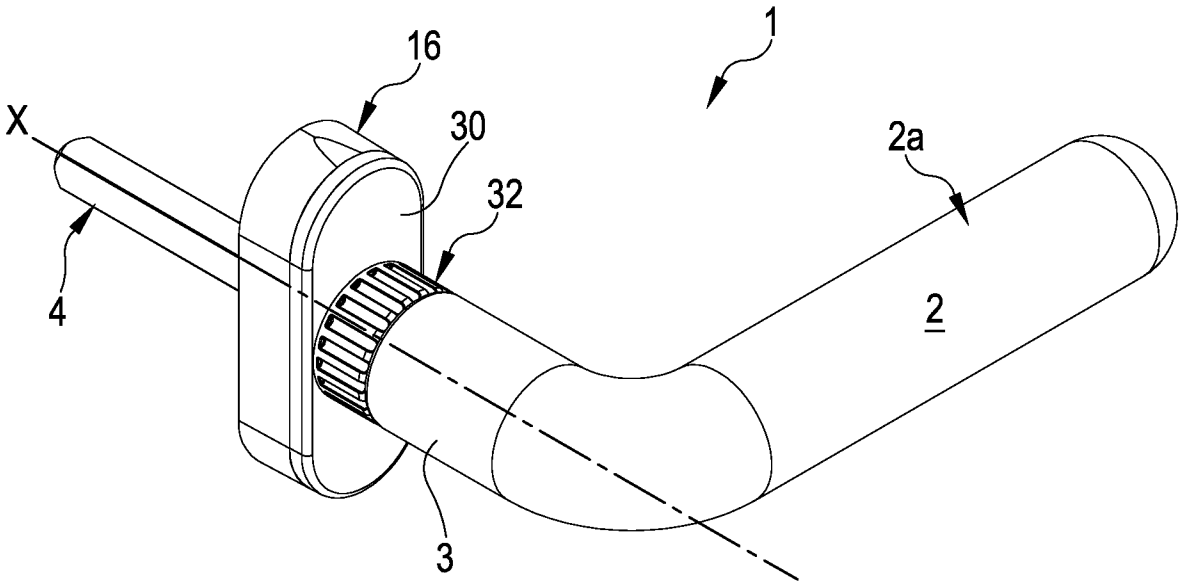


FIG.37

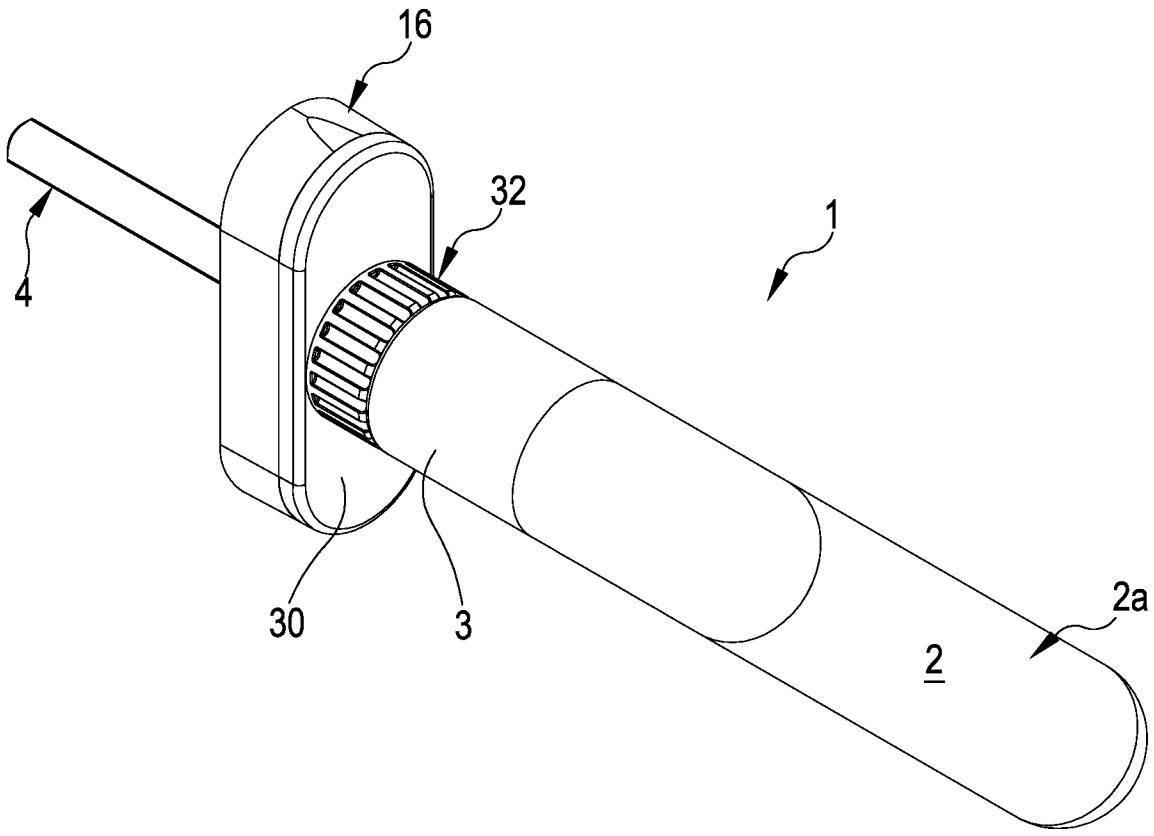


FIG.38

FIG.39

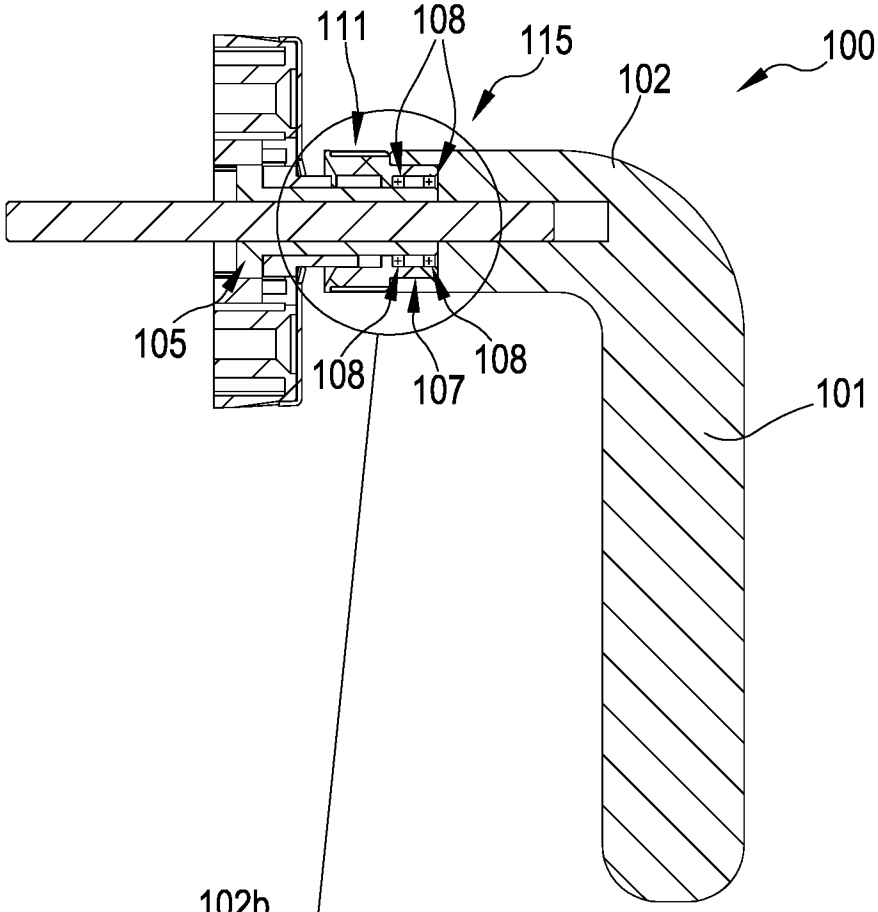


FIG.39A

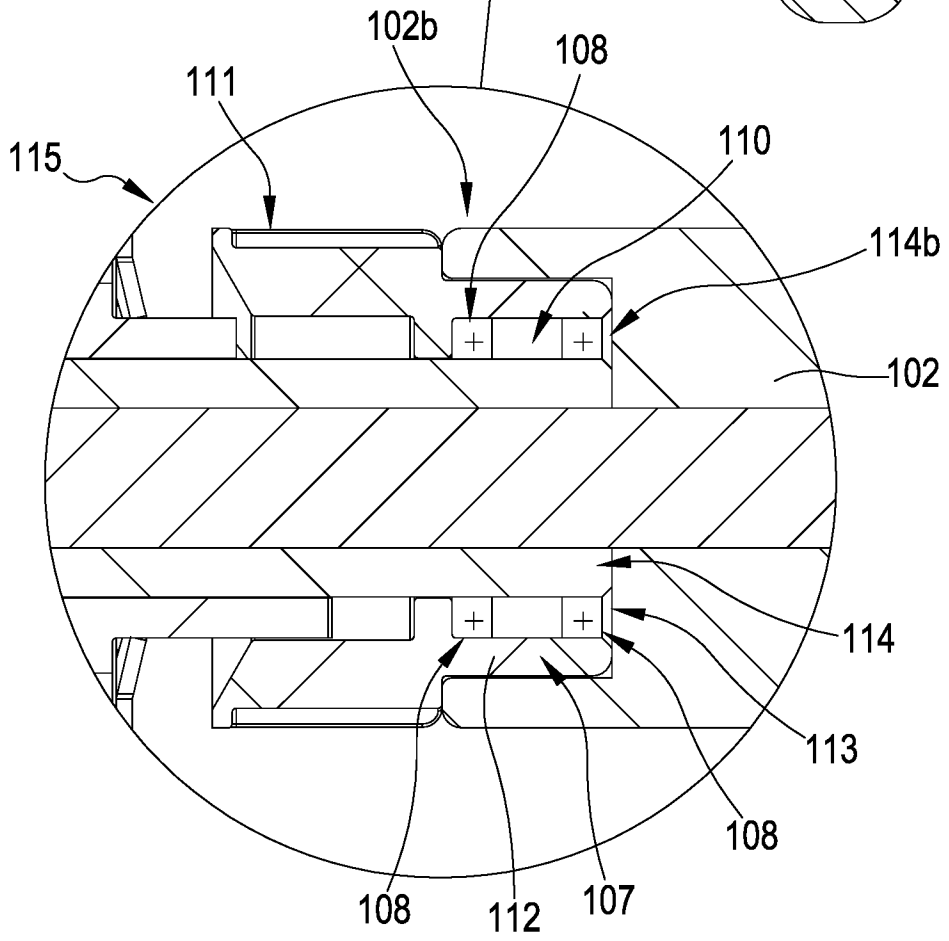
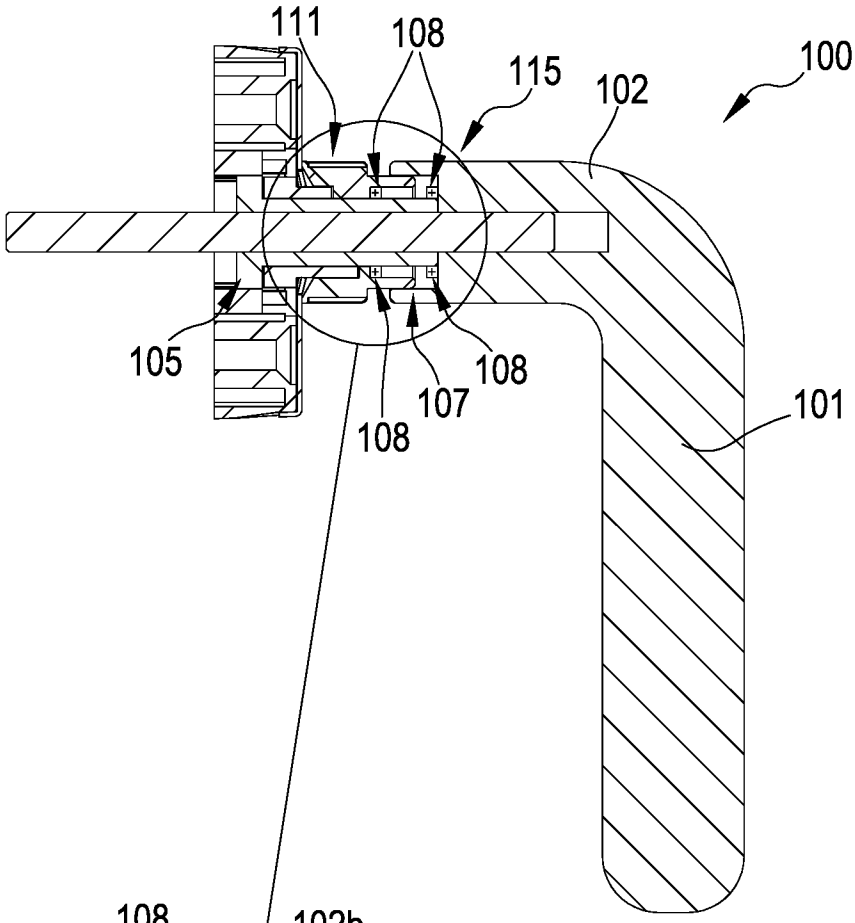


FIG.40



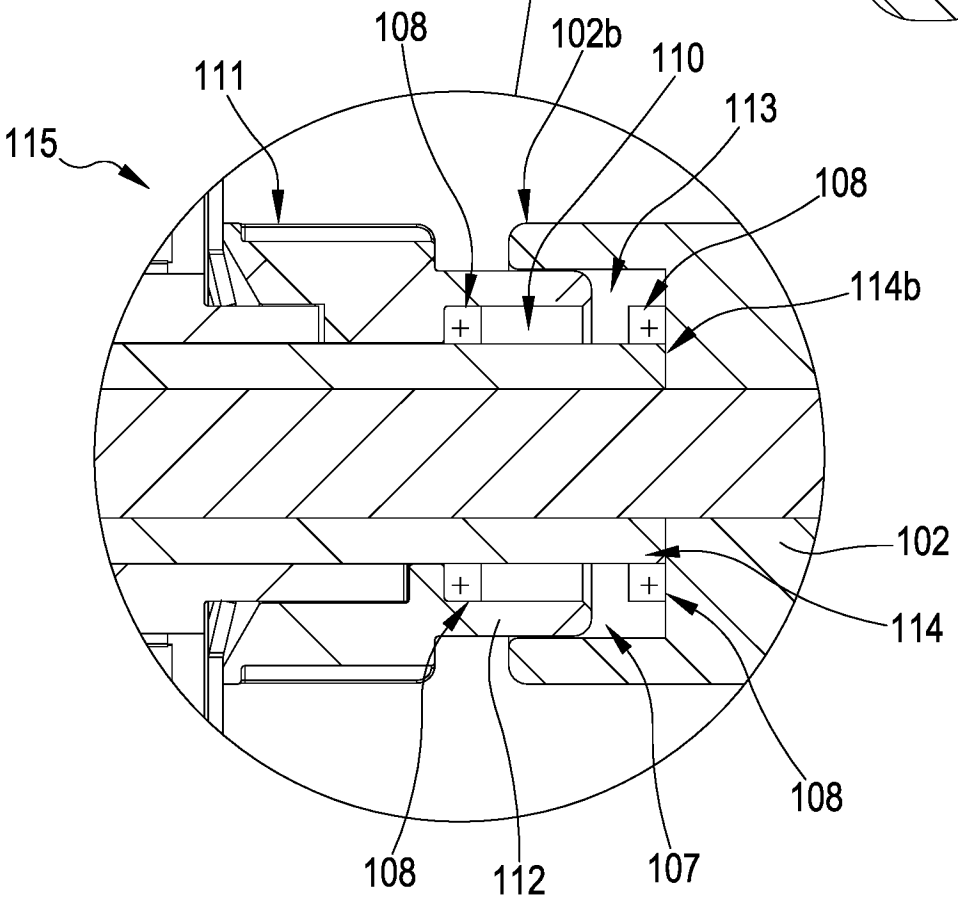


FIG.40A

FIG.41

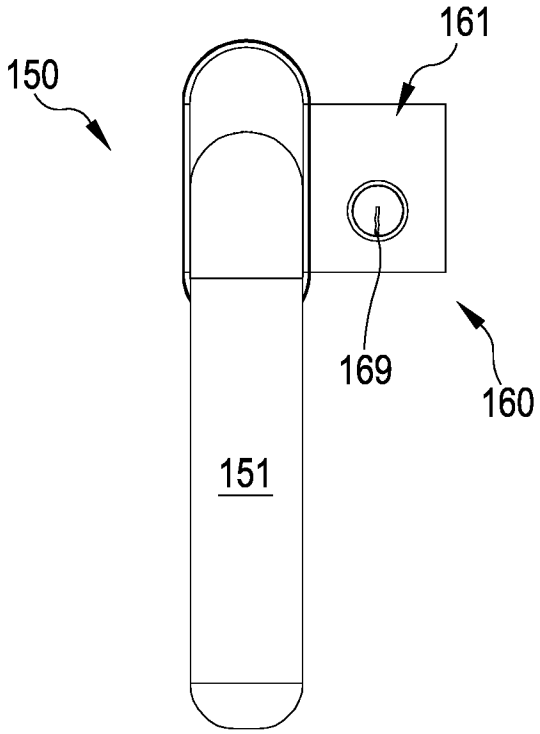
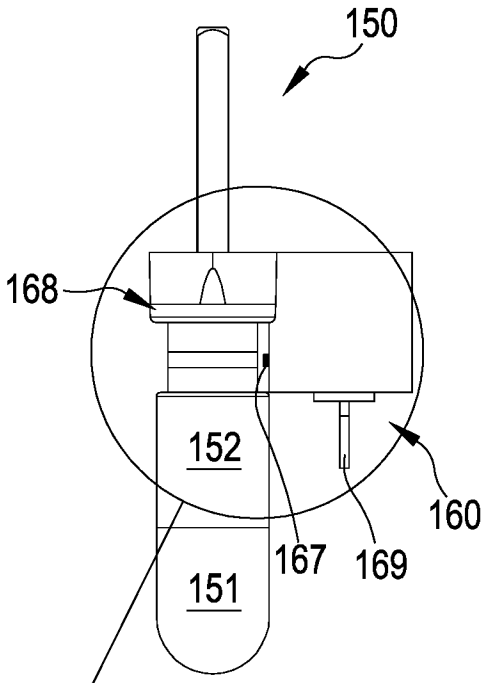


FIG.42



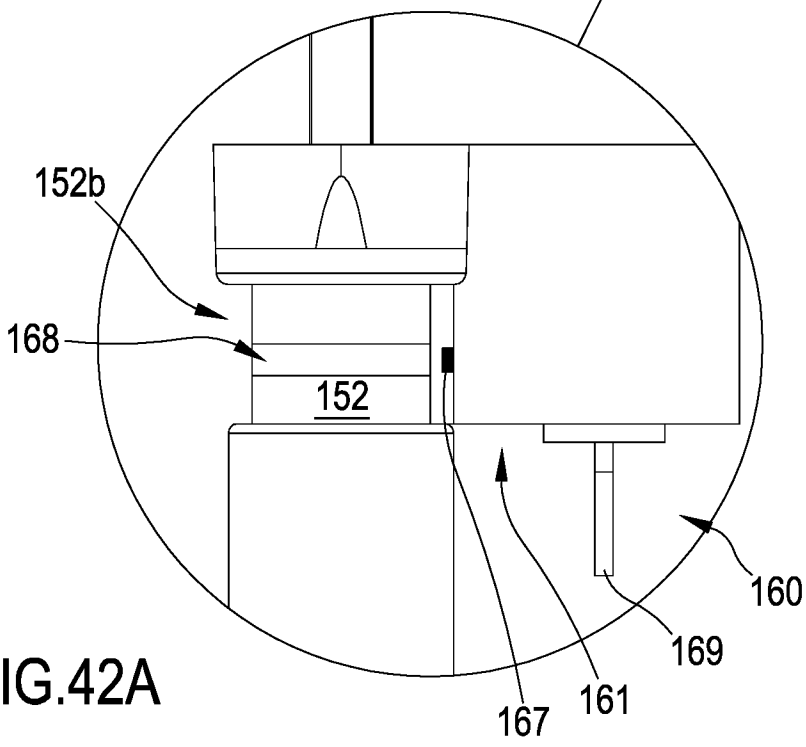


FIG.42A

FIG.43

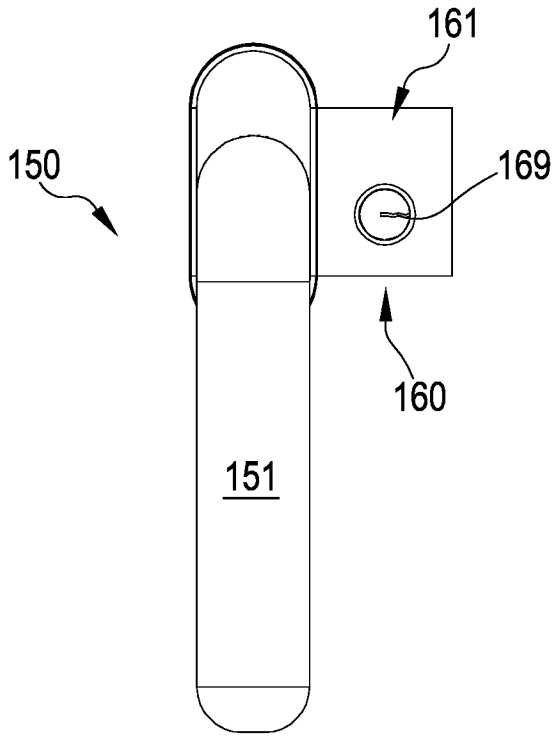
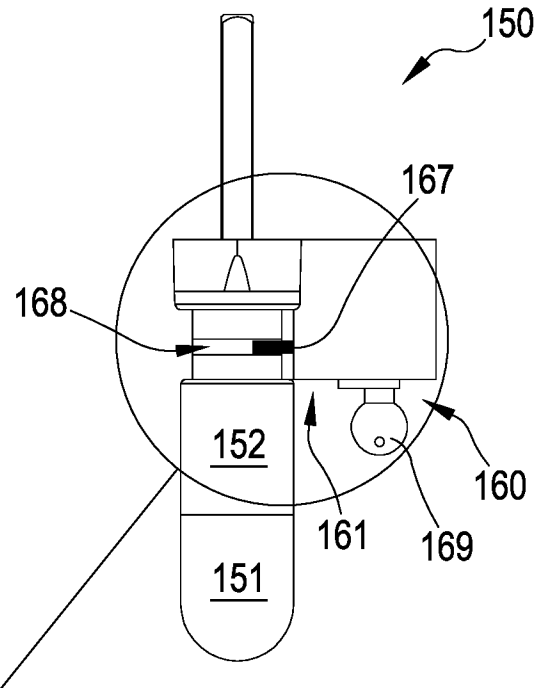


FIG.44



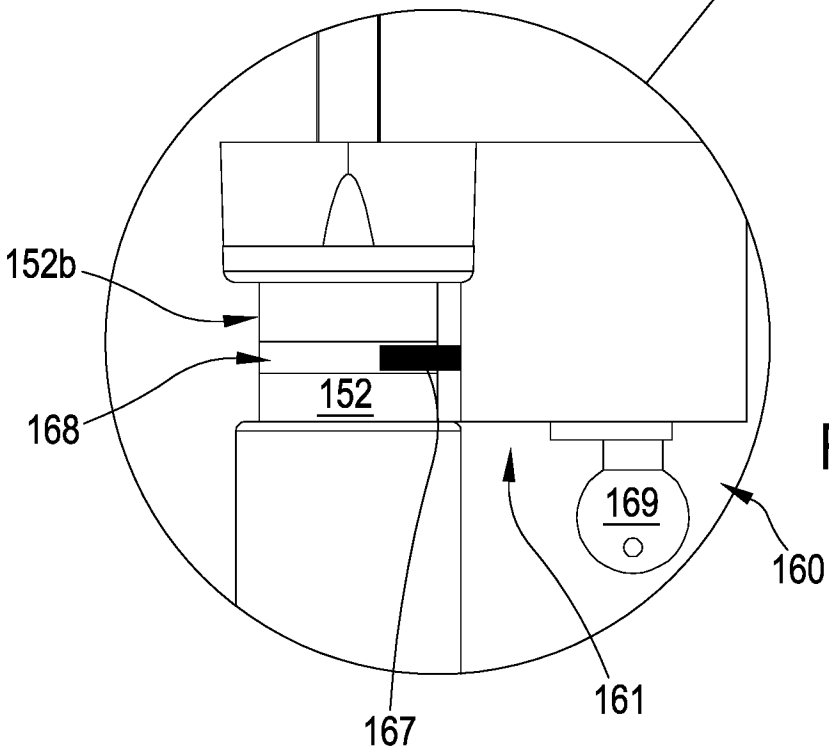
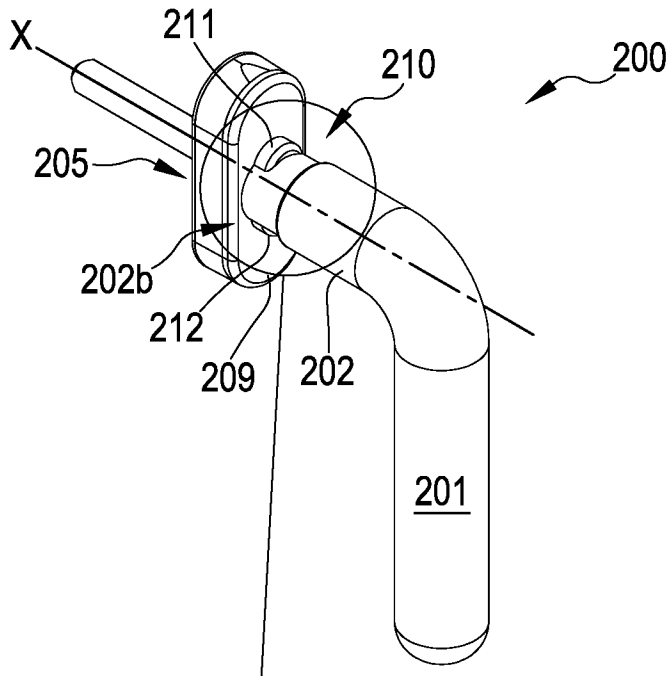


FIG.44A

FIG.45



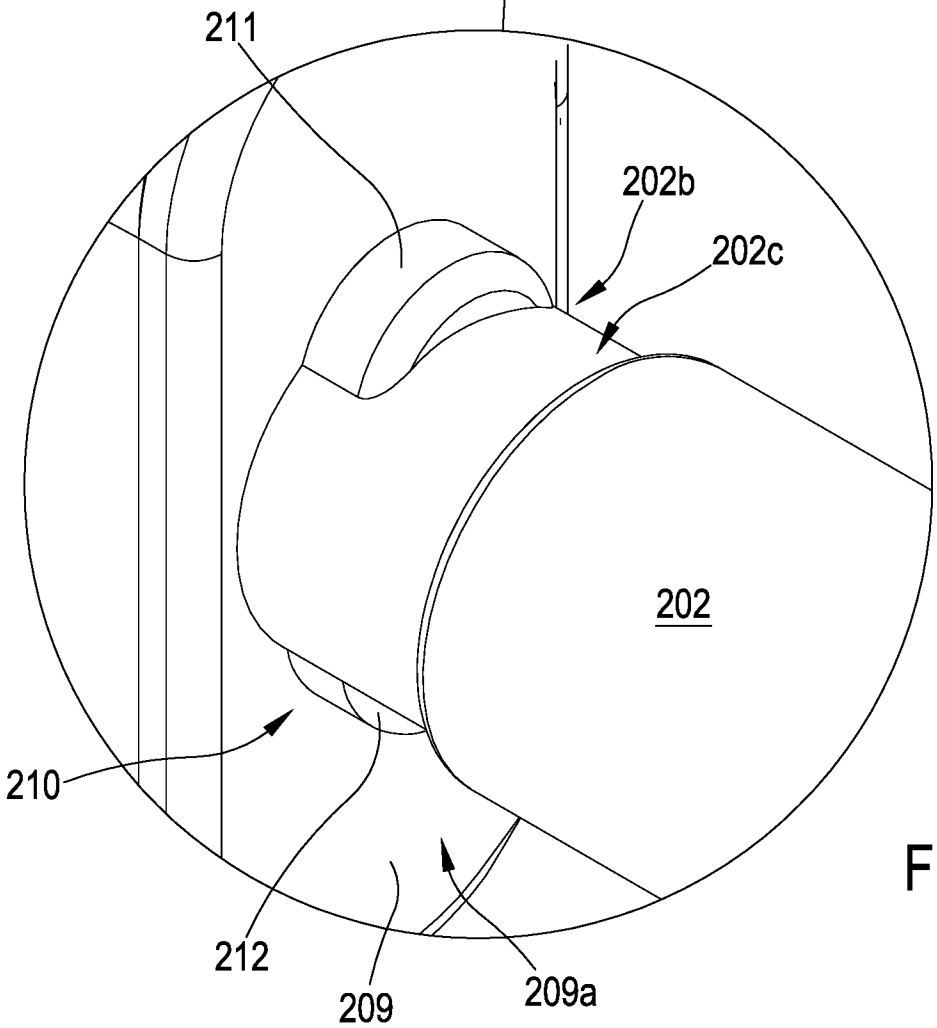
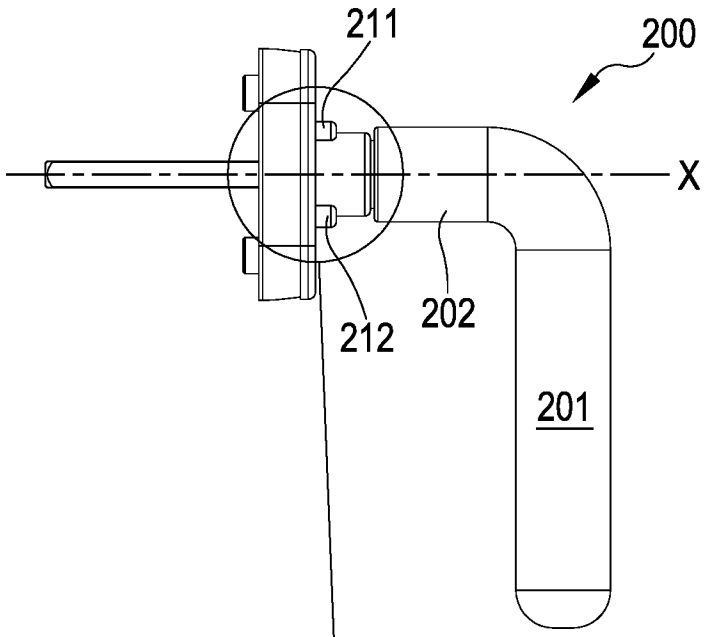


FIG.45A

FIG.46



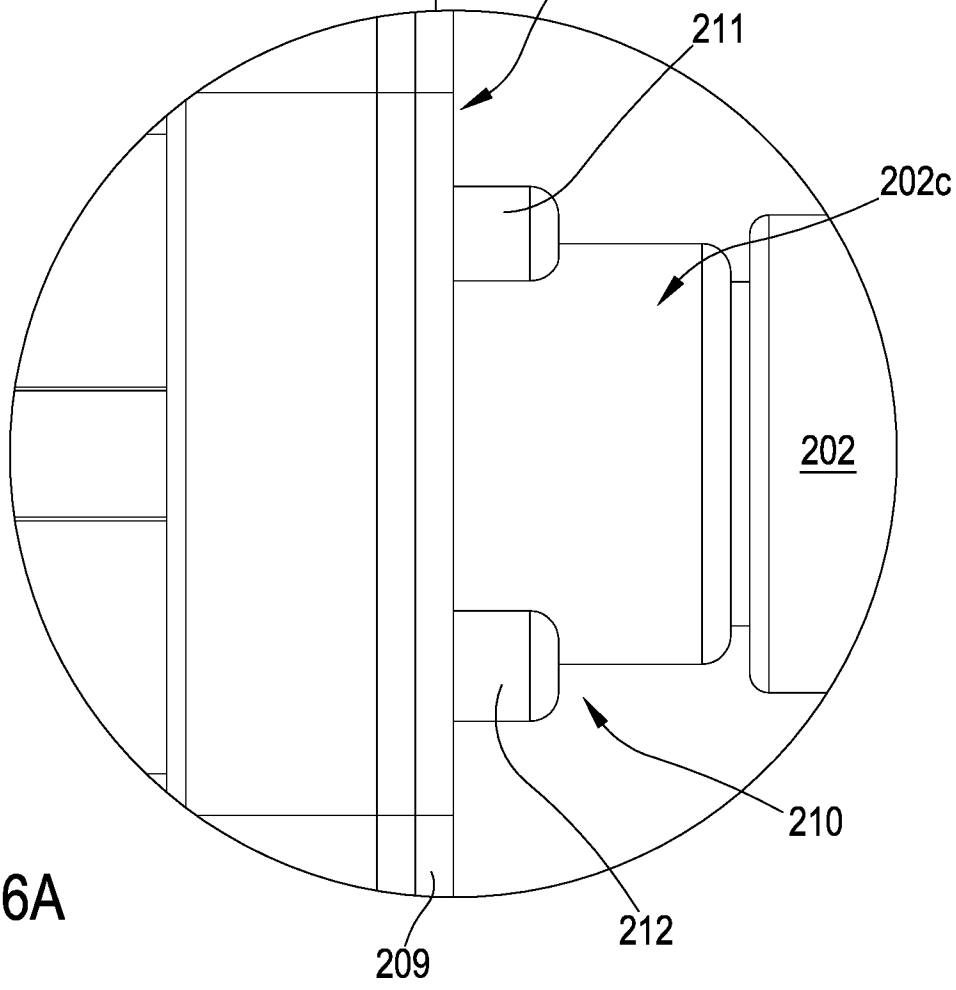
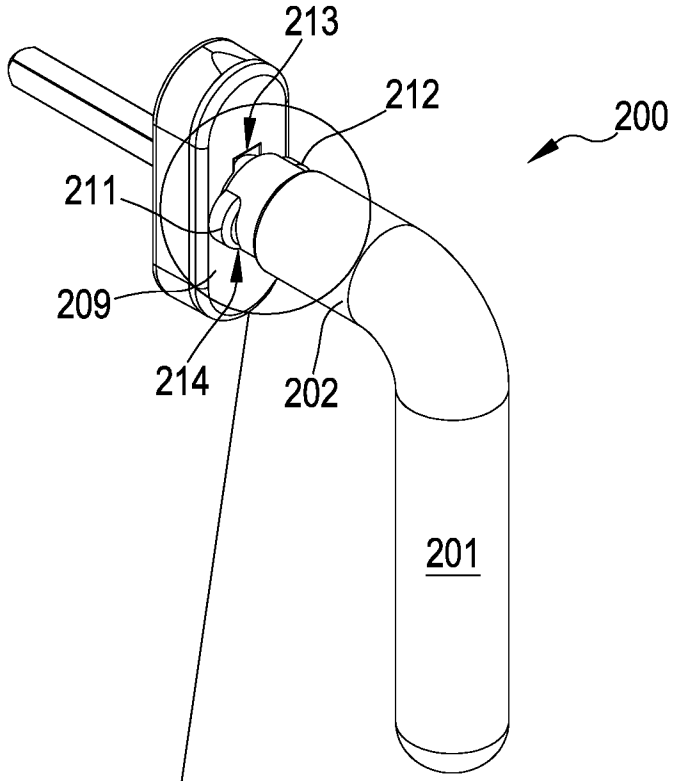


FIG.46A

FIG.47



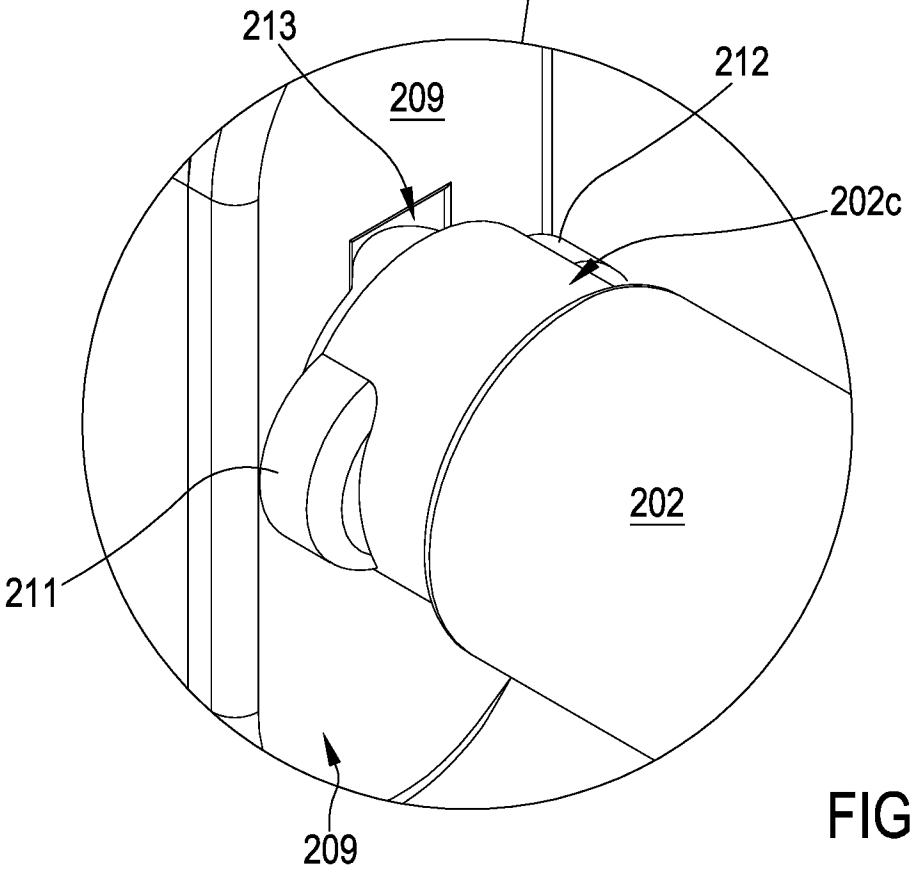
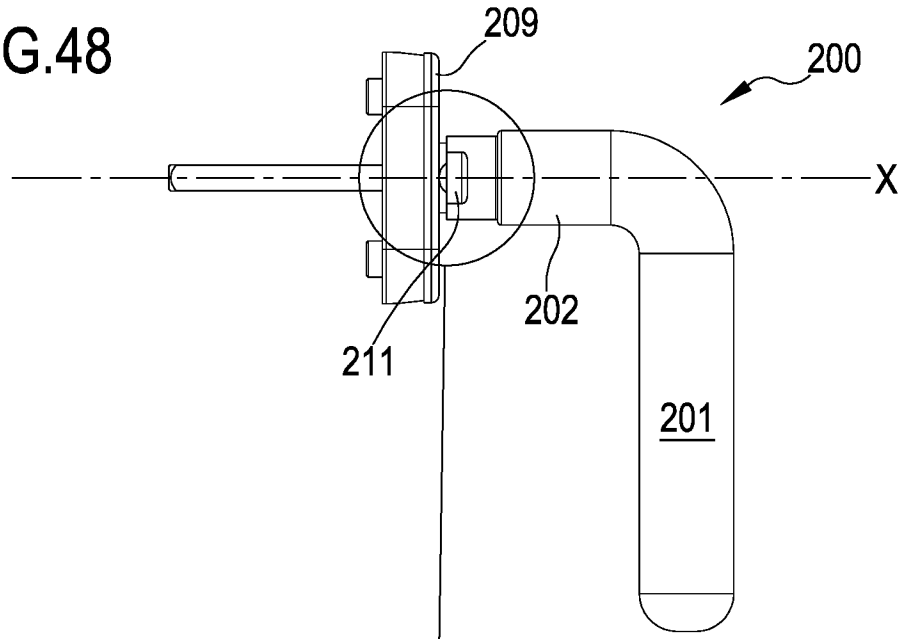


FIG.47A

FIG.48



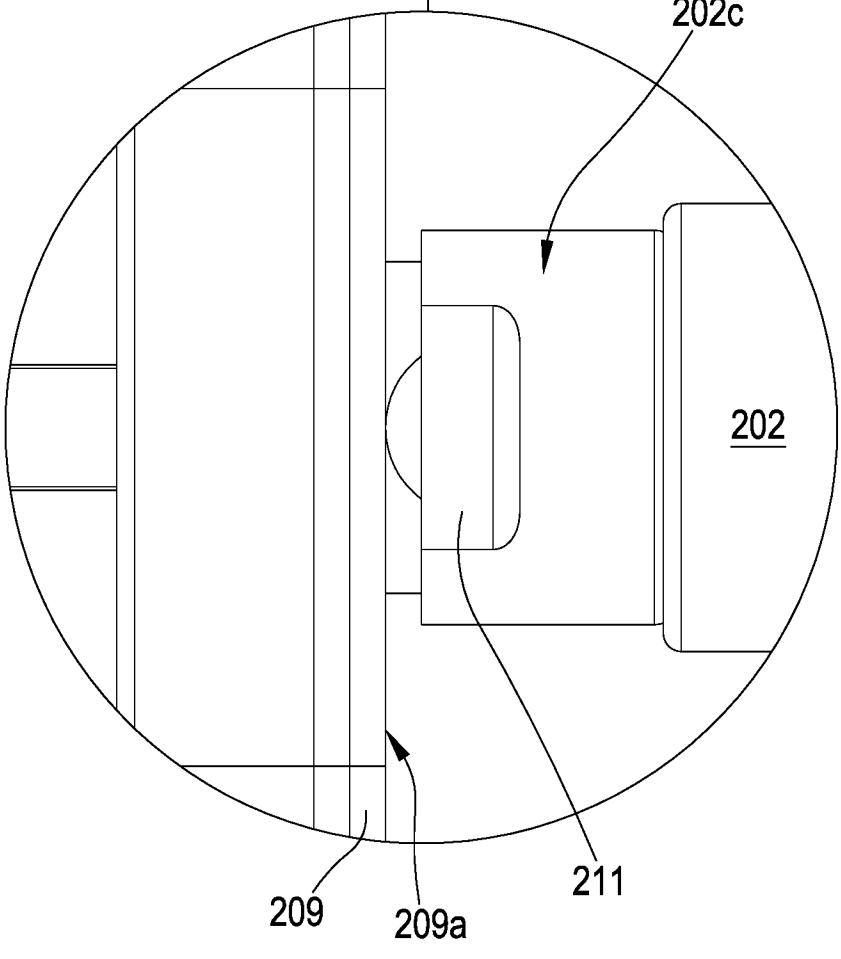


FIG.48A

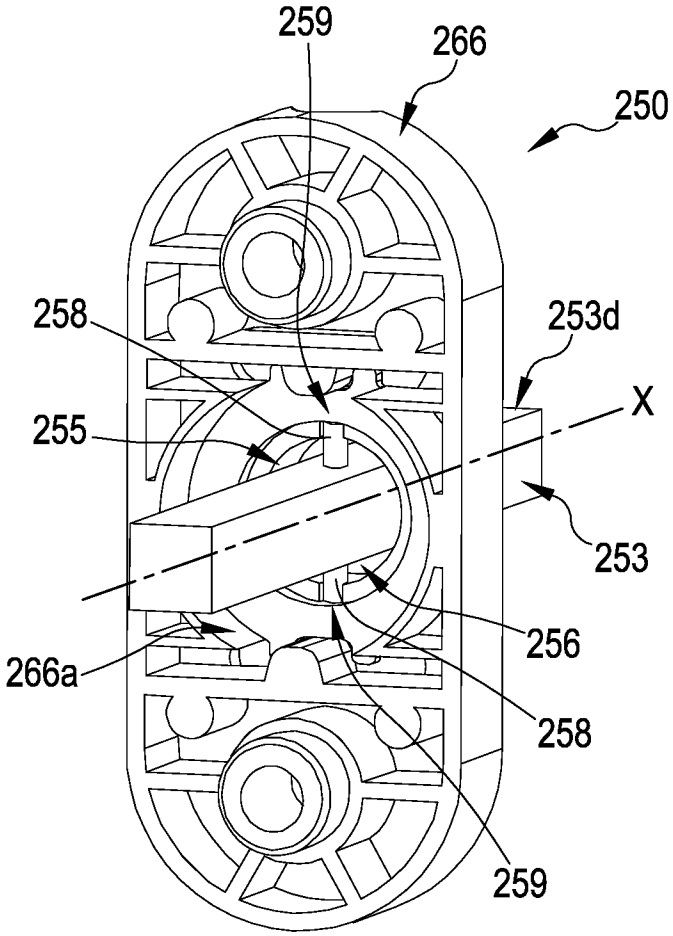

259
266
250
258
253d
X
255
253
256
266a
258
259

FIG.49

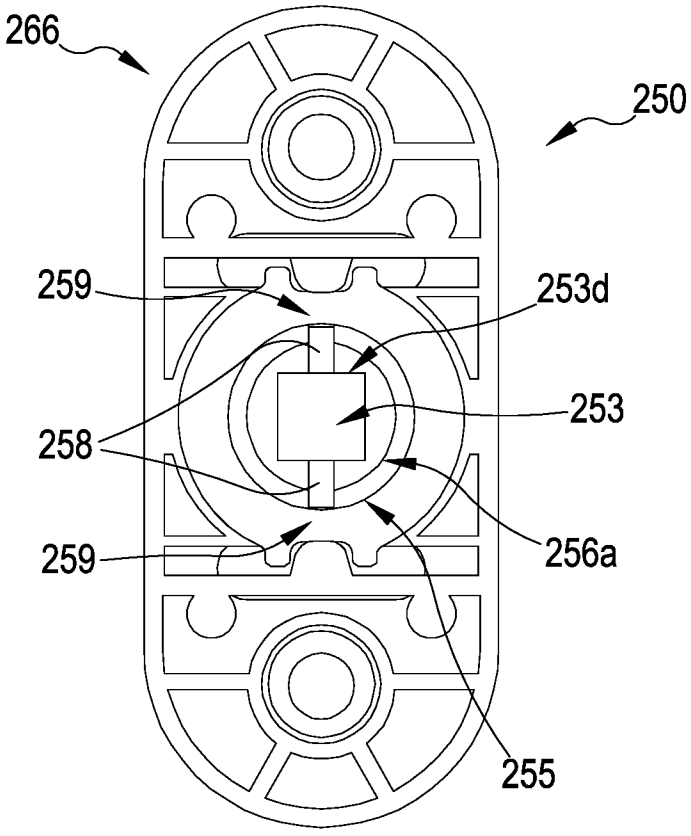
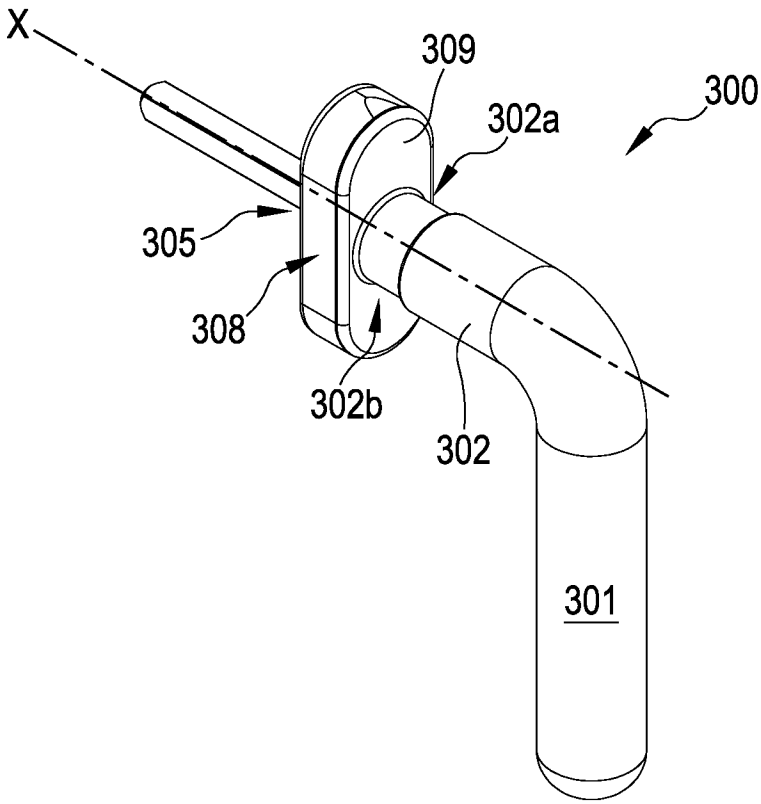

266
250
259
253d
253
258
259
256a
255

FIG.50

FIG.51


X
309
300
302a
305
308
302b
302
301

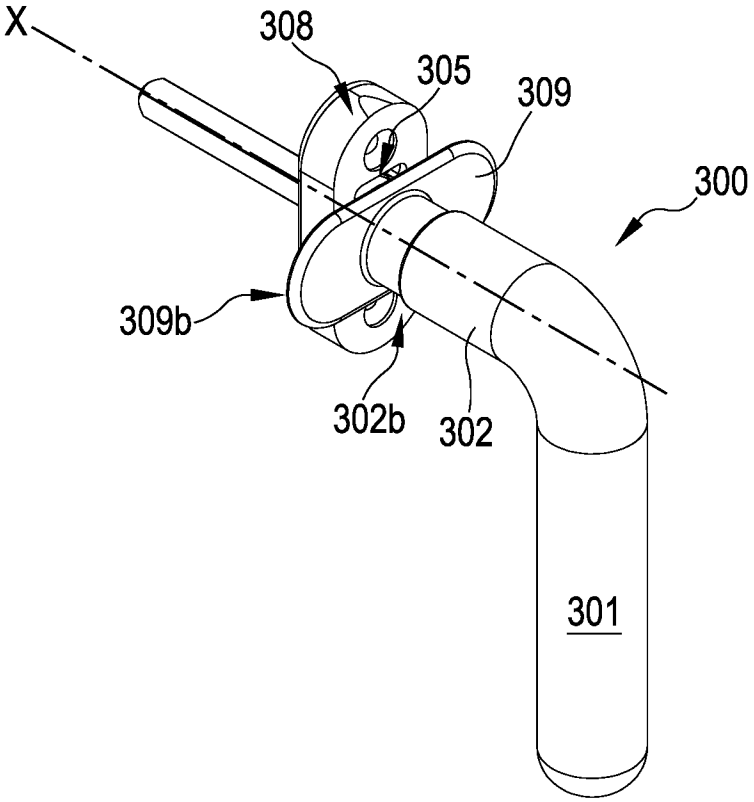

X
308
305
309
300
309b
302b
302
301

FIG.52

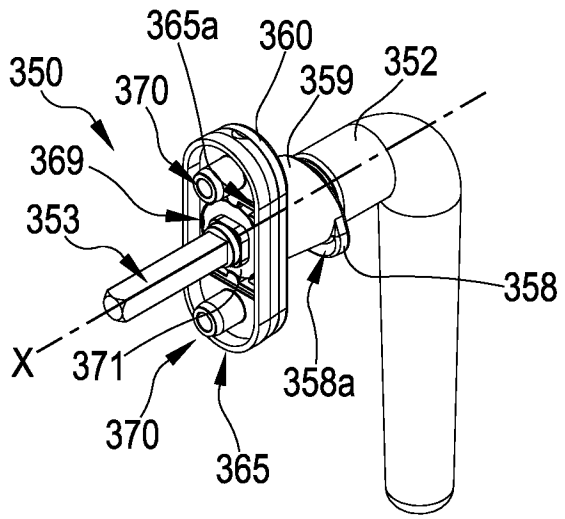


FIG.53

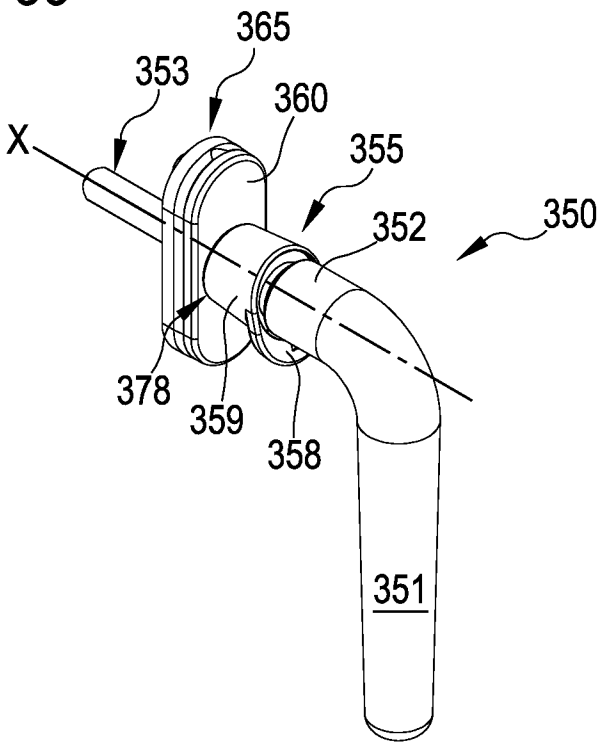


FIG.54

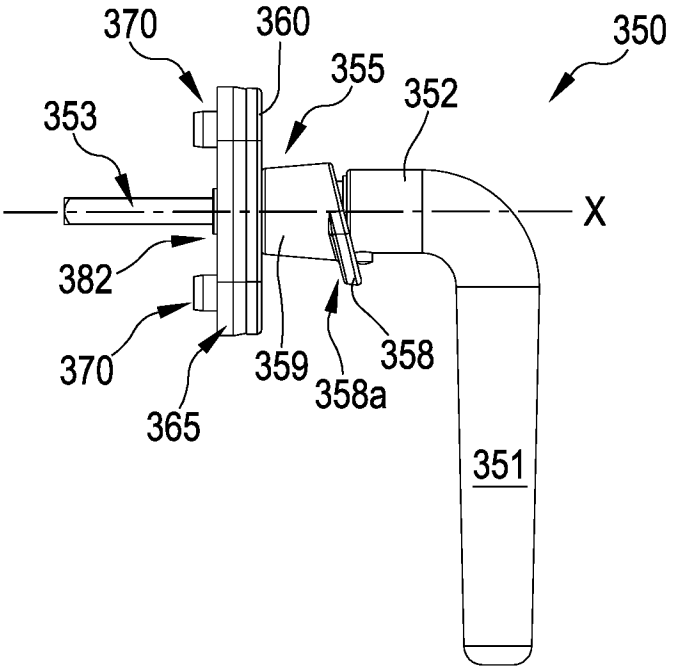


FIG.55

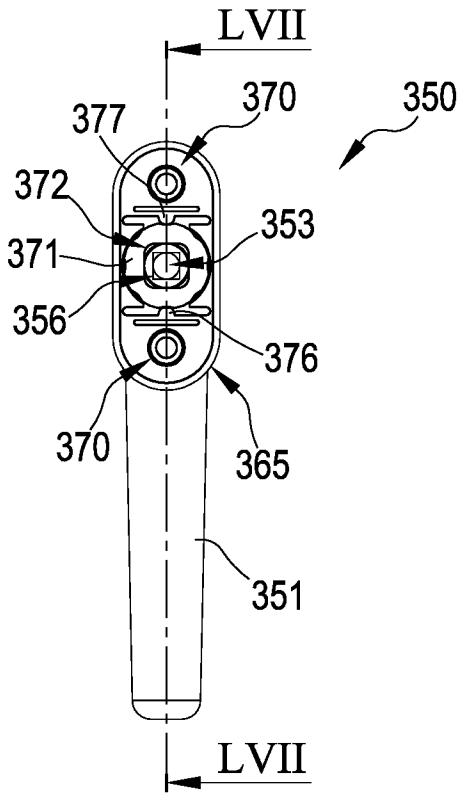
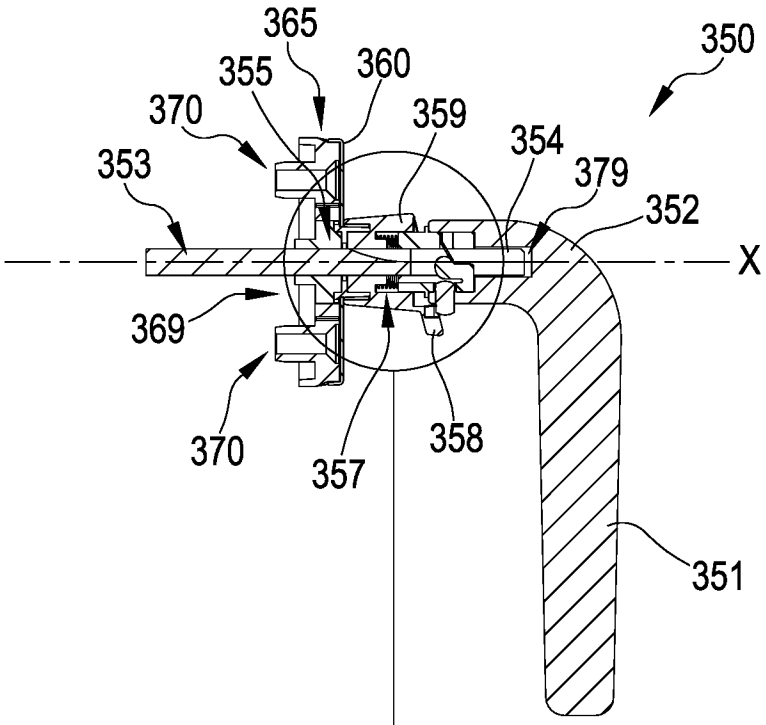


FIG.56

FIG.57



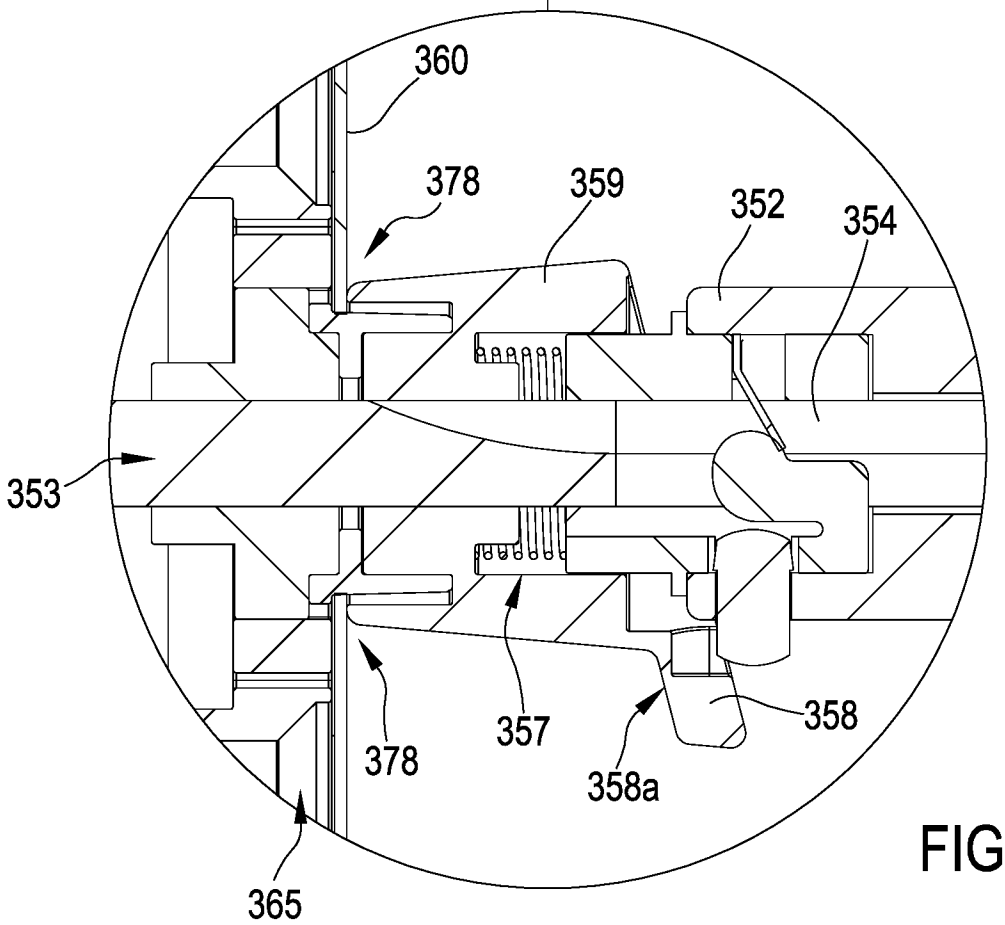


FIG.57A

FIG.58

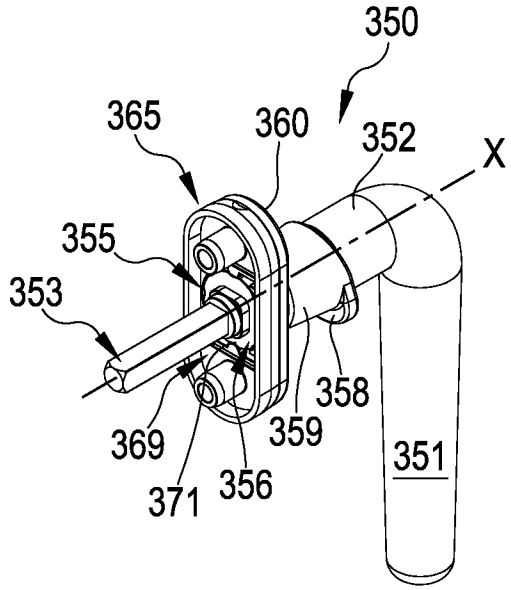
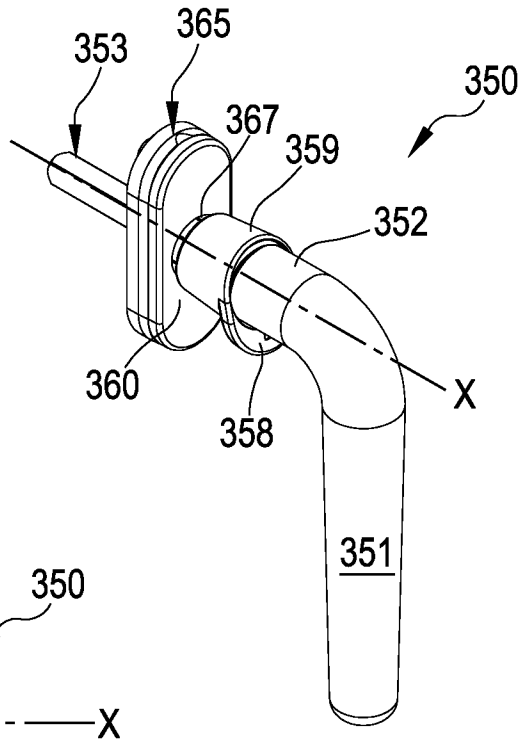


FIG.59



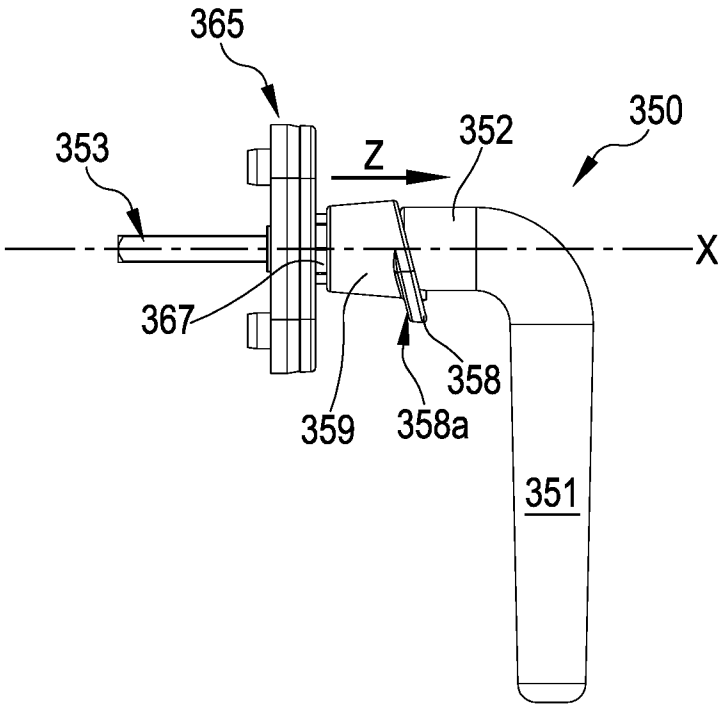
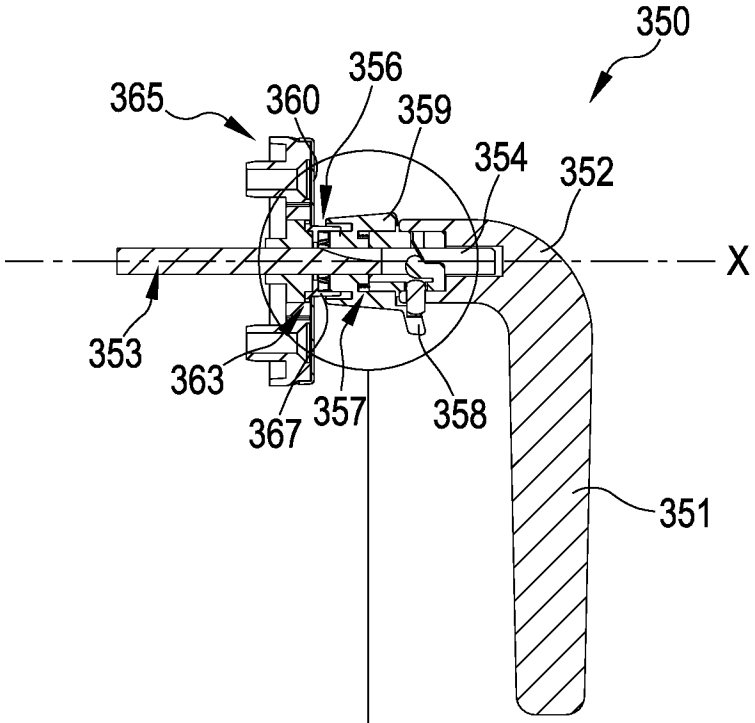


FIG.60

FIG.61



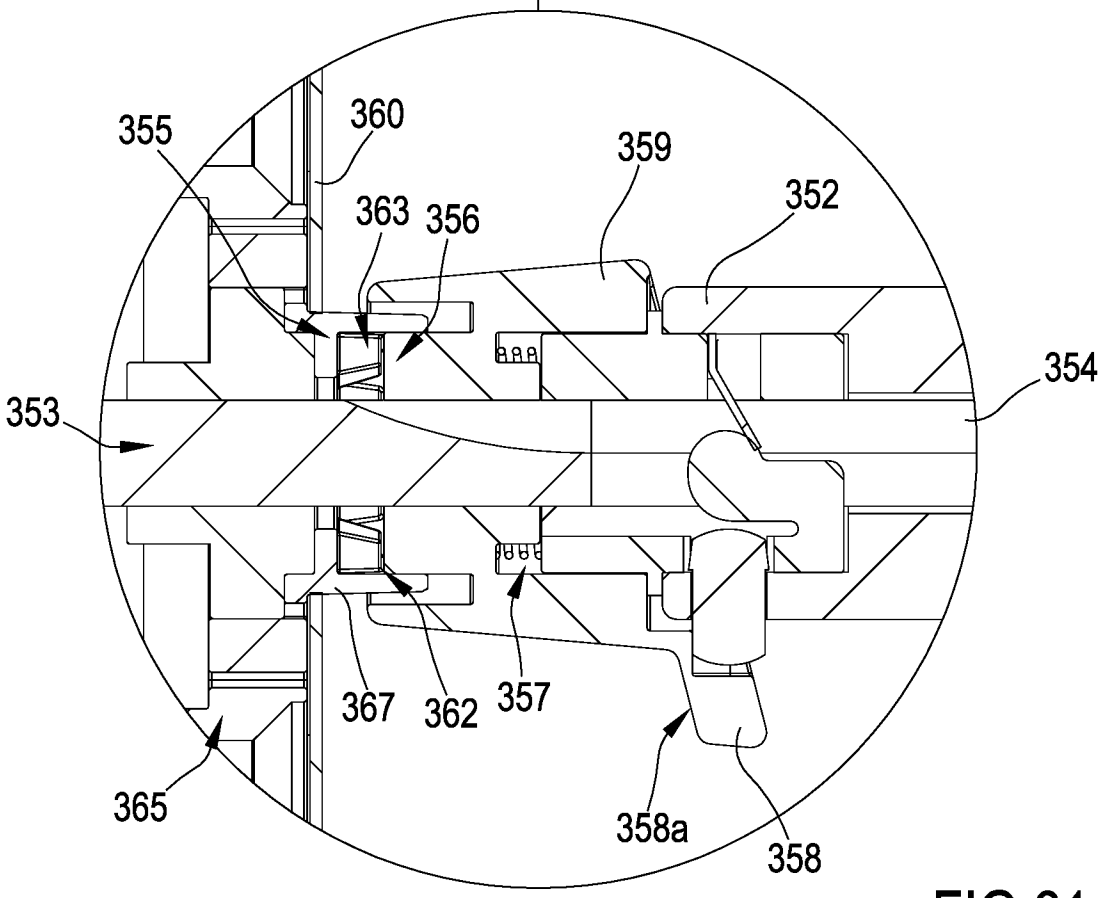


FIG.61A

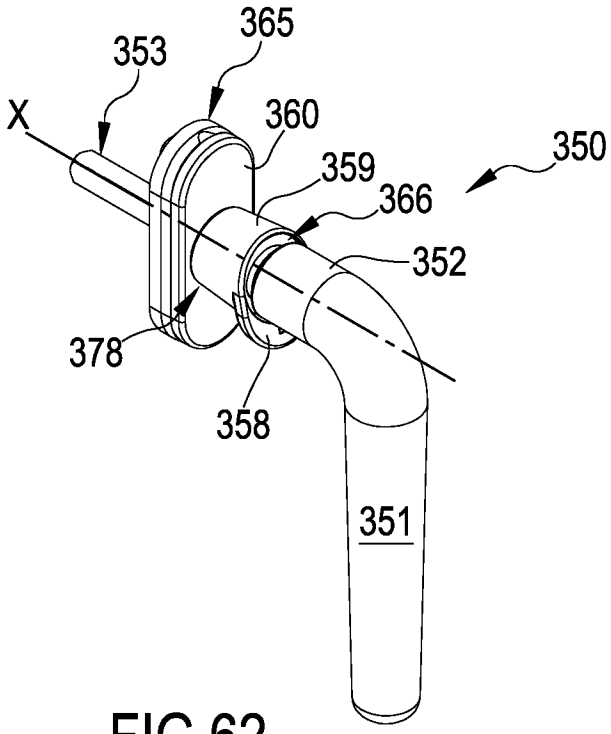

365
353
X
360
359
350
366
352
378
358
351

FIG.62

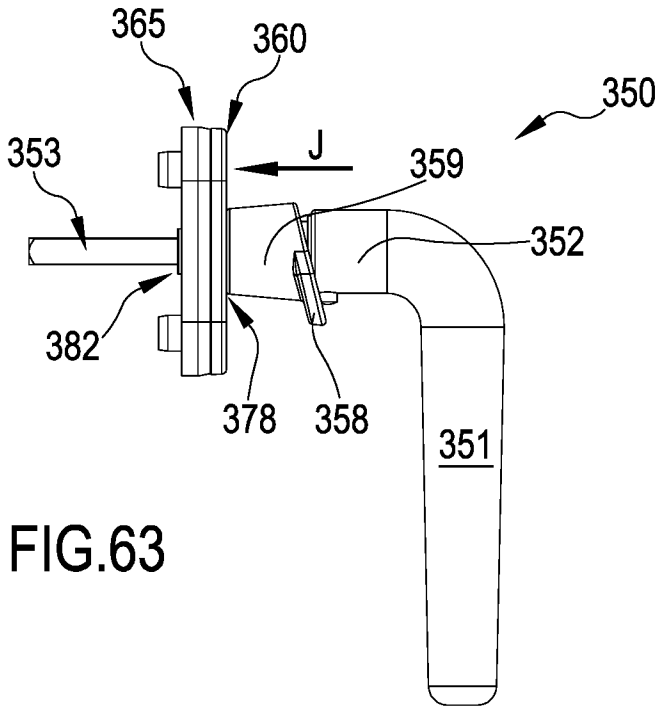
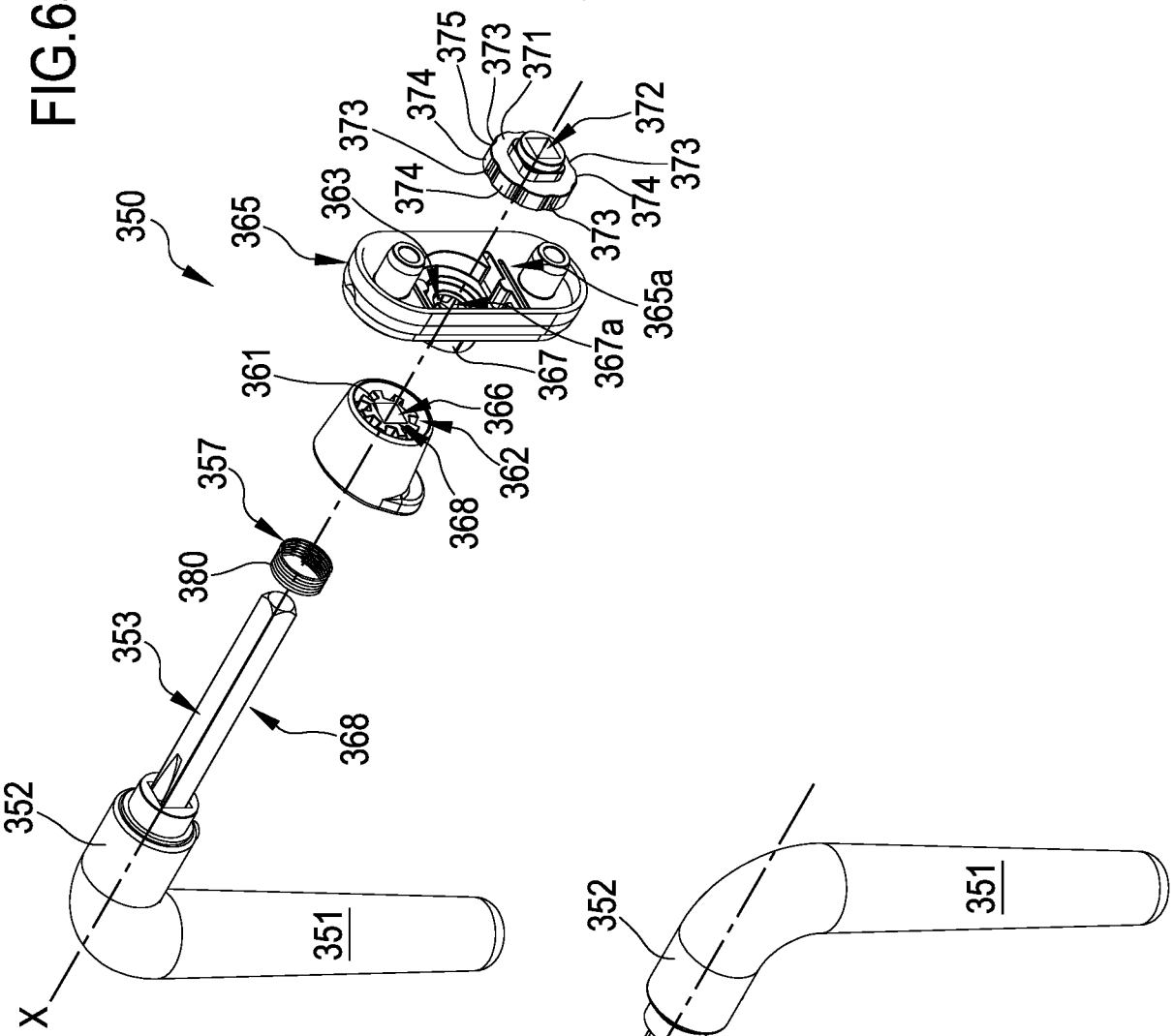

365
360
350
353
J
359
352
382
378
358
351

FIG.63

FIG.65


350
365
363
374
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371
372
365a
367a
367
361
366
362
368
357
380
353
352
351
X

FIG.64

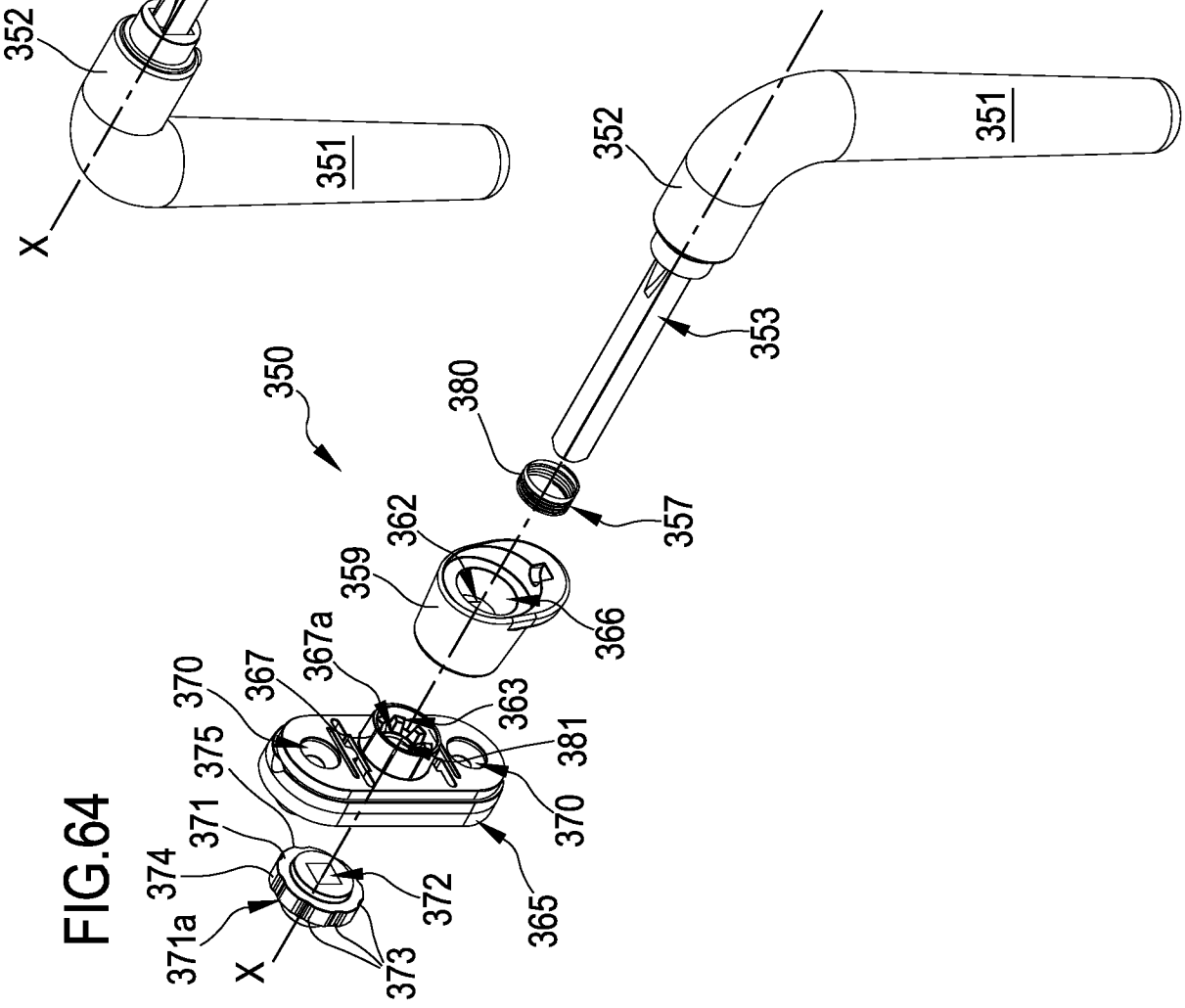

350
380
357
362
359
366
367a
367
370
375
371
374
371a
X
373
372
365
363
381
370
353
352
351

FIG.72

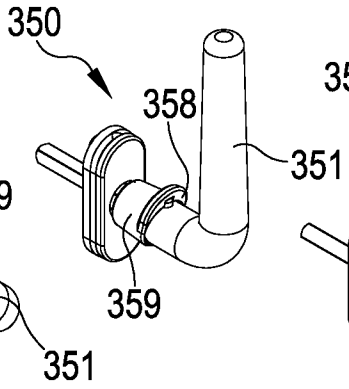


FIG.71

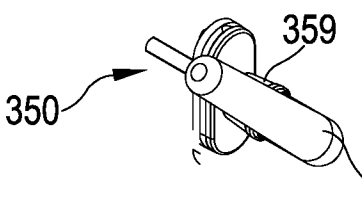


FIG.73

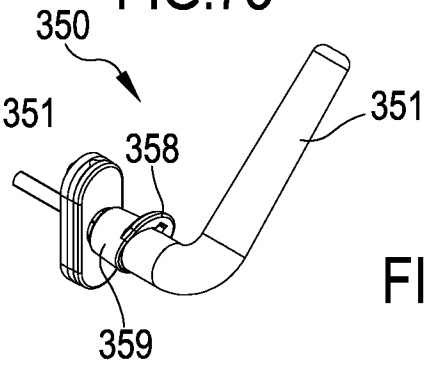


FIG.66

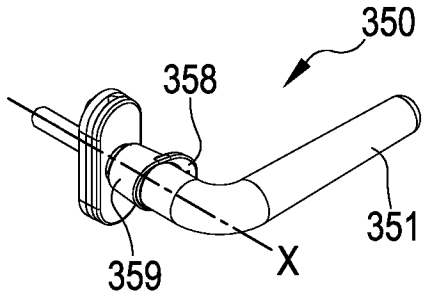
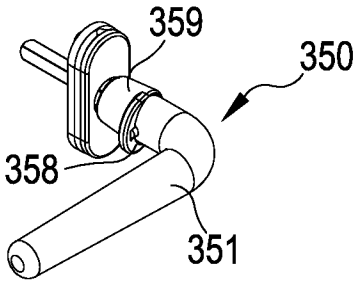


FIG.70



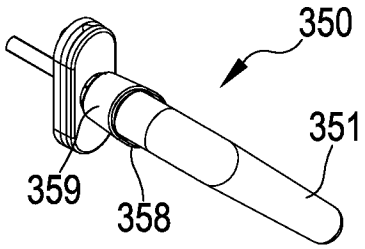


FIG.67

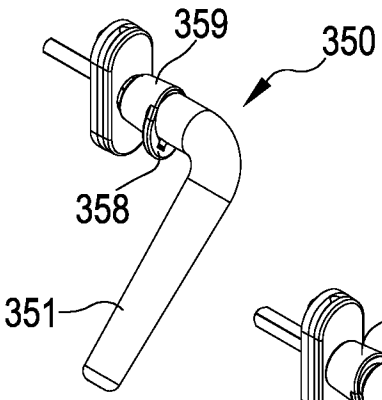


FIG.69

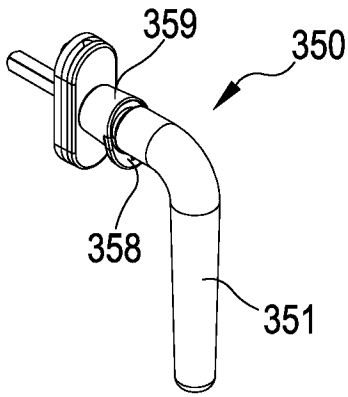


FIG.68

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2018/052124

A. CLASSIFICATION OF SUBJECT MATTER
INV. E05B13/00
ADD. E05B47/06

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E05B

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	DE 10 2014 103994 A1 (ENGELTECH GMBH ÖSTERREICH [AT]) 24 September 2015 (2015-09-24) paragraph [0044] - paragraph [0051]; figure 1	1-4, 7-12, 31-33 5,6, 13-17, 19-30, 34-37

X	EP 1 544 383 A1 (WINKHAUS FA AUGUST [DE]) 22 June 2005 (2005-06-22) paragraph [0019] - paragraph [0022]; figures 1-6	1-4, 7-12,18, 30-32

X	DE 373 259 C (RUDOLF BENDA) 10 April 1923 (1923-04-10) page 1, line 15 - line 57; figures 1,2	1-4, 7-11,19, 28

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 May 2018	11/06/2018

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Pérez Méndez, José F

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2018/052124

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 10 2011 100591 A1 (GRINBERG IACOV [DE]) 16 May 2013 (2013-05-16) paragraphs [0005], [0006]; figures 1,2 -----	1-4, 7-12,31, 32
A	US 1 768 193 A (DE VITA SALVATORE) 24 June 1930 (1930-06-24) page 1, line 99 - page 2, line 50; figures 1-9 -----	1,5,6

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2018/052124

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